GE Headquarters Project

Expanded Environmental Notification Form/Project Notification Form

244-284 A STREET
BOSTON, MA 02210

SUBMITTED TO
Executive Office of Energy and Environmental Affairs, Massachusetts Environmental Policy Act Office and the Boston Redevelopment Authority

PROPONENTS
General Electric and MassDevelopment

IN ASSOCIATION WITH
GENSLER
OJB
LEMESSURIER
RDK ENGINEERS
WJE ASSOCIATES
PALADINO
HALEY ALDRICH

PREPARED BY
vhb
99 High Street, 10th Floor
Boston, MA 02110
617.728.7777

DATE
August 1, 2016

GE Headquarters Project

Boston, Massachusetts

SUBMITTED TO **Executive Office of Energy and Environmental Affairs**
100 Cambridge Street, Suite 900 (9th Floor)
Attn: MEPA Office
Boston, MA 02114

Boston Redevelopment Authority
One City Hall Square
Boston, MA 02201

PROPONENTS **General Electric**
31-43 Farnsworth Street
Boston, MA 02210

Massachusetts Development Finance Agency
99 High Street
Boston, MA 02110

PREPARED BY **VHB**
99 High Street, 10th Floor
Boston, MA 02110

In association with:
Gensler
The Office of James Burnett
RDK Engineers
Paladino and Company
Haley & Aldrich
RWDI Consulting Engineers and Scientists
Wiss, Janney, Elstner Associates, Inc.
Le Messurier

August 2016

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Commonwealth of Massachusetts

Executive Office of Energy and Environmental Affairs
Massachusetts Environmental Policy Act (MEPA) Office

Environmental Notification Form

For Office Use Only
EEA# :____________________
MEPA Analyst: _____________

The information requested on this form must be completed in order to submit a document electronically for review under the Massachusetts Environmental Policy Act, 301 CMR 11.00.

Project Name: **GE Headquarters Project**		
Street Address: **244-284 A Street**		
Municipality: **Boston**	Watershed: **Boston Harbor**	
Universal Transverse Mercator Coordinates: **4651711.1 N / 665638.8 E**	Latitude: **42°20'56.4"N** Longitude: **71°03'05.2"W**	
Estimated commencement date: **Spring 2017**	Estimated completion date: **June 2018**	
Project Type: **Campus**	Status of project design: **20** %complete	
Proponent: **General Electric Company (GE) and the Massachusetts Development Finance Agency (MassDevelopment)**		
Street Address: **31-43 Farnsworth Street**		
Municipality: **Boston**	State: **MA**	Zip Code: **02210**
Name of Contact Person: **Elizabeth Grob**		
Firm/Agency: **VHB**	Street Address: **99 High St., 10th Floor**	
Municipality: **Boston**	State: **MA**	Zip Code: **02110**
Phone: **(617) 728-7777**	Fax: **(617) 728-7782**	E-mail: **egrob@vhb.com**

Does this project meet or exceed a mandatory EIR threshold (see 301 CMR 11.03)? ☒Yes ☐No
If this is an Expanded Environmental Notification Form (ENF) (see 301 CMR 11.05(7)) or a Notice of Project Change (NPC), are you requesting:

a Single EIR? (see 301 CMR 11.06(8))	☒ Yes	☐ No
a Special Review Procedure? (see 301CMR 11.09)	☐ Yes	☒ No
a Waiver of mandatory EIR? (see 301 CMR 11.11)	☐ Yes	☒ No
a Phase I Waiver? (see 301 CMR 11.11)	☒ Yes	☐ No

(Note: Greenhouse Gas Emissions analysis must be included in the Expanded ENF.)

Which MEPA review threshold(s) does the project meet or exceed (see 301 CMR 11.03)?

301 CMR 11.03(3)(a)(5) – Project requires a new Chapter 91 license for a non-water dependent use which occupies more than one acre of tidelands

301 CMR 11.03(6)(b)(13) – Generation of 2,000 or more new ADT on roadways providing access to a single location

301 CMR 11.03(10)(b)(a) – Demolition of any exterior part of any Historic Structure listed in or located in any Historic District listed in the State Register of Historic Places or in the Inventory of Historic and Archaeological Assets of the Commonwealth

Which State Agency Permits will the project require?

Massachusetts Department of Environmental Protection (DEP) – Chapter 91 License

Identify any financial assistance or land transfer from an Agency of the Commonwealth, including the Agency name and the amount of funding or land area in acres:

The Project is proposed jointly between GE and MassDevelopment, a State Agency, and will be partially funded through the MassWorks Infrastructure Program.

Summary of Project Size & Environmental Impacts	Existing	Change	Total
LAND			
Total site acreage	2.40 ac		
New acres of land altered		- 0 -[1]	
Acres of impervious area	2.27 ac	(0.46 ac)	1.81 ac
Square feet of new bordering vegetated wetlands alteration		- 0 -	
Square feet of new other wetland alteration		- 0 -	
Acres of new non-water dependent use of tidelands or waterways		2.13 ac	
STRUCTURES			
Gross square footage[2]	106,400 sf[3]	282,300 sf	388,700 sf
Number of housing units	- 0 -	- 0 -	- 0 -
Maximum height (feet)	69 ft[4]	111 ft	180 ft[5]
TRANSPORTATION			
Vehicle trips per day	406	570 (adjusted) 2,739 (unadjusted)	976 (adjusted) 3,145 (unadjusted)
Parking spaces	203	(173)[6]	30
WASTEWATER			
Water Use (Gallons per day)	0 GPD	±46,714 GPD[7]	±46,714 GPD[7]
Water withdrawal (GPD)	0 GPD	0 GPD	0 GPD
Wastewater generation/treatment (GPD)	0 GPD	±42,467 GPD[7]	±42,467 GPD[7]
Length of water mains (miles)	0 Miles	0 Miles	0 Miles
Length of sewer mains (miles)	0 Miles	0 Miles	0 Miles

Has this project been filed with MEPA before?
☐ Yes (EEA #__________) ☒ No

Has any project on this site been filed with MEPA before?
☐ Yes (EEA #__________) ☒ No

1 The entire Project Site was previously developed/disturbed consisting of historic manufacturing buildings, surface parking, and site access ways.
2 Represents approximate gross floor area (GFA), as defined by Article 2A of the Boston Zoning Code, which excludes basement, mechanical space/penthouses, storage, etc.
3 Includes the removal of approximately 17,600 square feet of ground floor and addition of approximately 12,000 square feet of new atrium in the Brick Buildings.
4 Represents the height of the existing buildings (the Brick Buildings), as measured in accordance with Article 2 of the Code to be the vertical distance from grade to the top of the structure of the last occupied floor.
5 Represents the height of the new building (the "New Building"), as measured in accordance with Article 2 of the Code to be the vertical distance from grade to the top of the structure of the last occupied floor.
6 The construction of the New Building on existing surface parking results in the reduction in on-site parking spaces.
7 Water use and wastewater generation estimates are based on the current building program and DEP Title V Regulation 310 CMR 15.203f.

GENERAL PROJECT INFORMATION – all proponents must fill out this section

PROJECT DESCRIPTION:

Describe the existing conditions and land uses on the project site:

The proposed development site contains approximately 2.4 acres of land located within the Fort Point area of the South Boston Waterfront neighborhood, and is comprised of two existing buildings at 5 and 6 Necco Court, totaling approximately 106,400 square feet[1] (the "Brick Buildings"), a surface parking lot, and a portion of existing Harborwalk (the "Project Site"). Refer to Figure 1.1 for the site locus map and Figure 1.2 for site context. The Project Site is bounded to the east by Necco Street, to the south by additional surface parking owned by The Gillette Company ("Gillette"), to the west by the Fort Point Channel, and to the north by Necco Court, which is a private way.

The Brick Buildings were originally constructed in 1907 as the headquarters of the New England Confectionary Company ("NECCO"); however, they are currently vacant and in need of extensive repair. The existing Harborwalk is in fair condition and is part of the South Bay Harbor Trail. Refer to Figure 1.3 for existing site conditions, Figure 1.4 for the site survey and parcel plan, and Figure 1.5 for photographs of the existing site.

Describe the proposed project and its programmatic and physical elements:

The Project consists of approximately 388,700 square feet and will include the following key components:

1. **The Brick Buildings on Necco Court will be rehabilitated and renovated, and connected by a new glass atrium with a shared reception area and approximately 75 percent of the ground floor to consist of public uses;**
2. **A new 12-story building will be constructed along Necco Street (the "New Building") with approximately 75 percent of the ground floor building space to consist of public uses;**
3. **The Brick Buildings and the New Building will be separated by a new public pedestrian-only plaza to run from Necco Street to the Fort Point Channel with a portion of the plaza beneath a translucent 4-season canopy ("GE Plaza"); and**
4. **New public realm improvements will provide over 61,940 square feet of outdoor public space, including an inviting Harborwalk, green space, interpretive signage, and amenities.**

Collectively, these components will comprise the GE Headquarters Project (the "Project") designed in a way to celebrate GE's industrial past and its digital future. Refer to Chapter 1, *Project Description and Alternatives* for additional information.

NOTE: The project description should summarize both the project's direct and indirect impacts (including construction period impacts) in terms of their magnitude, geographic extent, duration and frequency, and reversibility, as applicable. It should also discuss the infrastructure requirements of the project and the capacity of the municipal and/or regional infrastructure to sustain these requirements into the future.

Describe the on-site project alternatives (and alternative off-site locations, if applicable), considered by the proponent, including at least one feasible alternative that is allowed under current zoning, and the reasons(s) that they were not selected as the preferred alternative:

Refer to Chapter 1, *Project Description and Alternatives* for an analysis of Project alternatives.

NOTE*: The purpose of the alternatives analysis is to consider what effect changing the parameters and/or siting of a project, or components thereof, will have on the environment, keeping in mind that the objective of the MEPA review process is to avoid or minimize damage to the environment to the greatest extent feasible. Examples of alternative projects include alternative site locations, alternative site uses, and alternative site configurations.*

1 Unless otherwise labelled, all areas are provided as approximate gross floor area (GFA), as defined by Article 2A of the Boston Zoning Code, which excludes basement, mechanical space/penthouses, storage, etc. The existing Brick Buildings do not contain interior mechanical space, therefore gross square feet (GSF) and GFA are considered equal under the existing condition.

Summarize the mitigation measures proposed to offset the impacts of the preferred alternative:

Project-related impacts have been avoided and minimized to the extent practicable, and will be offset by a multitude of environmental and public benefits. The Project is expected to improve upon the existing environmental conditions on-site by increasing pervious area by approximately 20 percent, substantially improving stormwater treatment, improving water quality, and creating innovative design features including:

- **On-site solar photovoltaic system**
- **Smart building systems with automated utility/mechanical performance management and energy use monitoring**
- **LED lighting, high performance materials, and high efficiency systems**
- **Rainwater harvesting, green roofs, and water conservation measures and usage monitoring**
- **Improved stormwater management**

Furthermore, the Project will provide new ground level public amenities and an enhanced public realm/Harborwalk.

Project benefits are further outlined in Chapter 1, *Project Description and Alternatives*.

If the project is proposed to be constructed in phases, please describe each phase:

The Proponents are requesting a Phase 1 Waiver pursuant to 301 CMR 11.11(5) to allow for immediate acquisition of the Project Site, leasing of the Brick Buildings, and certain other real estate by MassDevelopment to GE, rehabilitation of the Brick Buildings including a shared lobby/connection between the Brick Buildings, and infrastructure improvements funded in part by MassDevelopment (the Phase 1 Project) prior to the completion of the MEPA review process and State and City permitting of the overall Project. Construction of the New Building and associated Site improvements will be conducted within a single subsequent phase as soon as the necessary permits have been obtained.

AREAS OF CRITICAL ENVIRONMENTAL CONCERN:

Is the project within or adjacent to an Area of Critical Environmental Concern?

☐Yes (Specify____)
☒No

If yes, does the ACEC have an approved Resource Management Plan? ___ Yes ___ No;

If yes, describe how the project complies with this plan. ______________________________

Will there be stormwater runoff or discharge to the designated ACEC? ___ Yes ___ No;

If yes, describe and assess the potential impacts of such stormwater runoff/discharge to the designated ACEC. ____

RARE SPECIES:

Does the project site include Estimated and/or Priority Habitat of State-Listed Rare Species? (see http://www.mass.gov/dfwele/dfw/nhesp/regulatory_review/priority_habitat/priority_habitat_home.htm)

☐Yes (Specify________________________________) ☒No

HISTORICAL /ARCHAEOLOGICAL RESOURCES:

Does the project site include any structure, site or district listed in the State Register of Historic Place or the inventory of Historic and Archaeological Assets of the Commonwealth?

☒Yes (Specify: **The Brick Buildings at 5 and 6 Necco Court are contributing properties to the Fort Point Channel Historic District and Fort Point Channel Landmark District**) ☐No

If yes, does the project involve any demolition or destruction of any listed or inventoried historic or archaeological resources? ☒Yes (Specify: **The pedestrian bridge between 6 Necco Court and the rear of 27 Melcher Street will be removed)** ☐No

WATER RESOURCES:
Is there an Outstanding Resource Water (ORW) on or within a half-mile radius of the project site?
___Yes _X_No; if yes, identify the ORW and its location.
____

(NOTE: Outstanding Resource Waters include Class A public water supplies, their tributaries, and bordering wetlands; active and inactive reservoirs approved by MassDEP; certain waters within Areas of Critical Environmental Concern, and certified vernal pools. Outstanding resource waters are listed in the Surface Water Quality Standards, 314 CMR 4.00.)

Are there any impaired water bodies on or within a half-mile radius of the project site? ___Yes _X_No;

If yes, identify the water body and pollutant(s) causing the impairment: ___________________________.

Is the project within a medium or high stress basin, as established by the Massachusetts Water Resources Commission? ___Yes _X_No

STORMWATER MANAGEMENT:

Generally describe the project's stormwater impacts and measures that the project will take to comply with the standards found in MassDEP's Stormwater Management Regulations:

The Project will comply with the standards set in the DEP Stormwater Management Regulations by the following means:

- **Increasing Site pervious area to promote the natural attenuation of peak runoff rates;**
- **Installing greens roofs to reduce runoff rates and volumes from what are typically impervious building roof areas;**
- **Promoting the infiltration of the first inch of runoff from the Project development as required for developments within Boston's Groundwater Conservation Overlay District (GCOD);**
- **Maximize storage in surficial landscape design to further promote water quality treatment and Infiltration of surface runoff to groundwater; and**
- **Preparing and executing an erosion and sedimentation control program for the Project construction period and completed condition.**

MASSACHUSETTS CONTINGENCY PLAN:
Has the project site been, or is it currently being, regulated under M.G.L.c.21E or the Massachusetts Contingency Plan? Yes _X_ No __ ; if yes, please describe the current status of the site (including Release Tracking Number (RTN), cleanup phase, and Response Action Outcome classification):__________________

Is there an Activity and Use Limitation (AUL) on any portion of the project site? Yes ___ No_X_;
if yes, describe which portion of the site and how the project will be consistent with the AUL:
_____________________.

Are you aware of any Reportable Conditions at the property that have not yet been assigned an RTN?
Yes ___ No _X_; if yes, please describe:____________________________________

Soils collected from the site in 1992/1994, 2001, 2005, 2007, and 2016 were found to exceed Reportable Concentrations for multiple of the following constituents: Polynuclear aromatic hydrocarbons (PAHs), total petroleum hydrocarbons (TPH), extractable petroleum hydrocarbons (EPH), arsenic, beryllium, and lead. These contaminants are associated with Historic/Urban fill and naturally occurring background (i.e., beryllium in Boston Blue Clay). These conditions will be addressed in accordance with the MCP, as applicable.

SOLID AND HAZARDOUS WASTE:

If the project will generate solid waste during demolition or construction, describe alternatives considered for re-use, recycling, and disposal of, e.g., asphalt, brick, concrete, gypsum, metal, wood:

The Brick Buildings will be retained as part of this Project. Excavation of soils to support construction of the New Building is also included in the Project. A waste management plan will be prepared to divert Project-related construction waste material from landfills through recycling and salvaging where practicable, including:

- **Existing pavement will either be processed on-site for re-use as structural fill or shipped off-site to an asphalt recycling facility.**
- **Analytical testing of the soils will be conducted to determine proper off-site disposal of excess soils generated during the construction.**
- **Materials will be handled according to applicable federal, state, and municipal environmental laws and regulations.**
- **In the event that subsurface contamination exceeding Reportable Concentrations is encountered that requires notification DEP will be notified and the contamination managed in accordance with the MCP as applicable.**
- **Universal and/or regulated wastes will be managed and/or transported and disposed in accordance with applicable federal, state and municipal environmental laws and regulations.**

The Project endeavors to divert no less than 75 percent of construction and demolition debris from landfills.

(NOTE: Asphalt pavement, brick, concrete and metal are banned from disposal at Massachusetts landfills and waste combustion facilities and wood is banned from disposal at Massachusetts landfills. See 310 CMR 19.017 for the complete list of banned materials.)

Will your project disturb asbestos containing materials? Yes X No ___ ;
if yes, please consult state asbestos requirements at http://mass.gov/MassDEP/air/asbhom01.htm

Asbestos Containing Material (ACM) and Lead-Based Paint (LBP) surveys were conducted at the Site by AECOM in May of 2016. Asbestos and hazardous building materials abatement will be performed prior to or concurrent with renovation of the existing Brick Buildings in accordance with applicable laws and regulations.

Describe anti-idling and other measures to limit emissions from construction equipment:

The Project will comply with the requirements of the Clean Construction Equipment initiative to the extent practicable, including retrofitting diesel construction vehicles, or utilizing vehicles that use alternative fuels, such as ultra-low-sulfur diesel fuel to reduce emissions during construction activities. In addition, the Massachusetts anti-idling law will be enforced during the construction phase of the Project with the installation of on-site anti-idling signage.

DESIGNATED WILD AND SCENIC RIVER:

Is this project site located wholly or partially within a defined river corridor of a federally designated Wild and Scenic River or a state designated Scenic River? Yes ___ No **X** ;

ATTACHMENTS:

1. List of all attachments to this document.

   Appendix A – MEPA Distribution List
   Appendix B – Survey and Metes & Bounds
   Appendix C – BRA Letter of Intent
   Appendix D – BRA Checklists
   Appendix E – Regulatory Supporting Documentation
   Appendix F – Sustainability Supporting Documentation
   Appendix G – Environmental Supporting Documentation
   Appendix H – Transportation Supporting Documentation
   Appendix I – Air Quality/Greenhouse Gas Emissions Assessment Supporting Documentation

2. U.S.G.S. map (good quality color copy, 8-½ x 11 inches or larger, at a scale of 1:24,000) indicating the project location and boundaries.

   Refer to Figure 1.1 for Locus Map

3.. Plan, at an appropriate scale, of existing conditions on the project site and its immediate environs, showing all known structures, roadways and parking lots, railroad rights-of-way, wetlands and water bodies, wooded areas, farmland, steep slopes, public open spaces, and major utilities.

   Refer to Figures 1.2 and 1.3 for site context and existing conditions.

4 Plan, at an appropriate scale, depicting environmental constraints on or adjacent to the project site such as Priority and/or Estimated Habitat of state-listed rare species, Areas of Critical Environmental Concern, Chapter 91 jurisdictional areas, Article 97 lands, wetland resource area delineations, water supply protection areas, and historic resources and/or districts.

   Refer to Chapter 5, *Wetlands and Waterways* figures for environmental constraints and Chapter 7, *Historic Resources* figures for historic resources and districts.

5. Plan, at an appropriate scale, of proposed conditions upon completion of project (if construction of the project is proposed to be phased, there should be a site plan showing conditions upon the completion of each phase).

   Refer to Figure 1.6 for the proposed conditions plan.

6. List of all agencies and persons to whom the proponent circulated the ENF, in accordance with 301 CMR 11.16(2).

   Refer to Appendix A – MEPA Distribution List

7. List of municipal and federal permits and reviews required by the project, as applicable.

   Refer to Table 2-1 of Chapter 2, *Regulatory Context and General Information* for a list of anticipated permits and approvals for the Project.

LAND SECTION

I. Thresholds / Permits

A. Does the project meet or exceed any review thresholds related to land (see 301 CMR 11.03(1) ___ Yes **X** No; if yes, specify each threshold:

II. Impacts and Permits

A. Describe, in acres, the current and proposed character of the project site, as follows:

	Existing	Change	Total
Footprint of buildings	0.40 AC+/-	+0.57 AC+/-	0.97 AC+/-
Internal roadways	0.00 AC	0.00 AC	0.00 AC
Parking and other paved areas	1.91 AC+/-	-1.52 AC+/-	0.39 AC+/-
Other altered areas*	0.18 AC+/-	+0.95 AC+/-	1.13 AC+/-
Undeveloped areas	0.00 AC	0.00 AC	0.00 AC
Total: Project Site Acreage	**2.40 AC+/-**	**0.00 AC+/-**	**2.40 AC+/-**

*** The Project Site is comprised of historic fill and is therefore entirely previously altered.**

B. Has any part of the project site been in active agricultural use in the last five years? __ Yes **X** No;

If yes, how many acres of land in agricultural use (with prime state or locally important agricultural soils) will be converted to nonagricultural use?

C. Is any part of the project site currently or proposed to be in active forestry use? ___ Yes **X** No;

If yes, please describe current and proposed forestry activities and indicate whether any part of the site is the subject of a forest management plan approved by the Department of Conservation and Recreation:

D. Does any part of the project involve conversion of land held for natural resources purposes in accordance with Article 97 of the Amendments to the Constitution of the Commonwealth to any purpose not in accordance with Article 97? ___ Yes **X** No;

If yes, describe:

E. Is any part of the project site currently subject to a conservation restriction, preservation restriction, agricultural preservation restriction or watershed preservation restriction? __Yes **X** No;

If yes, does the project involve the release or modification of such restriction? ___ Yes ___ No;

If yes, describe:

F. Does the project require approval of a new urban redevelopment project or a fundamental change in an existing urban redevelopment project under M.G.L.c.121A? ___ Yes **X** No;

If yes, describe:

G. Does the project require approval of a new urban renewal plan or a major modification of an existing urban renewal plan under M.G.L.c.121B? Yes ___ No **X** ;

If yes, describe:

III. Consistency

A. Identify the current municipal comprehensive land use plan

The Project is included within several overlaying municipal plans, including the 100 Acres Master Plan, the South Boston Waterfront District Municipal Harbor Plan, and the Fort Point Channel Watersheet Activation Plan. Refer to Chapter 5, *Wetlands and Waterways*, for a detailed description of Project consistency with applicable plans.

B. Describe the project's consistency with that plan with regard to:

Refer to Chapter 5, *Wetlands and Waterways*.

C. Identify the current Regional Policy Plan of the applicable Regional Planning Agency (RPA)

Refer to Chapter 5, *Wetlands and Waterways*.

D. Describe the project's consistency with that plan with regard to:

Refer to Chapter 5, *Wetlands and Waterways*.

RARE SPECIES SECTION

I. Thresholds / Permits

A. Will the project meet or exceed any review thresholds related to rare species or habitat (see 301 CMR 11.03(2))? ___ Yes _X_ No; if yes, specify, in quantitative terms:

(NOTE: If you are uncertain, it is recommended that you consult with the Natural Heritage and Endangered Species Program (NHESP) prior to submitting the ENF.)

B. Does the project require any state permits related to rare species or habitat? ___ Yes _X_ No

C. Does the project site fall within mapped rare species habitat (Priority or Estimated Habitat?) in the current Massachusetts Natural Heritage Atlas (attach relevant page)? ___ Yes _X_ No.

D. If you answered "No" to all questions A, B and C, proceed to the Wetlands, Waterways, and Tidelands Section. If you answered "Yes" to either question A or question B, fill out the remainder of the Rare Species section below.

WETLANDS, WATERWAYS, AND TIDELANDS SECTION

I. Thresholds / Permits

A. Will the project meet or exceed any review thresholds related to wetlands, waterways, and tidelands (see 301 CMR 11.03(3))? _X_ Yes ___ No; if yes, specify, in quantitative terms:

301 CMR 11.03(3)(a)(5) – Project requires a new Chapter 91 license for a non-water dependent use which occupies more than one acre of tidelands.

B. Does the project require any state permits (or a local Order of Conditions) related to wetlands, waterways, or tidelands _X_ Yes ___ No; if yes, specify which permit:

Massachusetts Department of Environmental Protection – Chapter 91 License
Boston Conservation Commission – Order of Conditions

C. If you answered "No" to both questions A and B, proceed to the Water Supply Section. If you answered "Yes" to either question A or question B, fill out the remainder of the Wetlands, Waterways, and Tidelands Section below.

II. Wetlands Impacts and Permits

A. Does the project require a new or amended Order of Conditions under the Wetlands Protection Act (M.G.L. c.131A)? _X_ Yes ___ No; if yes, has a Notice of Intent been filed? ___ Yes _X_ No; if yes, list the date and MassDEP file number: ______; if yes, has a local Order of Conditions been issued? ___ Yes ___ No; Was the Order of Conditions appealed? ___ Yes ___ No. Will the project require a Variance from the Wetlands regulations? ___ Yes _X_ No.

B. Describe any proposed permanent or temporary impacts to wetland resource areas located on the project site:

Refer to Chapter 5, *Wetlands and Waterways*, for a detailed description of wetlands and waterways impacts.

C. Estimate the extent and type of impact that the project will have on wetland resources, and indicate whether the impacts are temporary or permanent:

Coastal Wetlands	Area (square feet) or Length (linear feet)	Temporary or Permanent Impact?
Land Under the Ocean	0	NA
Designated Port Areas	0	NA
Coastal Beaches	0	NA
Barrier Beaches	0	NA
Coastal Banks	0	NA
Rocky Intertidal Shores	0	NA
Salt Marshes	0	NA
Land Under Salt Ponds	0	NA
Land Containing Shellfish	0	NA
Fish Runs	0	NA
Land Subject to Coastal Storm Flowage	95,300	Temporary/ Permanent*
Inland Wetlands		
Bank (lf)	0	NA
Bordering Vegetated Wetlands	0	NA
Isolated Vegetated Wetlandsw	0	NA
Land under Water	0	NA
Isolated Land Subject to Flooding	0	NA
Bordering Land Subject to Flooding	0	NA
Riverfront Area	0	NA

D. Is any part of the project:

1. proposed as a limited project? ___ Yes _X_ No; if yes, what is the area (in sf)? ___
2. the construction or alteration of a dam? ___ Yes _X_ No; if yes, describe:
3. fill or structure in a velocity zone or regulatory floodway? _X_ Yes ___No
4. dredging or disposal of dredged material? ___ Yes _X_ No; if yes, describe the volume of dredged material and the proposed disposal site:
5. a discharge to an Outstanding Resource Water (ORW) or an Area of Critical Environmental Concern (ACEC)? ___ Yes _X_ No
6. subject to a wetlands restriction order? ___ Yes _X_ No; if yes, identify the area (in sf):
7. located in buffer zones? _X_ Yes ___No; if yes, how much (in sf) ______

E. Will the project:

1. be subject to a local wetlands ordinance or bylaw? ___ Yes _X_ No
2. alter any federally-protected wetlands not regulated under state law? ___ Yes _X_ No; if yes, what is the area (sf)?

III. Waterways and Tidelands Impacts and Permits

A. Does the project site contain waterways or tidelands (including filled former tidelands) that are subject to the Waterways Act, M.G.L.c.91? X Yes ___ No; if yes, is there a current Chapter 91 License or Permit affecting the project site? X Yes ___ No; if yes, list the date and license or permit number and provide a copy of the historic map used to determine extent of filled tidelands:

The Brick Buildings are subject to Amnesty License DEP No. 9342a. The existing public landing is subject to DEP License No. 12906. Refer to Appendix E for a copy of the licenses.

The entire Project Site is within filled tidelands. Refer to Figure 5.1 for Chapter 91 jurisdiction limits.

B. Does the project require a new or modified license or permit under M.G.L.c.91? _X_ Yes ___ No; if yes, how many acres of the project site subject to M.G.L.c.91 will be for non-water-dependent use? Current **2.40** Change **0** Total **2.40**
If yes, how many square feet of solid fill or pile-supported structures (in sf)?

The Project Site consists of entirely of previously filled land.

C. For non-water-dependent use projects, indicate the following:

Area of filled tidelands on the site: **2.4 acres**

Area of filled tidelands covered by buildings: **0.40 acres existing (1.21 acres proposed)**

For portions of site on filled tidelands, list ground floor uses and area of each use: **Refer to Figure 3.1a for ground floor uses**

Does the project include new non-water-dependent uses located over flowed tidelands?
Yes ___ No _X_

Height of building on filled tidelands: **Up to 180 feet**

Also show the following on a site plan: Mean High Water, Mean Low Water, Water-dependent Use Zone, location of uses within buildings on tidelands, and interior and exterior areas and facilities dedicated for public use, and historic high and historic low water marks.

Refer to Chapter 5, *Wetlands and Waterways* report figures.

D. Is the project located on landlocked tidelands? ___ Yes _X_ No; if yes, describe the project's impact on the public's right to access, use and enjoy jurisdictional tidelands and describe measures the project will implement to avoid, minimize or mitigate any adverse impact:

E. Is the project 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? _X_ Yes ___ No;

if yes, describe the project's impact on groundwater levels and describe measures the project will implement to avoid, minimize or mitigate any adverse impact:

The Project Site is located in a No Harm Overlay area of the GCOD and will be designed to not lower area groundwater levels, in accordance with Article 32 of the Boston Zoning Code. A groundwater recharge system will be installed and will result in a benefit to area groundwater levels. In addition, groundwater monitoring will be undertaken during the design phase and continue through construction at area groundwater observation wells.

F. Is the project non-water-dependent and located on landlocked tidelands or waterways or tidelands subject to the Waterways Act and subject to a mandatory EIR? _X_ Yes ___ No;
(NOTE: If yes, then the project will be subject to Public Benefit Review and Determination.)

G. Does the project include dredging? ___ Yes _X_ No; if yes, answer the following questions:

What type of dredging? Improvement ___ Maintenance ___ Both ____

What is the proposed dredge volume, in cubic yards (cys) _________

What is the proposed dredge footprint ____length (ft) ___width (ft)____depth (ft);

Will dredging impact the following resource areas?

Intertidal Yes__ No__; if yes, ___ sq ft

Outstanding Resource Waters Yes__ No__; if yes, ___ sq ft

Other resource area (i.e. shellfish beds, eel grass beds) Yes__ No__; if yes __ sq ft

If yes to any of the above, have you evaluated appropriate and practicable steps to: 1) avoidance; 2) if avoidance is not possible, minimization; 3) if either avoidance or minimize is not possible, mitigation?

If no to any of the above, what information or documentation was used to support this determination?

Provide a comprehensive analysis of practicable alternatives for improvement dredging in accordance with 314 CMR 9.07(1)(b). Physical and chemical data of the sediment shall be included in the comprehensive analysis.

Sediment Characterization

Existing gradation analysis results? __Yes ___No: if yes, provide results.

Existing chemical results for parameters listed in 314 CMR 9.07(2)(b)6? ___Yes ____No; if yes, provide results.

Do you have sufficient information to evaluate feasibility of the following management options for dredged sediment? If yes, check the appropriate option.

Beach Nourishment ___
Unconfined Ocean Disposal ___
Confined Disposal:
  Confined Aquatic Disposal (CAD) ___
  Confined Disposal Facility (CDF) ___
Landfill Reuse in accordance with COMM-97-001 ___
Shoreline Placement ___
Upland Material Reuse____
In-State landfill disposal____
Out-of-state landfill disposal ____
(NOTE: This information is required for a 401 Water Quality Certification.)

IV. Consistency:

A. Does the project have effects on the coastal resources or uses, and/or is the project located within the Coastal Zone? _X_ Yes ___ No; if yes, describe these effects and the projects consistency with the policies of the Office of Coastal Zone Management:

Refer to Chapter 5, *Wetlands and Waterways*, for a CZM Consistency. Formal CZM consistency review is not required as the Project does not require any federal permit.

B. Is the project located within an area subject to a Municipal Harbor Plan? _X_ Yes ___ No; if yes, identify the Municipal Harbor Plan and describe the project's consistency with that plan:

Refer to Chapter 5, *Wetlands and Waterways*, for consistency with the South Boston Waterfront District Municipal Harbor Plan Amendment.

WATER SUPPLY SECTION

I. Thresholds / Permits

A. Will the project meet or exceed any review thresholds related to water supply (see 301 CMR 11.03(4))? ___ Yes _X_ No; if yes, specify, in quantitative terms:

B. Does the project require any state permits related to water supply? ___ Yes _X_ No; if yes, specify which permit:

C. If you answered "No" to both questions A and B, proceed to the Wastewater Section. If you answered "Yes" to either question A or question B, fill out the remainder of the Water Supply Section below.

WASTEWATER SECTION

I. Thresholds / Permits

A. Will the project meet or exceed any review thresholds related to wastewater (see 301 CMR 11.03(5))? ___ Yes _X_ No; if yes, specify, in quantitative terms:

B. Does the project require any state permits related to wastewater? ___ Yes _X_ No; if yes, specify which permit:

C. If you answered "No" to both questions A and B, proceed to the Transportation -- Traffic Generation Section. If you answered "Yes" to either question A or question B, fill out the remainder of the Wastewater Section below.

TRANSPORTATION SECTION (TRAFFIC GENERATION)

I. Thresholds / Permit

A. Will the project meet or exceed any review thresholds related to traffic generation (see 301 CMR 11.03(6))? _X_ Yes __ No; if yes, specify, in quantitative terms:

301 CMR 11.03(6)(b)(13) - Generation of 2,000 or more new average daily trips (ADT) on roadways providing access to a single location

B. Does the project require any state permits related to state-controlled roadways?
__ Yes _X_ No; if yes, specify which permit:

C. If you answered "No" to both questions A and B, proceed to the Roadways and Other Transportation Facilities Section. If you answered "Yes" to either question A or question B, fill out the remainder of the Traffic Generation Section below.

II. Traffic Impacts and Permits

A. Describe existing and proposed vehicular traffic generated by activities at the project site:

	Existing	Change	Total
Number of parking spaces	203	-173	30
Number of vehicle trips per day*	406	2,739/570*	3,145/976*

**Unadjusted / Adjusted*

ITE Land Use Code(s): **LUC 714- Corporate Headquarters Building**

B. What is the estimated average daily traffic on roadways serving the site?

Roadway	Existing	Change*	Total
1. A Street	9,200	250	9,450
2. Melcher Street	2,650	250	2,900
3. Necco Street	3,800	502	4,302

* Adjusted trips

If applicable, describe proposed mitigation measures on state-controlled roadways that the project proponent will implement:

The Project does not abut or require mitigation on state-controlled roadways.

C. How will the project implement and/or promote the use of transit, pedestrian and bicycle facilities and services to provide access to and from the project site?

The Project will implement a comprehensive Transportation Demand Management (TDM) plan which will encourage alternatives modes of transportation. Refer to Chapter 8, *Transportation*, for a detailed description of proposed TDM measures.

D. Is there a Transportation Management Association (TMA) that provides transportation demand management (TDM) services in the area of the project site? _X_ Yes ____ No; if yes, describe if and how will the project will participate in the TMA:

The Proponents will explore membership opportunities with the Seaport TMA and/or a Better City (ABC).

E. Will the project use (or occur in the immediate vicinity of) water, rail, or air transportation facilities? _X_ Yes ____ No; if yes, generally describe:

The Project is located in close proximity to South Station and will rely on available bus, commuter rail, and subway services provided by the Massachusetts Bay Transportation Authority (MBTA) and other private vendors.

F. If the project will penetrate approach airspace of a nearby airport, has the proponent filed a Massachusetts Aeronautics Commission Airspace Review Form (780 CMR 111.7) and a Notice of Proposed Construction or Alteration with the Federal Aviation Administration (FAA) (CFR Title 14 Part 77.13, forms 7460-1 and 7460-2)?

The Project is located approximately 2 miles from Runway 9 at Boston's Logan International Airport. The Project is required to file one or more 7460-1 Notices of Proposed Construction or Alteration with FAA because it exceeds a maximum height[2] of 200 feet above grade level (AGL). These notices will be submitted to FAA following the completion of the MEPA process.

The Massport Composite Surface at the Project Site's closest point to Logan is just greater than 275 FT Above Mean Sea Level (NAVD88) "AMSL", sloping up across the site to a maximum elevation of approximately 290 FT AMSL NAVD88. The Project will not infringe upon these height restrictions, and is therefore not anticipated to result in a hazard to navigation.

III. Consistency

Describe measures that the proponent will take to comply with municipal, regional, state, and federal plans and policies related to traffic, transit, pedestrian and bicycle transportation facilities and services:

The Project is consistent with planning studies for the area, which generally seek to reduce surface parking and balance vehicular traffic with pedestrian and cyclist needs. The Project also supports the City's vision for the area and has used the framework set forth in the 100 Acres Master Plan (2006), the South Boston Waterfront District Municipal Harbor Plan Amendment (2009), and the South Boston Waterfront Sustainable Transportation Plan (2015) to develop a multi-modal Project.

2 Height for FAA purposes is measured to highest point of the building, as opposed to zoning height, as presented previously, which measures to the top of structure on the last occupied floor.

The Project is subject to the South Boston Parking Freeze and will require a parking permit from the Boston Air Pollution Control Commission (BAPCC). The BAPCC administers the South Boston Parking Freeze which is part of a state decision to limit parking in selected areas of the City. The State imposed this parking freeze to balance the impact on air quality resulting from the Central Artery/Tunnel Project. It is part of a State Implementation Plan (SIP) to meet federal Clean Air Act requirements. As it pertains to the Project, the BAPCC requires landowners who seek to create non-residential parking spaces on property in the piers or industrial zones to file a New or Modified Permit Application.

Key Project related transportation measure that are consistent with the area planning initiatives include the following:

- **Reducing surface parking along the Fort Point Channel and creating new pedestrian connections to the waterfront;**
- **Providing a limited amount of parking (30 spaces) on-site and utilizing other shared parking facilities in the area to reduce on-site parking needs for individual buildings;**
- **Providing an off-street loading dock area;**
- **Enhancing the pedestrian realm by providing new sidewalks and street trees;**
- **Installing new lighting to enhance the pedestrian environment and increase safety;**
- **Investigating possible shared shuttle opportunities to connect employees with North Station;**
- **Providing secure indoor bicycle storage and at-grade public bicycle storage spaces throughout the campus for visitors and the general public. These spaces will be located in convenient and highly visible locations; and**
- **Implementing an aggressive TDM plan to discourage single-occupancy vehicle trips.**

TRANSPORTATION SECTION (ROADWAYS AND OTHER TRANSPORTATION FACILITIES)

I. Thresholds

A. Will the project meet or exceed any review thresholds related to roadways or other transportation facilities (see 301 CMR 11.03(6))? ___ Yes _X_ No; if yes, specify, in quantitative terms:

B. Does the project require any state permits related to roadways or other transportation facilities? ___ Yes _X_ No; if yes, specify which permit:

C. If you answered "No" to both questions A and B, proceed to the Energy Section. If you answered "Yes" to either question A or question B, fill out the remainder of the Roadways Section below.

ENERGY SECTION

I. Thresholds / Permits

A. Will the project meet or exceed any review thresholds related to energy (see 301 CMR 11.03(7))? ___ Yes _X_ No; if yes, specify, in quantitative terms:

B. Does the project require any state permits related to energy? ___ Yes _X_ No; if yes, specify which permit:

C. If you answered "No" to both questions A and B, proceed to the Air Quality Section. If you answered "Yes" to either question A or question B, fill out the remainder of the Energy below.

AIR QUALITY SECTION

I. Thresholds

A. Will the project meet or exceed any review thresholds related to air quality (see 301 CMR 11.03(8))? ___ Yes _X_ No; if yes, specify, in quantitative terms:

B. Does the project require any state permits related to air quality? ___ Yes _X_ No; if yes, specify which permit:

C. If you answered "No" to both questions A and B, proceed to the Solid and Hazardous Waste Section. If you answered "Yes" to either question A or question B, fill out the remainder of the Air Quality Section below.

SOLID AND HAZARDOUS WASTE SECTION

I. Thresholds / Permits

A. Will the project meet or exceed any review thresholds related to solid or hazardous waste (see 301 CMR 11.03(9))? ___ Yes _X_ No; if yes, specify, in quantitative terms:

B. Does the project require any state permits related to solid and hazardous waste? ___ Yes _X_ No; if yes, specify which permit:

C. If you answered "No" to both questions A and B, proceed to the Historical and Archaeological Resources Section. If you answered "Yes" to either question A or question B, fill out theremainder of the Solid and Hazardous Waste Section below.

HISTORICAL AND ARCHAEOLOGICAL RESOURCES SECTION

I. Thresholds / Impacts

A. Have you consulted with the Massachusetts Historical Commission? ___ Yes _X_ No; if yes, attach correspondence. For project sites involving lands under water, have you consulted with the Massachusetts Board of Underwater Archaeological Resources? ____Yes ____ No; if yes, attach correspondence

The filing of this EENF/EPNF will initiate the required MHC review under MEPA and MHC's State Register Review process.

B. Is any part of the project site a historic structure, or a structure within a historic district, in either case listed in the State Register of Historic Places or the Inventory of Historic and Archaeological Assets of the Commonwealth? _X_ Yes ___ No; if yes, does the project involve the demolition of all or any exterior part of such historic structure? _X_ Yes ___ No; if yes, please describe:

A deteriorated pedestrian bridge between the north elevation of 6 Necco Court and the south (rear) of 19-27 Melcher Street will be removed.

C. Is any part of the project site an archaeological site listed in the State Register of Historic Places or the Inventory of Historic and Archaeological Assets of the Commonwealth? ___ Yes _X_ No; if yes, does the project involve the destruction of all or any part of such archaeological site? ___ Yes ___ No; if yes, please describe:

D. If you answered "No" to all parts of both questions A, B and C, proceed to the Attachments and Certifications Sections. If you answered "Yes" to any part of either question A or question B, fill out the remainder of the Historical and Archaeological Resources Section below.

II. Impacts

Describe and assess the project's impacts, direct and indirect, on listed or inventoried historical and archaeological resources:

The 100 Acres Master Plan, adopted by the Boston Redevelopment Authority in 2006, calls for the transformation of the Brick Buildings and existing surface parking lots into a lively, mixed-use neighborhood anchored by new public open space, and commercial, residential, cultural and other new/renovated developments. The Project will be sensitive to and consistent with the density, land uses and open spaces and other public realm improvements envisioned by the 100 Acres Master Plan. The Project will contain cultural, commercial, and community uses which will contribute to the revival of this long-dormant part of the Fort Point area. The permanent improvements that will be made to the City's Harborwalk as part of the Project will also help attract visitors and residents of the City to the area.

The project includes the rehabilitation of two historic buildings at 5 and 6 Necco Court, which contribute to the Fort Point Channel Historic District and Fort Point Channel Landmark District. The intent of the building improvements is to preserve character-defining features through rehabilitation or reconstruction as necessary to replicate missing or damaged elements.

The pedestrian bridge between 6 Necco Court and 27 Melcher Street is deteriorated as a result of age deferred maintenance and fire damage. The structure was originally wood, and steel and was constructed as early as 1907 as part of the NECCO complex, which existed on the site until 1927. At some point the west walls of the bridge were removed and replaced with corrugated steel. GE and its design team evaluated potential uses for the Necco Court pedestrian bridge. Extensive study of the bridge has revealed the following:

1. **Existing deed restrictions on the Brick Buildings require removal of the bridge in connection with the rehabilitation of the Brick Buildings.**
2. **The bridge is in very poor condition. A structural evaluation revealed that substantial structural repairs would be necessary to stabilize the bridge. In addition, the bridge would require structural updates to meet current Boston City code requirements, including seismic codes. These updates would alter the structure's appearance, most notably with vertical supports required at street-level.**
3. **The bridge is non-functional. The building at 19-27 Melcher Street has been renovated as office space. All access to the bridge from the building has been sealed and sheetrock installed within the office space, resulting in the bridge being a dead-end from 6 Necco Court.**
4. **With floor dimensions of approximately 8 feet wide and 40 feet long and a single means of egress, the only viable use would be storage. This would require additional structural intervention to ensure that dead and live load requirements could be satisfied.**
5. **Chapter 91 and the South Boston Waterfront District Municipal Harbor Plan Amendment encourage public access and use of the waterfront. The bridge over Necco Court currently blocks views of Fort Point Channel and impedes visual access to the Fort Point Channel as approached from Necco Street.**

III. Consistency

Describe measures that the proponent will take to comply with federal, state, regional, and local plans and policies related to preserving historical and archaeological resources:

Rehabilitation of the Brick Buildings at 5 and 6 Necco Court will be generally consistent with the Fort Point Channel Landmark District design standards and criteria and the Secretary of the Interior's Standards for Rehabilitation of Historic Properties. See Chapter 7, *Historic Resources*, for additional information regarding the proposed improvements.

CERTIFICATIONS:

1. The Public Notice of Environmental Review has been/will be published in the following newspapers in accordance with 301 CMR 11.15(1):

   Boston Herald on August 10, 2016

2. This form has been circulated to Agencies and Persons in accordance with 301 CMR 11.16(2).

Proponents:

7/28/16

Date Signature of Responsible Officer or Proponent	Date ~~Signature of person preparing ENF (if different from above)~~
Ann R. Klee	**Marty Jones**
Name (print or type)	Name (print or type)
General Electric Company (GE)	**Massachusetts Development Finance Agency**
Firm/Agency	Firm/Agency
31-43 Farnsworth Street	**99 High Street**
Street	Street
Boston/MA/02210	**Boston/MA/02110**
Municipality/State/Zip	Municipality/State/Zip
(203) 373-2211	**(617) 330-2000**
Phone	Phone

Preparer:

7/28/16 (for)

Date Signature of person preparing ENF (if different from above)

Elizabeth Grob
Name (print or type)

VHB
Firm/Agency

99 High Street
Street

Boston/MA/02110
Municipality/State/Zip

(617) 728-7777
Phone

Executive Summary

The GE Headquarters Campus

The GE Headquarters Campus Project (the "Project") will build on the proud history and tradition of Boston's Fort Point neighborhood in ways that are emblematic of GE's transformation into a Digital Industrial company, emphasizing community and collaboration, sustainability, resiliency, innovation and transparency.

The Campus will be faithful to the industrial legacy of GE and the neighborhood while leading the way to an innovative future. The Campus will be a unique landmark destination for GE, its collaborators, students of all ages and the public.

The 2.4-acre Campus is bordered to the east by Necco Street, to the south by a surface parking lot owned by The Gillette Company, to the west by the Fort Point Channel, and to the north by Necco Court. It is a short walk from South Station, a major transit hub, and also a short commute to Logan International Airport. The Campus is also located within walking distance of multiple stations on the T's Red Line and Silver Line. Because of the Campus's proximity to housing, hotels and multiple mass transit options, GE will encourage its employees and visitors to use mass transit, walk or bike to the Campus.

When completed in 2018 the Campus will include approximately 388,700 square feet of gross floor area in three buildings. Two of the buildings, now known as the Brick Buildings, were constructed in 1907 and are vacant and dilapidated. The Brick Buildings, and approximately 41,000 of the approximately 61,000 square feet of outdoor public space that will be developed, will be acquired by a subsidiary of MassDevelopment and leased to GE which will completely rehabilitate them. The third building on the Campus will be a new 12-story building known as the New Building to be constructed and owned by GE.

A unique feature of the Campus will be its extensive indoor and outdoor public space. The indoor public spaces will include Maker Spaces, Work Lounges, a Bistro, a Coffee Shop, an enhanced and widened Harborwalk, and a two story public Museum. The indoor public spaces are transformative elements of the Campus and as important to GE as the office element of the Project. Approximately seventy-five percent of the ground floor of both the Brick Buildings and the New Building (all of the useable space, excluding only "back of office" areas) will be open to the public.

The Brick Buildings

The Brick Buildings will be completely rehabilitated to restore them to productive use after being largely vacant for decades. When their rehabilitation is complete, they will provide approximately 95,400 square feet of the Campus gross floor area. The Brick Buildings will be connected by a glass atrium allowing the integration of the two buildings and their infrastructure. The roof of the Brick Buildings will include a terrace with a vegetated green roof area for collaboration and relaxation, and to increase the sustainability and resilience of the Project. The upper levels of the Brick Buildings will host GE offices and internal GE Maker Space. The ground floor of the Brick Buildings will host Brilliant Labs classrooms, public Maker Space, and a waterfront Bistro. The ground floor of the Brick Buildings will feature large glass “garage doors” or folding glass partitions facing the new GE Plaza, a public pedestrian-only area that will invite the public into the Bistro and Brilliant Labs and allow greater access to the waterfront.

New Building

The signature New Building will provide approximately 293,300 square feet of gross floor area. The ground floor and part of the second floor will feature a GE experience center, or Museum showcasing the history and future of GE. The ground floor will also feature a Community Lounge that will function as both a visitor reception and co-working space open to the public, and a Coffee Bar also open to the public.

The upper floors of the New Building will host office space and Convener Space where GE and its guests from the global and local communities will gather to share ideas. The roof of the New Building will also include a roof terrace with a vegetated green roof area.

To emphasize GE’s commitment to transparency and collaboration, a “vertical village,” a glass enclosed core of activity, will connect GE employees and building visitors across floors and teams, encouraging seamlessness and providing a literal window into GE for passers-by.

A new bridge will connect the Brick Buildings and New Building, a tribute to the pedestrian bridges that are a historical signature of the Fort Point neighborhood.

Public Realm Improvements

The Campus will be a catalyst for the execution of the City’s 100 Acres Plan and provide a benchmark for future waterfront and public realm development in the City of Boston. The Project will expand the Harborwalk from 12 to 18 feet in width, and use improved and inviting materials to rehabilitate and expand the Harborwalk and adjacent public spaces. This will materially improve the Harborwalk experience for pedestrians and cyclists, creating an active and vibrant waterfront that connects to and through the Campus. The pedestrian-only GE Plaza between the Brick Buildings and the New Building will include elements to encourage socialization and integrate the Campus's indoor and outdoor spaces, serving as the life center of the Campus for employees and the public.

The sidewalks and streets approaching the Campus will be upgraded and made accessible. Enhancements to Necco Street will include expanding the public sidewalk width to create a more pedestrian-friendly streetscape, integrating a drop-off area as a safe point of vehicular access without interrupting traffic flow, and introducing improved street furnishings, such as benches or seating elements and bike racks.

A waterfront activation plan will be developed and will include opportunities for increased utilization of the existing Fort Point Channel dock that will be part of the Campus.

The Campus's landscape will also protect the Campus from flooding from extreme storm events.

Sustainability

As a Digital Industrial company, GE will continue to lead the business world in sustainability through partnerships, digital solutions, and new business models. Through its ecomagination program, GE has worked hard to solve global challenges around energy, efficiency, Greenhouse Gas emissions and water. Predix, GE's cloud-based platform for the Industrial Internet provides a unique foundation upon which to increase energy and materials efficiencies and reduce emissions using the power of analytics. Predix applications will be applied throughout the Project.

GE will apply the new, more stringent version of the United States Green Building Council's (USGBC) Leadership in Energy and Environmental Design (LEED®) rating system (version 4) to the Campus even though the use of version 4 is not yet required.

Notable Campus elements that will make it more sustainable include a signature rooftop solar PV system (referred to as the "Solar Veil") and the incorporation of vegetated roof areas on both the Brick Buildings and the New Building to mitigate heat island effect, help manage stormwater runoff, provide new habitat for wildlife and extend the life of the roof materials.

GE expects to achieve energy use reduction targets that will put the New Building in the top 20 percent of similar buildings opening in 2018 in this climate zone and also substantially improve the energy efficiency of the Brick Buildings by incorporating Energy Conservation Measures (ECMs) and energy-efficient design strategies, including high-efficiency heating, cooling, and lighting systems, daylight harvesting strategies, energy-efficient windows and increased insulation, and by incorporating smart building systems enabled by GE Predix.

GE also plans to limit water use demand in the Campus buildings to 20 gallons per person per day which is equivalent to 9 gallons per square foot, at the very low end of the range of water usage in similar projects in the City of Boston. GE will do this by using high-efficiency plumbing fixtures and WaterSense appliances, using a rainwater harvesting system, and by using native and adaptive plants in the landscape. GE is also considering the employment of a blackwater reuse system.

The Campus's proximity to mass transit, the limited availability of parking on-site (30 below ground spaces including approximately eight with Electric Vehicle (EV) charging stations), and the implementation of a rigorous Transportation Demand Management Plan, are together expected to greatly reduce transportation-related Greenhouse Gas emissions.

New stormwater management and treatment systems will improve water quality, reduce runoff volume, and control peak rates of runoff in comparison to existing conditions. Wind and solar impacts will be minimized and mitigated.

GE is also considering the health and wellness of the occupants of the Campus by aligning its design and operations with both GE's internal wellness program, HealthAhead, and the principles of the WELL Building Standard®.

Resiliency

Since the Campus is located on the Fort Pont Channel, GE is making sure the Campus is ready for the effects of our changing climate, including sea level rise. The elevations of the first floors of the Campus buildings will be set at +19.5, which would provide protection against a 500-year storm event in 2075.

In addition, critical mechanical and life safety/standby emergency building systems will be placed above vulnerable elevations and the stormwater infrastructure will be designed to effectively manage inland flooding, including through the use of adaptive landscaping that will be resilient against flooding and saltwater intrusion. The Campus's hardscape including walls, walkways, stairways, and railings will also be designed to withstand saltwater inundation.

Philanthropic/Community Benefits

When fully occupied the Campus will be the work address for 800 GE employees who will call Greater Boston home. Experts predict that the Campus will add 4,000 additional temporary and permanent jobs across the region.

The GE Foundation has committed $50 million to improve healthcare in underserved Greater Boston communities, improve the quality of science, technology, engineering and math (STEM) education in Boston Public schools, and build a diverse workforce for jobs of the future in STEM. In addition, GE employees will be actively engaged in the community and local charitable organizations, contributing significant resources and expertise.

Historic Resources

The Brick Buildings will be rehabilitated to preserve character defining features when feasible whether by rehabilitation or reconstruction. This will be done in a manner generally consistent with the Fort Point Channel Landmark District design standards and criteria and the Secretary of the Interior's Standards for Rehabilitation of Historic Properties.

The existing sheet metal-clad historic pedestrian bridge between the Brick Buildings will be restored and will continue to be a prominent feature on the Campus. A glass atrium to be added between the Brick Buildings will allow them to be connected at multiple floors while preserving the exterior masonry with punched openings. The atrium will be set back, allowing the Brick Buildings to remain the primary visual elements of the north side of the Campus.

The remnants of the pedestrian bridge between one of the Brick Buildings and the building at 19-27 Melcher Street will be removed. Part of the bridge was previously replaced with corrugated steel and fire and water damage have resulted in further deterioration that would require major structural updates that would alter the bridge's appearance. Finally, a deed restriction requires the removal of the bridge in connection with any renovation of the Brick Buildings.

Conclusion

GE is excited to make Boston its home. We are committed to helping transform the Fort Point neighborhood waterfront and partner with Boston to make it the global epicenter for the industrial internet. The Campus will be a testament to the City's industrial past and a beacon for its innovative, sustainable and resilient future, accessible to all.

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1

Project Description and Alternatives

1.1 Introduction

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 "Code"), General Electric (“GE”) and the Massachusetts Development Finance Agency (MassDevelopment) (collectively "the Proponents") respectfully submit this joint "expanded" Environmental Notification Form and Project Notification Form ("EENF/EPNF") for the construction of the new GE Headquarters Project in Boston, Massachusetts (the "Project").

This chapter provides an overview of the existing site conditions and describes the Project. This chapter also presents Project-related benefits, an analysis of alternatives, a description of community outreach efforts and a Phase I Waiver request pursuant to 301 CMR 11.11(5).[1]

1.2 Site Context and Existing Conditions

The proposed development site contains approximately 2.4 acres of land located within the Fort Point area of the South Boston Waterfront neighborhood, and is comprised of two existing historic brick buildings at 5 and 6 Necco Court (the "Brick Buildings"), a surface parking lot, and a portion of Harborwalk (the "Project Site"). Refer to Figure 1.1 for the site location map. The Project Site is bounded to the east by Necco Street, to the south by additional surface parking owned by The Gillette Company (“Gillette”), to the west by the Fort Point Channel and to the north by Necco Court. The Project Site is well served by public transportation as it is located approximately 0.5 miles from each of South Station, Broadway Station, and Courthouse Station, which collectively provide access to the Red Line, Silver Line, commuter and passenger rails, Amtrak, and local and regional bus services. The Project Site is also in close proximity to key area destinations, including the Boston Convention and Exhibition Center (“BCEC”) and the booming development in the rapidly transforming Seaport. Refer to Figure 1.2 for site context.

1 This EENF/EPNF has been prepared by GE and the members of the Development Team identified in Section 2.9 other than MassDevelopment. GE and the members of the Development Team other than MassDevelopment are solely responsible for its content.

The shoreline of the Project Site consists of a stone seawall bordered by a portion of the Harborwalk and an existing public boat dock. An above and below water inspection of the seawall was performed in the spring of 2016, which confirmed that the seawall is structurally sound. The existing dock is also in overall good structural condition as it was constructed within the past five years. The existing Harborwalk is in fair condition, but does not meet the recommended width envisioned by the South Boston Waterfront District Municipal Harbor Plan Amendment. The Brick Buildings were originally constructed in 1907 as the headquarters of the New England Confectionary Company (“NECCO”); however, they are currently vacant and in need of extensive repair. The Project Site currently consists of approximately 95 percent impervious surface. Refer to Figure 1.3 for existing site conditions and Figure 1.4 for photographs of the Project Site.

1.2.1 Site Metes and Bounds

Refer to Appendix B for the description of the metes and bounds of the Project Site and accompanying site survey plan.

1.2.2 Project Site Ownership

The Project Site is currently owned by Gillette and is subject to a Purchase and Sale Agreement between Gillette and GE.

1.2.3 Land Transfers and Easements

As shown in Figure 1.5, the portion of the Project Site on which a new building will be constructed will be acquired from Gillette and owned by GE. The portion of the Project Site consisting of the Brick Buildings and public realm improvement will be acquired by a wholly owned subsidiary to MassDevelopment, as a designee of GE under the Purchase Agreement, rather than by MassDevelopment directly. This new entity will be the owner and landlord to GE, and will lease this portion of the Project Site to GE under a ground lease.

1.2.4 Brick Building Chapter 91 Amnesty and Public Dock Licenses

Under MGL Chapter 91, as implemented by the Massachusetts Department of Environmental Protection (“DEP”) through the Waterways regulations (310 CMR 9.00), structures constructed before 1984 were eligible for licensing under the amnesty program, which exempted them from certain Chapter 91 requirements, so long as an application was submitted in or prior to 1996.

As presented in greater detail in Chapter 5, *Wetlands and Waterways*, in 1996 The Boston Wharf Company applied to DEP for an amnesty license for the Brick Buildings. The license for the Brick Buildings was approved by DEP in 2003 as license number 9342a and contained conditions (the "Amnesty License"). The Amnesty

License included conditions requiring construction of the Harborwalk as well as the construction and maintenance of a public dock for recreational boating uses. The public dock was licensed separately by Gillette in 2011 under DEP license number 12906.

1.3 Project Description

Figure 1.6 presents the proposed Site plan for the Project. The Project consists of approximately 388,700 gross floor area situated on approximately 2.4 acres in the Fort Point area within the South Boston Waterfront neighborhood. The Project will include the following key components:

1. The Brick Buildings will be rehabilitated and connected by a new glass atrium as one building;
2. A new 12-story building will be constructed along Necco Street (the “New Building”);
3. The Brick Buildings and the New Building will be separated by a new pedestrian-only walkway, open to the public, to run from Necco Street to the Fort Point Channel with a portion of the plaza beneath a translucent 4-season canopy (the "GE Plaza"). The GE Plaza will connect the Fort Point area from Necco Street directly to the waterfront; and
4. New public realm improvements will provide transformative outdoor public space, including an inviting Harborwalk, landscaped areas, interpretive signage and amenities.

The following sections describe the Project's guiding principles, proposed development program and uses, building design approach, including sustainable elements, key site improvements, and project schedule.

1.3.1 Project Guiding Principles & Aspirations

GE, as the world's leading digital industrial company, is driven to make every day extraordinary. The company is transforming its industry by connecting the physical and digital by sensing, predicting, and responding to the innovations that make the world work better. As such, GE has embraced the following three guiding principles in designing the Project:

a. **Community Convener:** GE will create a compelling street-level experience open to the public that supports work-life integration to draw a steady flow of employees, GE collaborators, building guests and the public to the Project Site. GE intends to further catalyze the innovation scene within the Boston and global communities through dynamic spatial infrastructure that allows boundless cross disciplinary collaboration, both physical and virtual.

b. **Performance Enabler:** GE desires to minimize physical barriers and utilize semi-permeable layers between spaces for greater program integration and visual connectivity between its employees and the public. The Project will be designed with flexibility that will allow it to evolve with changing program scopes and uses over time. The Project will emphasize employee wellness and access to enable cross fertilization of people and ideas that allow for a seamless building experience. GE would like its headquarters to embody its brand promise while integrating the company's innovations into the physical space to empower individuals on a day-to-day basis.

c. **Resiliency Pioneer:** GE is committed to exploring emerging sustainable strategies that address tomorrow's energy challenges. GE would like to position the Project as a work in progress that will continue to adapt and evolve with GE over time to reflect changing business needs. GE will strategically invest in adaptable spaces, tools, and technology that support GE's mission and provide long-term value over multiple lifecycles.

The GE Headquarters Campus's ability to foster relationships both among its employees and with the greater community is a critical indicia of the Project's success. GE sees the Fort Point area of Boston as no longer a forgotten underutilized industrial area, but as a center for creating ideas. Top talent wants to live, work, and play in such a place. The Projects' many public spaces will enable the fostering of relationships among the City's secondary education, higher education, and startup communities with the business and venture communities. GE hopes this will help to cement the region as an international nexus of innovation and knowledge sharing strengthened by multi-institutional collaboration.

1.3.2 Proposed Development Program

The Project will include office uses with accessory uses, such as an employee cafeteria, and health and wellness space with an employee gym. Other uses include space for innovation, collaboration, customer interface and education in addition to ground floor publicly-accessible amenities, such as a museum and restaurant space. Table 1-1 below presents a summary of the proposed development program for the Project. Specific initial building uses are described more fully below. Building uses are anticipated to shift and transition over time, but will retain approximately 75 percent ground floor public uses, as required under Chapter 91regulations.

Table 1-1 Proposed Development Program

Use/Element	Approx. Size[1]	Quantity
Overall Project Site	104,000 sf (2.4 acres)[2]	–
Brick Buildings		
Existing Building Height[3]	69 feet	6 stories
Proposed Building Height[4]	87 feet	6 stories
Existing Building Footprint	17,600 sf	–
Proposed Building Footprint	18,860 sf	–
Building Modifications		
Existing Building Area[5]	106,400 sf	–
Ground Floor Removal	(17,600 sf)	
Proposed Atrium	12,000 sf	–
Building Uses		
Workplace	69,135 sf	–
Maker Space	11,500 sf	–
Bistro	7,000 sf	75 seats
Lab	6,500 sf	–
Lobby/Reception	1,265 sf	–
Brick Buildings Total	*95,400 sf*	*75 seats*
New Building		
Building Height[3]	180 feet	12 stories
Building Footprint	23,100 sf	
Building Uses		
Workplace	243,200 sf[6]	–
Employee Community Space	16,500 sf	325 seats
Museum	13,400 sf	-
Convener Space	15,000 sf	500 seats
Community Work Lounge	3,200 sf	–
Coffee Bar	2,000 sf	25 seats
Parking (basement)	-	30 spaces
New Building Total	*293,300 sf*	
Overall Total SF	**388,700 sf**	**500 seats** (assembly) **30 spaces** (vehicle parking)

1 All areas are provided as gross floor area (GFA), as defined by Article 2A of the Boston Zoning Code, which excludes basement, mechanical space/penthouses, storage, etc.
2 The Project Site is 0.10 acres smaller than the overall parcel as it does not include within the watersheet.
3 Measured to the top of the last occupied floor.
4 Measured to the top of the proposed rooftop atrium as the last occupied floor.
5 The area of the proposed Brick Buildings will be reduced by approximately 5,600 square feet from the existing condition to 100,800 gross square feet (GSF). The existing Brick Buildings do not contain interior mechanical space, therefore GSF and GFA are considered equal under the existing condition.
6 Includes employee workplace, conference center, health/wellness and gym space, and support areas.

The following describes the uses summarized in Table 1-1 above:

- **Office** - Employee work space for GE Headquarters functions and components of GE business units.
- **Maker Space:**
  - Internal – work space for GE employees to work and co-create with invited collaborators and visitors to prototype and develop new products/solutions. The maker space is generally used for prototyping, 3-D printing, and small-scale manufacturing from the lab to viable production quantities for both physical and digital products.
  - External – hands-on classroom workspace to support GE educational and outreach programs. The space will also feature maker equipment to display GE technology and innovation. The GE outreach programs accommodated in this space include: the GE Garages, a space for tech startups to collaborate with GE and experience the company's cutting edge products, as well as the Brilliant Labs—a program sponsored by the GE Foundation in conjunction with Boston Public Schools. Located at the ground-level, this space will be open to the community, including university and high school students, to explore careers in Science Technology Engineering and Math.
- **Bistro** – A ground-level restaurant space open to the public.
- **Employee Community Space** – Community space for GE employees and their visitors, including a cafeteria and other amenities.
- **Museum** – Publically accessible space intended to be an evolving display of the inspirational story of the past, present, and future of GE, both from a technology and human initiative point of view.
- **Convener Space** – Large assembly space for presentations/events where GE and interested global and local community thought leaders get together to share knowledge with each other and become a catalyst for innovation to solve tomorrow's global challenges.
- **Community Work Lounge** – A visitor reception/check-in lounge furnished with a variety of seating options for employees, customers, and public visitors to use as a "co-work" area or gathering point.
- **Lab** – Laboratory space to include flexible space with hoods and shared support space primarily for life sciences business. GE anticipates using this space to engage 6-12 early stage companies to develop innovative co-created products.
- **Coffee Bar** – A ground-level quick service coffee bar with a variety of “grab & go” options that will be open to the public.

The spaces detailed above can be categorized into the following function areas:

- **HQ Functions** – Office space that supports corporate functions, including Finance, Legal, and Marketing.

- **GE Businesses** – Office space utilized by business units within GE that focus on key product segments including Current by GE, Healthcare IT, Power, Aviation and Transportation.
- **Innovation Network Space** – Space provided by GE for GE, its partners, customers, co-creators and the general public to innovate the future of industry. This space focuses both on bringing innovation to scale and on the development of the company's digital-industrial products.
- **Internal Community Spaces** – Spaces that can be utilized by all employees to connect, collaborate, refresh, and relax.
- **Public Community Spaces** – Spaces open and accessible to the public:
  - Ground Floor: not less than 75 percent of the ground floor of both the Brick Buildings and the New Building will be open and accessible to the public, including the Museum, the Bistro, the Community Work Lounge, public restrooms and the External Maker Space, including Brilliant Labs.
  - Upper Floors: The Museum in the New Building will expand onto the second floor of the New Building. The Convener Space on the New Building's upper floors will host conferences and networking events open to invited members of the public.
- **Infrastructure** - Space within the Project dedicated to the delivery of program elements. Infrastructure space includes space for building systems, mail rooms, and security.

Section 5.5.3 of Chapter 5, *Wetlands and Waterways*, describes more fully the exterior and interior public facilities proposed to allow for and encourage public access to the waterfront.

Brick Buildings

The Brick Buildings will provide approximately 95,400 square feet of gross floor area of rehabilitated space. Portions of the Brick Buildings were utilized as construction field offices during the Central Artery/Tunnel (also known as the "Big Dig") construction project from 1991 to 2007. Since the conclusion of that project, the Brick Buildings have largely remained vacant with minimal routine maintenance.

The Project will connect the two Brick Buildings with a glass atrium. The roof of the Brick Buildings will feature a terrace with vegetated/green roof area for employees to collaborate and relax. The upper levels of the Brick Buildings will support office uses with Maker Space for internal GE use. The Bistro as well as the External Maker Space, including the Brilliant Labs classrooms, will be on the Brick Buildings' ground floor. The Brick Buildings are the subject of the Phase 1 Waiver request (the "Phase 1 Project").

New Building

The New Building will provide approximately 293,300 square feet of gross floor area (12-stories, approximately 180-foot in height). The ground floor of the New Building will feature the Museum showcasing the past and future of GE and a Community Lounge that will function as both a visitor reception and co-working space open to the public. A Coffee Bar also open to the public is proposed on the ground floor of the New Building. Employee parking and service/loading area will be provided below-grade with the service ramp accessed off Necco Street.

The upper floors of the New Building will feature employee office space as well as the Convener Space for GE and invited parties from the global and local community to gather and share knowledge, providing a catalyst to think differently and support future-orientated solutions to current problems. The top floor of the New Building will feature a roof terrace with vegetated/green roof area.

1.3.3 Overview of Planning Principles and Design Goals

The Project will be a highly visible emblem of GE's vision and will be a catalyst for future development in the Fort Point area. The Project will be a heroic testament to the GE organization, but the qualities that the Project will celebrate are uniquely 21st-century—a spirit of transparency, a belief in the power of new thinking, an embracing of connected collaboration. To reinforce the continuous connection to GE's industrial history, innovation functions will be located within the Brick Buildings. The educational component of the Museum in the New Building will be a celebrated, central feature that greets employees and visitors alike with an opportunity to experience firsthand how GE's groundbreaking achievements have changed the world.

The Brick Buildings, constructed as warehouses in the early 1900s, will be a home for the various components of GE's innovation network. The Brick Buildings will be connected by a glass atrium providing connection between them at every floor as well as a new roof deck terrace to be connected to the New Building by a pedestrian bridge. The existing historic bridge connecting the Brick Buildings will be preserved. Refer to Chapter 7, *Historic Resources*, for further details on the preservation and rehabilitation of the Brick Buildings.

The overall design goal of the New Building is to be a contextual addition reflecting both the Project Site's industrial past and GE's digital future. To emphasize GE's commitment to enabling performance and collaboration, a "vertical village," or a glass enclosed core of activity, will connect GE employees and building visitors across floors and teams, encouraging work activities to happen seamlessly and effortlessly. This central feature of the New Building will celebrate GE's commitment to transparency and collaboration, a commitment visible to passersby and to the greater Boston community. Refer to Chapter 3, *Urban Design*, for further details on the proposed building design approach for the Project, and supporting project plans and renderings. Figures 1.7a-b present project renderings.

1.3.4 Overview of the Sustainability, Resiliency, and Wellness

The Project is inherently sustainable as it will utilize land and existing building stock efficiently by transforming vacant warehouses into a world-class headquarters campus. It will also be resilient to an adapting climate, both the natural environment and workforce needs. It will promote the use of alternative modes of transportation, encourage pedestrian activity, provide public access and engagement, provide for a high-quality indoor environment for users, elevate health and wellness design strategies to the same level as building design considerations, and reduce environmental impacts both locally and globally.

With these elements in mind, GE has committed itself to maintain resiliency, sustainability, and wellness as pillars for the overall design of the Project. Sustainable and high-performance building strategies are at the core of the design. Energy, Greenhouse Gas ("GHG"), and water targets aligned with the State, City, and GE's goals are setting the bar for a Project that will complement Boston's existing building stock and serve as an example for future designers.

GE continues to be an industry leader by choosing the new, more stringent version of the United States Green Building Council's ("USGBC") Leadership in Energy and Environmental Design ("LEED™") rating system ("version 4", or "v4") for each Project component. Rather than reflect green building requirements developed over a decade ago, LEEDv4 advances the green building standard of excellence across the board. Specifically, the new rating system expands on transparency of the health and environmental impacts of building materials, utilizes a more performance-based approach to indoor environmental quality to improve occupant comfort, and expands the evaluation of energy and water efficiency to the total building water use.

Given the Project Site location along the Fort Point Channel, the Proponents and design team have taken a hard look at potential vulnerabilities due to climate change impacts. The potential impacts associated with predicted sea level rise and the increased frequency and intensity of storm events have been examined and the Project embraces the changes and flexibility needed to operate in such an environment through consideration of ground floor elevation, placement of critical systems, flexibility of heating and cooling systems, and design of a landscape that not only can withstand saltwater inundation but can flourish with it.

Notable sustainable features include a rooftop solar PV system designed as a dramatic architectural gesture (also referred to as the "Solar Veil") and the incorporation of green, or vegetated, roof areas (an approximately 2,900 square foot area on the Brick Buildings roof and approximately 3,400 square foot area on the New Building) that will serve environmental and ecological functions to further mitigate heat island effect, help manage stormwater runoff, provide new habitat for wildlife and extend the life of the roof materials.

GE is looking beyond the sustainable design of the built environment to the health and wellness of its future occupants and users by aligning project design and operations with both GE's internal wellness program, HealthAhead, and the principles of the WELL Building Standard.® The rooftop terraces and green/vegetated roof areas will provide a wellness benefit as they will be "work enabled" and employees will be encouraged to use these spaces to periodically disconnect from indoor work spaces.

Refer to Chapter 4, *Sustainability/Green Building and Climate Change Resiliency*, for further details on GE's corporate sustainability goals, and the sustainable design elements and climate change preparedness approach for the Project.

1.3.5 Site Improvements

With the Project Site's current uses, including surface parking and vacant industrial buildings, the Project aims to create a more sustainable, active, and connected environment that both activates and integrates into the surrounding Fort Point area. The Project provides the opportunity to improve access to the waterfront with an enhanced pedestrian environment. Enhancements to the public realm are intended to inspire people to visit the Project Site and engage the interior spaces that will be developed with public engagement in mind.

Waterfront Access Enhancements

The existing Harborwalk will be integrated throughout the Project Site as an interpretive pathway that accommodates the casual passerby as well as employees and visitors. Expanding the Harborwalk in width, and the use of improved and inviting materials, will provide a welcoming and accessible experience for all users, including pedestrians and cyclists. Visitors and employees alike will have access to a network of amenity spaces along the waterfront leading into the public plaza. Program components may include creative seating, interpretive signage, waterfront overlooks, Channel access, and native plan displays.

The Project's public program elements on the ground floors, as further described in Chapter 5, *Wetlands and Waterways*, will be accessed via main entry doors at each building. The ground floor of the Brick Buildings will feature large garage doors or folding glass partitions facing the public plaza, inviting the public into the Bistro and external Maker Space.

Public Realm Improvements

Utilization and enhancement of the existing Harborwalk will create a vibrant waterfront that attracts people to the area and provides strong connections to and through the Project Site. Beyond the waterfront improvements, the Project will seek to provide spaces for public engagement, which may include public art installations, activities, and other amenities.

The Project will serve as a catalyst for the execution of the 100 Acres Master Plan and serve as a benchmark for future waterfront and public realm development. As described further in Chapter 5, *Wetlands and Waterways*, the Project's ground floor will consist of 75 percent publicly-accessible program elements, including the Museum that will be an evolving display of the inspirational story of the past, present, and future of GE, a Community Work Lounge, and the External Maker Space. The Project will also feature casual restaurant space, including the Coffee Bar in the New Building and the Bistro facing the Fort Point Channel on the ground floors of the Brick Buildings (Figure 1.6). The indoor/outdoor connectivity throughout the Campus will aim to further enliven the public spaces with visibility into GE's innovation and collaborative work spaces in addition to public programming.

The proposed pedestrian-only GE Plaza between the Brick Buildings and the New Building will include program components that aim to encourage socialization and integrate with interior spaces. The GE Plaza will serve as the life center of the Campus and an activity hub for employees and public users alike.

Landscaping and Streetscape Improvements

The site landscaping has been designed and programmed to attract and inspire as well as manage stormwater runoff and/or flooding. As an integrated Campus, the Project will provide a variety of spaces for public interaction and engagement, as well as more passive areas for leisure and relaxation. Key aspects of the landscape design aim to provide areas for seamless integration with interior ground level programming, creating a porous ground plane for the Project Site. A series of stormwater management strategies will be mixed in with leisure activities encouraging public use as well as employee engagement.

Sidewalks on the proposed Campus will be upgraded and made accessible, including the Necco Street corridor, which will provide an inviting entryway. Enhancements to Necco Street will include expanding the public sidewalk width to create a more pedestrian-friendly streetscape, integrating a drop-off area as a safe point of vehicular access without interrupting traffic flow, and introducing street furnishings, such as benches or seating elements, where possible, to serve as a resting place for pedestrians, street lighting to improve pedestrian safety, and bike racks. Each major point of entry to the buildings, old and new, will be accessible.

1.3.6 Site Access and Neighborhood Connectivity

It is anticipated that the Project will be primarily accessed via foot from either mass transit access points at South Station or the MBTA Broadway Red Line station and nearby residences in the Fort Point area and in the greater South Boston Waterfront neighborhood. The primary pedestrian connection envisioned is from the Summer

Street Bridge along the Harborwalk to the outdoor public realm space in front of the New Building.

The proposed GE Plaza will be a pedestrian-only area, open to the public, located between the Brick Buildings and the New Building. This walkway, a portion of which will be covered by a translucent canopy, will connect pedestrians from Necco Street to the Harborwalk at the Fort Point Channel.

Vehicular access to the approximately 30 below-grade parking spaces and loading dock will be via a portal in the New Building façade along Necco Street. The New Building will have one shared site driveway on Necco Street providing access and egress to the below-grade parking and loading area (Figure 1.6). Curbside drop-off/pick-up will be provided on Necco Street. The Brick Buildings will be rehabilitated and continue to have minimal vehicular access from Necco Court.

1.3.7 Parking

Vehicle Parking

In support of the City's goal to not overbuild parking, the Project will include approximately 30 below-grade parking spaces underneath the New Building for GE employees. The garage will be accessed via a driveway on Necco Street. As discussed more fully in Chapter 8, *Transportation*, there is currently ample public parking available on a typical weekday in the area. While GE may generate additional parking demand beyond the approximately 30 spaces to be provided on-site, employees will be first encouraged to utilize public transit, walk, bike, and use nearby public parking if they need to drive.

Bicycle Parking

Consistent with the City's goals, GE will provide secure bicycle storage to encourage cycling as a healthy and environmentally-friendly means to commute. A total of 50 secure indoor bicycle spaces be available for employees upon Project completion with the ability to expand to 120 spaces as demand warrants. In addition, on-site shower and locker facilities will be provided for employees. Also, 30 at-grade publicly-accessible bicycle parking spaces will be located throughout the Campus near building entrances. GE is also considering sponsorship of a Hubway Station on or near the Campus to serve employees and visitors.

1.3.8 Anticipated Project Schedule

The Project is intended to be completed in two phases. The first phase of construction includes preservation and rehabilitation of the existing Brick Buildings to commence in the 4th Quarter of 2016. The anticipated occupancy of the Brick Buildings is the 1st Quarter of 2018. The second phase of construction will begin in 1st Quarter of 2017 with occupancy anticipated in the 3rd Quarter of 2018.

1.4 Public Benefits

This section summarizes the many project benefits associated with the Project.

Philanthropic/ Community Benefits

The GE Foundation has committed to invest $50 million to improve healthcare in underserved area communities and improve science and math education in Boston area schools. This investment will create thousands of new jobs and support the regional economy. GE's philanthropic commitments include:

- GE will invest $25 million in Boston Public Schools that will allow students to explore college and career possibilities through GE's career labs, computer science courses, and high school design experience.
- GE will create "GE Brilliant Career Labs" with both physical and virtual locations to allow students a unique hands-on experience with advanced manufacturing technology and software to assist them through career planning and internships.
- GE has pledged $10 million to build a diverse workforce population in the STEM and health care fields in Boston and surrounding areas. GE will leverage its employees and leaders to provide training, access to manufacturing labs, and externships for underserved populations outside of the Boston Metro area.
- GE will commit $15 million to developing and expanding the skills of health care providers at critical Community Health Centers (“CHCs”) in underserved communities. The Developing Health Boston program will initially support 22 Boston area CHCs and will provide skills training to more than 75 percent of CHC leaders, health care providers, and staff.
- Economic studies predict that the relocation of GE's Headquarters will add 4,000 temporary and permanent jobs across the Boston region.
- Approximately 800 GE employees will expand the GE Volunteer network and are anticipated to contribute an additional $1 million in charitable contributions annually.

Public Use and Enjoyment

- The Project will result in a substantial net improvement to community activities at the Project Site by providing new ground-floor public uses of approximately 75 percent of the first floors of the Brick Buildings and New Building designed to attract and inspire, including the:
  - Museum that will be an evolving display of the inspirational story of the past, present, and future of GE;
  - Community Work Lounge;
  - External Maker Space;

- Casual restaurant space, including the Coffee Bar in the New Building and the Bistro facing the Fort Point Channel on the ground floors of the Brick Buildings; and
- Passive gathering areas throughout the Campus.

› The Project will significantly improve the pedestrian realm by reconstructing and widening the Harborwalk at the Project Site, constructing new sidewalks where there are none now, reconstructing sidewalks at the Project Site to be Americans with Disabilities Act ("ADA")-compliant and installing new street lighting on the Project Site;

› The Project will eliminate approximately 203 surface parking spaces adjacent to the Fort Point Channel and some additional reserved private on-street parking.

› The Project will include only 30 below-grade parking spaces to encourage employees and visitors to rely on alternative modes of transportation to reduce traffic in the Fort Point area.

› The Project will implement a substantial Transportation Demand Management ("TDM") Plan to encourage employees and visitors to use alternative modes of transportation.

› Bicycle parking will be provided for 50 employee bicycles at Project completion with space to accommodate up to 120 bicycles in the future and 30 at-grade publicly accessible bicycle spaces will be provided.

› The Project will promote public health and safety through implementing a site design that provides a safe and universally accessible facility from all directions.

› The design includes on-site and off-site transportation improvements to increase pedestrian and bicyclist safety and accessibility in the neighborhood.

Public Realm/Open Space Activation

› The Project will provide over 61,940 square feet of outdoor public space, including an enhanced and inviting Harborwalk, GE Plaza green space, interpretive signage, and amenities.

› The Project provides substantial public benefits and is protective of the Public Trust rights inherent in filled tidelands by significantly enhancing public access to and use of the waterfront on the Project Site.

› The Project will transform the Project Site into a hub of technology, innovation, and intellectual stimulation as well as a new meaningful destination on the City's Harborwalk, attracting a broad range of visitors, day and night, year-round.

› The indoor/outdoor connectivity throughout the Campus will aim to further enliven the public spaces with visibility into GE's innovation and collaborative work spaces in addition to public programming.

› The Project will reflect and complement the unique architectural character of the surrounding neighborhood.

Environment/Sustainability

Sustainable and high-performance building strategies are at the core of the design for the New Building as well as the rehabilitation of the Brick Buildings. Such strategies, aligned with the guiding principles of sustainability, resiliency, and wellness, are summarized below, grouped into the categories of energy, water, building materials, resiliency, employee wellness and community benefits.

Energy Conservation/GHG Emissions Reductions

- Achieve Energy Use Index ("EUI") target of 38.5 for the New Building positioning it as a top 20 percent performing building compared to similar building types to be put into operation in 2018 in this climate zone. In Boston, very few office buildings constructed within the past ten years claim to meet such an aggressive target. Based on energy reporting data submitted on comparable projects, EUIs range from 40.3 to 89.3.[2]
- Achieve EUI target of 56.3 for the Brick Buildings positioning it as a high performance building compared to similar historic rehabilitation and preservation projects in this climate zone. Other such rehabilitated buildings in the Boston area being used for office space have EUIs ranging from 44.6 to 67.2 based on energy reporting data submitted to the City.
- Achieve an estimated 26.7 percent reduction in stationary source CO2 emissions by reducing overall energy consumption by approximately 27.0 percent through the incorporation of Energy Conservation Measures ("ECMs") and energy-efficient design strategies, such as a high-performance building envelope, high-efficiency heating and cooling, and lighting systems, daylight harvesting strategies, energy-efficient windows and increased insulation.
- Incorporation of smart building systems will further reduce energy usage and stationary source GHG emissions during operation through an automated central Building Management System (BMS) that allows for:
  - Management, optimization, and analysis of performance of all utility/mechanical systems for the Project;
  - A fully networked interior lighting control system tied to the BMS and enabled by GE's Predix system; and
  - A User-accessible energy monitoring system/real-time dashboard that will depict the building's energy usage (and generation) to educate building users.
- The on-site Solar Photovoltaic ("PV") System for the New Building will generate clean energy for building consumption/supply back to the grid. The PV system is forecast to reduce overall utility loads by an estimated 157 kwH and associated GHG emissions.

2 Data obtained from www.berdo.greenovateboston.org

- GE is committed to working towards a Net Zero Energy ("NZE") campus over the life of the buildings, as technology becomes available and operational processes are refined.

Water Conservation

- Reduce water use demand in the buildings to 20 gallons per person on a daily basis, or an equivalent 9 gallons per square foot (gal/sf). Few office buildings constructed within the past ten years in Boston claim to meet such an aggressive target. Based on water usage reporting data submitted by similar projects, water efficiencies range from 8.78 gal/sf to 14.57 gal/sf.
- High-efficiency plumbing fixtures and WaterSense appliances will contribute up to an estimated 33 percent reduction of water demand over baseline (an approximately 660,000 gallons per year savings in potable water demand and sewer discharge).
- Further reduction of potable water use for toilet flushing by an estimated 43 percent through use of a rainwater harvesting system.
- Further reduction in potable water use for site irrigation by approximately 80 percent compared to a conventional irrigation system through the incorporation of green/vegetated roofs, use of rainwater harvesting; and use of native/adaptive landscaping.
- Further potable water reductions could be achieved through a blackwater system, which is being considered as part of the design process.
- In the New Building, an additional reduction of potable water use by 10 to 15 percent could be achieved by the quench water from the HVAC system.
- User-accessible water monitoring system/real-time dashboard that will depict building water usage to educate building users.

Site Location & Design

- Emphasis of walkability and bike-ability and proximity to mass transit will further reduce the Campus' environmental impact.
- On-site parking will be located below-grade, reducing the heat island impact and will be limited to approximately 30 spaces, including approximately 8 Electric Vehicle ("EV") charging stations to encourage electric vehicle use thereby reducing (transportation-related) GHG emissions.
- New/upgraded stormwater management and treatment systems on-site will improve water quality, reduce runoff volume, and control peak rates of runoff in comparison to existing conditions. This system will be designed as a landscape feature to reduce heat island effect, recharge the local groundwater table, and be resilient to saltwater inundation from coastal flooding.
- Green, or vegetated, roof areas further mitigate heat island effect, provide quality views for staff, help manage stormwater runoff, and extend the life of the roof materials.

- Outdoor lighting will be designed to minimize light pollution through the incorporation of "Dark Sky" strategies which are being evaluated as part of design.

Resiliency

- The proposed site design will provide protection to the Project relative to the Federal Emergency Management Agency (“FEMA”) 100-year and 500-year floodplain limits through site grading and landscaping. By raising the Project site grade so that the finished floor elevation for the Brick Buildings and the New Building is at +19.5 BCB, the Project will be resilient to extreme storm events, which includes taking into consideration sea level rise scenarios over the lifetime of the Project.
- Potential impacts associated with predicted sea level rise, and increased frequency and intensity of storm events as well as the need for a flexible building space have been considered through the following design strategies:
  - Place critical mechanical and life safety/standby emergency building systems outside of vulnerable elevations (the 100-year floodplain with 2.47 feet of sea level rise);
  - Provide oversized stormwater conveyance infrastructure to effectively remove stormwater from the Project Site;
  - Provide an overland drainage path around the buildings and elevated pedestrian areas for inland flooding;
  - Design flexible heating and cooling systems;
  - Use of a native/adaptive landscape, such as tidal zone planting materials that will connect to the history of the area and be resilient against flooding and saltwater intrusion; and
  - Use of landscaping walls, walkways, stairways, railings, benches and bike racks designed using materials that can withstand saltwater inundation.
- Resilient design so that building space remains flexible and can evolve with changing business practices and space needs.

1.5 Alternatives Analysis

In accordance with 301 CMR 11.07(6)(f), this section provides a summary of site development alternatives considered, including a future No-Build alternative, a Preferred Alternative and Alternative "B".

1.5.1 Alternatives Development - Project Goals and Objectives

The following Project goals are based on the Proponents' aspirations consistent with the City, State, and community planning and with objectives for redevelopment of the Fort Point Channel area within the South Boston Waterfront neighborhood.

Balance GE Needs and Existing Vision

- Offer a multitude of experiences (inside and outside the buildings) that appeal to different user groups, including GE employees and the general public.
- Create an open, publically-accessible, flexible campus that inspires and fosters creative thinking.
- Dedicate 75 percent of the ground floors of the buildings to public uses.
- Maintain compliance with the goals of the 100 Acres Master Plan, including maintaining a connection between the Fort Point Channel and Harborwalk to areas east of A Street and the BCEC.
- Incorporate an attractive design for all facades, both architecturally and through enhanced streetscape while respecting the area's history.
- Maximize public open space.

Minimize Environmental Impacts

- Reduce environmental impacts, specifically those related to traffic, noise, air quality, natural resources and water quality.
- Incorporate sustainable concepts in all aspects of planning, design, construction and operation.
- Plan and design for climate change and associated flood hazard and potential for a future rise in sea level.
- Enhance the public realm, including site access for bicycles and pedestrians.

Reuse of the Existing Historic Buildings

- Embrace the historical context of the Fort Point area through reuse and rehabilitation of two vacant former manufacturing buildings (the Brick Buildings).
- Retain the Brick Buildings as a critical component of GE's vision for the Campus as both a celebration of the GE's rich history and a progressive step towards their digital industrial future.

1.5.2 Project Alternatives

The following project alternatives are evaluated in this section:

- **No-Build Alternative** – would leave in place the existing conditions at the Project Site. It would remain a previously developed site with surface parking and vacant manufacturing buildings.

- **Alternative B** – consists of rehabilitation of the Brick Buildings and new construction in the form of two buildings, a new building and an additional building on the parcel between the Brick Buildings and Fort Point Channel, referred to as the "G1 Parcel."
- **Preferred Alternative** – the Project as proposed consisting of rehabilitated Brick Buildings and a New Building.

Table 1-2 below defines the programs of the two development alternatives.

Table 1-2 Project Build Alternatives

	Alternative B	Preferred Alternative
Total Square Footage	412,000 sf	394,100 sf
Parking Spaces	300 Spaces	30 Spaces
Number of New Buildings	2	1
Primary Ground Floor Use	75% Public	75% Public
Primary Upper Floor Use	Corporate Office	Corporate Office/Public Uses

No-Build Alternative

The No-Build Alternative would not include any of the extraordinary economic benefits or comprehensive improvements associated with the Project, including the rehabilitation of the Brick Buildings. This alternative would also leave in place the existing paved conditions at the Project Site, as described previously in Section 1.2 and shown on Figure 1.3.

The No-Build Alternative does not meet the Proponents' or the City's objectives and is inconsistent with the City's economic and redevelopment goals for the Fort Point area. Although the No-Build Alternative would not result in any new environmental and community impacts, it would not improve the environmental conditions of the Project Site, such as improved water quality through upgraded stormwater management facilities, or realize the extraordinary public benefits discussed previously in Section 1.4. The No-Build Alternative would not create the proposed public facilities and programs, and similarly would not activate the site and would not promote public use or enjoyment.

Alternative B

Alternative B would include approximately 412,000 square feet of building program consisting of the rehabilitated Brick Buildings, a new building similar in size to the New Building oriented with the long building face to the waterfront to maximize views, and a second approximately 30,000 square-foot newly constructed building along the Harborwalk between the Fort Point Channel and the Brick Buildings on the G1 Parcel (as anticipated by the 100 Acres Master Plan). Alternative B would also include 300 below-grade parking spaces. A conceptual site plan for this alternative is presented in Figure 1.8.

This development alternative assumes a similar breakdown of uses throughout the Campus as the Preferred Alternative, including 75 percent of the ground floor dedicated to public uses. While the proposed building orientation of this development alternative maximizes the building frontage to the waterfront and Necco Street, it requires a building to be constructed within what is open space under the Preferred Alternative, obstructing the view corridor envisioned by the 100 Acres Master Plan. This orientation also puts the bulk of the open space along and across from Necco Street away from the waterfront. Additionally, a narrowed Harborwalk restricts the ability to actively engage the waterfront with public open space.

Alternative B also provides more area for vehicular circulation and loading, and more on-site parking.

Preferred Alternative

The Preferred Alternative (or the Project), as described in detail in Section 1.3 and shown on Figure 1.6, proposes approximately 388,700 square feet of building program in the form of the rehabilitated Brick Buildings and approximately 293,300 square feet of new construction (the New Building). The Preferred Alternative would include ground floor public uses and a mix of uses throughout upper floors, including office use as well as publicly available assembly space, educational facilities, and maker space, as detailed in Table 1-1.

The Preferred Alternative proposes a building orientation that is consistent with the 100 Acres Master Plan, and preserves the view corridor and maximizes open space to the south and west of the Project Site including on a much improved Harborwalk. The Preferred Alternative would be consistent with the requirements of Chapter 91, the South Boston Waterfront District Municipal Harbor Plan Amendment, as clarified or amended, and the Fort Point Channel Watersheet Activation Plan, by enhancing connectivity to the Fort Point Channel, and increases open space by electing not to construct a building on the G1 Parcel. These planning documents are summarized in greater detail in Chapter 2, *Regulatory Context*. The Project aims to create a vibrant new destination on the waterfront that integrates office uses with public programming to create a center for science and technology education.

1.5.3 Qualitative and Quantitative Comparison Analysis

The sections below compare the potential environmental impacts of the project alternatives. Table 1-3 below provides a quantitative impact analysis comparing the No-Build Alternative, Alternative B, and Preferred Alternative.

Table 1-3 Comparison of Project Alternatives

Impact Category	No-Build Alternative	Alternative B	Preferred Alternative
Land			
Total Impervious Surface Area (building footprint and paved area)	±99,100 SF	±85,300 SF	± 78,750 SF
Impervious Area Reduction	NA	±13,800 SF	±20,350 SF
New Land Alteration	NA	- 0 -	- 0 -
Wetlands & Waterways			
Wetland Alteration	NA	None	None
Ch.91 Compliant FPAs[1]	None	Yes	Yes
WDUZ[2]	27,680 SF	27,680 SF	29,900 SF
Water & Wastewater			
Water Use (GPD)	±0 GPD	±49,189 GPD	±46,714 GPD
Wastewater Generation (GPD)	±0 GPD	±44,717 GPD	±42,467 GPD
Traffic			
Vehicle Trips per Day (Unadjusted)	406	3,616 (net new)	2,739 (net new)
Parking			
Parking Spaces	203	300	30
Historic Resources			
Impact to Historic Structure	None	Rehabilitates Brick Buildings	Rehabilitates Brick Buildings
Planning Consistency			
100 Acres Master Plan	Inconsistent	Inconsistent	Consistent
Fort Point Channel Watersheet Activation Plan	Inconsistent	Inconsistent	Consistent

GPD gallons per day
1 Facilities of Public Accommodation as defined under 310 CMR 9.02.
2 Water Dependent Use Zone as defined under 310 CMR 9.02.

Land

Both build alternatives would result in an overall reduction of impervious area (pavement) as the Project Site is currently nearly fully paved and/or covered with buildings and the proposed development would result in an increase in pervious area. However, the Preferred Alternative would result in a greater reduction of impervious area than Alternative B since it provides a more expansive public realm open space area and does not contain the approximately 8,000 square-foot building on the G1 Parcel. The Preferred Alternative will result in an approximately 20 percent reduction in total impervious area.

Wetlands and Waterways

Both build conditions will comply with the Chapter 91 dimensional and use requirements as applied to the Project Site. Alternative B would create a solid mass along the Fort Point Channel, inhibiting public use and enjoyment.

The Project will occur within Land Subject to Coastal Storm Flowage and buffer to coastal bank. There are no other impacts to wetland resource areas anticipated for either build alternative.

Water and Wastewater

Due to a larger, more intense development program, Alternative B would require more potable water and is expected to generate more sanitary sewer age compared to the Preferred Alternative.

Traffic and Parking

Alternative B would result in more vehicle trips per day than the No-Build Alternative and Preferred Alternative due to the increased size of the development. In addition to vehicle trips generated by the proposed uses, local vehicle trips would also be generated by the 300-space underground parking garage, which would likely be made available to the public, thereby, generating additional traffic compared to the Preferred Alternative. The Preferred Alternative provides 30 parking spaces rather than the 300 on-site parking spaces compared to Alternative B and 203 on-site parking spaces in the No-Build Alternative.

Consistency with Planning

As discussed in greater detail in Chapter 2, *Regulatory Context*, the Project Site has been subject to much planning effort to encourage thoughtful development that maintains the goals of the City. As such, the design of the Preferred Alternative carefully considers central goals of the various planning documents as well as the dimensional requirements. The Preferred Alternative is consistent with all applicable planning efforts and endeavors to exceed the expectations for activation of the waterfront and connectivity of space.

Alternative B is not consistent with local planning with regard to waterfront activation and use. Similarly, the No-Build Alternative maintains the existing conditions as a surface parking lot and fails to create the envisioned public spaces and active public uses.

1.5.4 Conclusion

The Preferred Alternative avoids or minimizes environmental impacts to a greater extent than either the No-Build Alternative or Alternative B, and has been designed to comply with planning recommendations and to provide uses that begin implementation of the 100 Acres Master Plan. Further, the Preferred Alternative supports strongly the economic development and sustainable goals of the City of Boston and the State. Analysis of the Preferred Alternative, including its existing site characteristics, development costs, and mitigation requirements did not identify a practical alternative that would significantly reduce the environmental impacts of the development over the Preferred Alternative. Consequently, the Preferred Alternative is carried forward for further analysis in this document.

The Preferred Alternative offers substantial public and environmental benefits that are expected to extend to the broader community, City, and region, providing new opportunities and serving as a catalyst for regional growth. It will create a new destination on the waterfront that offers an integrated combination of active and passive recreational opportunities both inside the buildings and within the adjacent public realm.

1.6 Community Outreach Overview

GE has conducted the following community outreach prior to this filing:

- **Fort Point Neighborhood Association ("FPNA"):** GE has held regular and frequent in-person meetings with FPNA leadership and representatives to present the overall Project and answer any preliminary questions or concerns.
- **Fort Point Artist Community ("FPAC"):** GE has had three in person meetings with FPAC staff and member representatives. In general, discussions focused on the role of FPAC in the neighborhood and ways in which GE and the existing artist community can coordinate.

In addition, GE has met with many area business owners, employers, elected officials, and various other stakeholders in order to introduce the Project, discuss transportation and traffic issues and mitigation efforts as well as other general business initiatives. GE has provided contact information in the event they have questions about the project or need information.

1.7 Standards for Phase 1 Waiver

The Proponents are requesting a Phase 1 Waiver pursuant to 301 CMR 11.11(5) to permit the immediate rehabilitation of the Brick Buildings, including the connection of a shared lobby/connection between the Brick Buildings and infrastructure improvements associated with the development of the Campus (referred to as the "Phase 1 Project") as well as the acquisition by MassDevelopment of the Brick Buildings and the land to be used for open space purposes, the lease of same by MassDevelopment to GE, and the use of public funds by the State and MassDevelopment for land acquisition by MassDevelopment and infrastructure improvements to be made by GE, all prior to be completion of the MEPA review process. The Phase 1 Project is identified in Figure 1.9.

The Brick Buildings are currently vacant and in disrepair. The Phase 1 Project will include the immediate redevelopment of the Brick Buildings, including the activation of Facilities of Public Accommodation on their ground floors.

The Phase 1 Project does not meet or exceed any Mandatory EIR review threshold. As demonstrated below, the Phase 1 Project fully complies with the standards for a Phase 1 Waiver. The Secretary may grant a Phase 1 Waiver if he finds the absence of such a waiver will:

- Result in undue hardship for the proponent and
- Not serve to avoid or minimize Damage to the Environment.

More specifically, pursuant to 301 CMR 11.11(4), Determination of a Phase 1 Waiver, the Secretary may issue a Phase 1 Waiver allowing the first phase of a project to proceed prior to the completion of an EIR if he determines that:

- The potential environmental impacts of phase one, taken alone, are insignificant;
- Ample and unconstrained infrastructure facilities and services exist to support phase one;
- The project is severable, such that phase one does not require the implementation of any other future phase of the project or restrict the means by which potential environmental impacts from any other phase of the project may be avoided, minimized, or mitigated; and
- The Agency Action on phase one will contain terms such as a condition or restriction in a permit, contract, or other relevant document approving or allowing the agency action, or other evidence satisfactory to the Secretary, so as to ensure compliance with MEPA and 301 CMR 11.00 prior to commencement of any other phase of the project.

1.7.1 Strict compliance would result in undue hardship to Proponents

The State and the City offered GE significant incentives in connection with GE's relocation of its headquarters to Massachusetts. Those incentives included the acquisition of certain of the real estate that will comprise the Project, including the Brick Buildings, and the funding of certain redevelopment activities. Another incentive was streamlined permitting to allow the occupancy of the GE headquarters as soon as possible which, in turn, will result in the generation of much needed jobs and revenue for the State and the City. If the Proponents were required to complete the MEPA process before the Brick Buildings can be acquired and their rehabilitation commenced, it would result in a material delay in the improvement of this area of Fort Point, including the provision of the much needed Facilities of Public Accommodation that will be offered in the existing Brick Buildings, and the activation of the GE Headquarters campus. This will result in undue and unnecessary hardship to the Proponents, the State, and the City, which can be easily avoided by a Phase 1 Waiver allowing the redevelopment of the Brick Buildings, which already are licensed under Chapter 91 through the Amnesty License, without further delay upon the Secretary's certificate of the sufficiency of this EENF/EPNF.

1.7.2 Strict compliance would not serve to avoid or minimize Damage to the Environment

The Phase 1 Project will not result in significant environmental impacts as it does not meet or exceed any Mandatory EIR review thresholds. The existing Brick Buildings are located within a previously developed site. Further, as demonstrated in this EENF/EPNF, the Phase 1 Project will improve the environment, not damage it because adequate measures to avoid, minimize, and mitigate the potential Phase 1 Project-related impacts will be employed, as necessary. This EENF/EPNF provides an EIR-level analysis of the potential environmental impacts of the Phase 1 Project, and potential mitigation measures, as detailed below, so strict compliance with MEPA would not result in any additional avoidance or minimization of environmental impacts.

1.7.3 The potential environmental impacts of Phase 1, taken alone, are insignificant

The principal areas of potential environmental inquiry under MEPA for the Phase 1 Project are land, wetlands and waterways, historic resources, transportation, air quality, GHG emissions, water and wastewater, and construction. As summarized below and detailed in the supporting chapters of this EENF/EPNF, the Phase 1 Project will not have negative impacts in these areas.

Land and Stormwater Management/Water Quality

The Project Site is entirely impervious and without infiltration systems or stormwater treatments in the existing condition. While minimal changes to the existing stormwater management system will occur for the Phase 1 Project, by enclosing the area between the existing buildings to construct an atrium and capturing a portion of the roof runoff, overall site runoff associated with the Phase 1 Project will be reduced. As a redevelopment project, the Phase 1 Project will meet the DEP stormwater management standards to the maximum extent practicable.

Wetlands and Waterways

As discussed in previously Section 1.2.4 the Phase 1 Project is authorized under Chapter 91 by the Amnesty License for the Brick Buildings and an Administrative Consent Order which is described further in Chapter 5, *Wetlands and Waterways*. The Phase 1 Project does not exceed any MEPA review thresholds related to wetlands or waterways.

Historic Resources

The Phase 1 Project, which consists of the rehabilitation of the Brick Buildings, will be generally consistent with the Secretary of the Interior's Standards for Rehabilitation and the Fort Point Channel Landmark District standards and criteria. Refer to Chapter 7, *Historic Resources*, for further information on the proposed rehabilitation of the Brick Buildings.

Prior to work commencing on these structures, the Proponents will submit an Application for Certificate of Design Approval to the Fort Point Channel Landmark District Commission ("FPCLDC"). In addition, submittal of this EENF/EPNF initiates Massachusetts Historical Commission ("MHC") review. Prior to work commencing on these structures, the Proponents will consult with the MHC to seek a determination of effect in accordance with State Register Review requirements.

Transportation/Air Quality

The Phase 1 Project is projected to generate approximately 808 unadjusted (252 adjusted) daily vehicle trips, which does not exceed any transportation-related review thresholds under MEPA. Refer to Chapter 8, *Transportation* and Section 6.6 of Chapter 6, *Environmental Protection*, for further information on traffic and air quality, respectively.

Greenhouse Gas Emissions

Consistent with the current MEPA Greenhouse Gas Emissions Policy and Protocol, the Phase 1 Project will be designed and operated to achieve reductions in both stationary source and mobile source GHG emissions. Based on the building energy model, the Phase 1 Project will reduce energy use by approximately 19.8 percent, which equates to approximately 20.0 percent reduction in stationary source CO_2 emissions when compared to a base case. Refer to Chapter 9, *Greenhouse Gas Emissions Assessment* for additional information on the building energy optimization measures proposed for the Phase 1 Project. The overall GHG mobile source emissions for the Project are 368.2 tons per year ("tpy"), including an estimated 7.5 tpy due to the proposed TDM measures.

Water and Wastewater

As presented in Chapter 10, *Infrastructure*, the Phase 1 Project is estimated to generate approximately 10,067 gallons per day of sanitary sewage and use approximately 11,074 gallons per day of potable water. The Project will include low-flow and low-consumption plumbing fixtures as well as reuse roof runoff for toilet flushing and, possibly, irrigation to reduce water usage.

Construction

Phase 1 Project construction will require demolition to stabilize the Brick Buildings existing structures for rehabilitation. There is minimal site work associated with the Phase 1 Project, so anticipated construction impacts are largely limited to waste generation and asbestos removal. To mitigate these impacts, all work will be completed in compliance with state and federal regulations.

1.7.4 Ample and unconstrained existing infrastructure facilities and services exist to support Phase 1

As discussed in Chapter 10, *Infrastructure*, adequate infrastructure facilities and services are available within the Fort Point area to serve the Phase 1 Project, including water supply, sanitary sewer, and drainage systems. Gas, electric, telephone and telecommunications utilities are also located proximate to the Project Site. The Proponents will continue working with the utility providers to verify demands and serviceability to the Phase 1 Project.

The traffic analysis results for the Phase 1 Project presented in Chapter 3, *Transportation*, demonstrate that the Phase 1 Project-related vehicle traffic can be handled by the existing roadway network.

1.7.5 Phase 1 is severable from other Project phases

The Phase 1 Project is a severable project phase that will be completed with only minimal infrastructure improvements described above. It does not require the completion of any other Project phase. Further, construction of the Phase 1 Project will not impair or restrict the means by which potential environmental impacts from any other project components may be avoided, minimized, or mitigated for the full build.

Relevant Agency Action of the Phase 1 Project will ensure compliance with MEPA for subsequent phases. The existing Brick Buildings have a 99-year Chapter 91 license. However, the Project requires an additional Chapter 91 license, which will not be issued until after the Secretary has certified that the EIR for the Project complies with MEPA. Therefore, MEPA compliance for the Project is assured.

1.7.6 Conclusion

Based on the above evaluation of the standards for a Phase 1 Waiver, the Proponents respectfully submit that the Phase 1 Waiver is warranted.

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Source: USGS 2011 Digital Topo

Prepared By: VHB

Figure 1.1

Locus Map

GE Headquarters Project
Boston, Massachusetts

Source: ArcGIS Online Bing Aerial

Prepared By: VHB

Figure 1.2

Project Site Context

GE Headquarters Project
Boston, Massachusetts

Source: Feldman Land Surveyors

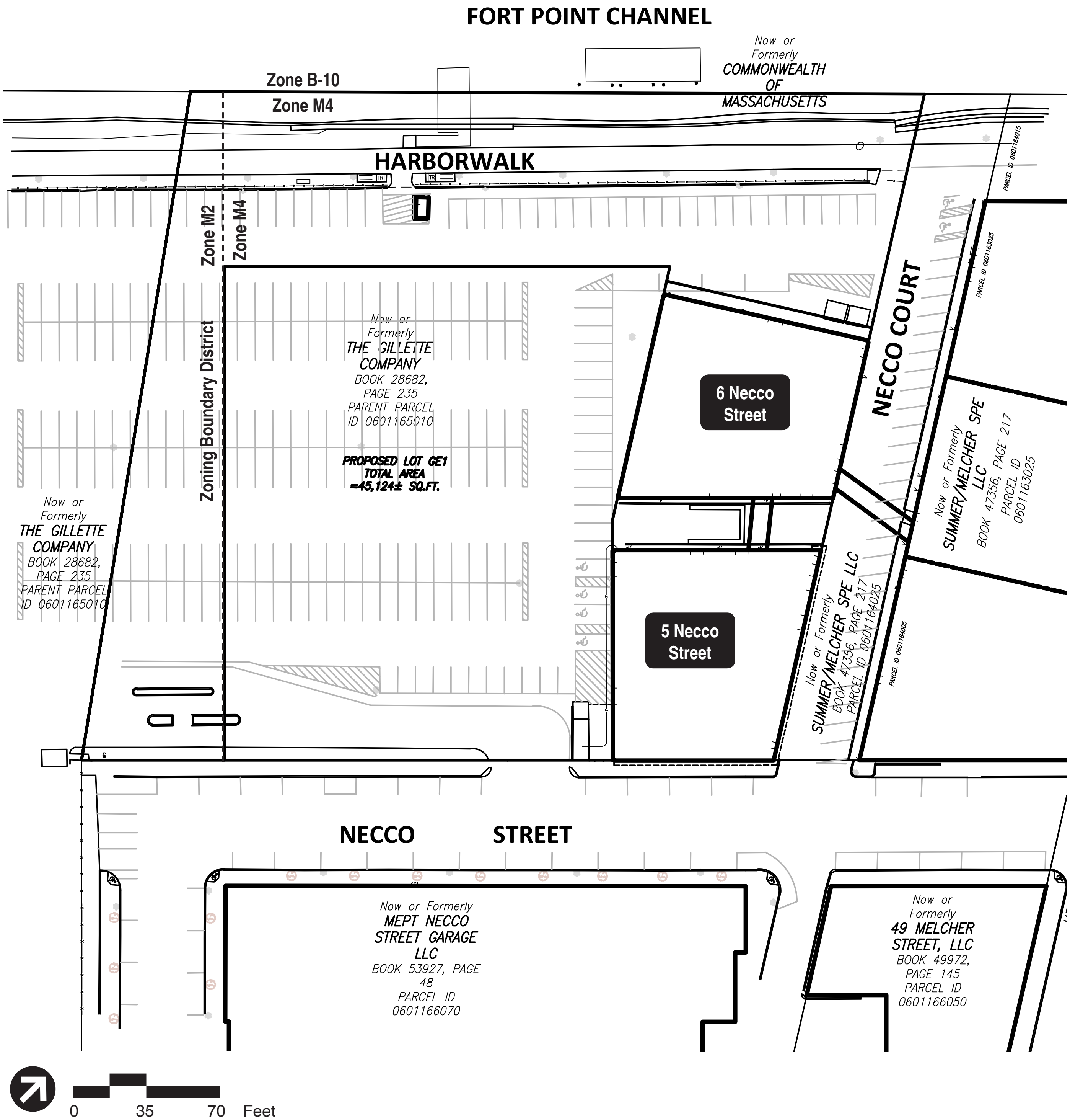
Project Site

Prepared By: VHB

Figure 1.3

Existing Conditions

GE Headquarters Project
Boston, Massachusetts



Source: Feldman Land Surveyors

Prepared By: VHB

Figure 1.4

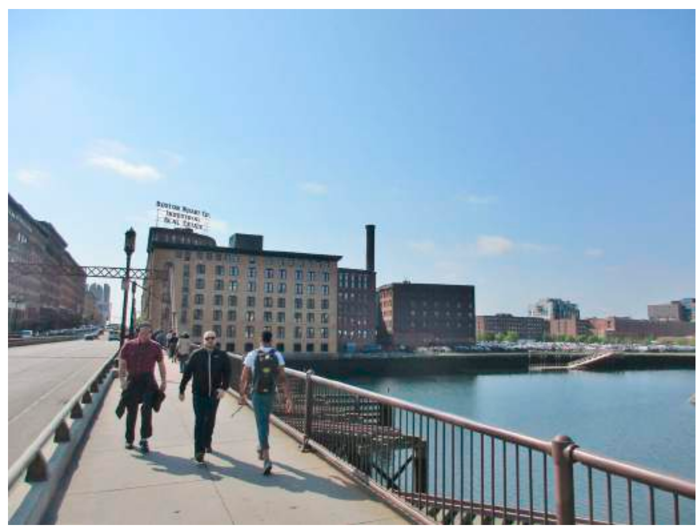
Site Survey and Parcel Plan

GE Headquarters Project
Boston, Massachusetts

Project SIte from Boston Harborwalk looking northeast

Existing Brick Buildings looking northwest from Necco Street

Existing Brick Buildings looking north from site of New Building



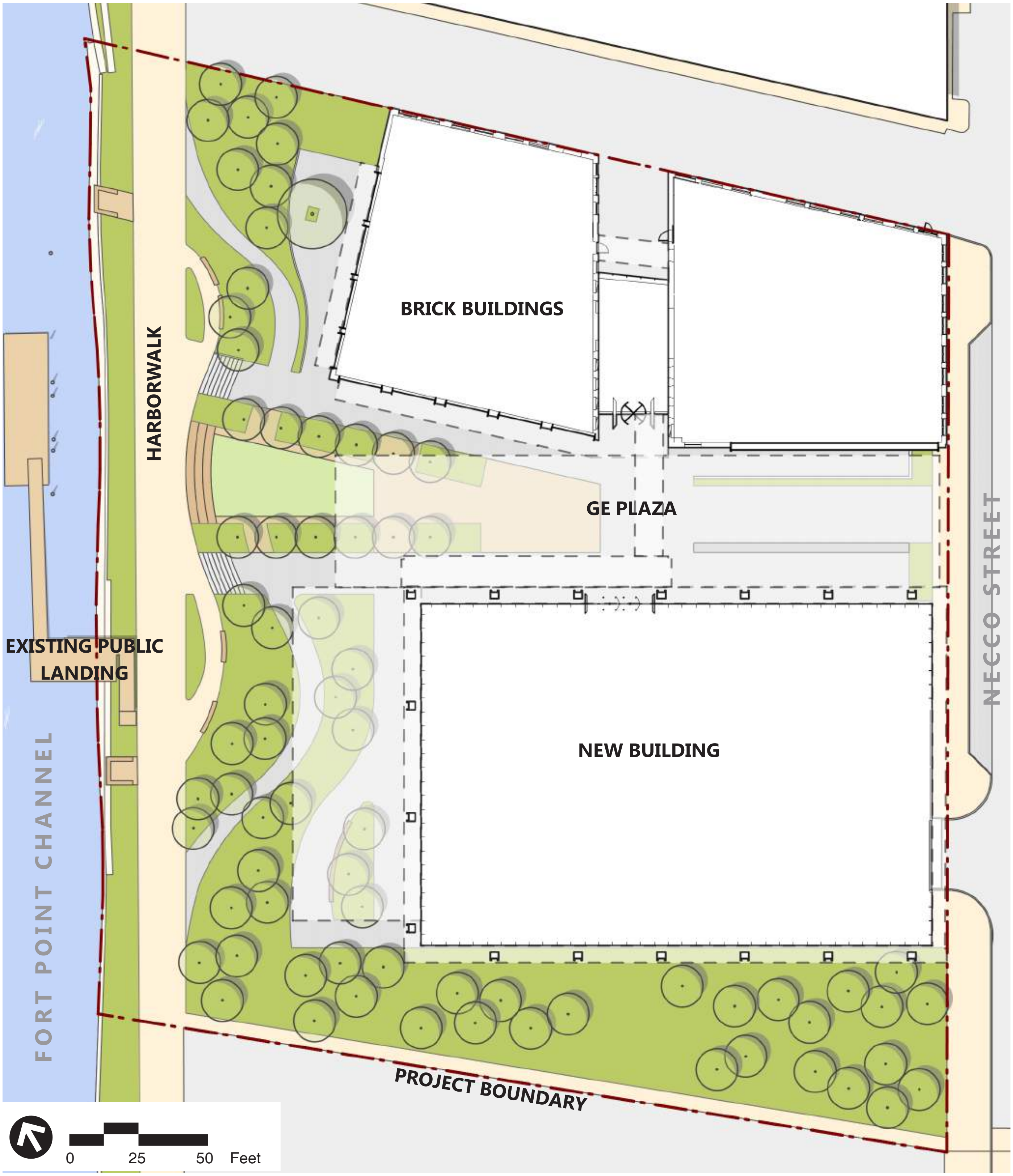
Project Site looking southeast from Summer Street

Prepared By: VHB

Figure 1.5

Existing Conditions Photos

GE Headquarters Project
Boston, Massachusetts



Source: OJB

OJB

Figure 1.6

Proposed Conditions

GE Headquarters Project
Boston, Massachusetts

Gensler

Figure 1.7a

Project Rendering - Aerial View

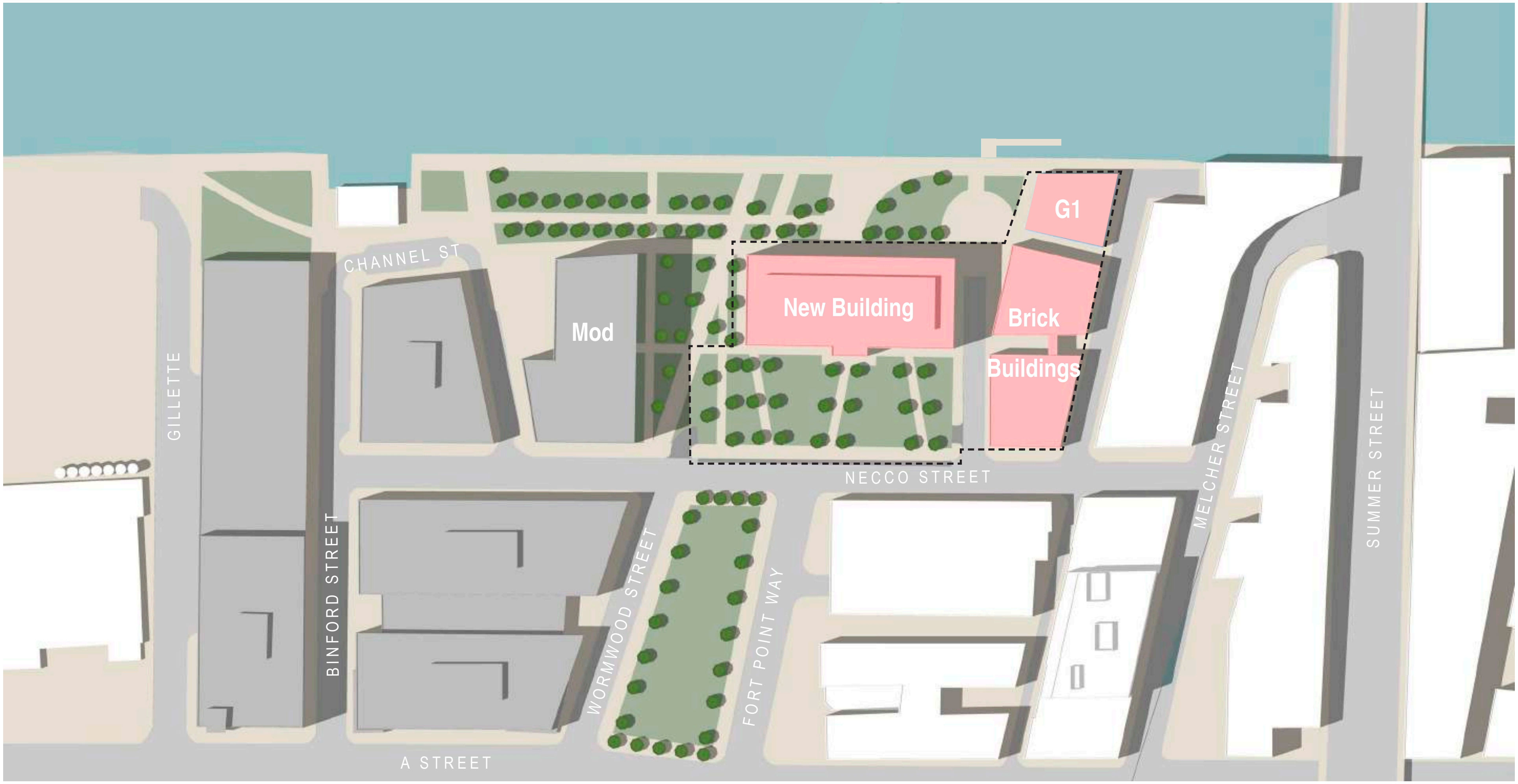
GE Headquarters Project
Boston, Massachusetts

Gensler

Figure 1.7b

Project Rendering - View from Harborwalk

GE Headquarters Project
Boston, Massachusetts

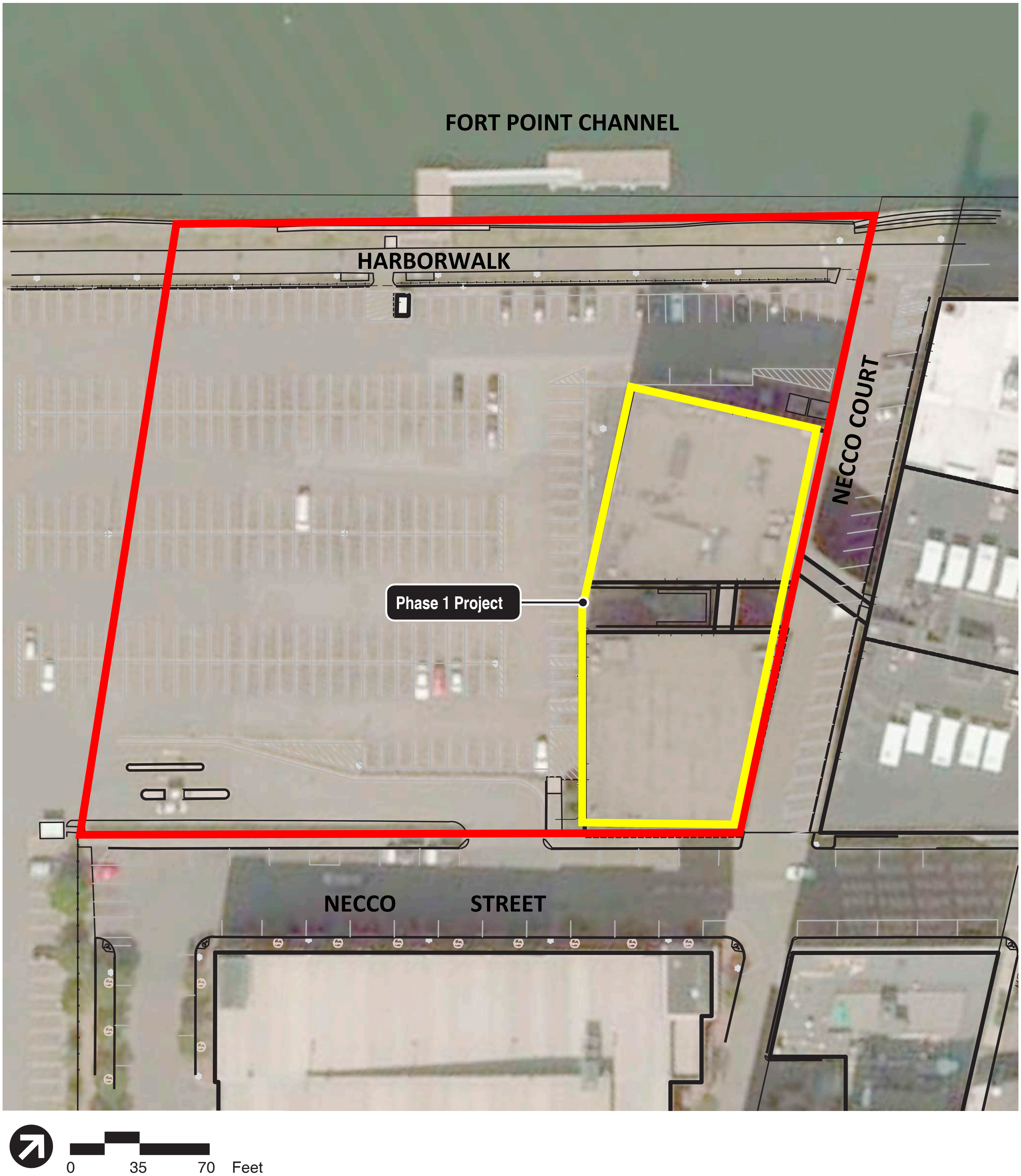


0 1000 2000 Feet

Existing Buildings
Planned 100 Acres Buildings
Future Open Space
Project Buildings
Public Use
Sidewalk/Plaza

Figure 1.8
Alternative B

GE Headquarters Project
Boston, Massachusetts



Source: Feldman Land Surveyors

Project Site

Prepared By: VHB

Figure 1.9

Phase 1 Project Area

GE Headquarters Project
Boston, Massachusetts

2

Regulatory Context and General Information

2.1 Introduction

This chapter summarizes the local planning and regulatory controls and anticipated permits and approvals applicable to the Project.

2.2 Planning Context

2.2.1 100 Acres Master Plan

The Fort Point District 100 Acres Master Plan (the "100 Acres Master Plan") was prepared in 2006 by the BRA and the Fort Point Channel Working Group, and adopted by the BRA, to provide a framework for the future development of the 100 Acres. The planning area for the 100 Acres Master Plan is bounded by the Fort Point Channel and Dorchester Avenue to the west, Summer Street to the north, the South Boston Bypass Road/Haul Road to the east, and West First Street and West Second Street to the South. The primary goals of the 100 Acres Master Plan were to create a vibrant 24-hour mixed use neighborhood, enhance the existing South Boston neighborhood and promote access to shared natural resources, all while protecting the viability of industrial and manufacturing uses.

The Project Site is located within the northwestern corner of the planning area, and is the first waterfront parcel to be developed within the 100 Acres. Refer to Figure 2.1 for the 100 Acres Master Plan area in relation to the Project Site. The 100 Acres is governed by a PDA Master Plan adopted by the Boston Zoning Commission pursuant to Article 80C of the Code, which establishes the zoning framework recommended by the 100 Acres Master Plan. The 100 Acres Master Plan is further implemented by a Memorandum of Agreement between the real estate owners and the BRA, as well as the South Boston Waterfront District Municipal Harbor Plan, which is implemented by DEP through the Chapter 91 licensing process.

PDA Master Plan and MOA

The 100 Acres Master Plan was codified through the Boston Zoning Commission's approval of the Master Plan for Planned Development Area No. 69, South Boston/100 Acres as amended to date (the "PDA Master Plan"). The Proponents of the PDA Master Plan were the several owners of the real estate included in the 100 Acres planning area operating pursuant to an Amended and Restated Memorandum of Agreement ("MOA") with the BRA, also dated January 10, 2007.

The MOA, among other things, allocates responsibility for the phased construction and long term maintenance of open spaces within the 100 Acres. Construction of new open spaces and infrastructure improvements as described in the PDA Master Plan are allocated to specific development parcels, including the Project Site. As described in the PDA Master Plan provided in Appendix E, the Project Site is made up of development Parcels G1, G2 and G3. Although Parcel G1, will become public open space rather than a building, the following open space and infrastructure improvements will be provided, consistent with the MOA as well as the PDA Master Plan:

› Construction of open spaces HW1 and partial FT1.; and
› Necco Street Improvements.

In addition to these improvements, the Project will also provide a new GE Plaza, a pedestrian-only open space, rather than the "New Street" identified in the MOA. The Project also provides additional open space on a portion of HW2, although not required by the MOA. Open space requirements of the PDA Master Plan and the MOA are discussed in greater detail in Chapter 5 and illustrated on Figures 5.4 and 5.5. Amendments to the PDA Master Plan and MOA will accommodate the following changes to the 100 Acre Master Plan:

› Changing the G1 parcel from building to open space:
› Changing the New Street to the pedestrian-only GE Plaza; and
› Clarifying the area of open space HW1, HW2 and FT1.

2.2.2 South Boston Municipal Harbor Plan

The Municipal Harbor Planning regulations (301 CMR 23.00) allow municipalities to tailor Chapter 91 standards and, in particular, those related to height, setback, and open space. These Chapter 91 standards may be amended through a municipal harbor plan ("MHP"), provided that the substitute requirements or amplifications proposed by the municipality are not only consistent with the mandate of Chapter 91 to protect and preserve the rights of the Commonwealth's residents in the tidelands, but are also otherwise consistent with the Chapter 91 Waterways regulations. These substitute provisions, in some cases, require implementation of additional public benefits beyond the standard provisions, known as "offsetting provisions."

In 2000, the Massachusetts Secretary of the Executive office of Energy and Environmental Affairs ("EEA") approved the South Boston Waterfront District MHP ("South Boston MHP") that encompassed tidelands of South Boston extending along the Fort Point Channel and the Boston Inner Harbor from West 4th Street at the southern end of the Fort Point Channel to Pier 4 east of Fan Pier. In 2009, the Boston Redevelopment Authority ("BRA") proposed to amend the South Boston MHP to refine the regulatory framework for a portion of the South Boston Waterfront within the area of the 100 Acres Master Plan, which includes the Project Site. The South Boston MHP Amendment ("MHP Amendment") was approved by the Secretary of Energy and Environmental Affairs in October of 2009. As a result, activities proposed within this area are also subject to the provisions of the MHP Amendment. Refer to Figure 2.2 for the MHP Amendment area in relation to the Project Site. An analysis of the MHP Amendment offsetting provisions and associated Project compliance is presented in Chapter 5, Wetlands and Waterways.

2.2.3 South Boston Waterfront Sustainable Transportation Plan

The South Boston Waterfront Sustainable Transportation Plan, published in 2015 by the Massachusetts Convention Center Authority, Massachusetts Port Authority, the City of Boston and the Massachusetts Department of Transportation, in collaboration with A Better City, provides a vision for the South Boston Waterfront to define and prioritize transportation system investments, influence travel behaviors, and improve the public realm. The plan seeks to transform the South Boston Waterfront into a neighborhood that;

- Supports a broad cross-section of the region's economic drivers, including:
  - Traditional maritime and industrial trades
  - Innovative economy/incubator businesses
  - Financial, legal, and technology sectors
  - Convention and tourism business and related services
  - Arts and culture
- Provides residential space and quality of life for a diversity of Boston's residents.
- Is a world renowned, memorable, and accessible destination for tourists, conventioneers, and visitors alike.

The plan recommendations include: improving regional access, expanding community connections, enhancing internal waterfront mobility, improving the public realm, implementing supportive management strategies and policies, and maintaining a state of good repair. Consistency with the South Boston Waterfront Sustainable Transportation Plan is detailed in Chapter 8, *Transportation*.

2.2.4 Fort Point Channel Watersheet Activation Plan

The 2002 Fort Point Channel Watersheet Activation Plan (FPCWAP) was a cooperative planning effort by the BRA, the Fort Point Channel Abutters Group, and the Fort Point Channel Working Group, which identified a number of public amenities which were recommended to activate the Fort Point Channel. The

FPCWAP contemplates public uses in the "Seawall Basin", the area south of Summer Street, including rowing, canoeing, racing, water taxiing, youth programs, water festivals, lantern festivals, paddle boating, kayaking, floating islands, floating art, floating horticultural displays, an art barge, model boat racing, light festivals and displays, a floating park, fountains, a pedestrian bridge, a small boat program, an interpretive water trail and tidal art. The FPCWAP also recommends elements that could be used by DEP as a menu to fulfill standard baseline requirements under Chapter 91, as well as substitute requirements such as amplifications and offsets identified in the MHP Amendment.

The existing public landing and Harborwalk are examples of such amenities which resulted from the development and implementation of this plan. A summary of the Project's support of the goals and objectives of the FPCWAP is presented in Chapter 5, *Wetlands and Waterways*.

2.3 Zoning Controls/Planned Development Area

As noted, a portion of the Project will be on land owned by MassDevelopment (through an affiliate) and leased to GE and a portion on land owned by GE. Development projects on land owned by MassDevelopment are exempt from municipal zoning and ordinance regulations pursuant to M.G.L. c. 23G. As such, the redevelopment of the Brick Buildings is exempt from review by the BRA and other City agencies. Nevertheless, to ensure cooperation and coordination between the Proponents and the City of Boston, the Proponents have agreed to voluntarily submit the entire Project to the City of Boston's Article 80 review process and obtain certain other local permits and approvals as set forth herein.

The Project Site is within an area governed by the PDA Master Plan as adopted by the BRA on August 10, 2006 and by the Boston Zoning Commission ("Zoning Commission") effective January 10, 2007. The PDA Master Plan sets forth the planning objectives for the 100 Acres, and provides the use, density and height controls which form the zoning framework for creation of a lively, 24-hour mixed use neighborhood comprised of residential, commercial, industrial, retail, restaurant, cultural and other uses. The Project Site will be the subject of a Development Plan that is subject to review by the BRA and the Zoning Commission (the "PDA Plan") pursuant to the provisions of Article 3-1A and Article 80C of the Zoning Code. The PDA Plan will provide specific zoning controls for the Project Site which are consistent with those of the PDA Master Plan. The PDA Plan, which will be submitted to the BRA subsequent to this EPNF/EENF, will set forth the proposed location, appearance and dimensions of the Project, as well as the proposed parking accommodations and landscaping and other improvements to be undertaken, and also describes access to public transportation, loading and delivery accommodations, and proposed uses at the Project.

The site of the New Building comprises Parcel "G3" as depicted on Exhibit I to the PDA Master Plan provided in Appendix E, with a maximum height of 180 feet. The Brick Buildings comprise Parcel "G2" as depicted on said Exhibit I and described in Table 2 of the PDA Master Plan. The PDA Master Plan provides for permitted rooftop additions to existing buildings (see PDA Master Plan at Page 9), as proposed for the Brick Buildings. Parcel "G1" as shown on Exhibit I to the PDA Master Plan is part of the Project Site; that Parcel G1 will become open space available to the public, instead of a building with a maximum height of 80 feet, as allowed under the PDA Master Plan. Creation of this open space area will afford enhanced public access to the City's waterfront. As a consequence of this change, the Proponents are also submitting concurrently with this EPNF/EENF, a proposed amendment to the PDA Master Plan to reflect the change in use of most of Parcel G1 from a development site to open space use. As previously discussed, the proposed uses at the Project will include a range of office, research and development, restaurant, retail, and cultural uses, as well as accessory parking uses. The uses at the Project may also include accessory banking (ATM machine) and service uses (e.g., laundry/dry-cleaning/cobbler/tailor drop-off/pick-up location(s)) and uses ancillary to all of the foregoing uses, all of which are permitted by the PDA Master Plan. The Project has also been designed to conform to the height and density requirements of the PDA Master Plan.

2.3.1 Article 80 Large Project Review

The Project will undergo Large Project Review pursuant to Article 80 of the Code. The Proponents filed a Letter of Intent ("LOI") with the BRA on June 23, 2016 (refer to Appendix C for a copy of the LOI). To maximize coordination between Article 80 and MEPA review processes, the Proponents have filed a combined EENF/EPNF.

2.4 Massachusetts Environmental Policy Act

The Project is subject to MEPA review because it exceeds a review threshold pursuant to:

1. 301 CMR 11.03(3)(a)(5) as it requires a new Chapter 91 license for a non-water dependent use which occupies more than one acre of tidelands,
2. 301 CMR 11.03(6)(b)(13) – Generation of 2,000 or more new ADT on roadways providing access to a single location,
3. 301 CMR 11.03(10)(b)(a) – Demolition of any exterior part of any Historic Structure listed in or located in any Historic District listed in the State Register of Historic Places or in the Inventory of Historic and Archaeological Assets of the Commonwealth, and
4. Requires the state actions described in Section 2.7 below.

2.5 Chapter 91 Jurisdiction

Chapter 91 codifies the Massachusetts Public Waterfront Act which preserves and protects certain rights within existing and filled tidal waters and lands. The New Building requires a new license under Chapter 91 because it includes work within historically filled tidelands and meets the regulatory criteria listed in 310 CMR 9.05(1) for activities requiring a license.

The renovation of the Brick Buildings is within Chapter 91 jurisdiction, however it is not subject to new licensing as there is an existing Amnesty License (DEP No. 9342a) issued pursuant to 310 CMR 9.22(3). The proposed work will be performed under and Administrative Consent Order. A detailed description of Project compliance with the Chapter 91 regulations is presented in Chapter 5.

2.5.1 Public Benefits Determination

The regulations at 301 CMR 13.02 require a public benefits determination be made by the Secretary for any project that:

- Files an Environmental Notification Form after November 15, 2007;
- Requires an Environmental Impact Report ("EIR"); and,
- Is completely or partially located in tidelands or landlocked tidelands.

The Project meets these criteria and therefore, requires a Public Benefit Determination. The regulations require the EEA Secretary to consider the following when making a Public Benefits Determination:

- Purpose and effect of the development;
- 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; and,
- General welfare.

A description of the Project's public benefits as they relate to the above categories is provided in Chapter 5, Wetlands and Waterways.

2.6 Other Government Actions/Assistance

2.6.1 Ground Lease of the Brick Buildings from MassDevelopment

GE has entered into a purchase and sale agreement with Gillette for the acquisition of the Project Site. The Brick Buildings and adjacent open space areas will be conveyed Gillette to a wholly-owned affiliate of MassDevelopment. Thereafter, the MassDevelopment affiliate will lease the Brick Buildings and adjacent open space areas to GE pursuant to a ground lease that will expire after a term of up to twenty-two years, provided that GE shall have the right to extend such term for up to two additional periods of ten years each.

2.6.2 State Incentives

The State has offered to provide grants of up to $120 million in connection with the Project. It is proposed that grants of up to this amount will be provided to MassDevelopment by the State through the State's "MassWorks Infrastructure Program," which is authorized by MGL Chapter 23A, Section 63. The grant funds received by MassDevelopment would be used in turn by MassDevelopment to eligible costs under the MassWorks Program for land acquisition and for improvements in connection with the Project.

2.7 List of Anticipated Permits and Approvals

Table 2-1 below provides a comprehensive list of approvals and/or permits anticipated to be required for the Proposed Project.

Table 2-1 Anticipated Project Permits and Approvals

Agency/Department	Permit/Approval/Action
Federal	
Federal Aviation Administration	Determination of no hazard to air navigation (buildings and cranes)
Environmental Protection Agency	National Pollutant Discharge Elimination System ("NPDES")
	Construction Dewatering Permit
	Notice of Intent Construction General Permit
	Stormwater Pollution Prevention Plan Preparation
Commonwealth of Massachusetts	
Executive Office of Energy and Environmental Affairs	Massachusetts Environmental Policy Act Review
	Coastal Zone Management Consistency Review
	Chapter 91 License
	South Boston Municipal Harbor Plan Letter of Clarification Public Benefits Determination
Executive Office of Housing and Economic Development	MassWorks Grant Agreement (with MassDevelopment)
Massachusetts Development Finance Agency	Land and Building Acquisition, Ground Lease and related agreements
Massachusetts Historical Commission	State Register Review
Massachusetts Department of Environmental Protection	Pre-construction Notices
	Asbestos Removal Notice (Brick Buildings)
City of Boston	
Boston Redevelopment Authority	Article 80B Large Project Review
	Article 80C Review – PDA Development Plan & Amendment to PDA Master Plan No. 69
	Amendment to 100 Acres Memorandum of Agreement
	Article 80 Agreements
	Demonstration Project Approval, Chapter 121B
Boston Tax Assessor	PILOT Agreement
Boston Civic Design Commission	Design Review
Public Improvement Commission	Line/Grade Approval
Fort Point Channel Landmark District Commission	Design Review (Brick Buildings)
Boston Conservation Commission	Order of Conditions
Boston Water & Sewer Commission	Site Plan Approval
Boston Transportation Department	Transportation Access Plan Agreement
	Construction Management Plan
Committee on Licenses, Public Safety Commission	Garage Permit and Fuel Storage License
Air Pollution Control Commission	Parking Permit under South Boston Parking Freeze
Inspectional Services Department	Building Permit
	Certificate of Occupancy
Boston Public Health Commission	Asbestos Removal Permit (Brick Buildings)

* This is a preliminary list of local, state and federal permits and approvals that may be sought for the Project. This list is based on current information about the Project, and is subject to change as the design of the Project evolves.

2.8 Agency Coordination

The Proponents have held several meetings with State and City agencies including EEA, DEP, BRA, FPCLDC, BTD, BWSC, and others as this filing was prepared.

2.9 Development Team

The following lists the key members of the development team for the Proposed Project:

Proponents	General Electric (GE) 31-43 Farnsworth Street Boston, MA 02210 Ann Klee ann.klee@ge.com Peter Cavanaugh peter.cavanaugh@ge.com Timothy Kruppenbacher timothy.kruppenbacher@ge.com
Proponents (continued)	Massachusetts Development Finance Agency (MassDevelopment) 99 High Street Boston, MA 02110 Marty Jones, President and CEO mjones@massdevelopment.com
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Cultural Resources	VHB 184 Walnut Street Watertown MA 02472 617-607-1590 Maureen Cavanaugh mcavanaugh@vhb.com
Traffic Engineer	VHB 99 High Street, 10th Floor Boston, MA 02110 617-728-7777 Ellen Donohoe edonohoe@vhb.com

Civil Engineer	VHB 99 High Street, 10th Floor Boston, MA 02110 617-607-2941 Rick Dupuis rdupuis@vhb.com Joseph Albani jalbani@vhb.com
Geotechnical Services	Haley & Aldrich 465 Medford Street, #2200 Charlestown, MA 02129 617-515-4647 Mark Haley mhaley@haleyaldrich.com
Historic Advisor	Wiss, Janney, Elstner Associates, Inc. 311 Summer Street, Suite 300 Boston, MA 02210 617-946-3413 Tara Ikenouye tikenouye@wje.com Anita Simon asimon@wje.com
Structural Engineer	Le Messurier 1380 Soldiers Field Road, Boston, MA 02135 617-868-1200 Peter Cheever pcheever@lemessurier.com
Wind & Glare Technical Expert	RWDI Consulting Engineers and Scientists 650 Woodlawn Road West, Guelph, Ontario, Canada N1K 1B8 519-823-1311 Derek Kelly derek.kelly@rwdci.com

Mechanical, Electrical, and Plumbing Engineer	RDK Engineers 70 Fargo Street, Suite 800 Boston MA 02210 857-221-5920 Dana Etherington detherington@rdkengineers.com Pat Murphy pmurphy@rdkengineers.com
Sustainable Design Consultant	Paladino and Company 1775 Greensboro Station Place, Suite 350 McLean, VA 22102 703-270-4919 Tom Paladino tomp@paladinoandco.com Michelle Dusseau Diller MichelleD@paladinoandco.com Kim Pexton KimP@paladinoandco.com
Landscape Architect	The Office of James Burnett 150 Staniford Street, #5 Boston, MA 02114 Cody Klein cklein@ojb.com Ryan Steib rsteib@ojb.com

2.10 Required Legal Information

2.10.1 Legal Judgments or Actions Pending Concerning the Proposed Project

To the Proponents’ knowledge, there are no legal judgments or actions pending concerning the Project.

2.10.2 History of Tax Arrears on Property Owned in Boston by the Applicant

There are no known tax arrears on property in Boston owned by the Proponents.

2.10.3 Evidence of Site Control

GE has entered into a binding purchase and sale agreement with The Gillette Company for the acquisition of the Project Site. This EPNF/EENF is being submitted with the permission of The Gillette Company.

2.10.4 Site Control/Public Easements

There is an existing easement across the Site which was taken by the BRA in 2004 to accommodate the Harborwalk.

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Source: BRA Master Plan for PDA No. 69, South Boston/The 100 Acres, January 10, 2007

Project Site

Prepared By: VHB

Figure 2.1

100 Acres Master Plan

GE Headquarters Project
Boston, Massachusetts

Source: South Boston Municipal Harbor Plan Amendment, May 2009

Project Site

Prepared By: VHB

Figure 2.2

South Boston Municipal Harbor Planning Area

GE Headquarters Project
Boston, Massachusetts

3

Urban Design

3.1 Introduction

This chapter provides detailed descriptions of the design of the Project, including its substantial public realm improvements. Within the context of the City's 100 Acres Master Plan, the Project provides the opportunity to create a new vibrant campus centered upon industrial innovation, with publicly accessible ground floor uses, an enhanced and enlivened pedestrian environment, and waterfront open space, all of which aim to activate this waterfront portion of the Fort Point Channel, including the Harborwalk.

The proposed Project design departs from the typical office prototype with the creation of an iconic design anchored in the use and expression of 21st century technology. The Project will further amplify Boston's standing as a world center of innovation that offers a unique destination not only for GE employees, but also for the general public.

3.2 Key Findings and Benefits

The key findings related to urban design include:

› The Project embodies the guiding principles of GE, emphasizing connected collaboration both as an organization and with the public in addition to being transparent as a place of innovation and knowledge sharing. Both themes will be expressed visually in the Project's architecture.

› The Project will reflect and complement the unique architectural character of the surrounding neighborhood.

› The Project will enhance the existing on-site Harborwalk with a pedestrian experience informed by both on-site public program elements and resiliency considerations.

› The Project will be characterized by extensive outdoor space to be used both by the public as well as GE-hosted events, including the GE Plaza located between the Brick Buildings and the New Building.

› The Project will feature a number of sustainability features, including a rooftop solar PV system designed as a dramatic architectural gesture (also referred to as the "Solar Veil").

3.3 Neighborhood Context

The Project's location at the intersection of Necco Street and Necco Court within the Fort Point area provides a unique opportunity to continue the revitalization of the area and realize the vision of dense and vibrant mixed-use district that reflects and complements the unique architectural character of the surrounding neighborhood. Historically the Project Site has been used for industrial purposes (the Brick Buildings) and a large portion of the Project Site (south of the existing Brick Buildings) is used today for surface parking. The Project will be sensitive to and consistent with the land uses envisioned by the 100 Acres Master Plan, including the planned open space corridors by decreasing density adjacent to the Fort Point Channel, and adding cultural and community amenities both along the Harborwalk as well as within and surrounding the Project buildings' ground floors.

The Project Site is a short walk from South Station and the restaurants and gastropubs along Summer and Congress Streets, and elsewhere in the South Boston Waterfront. In addition, the BCEC, the Rose Kennedy Greenway, the Institute of Contemporary Art, and the Lawn on D are located within walking distance from the Project Site.

One of the strengths of the Project is its proximity to public transit. It is located no more than a 10-minute walk from the Silver Line and South Station, a major transit hub to destinations all across the region, and also a short ride to Logan International Airport. The Project is also located within walking distance of the Red Line's Broadway T station.

The Project is sensitive to its context within the Fort Point area, and alongside the city's South Boston Waterfront district. Within steps of the Project, over seven million square feet of new construction is currently underway. Seaport Square, Pier 4, and the Fan Pier projects all will bring a diversity of new retail and restaurant offerings to the neighborhood, but will also provide millions of square feet of new residential and office space. In addition, these developments—combined with the Project and the other elements of the 100 Acres Master Plan—will bring new green space to the neighborhood, transforming a historic largely industrial district into a vibrant urban community.

3.4 Planning Principles and Design Goals

The Project will be a highly visible emblem of GE's vision and will be a catalyst for future development in the Fort Point area. Like a traditional headquarters, the Project will be a heroic testament to the GE organization, but the qualities that the building will celebrate are uniquely 21st-century—a spirit of transparency, a belief in the power of new thinking, an embracing of connected collaboration—that represent GE's position at the vanguard of creativity. To reinforce the continuous connection to the company's industrial history, innovation functions will be located in the Brick Buildings. The educational component of the Museum in the New Building will be a celebrated, central feature that greets employees and visitors alike with an opportunity to experience firsthand how GE's groundbreaking achievements have changed the world.

At the same time the Project will aim to align itself with the 100 Acres Master Plan while serving as a connection between the established downtown and the Fort Point area and the greater South Boston Waterfront District. The Project will be both aware and sensitive to the unique character of the Brick Buildings. Integration with the existing urban context is a natural outcome of the alignment between contemporary design perspective and the values embodied in the existing building vernacular. Enduring materials and construction, a level of tactility that conveys warmth and comfort to inhabitants, and open floor plans that maximize daylight, are timeless attributes that will firmly embed the Project in the local context.

As the Project is adjacent to the Fort Point Channel, it is designed in consideration of sea level rise, 100-year and 500-year floodplains, and overall project resiliency.

3.5 Project Design Concept

Figures 3.1a through 3.1h show the Project's conceptual floor plans. Figure 3.2 shows a cross section of the buildings with intended primary use by floor. In the proposed design, the New Building is a contextual addition to the Fort Point area, being both modern in character while reflecting the neighborhood's industrial past through its materials and exposed structure. The New Building will have entrances along its northern façade, leading pedestrians out to GE Plaza, as well as its southern façade embracing the green space envisioned as part of the 100 Acres Master Plan.

To the west of the building, along the Fort Point Channel, an extended Harborwalk and interpretative landscaping will activate the waterfront. The Brick Buildings situated on the northern edge of the Project Site will be accessed via a new atrium with access from GE Plaza. In addition, the ground floor of the Brick Buildings is envisioned to have folding glass partitions that can be opened to the outside, engaging pedestrians passing through GE Plaza.

Central to the design is the theme of community connectivity, both among GE employees and with the public at large. As such, GE Plaza is envisioned to be a vital and dramatic physical connection traversing the Project Site, a publicly accessible place that can foster relationships among GE employees and members of the public across the Project's three buildings. This occurs both at the ground floor via GE Plaza as well as at the buildings' sixth floor, where a pedestrian bridge connects the New Building and the Brick Buildings.

The ground level experience throughout the Project embodies the vision of a connected community. For both employees and members of the public, the moment one steps onto the pathways leading from the Harborwalk through the contextual landscape, one begins to feel part of the GE "ecosystem." Upon approach of the buildings, a visitor's attention is immediately drawn to the sustainable features, which serve to extend the Museum experience from the New Building within while celebrating the Project's many innovative technological, sustainable, and resilient elements. As you arrive at GE Plaza, you are greeted by an expansive outdoor space between the two buildings, covered by a translucent canopy that protects employees and visitors from the elements as they approach the buildings' main entrances. Once inside the New Building, employees and visitors are at the heart of the GE ecosystem, surrounded by the sights and sounds of the company's activity, greeted with views to the Museum, up steps towards the workspaces, and glimpses into incubator and co-working spaces and beyond.

The New Building will be topped by a major architecture gesture of PV panels, dubbed a "Solar Veil," which will celebrate GE's commitment to sustainability. The Solar Veil will be angled over the top of the building. The Solar Veil will extend down the southern façade of the building to increase the surface area exposed to the sun.

Another key element of the design is the expression of transparency. The New Building will be especially striking as approached from the Financial District across the Summer Street Bridge. Not only will the New Building be identified by a large, lit GE sign on the roof of the New Building, but one also will notice a "vertical village," a glass-enclosed core connecting the collaboration and incubation spaces across floors and teams, enabling work activities to happen seamlessly and effortlessly among GE employees. This central feature of the New Building, as visible in the massing diagram in Figure 3.3, will celebrate GE's commitment to transparency and collaboration, a commitment visible to the greater Boston community.

The ability for the GE Headquarters Campus to foster relationships both among the employees and the greater community is a critical driver of the Project. The Project's many public spaces will enable the fostering of relationships among the city's secondary education, higher education, and startup communities with the business and venture capital communities. Together, GE hopes to be one of the many catalysts in greater Boston, cementing the region as an international nexus of innovation and knowledge sharing strengthened by multi-institutional collaboration.

3.5.1 Building Massing and Height

Figure 3.3 presents the New Building massing diagram as it relates to the renovated Brick Buildings. The massing of the New Building is rectilinear in form and conforms to requirements outlined in the MHP Amendment. At the sixth floor, the New Building has a 40-foot cantilever extending over the west side of the building, creating a dramatic, covered outdoor area at the base of the building while the top occupiable floor will feature an outdoor roof terrace for building users. The sixth floor of the New Building will also feature a pedestrian bridge connecting it to the top of the atrium between the Brick Buildings.

The massing of the Brick Buildings will remain substantially unchanged with the exception of an addition of a glass atrium enabling the two buildings to function as one. Modern infrastructure including new elevator cores will be installed.

Figures 3.4a through 3.4f present the proposed building elevations of the Brick Buildings and the New Building. The New Building will reach up to 12 stories; approximately 180-feet in height to the top of the highest occupiable floor. A new gathering space will be added on the top floor of the Brick Buildings, raising the total height from approximately 69-feet to approximately 87-feet. The proposed building height and massing are designed to be optimally flexible for the many uses of the buildings, including corporate workspace, innovation spaces, Maker Space, and collaborative work areas.

3.5.2 Roof Terraces and Green Roofs

The roof terraces planned for the top of the New Building as well as the northernmost Brick Building will serve as integrated spaces for collaboration and respite for the employees of GE. A primary objective of the design will be the creation of flexible, multi-purpose areas to accommodate a multitude of uses and users. Both roof areas will be “work enabled” and encourage employees to periodically disconnect from indoor work spaces. Providing a variety of flexible seating types will allow groups to congregate and collaborate, as well as allowing individuals to disconnect and relax, promoting employee health and wellness. The design will encourage usage of the spaces throughout the year by utilizing landscape elements to create favorable environmental conditions. Trees or alternative canopy structures will provide shade during the summer, while planters and tree clusters will guard against prevailing winds during the winter.

In addition to social and health benefits, the roof terraces will also include green roof areas which serve environmental and ecological functions. The terrace planned for the Brick Buildings will include approximately 2,900 square feet of intensive planting area which will provide ample space for native plantings to flourish, as well as collecting and infiltrating storm water. The New Building will feature approximately 3,400 square feet of planting area at full depth, with the remaining terrace area dedicated to social spaces and areas of relaxation utilizing extensive systems. Native plantings will serve aesthetic and ecological functions, working to create an environment welcoming of both people and wildlife. The ample extent of the roof terrace areas will serve to reduce heat island effect from the existing site condition.

3.5.3 Character and Exterior Materials

The character and materials of the New Building represent the highly efficient, modern, and cutting-edge occupant. A portion of the New Building will be topped by a green roof terrace as further described above. The base of the New Building anchors the building through a highly-transparent lobby façade and inviting entrance canopies that give the building a pedestrian scale and public transparency. The spaces then open onto GE Plaza, the expansive outdoor space covered by a translucent canopy.

The Brick Buildings will largely remain as-is on the exterior with a new glass and steel atrium that will connect the Brick Buildings. The design of this element will aim to celebrate the buildings' historic nature while enabling the buildings and its occupants to function as one.

Figure 3.5 presents the palate of exterior building materials being considered for the Project. Throughout the Project, materials that can patina, or result in a worn-in look will be used including wood or wood-like materials, zinc metal, and masonry anchoring the proposed buildings to the adjacent historic neighborhood. The New Building will also express its structure on the exterior, reflecting the industrial past of the Project Site.

Figures 3.6a through 3.6g depict the Project from various angles, including the approach along the Harborwalk coming from the Summer Street Bridge, the approach to GE Plaza, and various views from Necco Street.

3.5.4 Signage

The exterior signage for the Project remains in design. The New Building is envisioned to have a large GE Monogram on its roof which will be approximately 30 feet by 30 feet in size and will sit on top of the mechanical penthouse of the New Building. GE's Monogram, the company logo enduring over a century, is intended to show the company's presence in Boston. It will be visible to Downtown Boston and the Financial District as seen in Figure 3.6f, a project rendering from the Summer Street Bridge. Design of the proposed GE monogram sign and the Solar Veil is underway. The Solar Veil will project above the mechanical penthouse roof and the sign may be set on top of the building's mechanical penthouse. While final arrangement and height of both the sign and the Solar Veil are yet to be finalized, their maximum height will be approximately 245 feet above the Project Site's average grade. The sign will be metallic in material and will be illuminated. The proposed design of the GE signage will be aware of and sensitive to the historic nature of the nearby Boston Wharf Company sign. A smaller GE monogram logo will also adorn both ends of the proposed canopy over GE Plaza. These illuminated glass and metal signs will be approximately 7 feet in diameter and will signify one's arrival to the heart of the Project and the entrances to the New Building and the Brick Buildings. Figures 3.7a through 3.7c detail the exterior signage as it has been designed to date.

Arrival to the Site over the Summer Street Bridge is a major project consideration. As pedestrians approach the Project Site, they will clearly see the GE Monogram on the New Building's roof. As they approach closer and arrive on site, they will notice enhanced Harborwalk signage. Outdoor public spaces will also include interpretative signage detailing the Project's use of native species plants, unique sustainability and technological elements, and resiliency features. Signage throughout the landscape will aim to educate visitors of not only the proposed site conditions, but also of the rich history of the Fort Point area and that of GE.

3.6 Public Realm Improvements

Figure 3.8 presents the proposed landscape and public realm improvements planned for the Project. With the Project Site's most recent significant use being surface parking, the Project aims to create a more sustainable, active and connected environment to tie into the surrounding Fort Point area. Enhancements to the public realm will serve to inspire people to visit the Project Site while the interior spaces will be developed with public engagement in mind. Figures 3.9a and 3.9b present detailed plans for the proposed public realm improvements. Utilization and enhancement of the existing Harborwalk will create a vibrant waterfront that attracts people to the area and provides strong connections to and through the Project Site. Beyond the waterfront improvements, the Project will provide spaces for public engagement, which may include public art installations, activities and other amenities. The public realm will also be a showcase for sustainable technology as part of stormwater collection and treatment. Native plantings will serve aesthetic and ecological functions, working to create an environment welcoming of both people and wildlife. The Project will serve as a catalyst for the activation of the 100 Acres Master Plan and serve as a benchmark for future waterfront and public realm development in the greater Fort Point Area.

Approximately 75 percent of the ground floor of the Project will be publicly-accessible elements including the Museum and gift shop that will be an evolving display of the inspirational story of the past, present, and future of GE. The Project will also feature a coffee bar and bistro-style restaurant facing the Fort Point Channel, both open to the public. Finally, the ground floor of the Project will also be defined by various co-working and innovation spaces including Brilliant Labs, a space which will invite Boston Public School high school students to explore careers in Science Technology Engineering and Math ("STEM").

One of the centerpieces of the Project will be the new GE Plaza that will be a new pedestrian-only access "street" located between the Brick Buildings on Necco Court and the New Building (Figure 3.9a). The GE Plaza is envisioned to be a physical connection between Necco Street and the Harborwalk, inviting pedestrians to move through the Campus and engage the waterfront. Refer to Figures 3.10a and 3.10b for perspective views from within the GE Plaza.

3.6.1 Waterfront Access Enhancements

The existing Harborwalk will be integrated throughout the Project Site as an interpretive pathway that accommodates the casual passerby as well as employees and visitors. Expanding the Harborwalk from 12 to 18 feet in width, and the use of improved and inviting materials, will provide a welcoming and accessible experience for all users, including pedestrians and cyclists. The enhancements to the existing Harborwalk will create an active and vibrant waterfront that connects to and through the Campus. Visitors and employees alike will have access to a network of amenity spaces along the waterfront leading into the public GE Plaza. Program components may include creative seating elements, interpretive signage, waterfront overlooks, Fort Point Channel access, and native plant displays (Figure 3.9b).

The Project's public program elements on the ground floors will be accessed via main entry doors at each building. The ground floor of the Brick Buildings will feature folding glass partitions facing the GE Plaza, and when open, can invite the public into the External Maker Space to experience the innovation and creation within.

3.6.2 Pedestrian Access/Circulation and Accessibility

Sidewalks approaching the proposed Project will be upgraded and made accessible. There are three main entryways for the Project buildings: one on both the northern and southern facades of the New Building and one at the southern side of the Brick Buildings at the atrium. Additional access will be available via folding glass partitions along the ground floor of the Brick Buildings facing the GE Plaza between both buildings.

The Proponents and design team have made efforts to provide accessibility throughout the Project. All entrances will be ADA-accessible per code requirements, and approximately 30 parking spaces for GE employees will be provided in the basement of the New Building and at least one space will be van-accessible. Refer to Appendix D for a completed Accessibility Checklist for the Project, as required for Article 80 review submissions.

The Project includes significant improvements to public open space and pedestrian accessibility. The Project Site is well served by existing public transportation as it is located approximately 0.5 miles (10-minute walk) from South Station, a transportation hub that provides access to the MBTA Red Line, Silver Line, Amtrak, and seven commuter rail branches. The Project Site is also well served by water-transportation with water-taxi stops at nearby Fan Pier. Linkage to these public transportation nodes will be established through the use of wayfinding signage.

As shown in Figure 3.11, primary pedestrian access to the Project Site is anticipated to come from the northwest from the Summer Street Bridge. Users will utilize the enhanced Harborwalk when entering the Project Site from Summer Street with multiple points of access to and through the Project Site. Accessible routes into the interior of the Project Site will integrate with primary circulation points from all directions. Each level of landscape will accommodate all users with continuous circulation throughout the Project Site. A primary goal of the proposed Site design will be to provide universal access without the use of intrusive elements such as walls and handrails. Each major point of entry to the buildings, old and new, will be ADA-accessible.

3.6.3 Proposed Landscape Plan

The exterior public spaces throughout the Project will be designed and programmed to attract and inspire. The Harborwalk will be integrated throughout the Project Site as an interpretive pathway that accommodates the casual passerby as well as Campus visitors. The enhancements will aim to create an active and vibrant waterfront that connects to and through the Project. Visitors and employees alike will have access to a network of amenity spaces along the waterfront leading into the central plaza space.

The flexible green space will be a zone of ecological and leisure activity (Figure 3.9b). A series of stormwater management strategies will be mixed in with leisure activities encouraging public use as well as employee engagement. As an integrated Campus, the Project will provide a variety of spaces for public interaction and engagement, as well as more passive areas, for leisure and relaxation. Key aspects of the landscape will aim to provide areas for seamless integration with interior ground level programming creating a porous ground plane for the Project Site.

GE Plaza between the Brick Buildings and the New Building will be a pedestrian-only plaza. Program components of the GE Plaza will aim to encourage socialization and integrate with interior spaces. GE Plaza will serve as the life center of the Project and an activity hub for employees and public users alike.

Indoor/outdoor connectivity throughout the Project will aim to further enliven the public spaces with visibility into GE's innovation and collaborative work spaces in addition to public programming.

3.6.4 Necco Street Improvements

The Project seeks to enhance the Necco Street corridor providing an inviting entry to the Campus. These improvements will include expanding the public sidewalk width and creating a more pedestrian-friendly streetscape. A drop-off area will also provide a safe point of vehicular access without interrupting traffic flow. The enhanced condition will feature streetscape elements consistent with the character of the Fort Point area as well as Boston Complete Streets guidelines. Street furnishings, such as benches or seating elements will be included where possible to serve as a resting place for pedestrians, while street lighting elements will be provided where necessary. Bike racks will also be provided where space allows to encourage alternative transportation to the Project Site. All of these elements will aim to enhance the pedestrian and vehicular experience on Necco Street while remaining true to the character of the Fort Point area and its industrial history.

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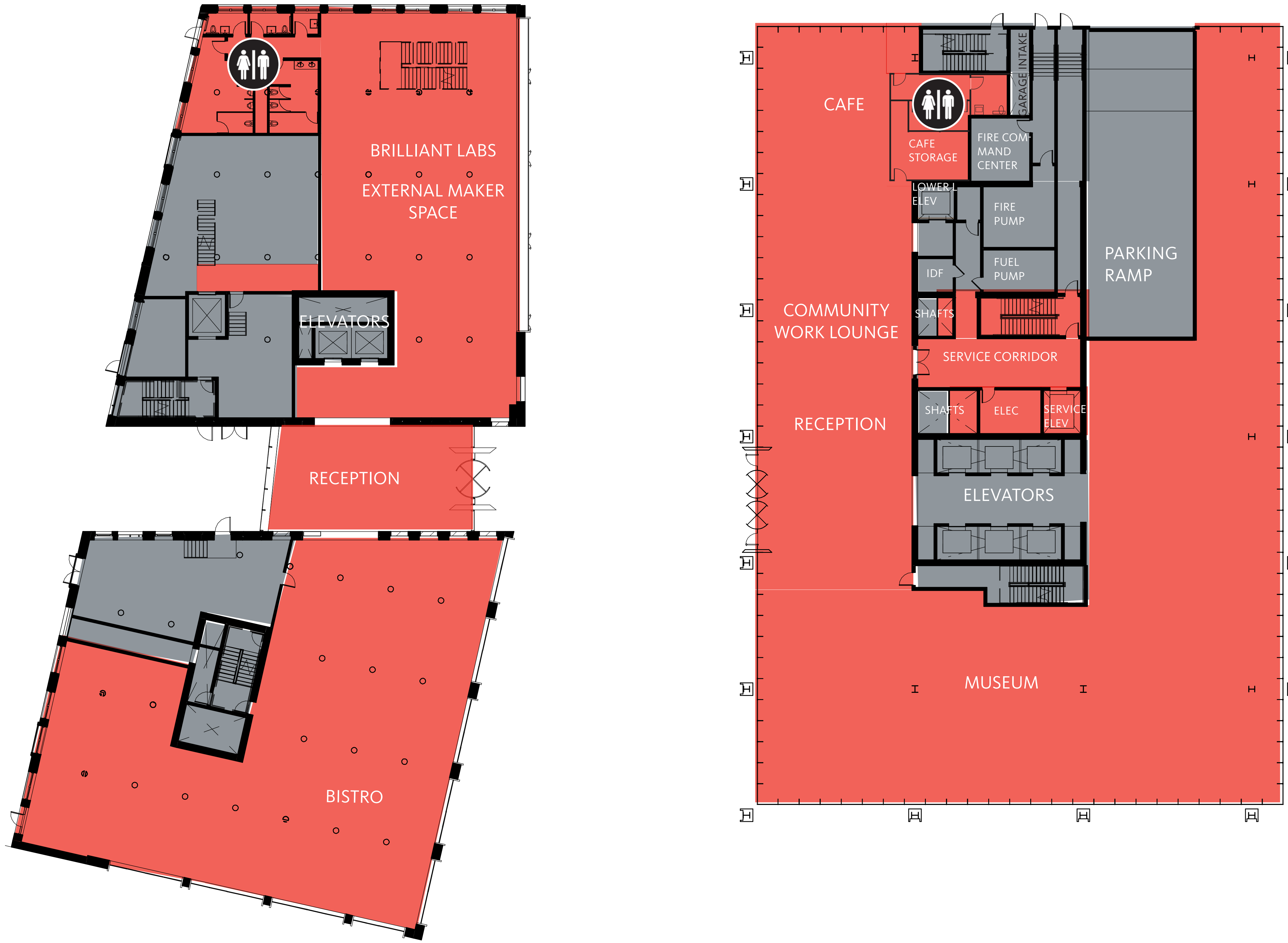
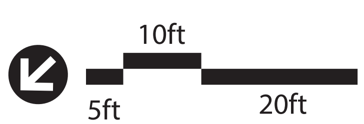
- WORKPLACE
- EMPLOYEE COMMUNITY SPACE
- CONVENER SPACE
- MAKER SPACE
- PUBLIC SPACE
- BUILDING CORE / BACK OF HOUSE
- ROOF TERRACE
- VERTICAL VILLAGE

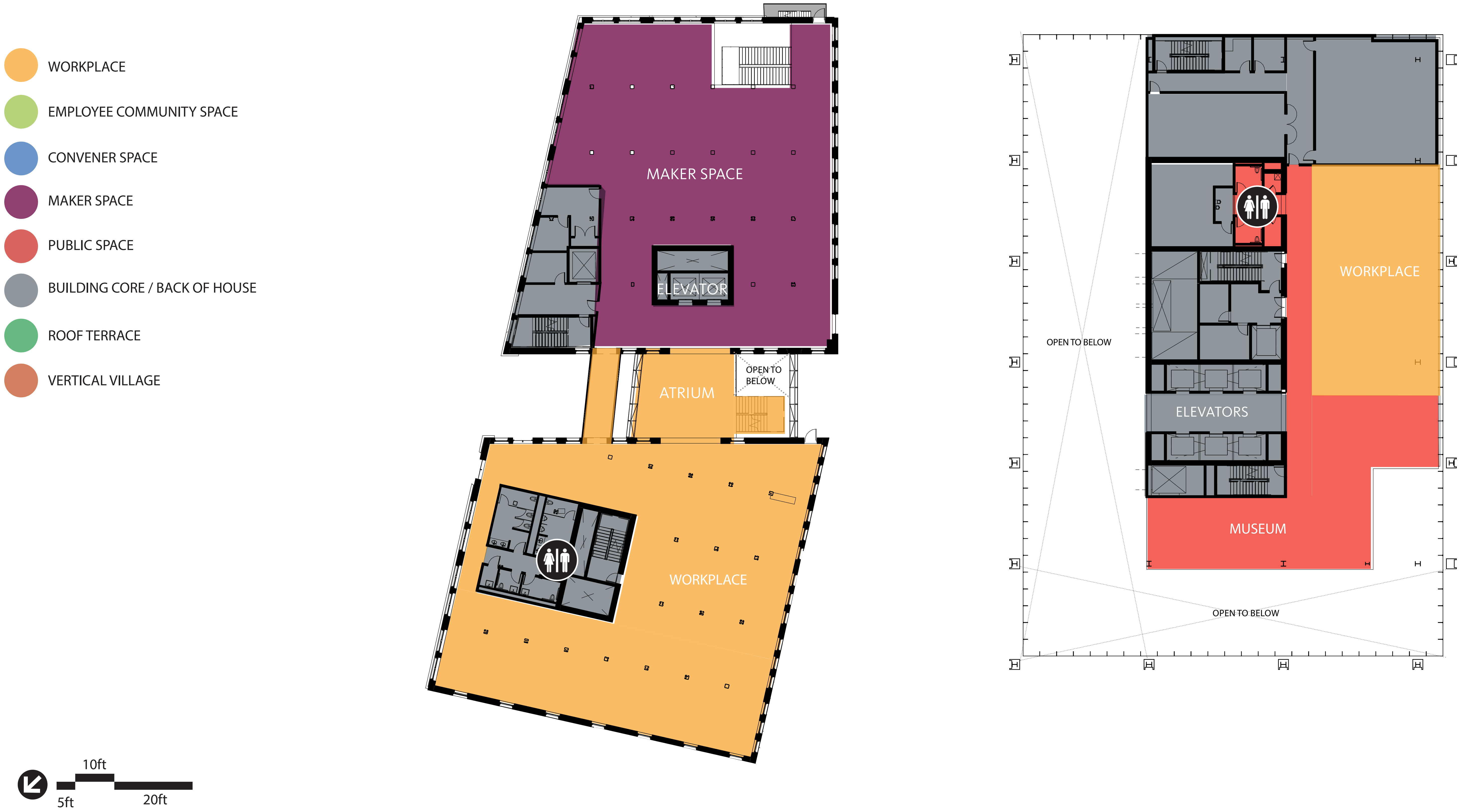




Gensler

Figure 3.1a
New Building + Brick Buildings Ground Level Plan

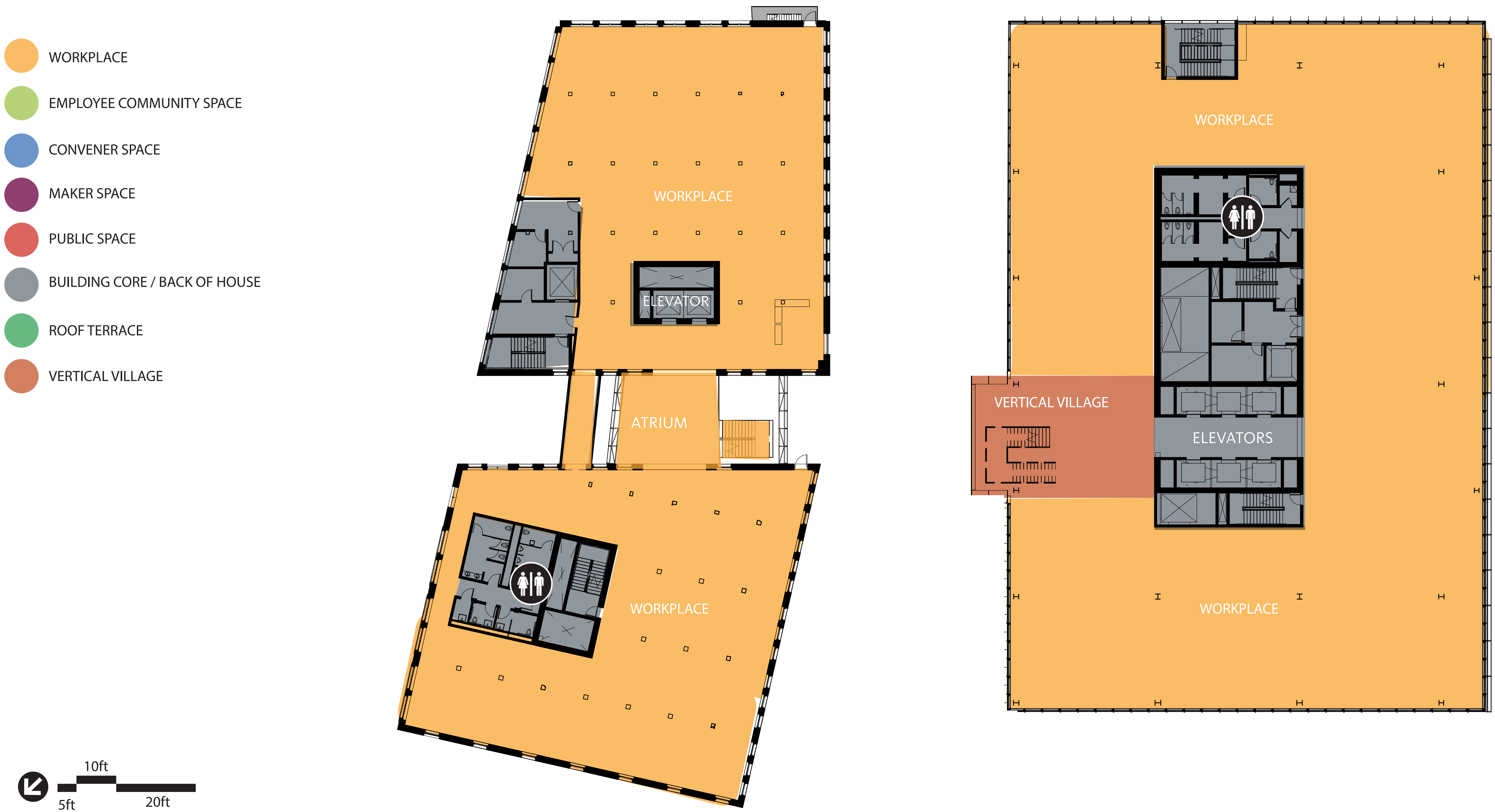
GE Headquarters Project
Boston, Massachusetts



Gensler

Figure 3.1b
New Building + Brick Buildings Second Level Plan

GE Headquarters Project
Boston, Massachusetts

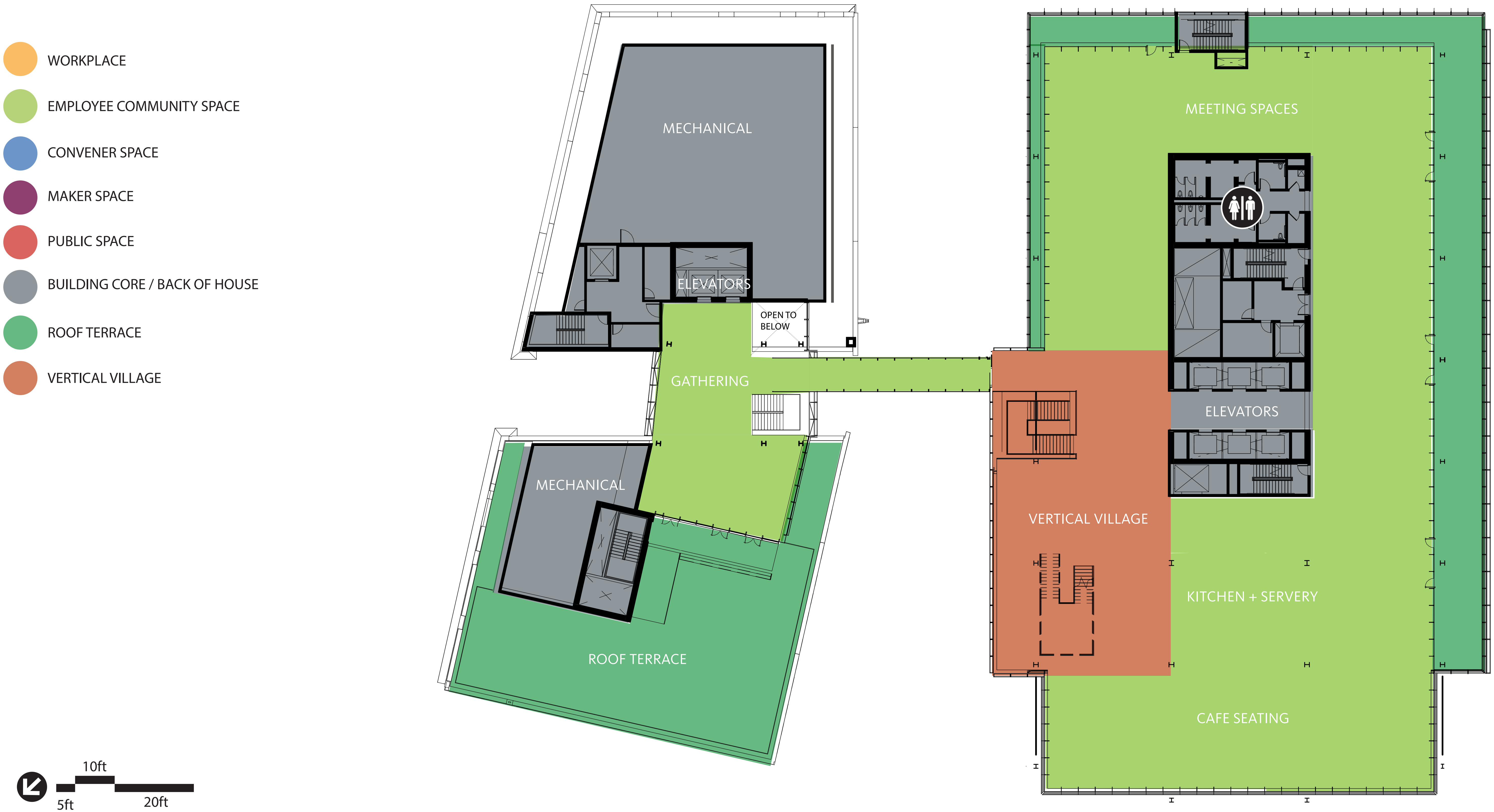


Gensler

Figure 3.1c
New Building + Brick Buildings Third Level Plan - Typical Office

GE Headquarters Project
Boston, Massachusetts

- WORKPLACE
- EMPLOYEE COMMUNITY SPACE
- CONVENER SPACE
- MAKER SPACE
- PUBLIC SPACE
- BUILDING CORE / BACK OF HOUSE
- ROOF TERRACE
- VERTICAL VILLAGE

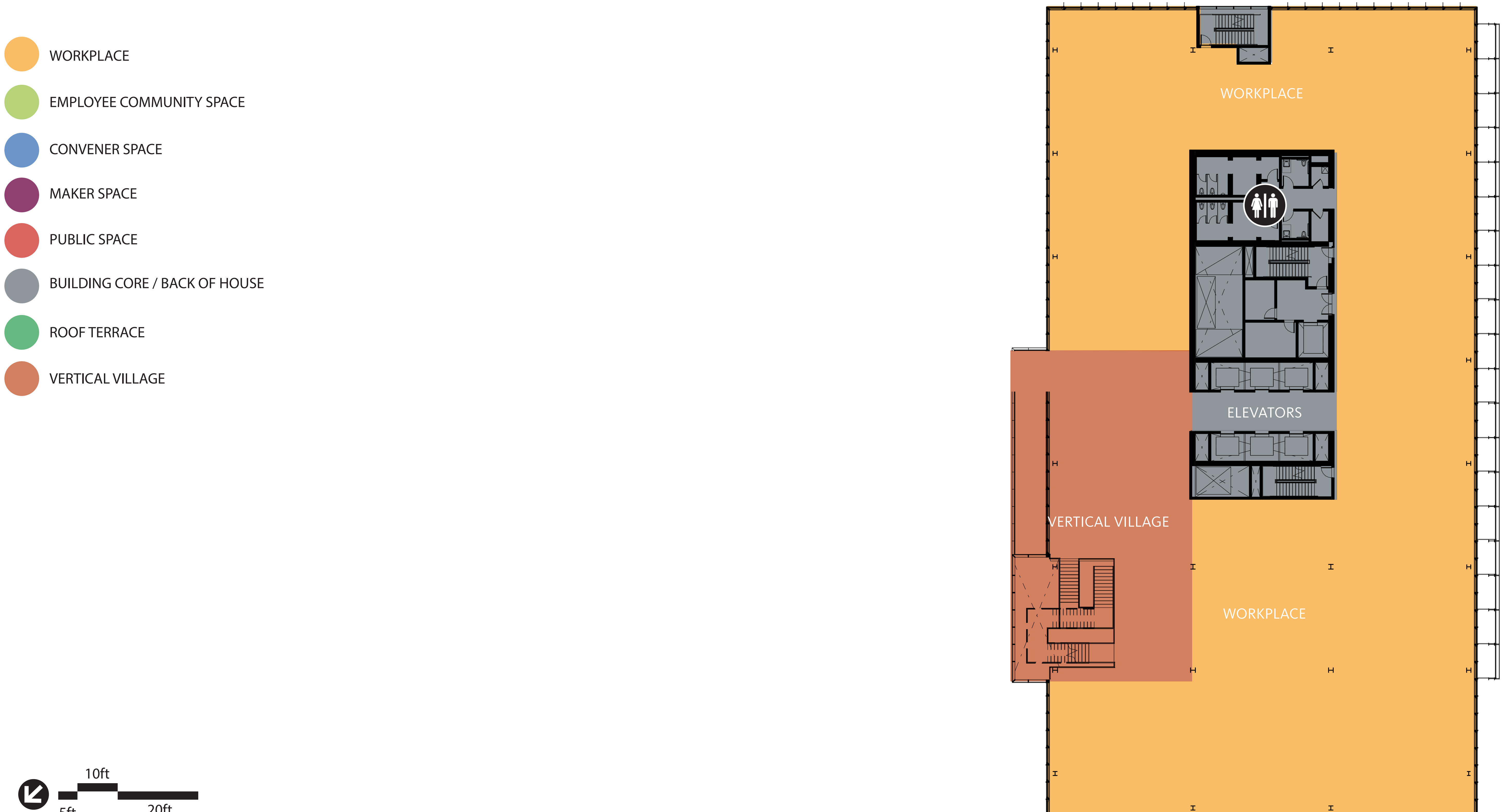


Gensler

Figure 3.1d

New Building Sixth Level Plan + Brick Buildings Roof Plan

GE Headquarters Project
Boston, Massachusetts

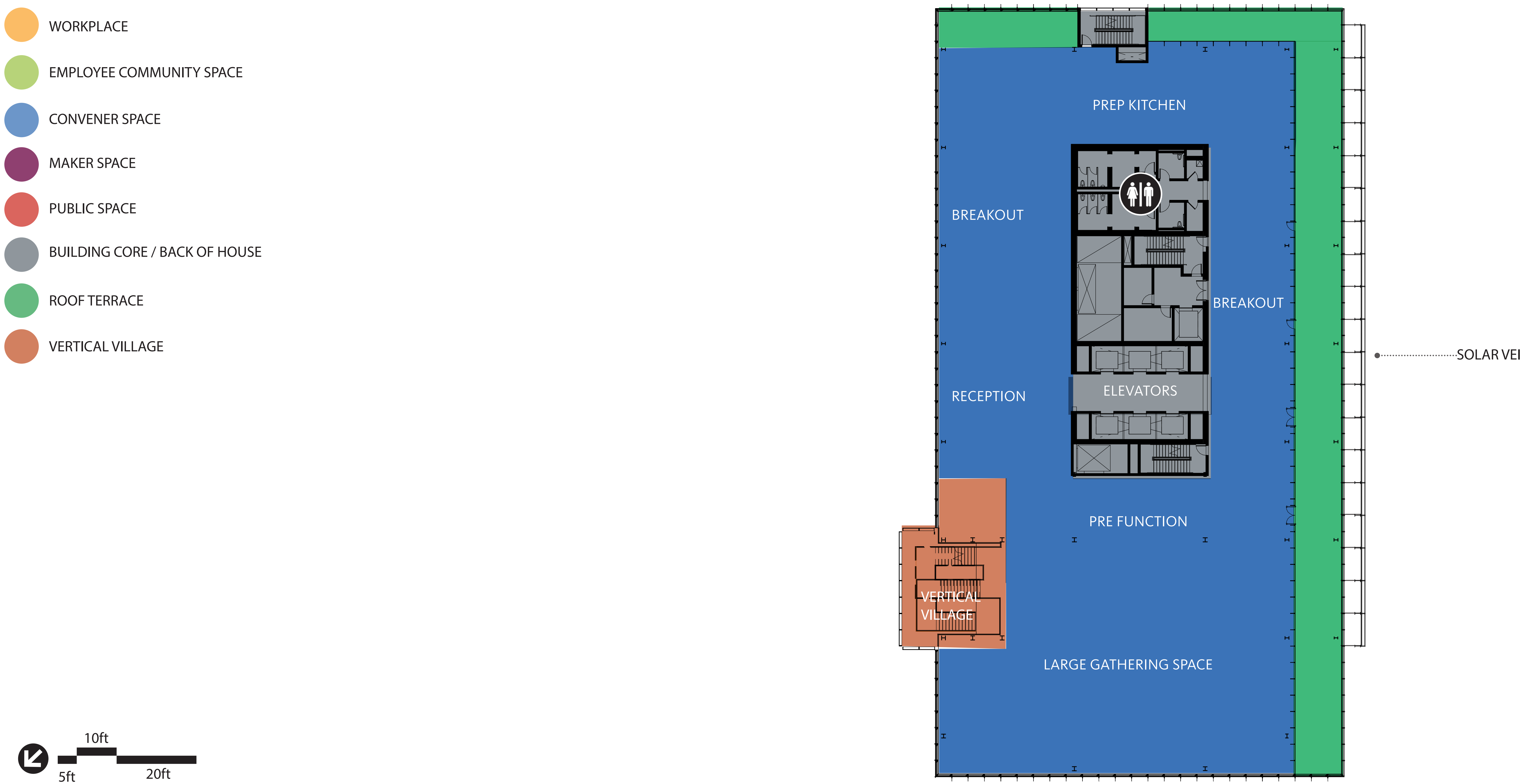


Gensler

Figure 3.1e

New Building Eighth Level Plan

GE Headquarters Project
Boston, Massachusetts



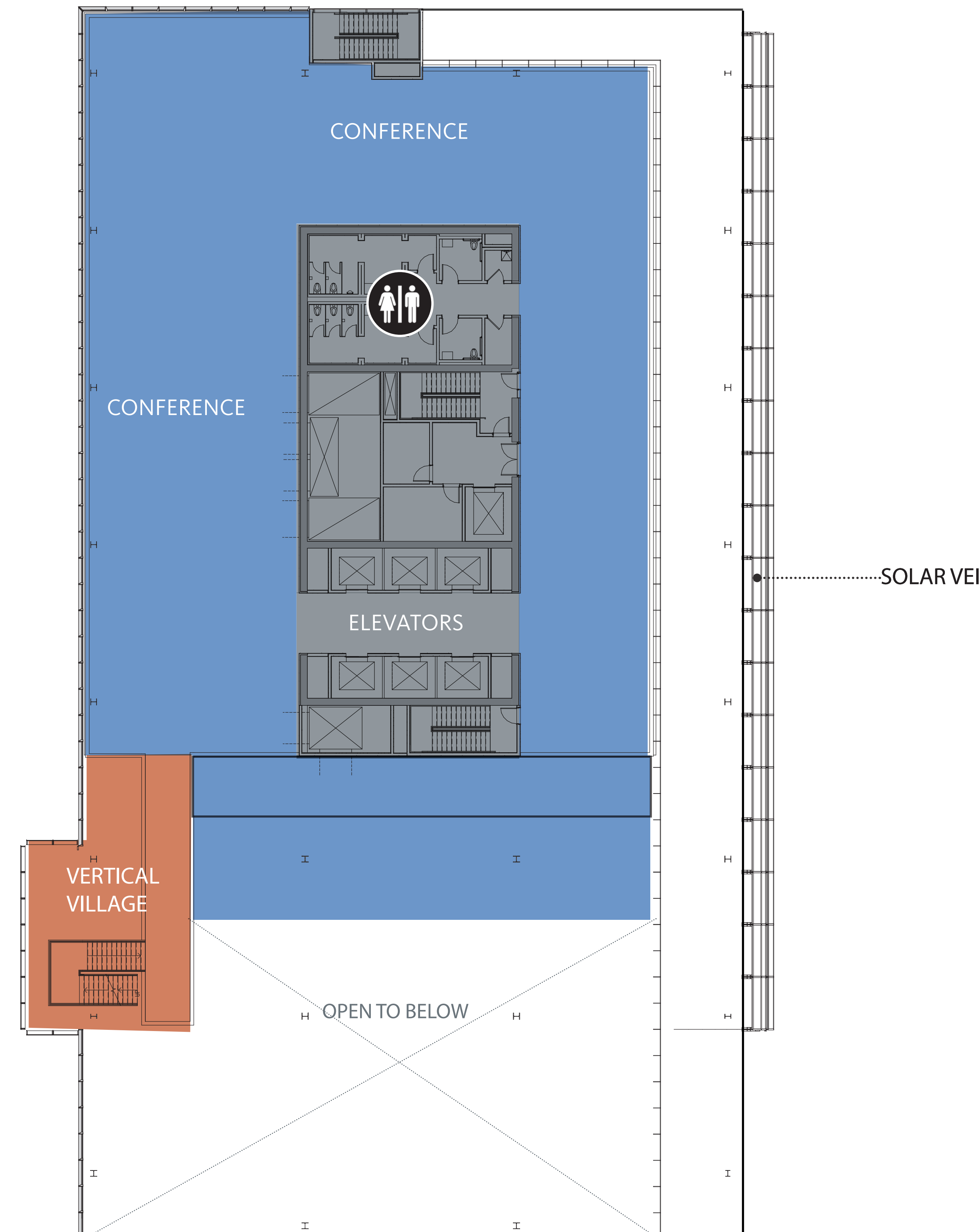
Gensler

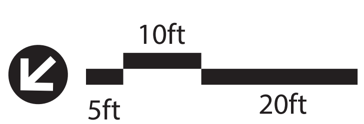
Figure 3.1f

New Building Eleventh Level Plan

GE Headquarters Project
Boston, Massachusetts

- WORKPLACE
- EMPLOYEE COMMUNITY SPACE
- CONVENER SPACE
- MAKER SPACE
- PUBLIC SPACE
- BUILDING CORE / BACK OF HOUSE
- ROOF TERRACE
- VERTICAL VILLAGE





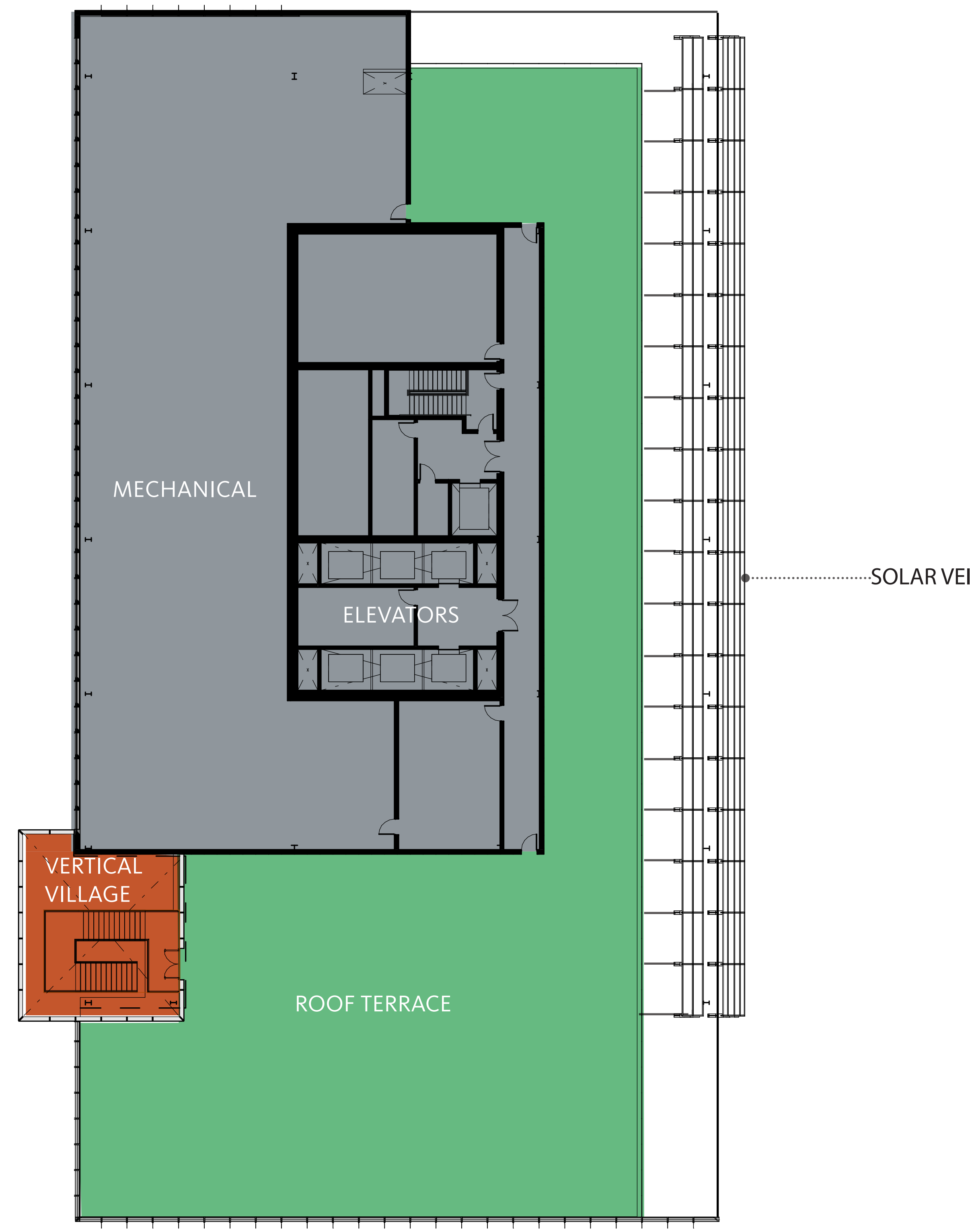
Gensler

Figure 3.1g

New Building Twelfth Level Plan

GE Headquarters Project
Boston, Massachusetts

WORKPLACE
EMPLOYEE COMMUNITY SPACE
CONVENER SPACE
MAKER SPACE
PUBLIC SPACE
BUILDING CORE / BACK OF HOUSE
ROOF TERRACE
VERTICAL VILLAGE



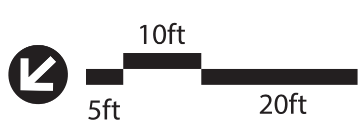


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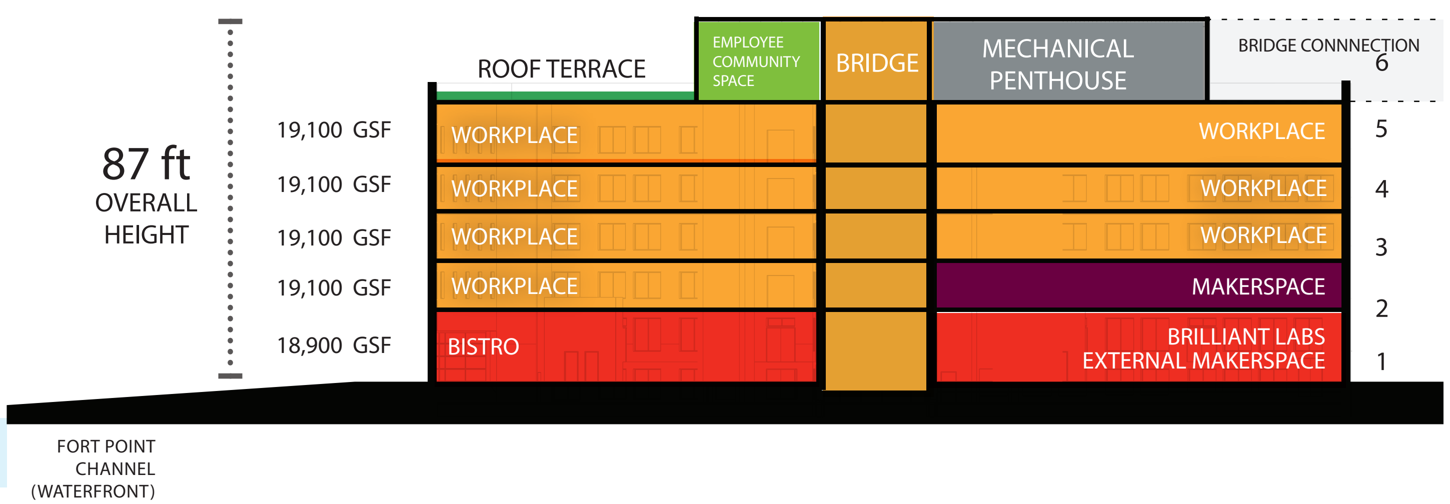
Figure 3.1h

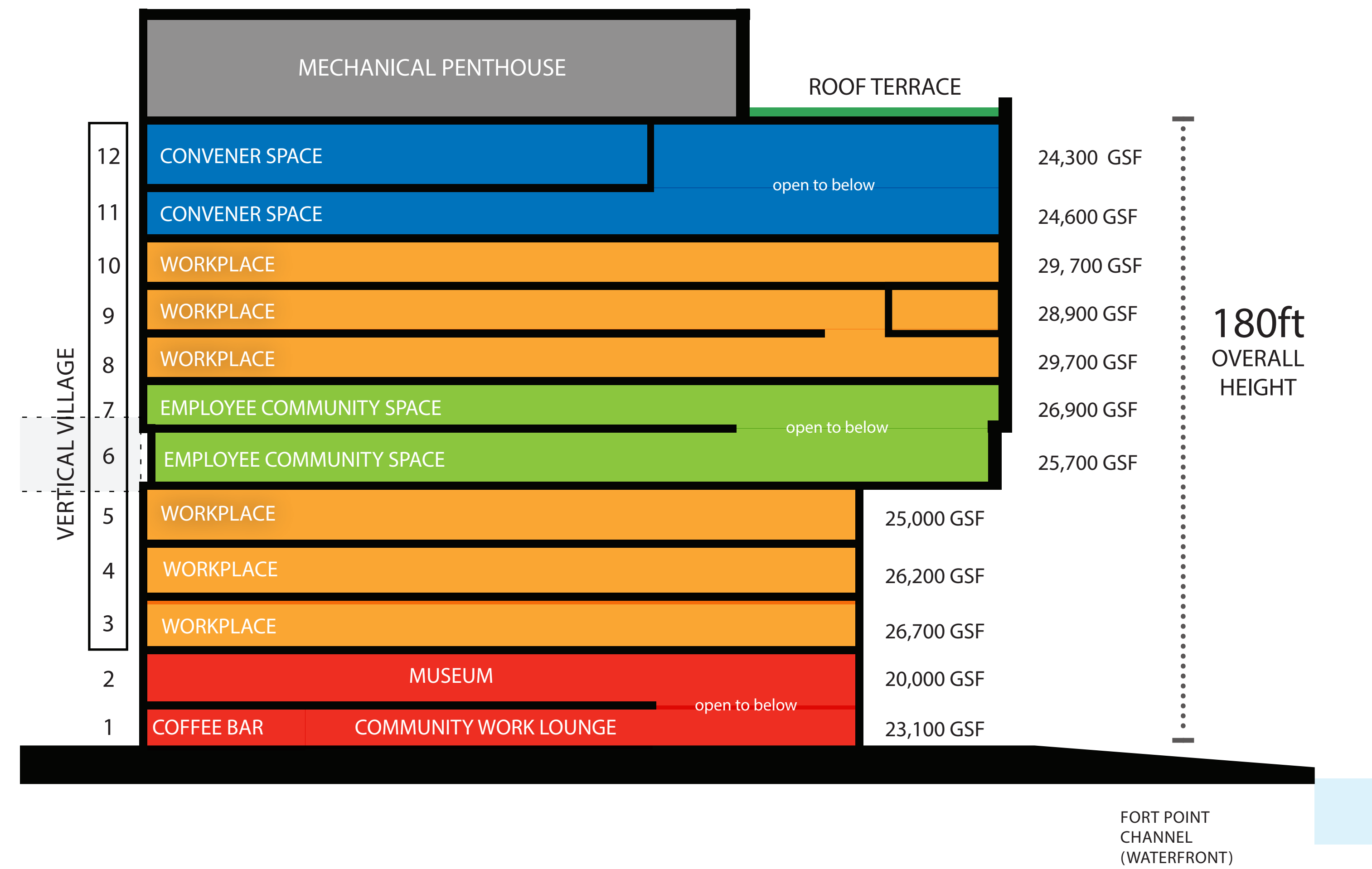
New Building Roof Plan

GE Headquarters Project
Boston, Massachusetts

KEY:

- WORKPLACE
- EMPLOYEE COMMUNITY SPACE
- CONVENER SPACE
- MAKER SPACE
- GROUND FLOOR PUBLIC SPACE
- BUILDING CORE / BACK OF HOUSE
- ROOF TERRACE





SECTION CUT DIAGRAM:

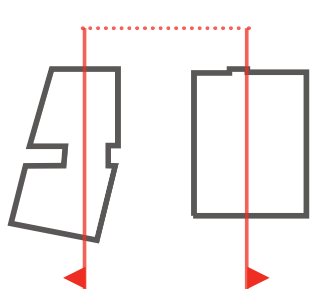


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Figure 3.2

Building Section w/ Intended Uses

GE Headquarters Project
Boston, Massachusetts

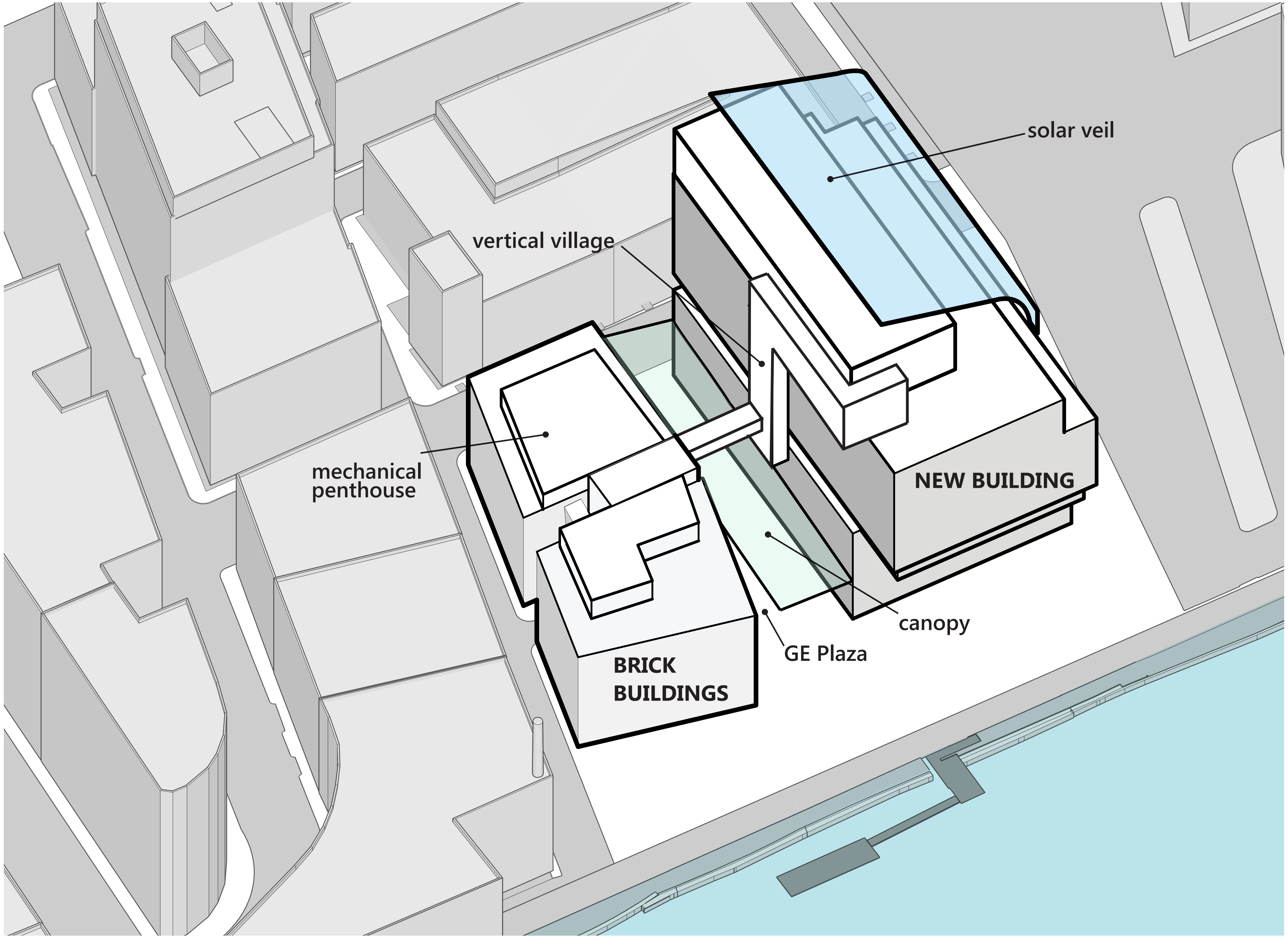

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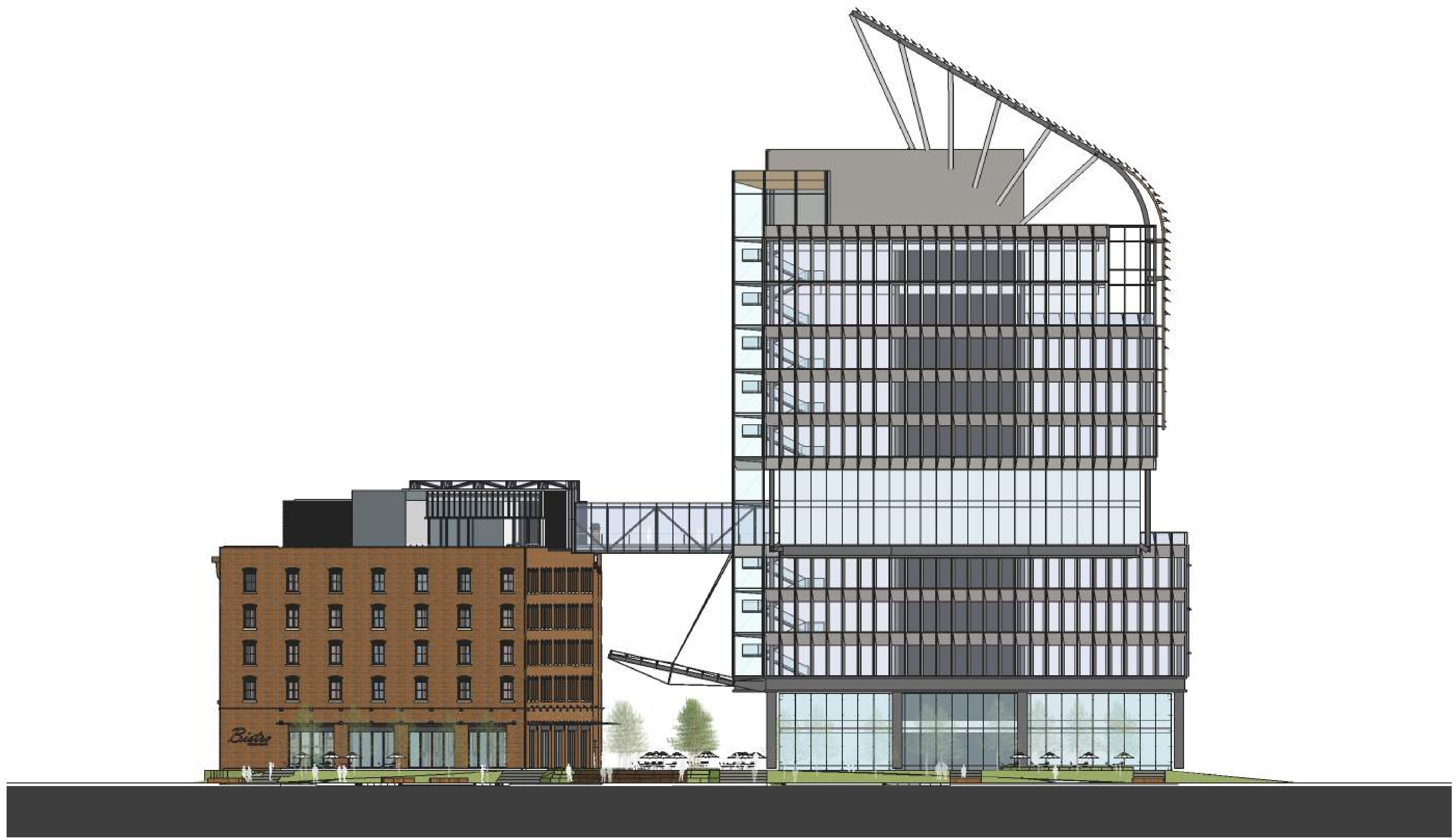
Figure 3.3

Building Massing Diagram

GE Headquarters Project
Boston, Massachusetts



***signage not shown**

Gensler

Figure 3.4a

Building Elevation - West Facade

GE Headquarters Project
Boston, Massachusetts

***signage not shown**

Gensler

Figure 3.4b

Building Elevation - East Facade

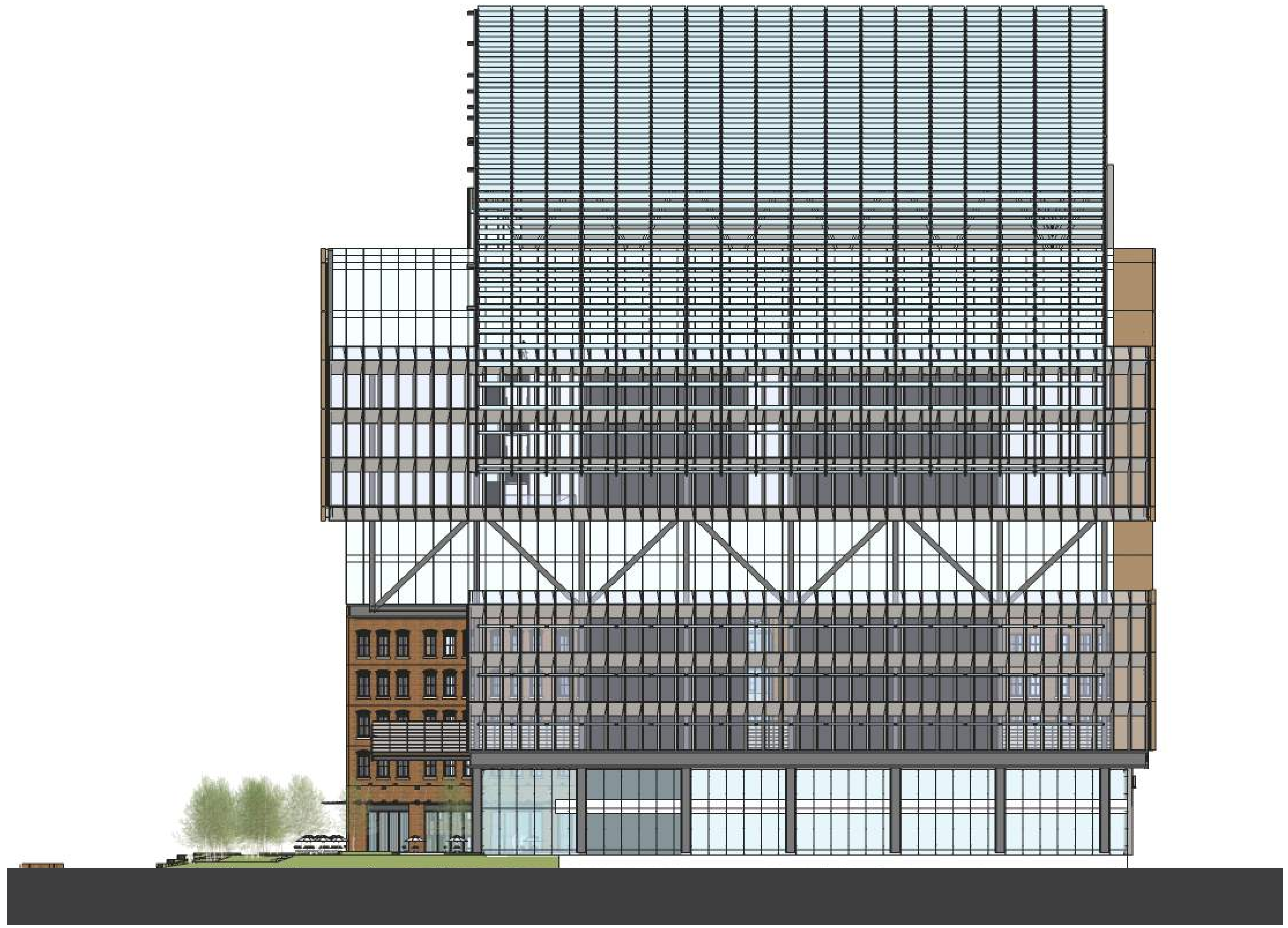
GE Headquarters Project
Boston, Massachusetts

*signage not shown

Gensler

Figure 3.4c
Building Elevation - North Facade Brick Buildings

GE Headquarters Project
Boston, Massachusetts



***signage not shown**

Gensler

Figure 3.4d

Building Elevation - South Facade

GE Headquarters Project
Boston, Massachusetts

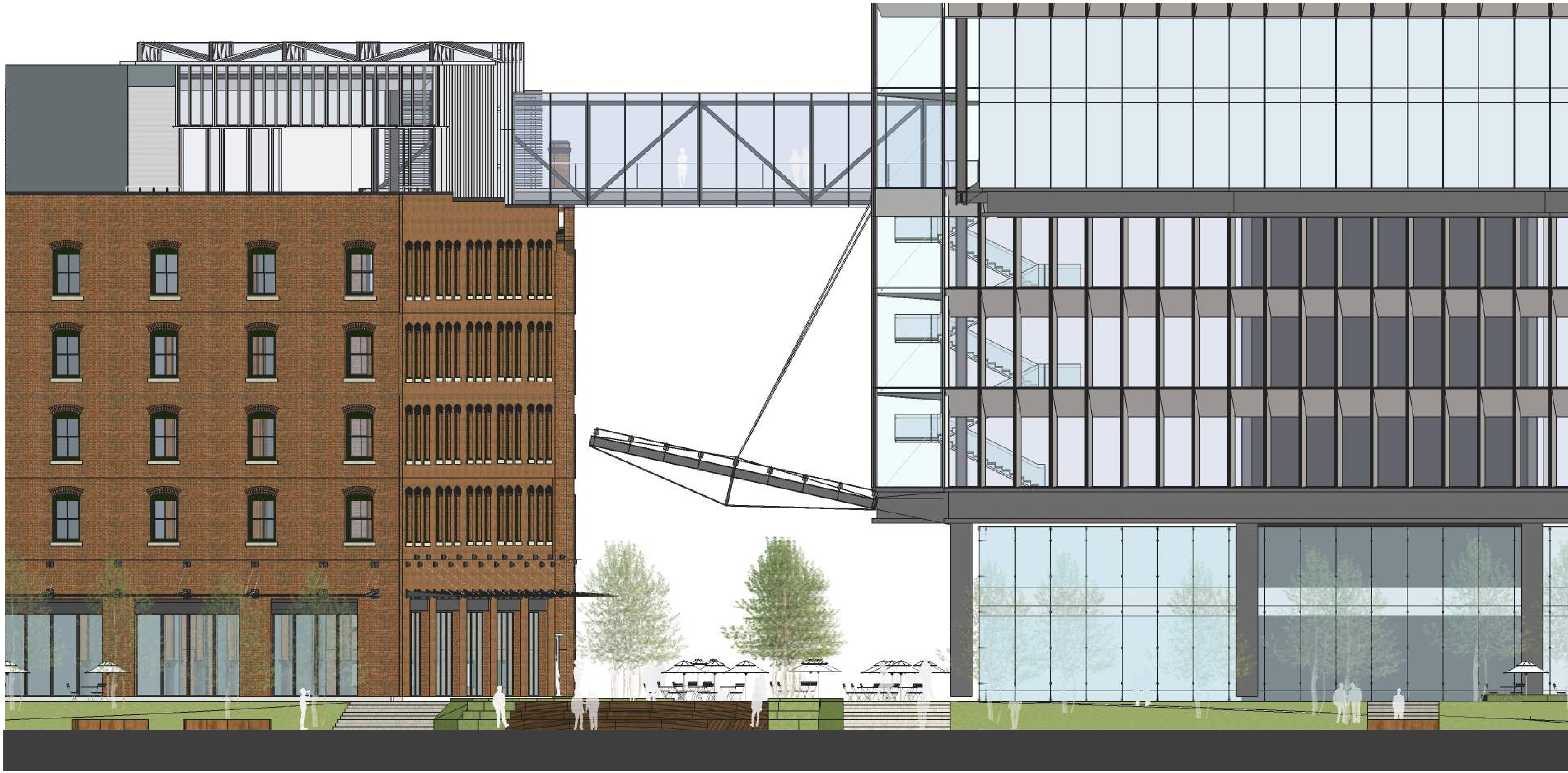
signage not shown

Gensler

Figure 3.4e

Elevation - East Facade - GE Plaza
New Building (left), Brick Buildings (right)

GE Headquarters Project
Boston, Massachusetts



***signage not shown**

Gensler

Figure 3.4f

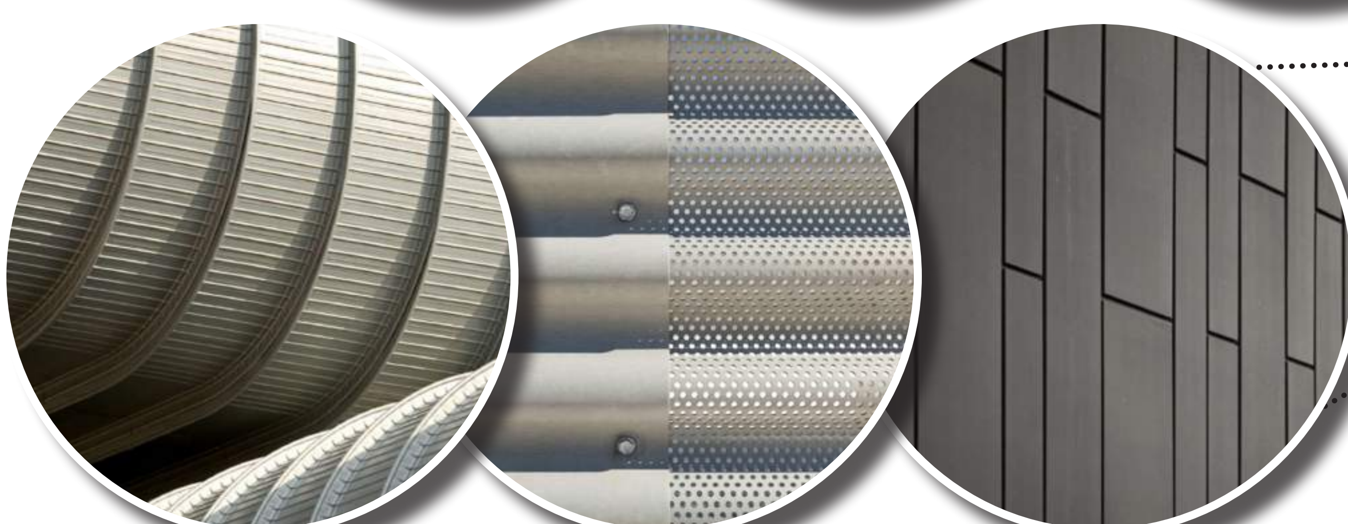
Elevation - West Facade - GE Plaza
New Building (right), Brick Buildings (left)

GE Headquarters Project
Boston, Massachusetts

WOOD FINS

EXPOSED STRUCTURE

ZINC METAL



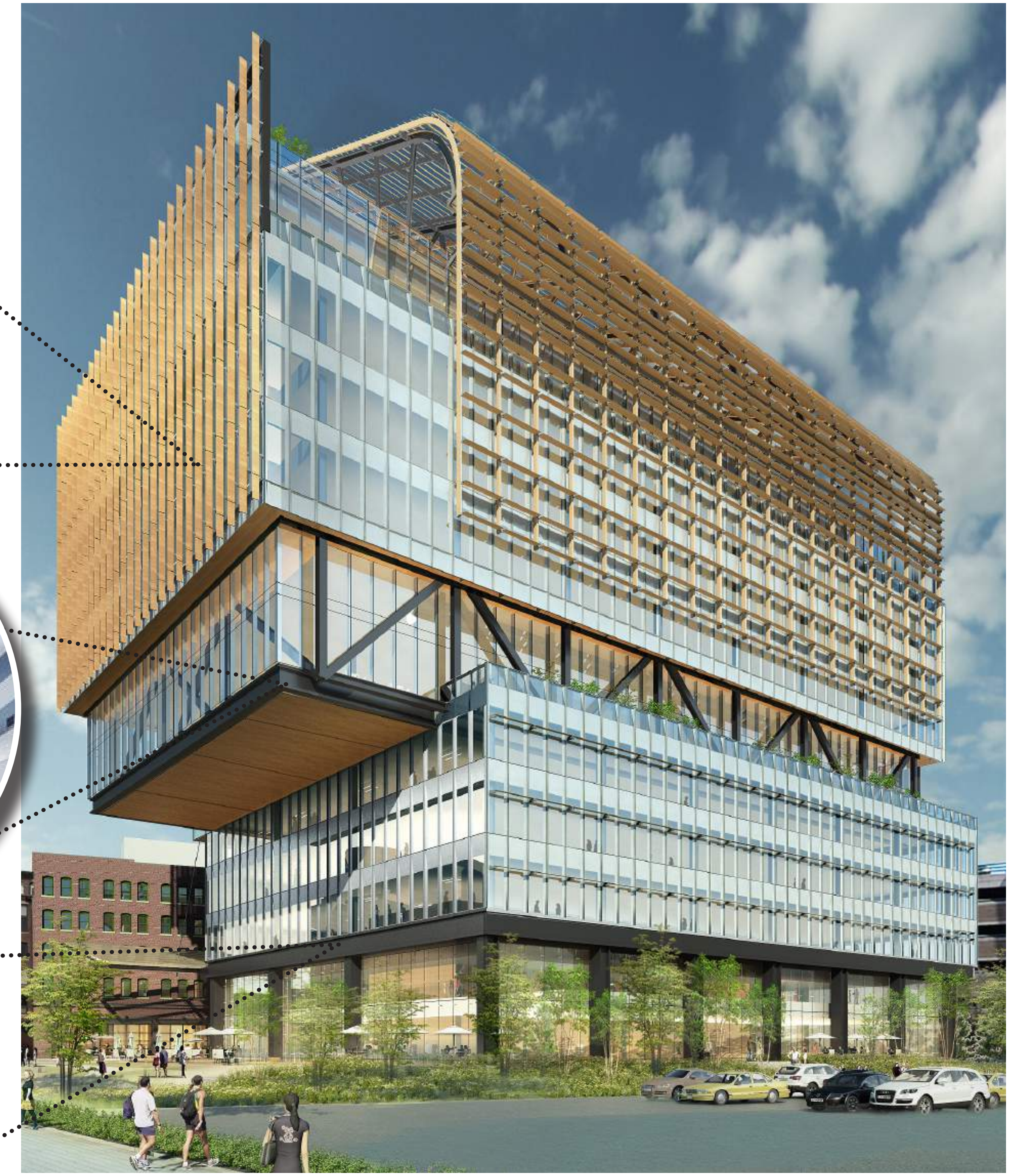


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Figure 3.5

Exterior Materials Concepts

GE Headquarters Project
Boston, Massachusetts

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Figure 3.6a
Project Rendering - Approach from Summer Street Along Harborwalk

GE Headquarters Project
Boston, Massachusetts

Gensler

Figure 3.6b
Project Rendering - Looking East Through GE Plaza

GE Headquarters Project
Boston, Massachusetts

Gensler

Figure 3.6c
Project Rendering - View of Solar Veil from Harborwalk

GE Headquarters Project
Boston, Massachusetts

Gensler

Figure 3.6d
Perspective - New Building from Brick Buildings Roof Terrace

GE Headquarters Project
Boston, Massachusetts

Gensler

Figure 3.6e

Perspective - Brick Buildings Roof Terrace from New Building

GE Headquarters Project
Boston, Massachusetts

Gensler

Figure 3.6f

Project Rendering - View From Summer Street Bridge

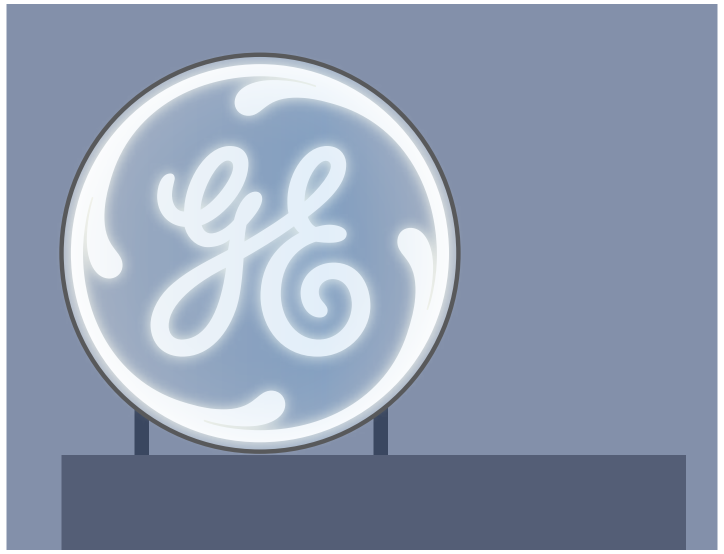
GE Headquarters Project
Boston, Massachusetts

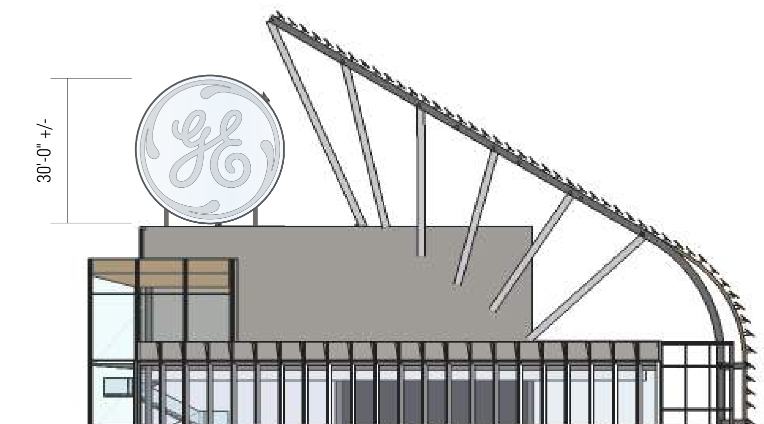
Gensler

Figure 3.6g

Project Rendering - View From Summer Street Bridge at Night

GE Headquarters Project
Boston, Massachusetts






Fabricated Monogram with Glass or Acrylic face with etched and paint filled graphic.

Mounted to building with structure.

Double-sided.

Edge illumination.

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Figure 3.7a

Exterior Signage - Building Top Sign

GE Headquarters Project
Boston, Massachusetts

10” thick dimensional Monogram made with GE material (i.e. Silicon Carbide).

Double-sided.

External spot illumination.

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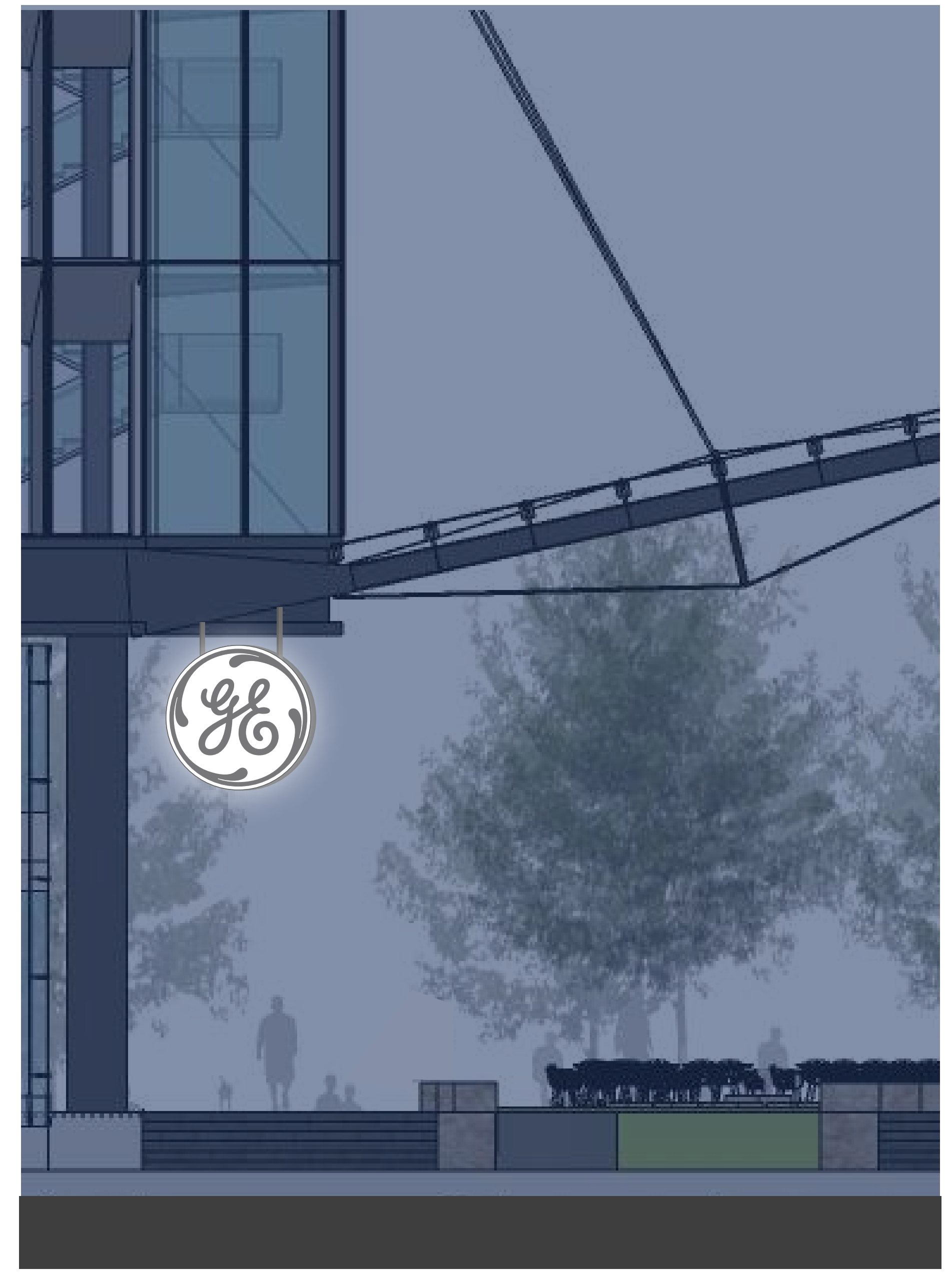
Figure 3.7b
Exterior Signage - GE Plaza Entrance from Fort Point Channel

GE Headquarters Project
Boston, Massachusetts



Fabricated stainless steel building mounted monogram.

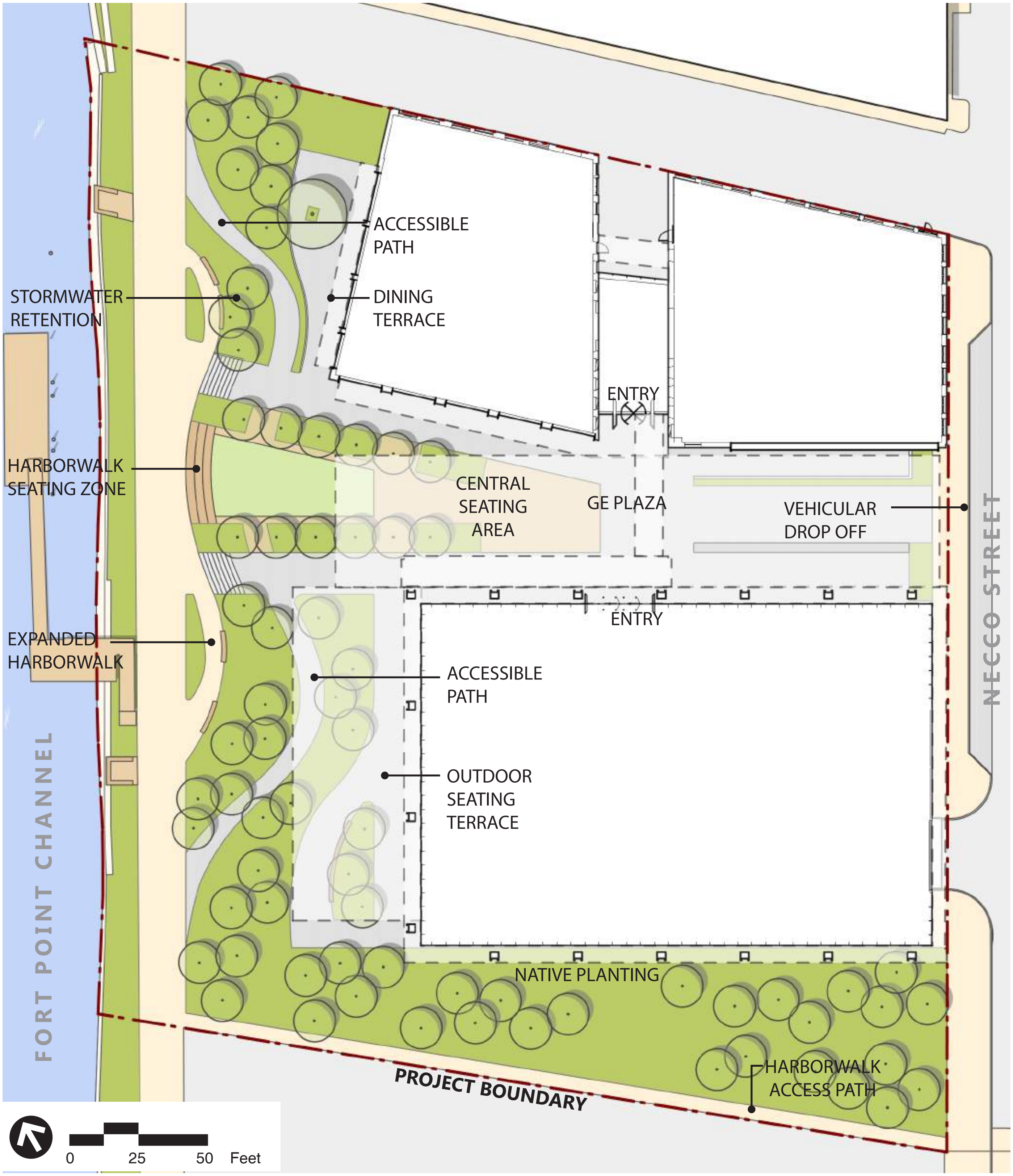
Double-sided.

Internally Illuminated.

Gensler

Figure 3.7c
Exterior Signage - GE Plaza Entrance from Necco Street

GE Headquarters Project
Boston, Massachusetts

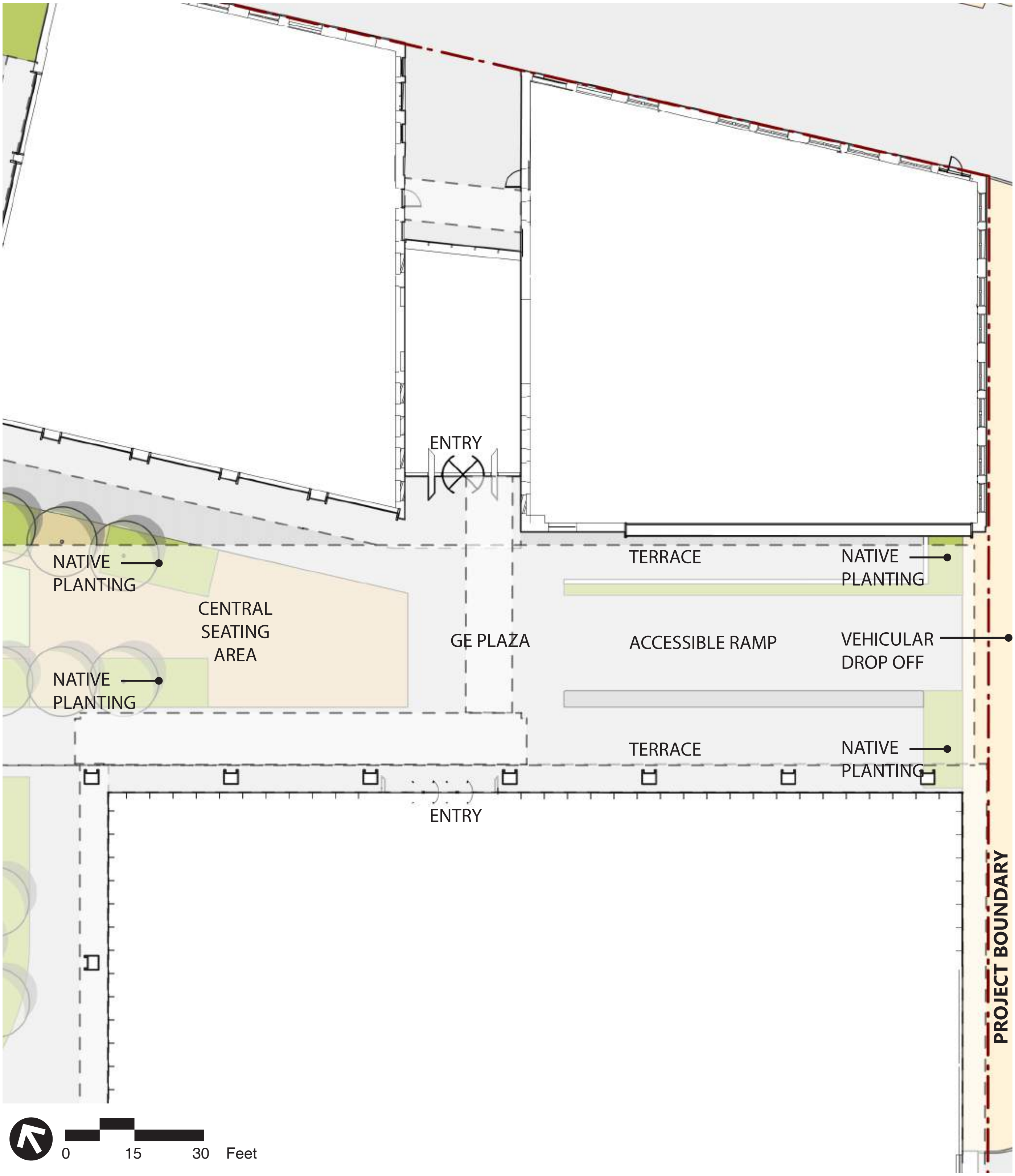


Source: OJB

Figure 3.8

Landscape Plan

GE Headquarters Project
Boston, Massachusetts



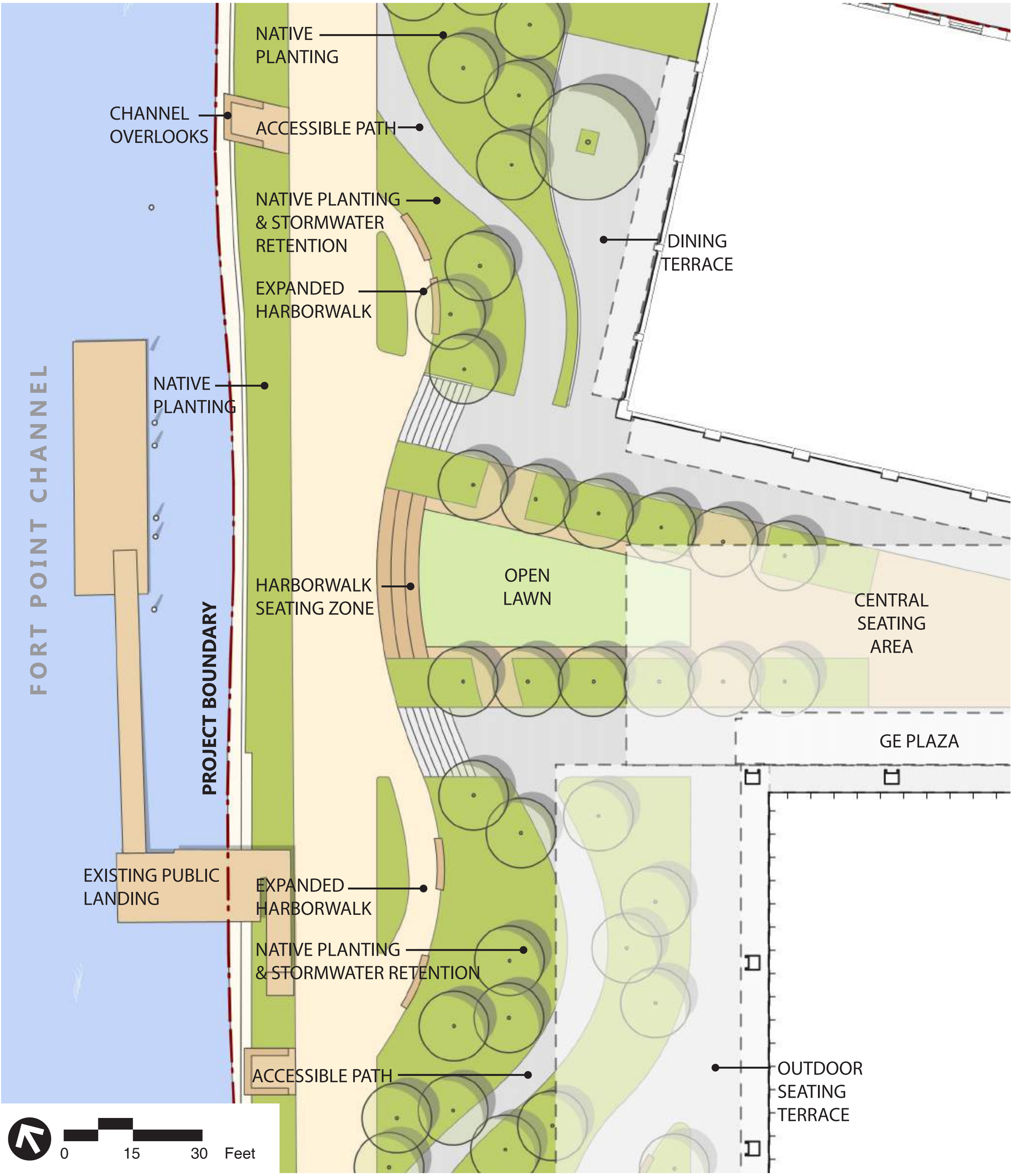
Source: OJB

OJB

Figure 3.9a

Open Space Element 1 - GE Plaza

GE Headquarters Project
Boston, Massachusetts



Source: OJB

OJB

Figure 3.9b

Open Space Element 1 - Public Harborwalk

GE Headquarters Project
Boston, Massachusetts

Gensler

Figure 3.10a

Perspective - Standing in GE Plaza

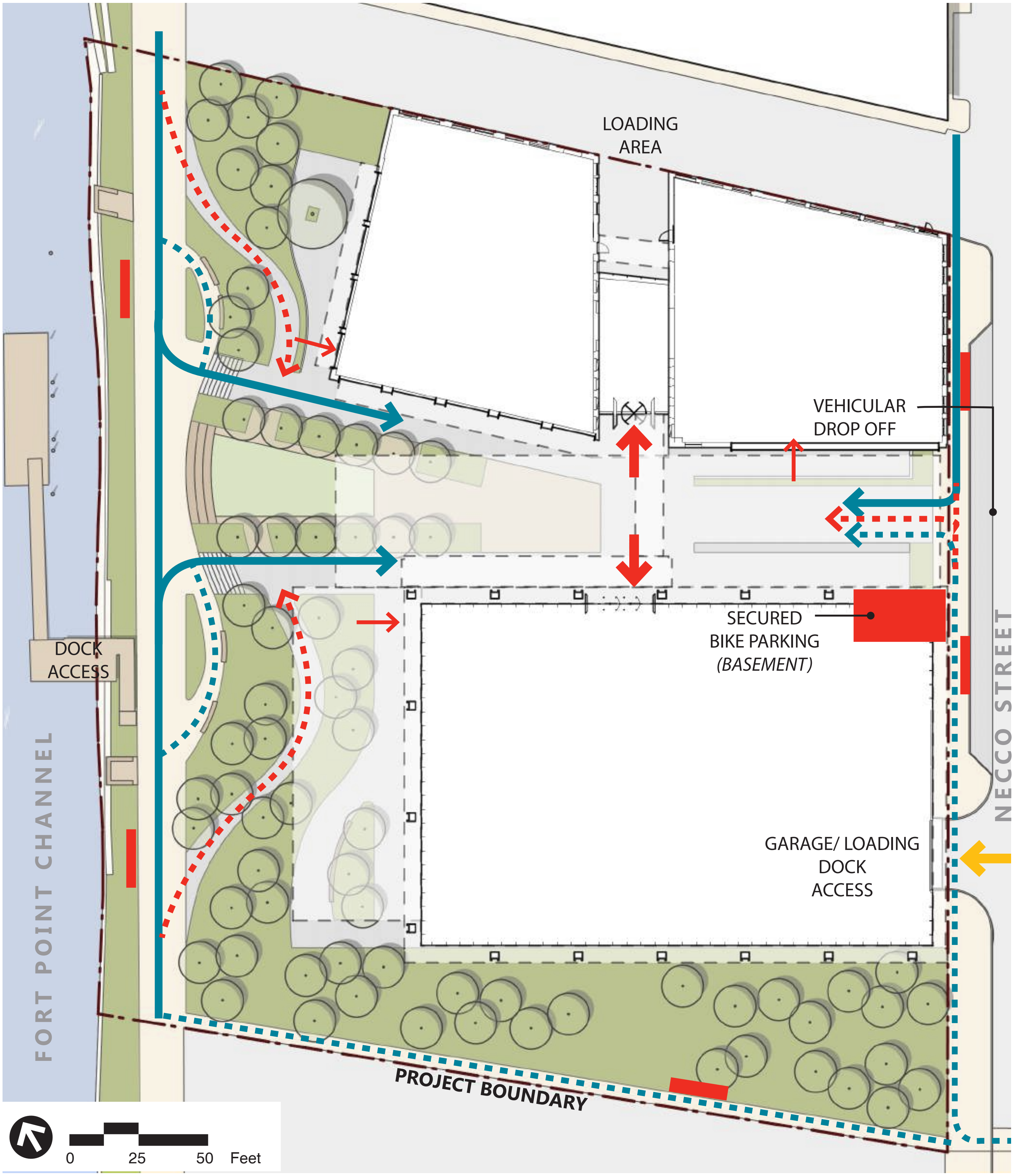
GE Headquarters Project
Boston, Massachusetts

Gensler

Figure 3.10b

Perspective - Standing in GE Plaza

GE Headquarters Project
Boston, Massachusetts



Source: OJB

- Primary Pedestrian Access Path
- Pedestrian Access Path
- Accessible Access Path
- Main Entries
- Potential Entries
- Garage Entry
- Bike Parking

OJB

Figure 3.11

Pedestrian Access and Circulation Plan

GE Headquarters Project
Boston, Massachusetts

4

Sustainability/Green Building and Climate Change Resiliency

4.1 Introduction

A core business value for GE is to solve problems for customers and find solutions that make things better for society, the environment, and the economy. As a Digital Industrial company, GE continues to lead the business world in sustainability through Ecomagination partnerships, digital solutions, and new business models both domestically and globally. Consistent with these core business values, the Project will be a high-performance development with the goal of the New Building being within the top quintile of energy performance among similar building types also to be in operation in 2018 in a similar climate, meeting LEED™ version 4 certification standards, and following the principles of the WELL Building Standard® ("WELL"), as further described in this chapter.

The Project is inherently sustainable as it includes the redevelopment of an underutilized urban site and repurposing of existing buildings to create a world-class headquarters campus. The Project also provides flexibility to an adapting natural environment (i.e., climate change) and workforce, promotes the use of alternative modes of transportation and encourages pedestrian activity, provides improved public access and engagement, provides for a high-quality indoor environment for future users, and elevates health and wellness design strategies to the same level as building design considerations-all of which will reduce environmental impacts both locally and regionally.

This chapter describes the sustainable design elements of the Project to comply with the requirements of Article 37 of the Boston Zoning Code relative to the City's Green Building policies and procedures.

GE will utilize the LEED for Building Design and Construction ("LEED-NC") rating system ("version 4", or "LEEDv4") for each component of the Project even though projects may still be registered under the LEEDv2009 (version 3) system through October 31, 2016. Rather than reflect green building requirements developed over a decade ago, GE has chosen to be forward-facing and commit to the future of green building standards.

LEEDv4 advances the green building standard of excellence across the board by expanding the focus on transparency of health and environmental impacts associated with building materials, utilizing a more performance-based approach to indoor environmental quality to improve occupant comfort, setting a higher energy performance bar, and expanding the evaluation of water efficiency to total building water use. A summary of applicable LEED credits and the LEED scorecards for the New Building and Brick Buildings is provided in Appendix F.

GE is looking beyond the sustainable design of the built environment to the health and wellness of its future occupants and users by aligning project design and operations with both GE's internal wellness program, HealthAhead, and the WELL system principles.

Given the Project Site location along the Fort Point Channel, the Proponents have studied potential vulnerabilities due to climate change impacts. In accordance with the BRA Climate Change Resiliency and Preparedness Policy (the "Resiliency Policy"), this chapter also provides an approach to assessing and mitigating predicted climate change impacts through site resiliency measures. The completed BRA Climate Change Resiliency and Preparedness Checklist (the "Resiliency Checklist") is provided in Appendix D.

In support of Boston's Greenhouse Gas ("GHG") emissions reductions goals, this chapter also presents the estimated Project energy usage and GHG emissions reductions. Refer to Chapter 9, *Greenhouse Gas Emissions Assessment* for additional detail on the Project energy model assumptions and results as well as an evaluation of on-site clean/renewable energy opportunities and private utility company energy efficiency assistance programs that may be available to the Project.

4.2 Key Findings and Benefits

The key findings related to sustainable, high-performance design and climate change preparedness include:

- GE continues to lead the business world in sustainability through partnerships such as Ecomagination, digital solutions, and new business models both domestically and globally. GE has developed numerous sustainable initiatives, and has set and surpassed targets to reduce its impact on the global environment for GHG emissions and potable water usage.
- GE's guiding principles for the Project, expressed as pillars, include Global Steward (sustainability impact); Business Transformer (resilient growth and efficiency); and Holistic Employer (human wellness). Multiple strategies aligned with these guiding principles are being incorporated into the design and are summarized in this chapter, grouped into the categories of energy, water, building materials, resiliency, employee wellness and community benefits.
- The Project goes beyond the requirements of Article 37 by striving for more ambitious LEEDv4 green building design, construction, and operations standards for the Campus.
- Looking beyond the sustainable design of the built environment, GE aims to enhance the health and wellness of its future occupants and users by aligning project design and operations with their internal health and wellness programs/initiatives ("HealthAhead") and WELL.

- The proposed site design will provide protection to the Project relative to the FEMA 100-year and 500-year floodplain limits through site grading and landscaping. By raising the Project site grade so that the finished floor elevation for the Brick Buildings and the New Building is at +19.5 Boston City Base ("'BCB"), the Project will be resilient to extreme storm events, which includes taking into consideration sea level rise scenarios over the lifetime of the Project.
- Potential impacts associated with predicted sea level rise, and increased frequency and intensity of storm events as well as the need for a flexible building space have been considered through the following design strategies:
  - Place critical mechanical and life safety/standby emergency building systems outside of vulnerable elevations (the 100-year floodplain with 2.47 feet of sea level rise);
  - Provide oversized stormwater conveyance infrastructure to effectively remove stormwater from the Project Site;
  - Provide an overland drainage path around the buildings and elevated pedestrian areas for inland flooding;
  - Design flexible heating and cooling systems;
  - Use of a native/adaptive landscape, such as tidal zone planting materials that will connect to the history of the area and be resilient against flooding and saltwater intrusion; and
  - Use of landscaping walls, walkways, stairways, railings, benches and bike racks designed using materials that can withstand saltwater inundation.
- Resilient design so that building space remains flexible and can evolve with changing business practices and space needs.

4.3 Regulatory Context

4.3.1 Article 37/Green Buildings

Article 37 submittal requirements include completing a LEED scorecard to demonstrate that a project meets the minimum requirements to achieve a LEED Certified level (all LEED prerequisites and achieve at least 40 points) without registering or certifying the project with the USGBC, or "LEED certifiable." This documentation is reviewed by the Boston Interagency Green Building Committee ("IGBC"), which is responsible for advising the BRA on a proposed project's compliance with the provisions of this article.

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 and are intended to address local issues unique to development within Boston. The credits include the following categories: Modern Grid, Historic Preservation, Groundwater Recharge, and Modern Mobility.

4.3.2 BRA Climate Change Preparedness and Resiliency Policy

In conformance with the Mayor's 2011 Climate Action Leadership Committee's recommendations, the BRA requires projects subject to Boston Zoning Article 80 Small and Large Project Review to complete a Resiliency Checklist to assess potential adverse impacts that might arise under future climate conditions, and any project resiliency, preparedness, and/or mitigation measures identified early in the design stage. The Resiliency Checklist is reviewed by the IGBC.

4.3.3 MEPA Draft Climate Adaptation and Resiliency Policy

In September 2014, the MEPA Office issued a draft policy for addressing potential impacts associated with climate change. The policy's intent is to facilitate the consideration and assessment of risk and vulnerabilities of a project or action under foreseeable scenarios or conditions associated with climate change in order to identify potential mitigation measures.

4.4 GE Corporate Sustainability

4.4.1 Overview

GE believes that innovation is at the heart of sustainability. A core business value is to solve problems for customers and find solutions that make things better for society, the environment, and the economy. As a Digital Industrial company, GE will continue to lead the business world in sustainability through partnerships, digital solutions, and new business models both domestically and globally. Through the Ecomagination program, GE has launched outcome focused partnerships to solve global challenges around energy, efficiency, GHG emissions and water. GE has one of the world's largest renewable energy portfolios and delivers grid solutions to clients. GE will accelerate the adoption of energy savings solutions. Predix, GE's cloud-based platform for the Industrial Internet, provides the foundation to increase energy and material efficiencies and reduce emissions across industries using the power of analytics. Predix applications will be applied throughout the Project.

4.4.2 GE Corporate Sustainable Initiatives

Sustainability for GE means aligning business strategy to meet societal needs, while minimizing environmental impact and advancing social development. Current business sustainability priorities fall into three categories: 1) Social (Workforce and Idea Development, Improving Health and Human Rights); 2) Environment (Energy and

Climate, Resource Productivity, Water); and 3) Governance (Integrity and Compliance, Global Growth).

GE continues to set and surpass targets to reduce its GHG emissions and potable water usage. Goals were first set in 2005 to reduce GHG emissions by at least 1% by 2012; by 2010 a 22% reduction had been realized from the 2004 baseline, by 2014 a 31% reduction was accomplished. In 2007, a target was set to reduce global water usage by 20% between 2006 and 2012; a 30% reduction had been realized by 2010 and a 42% reduction was realized by 2014. By 2013, energy intensity had been reduced by 31% from its 2004 baseline year. 2020 goals include further reductions in GHG emissions and water use: 20% for both from the 2011 baseline.

GE has launched HealthAhead to build a strong culture of health and to ensure its work sites across the globe are safe and healthy. HealthAhead will engage and support employees and their families to take actions every day that improve their physical, emotional and social well-being. Personalized programs and tools will be offered across four key areas of well-being: 1) Healthy Environments, 2) Healthy Bodies, 3) Healthy Minds, and 4) Healthy Connections. Each tenet is described further below.

› **Healthy Environments** - focuses on tobacco-free campuses, healthy food offerings, and physical activity options. Family participation is also encouraged.
› **Healthy Bodies** - focuses on getting fit, eating healthy, not using tobacco, maintaining a healthy weight and preventative medical care.
› **Healthy Minds** - focuses on balance, mindfulness, and being resilient. Staying resilient in this context means managing personal energy levels and planning ahead to realize one's best potential.
› **Healthy Connections** - focuses on building and maintaining trusting partnerships and social interactions.

The Project design will reflect these objectives by including a fitness center for employees, encouraging alternative modes of transportation, promoting active movement throughout the Campus both within the physical spaces and surrounding outdoors, implementing a tobacco-free campus, and offering healthy food options in the Bistro-Café, employee cafeteria, and coffee bar.

Sustainability is rewarded throughout the value chain at GE. Outstanding projects undertaken by GE employees that contribute significantly to the company's sustainability goals are recognized through the EcoAwards program - 2016 marks the 5th annual EcoAwards. Projects are recognized in multiple categories, reflecting the company's sustainability priorities: renewable energy, GHG reductions and energy efficiency, water conservation, materials sustainability, waste management and recycling, supply chain partnerships, commercial innovation, employee engagement and community outreach, and eco-design.

4.5 Project Approach to Sustainability

GE is committed to incorporating many key aspects of sustainability and high-performance building design in the Project. Early in the design process GE brought on a sustainability consultant who facilitated a visioning workshop with a Green Team comprised of owner representation, designated design discipline leads, and permitting leaders. The workshop's primary focus was to develop a sustainability vision; set key sustainable drivers, for the Project; and set energy, GHG and water reduction targets to guide design.

Those drivers, for GE, the design team, and other stakeholders, expressed as pillars are:

1. Global Steward (sustainability impact);
2. Business Transformer (resilient growth and efficiency); and
3. Holistic Employer (human wellness).

These three pillars serve as guardrails for the Project to guide GE, the design team and other project stakeholders, and provide the umbrella under which project objectives have been developed.

4.5.1 Integrated Design Process

The Project will be delivered utilizing an integrated design process - bringing representatives to the table weekly from GE, the design team, and various support functions. Now that the Project has moved past visioning, the function of the 'Green Team', has been wrapped into the overall design process to further facilitate a true integrated design process.

4.5.2 Project Performance Targets

Energy conservation, GHG emissions reductions, and water conservation targets have been aligned with both the BRA's and the Proponents' goals setting the bar for a development that will compliment Boston's existing buildings and serve as an example for future designers. Design targets have been set for Energy Use Intensity ("EUI"), GHG emissions reductions, and Water Use Intensity ("WUI"), as listed in Table 4-1 below. GE established these targets for the New Building to be in the top quintile (top 20 percent) for energy performance among similar building types to also be in operation in 2018 in a similar climate.[1] Water conservation goals were set to position the Project as a top performer among office buildings in the United States and to reflect GE's corporate-level targets.[2]

1 Energy benchmarking was based on data from the Berkley Lab Building Performance Database. Buildings completed 2008-2016 located in Climate Zone 5 (equivalent to Boston's climate) were reviewed; a 'blended' building use quintile bar graph was created based on anticipated building program (office, public assembly, lab), and a 2.5% improvement per year was assumed to develop a 2018 top 20% performance target.

2 Water benchmarking was based on Energy Star Portfolio Manager Data for 13,144 office buildings (> 1000 in MA), which have a median indoor water EUI of 12 gal/sq ft. GE's goal represents a 20% reduction from current HQ campus use and is approximately equivalent to 9 gal/sq ft.

Table 4-1 Project Design Targets

Project Component	EUI	GHG Emissions Reductions	WUI
New Building	38.5	5.2 kgCO2/sf/year	20 gpd/person (9 gal/sf)
Brick Buildings	56.3	7.6 kgCO2/sf/year	20 gpd/person (9 gal/sf)

sf square feet
gpd gallons per day

GE is committed as a corporation to reduction of overall energy usage across all facilities. Intensity goals have been set for the Project as a way to evaluate the relative predicted energy use for the Campus under a multitude of high-performance building strategy scenarios. Building metrics across the company are tracked as annual kWh usage, which enables the confirmation of energy use reduction. Early energy modeling and water balance calculations indicate these very aggressive goals are achievable. As presented in Chapter 9, *Greenhouse Gas Emissions Assessment*, the as-modeled EUIs for the New Building and Brick Buildings are 39.5 and 61.2 kBTU/sf,[3] respectively. While the overall average EUI is within 3 percent of the target, with the continued evaluation of strategies to optimize energy use demand and renewable strategies, it is expected both the Brick Buildings and the New Building will meet or exceed the EUI targets. GE has committed to sustainable design features (summarized in this chapter) to design a building that performs better than 80 percent of its peer set, sets a leadership example and raises the benchmark for all future buildings in Boston.

The Project is being designed and constructed with the future in mind, to allow additional efficiencies and, potentially, renewable energy strategies to be added in the future as technology is available and doing so is cost-effective. This is one of the strategies in place to work towards continued reduction of overall energy usage for the company. Systems analyses are being conducted to determine what will best serve the Project in terms of energy efficiency while providing flexibility in space usage and plug load demand over the life of the building. Final design of solar photovoltaic capacity, which will further reduce Project EUI, is in progress. A high-efficiency Variable Air Volume system will be employed; ventilation air will be provided by air handling units.

GE measures GHG reductions target progress at a company-wide level, rolling up the individual facility data into a company-wide reporting metric that is compared against the baseline year to measure overall reduction efforts. Consistent with its corporate sustainable initiative for reducing GHG emissions, GE will track GHG emissions for the first year of operation of the Project and subsequent years. Because the current GE GHG emissions reduction goal for 2020 measured against a 2011 baseline, the Project's data will be rolled up into that reporting metric company-wide. Design WUI is anticipated to

3 kBTU/sf = thousand British Therman Units per square foot.

be below the target based on demand estimates and proposed reuse strategies. Potable water demand will be reduced through high-efficiency fixtures and rainwater harvesting to provide toilet flushing and site irrigation. Water reuse, or recycling, will further reduce the potable water needs for the Project. Water reuse systems currently being considered include recovery from a reverse osmosis ("RO") system and potentially a blackwater reuse treatment system.

4.6 Sustainable Design Elements

As illustrated in Figure 4.1, sustainable and high-performance building strategies are at the core of the design for the New Building as well as the rehabilitation of the Brick Buildings. Such strategies, aligned with the guiding principles of sustainability, resiliency, and wellness, are summarized below, grouped into the categories of energy, water, building materials, resiliency, employee wellness and community benefits.

Energy Conservation

- Achieve EUI target of 38.5 for the New Building positioning it as a top 20 percent performing building compared to similar building types to be put into operation in 2018 in this climate zone. In Boston, very few office buildings constructed within the past ten years claim to meet such an aggressive target. Based on energy reporting data submitted on comparable projects, EUIs range from 40.3 to 89.3.
- Achieve EUI target of 56.3 for the Brick Buildings positioning it as a high performance building compared to similar historic rehabilitation projects in this climate zone. Other such renovated buildings in the Boston area being used for office space have EUIs ranging from 44.6 to 67.2 based on energy reporting data submitted to the City.
- Reduce energy consumption by 27 percent (beyond ASHRAE 90.1-2010 as the baseline) resulting in a 26.7 percent reduction in associated GHG emissions through the use of energy-efficient building systems and design.
- Incorporate energy-efficient building systems and other Energy Conservation Measures ("ECMs"), including:
  - Low-temperature Variable Air Volume system to provide incoming air that is cooler than with a standard system to reduce energy required to power fans needed to condition the air being supplied to the building.
  - High-efficiency lighting to reduce heat generation and energy demand.
  - Daylight harvesting to offset the amount of electric lighting and, thus, energy needed to properly light a space. This is accomplished by using lighting control systems that sense how much daylight is available and have the ability to dim or turn off the electric lighting if there is ample daylight.
  - High-performance building envelope where the thermal barrier as the interface between the interior of the building and the outdoor environment (including

the walls, roof, and foundation) is optimized. The building envelope plays an important role in determining the amount of energy necessary to maintain a comfortable indoor environment relative to the outside environment.

- Energy-efficient windows, increased insulation (in the New Building), and partially vegetated roofs to further improve the building envelope and reduce energy needed to maintain the indoor environment.
- Energy-efficient LED technology for indoor and outdoor lighting.
- A natural gas emergency power generator which provides multiple environmental and resiliency benefits including: lower GHG emissions; less odor; opportunity for waste heat recovery; and elimination of on-site fuel storage.
- Smart building systems (enabled by GE Predix) to moderate demand-based upon use/occupancy, such as:
  - An automated central Building Management System ("BMS") that allows for management, optimization, and analysis of performance of all utility/mechanical systems for the Campus.
  - A fully networked interior lighting control system tied to the Project's BMS and enabled by GE's Predix system, which:
    - Adjusts lighting levels based on real-time feedback through wireless sensors located throughout the Campus;
    - Adjusts lighting loads on an individual fixture or a work space level with real-time occupancy sensing and reporting; and
    - Controls and reduces energy usage compared to a "traditional" building with an "all on" 8AM to 6PM operation.
- User-accessible energy monitoring system/real-time dashboard that will depict the building's energy usage (and generation) to educate building users.

› The on-site PV System for the New Building will generate energy for building consumption/supply back to the grid. The PV system is forecast to reduce overall utility loads by an estimated 157 kilowatt-hours ("kwH") and associated GHG emissions.

› GE is committed to working towards a Net Zero Energy ("NZE") campus over the life of the buildings, as technology becomes available and operational processes are refined.

Resiliency

› The proposed site design will provide protection relative to the FEMA 100-year and 500-year floodplain limits through site grading and landscaping. By raising the site grade so that the finished floor elevation for the Brick Buildings and the New Building is at +19.5 BCB, the Project will be resilient to extreme storm events, which includes taking into consideration sea level rise scenarios over the lifetime of the Project. This strategic design approach will ensure the Brick Buildings and New Building will maintain operational capacity during a 500-year flood event evaluated by FEMA under the future Intermediate High Emission Sea Level Rise Scenario for the year 2075 (refer to Section 4.8 below).

- Potential impacts associated with predicted sea level rise, and increased frequency and intensity of storm events, as well as the need for a flexible building space, have been considered through the following design strategies:
  - Placement of critical mechanical and life safety/standby emergency building systems outside of vulnerable elevations (the 500-year floodplain with 2.47 feet of sea level rise);
  - Oversized stormwater conveyance infrastructure to effectively remove stormwater from the Project Site;
  - Provision of an overland drainage path around the buildings and elevated pedestrian areas for inland flooding;
  - Flexible heating and cooling systems;
  - Use of a native/adaptive landscape, such as tidal zone planting materials that will connect to the history of the area and be resilient against flooding and saltwater intrusion; and
  - Use of landscaping walls, walkways, stairways, railings, benches and bike racks designed using materials that can withstand saltwater inundation.
- Resilient design so that building space remains flexible and can evolve with changing business practices and space needs.

Water Conservation

- Reduce water use demand to 20 gallons per person on a daily basis, equivalent to 9 gallons per square foot (gal/sf). Few office buildings constructed within the past ten years in Boston claim to meet such an aggressive target. Based on water usage reporting data submitted by similar projects, water efficiencies range from 8.78 gal/sf to 14.57 gal/sf.
- High-efficiency plumbing fixtures and WaterSense appliances will contribute up to an estimated 33 percent reduction of water demand over baseline (an approximately 660,000 gallons per year savings in potable water demand and sewer discharge).
- Further reduction of potable water use through use of a rainwater harvesting system, RO reject water recapture, and, possibly, a blackwater system, which is being taken into consideration as part of the design process.
  - A rainwater harvesting system consisting of approximately 27,000 gallons of rainwater storage will further reduce potable water demand for toilet flushing by an estimated 43 percent for the Project.

- Potable water demand for irrigation will be reduced by approximately 80 percent compared to a conventional irrigation system through the:
  - Incorporation of green, or vegetated, roof areas;
  - Use of rainwater harvesting for irrigation; and
  - Use of native/adaptive landscaping to reduce potable water demand and capture stormwater beyond code requirements.
- 10 to 15 percent of the quench water from the HVAC system could be reused to achieve further potable water use reductions for the New Building.

› User-accessible water monitoring system/real-time dashboard that will depict building water usage to educate building users.

Building Materials and Waste Reduction

› Adaptive reuse of the Brick Buildings, while maintaining their historic character, will result in significant savings in embodied energy and materials through reduction in the need for raw materials and associated energy to transport new materials in addition to reducing the amount of demolition waste generated by the Project.

› Building materials will be sourced from local materials/local manufacture (where appropriate) to reduce the overall environmental footprint of the project and support the local economy.

› The selection of healthy materials and an emphasis on materials transparency maximizes employee wellness and reinforces the Proponents' commitment to the triple bottom line: environmental; economic; and social sustainability.

› Both indoor and outdoor lighting will utilize LED technology, which do not contain mercury.

› A Construction Waste Management Plan (“CWMP”) will be developed and implemented by the construction manager with the goal to divert as much demolition debris and construction waste from area landfills, as possible, with a targeted minimum diversion rate of 75 percent.

› Recyclables will be collected throughout the buildings and designated storage for collected recyclables will be provided in the Project. The recyclables will be collected by a contracted waste management company on a regular basis.

› GE will consider the use of a 'composting' technology similar to Eco-Safe Digester from BioHitech[4]. GE implements composting at other GE sites/campuses. In one GE facility over 65,000 pounds of solid waste was eliminated in 2015 alone using this technology.

[4] Eco-Safe Digester® is a technology that eliminates food waste on-site by converting organic/food waste into grey water and removing it via the municipal sewer system,.

Site Locatio and Design

- Location within an urban core provides numerous cultural and institutional amenities nearby, including public transportation reducing single-occupancy vehicle trips to/from the Project.
- Green/open space provides outdoor working spaces and amenities for both employees and the public.
- A stormwater management system designed as a landscape feature aims to reduce heat island effect, recharge the local groundwater table and be resilient to saltwater inundation from coastal flooding.
- Green, or vegetated, roof areas will serve environmental and ecological functions to further mitigate heat island effect, help manage stormwater runoff, provide new habitat for wildlife and extend the life of the roof materials.
  - The terrace planned for the Brick Buildings will include approximately 2,900 square feet of intensive planting area which will provide ample space for native plantings to flourish, as well as collecting and infiltrating storm water.
  - The New Building will feature approximately 3,400 square feet of planting area, with the remaining terrace area dedicated to social spaces and areas of relaxation utilizing extensive systems.
- Resource-efficient building systems, on-site green energy generation, and extensive landscaping will reduce stress on urban sewer, water, and power infrastructure.
- On-site parking will be located below grade, reducing the heat island impact and will be limited to approximately 30 spaces, including approximately 8 Electric Vehicle (“EV”) charging stations to encourage electric vehicle use thereby reducing (transportation-related) GHG emissions.
- Emphasis of walkability and bike-ability and proximity to mass transit will further reduce the Campus' environmental impact.
- Outdoor lighting will be designed to minimize light pollution through the incorporation of "Dark Sky" strategies which are being evaluated as part of design.
- An integrated pest management (“IPM”) program will reduce environmental impacts to the site and surrounding waterways.

Wellness

- Project design and operations are being aligned with GE's internal health and wellness programs and WELL principles.
- GE remains dedicated to an active and healthy workplace by:
  - Utilizing healthy building materials;
  - Incorporating abundant fresh air through increased ventilation and natural ventilation (of select areas);
  - Incorporating daylighting strategies with glare-free work areas;

  - Providing outdoor work areas and activity-based working environments; and
  - Implementing a tobacco-free campus and green housekeeping program.
- Rooftop terraces and green/vegetated roof areas will provide a wellness benefit for employees and visitors as an inviting space to collaborate, relax, and socialize. These spaces will be "work enabled" and encourage employees to periodically disconnect from indoor work spaces.
- Acoustics will be a focus of the design; building systems to be low-noise and noise insulation to be included as needed.
- Lighting will included Circadian lighting design. Circadian rhythms are kept in sync by various cues, including light. Lights of high frequency and intensity promote alertness, while the lack of this stimulus signals the body to reduce energy expenditure and prepare for rest.
- Thermal and lighting controls will optimize employee comfort and increase productivity.
- Biophilic design strategies (i.e., the incorporation of nature into the design) as a WELL system strategy will continue to be evaluated through design. Such strategies are beneficial to the wellness of building users' because humans have an affinity to the natural world and biophilic design recognizes the importance of creating an interior environment that nurtures the innate human-nature connection focusing on environmental elements, lighting and space layout. Measures like exposure to views to the outdoors and images of nature are known to boost mood, positive feelings, and productivity.
- Being active and eating healthy will be encouraged through building design and operation, including an on-site fitness center for employees, communicating locations of stairways, and healthy food offerings in the Cafeteria, Bistro-Café, and Coffee Bar.

Community Benefits

- GE has committed to moving a number of its corporate and business unit functions to the City of Boston, enabling its employees and visitors to take advantage of a host of local institutional and cultural attractions.
- Ground floor amenities of the Project to be open to the public include:
  - Work lounge providing campus reception services and Co-working Space open to the public
  - Museum telling the GE story
  - Bistro-Café
  - Brilliant Labs space providing a physical home to GE's commitment to STEM education in Boston Public Schools

- Publically accessible open space, including the GE Plaza, Harborwalk improvements (enhanced pedestrian pathways and kayak boat access) will be provided to reconnect people to the waterfront.

4.7 Compliance with Article 37/Green Building Design

The Project will be designed and constructed to be LEED certifiable in accordance with the requirements of Article 37. LEEDv4 advances the green building standard of excellence, expanding transparency on the health and environmental impacts of building materials and utilizing a more performance-based approach to indoor environmental quality to improve occupant comfort-both of which are consistent with GE's human wellness pillar for the Project. LEEDv4 also expands the evaluation of both energy savings and water efficiency to total building water use, consistent with GE's sustainability impact pillar. GE is forward-facing and, therefore, determined that LEEDv4 is the most appropriate rating system to demonstrate the performance of a development expected to be completed in 2018, rather than evaluating the design against standards developed a decade prior.

The Project is targeting LEED Silver under LEEDv4, which requires the achievement of a minimum of 50 points. This goal recognizes and reflects the results of the LEEDv4 Beta Program during which USGBC tracked the environmental efficiency of 120 projects under both LEEDv2009 and LEEDv4, and found that projects would achieve one level lower certification under LEEDv4 due to the higher bar of performance required in this new rating system.

As demonstrated by the draft LEED Scorecards for each project component (provided in Appendix F), a total of 54 'yes' points with 38 'maybe' points are being targeted for the Brick Buildings (Figure F.1), and a total of 52 'yes' points with 40 'maybe' points are being targeted for the New Building (Figure F.2). From a LEED perspective, the key difference between the two project components is that the Brick Buildings component is eligible to achieve the Materials and Resources credit "Building Life-Cycle Impact Reduction" for reuse of existing, historical buildings.

A Master Site LEED documentation approach is proposed to accommodate both the Brick Buildings and the New Building and to streamline the documentation process. The LEED prerequisites and credits available to be documented through the Master Site process are listed in Appendix F.

Appendix F provides an evaluation of the LEEDv4 credits and corresponding LEED Scorecards. This narrative describes credits known to be achievable by the Project based on the current design and those to be considered/evaluated further as design advances (with key differences compared to LEEDv2009 noted):

- **Integrated Process (IP)** - A new credit in LEEDv4 requires the project team to identify and use opportunities to achieve synergies across disciplines and energy-related and water-related building systems.

- **Location and Transportation (LT)** - A new credit category in LEEDv4 that is an outgrowth of the sustainable sites category. It rewards thoughtful decisions about building location with credits that encourage compact development, alternative transportation, and connections with amenities. Credit offerings encourage project teams to take advantage of the infrastructure elements in existing communities. The LT category considers how this infrastructure affects occupants' behavior and environmental performance.
- **Sustainable Sites (SS)** - This category rewards decisions about the environment surrounding the building, with credits that emphasize the vital relationships among buildings, ecosystems, and ecosystem services. It focuses on restoring project site elements and integrating the site with local and regional ecosystems. It raises the bar from LEEDv2009 by taking a deeper look at the site and whether rainwater management and heat island effects are addressed holistically.
- **Water Efficiency (WE)** - This category looks at indoor use, outdoor use, specialized uses, and metering. The section is based on an "efficiency first" approach to water conservation at a higher level than LEEDv2009. Outdoor use reduction now has a prerequisite bar to meet, the value of advanced metering to refine controls is rewarded, and credit can be earned for minimizing potable water use in cooling towers. Strategies involving reuse to reduce potable water demand continue to be rewarded.
- **Energy and Atmosphere (EA)** - This category addresses energy use reduction, energy-efficient design strategies and renewable energy sources. The energy performance bar has been raised from ASHRAE 90.1-2007 to 90.1-2010, which results in a more stringent baseline to reduce energy usage than LEEDv2009. Projects are rewarded that implement demand response technologies and make energy generation and distribution systems more efficient, increase grid reliability, and reduce greenhouse gas emissions.
- **Materials and Resources (MR)** - This category focuses on minimizing the embodied energy and other impacts associated with the extraction, processing, transport, maintenance, and disposal of building materials. The requirements are designed to support a life-cycle approach that improves performance and promotes resource efficiency. Each requirement identifies a specific action that fits into the larger context of a life-cycle approach to embodied impact reduction. This is a major lift from the LEEDv2009 focus on individual material attributes.
- **Indoor Environmental Quality (EQ)** - This category addresses a myriad of design strategies and environmental factors-air quality, lighting quality, acoustic design, control over one's surroundings-that influence the way people learn, work, and live. Credits continue to combine traditional approaches, such as ventilation and thermal control, with emerging design strategies, including a holistic, emissions- based approach (Low-Emitting Materials credit), source control and monitoring for user-determined contaminants (Enhanced Indoor Air Quality Strategies credit), requirements for lighting quality (Interior Lighting credit), and advanced lighting

metrics (Daylight credit). The approach is similar to LEEDv2009, but the dive is deeper, more focused on user benefits, and with current standards. A new acoustics credit is also available for new construction and major renovation projects.

- **Innovation in Design (IN)** - The purpose of this LEED category is to recognize projects for innovative building features and sustainable building practices and strategies. Occasionally, a strategy results in building performance that greatly exceeds what is required in an existing LEED credit. Other strategies may not be addressed by any LEED prerequisite or credit but warrant consideration for their sustainability. Opportunities in this category include new resiliency pilot credits and proposed offerings of WELL strategy packages, such as lighting and employee comfort.
- **Regional Priority Credits (RP)** - The ultimate goal of RP credits is to enhance the ability of LEED project teams to address critical environmental issues across the country and around the world. Regional Priority credits encourage project teams to focus on their local environmental priorities. The eligible RP credits are chosen by an oversight committee for each geographic area: the focus could be naturally occurring (e.g., water shortages) or man-made (e.g., polluted watersheds) and could reflect environmental concerns or environmental assets (e.g., abundant sunlight).

4.8 Climate Change Preparedness and Resiliency

Climate change is expected to result in rising sea levels, more frequent extreme storms, and more extreme weather events. The following sections describe how the predicted effects of climate change and potential resiliency measures have been considered in the design of the Project.

As required by the BRA for all Large Project Review projects, the Proponents have considered anticipated changes in climate, which is reflected in the Resiliency Checklist provided in Appendix D.

4.8.1 Predicted Future Conditions

The Proponents have surveyed climate change publications and data to evaluate potential future conditions over the life of the Project including changes in temperature, precipitation, and flooding events.

Extreme Precipitation

The City of Boston is expected to experience less frequent, but more extreme, precipitation events due to climate change. Increases in the intensity of precipitation events cause stormwater infrastructure to reach capacity faster with greater volumes of precipitation runoff. This results in inland flooding, where surface runoff cannot be conveyed to stormwater infrastructure properly. While inland flooding can damage buildings with floodwaters, stormwater overflows can cause combined sewer systems to reach capacity preventing the appropriate conveyance of wastewater from nearby buildings, while sending diluted wastewater into local waterways. To prevent these deleterious consequences, stormwater infrastructure needs to be designed to accommodate the expected increases in precipitation intensity and stormwater management needs to be applied across the local watershed.

Sea Level Rise

New England is expected to experience sea level rise due to climate change. There are many sources which have quantified the expected sea level rise and evaluated various scenarios for the City of Boston. CZM has prepared the document *Sea Level Rise: Understand and Applying Trends and Future Scenarios for Analysis and Planning* ("CZM Report"), which provides projections of expected sea level rise for Boston at several points in the future under different emission scenarios: Lowest; Intermediate Low; Intermediate High; and Highest.

The CZM Report gives planners and designers a resource for 'bathtub model' evaluations of assets and infrastructure. These elevations can be added to flood elevations provided by resources such as the FEMA Flood Insurance Rate Map ("FIRM") program. These maps provide the 1 and 0.2 percent annual chance of floods (i.e. 100-year and 500-year flood elevations along U.S. waterways and coasts). These maps, when combined with sea level rise projections, can provide a basic flood elevation evaluation tool.

The Massachusetts Department of Transportation ("MassDOT") and Federal Highway Administration ("FHWA") took the CZM sea level rise information one-step further than the 'bathtub' model, by creating a dynamic flooding model. The *MassDOT-FHWA Pilot Project Report: Climate Change and Extreme Weather Vulnerability Assessments and Adaptation Options for the Central Artery* ("MassDOT-FWHA Study") provided flood elevations generated by a hydrodynamic model coupled with a wave simulation model, over the topography and bathymetry of the greater Boston area. This model provides the most accurate publicly available site-specific flooding model with sea level rise in Boston for certain planning years and emission scenarios.

On June 1, 2016, a publication was issued by the City of Boston and the Green Ribbon Commission for the Climate Ready Boston project. The Boston Research Advisory Group ("BRAG") Report *Climate Change and Sea Level Rise Projections for Boston* ("BRAG Report") provided results focused on the City of Boston proper for three climate scenarios: Lowest Emissions; Intermediate Emissions; and Highest Emissions. BRAG was established in 2015 to develop a consensus on possible climate changes and sea level rise that would impact the City of Boston by years 2030, 2050, 2070 and 2100. The report lists a Maximum and a Likely Range for all scenarios studied.

Extreme Weather Conditions

In addition to sea level rise and flooding, additional climate change issues predicted for Massachusetts, per the EEA's 2011 Massachusetts Climate Change Adaptation Report, include an increase in extreme weather events, which could consist of drought, tropical rainfall patterns (i.e., increased precipitation) and extreme heat and cold stretches, increases in the number of days with extreme heat (i.e., temperatures greater than 90°F and 100°F) and/or fewer days of snow yet increased winter precipitation. Proposed Project-related resiliency measures aimed at addressing these potential events are discussed below.

4.8.2 Vulnerability Assessment

Because the Project Site is adjacent to the Fort Point Channel, it is susceptible to flooding from inland flooding, extreme flooding events, and/or predicted sea level rise. The following describes the Project Site vulnerabilities to flooding that the Proponents have considered.

FEMA 100-year Floodplain

The majority of the Project Site is located within the 'AE Zone' of the FEMA FIRM number 25025C0081J, effective March 16, 2016. The elevation of the flood zone, as shown on the FIRM, for the Project Site is +16.45 BCB. Refer to Figure 4.2 for the FEMA 100-year floodplain map. This elevation is slightly higher than the 1 percent annual chance (100-year) coastal stillwater elevation of +15.85 BCB, which is based on a statistical analysis of the Boston Harbor tide gage. Given that the 100-year flood elevation is slightly higher than the 100-year stillwater elevation for Boston Harbor, it can be derived that there is little impact from waves (approximately 0.6 feet during the 100-year storm event). The average existing site grade is approximately +15 BCB. Historical data shows that approximately 1.5 feet of flooding can be expected in the existing condition due to a 100-year flooding event.

Inland Flooding

The Project Site is in a watershed serviced by the stormwater infrastructure of the Boston Water and Sewer Commission ("BWSC"). The BWSC designs its infrastructure capacity to convey the 10-year, 24-hour design storm event. This design storm event is defined as a storm which generates 4.80 inches of precipitation in 24 hours, with a peak intensity of 1.52 inches per hour. In storm events that exceed the 10-year design storm event, drainage infrastructure either can be expected to surcharge into local roadways or combined sewer infrastructure, if cross connections exist.

Sea Level Rise Studies Referenced

CZM Report

The CZM report provides sea level rise scenarios from the Low to High emissions scenario from the United States National Climate Assessment, which have been adjusted for local conditions in Boston.

The sea level rise elevations for the design year 2075 are presented below in Table 4-2. In addition, these values were added to the Mean Higher High Water (MHHW) value of the Fort Point Channel and the 100-year flood event from the FEMA FIRM. MHHW is defined as the average height of the higher high tide of each day (typically two high tides per day). These values indicate that with the highest emission sea level rise, low levels of the existing Site would experience flooding during MHHW. They also indicate that the 100-year flooding event coupled with sea level rise, would cause flooding ranging from two feet to over five feet in the existing condition.

Table 4-2 Flooding Elevations with Sea Level Rise

Site Elevation	High Emission Sea Level Rise	Intermediate High Emission Sea Level Rise	Intermediate Low Emission Sea Level Rise	Low Emission Sea Level Rise
Mean Higher High Water (MHHW)	El. +11.22			
FEMA 100-Year Flood	El. +16.45			
CZM Report 2075	+3.92′	2.47′	1.21′	0.6′
MHHW + CZM 2075	El. +15.14	El. +13.69	El. +12.43	El. +11.82
FEMA + CZM 2075	El. +20.37	El. +18.92	El. +17.66	El. +17.05
GE Headquarters Project[1]		EL. +19.5		

1 Includes the Brick Buildings and New Building.

MassDOT-FHWA Study

The flooding elevations from the MassDOT-FHWA Study have been obtained for the Project Site. This report presents a single map for the coupled 100-year storm event with sea level rise for the High emission scenario in 2070 and the Intermediate High emission scenario in 2100. While there is no direct comparison between the MassDOT and CZM reports, the resulting flood elevation from the MassDOT-FHWA Study would be comparable to the CZM 2075 High Emissions Scenario Sea Level Rise coupled with the 100-year flooding event

BRAG Report

The flooding elevations from the BRAG report have been obtained for the City of Boston Proper. The CZM Intermediate High Scenario, which was used by the design team to establish a finished floor elevation, falls within the Likely Range of the BRAG report Intermediate Emissions.

FM Global Building Design Flood

FM Global is a mutual insurance company, which specializes in loss prevention services. FM Global has prepared a general Property Loss Prevention Data Sheet which provides recommendations for the 'prevention and mitigation of losses due to flooding and storm water runoff.' The Data Sheet specifically recommends the selection of a site location that is greater than two feet higher than the 500-year flood elevation derived from the local FEMA Flood Insurance Rate Map. The Data Sheet also recommends the selected site be greater than 500 feet from direct wave impacts or high flood-flow velocities.

The 500-year Stillwater flood elevation for the Project Site is +16.65 BCB, which is approximately 1.5 feet above the average grade of the existing site. The Project is also within 500 feet of the Fort Point Channel, and therefore does not meet the recommended site selection criteria; however, in this scenario the Data Sheet recommends that the entire Project Site be elevated greater than two feet above the 500-year flood elevation, unless the area is subject to high or moderate velocity flows. Flooding at the Project Site is primarily due to backwater from Boston Harbor and will not have high velocities. Though the Project Site abuts the Fort Point Channel, it is sheltered from direct wave impacts. There is not a direct open water fetch to develop significant waves. Therefore, low wave action is expected over the Stillwater elevation +16.65 BCB, which FM Global calculated to be approximately 1-foot-high during the 500-year flood event.

FM Global, based on their analysis, set the theoretical 500-year flood level including wave action at +17.45 BCB. The resultant recommended design elevation for the Project Site is two feet above the 500-year flood level including wave action at +19.45 BCB, which was rounded up to +19.5 to set the first floor elevation of the buildings.

4.8.3 Resiliency Measures

The Proponents have identified building and site design resiliency measures to address the potential impacts described above.

Flooding

Several building and site design measures have been evaluated to make the Project more resilient to flooding events. Based on the comprehensive analysis of the Project vulnerabilities to flooding presented above, the finished floor elevation for the Brick Buildings and the New Building has been set at +19.5 BCB. This strategic design approach will ensure that the Brick Buildings and the New Building will maintain operational capacity during a 100-year flood event evaluated by FEMA with the projected Intermediate High Emission Sea Level Rise in 2075. This finish floor elevation also provides over 2 feet of freeboard from a 500-year flooding event. In addition, the finish floor elevation and site grading provide resiliency to inland flooding. If the local BWSC drainage infrastructure surcharges, there is a drainage path from Necco Street across the lower site elevations and Necco Court, to the Fort Point Channel. Figure 4.3 depicts the FEMA 100-year floodplain elevation (16.45 BCB) in the existing condition, the 100-year floodplain elevation after site grading, and the 100-year floodplain elevation with 2.47 feet of sea level rise after site grading.

The remaining Project Site vulnerability from flooding, due to its lower elevation, is the New Building garage/loading dock entrance on Necco Street. The garage below the New Building must meet existing grade at this street which is more vulnerable to various types of flooding. To adapt to this flooding potential, the Proponents are exploring the use of both movable and permanent flood barriers at the garage entrance. These barriers would provide flooding protection at the garage/loading dock entrance to the desired elevation of +19.5 BCB. Examples of these barriers are included in Figure 4.4. Additionally, the building systems and operations, which will be in the basement of the New Building will be limited to those, which can withstand inundation or are not critical to the operation of the building.

The following Project design elements will further increase resiliency:

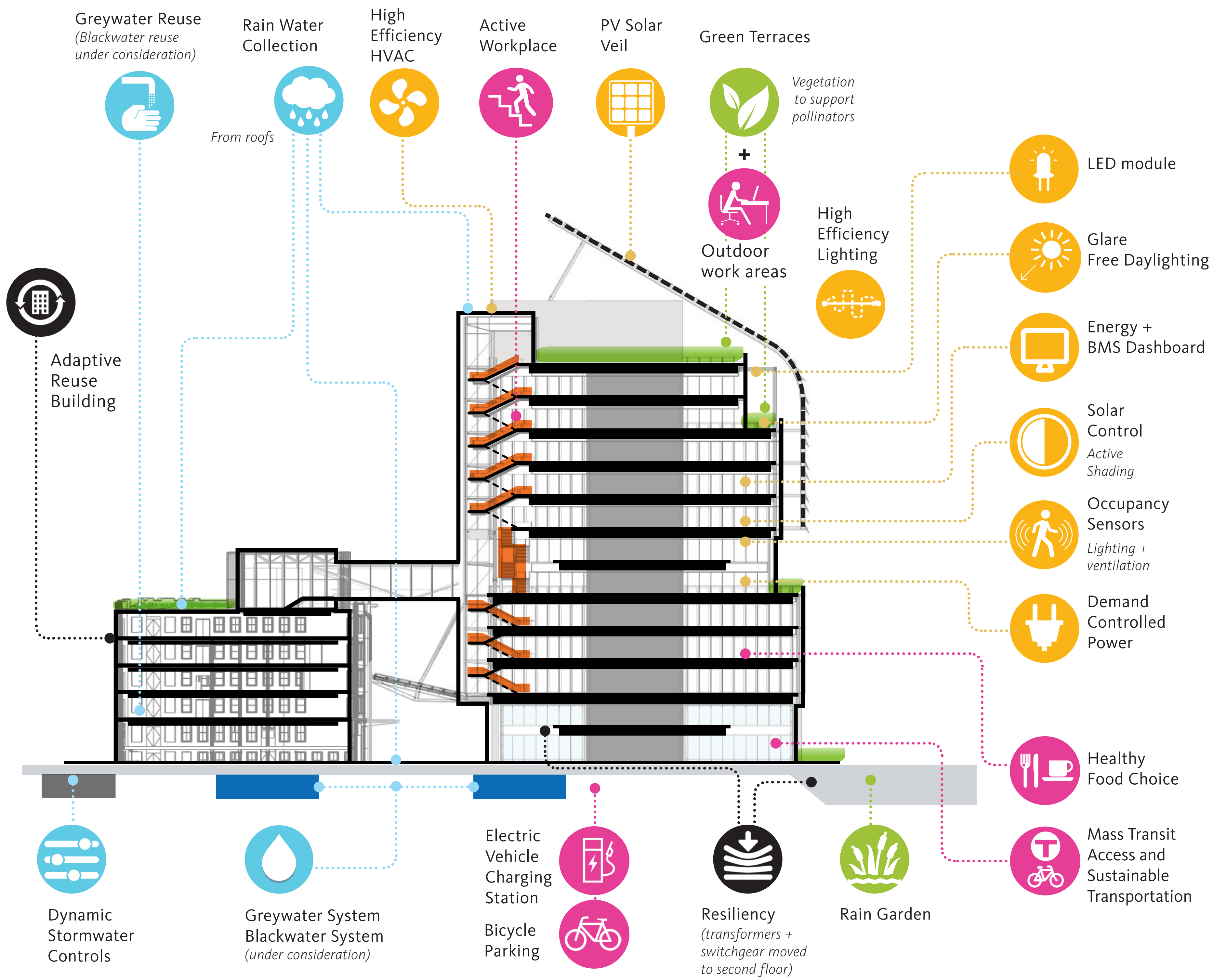
› All electrical distribution system equipment/components will be located on the second floor of the New Building above the 100-year flood level. The Brick Buildings will be served from the current utility feeders with pad mount transformers.
› All life safety/standby emergency generator serving the New Building will be located on the roof and the Brick Buildings emergency generator will be located above elevation +19.5 BCB.
› The stormwater management system will retain stormwater on-site in excess of the required 1-inch precipitation event, through a combination of roof rainwater capture, vegetated roofs, green infrastructure (i.e., on-site infiltration, bioretention, extensive landscaping) and subsurface storage/infiltration. This reduction in stormwater provides relief to the existing BWSC drainage infrastructure by freeing up capacity in relation to the existing site conditions.
› Roof runoff will be harvested from both the Brick Buildings and New Building as well as the GE Plaza canopy and stored in holding tanks for reuse in toilet flushing and to supplement irrigation.
› To cope with increasing intensity in precipitation, the stormwater infrastructure will be designed to capture and convey short-duration, high-intensity precipitation events.
› The surficial landscape has been designed to be resilient to the potential flooding of the Project Site. The plantings at the lower site elevations adjacent to the Fort Point Channel will be selected for their tolerance to inundation by saltwater.
› To prevent surcharging of sanitary sewer flows into the buildings, backflow preventers will be installed on all connections to the sanitary sewer system.

- The municipal sewer system is subject to surcharge due to several factors, including excessive Infiltration and Inflow (I/I) from groundwater and illicit stormwater discharges, as well as the potential failure of the downstream pump station, which conveys sewer flows to Deer Island. Internal stormwater and sanitary sewer piping will be water tight up to the second floor of the New Building. If the backflow preventers fail to operate properly, this design will allow stormwater and sanitary sewer flows to discharge from the New Building with the additional gravity head provided in the watertight pipes vertically.
- All utilities to both buildings will have watertight wall penetrations at the building face to prevent the intrusion of elevated groundwater levels.

Extreme Heat Events

To address extreme weather conditions that the City of Boston is expected to experience in the future, the Project has been designed to withstand and mitigate the expected increase in extreme heat events. Both the Brick Buildings and the New Building will have green/vegetated roof area in an effort to reduce heat island effects, among other benefits, such as reducing stormwater roof runoff. The evapotranspiration from the extensive Project open space will provide an enhanced pedestrian environment in extreme heat events as well. The Site design will maximize green space and focus on the creation of micro climates to enhance usability during all seasons. Additionally, by closely studying wind patterns, the Project will enhance prevailing winds during the summer months to increase pedestrian comfort.

The use of native plant materials will minimize the need for irrigation and maintenance, while providing habitats for local fauna. To accommodate any irrigation needs, the Project is evaluating the use of treated greywater and/or stormwater capture and storage as sources for water usage. Tree species will be evaluated to ensure high performance and functionality while requiring minimal irrigation and maintenance. The landscape design will explore the use of plant materials known for hydraulic redistribution to ensure survival in the multitude of conditions that will be encountered over the life of the Project Site. With the addition of ground level plantings and roof gardens, the Project will ultimately help to reduce heat island effect in the area exponentially from the current site condition (i.e., asphalt for surface parking).



The new GE HQ will utilize both **active and passive strategies on a building and an urban design scale** that showcase the company's future-forward approach in solving the world's energy challenges. To build a responsive solution that will sustain generations to come, GE is working with the design and delivery team to **create a solution that embodies GE's aspiration for a top of class, sustainable workplace environment.**

WATER

Rain water
Collection from green roof and landscaping
Dynamic storm water controls

Waste water
Greywater reuse for site irrigation + toilets

ENERGY

MEP systems
PV solar array on new building roof
Energy + BMS dashboard
High performance envelope

Workplace
Solar control
Occupancy sensors

GREEN AREAS

Treatment
Native landscaping with bioswales

Health and wellness
Green roof terrace at Convener Space
Green roof terrace accessible from cafeteria

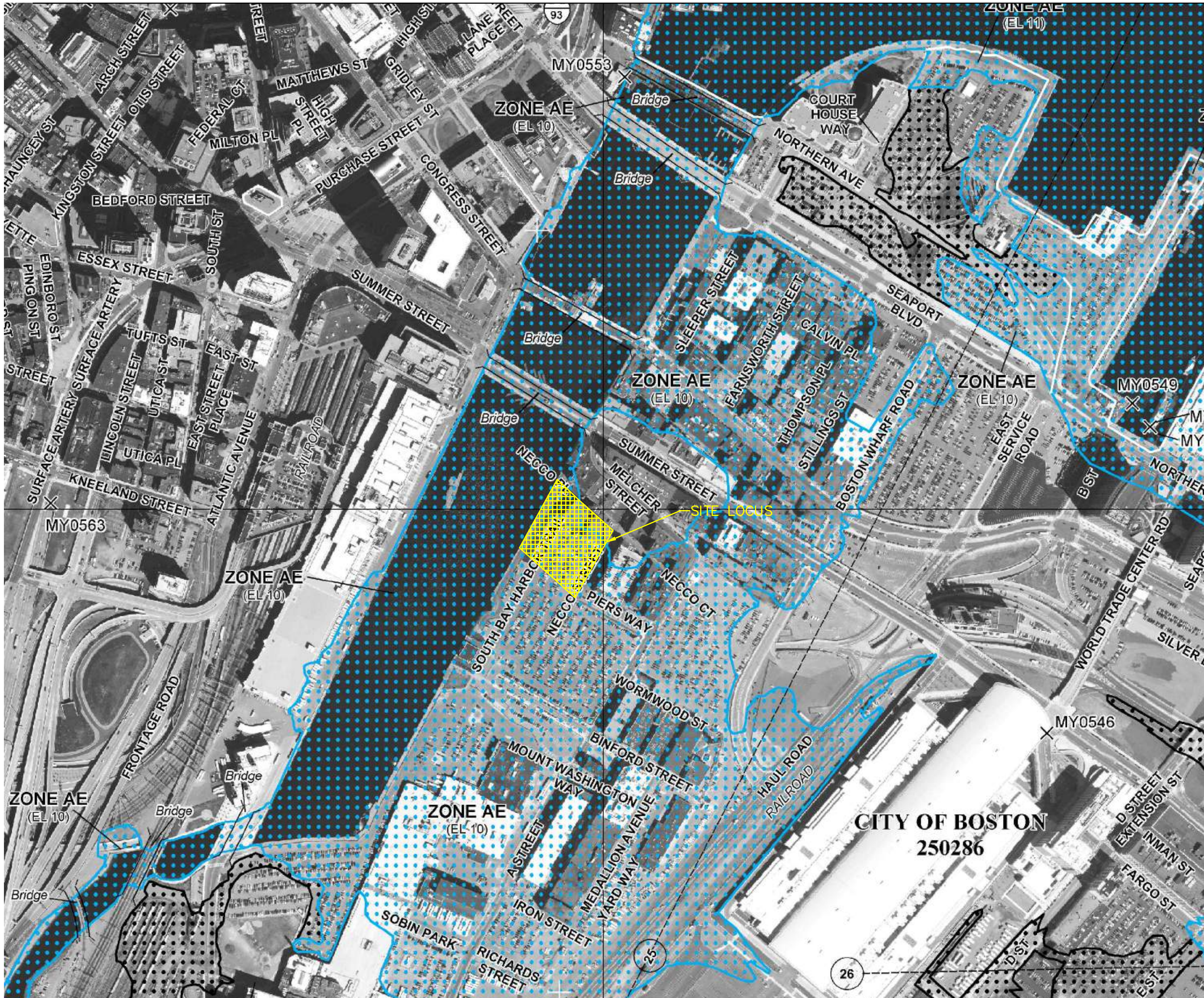
Active design
Access to nature
Connecting stairs
Walking paths connecting to Harborwalk
Stand up work stations

Gensler

Figure 4.1

Campus Sustainability Elements

GE Headquarters Project
Boston, Massachusetts



GILLETTE PARK

JOINS PANEL 0083

$^{3}31^{000m}E$

NFIP	PANEL 0081J

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

SUFFOLK COUNTY, MASSACHUSETTS (ALL JURISDICTIONS)

PANEL 81 OF 176

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
BOSTON, CITY OF	250286	0081	J

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER 25025C0081J

MAP REVISED MARCH 16, 2016

Federal Emergency Management Agency

Source Info: MassGIS, VHB, GE

FEMA Panel: 25025C0081J
eff. 3/16/2016

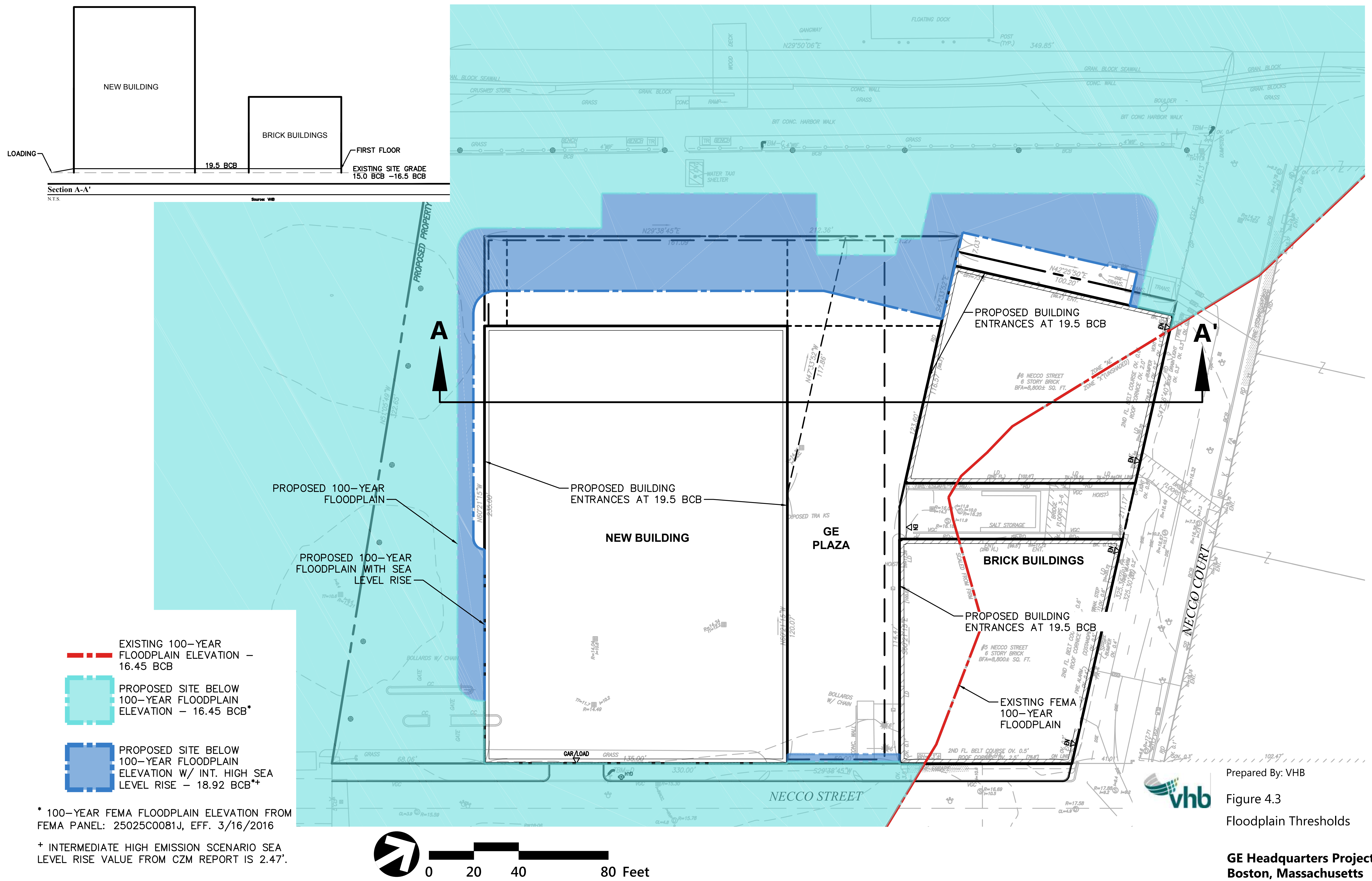
0 250 500 1000Feet

Prepared By: VHB

Figure 4.2

Effective FEMA 100 Year Floodplain

GE Headquarters Project
Boston, Massachusetts



* 100-YEAR FEMA FLOODPLAIN ELEVATION FROM FEMA PANEL: 25025C0081J, EFF. 3/16/2016

\+ INTERMEDIATE HIGH EMISSION SCENARIO SEA LEVEL RISE VALUE FROM CZM REPORT IS 2.47'.

Prepared By: VHB

Figure 4.3

Floodplain Thresholds

GE Headquarters Project
Boston, Massachusetts

A: Flood Log™ Flood Barriers
Source: http://www.floodpanel.com/flood-protection-products/flood-log-flood-barriers/


B: Flood Log™ Flood Barriers
Source: http://www.floodpanel.com/flood-protection-products/flood-log-flood-barriers/

These photos represent different measures that could be employed for protection. The product shown in A and B requires a small amount of permanent equipment to accept temporary barriers. Item C is a temporarily placed barrier.


C: AquaFence© Flood Barrier System
Source: http://www.aquafence.com

Figure 4.4

Potential Flood Control Measures

GE Headquarters Project
Boston, Massachusetts

5

Wetlands and Waterways

5.1 Introduction

The Project will activate vacant buildings and a parking lot on filled Commonwealth Tidelands. This chapter describes the wetlands and waterways jurisdiction relative to the Project and how the Project will meet or exceed the requirements of applicable regulations.

5.2 Key Findings and Benefits

- The Project provides substantial public benefits and is protective of the Public Trust rights inherent in filled tidelands by significantly enhancing public access to and use of the Project Site.
- The Project will meet all applicable wetland regulations.
- The Project will transform the Project Site into a hub of technology, innovation, and intellectual stimulation, as well as a new meaningful destination on the City's Harborwalk.
- The design and programming of the Project will attract a broad range of visitors, day and night, year-round.
- The Project will provide over 61,940 square feet of outdoor public space, including an inviting Harborwalk, green space, interpretive signage, and amenities.
- The Project will provide approximately 75 percent of ground floor public uses, including the Bistro, Maker Space, Coffee Bar, Museum, Community Work Lounge, and public restrooms. This will be true in both the New Building and the Brick Buildings where no public uses are required.

5.3 Phase 1 Project Impacts

As presented in Section 1.7, the Phase 1 Project, which includes the acquisition and redevelopment of the Brick Buildings, will begin before the construction of the New Building. The Phase 1 components will proceed in advance of completion of the MEPA and the Chapter 91 process for the Project.

The Phase 1 Project is located partially within the buffer zone to Coastal Bank and Land Subject to Coastal Storm Flowage. Any excavation or site work associated with Phase 1 will be subject to an Order of Conditions from the Boston Conservation

Commission. The Phase 1 Project does not exceed any MEPA review thresholds related to wetlands or waterways.

5.4 Regulatory Context

This section discusses the wetlands and waterways approvals applicable to the Project as well as the local planning and regulatory controls applicable to the Project.

5.4.1 Massachusetts Public Waterfront Act (Chapter 91)

The Massachusetts Public Waterfront Act, MGL Chapter 91, as implemented by the Massachusetts Department of Environmental Protection ("DEP") through the Waterways Regulations (310 CMR 9.00), regulates activities in filled and flowed tidelands within the Commonwealth, and is intended to protect and promote public use of the waterfront. The limit of Chapter 91 jurisdiction is defined by the oldest most credible map depicting the mean high water mark prior to placement of fill. This presumed historic shoreline is used to define the historic high water mark and the limits of Chapter 91 jurisdiction at the Project Site. According to GIS data compiled through the DEP/CZM Chapter 91 Historic Shoreline Mapping project, historic mean high water for the Project Site was determined based on the U.S. Coast Survey of the Inner Harbor, surveyed in 1847 (see Figure 5.1). The majority of the Project Site was filled under legislative authority by the Boston Wharf Company prior to the 1866 adoption of Chapter 91. In 1916, under the authority of the General Court, a license was issued by the Directors of the Port of Boston which recognized the legislative authorization of the previously placed fill, and issued a license for additional fill under license number 188.

The Project Site is located seaward of the historic mean high water, and is therefore entirely within Chapter 91 jurisdiction. The Project Site is not separated from the watersheet by a public way and is therefore not considered to be landlocked.

The Proponents will obtain a new non-water dependent license under Chapter 91 for construction of the New Building and the Project's public realm improvements. The existing Brick Buildings and the fill between the structures were licensed by DEP in 2003 under the Amnesty License, DEP license number 9342a. Upon transfer of the property, the Proponents and MassDevelopment will enter into an Administrative Consent Order with MassDEP to address historic violations and rehabilitation of the Brick Buildings as described in Section 1.7. Likewise, the existing public boat dock constructed in 2011 under DEP license number 12906 is not anticipated to be modified as part of the Project. Copies of the licenses for the Brick Buildings and public dock are provided in Appendix E.

5.4.2 100 Acres Master Plan and the South Boston Municipal Harbor Plan Amendment

The Municipal Harbor Planning process allows local planning authorities the opportunity to tailor the Chapter 91 regulations to achieve specific community goals. The EEA Secretary oversees this process to ensure that any modifications are in keeping with the intent of Chapter 91, and that the public benefit exceeds the value of any individual gain.

As presented in Chapter 2, *Regulatory Context and General Information*, an MHP for the South Boston Waterfront District was approved by the EEA Secretary in 2000, on completion of a master planning effort for the Fort Point Industrial District and the area now known as the "100 Acres." Following an extensive community planning process, the 100 Acres Master Plan was completed in 2006, and outlined an overall land use plan for the district, including recommendations for height, density, open space and pedestrian connections. These recommendations were codified by the BRA and Zoning Commission in 2007 through the approval of the PDA Master Plan, and responsibilities for implementation were allocated by the existing property owners and the BRA through a MOA, also in 2007. The MOA requires certain open space and infrastructure improvements for specific development sites.

Advancing this planning effort, the City prepared an amendment to the MHP which directs the implementation of the 100 Acres Master Plan and accommodates the envisioned uses. The Secretary's 2009 decision approving the MHP Amendment established several amplifications (i.e., more restrictive standards than Chapter 91) and substitute provisions (i.e., less restrictive standards). These include the following:

› Reconfiguration of the water-dependent use zone to provide a setback of 110 feet throughout all but a small portion of the shoreline in front of the existing Brick Buildings where the setback would be only 18 feet.
› Increasing the required minimum width of the public walkway along the water's edge to 18 feet where the water-dependent use zone is at least 100 feet, and to only 12 feet across the remainder of the shoreline.
› Providing for building heights that are consistent with the surrounding area and that will preserve wind, shadow, and other conditions of the ground level environment that will be conducive to water-dependent uses.

Furthermore, as described below, the MHP Amendment implements the objectives of the Fort Point Channel Watersheet Activation Plan ("FPCWAP") by requiring the inclusion of facilities and amenities which were envisioned within the plan.

Fort Point Channel Watersheet Activation Plan

The FPCWAP was an overlapping planning effort completed in 2002 that sought to activate the watersheet and preserve public rights along the Fort Point Channel. The

FPCWAP established standards for access and programming for projects proposed along the shores of the Fort Point Channel, including:

- locations to support and provide services associated with boat docks;
- restaurants or active uses that attract people to the waterfront;
- interpretive or wayfinding activities;
- locations to support rental of kayaks or small boats; and
- other watersheet or public access network amenities.

As presented in Section 5.5, the Project will be constructed in compliance with the relevant offsetting provisions and amplifications identified in the MHP Amendment, as clarified, and will advance the goals of the FPCWAP by activating the public use of the Fort Point Channel waterfront year-round.

5.4.3 Coastal Zone Management (CZM) Policies

The Project Site is located within the Massachusetts Coastal Zone and, as the Project will be a non-water dependent project, must be consistent with the regulatory policies established by Massachusetts Office of Coastal Zone Management ("CZM") under the federally approved Massachusetts Coastal Zone Program.[1]

The Massachusetts Coastal Program establishes 20 enforceable program policies and nine management principles intended to embody the coastal policy of the Commonwealth. As detailed in Section 5.7, the Project has been designed consistent with these goals to activate the waterfront and protect natural resources.

5.4.4 Boston Conservation Commission

As depicted on Figure 5.2, the Project Site contains state-regulated wetland resource areas, including Land Subject to Coastal Storm Flowage and land within the 100-foot buffer zone to Coastal Bank associated with the Fort Point Channel. These resources are subject to the jurisdiction of the Wetlands Protection Act ("WPA"). Work within these areas requires the filing of a Notice of Intent with the Boston Conservation Commission and the issuance of an Order of Conditions which protects the identified public interest of the WPA:

- Protection of public and private water supply;
- Protection of groundwater supply;
- Flood control;
- Storm damage prevention;
- Protection of land containing shellfish;

1 Massachusetts Office of Coastal Zone Management Policy Guide, Executive Office of Energy and Environmental Affairs, October 2011.

- Protection of fisheries; and
- Protection of wildlife habitat.

A detailed description of Project compliance with WPA standards is provided in Section 5.6.

5.5 Chapter 91 Licensing Review and Compliance

The following sections present the Chapter 91 jurisdictional framework and a review of the New Building, Brick Buildings and associated public realm improvements in relation to their compatibility with Chapter 91 and the MHP Amendment. The section also discusses consistency with the planning documents presented in Chapter 2 as they relate to the Chapter 91 regulations including the FPCWAP and the 100 Acres Master Plan.

The MHP Amendment addressed an approximately 13-acre area. Gillette has entered into an agreement with GE to sell a 2.5-acre portion of its property to the Proponent. Therefore, the Proponents will be licensing the work in only a portion of the area addressed by the MHP Amendment. Property ownership is described in greater detail in Chapter 1, *Project Description and Alternatives*.

As presented below, the Brick Buildings were previously licensed. The Phase 1 Project that includes renovation of the Brick Buildings will be covered by the Amnesty License and a related Administrative Consent Order. The existing public dock was licensed by DEP in 2011 under DEP license number 12906 and will not require a new license. The Chapter 91 license for the Project will ultimately result in one license for the entire Project.

5.5.1 Brick Buildings Amnesty and Public Dock Licenses

Under Chapter 91 regulations, structures constructed before 1984 were eligible for licensing under the amnesty program which exempted them from the requirements of certain procedural standards, so long as an application was submitted prior to 1996. The amnesty licensing program was intended to allow for the continued use and maintenance of existing structures on authorized filled tidelands that were constructed prior to the 1983 overhaul of the Chapter 91 regulations which extended Chapter 91 licensing authority to structures on previously filled tidelands.

The Brick Buildings were constructed in 1907 on tidelands which were filled by the Boston Wharf Company between 1836 and 1882. In 1996, the Boston Wharf Company applied to DEP for an amnesty license seeking to authorize the Brick Buildings under the pre-1983 requirements. The Amnesty License was also intended to serve as a mechanism for implementation of mitigation associated with the Central Artery and Tunnel Project ("CA/T") which was being constructed in the vicinity of the Project Site. Due to the timeframe of the CA/T construction, the review of the Amnesty License application was postponed until 2002 when plans were resubmitted by the new owner of the Brick Buildings, Gillette. The license was approved by DEP in 2003 as license number 9342a, and contained conditions that specifically directed the implementation of mitigation by the CA/T to improve public access and recreational opportunity along the waterfront. That mitigation included construction of the Harborwalk as well as the construction and maintenance of a public dock for recreational boating uses. The public dock was licensed separately by Gillette in 2011 under DEP license number 12906.

The license for the Project will ultimately include these existing licensed structures. The renovation of the Brick Buildings will incorporate public ground floor uses in approximately 75 percent of the ground floors of the Brick Buildings even though they are not required by the existing license.

5.5.2 Chapter 91 and the South Boston MHP Amendment

Chapter 91 provides for the protection of the public's rights to navigation along and access to the Massachusetts shoreline. The Chapter 91 regulations establish standards for jurisdictional projects based on a number of criteria. Key among these are a project's status as water-dependent or nonwater-dependent, its location on flowed or filled tidelands, and its location on tidelands identified as either Private or Commonwealth Tidelands. The regulations also apply additional criteria to that portion of a project site within the "water-dependent use zone." In the case of water dependency, a project that is principally nonwater-dependent will be reviewed as nonwater-dependent in whole, whether or not it includes water-dependent aspects.

The following sections review licensing provisions of Chapter 91 relative to the above standards.

Water Dependency

The Project includes nonwater-dependent uses and will therefore be reviewed under Chapter 91 as a nonwater-dependent project. To the degree modified by the MHP Amendment, these improvements will be subject to the Chapter 91 standards for the conservation of the capacity to provide for water-dependent uses as defined in the Chapter 91 regulations at §9.51, the standards for the utilization of the shoreline for water-dependent purposes at §9.52, and the standards for the activation of Commonwealth Tidelands at §9.53.

Private and Commonwealth Tidelands

The Chapter 91 regulations under §9.02 consider tidelands to be Commonwealth Tidelands if they lie seaward of the historic low water mark or are greater than 1,650 feet from the historic high water mark, whichever is further landward. The Project Site is approximately 2,200 feet from the historic high water mark; therefore, all tidelands within the Project Site are deemed Commonwealth Tidelands, as confirmed in the MHP Amendment.

Commonwealth Tidelands are considered to be held in trust for the benefit of the public, and require the Project to promote public use and enjoyment of the land. Under the MHP Amendment, this requirement is amplified, requiring that the Project specifically include public benefits and amenities recommended by the FPCWAP. These public benefits are detailed in Section 5.5.4.

Water-Dependent Use Zone

The Chapter 91 regulations at §9.51 require that nonwater-dependent use projects on tidelands not unreasonably diminish the capacity of such lands to accommodate water-dependent uses. The water-dependent use zone ("WDUZ") is defined as a certain area of waterfront land, measured from the water's edge, or more specifically, the "project shoreline" as defined by the Chapter 91 regulations at §9.02. Under the MHP Amendment, the WDUZ was increased to 110 feet in front of the New Building, but reduced to 18 feet in front of the existing Brick Buildings to accommodate the planned development of the parcel between the Brick Buildings and the Fort Point Channel, referred to in the 100 Acres Master Plan as the G1 parcel.

Since the Project includes the redevelopment of the G1 parcel as open space, a written clarification of the MHP has been requested, pursuant to 301 CMR 12.06(1) to expand the WDUZ to include the area of the G1 parcel. The reconfigured WDUZ is identified in Figure 5.3, and expands the total area reserved for water-dependent uses from a 28,000 square foot baseline under Chapter 91 and 27,680 square feet under the 2009 MHP Amendment to 29,400 square feet, increasing the area protected for water-dependent uses.

South Boston MHP Amendment Jurisdiction

As reviewed in Section 5.4.2, the Municipal Harbor Planning regulations at 310 CMR 23.00 allow municipalities to tailor particular Chapter 91 standards and, in particular, those related to use, height, setback, and open space. In 2009, the EEA Secretary approved the South Boston MHP Amendment for approximately 13 acres of waterfront area within the area of the 100 Acres Master Plan. This MHP Amendment area includes the entire Project Site. Both the planning guidelines and substitute provisions are applicable to the proposed improvements.

5.5.3 Special Public Destination Facility

The EEA Secretary's 1991 Decision for the City of Boston's Harbor Park Plan describes a Special Public Destination Facility (SPDF) as "…facilities [of public accommodation] that enhance the destination value of the waterfront by serving significant community needs, attracting a broad range of people, or providing innovative amenities for public use…." The designation was developed to form a network of public facilities along

Boston Harbor that not only allow for public access, but encourage it. Well-known SPDFs along the harbor include the "Town Square" at Rowes Wharf and the Institute of Contemporary Art ("ICA") in the Seaport. The provision of a SPDF is not required under the Chapter 91 regulations or the MHP Amendment; however, this designation is appropriate for the Project, which will provide a public destination and innovative presence that exceeds the sum of its parts, and will be an invaluable asset to the region as described in greater detail below.

The provision of this level of SPDF will serve to meet the regulatory requirements under §9.53 by activating tidelands and promoting public use and enjoyment of the shoreline. This SPDF will be the cornerstone for future development in the 100 Acres, and will serve as a benchmark to encourage future projects to prioritize activation of the waterfront. As discussed below, the Project has been designed to engage visitors and to offer a substantial benefit to the public, and as such, will meet the amplified requirements for development on Commonwealth Tidelands with a WDUZ and for the requested extended term license.

SPDF Description

The Project will create an iconic and magnetic public space that will transform this portion of the Fort Point Channel waterfront into a flagship destination. Through a combination of active public spaces, inspiring architecture, community integration, sustainable design, and intellectual programming, the Project will serve as a hub of innovation that will advance the progress of science and technology in the region.

Sustainability

As described in Chapter 3, *Urban Design*, and further detailed in Chapter 4, *Sustainability/Green Building and Climate Change Resiliency*, the Project incorporates a holistic approach to sustainability, and will use the sustainable design of the building as an opportunity to showcase sustainable technologies. Sustainability components such as the Solar Veil, Predix-powered smart building systems, greywater water reuse systems and rainwater collection will be integrated into the Project, including signage identifying the features and educating visitors on their functions. The sustainable design of the Project is intended to reflect GE's position as an industry leader in sustainable technologies and programs, as well as to demonstrate their adaptability and pioneering approach to challenges. Sustainable technologies utilized on-site will evolve throughout the lifetime of the Project as new technologies become available.

Public Realm and Open Space

The exterior public open spaces of the Project will be designed and programmed to attract and inspire. The landscaping design will be functional, mitigate sea level rise, and manage rainwater, while simultaneously showcasing sustainable innovation and creating an active and appealing public waterfront. In keeping with the overall theme of the Project, the public realm will feature interpretive and educational signage, creative seating areas, waterfront overlooks, and potential art installations, as well as flexible open spaces for temporary uses and general passive uses.

The Harborwalk will be integrated into the Project Site as an interpretive pathway that accommodates the casual passerby as well as Project visitors. Expanding the Harborwalk from 12 to 18 feet, and the use of improved and inviting materials, will provide a welcoming and accessible experience for all users, including pedestrians and cyclists. The Harborwalk will be integrated with the GE Plaza through a series of steps and accessible paths to provide seamless connectivity throughout the Project Site. Seating areas, overlook platforms and flexible lawn space bordering the Harborwalk will provide for respite and relaxation, separated from the more active public uses in the New Building by native planting beds that provide visual appeal, stormwater retention, and ecological value.

Activation of the public realm will be further achieved through the provision of ground floor interior public uses in the Brick Buildings and New Building that spill into the public realm via the GE Plaza. The GE Plaza will provide an expansive 50-foot-wide pedestrian-only walkway, which GE proposes to protect from the elements to encourage year round use by a translucent canopy. The uses bordering the GE Plaza are intended to welcome the public with features such as folding glass partitions in front of the External Maker Space. The GE Plaza will also feature outdoor café seating and work spaces, potential art installations, and regular programming.

Boat Dock

The existing licensed public dock discussed in Section 5.5.1 will be maintained as part of the Project and will be activated by the increase in public recreational opportunity and the improvements to the public realm. The Proponents will encourage use of this resource by improving accessibility to the dock and potentially incorporating the dock into both public and private programming. The Proponents will also provide support for a kayak and/or small boat rental facility to further activate the watersheet. Although this portion of the channel is not suitable for high volume water transportation due to limited overhead clearance beneath the Summer Street Bridge, the Proponents will encourage the use of this resource for general recreational uses, and will work with the local community to support activation of the Fort Point Channel.

Interior Public Facilities

With the exception of limited upper floor accessory services (no more than approximately 25 percent of footprint), the entire ground floor of both Brick Buildings and the New Building as well as a portion of the upper floors of the New Building will be devoted to public uses. These uses include a combination of unique and innovative features which directly support the Proponents' vision of advancing a hub of innovation, along with a museum, café space, a coffee bar, lobbies, and public restrooms. Although the provision of ground floor public facilities in the Brick

Buildings is not required under the existing Amnesty License, the Proponents are committed to preserving this space for the public use to enhance the destination value of the Campus. In addition to the ground floor public facilities, a portion of the upper floors of the New Building will be used for public gatherings with GE visitors, guests and the invited public.

Ground floor features planned for the Project include:

New Building

- **Museum** – public space located on the ground floor and second floor of the New Building that presents an evolving display of the inspirational story of the past, present, and future of GE, both from a technology and human initiative perspective.
- **Coffee Bar** – a ground level amenity open to the public featuring a variety of grab & go options.
- **Community Work Lounge** – a visitor reception/check-in area with a lounge and work space open to the public.
- **Public Restrooms (also in Brick Buildings)** – featuring signage so the public nature of these facilities is well advertised.

Brick Buildings

- **External Maker Space** – to support GE educational and outreach programs, Maker space will be provided in the ground level and second floor of the Brick Buildings. The External Maker Space located on the ground level will be open to the community, including university, and high school students to explore a career in STEM. The space will feature maker equipment to display GE technologies, and provide young entrepreneurs and tech startups with access to cutting edge technologies in a collaborative environment.
- **Bistro-Café** – a ground level restaurant space that will be open to the public. The café will face the channel and will enliven the public realm with indoor/ outdoor connectivity and seating that overlooks the waterfront.

These ground floor public spaces are positioned in a way that supports the interface between the interior facilities and the outdoor public realm to encourage and stimulate the public enjoyment of the Campus. The glass façade of the restaurant and bistro will support the spillover of interior activity into the public realm and the interconnectedness of the ground floor uses.

Upper floor public spaces of the New Building include an approximately 15,000 square-foot Convener Space for assembly and presentations/events where GE and interested global and local thought leaders get together to share knowledge with each other and become a catalyst for innovation to solve tomorrow's world challenges.

The above referenced public spaces will also serve to support the GE Brilliant Career Labs program, which is a multimillion dollar commitment by the GE Foundation to provide resources to support Boston Public Schools innovation programs. GE is committed to working with other local schools, colleges, and universities to advance the City's image as a hub of innovation with the GE Headquarters Campus at its core. The operation of these public spaces will be further detailed in a management plan.

5.5.4 Chapter 91 Licensing/Regulatory Standards Review

The following subsections review the proposed activities on the Project Site for consistency with applicable Chapter 91 regulatory standards in relation to the MHP Amendment as clarified. Components for which substitute provisions have been established by the MHP Amendment are identified below.

Extended Term Chapter 91 License

The Proponents are requesting a Chapter 91 license with an extended fixed term of 99 years pursuant to 310 CMR 9.15(1)(b). Such an extension is warranted for a number of reasons, including the expected life of the improvements to be developed at the Project Site by the Proponents, the consistency of the proposed improvements with the MHP Amendment and the long-term nature of the proposed use. Beyond the provision of the SPDF, and in support of the extended term, the Proponents provide the following justifications

› The New Building is being designed and engineered to have an expected useful structural life of equal to or greater than 99 years, and has incorporated a series of resiliency measures including raising the Project Site to achieve a ground floor elevation that is above the projected 500-year storm event for the year 2075.
› The Project supports the goals and objectives of local planning by creating a new destination on the Fort Point Channel, and will establish the Project Site as a public destination for the City of Boston and beyond.
› The Project will be designed and constructed with environmental sustainability in mind, including energy efficient building system performance, reuse and infiltration of water to reduce water demand and improve water quality, and renewable energy systems such as the Solar Veil.

The MHP Amendment indicates that the City supports the issuance of an extended term license within the planning area as a way to encourage long term investment.

Categorical Restrictions on Fill and Structures

All work within Chapter 91 jurisdiction is within previously filled tidelands, and outside of an Area of Critical Environmental Concern or Designated Port Area, as categorically permitted by §9.32(a)(1).

Environmental Protection Standards

In accordance with §9.33, all projects must comply with the applicable environmental regulatory programs of the Commonwealth. Those that are specifically applicable to the Project, and the status of the Project with respect to those programs, are summarized below:

Massachusetts Environmental Policy Act: Through the filing of this EENF/EPNF and the anticipated SEIR, the Proponents seek a determination from the EEA that the Project "adequately and properly complies" with MEPA.

Massachusetts Wetlands Protection Act: Compliance with the Wetlands Protection Act is presented in Section 5.6. The Project will be required to obtain approval in the form of an Order of Conditions from the Boston Conservation Commission for work within wetland resources areas and associated buffers.

Massachusetts Clean Water Act: As presented in Chapter 10, the Project will comply with the Massachusetts Clean Water Act and will undergo City, State, and federal review of water and wastewater management and treatment systems.

Massachusetts Historical Commission Review: MHC review will take place through MEPA, under Chapter 254 (State Register Review). Consistency with MHC policies is presented in Chapter 7.

Coastal Zone Management Consistency Review: The Project's compliance with the Coastal Zone Management Act is reviewed in Section 5.7.

Conformance with Municipal Zoning and Harbor Plans

The Project Site is located within the Fort Point Historic Sub-district of the South Boston Interim Planning Overlay District, as defined in the City of Boston's Seaport Public Realm Plan and the Code. A PDA has been developed for the 100 Acres (Area No. 69) that provides compatibility between the Chapter 91 standards, the MHP Amendment, and the Code. Compliance with the provisions of the Code will be achieved through an amendment to PDA Master Plan No. 69, which governs the zoning of the "100 acres" area of Boston, including the Project Site, as well as a new Development Plan covering only the Project Site, which will be approved by the BRA and the Zoning Commission as discussed in Chapter 2.

The MHP Amendment presents the use and dimensional parameters for the Project Site consistent with the City's goals and plans for this portion of the 100 Acres, and provides guidance for Chapter 91 licensing and approvals. The MHP Amendment also implements the goals of the FPCWAP. By maintaining consistency with requirements of the MHP Amendment, the Project advances and promotes the goals of both plans.

Standards to Preserve Water-Related Public Rights

The Chapter 91 regulations at §9.35 preserve rights held by the Commonwealth in trust for the public to use tidelands, and any access rights associated with such use. The regulations also ensure that jurisdictional public waterfront open spaces are properly managed and maintained.

The Project meets the requirements of this regulation by expanding and improving public open space along the waterfront and enhancing the pedestrian network along the Fort Point Channel consistent with the goals of the FPCWAP, the 100 Acres Master Plan, and the MHP Amendment. Management of the public spaces associated with the Project will be the responsibility of the Proponents. The Project will substantially improve the quality and accessibility of the waterfront open spaces and will increase the area within the Project Site dedicated to water-dependent uses. The Project will provide accessible connections to and from an expanded width Harborwalk through the GE Plaza to Necco Street. The Project will replace existing surface parking lot with 61,940 square feet of outdoor public space. These new public spaces will be designed and programmed to engage and attract the public to the Project Site on a year-round basis.

A site-specific management plan addressing compliance with the regulatory standards contained in §9.35 will be submitted during the Chapter 91 license review process.

Standards to Protect Water-Dependent Uses

The Chapter 91 regulations at §9.36 protect any water-dependent uses occurring at or proximate to the Project Site, including water-dependent uses within the five years prior to the filing of the license application.

Aside from the existing public dock, there are currently no water-dependent uses occurring at or proximate to the Project Site, which has been a surface parking lot and vacant buildings for over a decade. The public dock will be maintained and further activated as part of the Project.

Engineering Construction Standards

All structures associated with the Project will be designed and constructed in a manner that is structurally sound and will be certified by a registered Professional Engineer. No new seawalls or other coastal engineering structures are proposed. A structural inspection of the seawall was conducted during the initial due diligence assessment of the Project Site confirming that no structural alteration of the seawall is required for the proposed improvements.

Conservation Capacity for Water-Dependent Use

In accordance with §9.51, nonwater-dependent projects that include fill or structures on any tidelands (filled or flowed) shall not unreasonably diminish the capacity of the tidelands to accommodate future water-dependent uses. To meet this standard, §9.51 establishes specific standards and conditions. When an MHP has been formally accepted by the Secretary, the standards established by the MHP substitute for the general regulatory requirements. As discussed above, the Project is entirely within the boundary of the area subject to the MHP Amendment. As such, it is subject to, and further complies with, the provisions of the MHP Amendment as clarified.

Improvements associated with the Project will greatly enhance and promote pedestrian access and enjoyment of the waterfront along the Fort Point Channel. The Project will meet or exceed the Chapter 91 regulatory standards by complying with those standards and through direct compliance with the MHP Amendment substitutions and offsets for those standards. A review of the Project's compliance with the standards of §9.51 is provided below:

Non-water Dependent Facilities of Private Tenancy. The Chapter 91 regulations at §9.51(3)(b) prohibit facilities of private tenancy (FPTs) on any pile-supported structure on flowed tidelands, or on the ground floor of any filled tidelands within the WDUZ. The regulations at §9.51(1) and (2) also require that FPTs are developed in a way that does not conflict with existing water-dependent uses or the adaptability of the site for such uses. The Project does not include any ground floor FPTs within the WDUZ, as clarified.

Setback. The Chapter 91 regulations at §9.51(3)(c) require certain building and use setbacks from the water for properties that include a project shoreline and WDUZ. As discussed in Section 5.5.2, the Proponents requested an MHP clarification to reconfigure the WDUZ which will increase the overall size of the WDUZ by eliminating the building envisioned along the waterfront on the G1 parcel in the 100 Acres Master Plan. There are no non-water dependent buildings proposed within the proposed reconfigured WDUZ.

Open Space. The proposed open space at the Project Site is allocated to meet two key requirements;

1. The requirements of Chapter 91 §9.51(3)(d) and §9.53(3)(2)(b)1., and
2. The open space system envisioned by the 100 Acres Master Plan.

The Chapter 91 regulations contain two numerical standards pertaining to open space, the combined effect of which on Commonwealth Tidelands is to limit the site coverage for nonwater-dependent buildings at ground level to no more than 50 percent of the Project Site. Pursuant to the regulations under §9.51(3)(d), the Project is required to provide one square foot of open space for every square foot of tidelands occupied by the New Building and proposed additions to the Brick Buildings.

As summarized in Table 5-1 below, the New Building footprint is approximately 23,100 square feet, and the additional open space impact associated with the rehabilitation of the Brick Buildings is approximately 1,265 square feet, creating a <u>required building footprint offset of approximately 24,365 square feet</u>. Offsetting open space will be provided on-site along the shoreline and will be programmed to activate the waterfront along Fort Point Channel.

In addition to maintaining compliance with the numerical requirements of the Chapter 91 regulations, the proposed open space is oriented to contribute to the open space system envisioned by the 100 Acres Master Plan. Provision of these open spaces is a requirement of the PDA Master Plan which codifies the 100 Acres Master Plan, and Chapter 91 regulations have been tailored to accommodate this layout through the MHP Amendment. As shown in Figure 5.4, the 100 Acres Master Plan identifies a series of individual open space parcels which will provide an expansive waterfront park along the Fort Point Channel and a central open space corridor that extends from the channel to the BCEC. The MOA assigns the construction of the individual open space parcels and infrastructure improvements to specific development parcels.

The responsibility for construction of the planned open space parcels and infrastructure improvements is assigned by the MOA. As illustrated on Figure 5.5, the open space parcels required for the Project Site (Parcels G1, G2 and G3) include HW1 and partial FT1. In addition to constructing these required public open spaces, the Project will replace the building envisioned for the G1 parcel with open space, and provide the planned open space for the HW2 parcel.

Height. Chapter 91 regulations at §9.51(3)(e) require that new non-water dependent buildings within 100 feet of the high water mark be no taller than 55 feet in height, and for every additional two feet of separation from the high water mark, the regulations allow an additional foot of height. The South Boston MHP Amendment provides substitute provisions to accommodate additional building heights above baseline Chapter 91 standards, but requires that any new impacts are offset through additional open space for new shadow impacts lasting over an hour. As illustrated on Figure 5.6, the allowable building height for the New Building is 180 feet, while the allowable height for the Brick Buildings is 100 feet. As further described below, the Project fully complies with Chapter 91 height regulations as modified by the MHP Amendment.

› Shadow Analysis

Consistent with the methodology outlined in the South Boston MHP Amendment, a study was completed to analyze the shadow impact of the New Building greater than the shadow of a building constructed to baseline Chapter 91 heights (the "Chapter 91 Shadow Study"). The Chapter 91 Shadow Study was performed for October 23 from sunrise to sunset, and measured shadow impacts that lasted for one hour or more. The MHP Amendment requires the use of October 23 for the shadow study as it represents the end of the "outdoor season" when shadows would tend to be most unwelcome. A separate shadow analysis was conducted in accordance with the requirements of Section B.2 of the BRA Development Review Guidelines (2006) to identify shadow impacts throughout the year. The results of that analysis are presented separately in Chapter 6.

The Chapter 91 Shadow Study indicates that the shadow impact of the New Building will be approximately 21,415 square feet of shadow greater than the baseline Chapter 91 building heights. The extent of this additional shadow impact is illustrated in Figure 5.7. To offset this net new shadow impact, the MHP Amendment requires the Project to provide one square foot of open space for every two square feet of net new shadow impact. The Project will therefore provide an additional 10,708 square feet of open space above and beyond the required offsets for the New Building footprint to mitigate this net new shadow impact.[2]

› Wind Analysis

To ensure that the additional allowable building height does not result in unacceptable pedestrian conditions due to increased wind, the MHP Amendment requires a wind analysis and implementation of mitigation where necessary to ensure that there are no negative impacts on ground-level conditions. The results of the wind analysis are presented in Appendix G and summarized in Section 6.2 of Chapter 6.

A breakdown of the Project offsets and open space is provided below and illustrated in Figure 5.8.

Table 5-1 Open Space Requirements

Site Dimension	Area (square feet)
Open Space Required	
New Building Footprint	23,100
Building Cantilever	9,840
Open Space Enclosed at Brick Buildings[1]	1,265
Shadow Offset (50% of net new shadow)	10,708
Total	**44,913 sq. ft.**

1 Includes area of the atrium between the Brick Buildings.
2 Covered public space includes area beneath the New Building cantilever.

2 The shadow study compares the Project to the baseline Chapter 91 buildable heights for all buildings envisioned on the Project Site in the MHP Amendment. Accordingly, the Chapter 91 Shadow Study includes all buildings proposed under the 100 Acres Master Plan, including the building on the waterside of the Brick Buildings (referred to as Parcel G1 in the MHP Amendment/100 Acres Master Plan).

Utilization of Shoreline for Water-Dependent Use

In accordance with §9.52 of the Chapter 91 regulations, any nonwater-dependent activity or use shall devote a reasonable amount of space to water-dependent uses and public access. Such uses are defined to include waterfront boardwalks and esplanades for public recreation. Projects that include use of the WDUZ are also required to provide appropriate public walkway access for the entire length of the WDUZ. The width of said walkway is to be 10 feet wherever feasible, and should connect to other walkways. The South Boston MHP Amendment amplifies this requirement by expanding the required walkway (Harborwalk) width to 18 feet in front of the New Building, and 12 feet along the existing Brick Buildings.

The Project will support the continued activation of the watersheet by maintaining the existing public dock, and significantly improving the existing conditions of Harborwalk and public realm along the entire length of the water-dependent use zone. The improved Harborwalk will substantially improve the pedestrian experience along this section of the Fort Point Channel. The Harborwalk will be expanded from 12 to 18 feet, and will feature interpretive signage, potential art installations, sustainable design features, waterfront overlooks, and amenities which promote public enjoyment of the space. Improved materials and accessibility will provide a welcoming experience to all users including pedestrians and cyclists. The integration of these elements and amenities with interpretive signage will serve to invite, engage, and educate visitors to the Site.

Activation of Commonwealth Tidelands for Public Use

The Chapter 91 regulations at §9.53 state that a "nonwater-dependent use project that includes fill or structures on Commonwealth Tidelands … must promote public use and enjoyment of such lands to a degree that is fully commensurate with the proprietary rights of the Commonwealth therein, and which ensures that private advantages of use are not primary but merely incidental to the achievement of public purpose. In applying this standard, the Department shall take into account any factor affecting the quantity and quality of benefits provided to the public, in comparison to the detriments to public rights associated with facilities of private tenancy…" To meet this standard, §9.53 establishes criteria that are applicable to nonwater-dependent projects subject to Chapter 91 licensing and that are located within Commonwealth Tidelands (filled or flowed).

The New Building is entirely within filled Commonwealth Tidelands. As such, the improvements proposed will be reviewed in relation to the criteria established at §9.53. A review of the Project's compliance with the standards of §9.53 is provided below.

Water-Based Public Activity. For projects including a WDUZ, the Chapter 91 regulations at §9.53(2)(e) call for at least one facility that promotes watersheet activation, such as ferries, cruise ships, water shuttles, public landings and swimming/fishing areas, excursion/charter/rental docks, and community sailing centers. The MHP Amendment amplifies this requirement by specifying the implementation of public benefits and features prescribed in the FPCWAP.

In support of the FPCWAP, the Project offers substantial public realm improvements along the Fort Point Channel, and will serve as a year-round public destination to attract a broad range of visitors to the waterfront and to activate the Fort Point Channel. Project elements which specifically support the goals of the FPCWAP are identified below.

<u>Fort Point Channel Watersheet Activation Plan Consistency</u>

- *Locations to support and provide services associated with boat landings:* The Project will improve access to the existing public dock through the enhancement and expansion of the existing Harborwalk with new materials and amenities, and will support these uses with upland facilities including public restrooms.
- *Storage space for seasonal or year-round needs for water-based activities and rental locations for kayaks or small boats:* The Proponents are committed to providing support for future kayak/small boat rental operations available to employees and the public.
- *Restaurants or active uses that attract people to the waterfront:* The Bistro will provide a new destination along the Harborwalk to attract visitors to the waterfront. The Bistro will feature waterfront views and seasonal outdoor seating to enliven the public realm.
- *Interpretive or wayfinding activities:* Interpretive and wayfinding signage is a major component of the landscape design and will engage and inform the public.
- *Changing rooms for the South Bay Harbor Trail network:* Public restrooms will be provided in the Brick Buildings as well as the New Building, with signage to ensure the public nature of the facilities is clear and inviting.
- *Other watersheet or public access network amenities:* As presented in Section 5.5.3., the Project will create a new destination along the waterfront and will strengthen the accessible connections between the Fort Point Channel and adjacent historic district. The Project will provide new public ground floor uses, including a Museum to attract visitors to the site and engage the public.

In addition to these direct public amenities, the Project will help to preserve the historic character of the area by rehabilitating the Brick Buildings and developing the New Building and public realm in a way that pays tribute to the industrial history of both GE and the Fort Point Channel. The Proponents are strong advocates to activate the watershed and will work with the community to determine viable alternatives to execute the vision of the FPCWAP.

Space for Active and Passive Public Recreation. The Chapter 91 regulations at §9.53(2)(b) require the provision of exterior public open space equal to the square footage of all Commonwealth Tidelands on the site outside of the building footprint unless the project conforms with an approved municipal harbor plan which specifies alternatives for public outdoor recreational facilities.

In total, the Project will provide 61,690 square feet of outdoor space that is fully accessible to the public.

Facilities of Public Accommodation. The Chapter 91 regulations at §9.53(2)(c) require the ground level interior space of nonwater-dependent use facilities to be devoted to FPAs, and that these FPAs comprise an area that matches the portion of Commonwealth Tidelands that are within the footprint of the nonwater-dependent building uses on the site. Exception is made for those areas on the ground floor necessary for *Upper Floor Accessory Services*. Per the Chapter 91 regulations, these later areas cannot exceed 25 percent of the ground floor area, unless the Department determines that an alternative location would more effectively promote public use and enjoyment of the project site, or is more appropriate to make ground level space available for upper floor accessory services.

Approximately 75 percent of the public space within the ground floor of the New Building will be devoted to FPAs that are fully accessible to the public. Ground floor public spaces will include a coffee bar, lobby, and Museum that will showcase an evolving display of the past, present, and future of GE. Ground floor FPAs in the New Building will connect to ground floor FPAs in the Brick Buildings (even though FPAs in the Brick Buildings are not required by the current license) via the GE Plaza creating an integrated ground floor of public activity. The Project also provides upper floor space in the New Building that will be accessible to the public by invitation or for regularly programmed events.

Management Plan. The Chapter 91 regulations at §9.53(2) (d) require the development and implementation of a management plan for all on-site facilities offering water-related benefits to the public. The Proponents will be responsible for maintaining the areas of public open space established by the Project. A site-specific draft management plan will be submitted during the Chapter 91 license application process.

5.6 Massachusetts Wetlands Protect Act

The following sections present the existing wetlands resources and detail compliance with WPA performance standards.

5.6.1 Existing Wetlands Resources

Based on review of the existing conditions survey, the following resource areas have been identified on or adjacent to the Project Site:

- **Land Subject to Coastal Storm Flowage (LSCSF)** – As defined in §10.04, LSCSF means "land subject to any inundation caused by coastal storms up to and include that caused by the 100-year storm, surge of record, whichever is greater."
- **Coastal Bank** – As defined in §10.30(2), a coastal bank means "...seaward face or side of any elevated platform, other than coastal dune, whichever lies at the landward edge of the coastal beach, land subject to tidal action or other wetland."

Additional wetland resource areas are located along the Fort Point Channel shoreline, but these resources are all seaward of Coastal Bank and isolated from the Project Site. These resources include:

- Land Under the Ocean; and
- Land Subject to Tidal Action.

5.6.2 Wetlands Protection Act Compliance

The proposed work will occur within the 100-foot buffer zone to Coastal Bank and within the resource area Land Subject to Coastal Storm Flowage ("LSCSF"). No work is proposed within or immediately adjacent to any other wetland resource areas. As noted below, the WPA does not prescribe performance standards for LSCSF, however the Project will comply with the general provisions of the regulations for work in the buffer zone to coastal bank:

Land Subject to Coastal Storm Flowage

The most recent FIRM for the City of Boston indicates that a significant portion of the Project Site is within Zone AE of the 100-year flood, with elevations at 10 feet NAVD88. Since the flood waters would extend from the tidal waters of Fort Point Channel, this area is regulated as LSCSF. The WPA does not prescribe any performance standards for LSCSF.

100-foot Buffer Zone to Coastal Bank

The WPA regulations under §10.02(2)(b) establish a 100-foot buffer zone from the limits of coastal bank. Work within the 100-foot Buffer Zone to Coastal Bank will require compliance with the performance standards enumerated within §10.30. The proposed work within the buffer zone will not result in any short-term construction related or long-term operational impacts to the off-site protected resource area, Coastal Bank, or any additional down gradient resource area.

5.7 Consistency with CZM Policies

The Project Site is located within the Massachusetts Coastal Zone, and as a non-water dependent project, must be consistent with the regulatory policies established by CZM under the federally approved Massachusetts Coastal Program.[3]

Table 5-2 lists the CZM policies which are applicable to the Project, and assesses the consistency with those applicable policies.

Table 5-2 Consistency with Applicable Massachusetts Coastal Zone Management Policies

CZM Policy	Summary of Policy	Summary of Consistency Statement
Coastal Hazard Policy # 1	Preserve, protect, restore, and enhance the beneficial functions of storm damage prevention and flood control provided by natural coastal landforms	The policy does not apply. The Project Site is currently developed and does not contain natural coastal landforms.
Coastal Hazards Policy # 2	Ensure that construction in water bodies and contiguous land areas will minimize interference with water circulation and sediment transport	The Project does not involve work in a water body, and will not impact water circulation or sediment transport in any way. The adjacent bank consists of a man-made stone block wall and does not serve as a sediment source.
Coastal Hazards Policy # 3	Ensure that state and federally funded public works projects would be safe from flood and erosion-related damage	The policy does not apply. The Project is not a state or federally funded public works project.
Coastal Hazards Policy #4	Prioritize acquisition of hazardous coastal areas that have high conservation and/or recreation values	This policy does not apply. The project is not located within a coastal high hazard area.
Energy Policy # 1	For coastally dependent energy facilities, assess siting in alternative coastal locations	This policy does not apply. The Project is not an energy facility.
Energy Policy # 2	Encourage energy conservation and use of renewable sources	Project will incorporate energy conservation measures and include assessment of renewable energy potential to the extent practicable as presented in Chapter 4, *Sustainability/Green Building and Climate Change Resiliency*.
Growth Management Policy #1	Encourage sustainable development that is consistent with state, regional, and local plans	Project will incorporate sustainable design elements, and is consistent with regional, state, and local plans. Project sustainability is discussed further in Chapter 4, *Sustainability/Green Building and Climate Change Resiliency*.
Growth Management Policy #2	Ensure that state and federally funded infrastructure projects serve developed urban areas	The policy does not apply. The Project is not a state or federally funded infrastructure project.

3 Massachusetts Office of Coastal Zone Management Policy Guide, Executive Office of Energy and Environmental Affairs, October 2011.

Table 5-2 Consistency with Applicable Massachusetts Coastal Zone Management Policies (Continued)

CZM Policy	Summary of Policy	Summary of Consistency Statement
Growth Management Policy #3	Encourage revitalization and enhancement of existing development in the coastal zone	The Project will revitalize and activate the Project Site on a year-round basis.
Habitat Policy # 1	Protect coastal, estuarine, and marine habitats to preserve wildlife habitats	The Project will obtain an Order of Conditions from the Boston Conservation Commission for work in the buffer zone of coastal bank and within land subject to coastal storm flowage.
Habitat Policy # 2	Advance the restoration of degraded or former habitats in coastal areas	This policy does not apply.
Ocean Resources Policy # 1-3	Not applicable	The policies do not apply. No work is proposed within the waterway.
Ports and Harbors Policy # 1-5	Not applicable	The policies do not apply. The Project does not propose any dredging or work within a Designated Port Area.
Protected Areas Policy # 1-2	Not applicable	The Project Site is not within or proximate to any ACECs or designated scenic rivers.
Protected Areas Policy # 3	Ensure that proposed developments in or near designated or registered historic places respect the preservation intent of the designation and that potential adverse effects are minimized.	Refer to Chapter 7, *Historic Resources,* for a detailed evaluation of the Project's approach to enhancing the existing historic resources.
Public Access Policy # 1	Ensure that development would promote general public use and enjoyment of water front	The Project will create new recreational opportunities through the enhancement of filled tidelands by providing new pedestrian oriented open space and public accommodations.
Public Access Policy # 2	Improve public access to coastal recreational facilities; facilitate multiple uses; minimize adverse impacts of developments	The Project proposes significant improvements to public open space and pedestrian accessibility. The Project Site is well served by existing public transportation as it is located approximately 0.5 miles (10-minute walk) from South Station, a transportation hub that provides access to the MBTA Red Line, Silver Line, Amtrak, and seven commuter rail branches. The Project Site is also well served by water-transportation with water-taxi stops at nearby Fan Pier. Linkage to these public transportation nodes will be established through the use of wayfinding signage.

Table 5-2 Consistency with Applicable Massachusetts Coastal Zone Management Policies (Continued)

CZM Policy	Summary of Policy	Summary of Consistency Statement
Public Access Policy # 3	Expand coastal recreational facilities and develop new public areas for recreational activities	This policy does not apply. The Project does not involve the development of coastal recreational facilities. As noted above, the Project Site will include public access in the form of the open space and public pedestrian access ways to waterfront locations.
Water Quality Policy # 1	Ensure that point-source discharges do not comprise water quality standards	No point source discharges are associated with the proposed improvements. An improved stormwater management system will be designed and constructed for the Site which meets federal stormwater management standards and is compliant with both the DEP Stormwater Management Policy and Boston Water and Sewer Commission requirements.
Water Quality Policy # 2	Implement nonpoint source pollution controls to promote the attainment of water quality standards and protect designated uses and other interests	Potential nonpoint discharge is limited to stormwater runoff. Stormwater at the Project Site will be collected and treated in appropriate stormwater management structures designed in accordance with federal stormwater management standards, DEP Stormwater Management Policy and Boston Water and Sewer Commission requirements.
Water Quality Policy # 3	Ensure that subsurface waste discharges conform to applicable standards	The policy does not apply as the Project does not propose subsurface waste discharges.

5.8 Public Benefits Determination

The Project is subject to the jurisdiction of the 2007 statute "*An Act Relative to Licensing Requirements for Certain Tidelands*" (2007 Mass. Acts Ch. 168, sec 8) because it is entirely within filled tidelands. The act requires 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; and
- General welfare.

The following sections describe how the Project provides appropriate public benefits and is adequately protective of the Public Trust rights inherent in tidelands.

5.8.1 Purpose and Effect of the Development

The overall purpose of the Project is the construction of a new building and repurposing of the Brick Buildings to create a new innovation campus for GE.

The Project will provide substantial direct and indirect public benefits. Direct benefits include substantial improvements to public access to tidelands and a new SPDF on the waterfront. Indirect but equally important benefits include the GE Foundation's commitment to invest $50 million to improve healthcare in underserved area communities and improve science and math education in Boston area schools. This investment will create thousands of new jobs and support the regional economy.

5.8.2 Impact on Abutters and Community

The Project will result in a substantial net benefit to the community by advancing the goals of the 100 Acres Master Plan and converting an underutilized site into a new public destination. Additionally, the $50 million commitment by the GE Foundation discussed above will provide an extensive and lasting benefit to the community.

Community impacts are relatively limited in nature and will be mitigated to the extent feasible to preserve or improve upon the existing conditions. Potential traffic impacts of the Project will be mitigated through the transportation improvements describing in Chapter 8, *Transportation*. These improvements will be designed in close consultation with the BTD and will encourage alternatives to single-occupancy vehicle use, improve vehicular circulation, and pedestrian safety.

5.8.3 Enhancement of the Property

The Project will enhance the Project Site by converting a surface parking lot and two underutilized and unmaintained historic buildings into a state of the art campus with iconic architecture and new interior and exterior spaces. Additionally, the Project will serve as a cornerstone for future development in the neighborhood by increasing surrounding real estate demand, and by implementing significant improvements to the public realm and adjacent infrastructure.

5.8.4 Benefits to the Public Trust Rights in Tidelands or Other Associated Rights

As described in detail above, the Project will include numerous direct public benefits related to tidelands including the construction of an expanded Harborwalk, new public open space, and substantial ground floor public facilities. The Project will activate the waterfront by creating a new public destination along the Channel.

5.8.5 Community Activities on the Site

The Project will result in a substantial net improvement to community activities at the Site by providing new ground floor public uses designed to attract and inspire. Indoor spaces include a public museum, restaurant, coffee bar, passive gathering areas, and Maker Space.

5.8.6 Environmental Protection/Preservation

The Proponents are committed to redeveloping the Project Site in accordance with all applicable local, state, and federal environmental protection regulations. Table 2-2 in Chapter 2, *Regulatory Context*, provides a list of the regulatory approvals anticipated to be required.

5.8.7 Public Health and Safety

The Project will promote public health and safety through implementing a site design that provides a safe and universally accessible facility from all directions. The design includes on-site and off-site transportation improvements to increase pedestrian and bicyclist safety and accessibility in the neighborhood. Improvements include landscape and appropriate lighting and signage to provide a safe well-lit environment for visitors and employees on a 24/7 basis.

5.8.8 General Welfare

The Project will protect the general welfare by replacing vacant buildings and a surface parking lot with a modern pedestrian scale mixed use Project. The Project will comply with all applicable local, state, and federal environmental protection standards.

5.8.9 Protection of Groundwater

The Project Site is located in the Boston GCOD and is subject to the applicable City of Boston Zoning Code Article 32. As described in Chapter 10, *Infrastructure*, the Project protects groundwater levels at the Project Site. The Project Site design includes new vegetated areas, and a stormwater management system sized to infiltrate in excess of the first one-inch of rainfall to groundwater. Groundwater levels are not expected to fall as a result of the Project and may increase as a result of stormwater infiltration.

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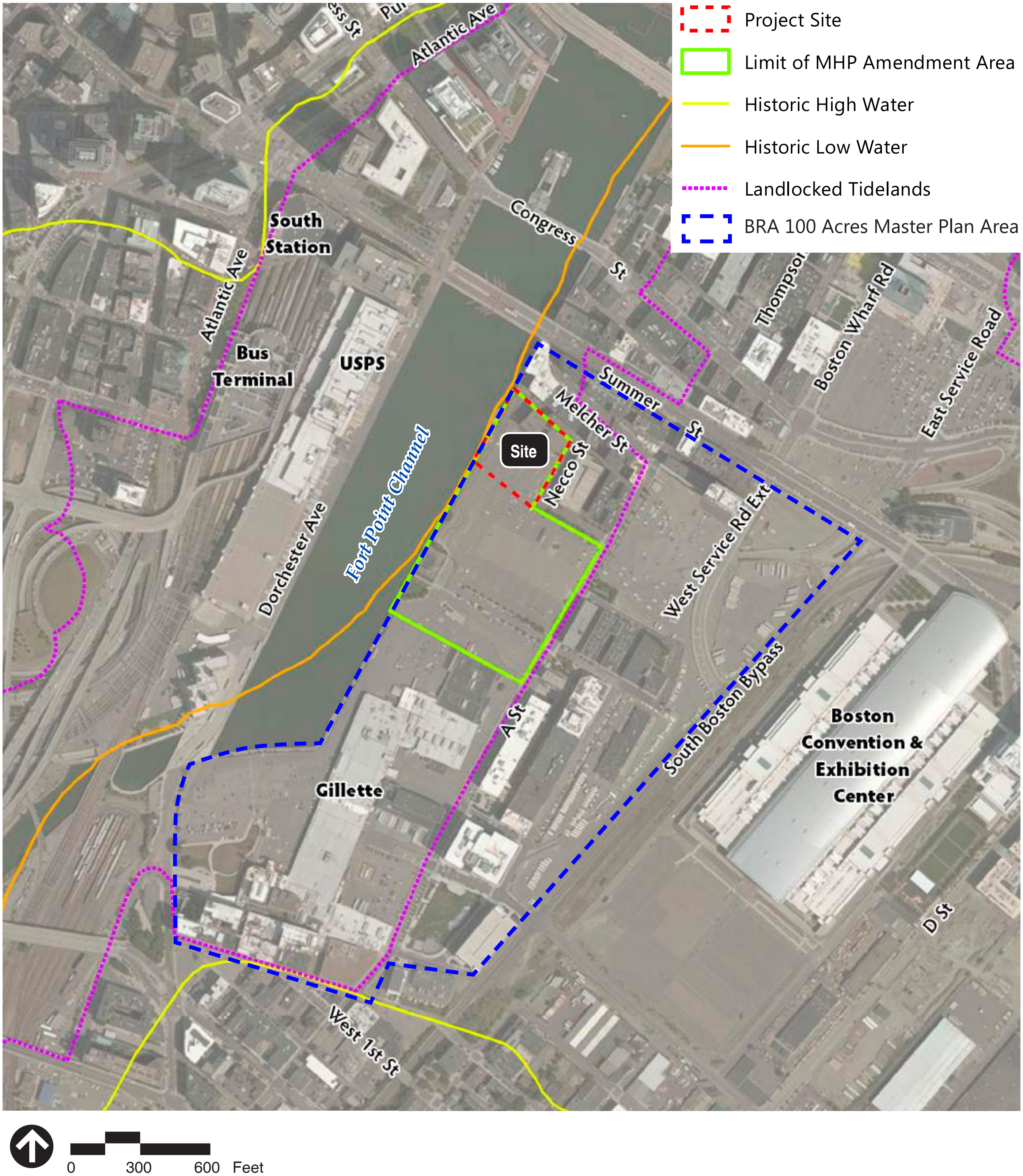
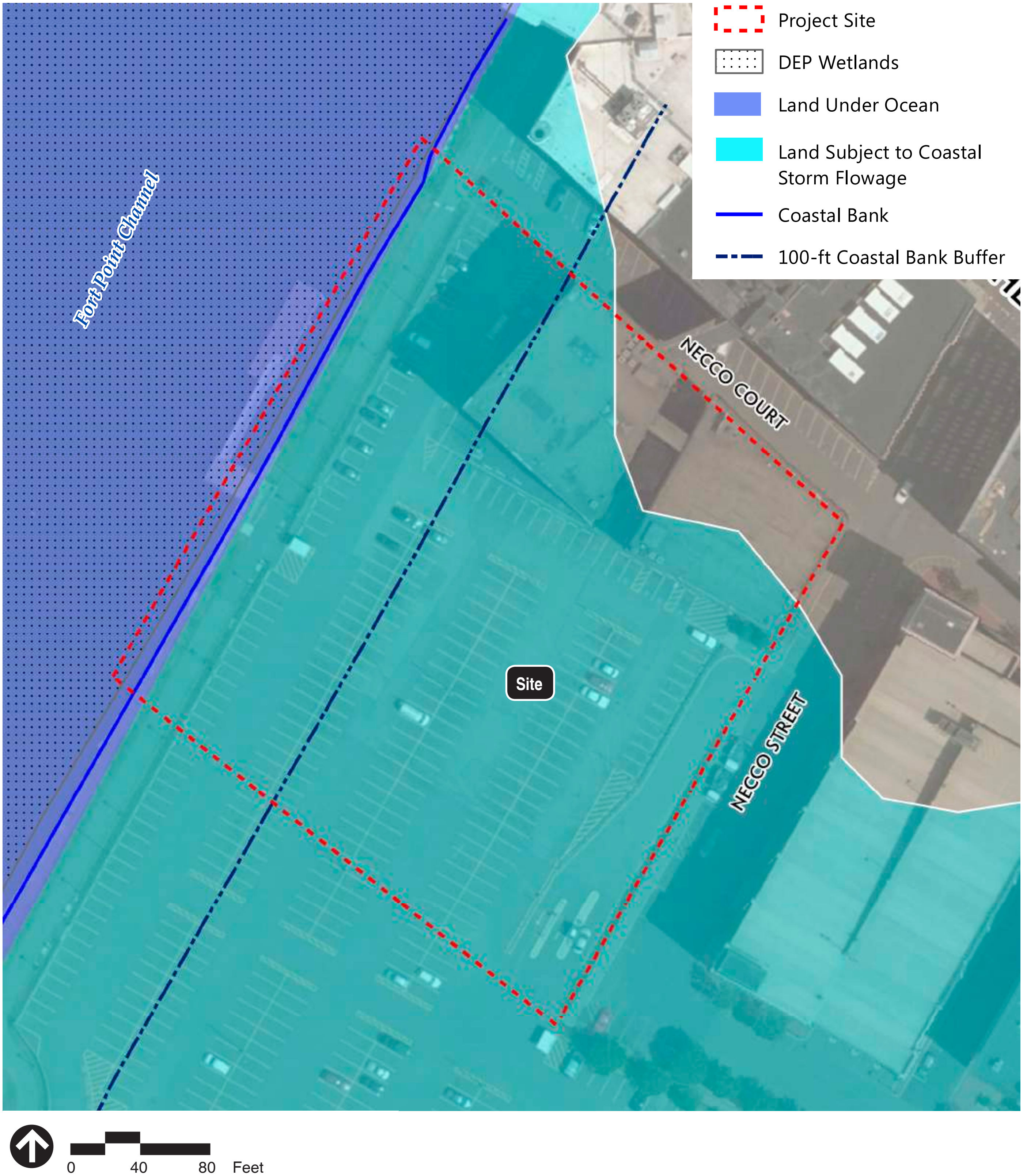


Source Info: ArcGIS Online Bing Aerial, MassGIS

Prepared By: VHB

Figure 5.1
Chapter 91 Jurisdiction

GE Headquarters Project
Boston, Massachusetts



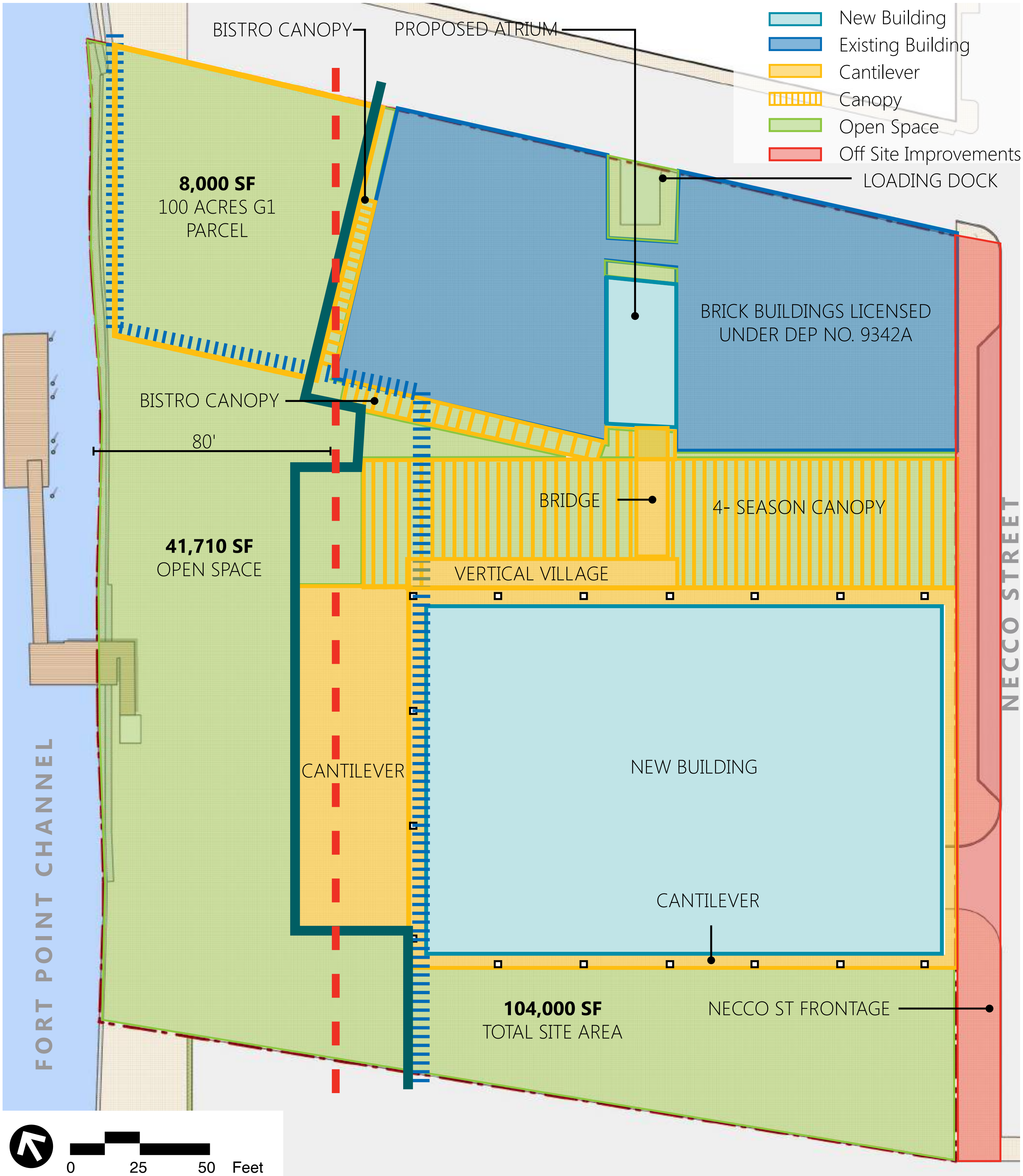
Source Info: MassGIS

FEMA Panel: 25025C0081J
eff. 3/16/2016

Prepared By: VHB

Figure 5.2
Wetland Resources

GE Headquarters Project
Boston, Massachusetts



WDUZ Areas:

1. **Baseline Ch.91** 28,000 SF
2. **MHP** 27,680 SF
3. **Proposed** 29,400 SF

1. As provided in Figure 1-3 of the 2009 MHP Amendment
2. MHP WDUZ with G1 building in place
3. Proposed WDUZ clarification/ correction

Figure 5.3

WDUZ

GE Headquarters Project
Boston, Massachusetts

Source: BRA Master Plan for PDA No.69, South Boston/The 100 Acres, January 10, 2007.

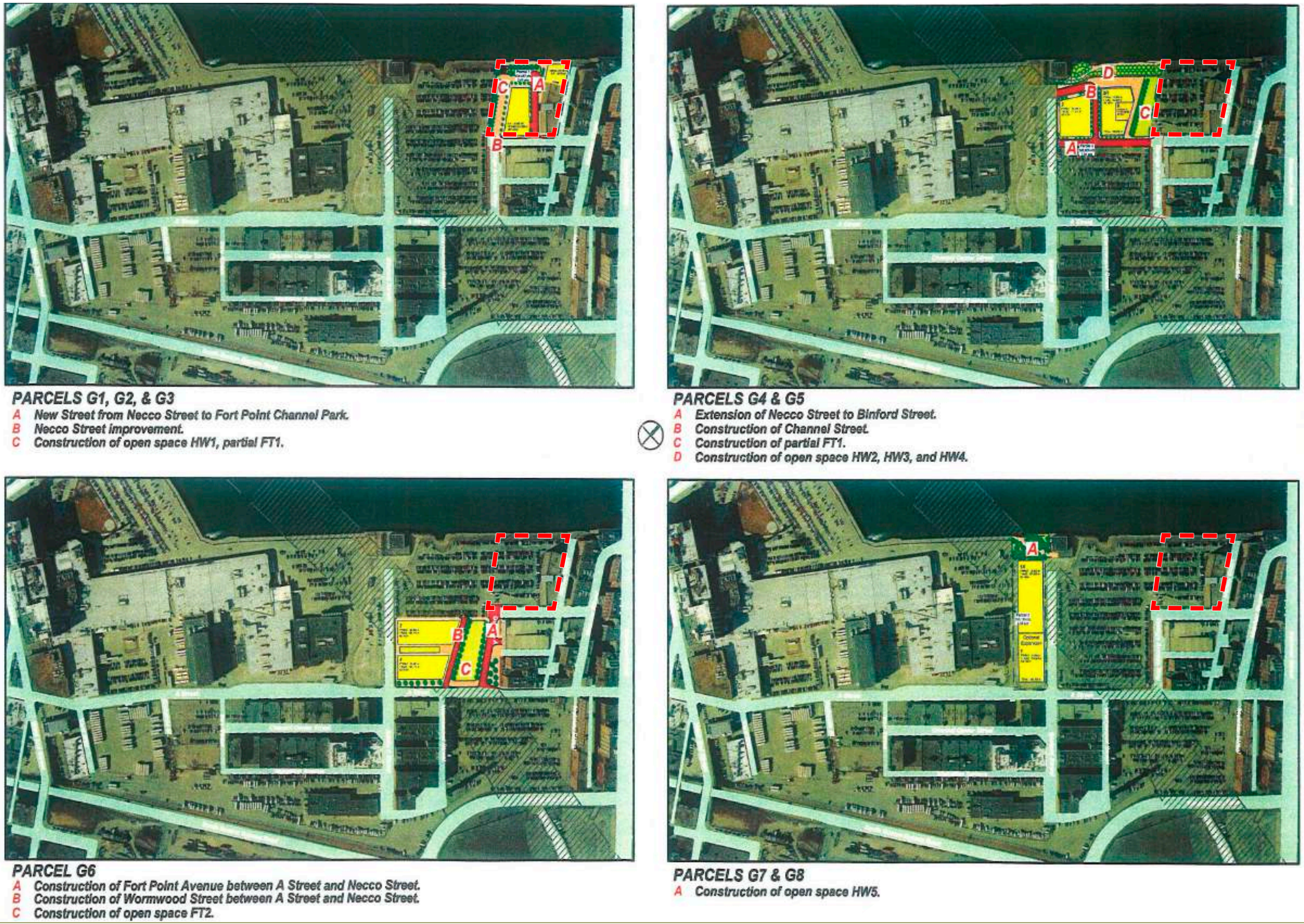
Project Site

Prepared By: VHB

Figure 5.4

100 Acres Open Space

GE Headquarters Project
Boston, Massachusetts



Source: Amended and Restated Memorandum of Agreement for PDA No 69, South Boston/The 100 Acres, January 10, 2007.

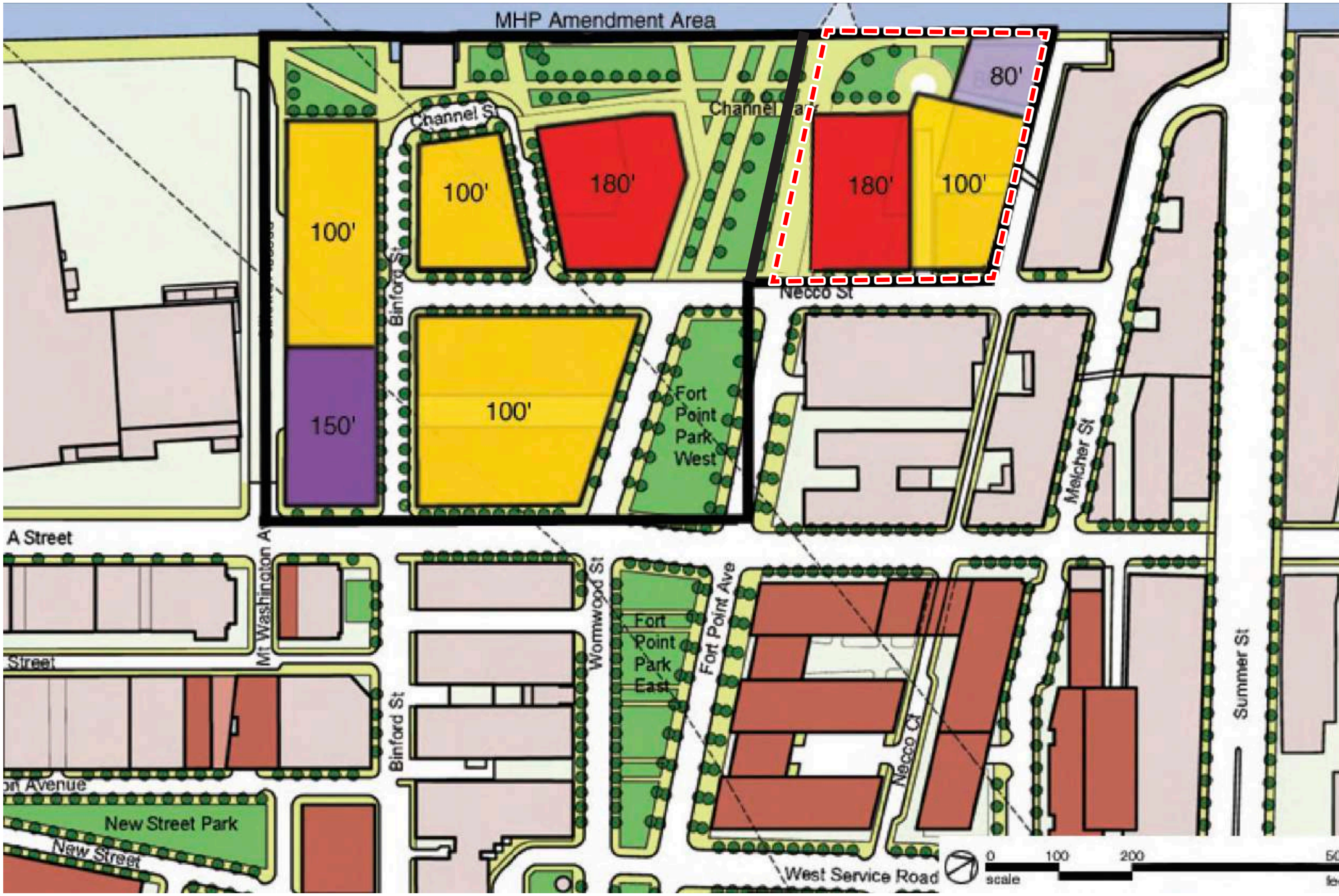
Project Site

Prepared By: VHB

Figure 5.5

MOA Required Open Space

GE Headquarters Project
Boston, Massachusetts



Source: South Boston Municipal Harbor Plan Amendment, May 2009

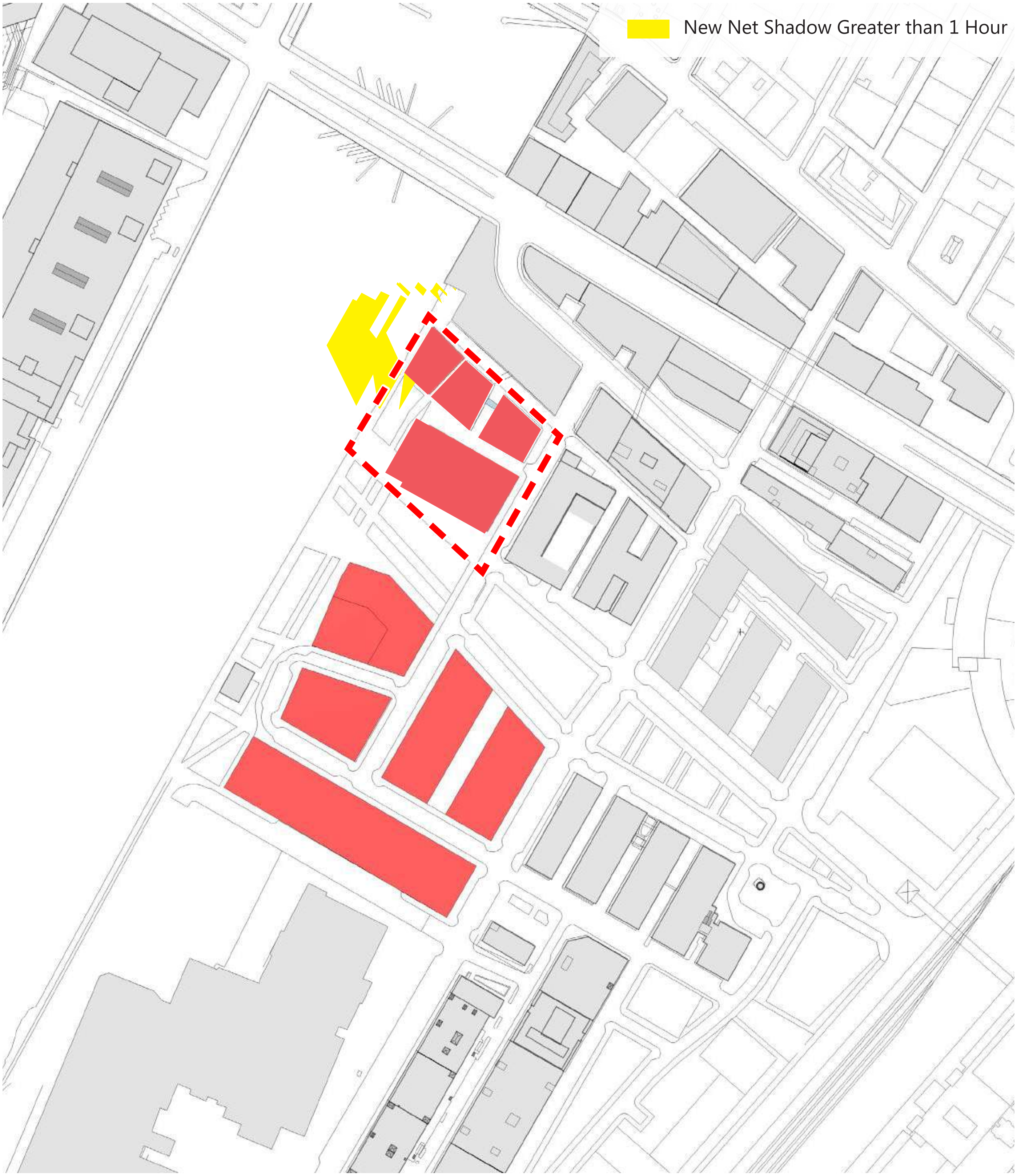
Project Site

Prepared By: VHB

Figure 5.6

Building Height

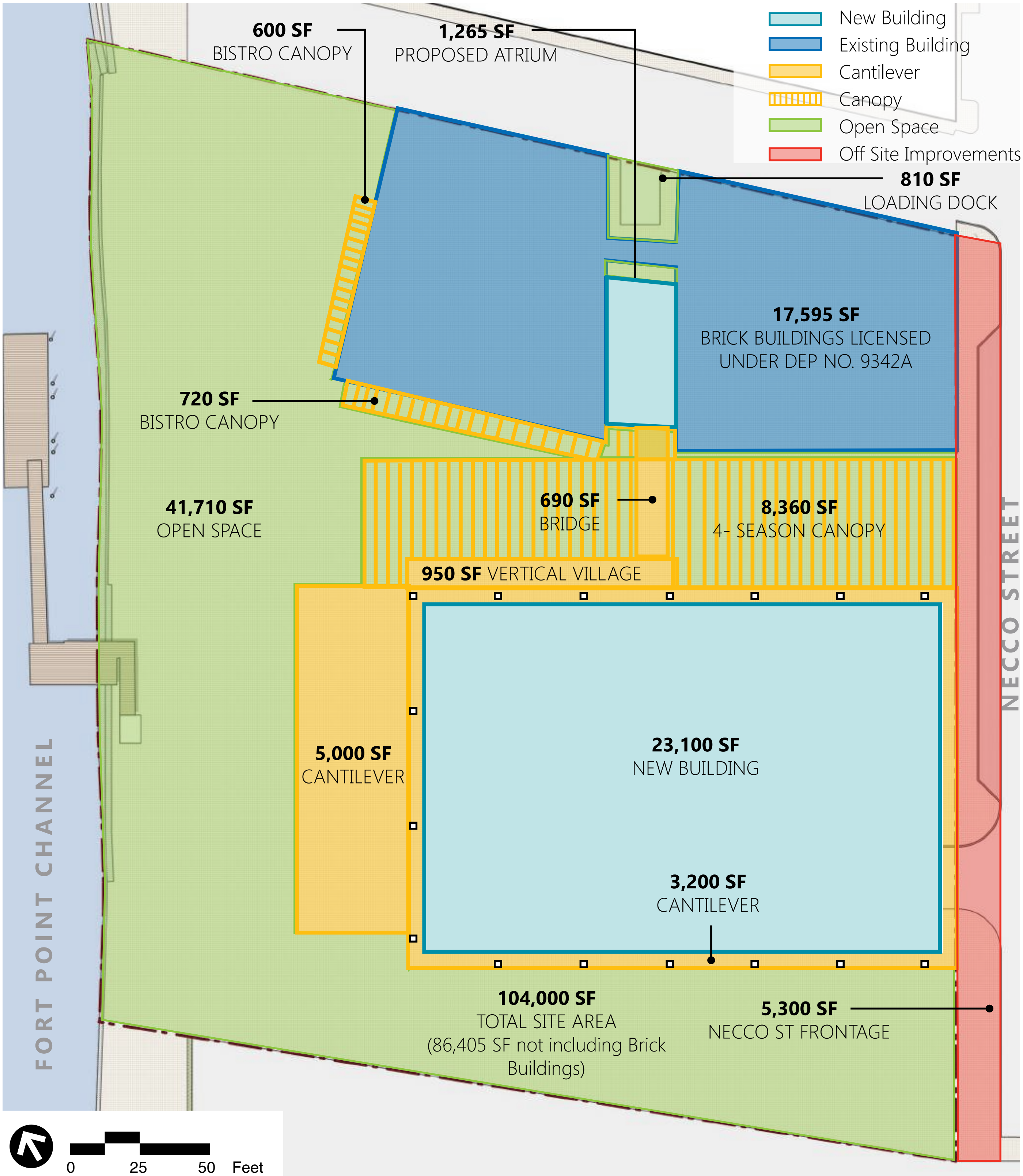
GE Headquarters Project
Boston, Massachusetts



New Net Shadow = 21,415 sf
Required Open Space Offset = 10,708 sf

Figure 5.7
Ch.91 Shadow Analysis

GE Headquarters Project
Boston, Massachusetts



Open Space Required	
Building Footprint Offset	34,205 SF
Shadow Offset	10,708 SF
Total	**44,913 SF**

Figure 5.8

Open Space Plan

GE Headquarters Project
Boston, Massachusetts

6

Environmental Protection

6.1 Introduction

This chapter presents information on existing environmental conditions at the Project Site and the potential environmental impacts of the Project. As described in detail below, the Proponents are committed to avoiding, minimizing or mitigating any adverse environmental impacts. The following sections identify potential Project-related impacts and those steps that have been or will be taken to avoid, minimize and/or mitigate adverse effects.

In compliance with City of Boston Article 80 and State MEPA requirements, this Project will address potential environmental impacts in the following categories:

- *Pedestrian Wind*
- *Shadow*
- *Daylight*
- *Solar Glare*
- *Air Quality*
- *Water Quality*
- *Noise*
- *Solid and Hazardous Waste*
- *Groundwater*
- *Geotechnical*
- *Construction*

6.2 Key Findings and Benefits

The key findings and benefits related to environmental protection include:

- **Wind** – The Project will not result in any new unacceptable or unsafe wind conditions in and around the Project Site. Preliminary wind analysis results indicate that the majority of the Project Site will remain comfortable explore additional wind mitigation options, including landscape treatments and building elements to ensure pedestrian comfort at the Project Site by reducing wind speed and gusts within the Project open space.
- **Shadow** – The Project will result in new shadows as a result of the construction of a 12-story structure on what is currently a parking lot. This is consistent with the conditions anticipated by the 100 Acres Master Plan and the MHP Amendment. The majority of the new shadows contemplated by the 100 Acres Master Plan and the MHP Amendment, as realized by the Project, fall over portions of the Fort Point Channel or the Project Site to the north and east. These shadow impacts will be offset by the substantial public realm improvements of the Project.
- **Daylight** – The Project will result in a reduction in the visible skydome when viewed from the adjacent public ways compared to the existing condition. These changes are consistent with the conditions anticipated by 100 Acres Master Plan

and the MHP Amendment and will be offset by the substantial public realm improvement of the Project.

- **Solar Glare** – A conservative analysis of the anticipated solar glare impacts indicates that the Project will have only minor and infrequent solar glare impacts which will be minimized through design.
- **Air Quality** – The air quality analysis demonstrates that the Project will conform to the National Ambient Air Quality Standards and will not have an adverse impact on local air quality.
- **Water Quality** –The Project will improve water quality and reduce runoff through substantial upgrades to stormwater management and treatment systems, as well as an over 20 percent increase in pervious surface area.
- **Noise –** The sound levels associated with the Project's mechanical equipment will be attenuated with mechanical enclosures and screening located on the roof, and therefore will have no adverse noise impacts at nearby sensitive receptor locations. Potential noise impacts associated with deliveries are expected to be negligible as the majority of loading is handled within the below-grade garage of the New Building.
- **Solid and Hazardous Materials** – The Project Site will be addressed in accordance with the Massachusetts Contingency Plan as applicable. Existing solid and hazardous materials within the Brick Buildings will be removed and disposed of in accordance with applicable regulations.
- **Geotechnical** – The ground surface across the Project Site generally consists of miscellaneous fill deposit ranging between 5 and 13 feet in thickness. The geotechnical engineer and contractor will work closely together throughout the excavation and foundation construction to avoid adverse impacts on adjacent structures and infrastructure.
- **Groundwater** – The Project is located in a No Harm Overlay Area of the GCOD and will be designed to maintain current area groundwater levels.
- **Construction Period Impacts** – Construction-related impacts are temporary in nature and are typically related to truck traffic, dust, noise, solid waste and vibration. All temporary construction-related impacts associated with the Project will be minimized in coordination with the appropriate agencies.

6.3 Wind

Pursuant to Section B.1 of the BRA Development Review Guidelines and as anticipated by the MHP Amendment, a pedestrian wind tunnel study was conducted to assess the potential effect of the Project on pedestrian-level wind conditions around the Project Site and to provide recommendations for minimizing any potential adverse effects. The following conditions were simulated:

- **No-Build Condition:** includes all existing buildings (including the Brick Buildings) and BRA-approved buildings within the Project area but ***not*** the implementation of the 100 Acres Master Plan ; and
- **Build Condition:** the No-Build Condition plus the proposed modifications of the Brick Buildings and the construction of the New Building but ***not*** the implementation of the remainder of the 100 Acres Master Plan.

6.3.1 Methodology

A scale model was equipped with specially designed wind speed sensors at 89 grade level locations, chosen in consultation with the BRA, which estimated the mean and fluctuating components of wind speed at a full-scale height of five feet above grade in pedestrian areas throughout the Project Site. The results were then combined with long-term meteorological data, recorded during the years 1991 to 2015 at Boston's Logan International Airport, in order to estimate full scale wind conditions. Meteorological data summarizing the annual and seasonal wind climates in the Boston area based on the data from Logan Airport is provided in Appendix G. The prevailing winds are between the southwest and northwest directions. In the case of strong winds, northeast and west-northwest are the dominant wind directions.

The interaction of winds with major buildings, especially those that protrude above their surroundings, often cause increased local wind speeds at the pedestrian level. Typically, wind speeds increase with elevation above the ground surface, and taller buildings intercept these faster winds and deflect them down to the pedestrian level (downwashing flows). The funneling of wind through gaps between buildings (channeling flows) and the acceleration of wind around corners of buildings may also cause increases in wind speed. Conversely, as recognized in the MHP Amendment, “the ground level environment is likely to benefit from the sheltering effects provided by multiple buildings that compose an urban environment.”

Pedestrian Wind Criteria

The BRA has adopted two standards for assessing the relative wind comfort of pedestrians. First, the BRA wind design guidance criterion indicates that an effective gust velocity (hourly mean wind speed plus 1.5 times the root mean square wind speed) of 31 miles per hour should not be exceeded more than one percent of the time. The second set of criteria used by the BRA to determine the acceptability of specific locations is based on the work of Melbourne.[1] This set of criteria is used to determine the relative level of pedestrian wind comfort for activities, such as sitting, standing, or walking. The criteria, as listed in Table 6-1 below, are expressed in terms of benchmarks for the one-hour mean wind speed exceeded one percent of the time (i.e., the 99-percentile mean wind speed).

1 Melbourne, W.H., 1978, “Criteria for Environmental Conditions,” Journal of Industrial Aerodynamics, 3 (1978) 241-249.

Table 6-1 BRA Mean Wind Criteria*

Dangerous	> 27 mph
Uncomfortable for Walking	> 19 and ≤ 27 mph
Comfortable for Walking	> 15 and ≤ 19 mph
Comfortable for Standing	> 12 and ≤ 15 mph
Comfortable for Sitting	< 12 mph

* Applicable to the hourly mean wind speed exceeded one percent of the time.

The wind climate in a typical downtown location in Boston is generally comfortable for the pedestrian use of sidewalks and thoroughfares and meets the BRA effective gust velocity criterion. However, without any mitigation measures, this typical downtown wind climate is likely to be frequently uncomfortable for more passive activities such as sitting.

MHP Amendment Wind Requirements

The MHP Amendment included a wind analysis that concluded that "the composite effect of implementing the *100 Acres Master Plan* will likely result in improved wind conditions at the ground level within the *MHP Amendment* planning area." However, the MHP Amendment also indicated that specific locations could experience conditions rated as uncomfortable for walking, which should be considered in connection with individual projects in the 100 Acres Master Plan area. Two of those locations (Location 15 and 16 of in Appendix 3 of the MHP Amendment) are located within the Project Site along the northeast and northwest corners of the New Building.

Model Limitations

Pedestrian wind studies based on models present a conservative analysis of potential project impacts. Most significantly, in this case, and unlike the analysis to support the MHP Amendment, the cumulative effect of all of the buildings anticipated by the 100 Acres Master Plan is not anticipated by the model. Therefore the potential effect of the Project is magnified. Second, the model evaluates the Solar Veil as a solid element and not a perforated series of panels which exaggerates the potential impact of that element of the Project. Third, the model doesn't account for the design team's addition of 18 inch vertical sunshades on the New Building's east and west facades which could mitigate wind effects. Finally, the model considers limited landscape improvements and does not account for the aggregate mitigated effect of a complete landscape plan.

6.3.2 Pedestrian Wind Findings

Figures 6.1a and 6.1b graphically depict the estimated wind comfort conditions at each wind measurement location based on the modeled annual winds for the No-

Build and Build Conditions. Figures 6.1c and 6.1d depict wind safety conditions for the No-Build and Build Conditions. Typically, summer and fall winds tend to be more comfortable than the annual winds while the winter and spring winds are less comfortable than the annual winds. The following summary of pedestrian wind comfort is based on the annual winds for each simulated condition.

No-Build Condition

Under the No-Build Condition, mean wind speeds at most of the on-site locations, are generally comfortable for sitting or standing on an annual basis. At off-site locations surrounding the Project Site, mean wind speeds are generally comfortable for walking, standing, or sitting with the exception of portions of A Street (Locations 23, 31, and 85), one sensor on the Summer Street Bridge (Location 78), and one sensor along Pastene Alley (Location 82). At these locations, winds are rated as uncomfortable, but not dangerous.

The annual effective gust speeds are found to be acceptable at all locations monitored in and around the Project Site with the exception of one location at the corner of Wormwood Street and A Street (Location 85).

Build Condition

Under the Build Condition, the modeled pedestrian wind comfort conditions are similar to the No-Build Condition at most locations around the Project Site. No dangerous wind conditions or new unacceptable effective gust conditions are predicted at any location within the study area as a result of the Project. The proposed site landscaping includes a combination of coniferous and deciduous trees to maximize pedestrian comfort by reducing wind speed and gusts in key pedestrian areas. As a result of these landscape features, conditions along the future Harborwalk are projected to continue to be comfortable for walking, sitting, and standing, with the exception of estimated uncomfortable conditions at Location 53. The Proponents are continuing to evaluate the anticipated conditions at this location and how to improve it.

While the preliminary wind results indicate that pedestrian level wind conditions within the public realm will remain generally comfortable, some of the locations at the north corners of the New Building on the west and east entrances of GE Plaza (Locations 4 and 11) are projected to become uncomfortable under the Build Condition in the absence of mitigation. The Proponents are continuing to evaluate the anticipated conditions at these locations and how to improve them.

Locations 12, 26, and 44 are also projected to become uncomfortable under the Build Condition in the absence of mitigation. The Proponents are continuing to evaluate the anticipated conditions at these locations and how to improve them.

Potential effective mitigation measures include adjustments to the landscaping plan for the Project, the addition of horizontal sunshades along the New Building's western façade, extension of planned vertical sunshades currently intended for the western façade of the New Building, and the addition of a canopy above the loading dock/parking ramp door on the east side of the New Building.

It important to note that the wind comfort conditions projected by the model are consistent with those in urban environments in greater Boston, particularly along the waterfront, and do not result in dangerous wind or unacceptable gust conditions. Nonetheless, the Proponent remains committed to improving wind comfort conditions throughout the Project Site. The Proponents will continue to evaluate potential mitigation measures to improve wind comfort conditions at these specific locations. The conditions are mainly caused by winds from the west (Location 4), north (Locations 11, 12, 26 and 53), and southwest (Location 44). Similar to the No-Build Condition, off-site wind conditions at isolated locations along A Street, Pastene Alley, and the Summer Street Bridge are expected to continue to be uncomfortable for walking, and conditions at these locations are not predicted to be adversely affected by the Project. The exceedance of the effective gust criterion at the intersection of A Street and Wormwood Street (Location 85) is expected to remain unchanged; however, winds at all other locations are predicted to meet the effective gust criterion under the Build Condition.

6.4 Shadow

An analysis of the shadow impact under the No-Build and Build Conditions is a requirement of the Article 80, Large Project Review (Section 80B-2(c) of the Code). The shadow analysis was prepared in accordance with the requirements of Section B.2 of the BRA Development Review Guidelines.

Figures 6.2a through 6.2d present anticipated net new shadow associated with the New Building and the modifications to the Brick Buildings. The shadow study model includes all buildings under construction and any proposed buildings anticipated to be completed prior to the completion of the Project. The Chapter 91 shadow analysis presented in Chapter 5, *Wetlands and Waterways*, considers all buildings anticipated by the 100 Acres Master Plan. These potential buildings are not included within this shadow analysis as they have not been reviewed or approved by the BRA.

6.4.1 Methodology

A shadow impact analysis was conducted at regular time intervals to investigate the effect that the Project will have throughout the year. A computer model of the Project and surrounding urban area was developed. Using software called Revit, a number of days and times were analyzed, as required under Article 80. The analysis used "clear sky" solar data at Boston's Logan International Airport, meaning the assumption that no cloud cover ever occurs; therefore, providing a “worst case” scenario showing the full extent of when and where shadow could occur.

In order to represent a variety of shadow conditions at various times of the day, and times of the year, three time intervals (9:00AM, 12:00PM, 3:00PM) are represented for the Vernal Equinox (March 21th, see Figure 6.2a), Summer Solstice (June 21st, see Figure 6.2b), Autumnal Equinox (September 21rd, see Figure 6.2c), and Winter Solstice (December 21st, see Figure 6.2d). As per the BRA Development Review Guidelines, 6:00PM has been added to the June 21st and September 21rd shadow study. The study shows both existing shadows in and around the Project Site, and the shadow impact of the Project. The analysis focuses on the shadow cast onto existing pedestrian areas, open spaces, and sidewalks adjacent to and in the vicinity of the Project Site.

6.4.2 Shadow Analysis Findings

The incremental shadows produced are consistent with the existing urban shadow pattern, and are not expected to have any noticeable effect on pedestrian use or enjoyment. A summary of the shadow analysis results for each respective period is provided below.

March 21

In late-winter/early-spring, the sun is still relatively low in the sky. As shown in Figure 6.2a, net new shadow in the morning primarily falls on portions of the watersheet and Harborwalk immediately west of the Project. While the lower angle casts a long shadow, the narrow orientation of the building minimizes the amount of shaded watersheet and public realm area. Also during the morning hours, the public realm immediately to the west of the New Building is shaded, but the GE Plaza and open space between the GE Plaza and the Fort Point Channel receives direct morning sunlight over the translucent canopy. Between 12PM and 3PM, the net new shadows are shorter and rotate northerly and easterly off the public realm and over the GE Plaza and the Brick Buildings (Figure 6.2a).

June 21

During the summertime, the morning sun casts shadows across the public realm; however, due to the higher angle of the sun, the shadow quickly shortens and rotates off of the public realm and over GE Plaza. As the day progresses, the shadow rotates easterly over Necco Street and the Brick Buildings, exposing the entire public realm and the majority of GE Plaza to sunlight by 6PM (Figure 6.2b).

September 21

As shown in Figure 6.2c, as during the springtime, in the morning during the fall net new shadow falls over portions of the watersheet and Harborwalk where both the

GE Plaza and a portion of the public realm immediately waterside of the GE Plaza receive full sunlight. As the day progresses, the shadow rotates north and east shifting off the watersheet by 12PM and off the Harborwalk and waterside public realm entirely by 3PM. By 6PM, as a result of the low sun angle, the shadow is long, but falls to the east over Necco Street and existing buildings to the east.

December 21

Winter shadows due to the low sun angle extend across the Fort Point Channel to the existing U.S. Post Office building. As the day progresses, the shadow moves to the north and east over the existing buildings north of the Project Site, including the Brick Buildings. Although net new shadow is greatest at this period, the days during this time of year are less bright and there is much less contrast between shaded and unshaded areas. Given these environmental conditions, net new shadow from the Project is fairly minimal and falls primarily on existing building rooftops (Figure 6.2d).

6.5 Daylight

The following section describes the anticipated effect on daylight coverage at the Project Site as a result of the Project. An analysis of the percentage of skydome obstructed under the Build and No-Build conditions is a requirement of the Article 80 (Section 80B-2(c)). The daylight analysis was prepared using the BRA's Daylight Analysis Program ("BRADA") and has been completed in accordance with the requirements of Article 80 of the Code. The results of the daylight analysis are presented in Figures 6.3a-b.

6.5.1 Methodology

The daylight analysis was conducted using the BRADA program developed in 1985 by the Massachusetts Institute of Technology to estimate the pedestrian's view of the skydome taking into account building massing and building materials used. The software approximates a pedestrian's view of a site based on input parameters such as: location of viewpoint; length and height of buildings and the relative reflectivity of the building façades. The model typically uses the midpoint of an adjacent right-of-way or sidewalk as the analysis viewpoint. Based on these data, the model calculates the perceived skydome obstruction and provides a graphic depicting the analysis conditions.

The model inputs used for the study presented herein were taken from a combination of the BRA's City of Boston model data, an existing conditions survey, and schematic design plans prepared by the Project's architects. As described above, the BRADA software considers the relative reflectivity of building façades when calculating perceived daylight obstruction. Highly reflective materials are thought to reduce the perceived skydome obstruction when compared to non-reflective materials. For the purposes of this daylight analysis, the building façades are considered non-reflective, resulting in a conservative estimate of daylight obstruction.

Daylight Viewpoints

The following viewpoints were used for this daylight analysis:

› **Necco Street** – This viewpoint is located on the centerline of Necco Street, centered on the eastern side of Project Site.

› **Harborwalk** – This viewpoint is located on the centerline of the Harborwalk, centered on the western side of the Project Site.

These points represent existing and proposed building façades when viewed from the adjacent public way.

6.5.2 Daylight Analysis Findings

Table 6-2 below presents the percentage of skydome that is expected to be obstructed with and without the Project from both viewpoints. Figure 6.3a and 6.3b graphically show the Project-related daylight impacts from the viewpoints from Necco Street and the Harborwalk, respectively.

Table 6-2 Existing/No-Build and Build Daylight Conditions

Viewpoint	Existing/No-Build Skydome Obstruction	Build Skydome Obstruction
Necco Street	3.2%	76.3%
Harborwalk	5.8%	16.0%

Under the Existing/No-Build Condition, the skydome has minimal obstruction, which is to be expected since the location of the New Building is currently occupied by a surface parking lot. Upon completion of the Project, the viewpoints along the adjacent public ways are expected to experience an increase in skydome obstruction due to the construction of the New Building, as would be expected when redeveloping a surface parking lot.

Due to the setback of the proposed buildings, the Harborwalk is the least impacted viewpoint, and is expected to experience only a 10 percent increase in skydome obstruction (from 5.8 percent to 16 percent). The Necco Street skydome is expected to be the most impacted with an increase of 73 percent (from 3.2 percent to 76.3 percent) due to the closer proximity of the buildings to the roadway.

6.6 Solar Glare

A solar glare study was conducted on the Project. The objective of the solar glare study was to assess the impact of solar reflections emanating from the building façade on the surrounding urban terrain and buildings.

6.6.1 Methodology

A computer model of the Project and surrounding urban area was developed using proprietary software called Eclipse.[2] A number of receptor locations with three types of receptors were utilized to understand the visual (glare) impacts on drivers, pedestrians and building façades. The solar glare analysis used "clear sky" solar data at Boston's Logan International Airport and assumed no cloud cover ever occurs to provide a "worst case" scenario showing the full extent of when and where glare could occur. Finally, a statistical analysis was performed to assess the frequency, intensity and duration of the glare events. Reflections from existing structures were not accounted for; although shadows from these structures were factored in.

Glazed surfaces were modeled as coated silk-screened glass, which has a visible and full spectrum reflectance of 30 and 38 percent, respectfully.

6.6.2 Solar Glare Study Findings

Levels of reflections created by the Project are typical of what is found in an urban environment. The shape of the New Building means the reflections emanating from it are not focusing in any particular area. Therefore, no significant visual glare impacts on sensitive receptors (i.e., building façades, drivers, and pedestrians) surrounding the Project Site are expected.

The most frequent reflections will occur within the existing parking lot to the south of the building, as well as on Necco Street to the east; however, these reflections are of relatively low intensity and will not create an uncomfortable or dangerous situation. Frequent reflections will also impact the western façade of the existing parking garage to the east of the Project Site, but again, these reflections are of relatively low intensity, and will not result in substantial heat gain or visual nuisance for users of the garage.

Less frequent glancing reflections may be experienced by drivers travelling south along Necco Street, particularly during winter months; however, these impacts would be limited to mid-day hours when traffic is typically light, and with the sun already in a driver's line of sight for a majority of that time, and the anticipated glare impact is limited. Reflections may extend to the north/west as far as Congress Street,

2 Developed by RWDI Consulting Engineers & Scientists

however these impacts would be relatively dim and limited, and would not impact a driver's ability to see.

Similarly, glancing reflections may be experienced by boaters in the Fort Point Channel; however, reflections would be comparable to the reflections of the sun off the water and during most daylight hours the sun would also be in the boater's line of sight. Given the typical usage of the Fort Point Channel (not a high congestion or high speed area), any solar glare will not create a new safety hazard or deter the use of this area.

6.7 Air Quality

This section presents an overview of the air quality assessment for the Project. The purpose of the air quality assessment is to demonstrate that the Project will not result in a violation of applicable local and state, and federal air quality standards. A microscale analysis was conducted to show that carbon monoxide ("CO") concentrations at study area intersections will not violate National Ambient Air Quality Standards (NAAQS). Additionally, a mesoscale analysis was performed for oxides of nitrogen ("NOx") and volatile organic compounds ("VOCs") to determine the potential impact on the regional Ozone inventory. The Project will incorporate reasonable and feasible mitigation measures to reduce VOCs and NOx emissions for the build condition, including a robust TDM program.

6.7.1 Microscale Analysis

This section presents an overview of and the results for the microscale ("hot spot") assessment conducted for the Project. The purpose of the air quality assessment is to demonstrate that the Project satisfies applicable local, state and federal requirements, and to determine whether it complies with the 1990 Clean Air Act Amendments ("CAAA") following the local and the U.S. Environmental Protection Agency ("EPA") policies and procedures.

The air quality assessment conducted for this Project includes a localized analysis of CO concentrations. The microscale analysis evaluated CO concentrations from vehicles traveling through congested intersections in the area around the Project Site under the existing conditions, as well as concentrations from Project-specific impacts under the future conditions. The results from this evaluation were compared to the NAAQS.

Background

The CAAA resulted in states being divided into attainment and non-attainment areas, with classifications based upon the severity of their air quality problems. Air quality control regions are classified and divided into one of three categories: attainment, non-attainment and maintenance areas depending upon air quality data and ambient concentrations of pollutants. Attainment areas are regions where ambient concentrations of a pollutant are below the respective NAAQS; non-attainment areas are those where concentrations exceed the NAAQS. A maintenance area is an area that used to be non-attainment, but has demonstrated that the air quality has improved to attainment. After 20 years of clean air quality, maintenance areas can be re-designated to attainment. Projects located in maintenance areas are required to evaluate their CO concentrations on the NAAQS.

The Project is located in the City of Boston, which under the EPA designation, is a CO Maintenance area. As such, CO concentrations need to be evaluated for this Project.

Air Quality Standards

The EPA has established the NAAQS to protect the public health. Massachusetts has adopted similar standards as those set by the EPA. Table 6-3 presents the NAAQS for carbon monoxide.

Table 6-3 National Ambient Air Quality Standards

	Primary Standards		
Pollutant	**Averaging Time**	**Level**	**Form**
Carbon Monoxide	1-hour	35 ppm (40 mg/m^3)	Not to be exceeded more than once per year
	8-hour	9 ppm (10 mg/m^3)	

Carbon monoxide is directly emitted by motor vehicles, and the predominant source of air pollution anticipated from typical project developments is emissions from project-related motor vehicle traffic. A product of incomplete combustion, CO is a colorless and odorless gas that prevents the lungs from passing oxygen to the blood stream. According to the EPA, 60 percent of CO emissions result from motor vehicle exhaust, while other sources of CO emissions include industrial processes, non-transportation fuel combustion and natural sources (i.e., wildfires). In cities, as much as 95 percent of CO emissions may come from automobile exhaust.[3]

The CO concentrations from motor vehicle traffic related to the Project have been calculated to demonstrate that the Project will comply with the NAAQS Standards.

Background Concentrations

The total CO concentrations that receptor locations will experience include background concentrations from other existing surrounding emission sources. Background concentrations are ambient pollution levels from other stationary, mobile, and area sources. The EPA and DEP maintain an air quality monitoring network and produce annual air quality reports that include monitoring data for CO.

3 U.S. EPA. 2003. National air quality and emissions trends report – 2003 special studies edition. EPA/454/R-03/005. Research Triangle Park, NC.

Ambient background air quality concentrations were obtained from the closest monitoring site with three years of data available, located on Harrison Avenue in Boston. For CO background concentrations, DEP recommends using the largest value for the most recent three years of the second highest concentration recorded for each year.

The design background concentration values of CO using the three most recent years of data are shown in Table 6-4.

Table 6-4 Background Concentrations at Harrison Avenue, Boston MA

Pollutant	Averaging Time	Background Concentration
Carbon Monoxide (CO)	1-Hour[1]	2.2 ppm
	8-Hour[1]	1.6 ppm

1 Using the highest second-high value recorded in the three most recent years (2012-2014).

Boston Redevelopment Authority Development Review Guidelines

The BRA Development Review Guidelines require "a microscale analysis predicting localized carbon monoxide concentrations should be performed, including identification of any locations projected to exceed the National or Massachusetts Ambient Air Quality Standards, for projects in which:

- Project traffic would impact intersections or roadway links currently operating at Level of Service D, E, or F or would cause LOS to decline to D, E, or F; or
- Project traffic would increase traffic volumes on nearby roadways by 10 percent or more (unless the increase in traffic volume is less than 100 vehicles per hour); or
- The Project will generate 3,000 or more new average daily trips on roadways providing access to a single location."

As presented in Chapter 8, Transportation, the traffic analysis indicates that LOS will decline at two of the study intersections to D, E, or F under the build condition. As such, a microscale analysis was conducted pursuant to the BRA Development Review Guidelines.

Microscale ("Hot Spot") Analysis Methodology

The modeling for the microscale analysis followed EPA's modeling guidelines. The traffic data was evaluated and locations were selected based on the requirements of the BRA Development Review Guidelines and the EPA modeling guidance. Figure 6.4 shows the locations of the air quality study area intersection and receptors.

EPA's Office of Transportation and Air Quality ("OTAQ") has developed the Motor Vehicle Emission Simulator ("MOVES2014a"). MOVES2014a is EPA's latest motor vehicle emissions model for state and local agencies to estimate pollutants from cars, trucks, buses, and motorcycles. Emission factors were developed using the MOVES2014a program, and were combined with the traffic data in EPA's Cal3QHC model to calculate the CO worst-case concentrations. EPA's Cal3QHC is an air quality dispersion model that applies emission factors obtained from MOVES2014a to projected traffic conditions in order to obtain localized pollutant concentrations at real-world locations.

The microscale analysis utilized the traffic (volumes and speeds) and emission factor data for the 2016 Existing, 2021 No Build, and 2021 Build Conditions. These data were incorporated into air quality models to demonstrate that the Project will meet the CAAA criteria. The microscale analysis calculated CO concentrations at congested intersections near the Project Site under Existing, No Build, and Build conditions. The worst-case CO concentrations were added to the background levels to determine if the Project's concentrations complied with the NAAQS.

The microscale analysis calculates maximum 1-hour and 8-hour CO concentrations in the project area during the peak CO season (winter). EPA's computer model CAL3QHC Version 2.0[4] was used to predict CO concentrations for each intersection. Receptor locations were selected near the congested intersections based upon areas where the public may have access. The intersection receptors were placed at the edge of the roadway, but not closer than 10 feet (3 meters) from the nearest travel lane; as required by EPA. The results calculated at these receptor locations represent the highest concentrations at each intersection (Figure 6.4). Receptor locations farther away from the intersections will have lower concentrations because of the dispersion characteristics. The receptor locations that are along other roadways in the study area are also expected to have lower concentrations than the receptor locations at the intersection. The emission rates for vehicles traveling along these roadways are much lower than the emission rates for vehicles queuing at intersections.

The air quality study evaluates the air quality impacts of the vehicular traffic associated with the Project on the environment. The vehicle traffic represents the worst-case conditions, which includes the increase in traffic volumes due to specific projects proposed for the study area, projected traffic growth over time, and future traffic associated with the development. The air quality study utilizes traffic and emissions data for the existing, future No-Build and Build Conditions. These data are incorporated into the EPA air quality models to generate air pollutant concentrations that demonstrate whether or not the Project would have air quality impacts. The scenarios modeled include:

- **Existing Conditions (2016):** reflects existing traffic volumes in the traffic study area.

4 User's Guide to CAL3QHC Version 2.0: A Modeling Methodology for Predicting Pollutant Concentrations Near Roadway Intersections, US Environmental Protection Agency, Office of Air Quality Planning and Standards, Technical Support Division; Research Triangle Park, NC; EPA-454/R-92-005; November 1992

- **No-Build Condition (2021):** reflects background growth associated with other planned projects and general background regional growth.
- **Build Condition (2021):** assuming the 2021 No Build Condition background growth with the Project fully constructed and in operation.

Emission Rates

All the vehicle emission factors used in the microscale analysis were obtained using the EPA's MOVES2014a emissions model. MOVES2014a calculates CO emission factors from motor vehicles for free-flow conditions in grams per vehicle mile and for idling conditions in grams per vehicle hour. The emission rates used in this study were developed with the assistance of DEP. The emission factors for the microscale analysis were based upon a peak hour on a typical weekday in the winter for Suffolk County. The CO emission factors were calculated for idle and free-flow conditions based upon roadway travel speeds.

The emissions calculated for this air quality assessment include Tier 3 emission standards, which is an EPA program that sets new vehicle emissions standards, including lowering the sulfur content of gasoline, heavy-duty engine, and vehicle GHG regulations (2014-2018), and the second phase of light-duty vehicle GHG regulations (2017-2025). It also includes Massachusetts specific conditions, such as the state vehicle registration age distribution and the statewide Inspection and Maintenance ("I/M") Program. These stringent emissions regulation programs often result in smaller emissions inventories with the passage of time when comparing similar scenarios.

Traffic Data

The air quality study uses traffic data (volumes, delays, and speeds) developed for each analysis condition based upon the traffic analysis. The traffic volumes and level of-service for the study area were evaluated, and based on the BRA Development Review Guidelines, three intersections (Figure 6.4) were selected for analysis:

- A Street at Thomson Place/Congress Street
- A Street at Necco Street
- Melcher Street at Summer Street

The analysis considered the evening peak hour traffic conditions as intersection volumes are generally larger and LOS is generally worse.

6.7.2 Microscale Air Quality Study Results

The microscale analysis determined that the 1-hour CO concentrations for the 2016 Existing Condition ranged from a minimum of 2.3 parts per million ("ppm") at the intersections of A Street at Necco Street to a maximum of 2.5 ppm at the intersection of A Street at Thomson Place/Congress Street. The corresponding maximum 8-hour CO concentrations ranged from a minimum of 1.6 ppm to a maximum of 1.8 ppm. The microscale CO results are presented in Table 6-5 and Table 6-6. All the 1 hour and 8-hour concentrations are below the CO NAAQS of 35 and 9 ppm, respectively. These values are consistent with the area's designation as a CO Maintenance area.

The CO concentrations for each intersection under the No-Build and Build Conditions are also presented in Table 6-5 and Table 6-6. The results show that there are minimal to no increases for 1-hour and 8-hour CO concentrations between the 2021 No Build and Build conditions due to the minor traffic volume increase and minimal intersection delays experienced at the study intersections. The 1-hour CO concentrations ranged between 2.2 and 2.4 ppm, and the 8-hour CO concentrations ranged between 1.5 and 1.7 ppm for the 2021 No-Build and Build conditions. Some of the CO concentrations show a decrease from Existing to No-Build because emission rates decrease from 2016 to 2021 due to Massachusetts and Federal programs as discussed earlier in the Emission Rates section. The results of the microscale analysis demonstrate that the 2021 No Build and Build CO concentrations (both 1- and 8-hour values) for the Project are well below the NAAQS.

Table 6-5 Predicted Maximum 1-Hour CO Concentrations (Parts Per Million)[1, 2]

			1-Hour CO Concentrations (ppm)		
No.	**Intersection**	**Receptor[3]**	**2016 Existing**	**2021 No-Build**	**2021 Build**
1	A Street at	Northwest	2.4	2.3	2.3
	Thomson Place/	Northeast	2.4	2.3	2.3
	Congress St	Southeast	2.5	2.3	2.4
		Southwest	2.5	2.3	2.3
2	A Street at	Northwest	2.3	2.3	2.3
	Necco Street	East	2.3	2.2	2.3
		Southwest	2.3	2.3	2.3
3	Melcher Street at	North	2.5	2.4	2.4
	Summer Street	Southeast	2.4	2.3	2.3
		Southwest	2.4	2.4	2.4

Source: VHB, Inc.

1 See Figure 6.4 for intersection and receptor locations.

2 The concentrations are expressed in parts per million (ppm) and include a 1-hour background concentration of 2.2 ppm. The background concentration is based on the past 3 years of monitoring data collected at DEP's Harrison Avenue monitoring site. The 1-hour NAAQS for CO is 35 ppm. The emissions presented represent the highest emissions experienced at each intersection.

3 Concentrations represent maximum concentrations within the grouping of receptors placed in the respective directions of each intersection.

Table 6-6 Predicted Maximum 8-Hour CO Concentrations (Parts Per Million)[1, 2]

			8-Hour CO Concentrations (ppm)		
No.	**Intersection**	**Receptor[3]**	**2016 Existing**	**2021 No-Build**	**2021 Build**
1	A Street at Thomson Place/ Congress St	Northwest	1.7	1.6	1.6
		Northeast	1.7	1.6	1.6
		Southeast	1.8	1.6	1.7
		Southwest	1.8	1.6	1.6
2	A Street at Necco Street	Northwest	1.6	1.6	1.6
		East	1.6	1.5	1.6
		Southwest	1.6	1.6	1.6
3	Melcher Street at Summer Street	North	1.8	1.7	1.7
		Southeast	1.7	1.6	1.6
		Southwest	1.7	1.7	1.7

Source: VHB, Inc.
1 See Figure 6.4 for intersection and receptor locations.
2 The concentrations are expressed in parts per million (ppm) and include an 8-hour background concentration of 1.6 ppm and a persistence factor of 0.7. The background concentration is based on the past 3 years of monitoring data collected at DEP's Harrison Avenue monitoring site. The 8-hour NAAQS for CO is 9 ppm. The emissions presented represent the highest emissions experienced at each intersection.
3 Concentrations represent maximum concentrations within the grouping of receptors placed in the respective directions of each intersection

Conclusion of Microscale Analysis

The air quality evaluation demonstrated that the development of the Project would not result in adverse localized air quality impacts. The microscale analysis evaluated Project-related vehicles traveling through congested intersections in the study area. This analysis demonstrates that all existing and future carbon monoxide concentrations are below the NAAQS. Specifically,

- All the one-hour CO concentrations ranged from 2.2 to 2.5 ppm and are well below the CO NAAQS of 35 ppm.
- All the eight-hour CO concentrations ranged from 1.5 to 1.8 ppm and are below the CO NAAQS of 9 ppm.

The microscale study demonstrates that the Project conforms to the CAAA and the SIP because:

- No violation of the NAAQS is expected to be created.
- No increase in the frequency or severity of any existing violations (none of which are related to this development) is anticipated to occur.
- No delay in attainment of any NAAQS is expected to result due to the implementation of the proposed action.

Based upon the analysis presented herein and the conclusions summarized above, no significant adverse air quality impacts from the Project are anticipated on microscale level.

6.7.3 Mesoscale Air Quality Analysis

The purpose of the mesoscale analysis is to estimate the area-wide emissions of VOC and NOx during a typical day in the peak ozone season (summer) consistent with the requirements of the State Implementation Plan ("SIP"). The mesoscale analysis evaluates the change in VOC and NOx emissions from average daily traffic volumes and vehicle emission rates. To demonstrate compliance with the SIP criteria, the air quality study must show the Project's change in daily (24-hour period) VOC and NOx emissions.

DEP has established guidelines that define the modeling and review criteria for air quality studies prepared pursuant to review under the MEPA. These guidelines require that mesoscale analyses be prepared for proposed development projects to determine the change in Project-related ozone precursor emissions. The predominant source of ozone precursor emissions anticipated from the Project is emissions from Project related traffic. Ozone is not directly emitted by motor vehicles, but is generated when VOCs and NOx emissions from motor vehicles, stationary sources, and area sources react in the atmosphere with sunlight and heat. Project-related ozone impacts are determined by assessing the changes in VOC and NOx emissions of motor vehicles. DEP criteria require that proposed development projects include all reasonable and feasible emission reduction mitigation measures if the ozone emissions from the Build Condition are greater than the No Build Condition. Massachusetts has incorporated this criterion into the SIP.

Suffolk County is in attainment for all NAAQS criteria pollutants with the exception of the revoked 1997 8-hour ozone standard and the revoked 1979 1-hour ozone standard, and is a maintenance area for carbon monoxide. As such, the air quality analysis calculated emission inventories of the two pollutants that contribute to the violation of the revoked ozone NAAQS from mobile sources-VOC and NOx.

The mesoscale analysis evaluated the change in emissions from Project-related traffic for the Existing, No Build, and Build Conditions. The air quality analysis demonstrates that the Project will meet DEP air quality criteria through reasonable and feasible emission reduction mitigation measures. While the Build Condition VOC and NOx emissions are estimated to increase as compared to the No Build Condition, the Project will be implementing such mitigation measures (including a TDM program) that will reduce VOC emissions and NOx emissions resulting in less Project-related emissions than under the Build Condition without mitigation.

Mesoscale Analysis Methodology

The ozone mesoscale air quality analysis was conducted following procedures similar to the GHG mobile source analysis, presented in Chapter 9 of this document.

The mesoscale analysis evaluated the change in emissions with and without the Project, specifically, daily (24-hour period) VOC and NOx emissions from the average daily traffic volumes and vehicle emission rates. DEP guidelines require that the air quality study utilize traffic and emissions data for existing and future (No Build and Build) conditions. The traffic and emissions data are incorporated into the EPA and DEP air quality models to generate emission's estimates that demonstrate whether the Project will have air quality impacts.

The mesoscale air quality analysis utilized developed traffic data (volumes, speeds, and roadway geometry) and emission factor data for Existing, No-Build, and Build Conditions. The mesoscale study area is Suffolk County, in which the City of Boston is located. Some of the major roadways that were included in the mesoscale analysis include A Street, West 2nd Street, Congress Street, Summer Street, Melcher Street and Necco Street.

The mesoscale analysis calculated the changes in VOC and NOx emissions for the existing and future conditions within the study area. The mesoscale analysis traffic and emission factor data were developed for the three aforementioned conditions. These data were incorporated into air quality models to evaluate the changes in VOC and NOx emissions.

Modeling Methodology & Emission Rates

All the vehicle emissions used in the mesoscale analysis were obtained using EPA's MOVES2014a emissions model. MOVES2014a calculates emission factors from motor vehicles in mass per distance format (often grams per mile) for the analysis year and applies these factors to Vehicle Miles Travelled ("VMT") data to obtain emissions inventories. As discussed above, the emissions calculated for this air quality assessment include Tier 3 emission standards and vehicle GHG regulations (2014-2018), and the second phase of light-duty vehicle GHG regulations (2017-2025) as well as Massachusetts specific conditions. These stringent emissions regulation programs often result in smaller emissions inventories with the passage of time when comparing similar scenarios.

The MOVES2014a model was run at a project-level to obtain emission factors for each link of the mesoscale analysis. The model was set to calculate the emissions burden by choosing to model emissions processes that are specifically related to vehicles in the study area. Links were created that used the appropriate speeds and grades for each roadway segment.

Traffic Data

The air quality study used traffic data (volumes) developed for each analysis condition. The mesoscale analysis uses typical daily peak and off-peak traffic volumes for the ozone summer season. The VMT data used in the air quality analysis were developed based on the traffic data analyzed in this report, see Chapter 8, Transportation.

6.7.4 Mesoscale Air Quality Study Findings

Existing Mesoscale Emissions

The mesoscale analysis calculated the existing VOC and NOx emissions for the study area inventory. These emissions, estimated to be 23.2 kilograms per day (kg/day) of VOCs and 13.6 kg/day of NOx establish an Existing Condition to which future emissions can be compared.

Future Mesoscale Emissions

Future Project-related emission calculations are based upon changes in traffic and emission factor data. The traffic data includes traffic volumes that were used to calculate VMT on the study network and delays. The emission factor data included emission reduction programs, shifts in vehicle type populations, and other factors. Under the No-Build Condition, VOC emissions were estimated to be 14.5 kg/day and NOx emissions were estimated to be 6.5 kg/day. The 2021 VOC and NOx emissions are lower than the 2016 emissions due to the implementation of emission control programs, such as the Federal Motor Vehicle Emission Control Program (Tier 3), the Stage II Vapor Recovery System, and the Massachusetts Vehicle Inspection and Maintenance program.

Under the Build Condition, as presented in Table 6-7, the VOC emissions are estimated to be 15.7 kg/day and the NOx emissions are estimated to be 6.8 kg/day. The SIP requires that Projects with VOC and NOx emissions under the Build Condition that are greater than the No-Build Condition include all reasonable and feasible emission reduction measures. The mitigation measures include a TDM Program presented in Chapter 8 - *Transportation* and summarized in the Proposed Mitigation Measures section below.

Proposed Mitigation Measures

The mobile source mesoscale assessment calculated the emissions for Project-related mobile sources. A comprehensive TDM program has been developed to mitigate impacts of Project-related traffic.

Table 6-7 Mesoscale Air Quality Analysis Results (kg/day)

Pollutant	2016 Existing Conditions	2021 No-Build Conditions[1]	2021 Build Conditions	Project-related Emissions[2]
Volatile Organic Compounds (VOCs)	23.2	14.5	15.7	1.2
Oxides of Nitrogen (NOx)	13.6	6.5	6.8	0.3

1 The future no build condition emissions are lower than the existing conditions emissions due to the implementation of state and federal emission control programs, such as the Federal Motor Vehicle Emission Control Program (Tier 3) and the Stage II Vapor Recovery System, and the Massachusetts Inspection and Maintenance program.

2 Represents the difference in emissions between the Build and No-Build Conditions.

The Proponents are committing to a comprehensive TDM program that will shift single occupancy vehicle trips to alternative modes of transportation. Details of this program are provided in Chapter 8, *Transportation*. Implementation of the TDM program is expected to improve air quality in the study area by promoting the use of alternative forms of transportation over the use of single-occupant motor vehicle trips to the Project Site. Although not easily modeled, previous estimates of similar TDM programs in an urban area have ranged on the order of 2 percent reduction in Vehicle Miles Travelled from the Project generated trips. Assuming a similar relationship to VOCs and NOx emissions, this would correlate to an approximate reduction of 0.02 kg/day of VOCs and 0.01 kg/day of NOx. This results in a final Project-related emissions of 1.18 kg/day of VOCs and 0.29 kg/day of NOx. A summary of the mitigation emissions reduction is seen in Table 6-8.

Table 6-8 Mitigation Analysis Results (kg/day)

Pollutant	Project-related Emissions[1]	Estimated Reductions Due to TDM Measures[2]	Resulting Project-related Emissions
Volatile Organic Compounds (VOCs)	1.2	0.02	1.18
Oxides of Nitrogen (NO_x)	0.3	0.01	0.29

1 Represents the difference in CO_2 emissions between the 2021 Build and No-Build Conditions.

2 Mitigation from TDM Measures estimated as 2 percent of unmitigated Project-related emissions.

Conclusion of Mesoscale Analysis

The air quality assessment demonstrates that the Project complies with local, state, and federal air quality requirements on a mesoscale level. The air quality assessment demonstrates that the Project complies with CAAA and is consistent with the guidelines of DEP, and the Project will incorporate reasonable and feasible measures to reduce VOC and NOx emissions in the ozone mesoscale analysis. The implementation of these mitigation measures will reduce the Build Condition VOC and NOx emissions associated with the Project.

6.8 Water Quality

The Project will improve the quality of stormwater runoff from the Project Site and reduce its quantity compared to the existing condition. In addition to a reduction in impervious area of approximately 20 percent, the Project will improve water quality by collecting and treating stormwater runoff through a series of structural Best Management Practices ("BMPs") designed to remove oil, floatables, and Total Suspended Solids ("TSS"). Clean runoff from the Project Site will be directed to recharge systems designed to infiltrate stormwater runoff in order to replenish groundwater and provide phosphorous removal. Chapter 10, Infrastructure, provides a complete description of the existing and proposed stormwater management systems, to the extent these systems are designed, and provides a summary of the Project's compliance with the Stormwater Management Standards.

6.9 Noise

The noise impact assessment evaluated the potential noise impacts associated with the Project's activities, including mechanical equipment and loading activities. This section discusses the fundamentals of noise, noise impact criteria, noise analysis methodology, and potential noise impacts. Noise monitoring was conducted to determine existing ambient sound levels. The analysis demonstrates that the Project will comply with applicable noise regulations.

6.9.1 Fundamentals of Noise

Noise is defined as unwanted or excessive sound. Sound becomes unwanted when it interferes with normal activities such as sleep, communication, work, or recreation. How people perceive sound depends on several measurable physical characteristics, which include the following:

- **Intensity** - Sound intensity is often equated to loudness.
- **Frequency** - Sounds are comprised of acoustic energy distributed over a variety of frequencies. Acoustic frequencies, commonly referred to as tone or pitch, are typically measured in Hertz. Pure tones have all their energy concentrated in a narrow frequency range.

Sound levels are most often measured on a logarithmic scale of decibels ("dB"). The decibel scale compresses the audible acoustic pressure levels which can vary from the threshold of hearing (zero dB) to the threshold of pain (120 dB). Because sound levels are measured in dB, the addition of two sound levels is not linear. Adding two equal sound levels creates a 3 dB increase in the overall level. Research indicates the following general relationships between sound level and human perception:

- A 3 dB increase is a doubling of acoustic energy and is the threshold of perceptibility to the average person.
- A 10 dB increase is a tenfold increase in acoustic energy but is perceived as a doubling in loudness to the average person.

The human ear does not perceive sound levels from each frequency as equally loud. To compensate for this phenomenon in perception, a frequency filter known as A weighted [dB(A)] is used to evaluate environmental noise levels. Table 6-9 presents a list of common outdoor and indoor sound levels.

Table 6-9 Common Outdoor and Indoor Sound Levels

Outdoor Sound Levels	Sound Pressure (μPa)[1]		Sound Level dB(A)[2]	Indoor Sound Levels
	6,324,555	-	110	Rock Band at 5 m
Jet Over Flight at 300 m		-	105	
	2,000,000	-	100	Inside New York Subway Train
Gas Lawn Mower at 1 m		-	95	
	632,456	-	90	Food Blender at 1 m
Diesel Truck at 15 m		-	85	
Noisy Urban Area—Daytime	200,000	-	80	Garbage Disposal at 1 m
		-	75	Shouting at 1 m
Gas Lawn Mower at 30 m	63,246	-	70	Vacuum Cleaner at 3 m
Suburban Commercial Area		-	65	Normal Speech at 1 m
	20,000	-	60	
Quiet Urban Area—Daytime		-	55	Quiet Conversation at 1 m
	6,325	-	50	Dishwasher Next Room
Quiet Urban Area—Nighttime		-	45	
	2,000	-	40	Empty Theater or Library
Quiet Suburb—Nighttime		-	35	
	632	-	30	Quiet Bedroom at Night
Quiet Rural Area—Nighttime		-	25	Empty Concert Hall
Rustling Leaves	200	-	20	
		-	15	Broadcast and Recording Studios
	63	-	10	
		-	5	
Reference Pressure Level	20	-	0	Threshold of Hearing

Source: *Highway Noise Fundamentals*. Federal Highway Administration, September 1980.
1 μPA – MicroPascals, which describe pressure. The pressure level is what sound level monitors measure.
2 dB(A) – A-weighted decibels, which describe pressure logarithmically with respect to 20 μPa (the reference pressure level).

A variety of sound level indicators can be used for environmental noise analysis. These indicators describe the variations in intensity and temporal pattern of the sound levels. The following is a list of common sound level descriptors used for environmental noise analyses:

- L90 is the sound level which is exceeded for 90 percent of the time during the time period. The L90 is generally considered to be the ambient or background sound level.
- Leq is the A-weighted sound level, which averages the background sound levels with short-term transient sound levels and provides a uniform method for comparing sound levels that vary over time.

6.9.2 Noise Methodology

The noise analysis evaluated the potential noise impacts associated with the Project's operations, which include mechanical equipment and loading/service activities. The noise analysis included measurements of existing ambient background sound levels and a qualitative evaluation of potential noise impacts associated with the proposed mechanical equipment (e.g., HVAC units, cooling tower) and loading activities. The study area was evaluated and sensitive receptor locations in the vicinity of the Project were identified and examined. The site layout and building design, as it relates to the loading area and management of deliveries at the Project Site were also considered. The analysis considered sound level reductions due to distance, proposed building design, and obstructions from surrounding structures.

Noise Receptor Locations

The noise analysis included an evaluation of the study area to identify nearby sensitive receptor locations, which typically include areas of sleep and areas of outdoor activity that may be sensitive to noise associated with the Project. The noise analysis identified three nearby sensitive receptor locations in the vicinity of the Project. As shown on Figure 6.5, the receptor locations include the following:

- R1 – Necco Street/Melcher Street (Future Loft Apartments);
- R2 – A Street (315 on A Apartments); and
- R3 – Wormwood Way/A Street (249-259 A Street Apartments).

These receptor locations, selected based on land use considerations, represent the most sensitive locations in the vicinity of the Project Site.

6.9.3 Noise Impact Criteria

The City of Boston and DEP have developed regulations to help protect the general public from adverse noise impacts.

City of Boston Noise Standards

The City of Boston has developed noise standards that establish noise thresholds deemed to result in adverse impacts. The noise analysis for the Project used these standards to evaluate whether the proposed development will generate sound levels that result in potential adverse impacts.

Under Chapter 40, Section 21 of the General Laws of the Commonwealth of Massachusetts and Title 7, Section 50 of the City of Boston Code, the Air Pollution Control Commission of the City of Boston has adopted Regulations for the Control of Noise in the City of Boston. These regulations establish maximum allowable sound levels based upon the land use affected by the proposed development. Table 6-10 summarizes the maximum allowable sound levels that should not be exceeded.

Table 6-10 City of Boston Noise Standards by Zoning District

Land Use Zone District	Daytime (7:00 AM – 6:00 PM)	All Other Times (6:00 PM – 7:00 AM)
Residential	60 dB(A)	50 dB(A)
Residential/Industrial	65 dB(A)	55 dB(A)
Business	65 dB(A)	65 dB(A)
Industrial	70 dB(A)	70 dB(A)

Source: Regulations for the Control of Noise in the *City of Boston, Air Pollution Control Commission*.

For a residential zoning district, the maximum noise level affecting residential uses shall not exceed the Residential Noise Standard. The residential land use noise standard is 60 dB(A) for daytime periods (7:00 AM to 6:00 PM) and 50 dB(A) for nighttime conditions (6:00 PM to 7:00 AM).

DEP Noise Criteria

DEP has developed noise impact criteria to assess whether or not a project will generate sound levels that result in adverse impacts. DEP's policy for implementing its noise regulation (310 CMR 7.10) is contained in DAQC Policy 90-001. This policy states that a source of sound will be considered to be violating the Department's noise regulation if the source:

- Increases the broad band sound level by more than 10 dB(A) above ambient (normally defined as L90 or the noise level exceeded 90 percent of the time during the hours of noise source operation); or
- Produces a "pure tone" condition (a condition when any octave band center frequency sound pressure level exceeds the two adjacent center frequency sound pressure levels by three decibels or more.)

6.9.4 Existing Noise Conditions

A noise monitoring program was developed to establish existing ambient sound levels. The existing sound levels were measured using a Type 1 sound analyzer (Larson Davis SoundExpert LxT). Measurements were conducted during the weekday daytime period (approximately 2:00 PM to 3:00 PM) and late night period (3:00 AM to 4:00 AM) in the vicinity of the Project Site on April 27, 2016. During the daytime period, the measured sound levels data under existing conditions were composed of noise from vehicles on local roadways such as Necco Street and A Street. The nighttime period sound levels were generally associated with mechanical equipment from nearby buildings. The existing measured sound level data are presented in Table 6-11.

Table 6-11 Existing Ambient Sound Levels, dB(A)

	City of Boston Residential District Noise Standard		Measured L_{90} Sound Levels	
Monitoring Location	Daytime	Nighttime	Daytime	Nighttime
M1 –Necco Street/Necco Court	60	50	59	56
M2 – A Street/Wormwood Way	60	50	54	52

Source: VHB
Note: Refer to Figure 6.5 for monitoring locations.

The L90 sound levels range from 54 dB(A) to 59 dB(A) during the daytime period and from 52 dB(A) to 56 dB(A) during the nighttime period. The result of the noise monitoring program indicates that the daytime sound levels within the study area are currently below the City of Boston's daytime standard of 60 dB(A) for a Residential District. However, due to nearby building mechanicals and the proximity to I-93, the sound levels during the nighttime period exceeds the City's nighttime standard of 50 dB(A) for residential use.

6.9.5 Future Noise Conditions

The noise analysis evaluated the potential noise impacts associated with the Project's proposed mechanical equipment and loading activities. The analysis determined the potential sound level impacts at the nearby sensitive receptor locations.

Building Mechanical Equipment

The mechanical equipment associated with the Project is expected to include the following:

- Air handling units,
- Boilers,

- Chillers, and
- Emergency generators.

This mechanical equipment will be located within a mechanical penthouse on the rooftop of the New Building. The rooftop of the New Building will be approximately 180 feet high. The Brick Building, located to the west, is expected to operate an air handling unit, boiler, a chiller and an emergency generator. This equipment will also be located within a mechanical penthouse on the rooftop, as well as an emergency generator. These units will be contained within an acoustical screening wall to minimize the sound associated with the equipment. During the design and selection process, appropriate low-noise mechanical equipment will be selected, including potential noise mitigation measures, such as acoustical enclosures and/or acoustical silencers. The Project will incorporate noise attenuation measures necessary to comply with City of Boston's and DEP's noise criteria at the sensitive receptor locations.

In addition to being located in an acoustical penthouse, the systems would be utilizing the height of the buildings in providing noise attenuation. Noise attenuation could be achieved by the Project's building design as the heights of the Project's buildings are similar or greater than the height of the nearest sensitive receptor, R1. The rooftops of the Project's buildings will serve as a barrier and break the direct line of exposure between the noise sources and receptor. With the equipment located in a mechanical penthouse and other sensitive receptors located over 700 feet from the Project's noise sources, it is expected the sound levels will dissipate over distance. As such, the sound levels associated with the Project's mechanical equipment will be negligible at the surrounding sensitive receptor locations.

The determination of specific generator parameters, such as the size and location, will be made during the building design process. The Project will be required to adhere to DEP regulations that require such equipment to be certified and registered. As part of the air permitting process, the Project will be required to meet additional noise requirements described in DEP regulations under Code of Massachusetts regulations (310 CMR 7.00). When the details of the emergency generators are developed, the Proponents will submit the appropriate permit application to DEP, which would include noise mitigation measures (such as acoustic enclosures and exhaust silencers) that are necessary to meet DEP's noise criteria.

Service and Loading Activities

The Project is expected to experience daily loading activities consisting of approximately 12 deliveries by small vehicles (such as FedEx/DHL vans) and 11 deliveries by larger vehicles (35 feet to 40 feet single unit box trucks). Loading activities will be located at two locations on the Project Site. The loading area associated with the existing Brick Buildings will be located off Necco Court between the two buildings. The loading area associated with the New Building will be located within the lower level of the building with access from Necco Street. Since loading activities will be shielded by surrounding buildings and will be managed, noise impacts to the sensitive receptor locations is expected to be negligible.

6.9.6 Conclusion of Noise Impact Assessment

The noise analysis evaluated the sound levels associated with the Project. This analysis determined that the sensitive receptor locations in the vicinity of the Project Site currently experience sound levels exceeding the City of Boston's nighttime noise criteria. Due to the anticipated location of the proposed equipment within a mechanical penthouse on the rooftop of the Brick Buildings and New Building, the sound levels associated with the Project's mechanical equipment will have no adverse noise impacts at nearby sensitive receptor locations. While impacts of the emergency generators are also expected to be negligible, a separate DEP permitting process will allow for further review of this equipment. The Project is designed such that the loading areas will be enclosed or surrounded by building structures, which will attenuate sound levels associated with the loading activities. As a result of the preliminary design, the Project's operations will have no adverse noise impacts at nearby sensitive receptor locations.

6.10 Solid and Hazardous Wastes

Phase I and Phase II Environmental Site Assessments ("ESAs') were completed in spring 2016 to determine the presence or likely presence of any hazardous substances or petroleum products on the Project Site. Results from the Phase II ESA were compared to Reportable Concentrations ("RCs") specified in the Massachusetts Contingency Plan ("MCP")(310 CMR 40.0000) as enacted by MGL Chapter 21E.

The Phase II ESA included advancement of six soil borings, four of which were completed as monitoring wells. Fourteen soil samples, including two duplicates, and four groundwater samples, including one duplicate, were submitted for laboratory analysis of selected parameters. Soil samples collected from fill material contained PAHs, extractable petroleum hydrocarbons ("EPH"), lead, and arsenic at concentrations exceeding the current MCP RCs for soils categorized as S-1 soils. There were no hazardous materials detected in groundwater samples at concentrations above the applicable MCP RCs (RCGW-2). A Site Plan showing the key existing features and boring locations is shown on Figure 6.6.

Fill is present at the Project Site from below the asphalt-paved parking surface to a depth of between 5 feet below the ground surface ("bgs") to 13 feet bgs. The fill material was noted to contain ash, slag, brick, wood mortar, asphalt, and glass. These materials, along with the detected hazardous materials are consistent with the presence of Urban/Historic Fill material. These conditions will be addressed in accordance with the MCP, as applicable, including characterization of soils for disposal off-site or re-use (if needed/required), air monitoring, and best management practices for dust control and storm water runoff and other appropriate measures to minimize health and safety risks.

The ESAs also identified the former presence of aboveground storage tanks ("ASTs"), potential asbestos containing materials ("ACM") and lead-based paint ("LBP"), water damage and suspect mold growth in the Brick Buildings, chemical and petroleum product storage throughout the Brick Buildings, concrete lined pits of unknown use in the basements of both Brick Buildings, and minor releases of potential polychlorinated biphenyl ("PCB") containing oil associated with the elevator cable drive motors.

6.11 Geotechnical

Based on available subsurface data, soil strata present at the Project Site are listed below in Table 6-12 in order of increasing depth below ground surface:

Table 6-12 Subsurface Conditions

Generalized Strata	Approx. Range in Thickness (ft)
Miscellaneous Fill	5-13
Organic Deposits	12-23
Marine Clay	20-28
Glaciofluvial	0-4
Glacial Till	10-14
Bedrock (Depth Below Ground Surface)	59-67
Bedrock (Elev., BCB)	El. -45 to El. -52

- **Miscellaneous Fill.** Fill at the Project Site generally consists of sand and gravel with silt, clay, brick, rubber, mortar, cinder, ash, porcelain, and sea shells.
- **Organic Deposits.** Organic deposits generally consisted of a sandy silt and lean clay with trace gravel and shells.
- **Marine Clay.** Marine clay (Boston Blue Clay) was a soft to stiff, olive gray to gray lean clay with moderate plasticity.
- **Glaciofluvial.** Glaciofluvial soil was encountered in two of the borings and consisted of a medium dense to very dense sand with little fine to medium gravel and little to trace silt.
- **Glacial Till.** The glacial till was comprised of sand, silt, gravel, and clay.
- **Bedrock.** Bedrock encountered at the Project Site was completely weathered and clay-like Cambridge Argillite to a depth of 80 to 85 feet. Bedding and other rock characteristics were not distinguishable. Below 85 feet, bedrock consisted of severely weathered, soft, fine grained Cambridge Argillite.

6.11.1 Proposed Construction

The Project includes rehabilitation of the Brick Buildings, and construction of the New Building. The New Building will be supported on end-bearing piles driven to glacial till or bedrock. Steel sheet piling will be driven along the perimeter of the proposed New Building for temporary earth support and groundwater control during construction.

Additionally, a temporary lateral earth support system may be required to complete construction for the below grade structures.

Temporary dewatering may be required during construction to remove groundwater or stormwater. A temporary construction dewatering permit will be obtained from governing agencies prior to discharge of temporary dewatering effluent from the Project Site. Testing of the effluent will be conducted prior to and during discharge to confirm compliance with all permit requirements.

The foundation construction will limit potential adverse impacts, especially to adjacent structures and to groundwater levels. Excavation and stabilization techniques for the basement of the New Building will ensure that the timber pile and granite block foundation of the Brick Buildings are not adversely impacted throughout construction, including no vibratory impacts or settlement of the existing structures.

6.12 Groundwater

Groundwater levels in the vicinity of the Project Site are monitored by the Boston Groundwater Trust (the "Trust") in observation wells typically located in the public sidewalks. Groundwater levels reported by the Trust in wells near the Project Site between 2005 and 2016 have ranged from approximately 7 to 9.5 feet BCB. Groundwater levels in the area could be influenced by leakage into and out of sewers, storm drains and other below-grade structures, as well as environmental factors such as precipitation, season, and temperature.

The Project is located in a No Harm Overlay area of the GCOD, and will be designed to not lower area groundwater levels (Article 32 of the Code). A groundwater recharge system will be installed and will result in a benefit to area groundwater levels. In addition, groundwater monitoring will be undertaken during the design phase and continue through construction at area groundwater observation wells.

6.13 Construction Period Impacts

The Proponents will provide measures to protect pedestrians and other visitors to the Project Site during construction of each phase. These control measures will maintain access to the Fort Point Channel to the extent practicable, and will be consistent with the phasing of improvements and public benefits, while providing pedestrians and other visitors safe access in the area during construction activities.

During construction there may be periods when public access will be controlled to ensure public safety while performing certain construction activities.

6.13.1 NPDES Construction General Permit

The Project will alter greater than one acre of land. Accordingly, the individuals who control the construction activities on the Project Site (e.g. owner, contractor/s) are required to file a Notice of Intent ("NOI") at least seven days prior to the start of construction pursuant to the National Pollution Discharge Elimination System ("NPDES") General Permit for Stormwater Discharges from Construction Sites with the EPA. These regulations require the preparation of a Stormwater Pollution Prevention Plan ("SWPPP") for the site-specific construction activities and implementation by the individuals who control the site. The SWPPP must be in place at the time of the filing of the EPA NOI. The SWPPP will include information such as:

- Project Drawings relative to stormwater management
- Project/Site description
- Drainage report as an attachment, including a Long Term Operations and Maintenance ("O&M") Plan
- Soils information
- General project phasing
- Description and details of recommended erosion control BMPs as defined by state guidelines.
- Temporary and final stabilization recommendations
- Inspection schedule and maintenance checklists for BMPs
- Description of spill prevention and response actions
- Copy of Order of Conditions
- Copy of NPDES Construction General Permit regulations

During construction, the contractor will be responsible for maintaining the stormwater management system. Upon completion of construction, inspections and maintenance will be the responsibility of the property management.

6.13.2 Construction Period Impacts

Overview

Most construction activities will be accommodated within current site boundaries. If required, details of the overall construction schedule, work hours, number of construction workers, worker transportation and parking, number of construction vehicles and routes will be addressed in a Construction Management Plan ("CMP") to be filed with BTD in accordance with the City's transportation maintenance plan requirements. The CMP (if required) would also include more detail on:

Waterfront Access

The Proponents understand the importance of public access to the waterfront. The construction phases will incorporate measures to maintain access to the waterfront, to the extent practicable, while protecting pedestrians and other visitors from the construction activities. This access will occur in a way that is consistent with public safety. Both permanent and interim Harborwalk plans will be designed to facilitate pedestrian traffic around the active construction site.

Signage (both directional and informational) will be incorporated into the landscape elements to orient visitors to the waterfront and provide information regarding construction and safety. Signage and other landscape elements will serve to restrict vehicle access to minimize pedestrian conflicts along the Harborwalk. Those portions of the Project Site not impacted by construction activities and not otherwise needed for parking will remain open for public access and use, in accordance with the phasing of improvements and public benefits described for the various construction phases.

Additionally, construction will include measures to protect pedestrian traffic that may use Necco Court between the Harborwalk and Necco Street during construction, except during periods of time when critical overhead work will be performed.

Air Quality

No adverse air quality impacts from the construction of the Project are anticipated. Fugitive dust mitigation measures may include, as necessary:

- Wet suppression to minimize the generation of dust from excavation operations and on-site vehicle traffic, with provisions for any runoff control;
- Spraying any piles of excavation materials with soil cement or calcium chloride overnight and on weekends, and securely covering long-term material stock piles;
- Compacting of the soil or the use of gravel to stabilize the site access points;
- Washing vehicle wheels before leaving the Project Site, as necessary, with provisions for runoff control;
- Periodic cleaning of paved streets near the entrances to the Project Site to minimize vehicle mud/dirt carryout;
- Installing fencing around the perimeter of the Project Site to assist in containing wind-blown dust;
- Requiring that trucks hauling excavated material from the Project Site install secure covers over their loads; and,
- Encouraging the construction contractors for the Project to implement the Massachusetts Diesel Retrofit Program control measures for heavy-duty diesel equipment.

Noise

The construction of the Project will be performed in a manner that complies with the DEP and City of Boston noise regulations. To ensure compliance with these regulations during construction, the Proponents, to the extent practicable, will seek to incorporate into the general construction contract the following mitigation measures:

- Limited vehicle idling to five minutes;
- Limited construction vehicle warm up to ten minutes;
- Insuring construction vehicles have ambient leveling sensors on the back up alarms;
- Limiting construction to the hours allowable by City of Boston regulations; and,
- Heavy trucks will be limited to the South Boston Haul Road

Traffic

By limiting construction traffic to truck haul roads, the Proponents will ensure that potential impacts from construction will be minimized. To minimize impacts to abutters and the local community, the Proponents will consider all available measures, including information on construction activities, specific construction mitigation measures, and construction materials access and staging area plans. Barricades, walkways, lighting and signage will be used to ensure public safety throughout the construction period.

Asbestos Containing Material and Construction Waste-Brick Buildings

Asbestos Containing Materials and Lead-Based Paint surveys were conducted at the Site in May of 2016. Abatement of asbestos and hazardous materials will be performed prior to or concurrent with the Phase 1 Project in accordance with state and federal regulations. Any required permits will be obtained and maintained throughout the process.

All construction debris will be sorted in compliance with the DEP construction debris regulations. Recycling programs to limit the amount of waste placed for ultimate disposal will be strictly adhered to.

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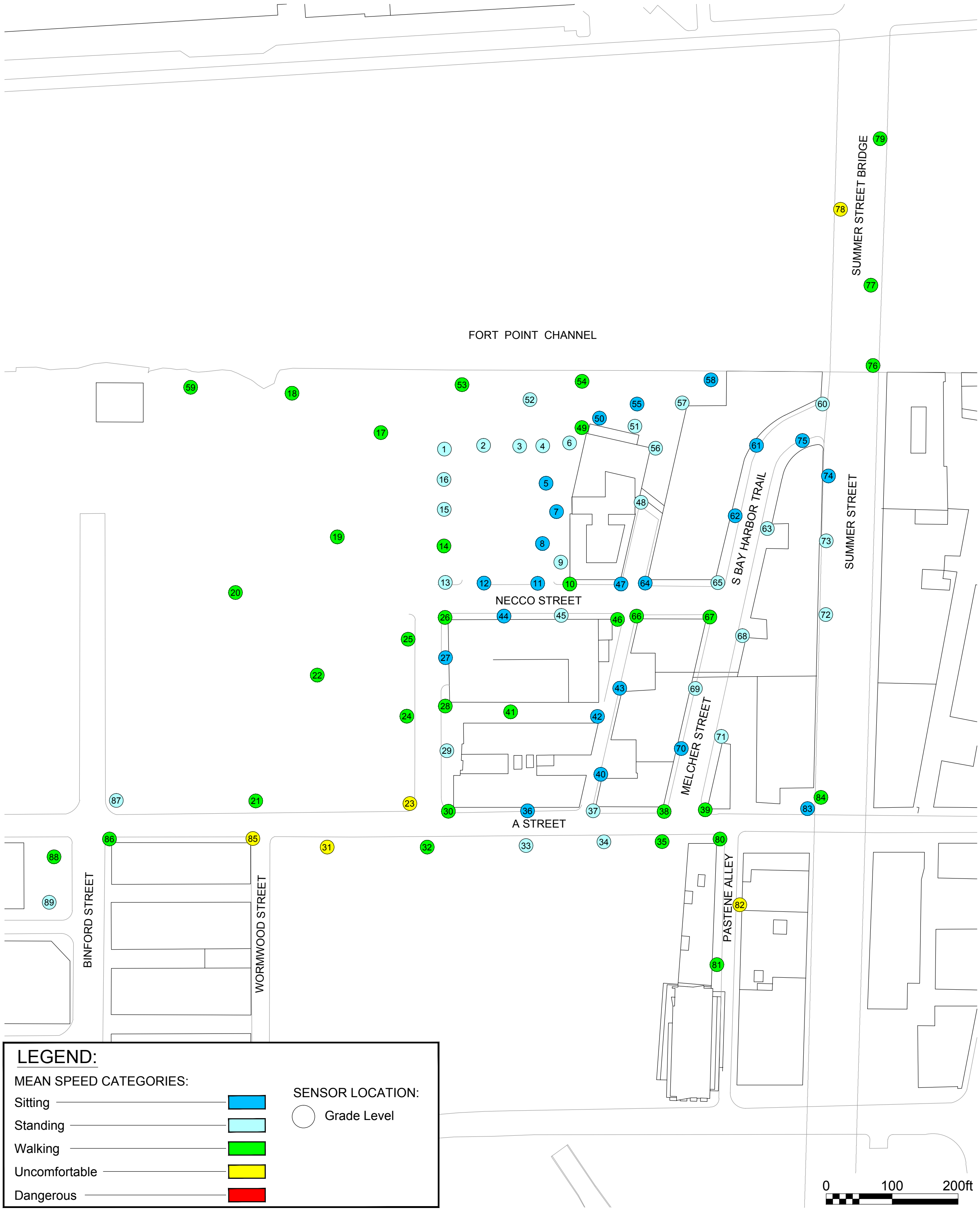


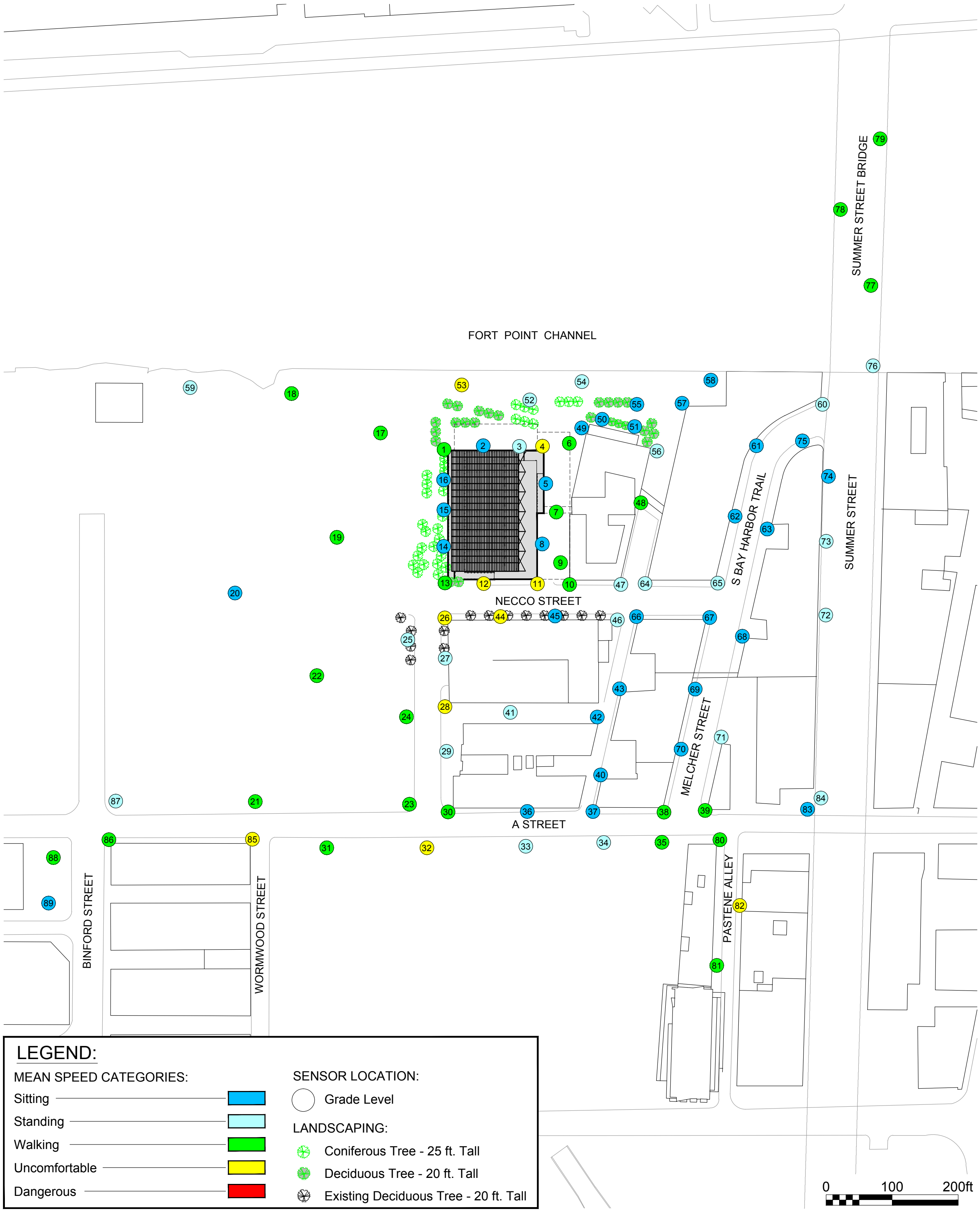
Source: RWDI

Prepared By: VHB

Figure 6.1a

No-Build Wind Conditions

GE Headquarters Project
Boston, Massachusetts



Source: RWDI

Prepared By: VHB

Figure 6.1b

Build with Mitigation Wind Conditions

GE Headquarters Project
Boston, Massachusetts

Source: RWDI

Prepared By: VHB

Figure 6.1c

No-Build Wind Conditions - Effective Gust

GE Headquarters Project
Boston, Massachusetts

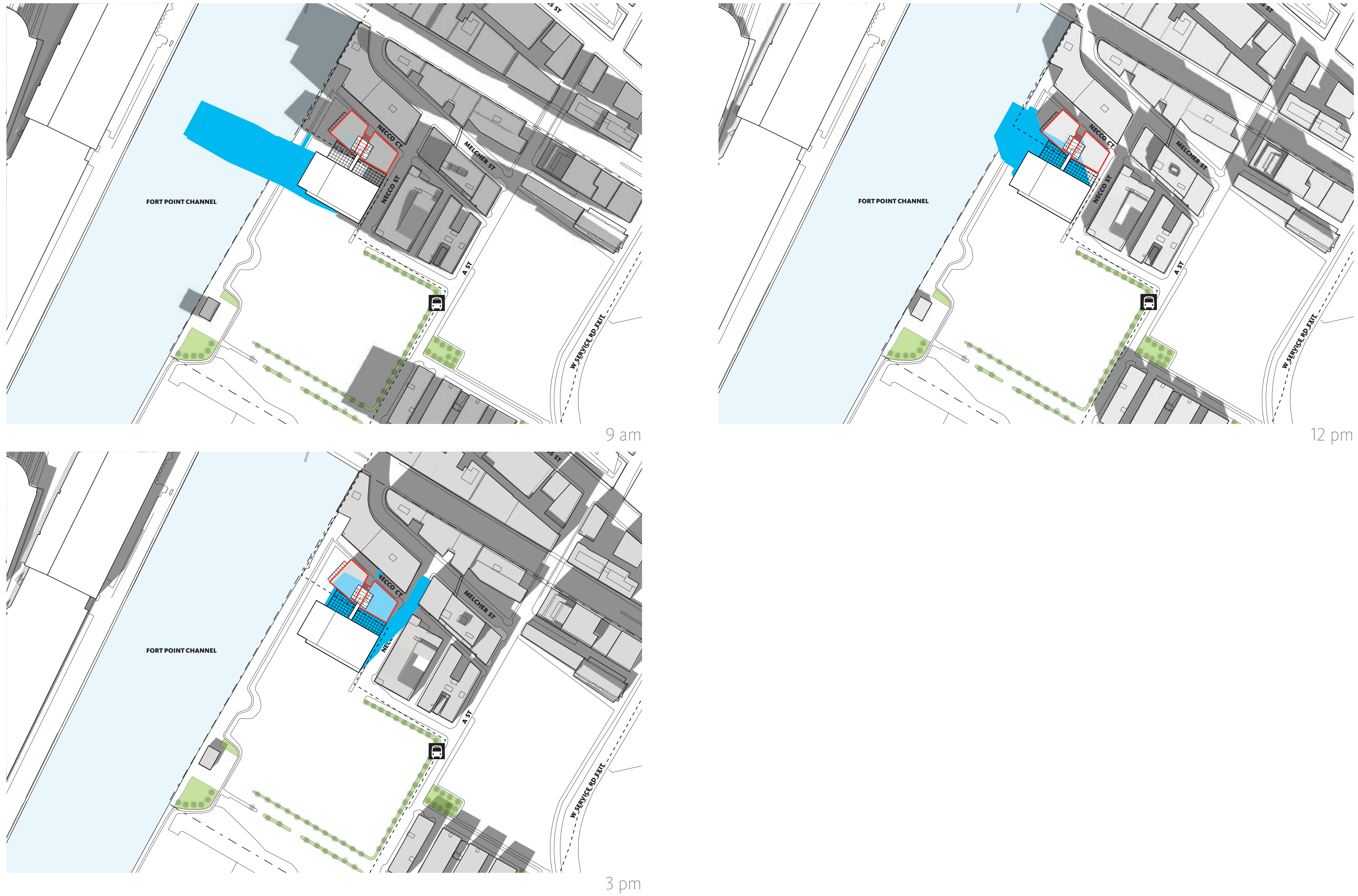
Source: RWDI

Prepared By: VHB

Figure 6.1d

Build Wind Conditions - Effective Gust

GE Headquarters Project
Boston, Massachusetts



0' 200' 400'

Source Info

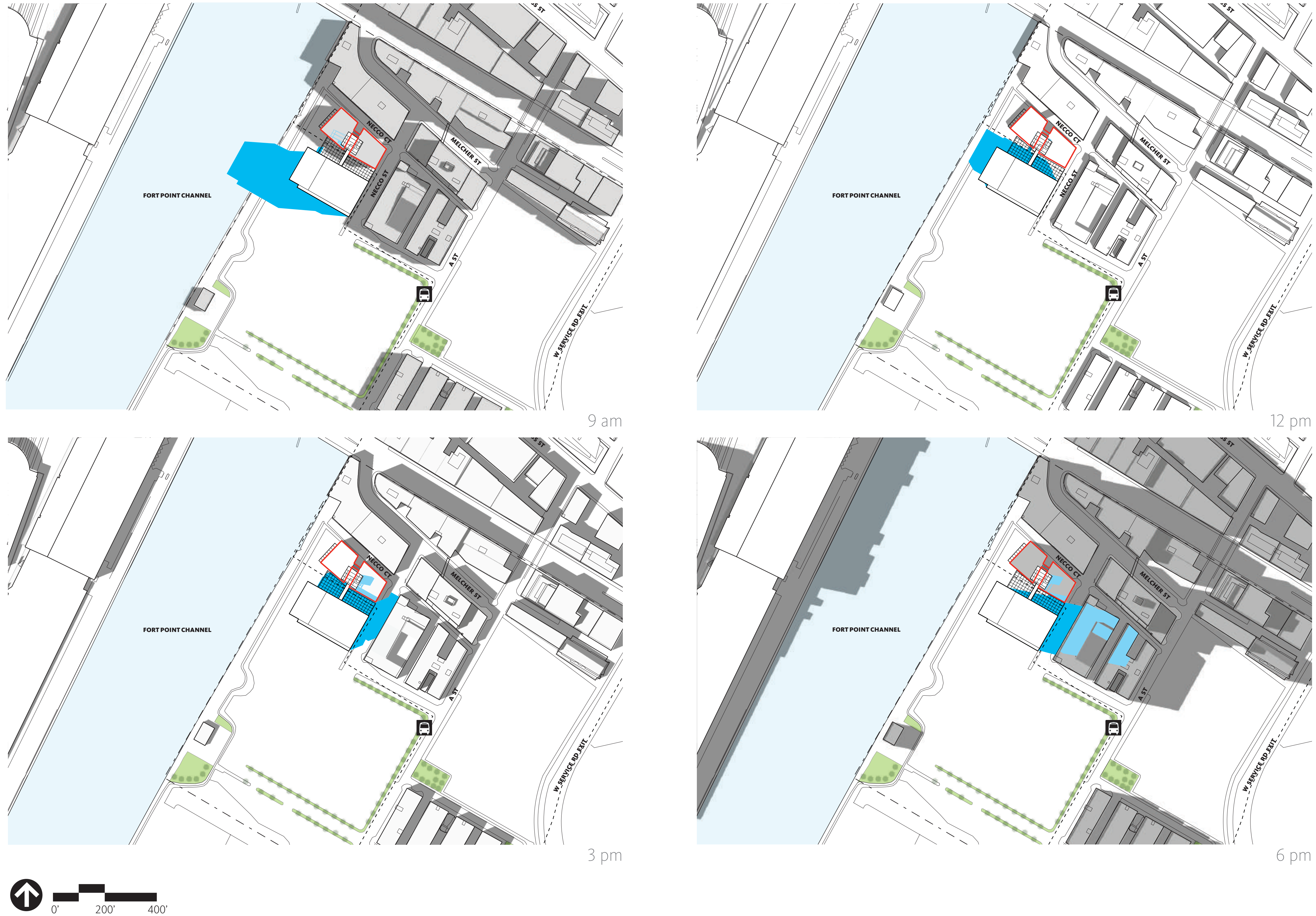
- Existing Building Outline
- Existing Shadow
- Net New Shadow (Street Level)
- Net New Shadow (Rooftop)
- Green Space
- Fort Point Channel Landmark District
- Fort Point Channel Historic District

Gensler

Figure 6.2a

Shadow Impacts
March 21

GE Headquarters Project
Boston, Massachusetts



Source Info

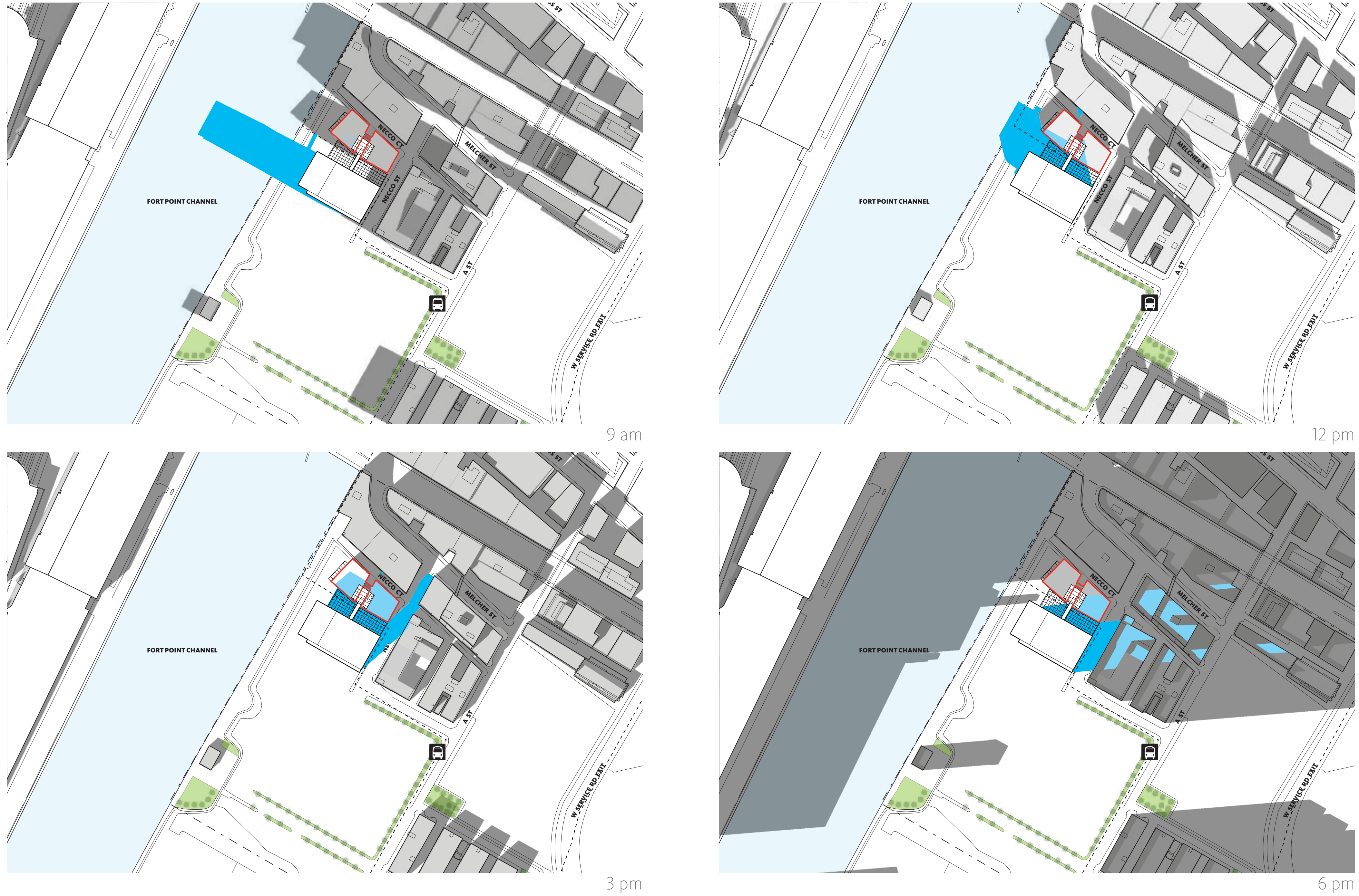
- Existing Building Outline
- Existing Shadow
- Net New Shadow (Street Level)
- Net New Shadow (Rooftop)
- Green Space
- Fort Point Channel Landmark District
- Fort Point Channel Historic District

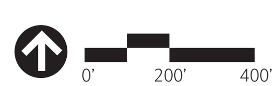
Gensler

Figure 6.2b

Shadow Impacts
June 21

GE Headquarters Project
Boston, Massachusetts





Source Info

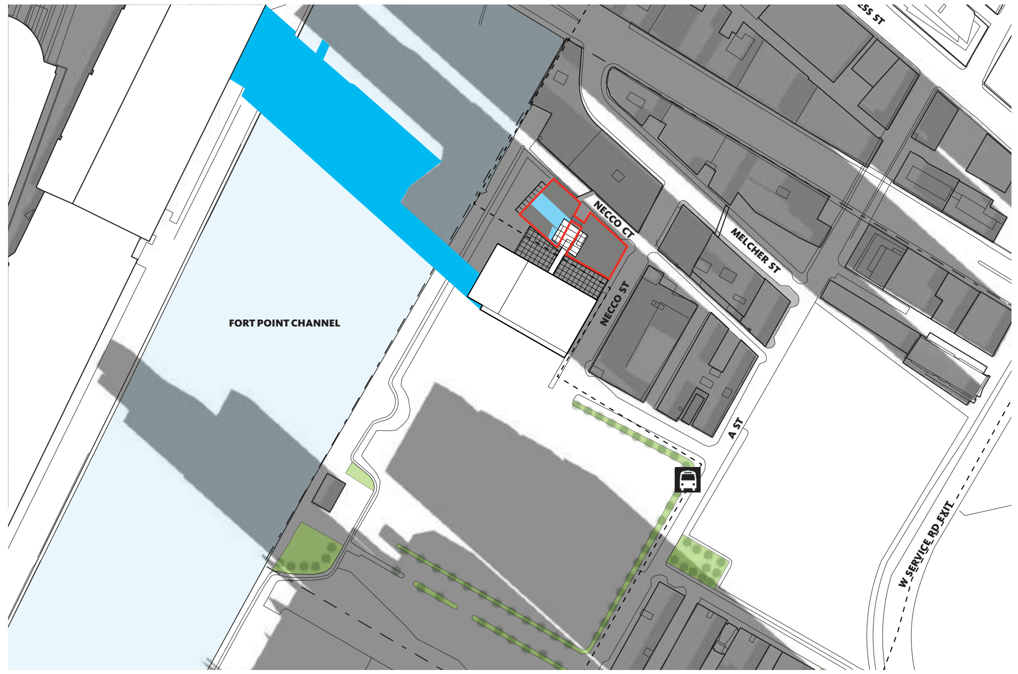
- Existing Building Outline
- Existing Shadow
- Net New Shadow (Street Level)
- Net New Shadow (Rooftop)
- Green Space
- Fort Point Channel Landmark District
- Fort Point Channel Historic District

Gensler

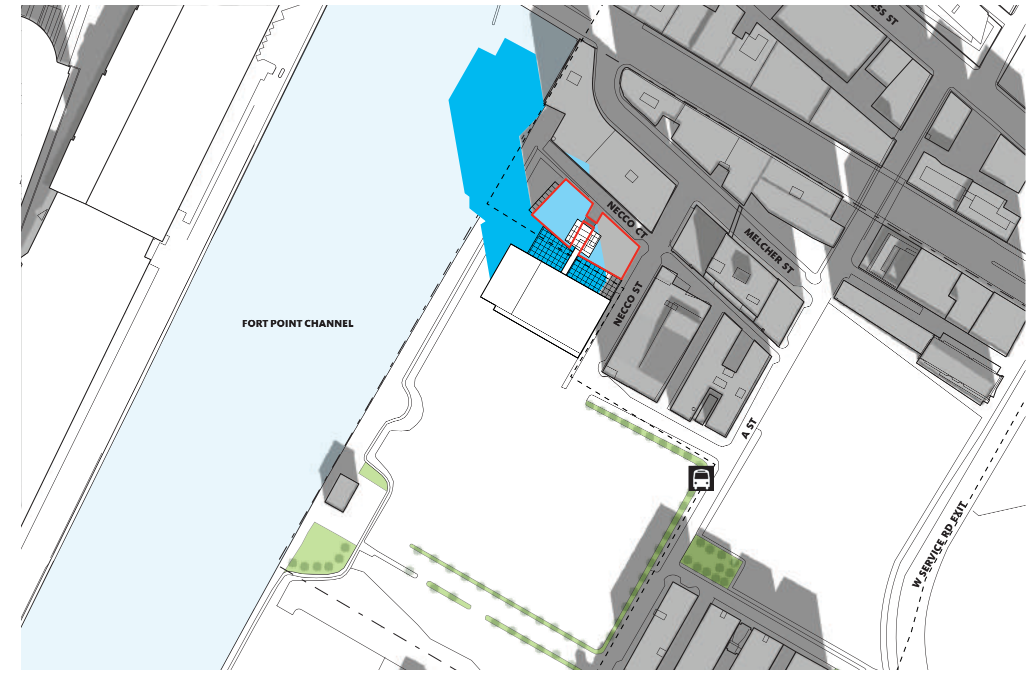
Figure 6.2c

Shadow Impacts
September 21

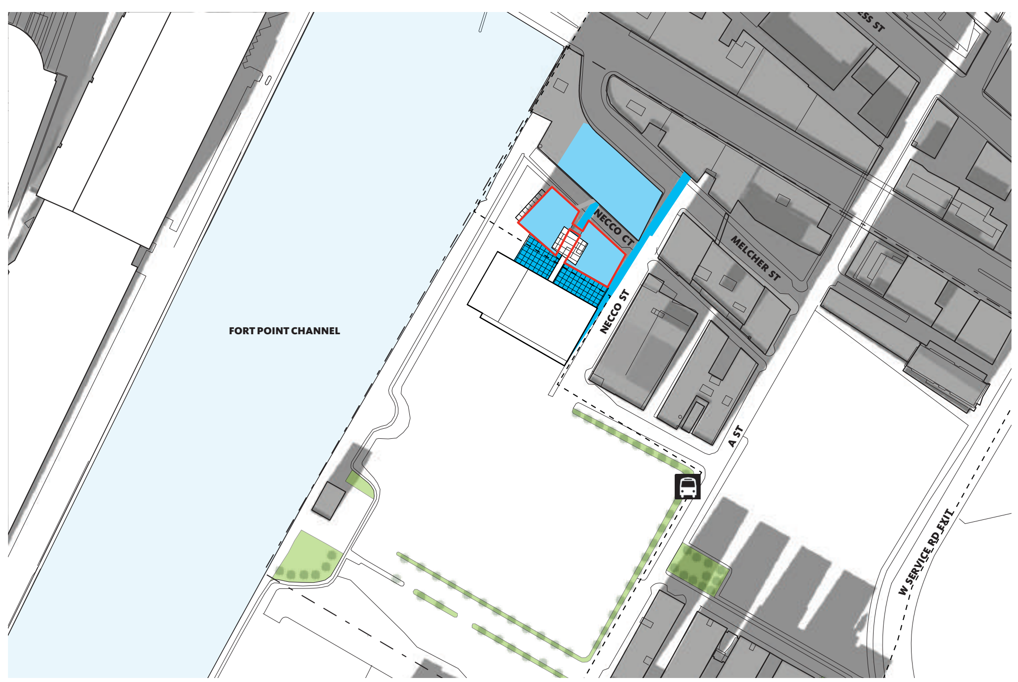
GE Headquarters Project
Boston, Massachusetts



9 am



12 pm



Source Info

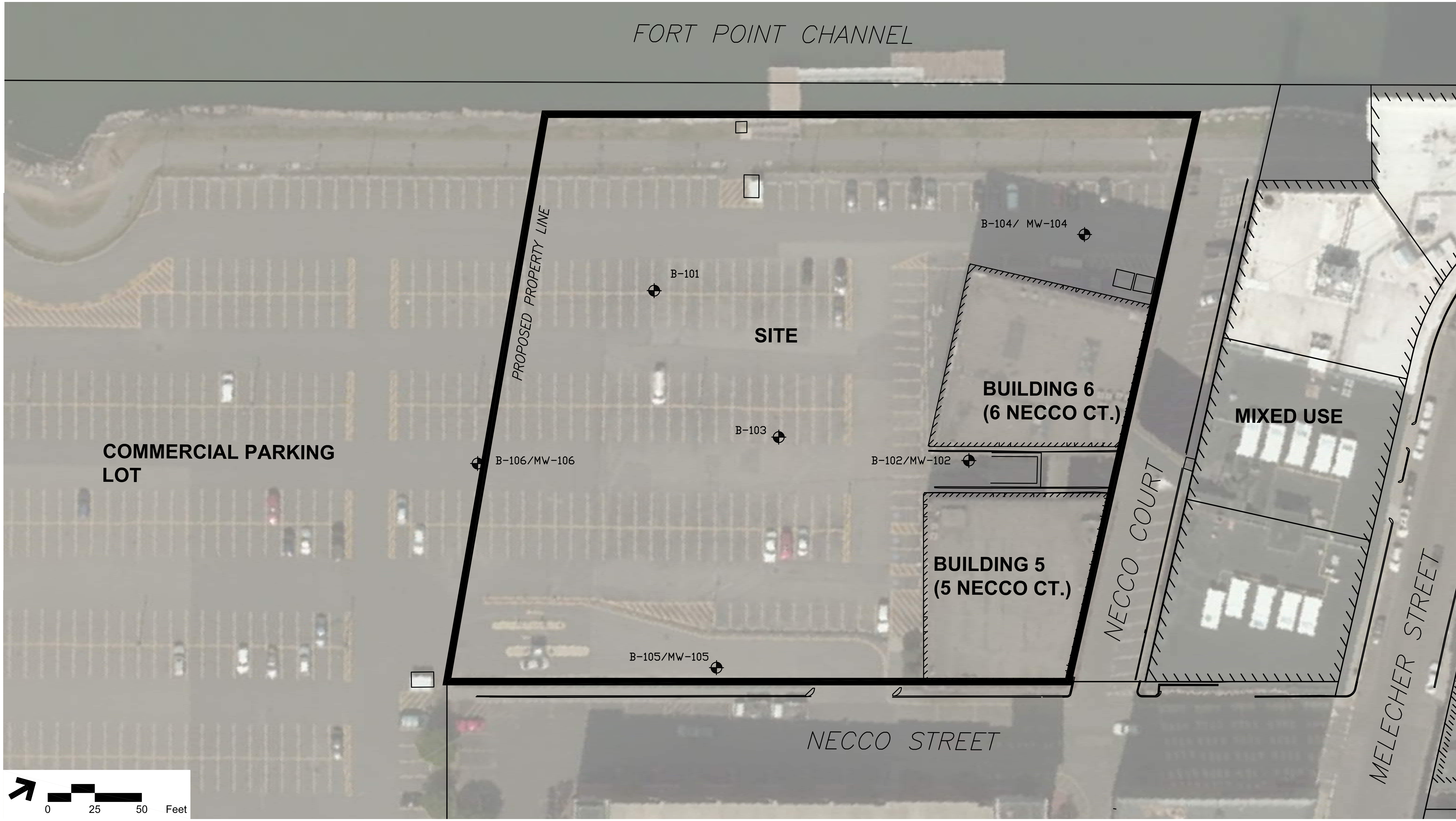
- Existing Building Outline
- Existing Shadow
- Net New Shadow (Street Level)
- Net New Shadow (Rooftop)
- Green Space
- Fort Point Channel Landmark District
- Fort Point Channel Historic District

Gensler

Figure 6.2d

Shadow Impacts
December 21

GE Headquarters Project
Boston, Massachusetts



SITE SURVEY PERFORMED BY FELDMAN LAND SURVEYORS OF BOSTON, MA APRIL 2016

B-101 ⊕ ENVIRONMENTAL BORING LOCATION

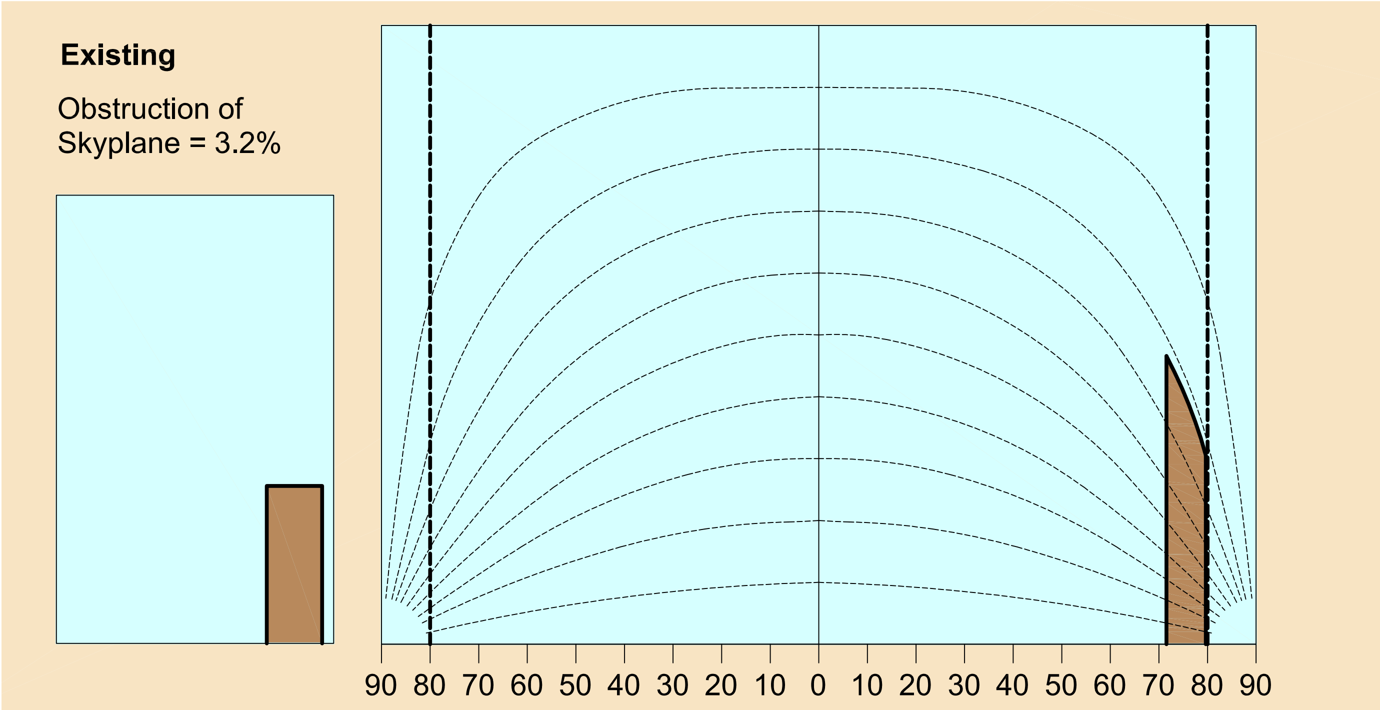
B-106/MW-106 ⊕ ENVIRONMENTAL BORING LOCATION WITH MONITORING WELL

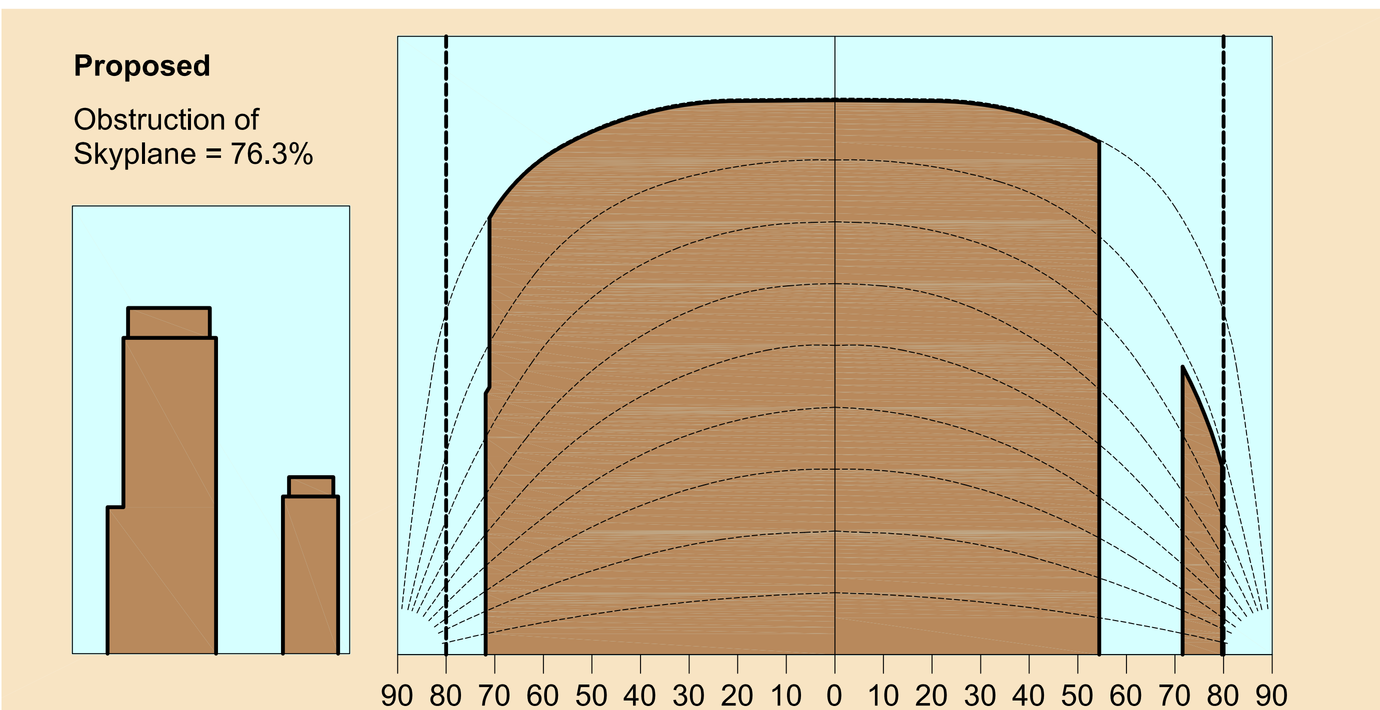
AECOM

Figure 6.6

Boring and Monitoring Well Location Plan

GE Headquarters Project
Boston, Massachusetts





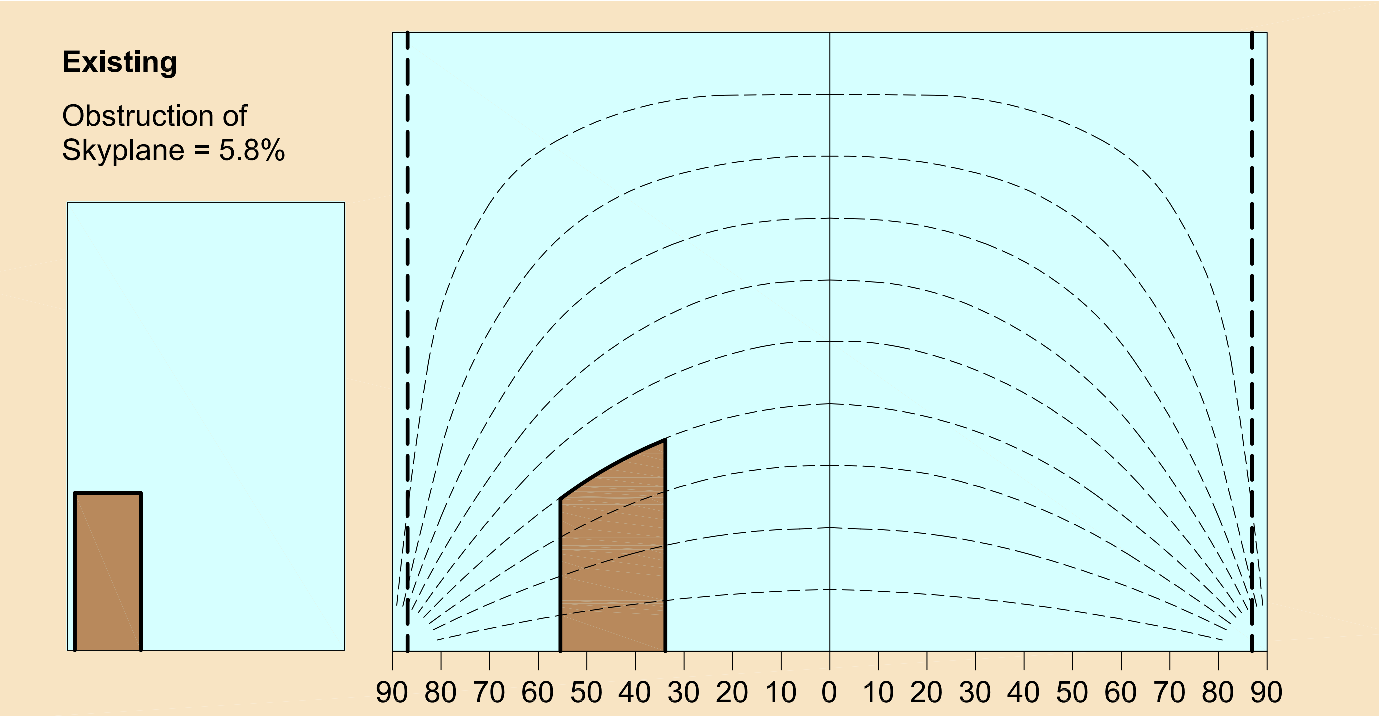
Source: BRADA software, Gensler Massing Model

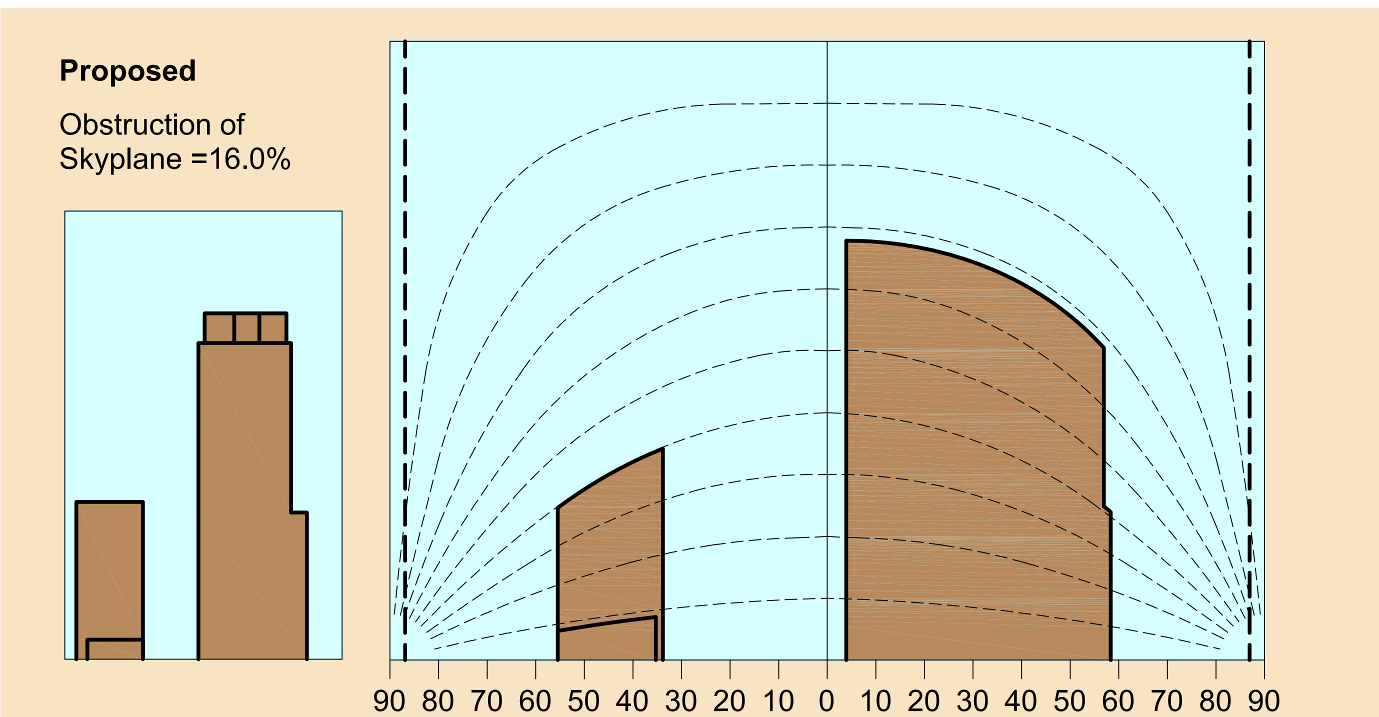
Prepared By: VHB

Figure 6.3a

Daylight Analysis
Center of Necco Street

GE Headquarters Project
Boston, Massachusetts





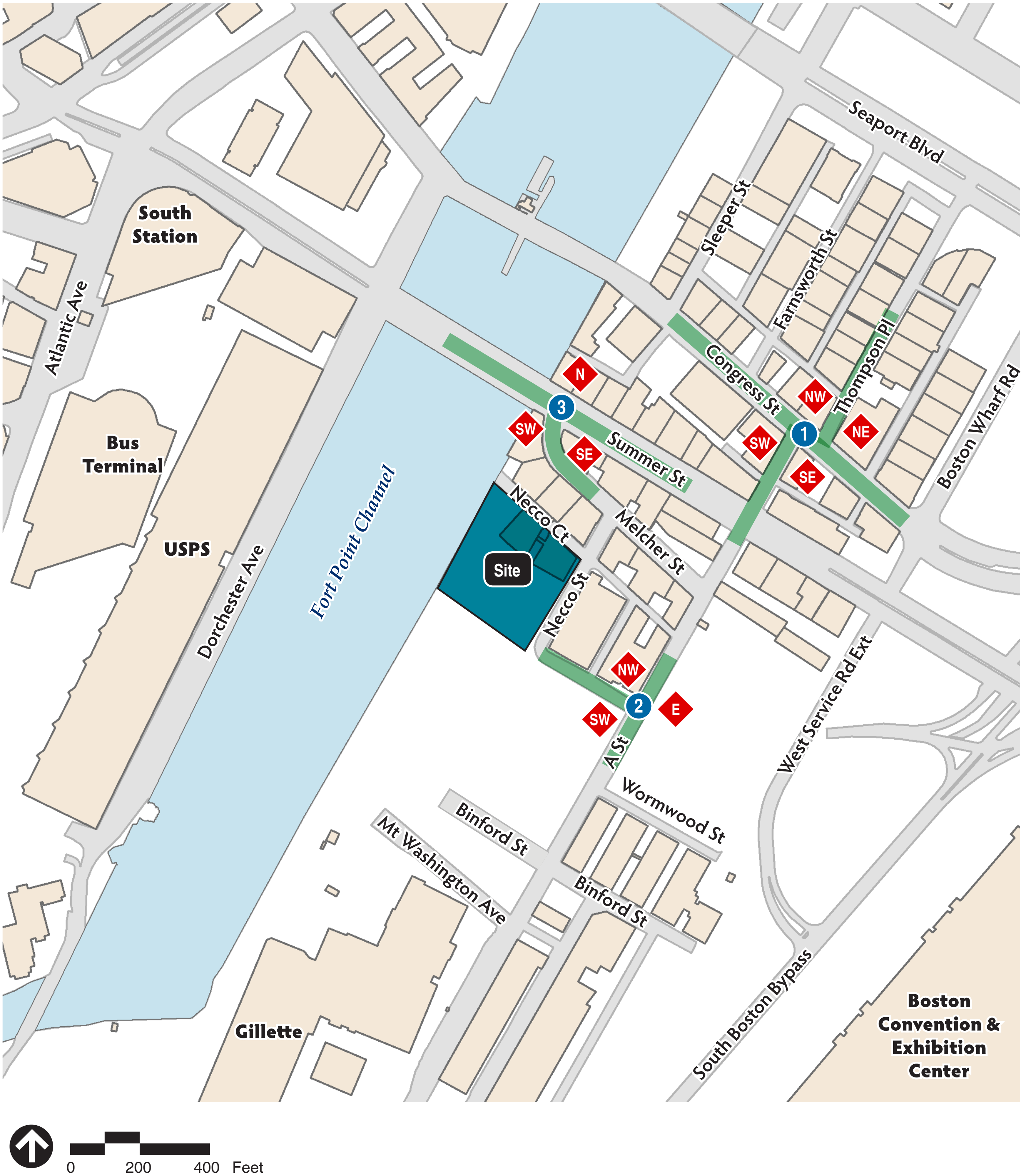
Source: BRADA software, Gensler Massing Model

Prepared By: VHB

Figure 6.3b

Daylight Analysis
Center of Harborwalk

GE Headquarters Project
Boston, Massachusetts



Source: BWSC

M# Intersection Location

R# Receptor Location

Prepared By: VHB

Figure 6.4

Air Quality Study Intersections

GE Headquarters Project
Boston, Massachusetts

Source: BWSC

M# Monitoring Location

R# Receptor Location

Prepared By: VHB

Figure 6.5

Noise Monitoring and Receptor Locations

GE Headquarters Project
Boston, Massachusetts

7

Historic Resources

7.1 Introduction

This chapter identifies properties located within and in the vicinity of the Project Site that are listed in the National and State Registers of Historic Places and/or are included in the Inventory of Historic and Archaeological Assets of the Commonwealth and evaluates potential Project-related effects on those properties.

7.2 Phase 1 Project Impacts

The Phase 1 Project includes the rehabilitation of the Brick Buildings. The rehabilitation of the Brick Buildings will be generally consistent with the Secretary of the Interior's Standards for Rehabilitation and the Fort Point Channel Landmark District standards and criteria.

Prior to work commencing on these structures, the Proponents will submit an Application for Certificate of Design Approval to the Fort Point Channel Landmark District Commission ("FPCLDC").

In addition, submittal of this EENF/EPNF initiates Massachusetts Historical Commission ("MHC") review. Prior to work commencing on these structures, the Proponents will consult with the MHC to seek a determination of effect in accordance with State Register Review requirements.

7.3 Regulatory Context

7.3.1 Massachusetts Historical Commission

The MHC has review authority over projects requiring state or federal funding, licensing, permitting, and/or approvals, in order to evaluate potential direct or indirect impacts to properties listed or eligible for listing in the National and State Registers of Historic Places, in compliance with State Register Review requirements (M.G. L. Chapter 9, Sections 27-27c, as amended by Chapter 254 of the Acts of 1988) and Section 106 of the National Historic Preservation Act of 1966 (if necessary). The filing of this EENF/EPNF will initiate the required MHC review under MEPA and MHC's State Register Review process.

7.3.2 Boston Landmarks Commission

The submission of this EENF/EPNF initiates review of the Project by the Boston Landmarks Commission ("BLC") under the BRA Article 80B, Large Project Review process, in association with the Boston Environment Department. The BLC's jurisdiction is focused on potential Project impacts to historic buildings and districts listed in the National and State Registers of Historic Places which are located within or in the vicinity of the Project Site, and how those impacts will be mitigated or minimized. Impacts to be considered by the BLC will include physical impacts to the historic buildings, as well as urban design, shadow, and visual impacts.

7.3.3 Fort Point Channel Landmark District Commission

The Brick Buildings are contributing structures to the Fort Point Channel Landmark District. Any work on the exterior of buildings within the Fort Point Channel Landmark District, that is visible from an existing or proposed street or way that is open to public travel is subject to review by the FPCLDC. The Proponents will submit an Application for Certificate of Appropriateness for the rehabilitation of the two Brick Buildings.

7.4 Historic Context

A portion of the Project Site is located in the Fort Point Channel National Register Historic District,[1] designated by the Secretary of the Interior in 2004 and Fort Point Channel Landmark District,[2] as created by the City of Boston in 2008. The Fort Point area was created by the Boston Wharf Company through a decades-long process of land filling which began in 1836 and continued until 1882. The Boston Wharf Company was responsible for erecting the majority of the buildings on the filled land it created, as well as for creating the streets and ways system within the area. These buildings were initially constructed for use as general manufacturing, warehouse, and commercial space, and were later employed to accommodate shipping and receiving uses.

The Fort Point Channel Landmark District as well as the distinct Fort Point Channel National Register Historic District are characterized by late-nineteenth and early-twentieth century masonry buildings which average five to six stories in height and represent a variety of architectural styles including Romanesque Revival, Renaissance Revival, Classical Revival, Queen Anne, Italianate, and Industrial.

1 National Register of Historic Places, Fort Point Channel Historic Distrust, Boston, Suffolk County, Massachusetts, National Register #04000959.

2 Boston Landmarks Commission, The Fort Point Channel Landmark District: Boston Landmarks District Study Report, Boston, Suffolk County, Massachusetts, 2008 (Amended).

7.5 Historic Resources

A survey was undertaken to identify historic resources within and in the vicinity of the Project Site. The Project Site contains two existing buildings known as 5 and 6 Necco Court, which are listed in the State and National Registers of Historic Places as contributing structures to the Fort Point Channel National Register Historic District and the Fort Point Channel Landmark District. In addition, within a one-quarter-mile radius of the Project Site are one National Register-listed district (Russia Wharf Buildings), one property listed individually in the National Register (South Station Headhouse), and four inventoried properties; however, five of the properties are separated from the Project Site by the Fort Point Channel and other properties, the Project will have no effect on those properties.

The names and addresses of properties listed in the State and National Registers of Historic Places and properties included in the State Inventory within a one-quarter-mile of the Project Site are listed in Table 7-1 and depicted in Figure 7.1. A description of the historic resources and associated photographs in the vicinity of the Project Site follows. The photographs are keyed to Figure 7.2, Site Photos Key.

Table 7-1 Historic Resources Within and in The Vicinity of the Project Site

No.	Resource Name	Location	MHC Inventory No.	Designation
A	Fort Point Channel Historic District	N/A	BOS.WZ/ NR #04000959	NRDIS
B	Fort Point Channel Landmark District	N/A	BOS.ZG	LHD
C	Russia Wharf Buildings	520 Atlantic Avenue, 270-272 Congress Street	BOS.BD/ NR #80000463	NRDIS
1	Federal Reserve Bank of Boston	556 Atlantic Avenue	BOS.1516	INV
2	Gillette Complex	1 Gillette Park		INV
3	South Station Headhouse	640 Atlantic Avenue	BOS.1517/ NR #75000299	NRIND
4	Former Stone and Webster Building	245 Summer Street	BOS.2050	INV
5	USPS General Mail Facility/South Postal Annex	25 Dorchester Avenue	BOS.1694	INV

NRIND National Register of Historic Places, Individual Listing
NRDIS National Register of Historic Places, District
LHD Local Historic District (State Register of Historic Places)
INV Listed in the Inventory of Historic and Archaeological Assets of the Commonwealth; no current designation

7.5.1 Historic Resources within the Project Site

5 and 6 Necco Court

Completed in 1907, the pair of warehouse buildings at 5 and 6 Necco Court (Brick Buildings) were constructed by the Boston Wharf Company for NECCO as candy manufacturing and storage facilities (Figures 7.3a through 7.3g). After NECCO relocated to a new facility in Cambridge, Massachusetts in 1928, the buildings were converted to wool warehouses by the Boston Wharf Company and used as such between 1928 and 1950. By the late 20th century, the warehouse spaces had been converted to mixed-use with retail and offices. Portions of the Brick Buildings were utilized as construction field offices during the Central Artery/Tunnel (also known as the "Big Dig") construction project from 1991 to 2007. Following the conclusion of that project the Brick Buildings have largely remained vacant.

Executed in the Classical Revival style, the Brick Buildings each rise five stories above a raised basement. These north-facing buildings are accentuated by sandstone and copper trim, and feature partially extant copper cornices supported by brick corbels that extend below the rooflines. The facades each terminate at a low-sloped roof.

The street-facing elevations along Necco Court (north) and Necco Street (east) feature a one and one-half story base defined by a sandstone beltcourse, and paired window openings with two-over-two wood windows and sandstone sills at each floor (Figures 7.3a, 7.3b, 7.3f, 7.3g). The basement and fifth story window openings have simple cast stone lintels; the first floor windows are accentuated by painted cast iron lintels. The second, third, and fourth floors contain segmental arched window openings with sandstone ornamentation.

The rear (south) and side (west) elevations facing the Gillette parking lots and Fort Point Channel are void of architectural detail, with the exception of punched window openings with sandstone sills and a faded ghost sign of the Necco Company logo. The building at 5 Necco Court features a vertical bay of infilled fire doors at the southwest corner of the rear (south) elevation (Figures 7.3c, 7,3d).

A two-bay, steel frame, corrugated metal-clad pedestrian bridge with paired two-over-two steel windows connects the west elevation of 5 Necco Court and east elevation of 6 Necco Court at the second through fifth floors (Figures 7.3c, 7.3d). Most of the window openings contain plywood infill. A similar originally three-bay pedestrian bridge connects the north elevation of 6 Necco Court and south (rear) elevation of 19-27 Melcher Street (owned by a third party) at the second through fifth floors.

The condition of the facades of the Brick Buildings is representative of buildings that have been vacant for extended periods. Conditions such as deteriorated wood window frames, aged sealant, unsealed facade penetrations, and broken window and door glass allow bulk water intrusion to building interiors. Character-defining elements of the Brick Buildings, and similar buildings in the district, are also at risk for loss without intervention. These elements include the extant copper cornice where sections are displaced and the structural steel support is exposed to weather. The multi-wythe, load-bearing brick masonry is cracked and spalled at localized areas at both buildings. Some of the remaining cast iron pintels from the original window shutters are cracked and corroded which in turn is causing distress in adjacent brick masonry. The cast iron lintels have peeling paint and surface corrosion. In the recent past, a broken skylight at the 6 Necco Court building resulted in water leakage that traveled multiple floors. The skylight has since been repaired, but the water intrusion resulted in warped and damaged interior floors.

Facade repairs to both of the Brick Buildings are warranted to prevent further deterioration and loss of character-defining elements. Due to the vacant occupancy status of the buildings, inspections are completed annually for compliance with the Boston Facade Ordinance. Subsequently, efforts to address public fall hazards have been completed, including installation of acrylic sheeting over window sashes. Efforts have been made to mitigate bulk water intrusion through miscellaneous openings; however, holistic repairs are required to make the enclosure watertight.

Fort Point Channel Landmark District

The Fort Point Channel Landmark District was adopted as a City of Boston Landmark District in 2008. When listed, the District included 95 industrial and commercial buildings and four structures. The 55-acre District is roughly bounded by Seaport Boulevard to the north, Boston Wharf Road, West Service Road and Medallion Avenue to the east, Iron Street to the south, and A Street, Necco Street, and the Fort Point Channel east seawall to the west. The FPCLDC reviews proposed exterior alterations to buildings and structures within the District for consistency with District standards and criteria adopted by the BLC (Figures 7.3a through 7.3g, 7.3i, 7.3j).

Fort Point Channel Historic District (BOS.WZ / NR #04000959)

The Fort Point Channel Historic District, listed in the National Register of Historic Places, has approximately the same boundaries as the Fort Point Channel Landmark District, but includes the Fort Point Channel, four bridges, and the west channel seawall, as well. The Fort Point Channel Historic District is roughly bounded by Northern Avenue to the north, A Street to the east, and Richards and Wormwood Streets to the south, and the Fort Point Channel to the west. At the time of the Fort Point Channel Historic District National Register listing in 2004, that District encompassed 98 industrial, commercial, and civic buildings and structures (Figures 7.3a through 7.3g, 7.3i, 7.3j).

7.5.2 Historic Resources within One-Quarter-Mile Radius of the Project Site

Russia Wharf Buildings (BOS.BD / NR #80000463)

The Russia Wharf Buildings form a 2.2-acre commercial block at 270 and 276-290 Congress Street and 518-540 Atlantic Avenue, across the Fort Point Channel and northwest of the Project Site and the Federal Reserve Bank of Boston building (see discussion below). Historically known as the old Russia Wharf, the Russia Wharf Buildings are located in the vicinity of the site of the 1773 Boston Tea Party, and subsequently served as headquarters for the prosperous trade with Russia as early as 1784. After the Great Fire of 1872 destroyed much of the downtown and Russia Wharf structures, the City of Boston extended Congress Street over the wharf with construction of a new bridge connecting downtown to South Boston (the Congress Street Bridge). The three extant buildings on Russia Wharf were constructed in 1897 for commercial and light industrial use. The Russia Wharf buildings at 270 and 276-290 Congress Street were designed in the Classical Revival style by Boston architectural firms Rand and Taylor, and Kendall and Stevens. The locally significant architectural firm of Peabody and Stearns was responsible for the building at 518-540 Atlantic Avenue. The Russia Wharf Buildings were listed in the National Register of Historic Places as a historic district in 1980.

Federal Reserve Bank of Boston (BOS.1516)

The Federal Reserve Bank of Boston, located at 556 Atlantic Avenue across the Fort Point Channel and northwest of the Project Site, was designed by Hugh Stubbins & Associates and completed in 1973 (Figure 7.3h). The building was "designed to unite a growing central business district with a major transportation exchange." At the time, the project architect, Hugh Stubbins, noted that "three main forces converged to shape the design of the complex: the importance of a clear expression of distinct but related functions in a unified scheme that would enhance a prime renewal area of downtown Boston, the need for well-defined circulation and the requirement for a high level of security within a pleasant environment."

The building was surveyed by the BLC in 2009, at which time it was noted that although not yet 50 years of age, the Federal Reserve Bank of Boston is significant for its associations with the architectural and economic renewal of downtown Boston and its waterfront in the late-twentieth century and for its important role in the financial industry of New England. The building was recommended by the BLC in 2009 as eligible for listing in the National Register.

Gillette Complex

The Gillette Complex encompasses 20 buildings that were constructed circa 1910 through 2000. The Gillette Company is a long-standing important manufacturing employer in the Boston area. The complex's growth is part of a pattern of industrial development seen along the South Boston waterfront in the late nineteenth and early twentieth centuries. The complex is associated with the founder of the Gillette Company, King Camp Gillette, a noted inventor, and is the site of innovations in shaving technology and personal hygiene products. While some buildings have been altered with later additions and/or replacement windows and doors, the majority of the complex is intact. The Gillette Complex was recommended by the MHC in 2014, as eligible for listing in the National Register, as part of the South Station Expansion environmental review process.

South Station Headhouse (BOS.1517/NR #75000299)

In 1896, the Boston Terminal Company (which was comprised of five smaller railroad companies) was incorporated, and plans were made to consolidate five railroad lines into one terminal, which would be called South Union Station. Land was acquired in the South Cove area, which was a developing commercial and warehouse district where the Boston & Worcester Railroad had already located a terminal. In preparation for this massive railroad line consolidation, the Boston Terminal Company cleared a large swath of land of existing commercial and industrial structures, abolished streets, and rerouted others. The cleared site extended east to Dorchester Avenue, including the present site of the USPS General Mail Facility/South Postal Annex, and as far south as Kneeland Street.

Shepley, Rutan & Coolidge (successors to architect H.H. Richardson) designed the South Station Headhouse (Figure 7.3h) which is located across Fort Port Channel from the Project Site with the USPS General Mail Facility/South Postal Annex and Stone & Webster Building (see discussions below) subsequently constructed between the Fort Point Channel and the South Station Headhouse. With the post-war rise of the automobile and a decline in rail travel, the Headhouse fell into disrepair by the 1960s, and was proposed for demolition in 1966. In 1975, however, the Headhouse was placed on the National Register of Historic Places and efforts were made to restore the building as part of the South Station Urban Renewal Project that had begun in 1969. At that time, only the central portion of the original station remained. Large sections of the east and west wings had been demolished in the early 1970s for construction of the Stone & Webster building, for expansion of the USPS General Mail Facility/South Postal Annex on Dorchester Avenue (see discussion below), and for construction of a bus depot on Atlantic Avenue.

Stone & Webster Building (BOS.2050)

The Stone & Webster Building at 245 Summer Street, is located across Fort Point Channel from the Project Site and north of the USPS General Mail Facility/ South Postal Annex. The International style steel frame office block was designed by the New York architectural firm of Welton Becket & Associates in 1973 and substantially renovated within the last decade. The building was completed in 1973 and the building does not meet the threshold of exceptional significance of National

Register Criterion Consideration G, for properties less than 50 years of age. The building was recommended by the MHC in 2014 as not currently meeting National Register eligibility criteria as part of the South Station Expansion environmental review process.

USPS General Mail Facility / South Postal Annex (BOS.1694)

The USPS General Mail Facility/South Postal Annex (Figure 7.3j), located across from Fort Point Channel from the Project Site, was constructed ca. 1950 with a substantial renovation and addition constructed in 1966 (southern structure) by the Boston architectural firm of Pedersen & Tilney, and a subsequent renovation in 1979 (northern building) by the Boston firm of Perry Dean Stahl and Rogers.

The building was surveyed by the BLC in 1980 at which time it was noted that the structure did not contribute architecturally to the surrounding area. The building was evaluated by the USPS in 1983, which concluded that extensive renovations had substantially altered the original structure and that the property did not meet National Register eligibility criteria. The building is now over 50 years of age; however, per the NPS eligibility criteria, the building still lacks sufficient integrity of design, materials, and workmanship to be eligible for listing in the National Register. The building was recommended by the MHC in 2014 to not meet National Register eligibility criteria as part of the South Station Expansion environmental review process.

7.5.3 Archaeological Resources

The Project Site is located on filled land created in connection with the construction of the Boston Wharf Company buildings and related streets/ways system. No previously identified archaeological resources are located within the Project Site or immediate vicinity. No impacts to archaeological resources are anticipated as a result of the Project.

7.6 Potential Impacts to Historic Resources

7.6.1 Historic Preservation

The Brick Buildings will be rehabilitated in a manner generally consistent with the Fort Point Channel Landmark District design standards and criteria and the Secretary of the Interior's Standards for Rehabilitation of Historic Properties. The intent of the building improvements is to preserve character-defining features through rehabilitation or reconstruction as necessary to replicate missing or damaged elements. Windows will be replaced with new aluminum replacement windows that match the existing configurations and dimensions. Some previously infilled window and door openings will be reopened. Buildings entrances along Necco Court will be reactivated, where possible. Existing historical doors will be reused or modified to be fixed. Replacement doors will be replicated to match existing or historic documentation. Wood door trim, where present, will be restored and painted. Exterior brick and stone masonry will be repaired with replacement units that match the existing masonry. Masonry joints will be repointed with mortar that is compatible with the existing brick masonry. Masons skilled in repairs of historic masonry will be instructed to avoid widening the masonry joints and to avoid overcuts to brick. Concrete spandrels over hoistway openings will be repaired to match the existing. All exterior masonry will be cleaned using the gentlest means possible. Restoration of cast iron lintels and lintel assemblies will include crack repair, removing surface corrosion, and installing a new high-performance coating. The extant copper cornice armature will be repaired as necessary and missing panels fabricated of new copper to match the profile of the original. Boston Wharf Co. medallions will be refurbished, including polishing, cleaning, and localized repair as necessary.

A recessed glass atrium will be added between the two buildings, allowing the structures to be connected at multiple floors, while preserving the exterior masonry with punched openings. The form and massing of the connector will be set back from the north and south elevations, allowing the historic structures to remain the primary visual elements. The existing sheet metal-clad historic pedestrian bridge between 5 and 6 Necco Court will be preserved, retained, repaired and incorporated into the new design. This historic bridge will continue to be a prominent feature, as viewed from Necco Court.

The pedestrian bridge between 6 Necco Court and 19-27 Melcher Street is deteriorated as a result of deferred maintenance and fire damage and is proposed to be removed. The structure was constructed as early as 1907 as part of the New England Confectionary Company’s complex, which existed on the site until 1927. The west side of the bridge has been completely removed and replaced with corrugated steel. GE and its design team evaluated potential uses for the Necco Court pedestrian bridge. Extensive study of the bridge has revealed the following:

1. The owner of 6 Necco Court is legally required to remove the bridge in connection with the rehabilitation of the building.
2. The bridge is in very poor condition. A structural evaluation revealed that substantial structural repairs would be necessary to stabilize the bridge. In addition, the bridge would require structural updates to meet current State Building Code requirements, including seismic standards. These updates would alter the structure’s appearance, most notably with vertical supports required at street-level.
3. The entire west wall of the bridge, both interior and exterior face, has been reconstructed, replacing the original corrugated steel siding, removing the windows on each floor, and removing all interior wall coverings.

4. The bridge is non-functional in its current form. The building at 19-27 Melcher Street has been renovated as office. All access to the bridge from the building has been sealed and sheetrock installed within the space, resulting in the bridge being a dead-end from 6 Necco Court.
5. The bridge has limited programmatic use. With floor dimensions of approximately 8 feet wide and 40 feet long and a single means of egress, the only viable use would be storage. This would require additional structural intervention to ensure that dead and live load requirements could be satisfied.
6. Chapter 91 and the MHP Amendment encourage public access and use of the waterfront. The bridge over Necco Court currently blocks views of Fort Point Channel and impedes visual access to the Channel as approached from Necco Street.

7.6.2 Urban Design

The 100 Acres Master Plan calls for the transformation of the Brick Buildings and existing surface parking lots into a lively, mixed-use neighborhood anchored by new public open space, and commercial, residential, cultural and other new/renovated developments. The Project will be sensitive to and consistent with the density, land uses and open space and other public realm improvements envisioned by the 100 Acres Master Plan. The Project will contain cultural, commercial and community uses which will contribute to the revival of this long-dormant part of the Fort Point neighborhood. The permanent improvements that will be made to the City’s Harborwalk as part of the Project will also help attract visitors and residents of the City to the area.

The design of the Project will utilize glass connectors and a translucent canopy to protect the space between the New Building and historic Brick Buildings and reinforce the relationship between the exterior and interior environments. The Brick Buildings will be connected by a glass and steel atrium. Located between the west elevation of 5 Necco Court, east elevation of 6 Necco Court, and sited south of the existing metal clad pedestrian bridge, the transparent glazed connector will enable the buildings to function as a unified structure while maintaining their historic integrity as separate buildings. The Brick Buildings will be connected to the new building by a pedestrian bridge at floors 3 – 6. The transparent glazed bridge connects to the atrium and has been designed to minimize visual and physical impacts on the Brick Buildings. A coffee bar and restaurant will be built at the west elevation of 6 Necco Court facing the Channel, and will be open to the public. GE Plaza, a new 50-foot-wide pedestrian avenue, will extend between the New Building and Brick Buildings beneath a translucent canopy. The Plaza will provide a physical connection between Necco Street and the Harborwalk, inviting pedestrians to move through the Campus and engage the waterfront.

Primary pedestrian access to the Campus will be from the Summer Street Bridge to the enhanced Harborwalk, with multiple points of access to and through the Project Site. Various modes of public transportation are within walking distance of the Project, including South Station, the Red Line's Broadway Station, and water-taxi stops at nearby Fan Pier.

7.6.3 Shadow Impacts

A shadow analysis was undertaken to show the anticipated new shadow from the New Building in comparison to the existing condition. The analysis consisted of a standard shadow study for March 21st, June 21st, September 21st, and December 21st, at 9:00AM, 12:00PM, and 3:00PM, as well as 6:00PM on June 21st and September 21st. As described in Chapter 6, *Environmental Protection*, net new shadow is limited in scope and duration.

The anticipated new shadow on historic resources is very limited. New shadow will be cast on the south (rear) elevations and roofs of 5 and 6 Necco Court, with the potential for some new shadow cast between the two closely-sited buildings. New shadow will be cast onto the rear elevations of buildings across Necco Court that face on Melcher Street. New Building shadow is limited to 3:00PM on March 21st, 12:00PM, 3:00PM and 6:00PM on September 21st, and 12:00PM and 3:00PM on December 21st. The Project will not have adverse shadow impacts on historic resources.

7.6.4 Visual Impacts

To protect the historic integrity of the Fort Point Channel Historic District and Fort Point Channel Landmark District, the proposed project design will both differentiate from the old and be compatible with the architectural features of the Brick Buildings. The design for the new building is contextual, respectful, and sensitive to the historic urban fabric, yet not imitative of the area buildings' earlier styles and methods of construction.

The use of connectors, canopies, and the glazed Vertical Village along the west and south elevations of the New Building will integrate modern materials and design chosen to be compatible with the Fort Point area's industrial character. The use of exposed metal juxtaposed against glazed façades further emphasizes the modern industrial character with horizontal metal members serving as reference points to cornice lines, floor lines, and architectural details of nearby and adjacent buildings, while the use of glass instills a sense of lightness. The Project is not anticipated to introduce materials that are incompatible with the current streetscape and skyline.

The Project will not have adverse visual impacts on the other historic resources listed in Table 7-1, given the distance from the Project Site, as well as intervening buildings.

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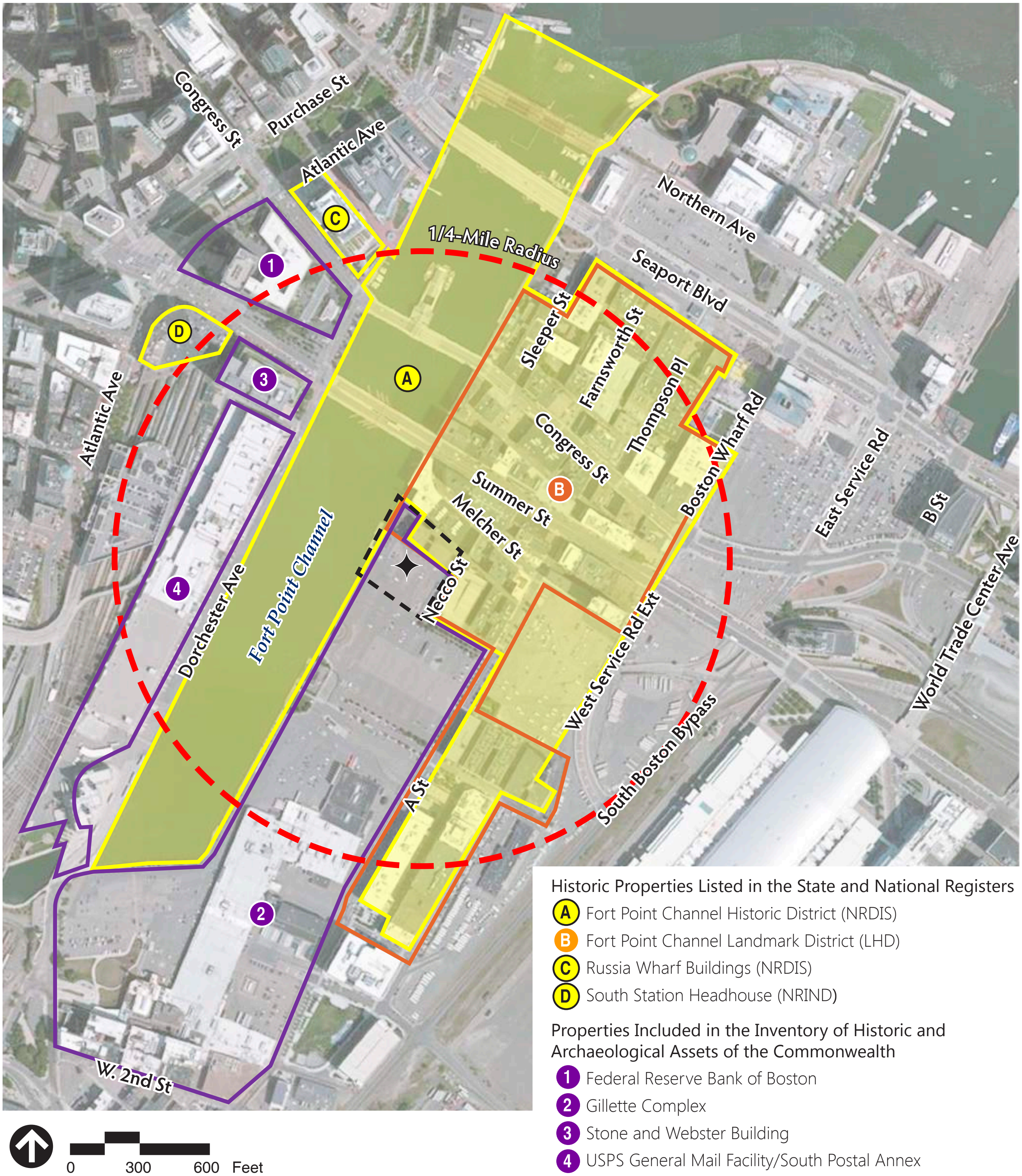


Historic Properties Listed in the State and National Registers

- A Fort Point Channel Historic District (NRDIS)
- B Fort Point Channel Landmark District (LHD)
- C Russia Wharf Buildings (NRDIS)
- D South Station Headhouse (NRIND)

Properties Included in the Inventory of Historic and Archaeological Assets of the Commonwealth

1. Federal Reserve Bank of Boston
2. Gillette Complex
3. Stone and Webster Building
4. USPS General Mail Facility/South Postal Annex

Source: ArcGIS Online Bing Aerial

Project Site

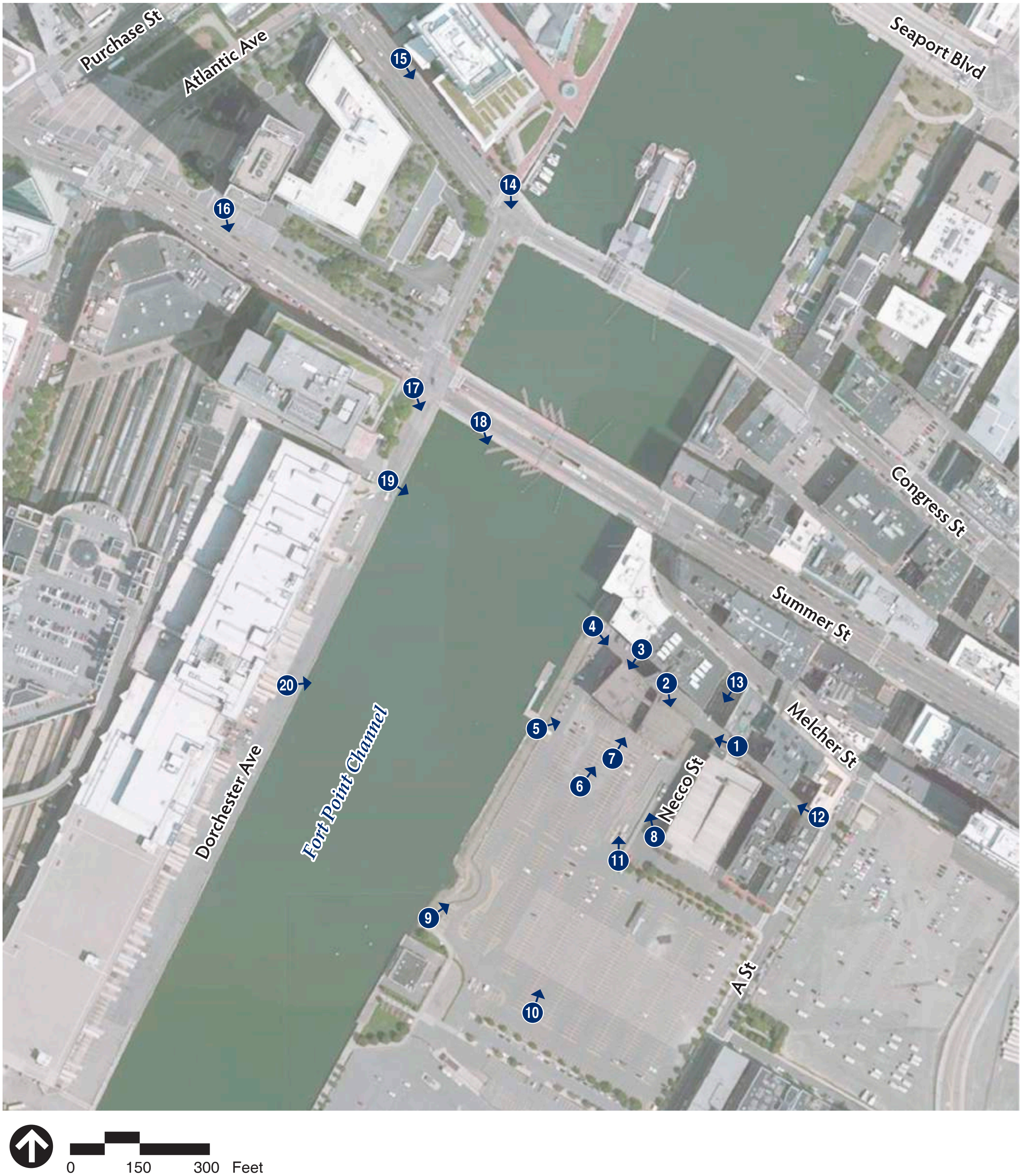
NRIND National Register of Historic Places, Individual Listing
NRDIS National Register of Historic Places, District
LHD Local Historic District (State Register of Historic Places)

Prepared By: VHB

Figure 7.1

Historic Resources

GE Headquarters Project
Boston, Massachusetts



Source: ArcGIS Online Bing Aerial

Prepared By: VHB

Figure 7.2

Site Photos Key

GE Headquarters Project
Boston, Massachusetts

1. View west of 5 Necco Court from intersection of Necco Court and Necco Street

2. View southeast of 5 Necco Court from north side of Necco Court

Source: ArcGIS Online Bing Aerial

Prepared By: VHB

Figure 7.3a

Site Photos

GE Headquarters Project
Boston, Massachusetts

3. View southwest of 6 Necco Court from north side of Necco Court

4. View southeast of 6 Necco Court from east bank of Fort Pont Channel

Source: ArcGIS Online Bing Aerial

Prepared By: VHB

Figure 7.3b

Site Photos

GE Headquarters Project
Boston, Massachusetts

5. View northeast of 5 and 6 Necco Court from east bank of Fort Point Channel

6. View northeast of 5 and 6 Necco Court from Channelside Parking Lot at 284 A Street

Source: ArcGIS Online Bing Aerial

Prepared By: VHB

Figure 7.3c

Site Photos

GE Headquarters Project
Boston, Massachusetts

7. View northeast of pedestrian bridge connecting the west elevation of 5 Necco Court and east elevation of 6 Necco Court

8. View northwest of 5 and 6 Necco Court from west side of Necco Street

Source: ArcGIS Online Bing Aerial

Prepared By: VHB

Figure 7.3d

Site Photos

GE Headquarters Project
Boston, Massachusetts

9. View northeast of 5 and 6 Necco Court from east bank of Fort Point Channel

10. View northeast of 5 and 6 Necco Court from southern perimeter of Channelside Parking Lot at 284 A Street

Source: ArcGIS Online Bing Aerial

Prepared By: VHB

Figure 7.3e

Site Photos

GE Headquarters Project
Boston, Massachusetts

11. View north of 5 and 6 Necco Court from east side of Necco Street

12. View northwest of 5 and 6 Necco Court from intersection of A Street and Necco Court

Source: ArcGIS Online Bing Aerial

Prepared By: VHB

Figure 7.3f

Site Photos

GE Headquarters Project
Boston, Massachusetts

13. View southwest of 5 and 6 Necco Court from intersection of Necco Street and Melcher Street

14. View southeast towards 5 and 6 Necco Court from intersection of Congress Street and Dorchester Avenue

Source: ArcGIS Online Bing Aerial

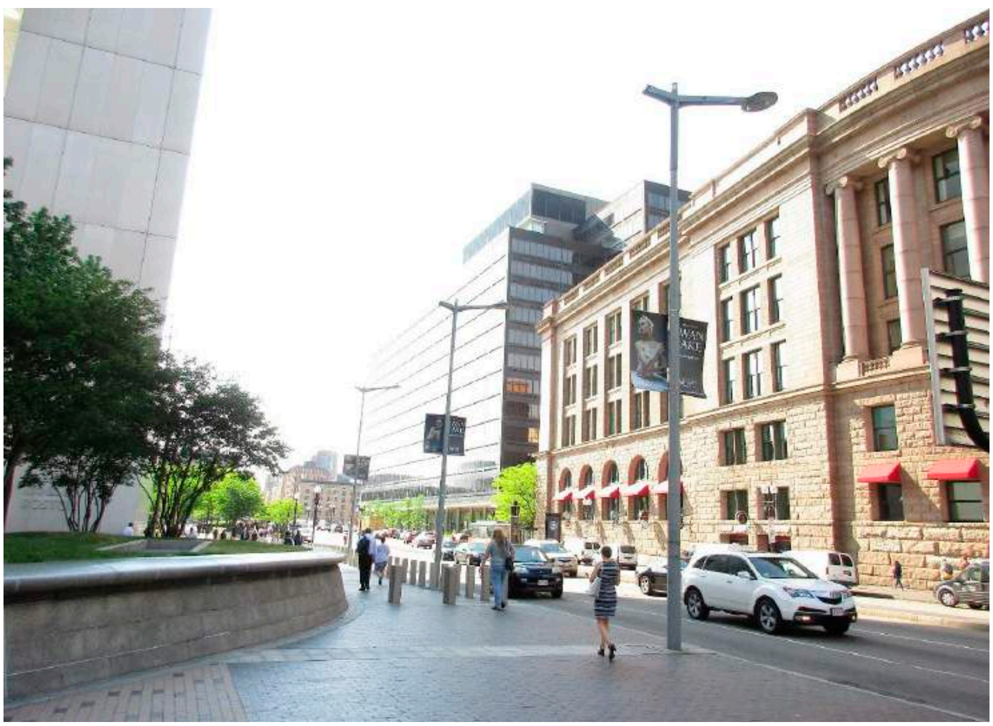
Prepared By: VHB

Figure 7.3g

Site Photos

GE Headquarters Project
Boston, Massachusetts

15. View southeast towards 5 and 6 Necco Court from Federal Reserve Bank of Boston Building (BOS.1516)



16. View southeast towards 5 and 6 Necco Court from South Station Headhouse (NR # 75000299 / BOS.1517)

Source: ArcGIS Online Bing Aerial

Prepared By: VHB

Figure 7.3h

Site Photos

GE Headquarters Project
Boston, Massachusetts

17. View southeast towards 5 and 6 Necco Court from intersection of Summer Street and Dorchester Avenue

18. View southeast towards 5 and 6 Necco Court from Summer Street Bridge

Source: ArcGIS Online Bing Aerial

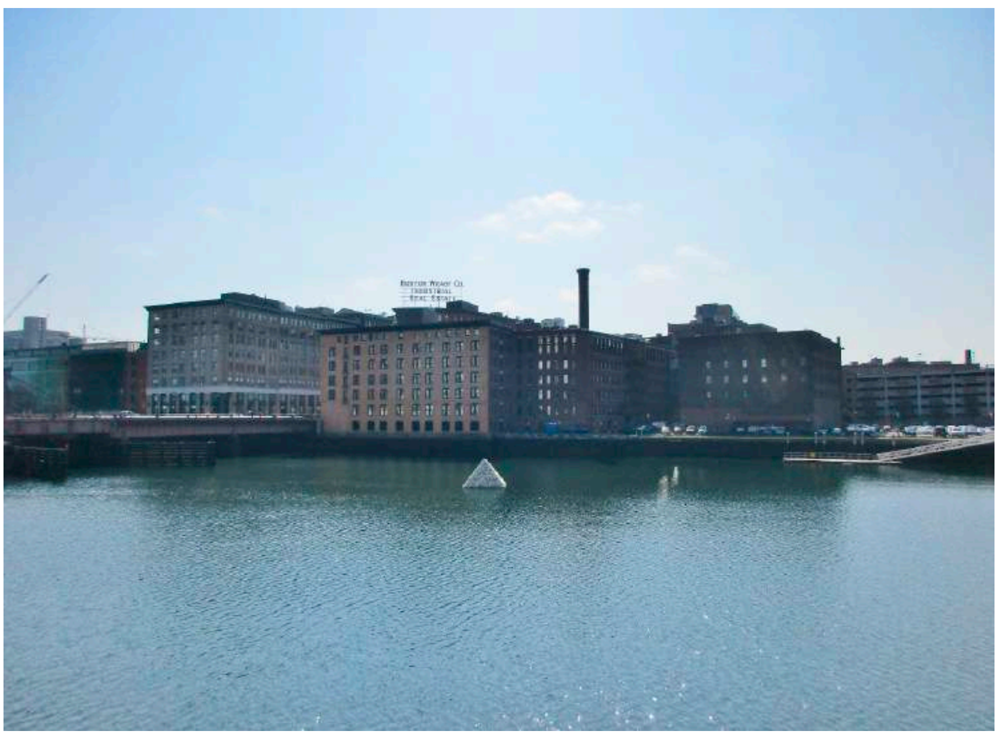
Prepared By: VHB

Figure 7.3i

Site Photos

GE Headquarters Project
Boston, Massachusetts

19. View southeast towards 5 and 6 Necco Court from USPS General Mail Facility / South Postal Annex (BOS.1694)



20. View northeast towards 5 and 6 Necco Court from USPS General Mail Facility / South Postal Annex (BOS.1694)

Source: ArcGIS Online Bing Aerial

Prepared By: VHB

Figure 7.3j

Site Photos

GE Headquarters Project
Boston, Massachusetts

8

Transportation

8.1 Introduction

This chapter provides a comprehensive evaluation of transportation conditions in the vicinity of the Project Site, and analyzes to what extent, if any, Project-related traffic is likely to affect the larger transportation network.

As discussed in Chapter 1, *Project Description and Alternatives*, the Project consists of the renovation of the Brick Buildings and construction of the New Building. The total gross floor area of the Brick Buildings and the New Building is 388,700 square feet. Approximately 30 parking spaces will be provided below the New Building. Because the proposed project design has been refined since the start of the Transportation Study presented here, this study assumes a gross floor area of 485,000 square feet (over 95,000 sf more than the Project total gross floor area). Therefore, this analysis overestimates the potential effects of the Project on the transportation network.

8.2 Key Findings and Benefits

The Project provides many benefits consistent with the City of Boston's transportation-related goals as set forth in the South Boston Waterfront Sustainable Transportation Plan. The Project's primary transportation benefit is the improvement of pedestrian access through the Project Site from the creation of an active pedestrian-friendly environment with connections between A Street and the Fort Point Channel.

The Project will eliminate approximately 203 surface parking spaces adjacent to the Fort Point Channel and some additional reserved private on-street parking. The Project Site will provide only approximately 30 below-grade parking spaces as GE will encourage employees and visitors to rely on alternative modes of transportation to reduce traffic in the Fort Point neighborhood.

As discussed in Section 8.7.1, the Project is anticipated to generate approximately 2,739 net-new unadjusted daily trips based on the Institute of Transportation Engineers ("ITE") land use code ("LUC") for a Corporate Headquarters Building. This estimated trip generation captures those trips resulting from the Project's numerous public facilities and amenities, consistent with the vision of the Campus as a public destination. This unadjusted daily trip figure does not take into account mode share splits.

In the Transportation Study, traffic operations at nine nearby intersections were evaluated. Overall, traffic generated by the Project will have a small impact on the study area intersections. A detailed level of service analysis was conducted and is presented in Section 8.7.2

The following are key findings related to transportation:

- The Project will significantly improve the pedestrian realm by reconstructing and widening the Harborwalk at the Project Site, constructing new sidewalks where there are none now, reconstructing sidewalks adjacent to the Project Site to be ADA compliant and installing new street lighting;
- Existing surface parking on the Project Site will be eliminated;
- Any traffic impacts to study area intersections will be minor;
- GE will implement a substantial Transportation Demand Management ("TDM") Plan to encourage employees and visitors to use alternative modes of transportation;
- Bicycle parking will be provided in the building for 50 bicycles upon completion of the Project with space to accommodate up to 120 bicycles in the future and 30 at-grade publicly accessible bicycle spaces will also be provided; and
- Loading and service also will be provided on-site.

8.3 Phase 1 Project Impacts

As described in Chapter 1, *Project Description and Alternatives*, the Phase 1 Project includes the renovation of the Brick Buildings. Construction of the New Building will include all associated site and open space improvements.

The Phase 1 Project is projected to generate approximately 808 unadjusted (252 adjusted) daily vehicle trips. These trips do not exceed any transportation-related review thresholds under MEPA. The trip generation analysis is provided in detail in Section 8.7.1.

8.4 Study Methodology

This transportation analysis conforms to the Boston Transportation Department ("BTD") Transportation Access Plan Guidelines and trip generating methodologies specified by BTD and MEPA.

The transportation analysis includes the projection of Project-generated trips based on ITE trip generation rates and the application of local travel characteristics established through the Access Boston 2000-2010 initiative. Synchro 8 software was used to facilitate the evaluation of traffic operations based on Highway Capacity Manual[1] ("HCM") methodologies.

1 Highway Capacity Manual; Transportation Research Board; Washington D.C.; 2000.

8.4.1 Consistency with Area Planning

The Project is consistent with the substance of planning studies for the area which seek to reduce surface parking and balance vehicular traffic with pedestrian and cyclist needs. The Project is also consistent with the City's vision for the Fort Point neighborhood presented in the 100 Acres Master Plan, the South Boston Municipal Harbor Plan Amendment, and the South Boston Waterfront Sustainable Transportation Plan. The Project Site is located within the South Boston Parking Freeze area.

Key Project-related transportation measures that are consistent with the plans identified in the immediately preceding paragraph include:

- Reducing surface parking along the Fort Point Channel and creating new pedestrian connections to the Channel and to the Harborwalk;
- Providing a limited amount of parking (approximately 30 spaces) on-site and encouraging use of other shared parking facilities in the area to reduce on-site parking needs for individual buildings, consistent with the goals of the South Boston Sustainable Transportation Plan;
- Providing off-street loading dock areas;
- Enhancing the pedestrian realm by providing new sidewalks and street trees;
- Installing new lighting to enhance the pedestrian environment and increase safety;
- Investigating possible shared shuttle opportunities to connect employees with North Station;
- Providing secure indoor bicycle storage and at-grade public bicycle storage spaces throughout the campus for visitors and the general public. These spaces will be located in convenient and highly visible locations; and
- Implementing an aggressive TDM plan to discourage single-occupancy vehicle trips.

8.4.2 Traffic Study Area

Based on a review of traffic studies prepared for other nearby development projects and the team's familiarity with the surrounding area, vehicular traffic associated with the Project is expected to be widely dispersed throughout the nearby street network. Considering these factors and after discussions with the BTD, the following intersections, as shown in Figure 8.1, were included in the study area for the analysis:

- Congress Street at A Street/Thomson Way
- A Street at Melcher Street
- A Street at Necco Court
- A Street at Necco Street

- A Street at Richards Street/Sobin Park
- A Street at West Second Street
- Necco Street at Necco Court
- Melcher Street at Necco Street
- Summer Street at Melcher Street

8.4.3 Analysis Conditions

The transportation analysis considers the following analysis scenarios:

- **2016 Existing Conditions** – Based on traffic data collection conducted within the study area in April 2016.
- **2021 No-Build Conditions** – Future conditions for a five-year time horizon if the Project was not constructed.
- **2021 Build Conditions** – Future conditions for a five-year time horizon assuming construction and full occupancy of the Project.

8.5 Existing Transportation Conditions

This section describes existing transportation conditions, including an overview of roadway, transit, pedestrian and bicycle facilities, and general site conditions.

8.5.1 Roadways

The Project is located in the Fort Point neighborhood in a block bounded by Necco Court to the north, Necco Street to the east, a parking lot to the south, and the Fort Point Channel and Harborwalk to the west.

A Street is located east of the Project and is classified as an urban minor arterial that runs in a general north/south direction. A Street connects Congress Street to the north and Dorchester Avenue in South Boston to the south. A Street is a two-lane roadway with one vehicle travel lane in each direction as well as bike lanes in each direction where the road is wide enough. Where the roadway is too narrow, sharrows are provided. Sidewalks are provided on both sides. Parking is allowed on both sides between Iron and Mt. Washington streets, on the east side between Mt. Washington Street and Necco Street, and on the west side between Necco Street and Melcher Street.

Congress Street is located north of the Project and is classified by MassDOT as an urban minor arterial that runs in a general east/west direction. Congress Street connects the South Boston Waterfront District to Government Center in Downtown Boston. Near the Project Site, Congress Street ranges from a two to four lane roadway, with sidewalks and on-street parking where the width allows.

Melcher Street is located to the north of the Project Site and is classified as a local road that runs in a general east/west direction. Melcher Street connects Summer Street to the north with A Street to the south. Melcher Street is a two lane roadway with one lane in each direction and on-street parking. Sidewalks are provided on both sides. There are no bicycle accommodations on Melcher Street.

Necco Court is located adjacent to the Project Site to the north and is classified as a local private road that runs in a general east/west direction. Necco Court connects the Harborwalk to the west and A Street to the east. Necco Court operates with two-way traffic with private parking on the north side of the block between the Harborwalk and Necco Street. Sidewalks are provided on the north side of Necco Court between the Harborwalk and Necco Street, and on the south side between Necco Street and the alleyway adjacent to the Necco Street garage. There are no bicycle accommodations on Necco Court.

Necco Street is located adjacent to the Project Site to the east and is classified as a local private way that runs in a general north/south direction with a bend in the road past the Necco Street lot entrance which changes the orientation to an east/west direction. Necco Street connects Melcher Street to the north and A Street to the south. Necco Street is a two lane roadway with no center line and private parking on both sides. Sidewalks are provided on both sides. There are no bicycle accommodations on Necco Street.

Richards Street/Sobin Park is located south of the Project Site and is classified as a local road that runs in a general east/west direction. Richards Street connects the Gillette campus to the South Boston Bypass Road. Richards Street is a three lane roadway with two lanes in the westbound direction and one lane in the eastbound direction between A Street and Yard Way and a two lane roadway with one lane in each direction from Yard Way to the South Boston Bypass Road with no on-street parking. Sidewalks are provided on both sides. There are no on-street bicycle accommodations on Richards Street.

Summer Street is located north of the Project Site and is classified as an urban principal arterial that runs in a general east/west direction. Summer Street connects South Boston to the east and Downtown Crossing to the west. Summer Street, close to the Project Site, is a four lane roadway with two lanes in each direction and on-street parking. Sidewalks are provided on both sides. Currently there are no bicycle accommodations on Summer Street. However, the City has plans to install a cycle track along this corridor in the future.

Thomson Place is located northeast of the Project Site and is a local private way that runs in a general north/south direction. Thomson Place connects A Street to the south and Seaport Boulevard to the north. Thomson Place is a two lane roadway with no center line and private parking and sidewalks on both sides.

West Second Street is located south of the Project Site and is classified as an urban minor arterial that runs in a general east/west direction. West Second Street connects Dorchester Avenue to the west and Dorchester Street in South Boston to the east. West Second Street runs one-way westbound from South Boston until reaching A Street, where it turns into a two lane road. West Second Street provides one travel lane with parking on both sides. Sidewalks are provided on both sides. There are no bicycle accommodations on West Second Street.

8.5.2 Study Area Intersections

The study area consists of nine study intersections shown in Figure 8.1 and which are described below. Traffic operations and level of service ("LOS") analysis are presented later in this Chapter.

Congress Street at A Street/Thomson Place

The intersection of Congress Street and A Street/Thomson Place is a four legged signalized intersection operating with a 110 second cycle during peak hours which includes an exclusive pedestrian phase and a lead left-turn phase for the westbound Congress Street approach. The eastbound Congress Street approach provides one shared through/left-turn lane, one through only lane and one right-turn only lane. Parking is provided before the right-turn only approach approximately 80 feet from the intersection. The southbound Thomson Place approach, which is slightly offset from the intersection, provides one general travel lane with no painted center line. The eastbound Congress Street provides one left-turn only lane and one through/right-turn lane. The northbound A Street approach provides one left-turn only lane and one right-turn only lane. MBTA bus stops are located on the westbound Congress Street approach and on the eastbound Congress Street receiving lane across from Thomson Place. Sidewalks, crosswalks, and wheelchair ramps are provided on all streets. Sharrows are provided on the A Street northbound approach.

A Street at Melcher Street

The intersection of A Street and Melcher Street is a three legged signalized intersection that operates with a 50 second cycle during the morning and a 100 second cycle in the evening with concurrent pedestrian phases. The eastbound Melcher Street approach provides one general travel lane with adjacent on-street parking. The southbound A Street approach provides one general travel lane with adjacent on-street parking. The northbound A Street approach provides one general travel lane and a dedicated 5-foot bicycle lane. The intersection also includes the unsignalized driveway for the United States Postal Service ("USPS") parking lot which does not operate under the signal control. The southbound A Street approach and receiving lane as well as the northbound receiving lane provide sharrows for cyclists. Sidewalks, crosswalks, and wheelchair ramps are provided on all streets.

A Street at Necco Court

The intersection of A Street and Necco Court is an unsignalized three legged intersection. The eastbound Necco Court approach provides one general travel lane with no double yellow center line. The southbound A Street approach provides one general travel lane with bicycle sharrow markings and adjacent on-street parking. The northbound A Street approach provides one general travel lane and a dedicated 5-foot bicycle lane. No stop bars or stop control signs are provided; however, the Necco Court approach operates as the minor approach with stop control. Sidewalks are provided on A Street and a crosswalk with wheelchair ramps is provided to cross Necco Court.

A Street at Necco Street

The intersection of A Street and Necco Street is an unsignalized three legged intersection. The eastbound Necco Street approach provides one general travel lane with adjacent on street parking and no double yellow center line. The southbound A Street approach provides one general travel lane with on street parking and sharrows. A dedicated 7.5-foot bicycle lane starts at the southbound receiving lane. The northbound A Street approach provides one general travel lane with sharrows and adjacent on street parking. A dedicated 5-foot bicycle lane starts at the northbound receiving lane. No stop bars or stop control signs are provided; however, Necco Street operates as the minor approach with stop control. Sidewalks are provided on all streets and crosswalks with wheelchair ramps are provided across Necco Street and across the northern leg of A Street.

A Street at Richards Street/Sobin Park

The intersection of A Street and Richards Street/Sobin Park is a four legged signalized intersection that operates with a 100 second cycle during the peak hours. The eastbound Sobin Park approach provides one left turn lane and one shared through/right lane. Sobin Park leads to the gated Gillette Headquarters loading dock entrance. The southbound A Street approach provides one general travel lane and a dedicated 6-foot bike lane. The westbound Richards Street approach provides one left turn only lane and one shared through/right lane. The northbound A Street approach provides one general travel lane and a 6-foot buffered bike lane. Sidewalks, crosswalks, and wheelchair ramps are provided on all streets.

A Street at West Second Street

The intersection of A Street and West Second Street is a four legged signalized intersection that operates with a 100 second cycle during the peak hours. The eastbound West Second Street approach provides one general travel lane. The southbound A Street approach provides one general travel lane and a dedicated 6-foot bicycle lane. The westbound West Second Street approach is one-way towards the intersection and provides one unstriped general purpose lane which operates as a left-turn only lane and a shared through/right lane. There is a posted lane sign that corresponds to these lane operations, but at the time of field inventory in May 2016, the pavement markings were faded. The northbound A Street approach provides one general travel lane and a dedicated 6-foot bike lane. Sidewalks, crosswalks, and wheelchair ramps are provided on all streets.

Necco Street at Necco Court

The intersection of Necco Street and Necco Court is an unsignalized four legged intersection. The eastbound Necco Court approach provides one general travel lane with no double yellow center line and perpendicular parking spaces on the northern side of the street. The southbound Necco Street approach provides one general travel lane with no double yellow center line and with adjacent private on-street parallel parking. The westbound Necco Court approach provides one general travel lane with no double yellow center line. The northbound Necco Street approach provides one general travel lane with no double yellow center line and with adjacent private on-street parking. Sidewalks are provided on all streets except for the south side of the Necco Court eastbound approach and the north side Necco Court westbound approach. No crosswalks are provided and only one wheelchair ramp at the southeast corner of the intersection is provided. There are no posted stop controls at this intersection; however, Necco Court functions as the stop controlled minor street. There are no bicycle facilities at this intersection.

Necco Street at Melcher Street

The intersection of Necco Street at Melcher Street is an unsignalized three legged intersection. All approaches provide one general travel lane. Parking is provided on the south side of both Melcher Street approaches, and on both sides of the Necco Street northbound approach. Sidewalks are provided on all sides, except in front of a loading dock on Melcher Street. A crosswalk with wheelchair ramps is provided across Necco Street. There are no posted stop controls at this intersection; however, Necco Street operates as the stop controlled minor Street. There are no bicycle facilities at this intersection.

Summer Street at Melcher Street

The intersection of Summer Street and Melcher Street is a three legged signalized intersection that operates with a 110 second cycle including an exclusive pedestrian phase. The eastbound Summer Street approach provides one through lane and a shared through/right lane with a 4-foot shoulder. The westbound Summer Street approach provides a shared left/through lane and a through lane with an MBTA bus stop and on-street parking. The northbound Melcher Street approach provides one general purpose lane which operates as two lanes: one left-turn lane and one right-turn lane. Sidewalks are provided on all streets and crosswalks with wheelchair ramps are provided across Melcher Street and the eastbound Summer Street approach. There are no bicycle facilities at this intersection.

8.5.3 Data Collection

To properly assess the traffic conditions of the surrounding street network, manual turning movement counts ("TMCs") were collected at the study area intersections. TMCs were collected on Wednesday April 27, 2016 during a typical weekday morning peak period (7:00 AM – 9:00 AM) and evening peak period (4:00 PM – 6:00 PM).

The TMCs were used to establish the study area network peak hour volumes for the 2016 Existing Conditions analysis. The weekday morning peak hour was determined to be 8:00 AM – 9:00 AM and the weekday evening peak hour from 5:00 PM – 6:00 PM. Existing morning and evening peak hour traffic volumes are shown in Figure 8.2 and Figure 8.3, respectively. The raw count data are included in Appendix H.

Field observations indicate that at times illegal stopping activity and jaywalking impacts traffic operations and can result in varying delays. This activity is difficult to quantify and varies from day to day with enforcement and weather. VHB conducted field observations over the course of several weeks during the month of May 2016 to calibrate the traffic model to represent typical operating conditions. Data collected during these visits to the study area included typical queue observations, critical gaps at unsignalized intersections, on-street parking regulations, lane usage, and other general operational observations.

8.5.4 Pedestrian Environment and Accessibility

Pedestrian volumes, shown in Figure 8.4 and Figure 8.5, at the study area intersections were collected in conjunction with the TMCs of April 27, 2106. During both peak hours, the intersection of Summer Street at Melcher Street was observed to have the highest volume of pedestrians, approximately 500 pedestrians cross the Melcher Street approach on Summer Street in the morning and approximately 600 pedestrians cross in the afternoon. The Summer Street Bridge is the closest in proximity to South Station, and it is the most convenient pedestrian route into the Fort Point neighborhood.

A Street also carries a significant volume of pedestrians in both peak hours since it is a major connection for people traveling to/from Downtown Boston and the Channel Center/Gillette Headquarters Area as well as people traveling to/from South Boston.

Close to the Project Site, at the intersection of Necco Street at Necco Court, approximately 150 pedestrians cross Necco Court in both directions and approximately 100 pedestrians cross Necco Street.

The Project Site is adjacent to the Harborwalk, which is a continuous shoreline walking path connecting Dorchester to Charlestown, with segments in East Boston. The Harborwalk currently has 38 miles of constructed walkway and continues to grow with collaborative efforts from the BRA, the City and State agencies, private developers, residents and harbor advocacy groups.

8.5.5 Bicycles

Bicycle volumes, shown in Figure 8.6 and Figure 8.7, at the study area intersections were collected simultaneously with the TMCs and pedestrian volume counts on April 27, 2016.

A Street, in close proximity to the Project Site, has sharrows and bicycle lanes to accommodate cyclist needs. In the morning peak hour, there are approximately 60 bicycles that travel northbound along A Street at Necco Street and approximately 50 in the evening peak hour travel southbound. The bicycle volume is highly directional since most cyclists are commuters traveling from South Boston to the Waterfront area or the Financial District. No other roads near the Project Site have bicycle accommodations.

The closest Hubway is at the intersection of Congress Street at Sleeper Street approximately one-tenth of a mile from the site and provides 19 docks. Within a half-mile radius, there are eight other Hubway Locations which are shown in Figure 8.8 and described in the Table 8-1.

Table 8-1 Hubway Stations within a Half Mile Radius

Location	Docks
Congress Street at Sleeper Street	19
South Station – 700 Atlantic Avenue	43
Fan Pier	13
Seaport Square Boulevard at Boston Wharf	17
Seaport Hotel	14
Boston Convention and Exhibition Center	19
Lawn on D	18
State Street at Channel Center	19

Source: Hubway Website. May 17, 2016

8.5.6 Public Transportation

The Project is easily accessible by a variety of public transit options that provide numerous connections to most other MBTA public transit services, allowing the Project Site to be reached by bus, subway and commuter rail from many locations within the City of Boston and the surrounding suburbs.

The Massachusetts Bay Transportation Authority ("MBTA") currently provides local and express bus, Red Line, Commuter Rail, and Silver Line service within a quarter mile of the Project Site. Figure 8.9 illustrates existing MBTA services and Table 8-2 provides a summary of MBTA local bus and subway services collected from the MBTA Ridership and Service Statistics (MBTA Blue Book) and from schedules posted on the MBTA website effective May 23, 2016. A detailed description of each service is also provided.

Table 8-2 MBTA Subway and Bus Services

Service	Origin/Destination	Peak Hour Frequency (Minutes)	Closest Stop (distance in miles)
Red Line	Alewife – Braintree/Ashmont	4.5	South Station (0.25)
Silver Line 1 (SL1)	Logan Airport – South Station	8-10	South Station (0.25)
Silver Line 2 (SL2)	Design Center – South Station	5	South Station (0.25)
Silver Line 4 (SL4)	Dudley – South Station	9	South Station (0.25)
Bus Route 4	North Station – Tide Street	12-20	Summer St & Melcher St (0.10)
Bus Route 7	City Point – Otis and Summer Street	4-7	Summer St & Melcher St (0.10)
Bus Route 11	City Point – Downtown Bay View	7-12	A St & Necco St (0.10)
Bus Route 448/449	Marblehead – Downtown Crossing	30	Congress St & A St (0.10)
Bus Route 459	Salem Depot – Downtown Crossing	Limited	Congress St & A St (0.10)

Source: MBTA

Red Line – Alewife – Braintree/Ashmont – The Ashmont branch of the Red Line provides service from Alewife Station in Cambridge to Ashmont Station in Mattapan. Service is provided on weekdays from 5:16 AM to 12:30 AM with 9 minute headways during peak hours. On the weekends, service runs from 5:16 AM to 12:30 AM on Saturdays and from 6:00 AM to 12:30 AM on Sundays.

The Braintree branch of the Red Line provides service from Alewife Station in Cambridge to Braintree Station in Braintree. Service is provided on weekdays from 5:15 AM to 12:18 AM with 9 minute headways during peak hours. On weekends, service runs from 5:15 AM to 12:18 AM on Saturdays and from 6:00 AM to 12:18 AM on Sundays.

The closest stop to the Project is at South Station approximately a quarter-mile northwest of the Project Site. Since both the Ashmont and Braintree lines run on the same track from Alewife to JFK/UMass, the combined headway at South Station is 4.5 minutes.

Silver Line SL1 – Logan Airport – South Station – This route connects Terminal A at Logan International Airport to South Station in Downtown Boston via the Ted Williams Tunnel. The closest stop to the Project is at South Station approximately a quarter mile northwest of the Project Site. During the weekday, SL1 operates from 5:38 AM to 1:07 AM with 8-10 minute headways during the peak hours. On the weekends, service is provided from 5:33 AM to 1:07 AM on Saturdays and from 5:50 AM to 1:10 AM on Sundays.

Silver Line SL2 – Design Center – South Station – This route connects the Design Center in the South Boston Waterfront to South Station in Downtown Boston via the World Trade Center, Dry Dock Avenue and Black Falcon Avenue. The closest stop to the Project is at South Station approximately a quarter mile northwest of the Project Site. During the weekday, SL2 operates from 5:45 AM to 1:00 AM with 5 minute headways during peak hours. During the weekend, service is provided from 5:50 AM to 12:59 AM on Saturdays and from 6:35 AM to 12:58 AM on Sundays.

Silver Line – SL4 – South Station – Dudley – This route connects Dudley Square to South Station via Washington Street through the South End. The closest stop to the Project is at South Station. During the weekday, SL4 operates from 5:20 AM to 12:53 AM with 9 minute headways during the peak hours. On weekends, service is provided from 5:23 AM to 12:55 AM on Saturdays and from 6:02 AM to 12:55 AM on Sundays.

Route #4 – North Station – Tide Street – This route connects North Station in the West End to the World Trade Center and Tide Street in the South Boston Waterfront via Commercial Street, Summer Street, and Drydock Avenue. The closest stop to the Project Site is Summer Street at Melcher Street approximately one-tenth of a mile to the north. During the weekday, Route 4 operates from 6:25 AM to 6:51 PM with 12 20 minute headways in the peak hours. There is no service on the weekends.

Route #7 – City Point – Otis and Summer Street – This route connects City Point in South Boston to Otis Street at Summer Street in downtown Boston via East Broadway and Summer Street. The closest stop to the Project Site is Summer Street at Melcher Street approximately one-tenth of a mile to the north. During the weekday, Route 7 operates from 5:15 AM to 10:32 PM with 4-7 minute headways during the peak hours. On Saturdays, the bus operates from 5:15 AM to 10:31 PM. There is no service on Sundays.

Route #11 – City Point – Downtown Bay View – This route connects City Point in South Boston to Downtown Boston via Chinatown, Tufts Medical Center, Broadway, East 8th Street and A Street. The closest stop to the Project is at A Street and Necco Street approximately one-tenth of a mile east from the Project Site. During the weekday, service is provided from 5:11 AM to 1:22 AM with 7-12 minute headways during the peak hours. On weekends, service is provided from 5:10 AM to 1:20 AM on Saturdays and from 6:15 AM to 1:28 AM on Sundays.

Route #448/449 – Marblehead – Downtown Crossing – This route connects the fire house in Marblehead to Otis and Summer Street in downtown Boston via Route 1A, Boston Logan Airport, and the Ted Williams Tunnel. The closest stop to the Project is Congress Street at A Street approximately one-tenth of a mile northeast of the Project Site. During the weekday, Route 448 operates from 6:00 AM to 7:30 PM with 30 minute headways during peak hours. There is no service on the weekends.

Route #459 – Salem Depot – Downtown Crossing – This route connects the Salem Commuter Rail Station in Salem to Otis Street at Summer Street in Downtown

Boston via Routes 107, 60 and 1A, Boston Logan Airport, and the Ted Williams Tunnel. The closest stop to the Project is Congress Street at A Street approximately one-tenth of a mile northeast of the Project Site. During the weekday, Route 459 operates from 5:50 AM to 8:27 PM with 70-75 minute headways during peak hours. There is no service on the weekends.

Other Services at South Station:

Commuter Rail – South Station – Framingham/Worcester – The Framingham/Worcester Line connects South Station and the City of Worcester to the West with stops at Back Bay, Yawkey, Newton, Auburndale, Wellesley, Natick, Framingham, Ashland, Southborough, Westborough, Grafton, and Worcester. Service is provided on weekdays from 4:45 AM to 1:51 AM. On the weekends, service runs from 6:40 AM to 12:30 AM on both Saturdays and Sundays.

Commuter Rail – South Station – Needham – The Needham Line connects South Station and the Town of Needham to the west with stops at Back Bay, Ruggles, Forest Hills, Roslindale, West Roxbury, and Needham. Service is provided on weekdays from 6:05 AM to 12:00 AM. On Saturdays, service is provided from 7:10 AM to 12:00 AM. There is no service provided on Sundays.

Commuter Rail – South Station – Franklin – The Franklin Line connects South Station and the Town of Franklin to the southwest with stops at Back Bay, Ruggles, Hyde Park, Readville, Dedham, Westwood, Norwood, Walpole, Norfolk, and Franklin. Service is provided on weekdays from 3:50 AM to 12:51 AM. On weekends, service is provided from 6:35 AM to 12:19 AM on both Saturdays and Sundays.

Commuter Rail – South Station – Providence/Stoughton – The Providence/Stoughton Line connects South Station and the City of Providence to the southwest with stops at Back Bay, Ruggles, Hyde Park, Westwood, Canton, Stoughton, Sharon, Mansfield, Attleboro, South Attleboro, and Providence. Service is provided on weekdays from 4:45 AM to 1:10 AM. On weekends, service is provided from 6:35 AM to 12:15 AM on Saturdays and from 11:05 AM to 12:15 AM on Sundays.

Commuter Rail – South Station – Fairmount – The Fairmont Line connects South Station and the Readville neighborhood of Boston. This line provides service only within the City of Boston with stops at Dorchester, Mattapan, Hyde Park, and Readville. Service is provided on weekdays from 5:39 AM to 11:30 PM. On weekends, service is provided from 6:50 AM to 11:55 PM on both Saturdays and Sundays.

Commuter Rail – South Station – Plymouth/Kingston – The Plymouth/Kingston Line, which is part of the Old Colony Line, connects South Station to the Town of Plymouth to the southeast with stops at Dorchester, Braintree, Weymouth, Abington, Whitman, Hanson, Halifax, Kingston, and Plymouth. Service is provided on weekdays from 5:32 AM to 11:36 PM. On weekends, service is provided from 7:00 AM to 11:42 PM on both Saturdays and Sundays.

Commuter Rail – South Station – Middleborough/Lakeville – The Middleborough Line, which is also part of the Old Colony Line, connects South Station and the Town of Middleborough/Lakeville to the southeast with stops at Dorchester, Quincy, Braintree, Holbrook/Randolph, Brockton, Bridgewater, and Middleborough/Lakeville. Service is provided on weekdays from 5:20 AM to 11:27 PM. On weekends, service is provided from 6:50 AM to 11:34 PM on both Saturdays and Sundays.

Commuter Rail – South Station – Greenbush – The Greenbush Line connects South Station and the Town of Scituate to the southeast with stops at Dorchester, Quincy, Weymouth, Hingham, Nantasket, Cohasset and Scituate. Service is provided on weekdays from 5:40 AM to 10:57 PM. On weekends, service is provided from 7:15 AM to 11:54 PM on both Saturdays and Sundays.

AMTRAK – The Acela Express and the Northeast Regional provide service from Boston to Connecticut, New York, Pennsylvania, Maryland and Washington DC. The Lake Shore Limited provides service from Boston to Albany and Chicago.

Private Bus Services – The South Station Bus Terminal is also located adjacent to South Station with service to several major United States cities as well as some international destinations in Canada. The Terminal also provides regional commuter bus services.

Shuttle Services

There are currently various private shuttle services operating in the vicinity of the Project Site that serve businesses in the Waterfront area. These shuttles connect businesses with Downtown Boston and various transportation nodes including North Station and South Station. These services add additional traffic to study area intersections and create curbside demands at location for passenger boarding and alighting. As documented in the South Boston Waterfront Sustainable Transportation Plan, there were over 40 shuttles per hour servicing the area in the year 2015.

The City is currently studying consolidated shuttle service options to reduce redundant services which adds to vehicular traffic. It is anticipated that a consolidated A Street shuttle service may connect South Station and North Station with area businesses in the near future.

8.5.7 Existing Parking

Within the vicinity of the Project Site there are a variety of on-street parking options including metered and reserved private parking spaces along Necco Court and Necco Street. Figure 8.10 shows the current on-street parking regulations within a quarter-mile of the Project Site. In addition to on-street parking, there are several other public lots and garage options available near the Project Site. Figure 8.11 shows the locations of the off-site parking (public garages and surface parking lots) within a quarter-mile of the Project Site. The closest car-sharing spaces are at the

Necco Street surface lot which provides seven Zipcar spaces and two Enterprise Rent-a-Car spaces.

The Project Site includes part of the existing Necco Street surface lot. The lot has approximately 1,256 parking spaces in total, with 203 spaces within the Project boundary which will be displaced by the Project. In order to understand the existing usage and availability of the surrounding public garages and lots, an occupancy study was conducted during a typical weekday in May 2016 between the hours of 10:00 AM and 12:00 PM when commuter parking demand is typically highest. Results are shown in Table 8-3.

Table 8-3 Existing Parking Supply and Demand

Garage	Total Public Spaces	Available Spaces	Percent Occupied
1-Russia Wharf Garage	100	20	80%
2-Congress Street Lot #1	83	33	60%
3-Congress Street Lot #2	18	0	100%
4-Farnsworth Garage	500	51	90%
5-Stillings Garage	400	142	65%
6-Seaport Lot #1	700	26	96%
7-Seaport Lot #2	375	78	79%
8-Congress Street Lot #3	40	0	100%
9-Necco Garage	715	50	93%
10A-Necco Lot (Project Site)	203	8	96%
10B-Necco Lot (to remain)	839	63	92%
11-Channel Center Garage	965	445	54%
Total	**4,938**	**916**	**81%**

Source:
Available Spaces: VHB counts, May 2016
Total Public Spaces: posted licensed spaces

The results of the occupancy study, shown in Table 8-3 above, indicate that there is available off-street parking in lots and garages within a 10-minute walk from the Project Site. Approximately 19 percent of the spaces, or approximately 916 parking spaces, are available. This existing supply can absorb the demand resulting from the elimination of 203 public spaces in connection with the construction of the Project.

8.6 Future Condition

To assess future transportation conditions, the analysis considered the following two future scenarios for a five-year time horizon (2021) from the time of the existing conditions described earlier.

- 2021 No-Build Condition – assumes background growth associated with other planned projects expected to be completed in the 5-year horizon and general regional growth, along with any planned roadway/infrastructure improvements; and
- 2021 Build Condition – assumes the same background growth and any planned infrastructure improvements in the No-Build Condition plus the estimated traffic associated with the Project.

8.6.1 No-Build Condition

In accordance with BTD guidelines, the No-Build Condition represents a five-year horizon (2021) from the Existing Condition (2016). The No-Build Condition provides insight to future traffic conditions resulting from regional growth as well as traffic generated by specific projects that are expected to affect the local roadway network without consideration of the Project.

Background Growth

A background growth rate of one-half of one percent per year was applied to the existing traffic volumes. The growth has been agreed upon by the BTD and is consistent with the anticipated growth identified in the South Boston Waterfront Sustainable Transportation Plan. In addition to the background growth rate, traffic projections for ten specific projects, obtained from project filings, were added to the Existing Conditions traffic volumes to develop the No-Build Conditions traffic volumes. These projects, inclusive of feedback from BTD, include the following developments anticipated in the future 5-year horizon:

- **South Boston Boutique Hotel** is a proposed 14 floor, 156 room hotel with ground floor retail and restaurant space at the corner of Dorchester Avenue and West Broadway. Parking for this site will be valeted to an off-site lot.
- **Artists for Humanity** is an expansion of the existing Artists for Humanity building at the corner of A Street and West Second Street. The expansion includes 57,000 sf of art studios, event venue space, a public market, galleries, retail space and a café. There is no parking associated with this project.
- **45 West Third Street** is a proposed mixed-use building with 164 residential units and 2,200 sf of ground floor retail situated at the corner of A Street and West Third Street. Approximately 115 parking spaces will be provided on-site.
- **181-185 West First Street** is a proposed mixed-use building with 97 residential units and 5,010 sf of ground floor retail situated at the corner of C Street and West First Street. Approximately 115 parking spaces will be provided on-site.
- **9 Channel Center** is the rehabilitation of an abandoned warehouse on A Street. This project includes approximately 6,687 sf of retail and restaurant space and approximately 65,875 sf of office space. Parking for 9 Channel Center will be provided at the Channel Center Garage.

- **14 West Broadway** is a proposed mixed-use building with 47 residential units, 5,315 sf of restaurant space, and 3,400 sf of office/retail space at the corner of Dorchester Avenue and West Second Street. Approximately 70 parking spaces will be provided on-site.
- **399 Congress Street** is a proposed 22 story 388-unit residential building at the so-called "sausage parcel" on Congress Street. Approximately 114 parking spaces will be provided on-site.
- **22 Boston Wharf Road** is an expansion of the existing parking garage on Boston Wharf Road with two additional floors of 55,095 sf of office space and the conversion of the ground floor parking into 56,000 sf of retail space.
- **150 Seaport Boulevard** is a proposed 22 story mixed-use building with 124 residential units and 8,902 sf of restaurant space located on Seaport Boulevard, adjacent to Pier 4. Approximately 179 parking spaces will be provided on-site.
- **Seaport Square** is the development of approximately 23 acres in the South Boston Waterfront. This project is being developed in phases, only four parcels will be completed within the five-year time frame for this project and were included in the analysis:
  - **Block L2** is the development of 77,000 sf of retail/entertainment space and 338,200 sf of office/research space at the corner of Seaport Boulevard and East Service Road.
  - **Block M** is the development of 314,700 sf of retail/entertainment space and 652,500 sf of residential space at the corner block bounded by Seaport Boulevard, Congress Street, East Service Road, and B Street.
  - **Block H** is the development of a 24,300 sf chapel on Seaport Boulevard on the block bounded by Sleeper Street and Farnsworth Street.
  - **Block J** is the development of 22,000 sf of retail/entertainment space and 64,000 sf residential space on Seaport Boulevard on the block bounded by Farnsworth Street and Thomson Street.

At the request of the City, projects anticipated to be completed after the completion of the Project were not included in the analysis. This includes projects with anticipated completion dates after 2021 such as the proposed Hines tower development and the expansion of South Station, the BCEC expansion, and additional build-out in the Commonwealth Flats Area Development ("CFDA").

The City also identified several projects having undergone Small Project Review including 248 Dorchester Avenue, 39 A Street, 69 A Street, and 148-152 Dorchester Avenue. However, since there are no specific traffic forecasts available for these projects it can be assumed that the general background growth rate of 0.5 percent per year would adequately account for any increase in traffic associated with these projects.

Planned Infrastructure Improvements

There were no planned infrastructure improvements that were identified in any of the Background Projects identified in this Chapter.

The nearby South Station Expansion Project, and its planned reopening of Dorchester Avenue adjacent to the USPS building was not included in this study. It is anticipated that the reopening of Dorchester Avenue will happen at a date later than the Project. The South Station Expansion in itself will generate little traffic that will affect the study area intersections. The reopening of Dorchester Avenue will significantly improve A Street by shifting traffic from this corridor. As a worst case scenario, it was assumed that no future improvements are made to reduce traffic or increase capacity on A Street by the year 2021.

The South Boston Bypass Road was also assumed not to be open for commuter traffic as it was at the time of the data collection. Recently MassDOT opened the Bypass Road to all traffic on a 6-month trial basis. Current regulations allow only commercial vehicles to use this road. The Bypass Road provides a connection between the Southeast Expressway ("I-93") and the Waterfront Area and is thought to relieve traffic demands on A Street, Atlantic Avenue, and other City Streets. Since it is unknown at the time of this filing if the Bypass Road will be permanently opened to all vehicles, the analysis takes a conservative approach by assuming the worst case scenario of all vehicular traffic going through the Waterfront area instead of using the Bypass Road.

Figures 8.12 and 8.13 present the 2021 No-Build Morning and Evening Traffic Volumes, respectively. These volumes combine existing traffic volumes with expected background growth and the traffic impacts of planned projects in the area.

8.6.2 Build Condition

The 2021 Build Condition includes construction of the Project, including renovations to the existing Brick Buildings and construction of the New Building. The Project will total 394,100 sf. Because the proposed project design has been refined since the start of the Transportation Study, this study assumes a gross floor area of 485,000 square feet (approximately 90,000 sf more than the Project's total gross floor area) as shown in Table 8-4.

Table 8-4 Project Summary for Transportation Analysis[2]

Building	Size
Brick Buildings	101,300 GFA
New Building	383,700 GFA
Parking	30 spaces

Note: Totals 485,000 GSF for the transportation analysis

The Campus will contain office uses, including accessory uses, such as an employee cafeteria, and health and wellness/gym space. Other uses somewhat unique to GE include space for innovation, collaboration, customer interface and education in addition to ground floor publicly-accessible amenities, such as a museum and restaurant space as previously discussed in Chapter 1. Underneath the New Building, 30 parking spaces will be constructed for GE employees.

The footprint of the New Building eliminates surface parking from Gillette's surface parking lot on A Street and results in the loss of some on-street reserved private spaces. With the Project, 203 spaces will be eliminated from the surface lot and 30 will be replaced for use by GE employees for a net-loss of 173 parking spaces. The New Building's footprint also eliminates the primary gate to this surface lot. At the time of the traffic analysis, it was assumed that a relocated gate would remain on Necco Street.

8.6.3 Site Circulation

The New Building will have one shared driveway on Necco Street providing access and egress to the below-grade parking garage and loading area as shown in Figure 8.14. Curbside drop-off/pick-up will be provided on Necco Street. This area will serve visitors, taxis and car-sharing vehicles, as well as an occasionally scheduled tractor-trailer delivery during off-peak hours.

The Brick Buildings will be renovated and continue to have minimal vehicular access from the dead-end Necco Court. It is anticipated that the only Project-generated traffic to the Brick Buildings will be occasional service and deliveries which will be accommodated in the alley area between the Brick Buildings off of Necco Court.

The GE Plaza will be a pedestrian-only walkway located between the Brick Buildings and the New Building. This walkway will be covered by a translucent canopy connecting pedestrians from Necco Street to the Harborwalk at the Fort Point Channel.

2 As indicated, in Section 8.1, the Transportation Study was based on a project gross floor area approximately 90,000 sf larger than the gross floor area of the Project and therefore the analysis overestimates the potential effects of the Project on the transportation network

8.6.4 Parking

The Project will include 30 below-grade parking spaces underneath the New Building (0.06 spaces/ksf). The garage will be accessed via a driveway on Necco Street. These spaces will be reserved for GE employees.

It is the Proponents' goal to utilize the ample public parking available on a typical weekday in the area. An aggressive TDM Plan will discourage employees and visitors from driving to the Project.

The Project will remove approximately 203 existing surface spaces. It is anticipated that drivers currently parking in these spaces will either utilize other parking facilities or shift to other modes of transportation. As parking becomes more constrained in the area it is expected that drivers will continue to shift to other means of transportation as demonstrated through a measured reduction in vehicle mode shares for the area.

The Project will also displace some on-street reserved private parking spaces. These spaces will be eliminated along the Necco Street building frontage to allow for a drop-off/pick-area area which may include school buses to accommodate student trips to the GE Brilliant Labs and Museum.

The Project Site located within the South Boston Parking Freeze area overseen by the Boston Air Pollution Control Commission ("BAPCC"). The freeze caps the number of parking spaces in South Boston to ensure that the roads do not become congested and limit air pollution that results from cars idling in traffic. Overall, the Project will be reducing the number of off-street parking by 173 spaces.

8.6.5 Service/Loading

The New Building will provide three below-grade dock spaces which will accommodate single unit trucks and small tractor-trailer trucks (up to 35 feet in length). One dock space will have a compactor for trash pick-up. The dock area will be accessed via the shared parking garage driveway on Necco Street Typically only smaller vehicles are utilized for deliveries. In the rare event that a larger truck should need to service the building, trucks may utilize the drop-off/pick-up curb area on Necco Street.

The Brick Buildings will be serviced via an alley between the two buildings on Necco Court. Currently the existing buildings have loading docks that face the street. These docks will be eliminated to improve the building frontage leading up to the Fort Point Channel.

8.6.6 Bicycle Parking

Consistent with the City's goals, the Proponents will provide a substantial amount of bicycle storage on-site for both employees and visitors. Currently, approximately three percent of employees in the South Boston Waterfront area commute by bicycle. This is expected to increase to four percent by 2035 according to the South Boston Waterfront Sustainable Transportation Plan.

Secure bicycle storage will be provided the New Building to encourage cycling as a healthy and environmentally friendly means to commute. The indoor facilities will be designed with 'room to grow' to accommodate the future growth expected as cycling trends increase. GE will work with BTD to satisfy bicycle demand at the Project Site. A total of 50 secure indoor bicycle spaces will be available for employees upon completion of the Project with the ability to install up to a total of 120 spaces as demand warrants to meet the City's suggested guidelines. In addition, on-site shower and locker facilities will be provided for employees.

Publicly accessible bicycle storage spaces will be highly visible and convenient for bicycle riders. Consistent with BTD guidelines, it is anticipated that approximately 30 at-grade bicycle spaces will be provided.

GE is also considering sponsorship of a Hubway Station on or near the campus to serve employees and visitors. The closest existing stations are on Richards Street at Channel Center and Congress Street at Sleeper Street.

8.6.7 Pedestrians

A new sidewalk will be constructed along Necco Street and made ADA compliant. As noted earlier, the Project will also include the GE Plaza which will be a pedestrian-only public open space between the Brick Buildings and the New Building connecting the Fort Point neighborhood to the Harborwalk. There will also be a new pedestrian connection established to the south of the New Building for access to the Harborwalk. The Project also includes reconstruction of and enhancements to the portion of the Harborwalk within the Project Site with landscaping, lighting, and interpretive signage.

8.7 Traffic Operations Analysis

8.7.1 Trip Generation

To assess the traffic impacts of the Project, trip estimates were based on rates from the ITE Trip Generation Handbook, 9th Edition. Trip generation for the Project was estimated using the following LUC:

> **LUC 714 Corporate Headquarters Building:** *A corporate headquarters building is a single tenant office building that houses the corporate headquarters of a company or organization, which generally consists of offices, meetings rooms, space for file storage and data processing, a restaurant or cafeteria and other service functions.*

The Campus will contain office uses, including accessory uses, such as an employee cafeteria, and health and wellness/gym space. Other uses somewhat unique to GE include space for innovation, collaboration, customer interface and education in addition to ground floor publicly-accessible amenities, such as a museum and restaurant space. These uses, combined with substantial public realm improvements and unique programming will attract visitors and generate additional vehicle trips beyond those of just GE employees/visitors. These additional trips are captured by the Corporate Headquarters Building LUC. The anticipated trip generation calculations are therefore consistent with the vision of the Campus as a public destination.

ITE yields unadjusted vehicle trips that do not account for alternative modes of transportation. Results of the unadjusted daily ITE trip generation for the Project are provided in Table 8-5.

Table 8-5 Daily Unadjusted Trip Generation (Vehicles)

Daily Trips (In and Out)	Estimated Program Size	Unadjusted Vehicle Trips	Less Parking*	Net-New Project Trips
Brick Buildings	101,300 GFA	808	-	808
Project (preliminary)	485,000 GSF	3,870	-406	3,464
Project (current)	394,100 GFA	3,145	-406	2,739

Source: Trip Generation, 9th Edition, Institute of Transportation Engineers, Washington D.C. (2012).
Note: The 485,000-GSF preliminary Project assumed for the Transportation Study has since been refined as design advanced.
* Less 203 surface parking spaces with construction of New Building

The unadjusted ITE results do not exceed transportation-related thresholds for a mandatory EIR under MEPA.

Mode Share and Vehicle Occupancy Rates

To account for alternative modes of transportation, recently collected mode shares for the area provided by BTD were applied to the unadjusted ITE trip results. These mode shares vary by direction and time of day. Mode shares by land use are shown in Table 8-6 below.

Table 8-6 Mode Split by Time of Day

Time of Day	Automobile	Transit	Walk/Bike
Daily	31%	49%	20%
Morning Peak			
Entering	33%	55%	12%
Exiting	27%	25%	48%
Evening Peak			
Entering	29%	37%	34%
Exiting	33%	56%	11%

Source: BTD

As shown in Table 8-6, the majority of trips to the Project Site are expected to be walk, bicycle, or public transit trips. Only 33 percent of peak-hour trips in the peak direction are expected to be made by automobile. The Project's close proximity to South Station, low parking supply, and a robust TDM will likely result in even lower auto-dependency at the Project Site.

Vehicle Occupancy Rates ("VOR") were also applied to the ITE trip generation to convert the ITE estimated unadjusted vehicle trips to person trips. The VORs were based on the 2009 National Household Travel Survey and assumes 1.13 persons per vehicle for work based trips. After VOR is applied to the ITE unadjusted vehicle trips to produce person trips, these trips were then split into modes based on the mode splits shown above in Table 8-6. VORs were again applied to the vehicle trips to produce adjusted vehicle trips.

Based on the process described above, Table 8-7 summarizes the Project trips for the full Project.

Table 8-7 Estimated Project Adjusted Trip Generation

Time Period/Direction	Public	Walk/Bike/Other	Vehicle Trips
Weekday Daily			
Enter	1,072	437	600
Exit	1,072	437	600
Total	2,144	874	1,200
Weekday Morning			
Enter	437	95	233
Exit	15	29	14
Total	452	124	247
Weekday Evening			
Enter	29	26	20
Exit	389	77	203
Total	418	103	223

Source: Trip Generation, 9th Edition, Institute of Transportation Engineers, Washington D.C. (2012).
Note: Trips assume Project is 485,000 sf

The Project is estimated to generate approximately 1,200 daily weekday vehicle trips (600 entering, 600 exiting) based on the larger 485,000 sf program. During a typical weekday the morning peak hour is expected to generate 247 vehicle trips (233 entering, 14 exiting) and during the evening peak hour the Project will generate 223 vehicle trips (20 entering, 203 exiting).

With the Project's close proximity to public transit the Project will generate 2,144 transit trips across all modes (i.e., subway, bus, commuter rail) (1,072 entering, 1,072 exiting) during a typical weekday. The morning peak will generate approximately 452 transit trips (437 entering, 15 exiting) and the evening peak hour will generate 418 transit trips (29 entering, 389 exiting).

The location of the Project is ideal for walking and biking, as well as use of other modes of transportation besides vehicle and transit, as the mode splits indicate in Table 8-6. The Project will generate 874 daily walk/bike/other trips (437 entering, 437 exiting) during a typical weekday. During the morning peak hour the Project will generate 124 walk/bike/other trips (95 entering, 29 exiting) and during the evening peak hour 103 walk/bike/other trips (26 entering, 77 exiting).

Net New Project-generated Vehicle Trips

As discussed above, the existing off-site parking lot currently generates vehicle trips to the Project Site. Credit for these existing trips to the 203 eliminated parking spaces, which are already traveling through the network, are accounted for by subtracting the existing trips from the Project-generated trips for the morning and evening peak hours, as presented in Table 8-8.

Table 8-8 Net New Project-generated Vehicle Trips

Time Period/Direction	Project-generated Trips	Existing Site Trips (Less 203 Spaces)	Net New Vehicle Trips
Weekday Morning			
Enter	233	-38	195
Exit	14	-6	8
Total	247	-44	203
Weekday Evening			
Enter	20	-3	17
Exit	203	-31	172
Total	223	-34	189

Note: Trips assume Project is 485,000 sf

Using ITE methodology, the Project is estimated to generate 203 net new vehicle trips (195 entering, 8 exiting) to the network during the morning peak hour and 189 net-new vehicle trips (17 entering, 172 exiting) during the evening peak hour.

Brick Buildings Trip Generation

As discussed previously, the Proponents are requesting a Phase 1 Waiver under MEPA to allow Phase 1 of the Project, including rehabilitation of the Brick Buildings. The resulting adjusted trip generation for the Brick Buildings is provided in Table 8-9. There may be some loss of reserved private on-street parking with the Brick Buildings renovations; however, trips are assumed to be negligible so no trip credit was taken.

Table 8-9 Brick Buildings Adjusted Trip Generation

Time Period/Direction	Public Transportation	Walk/Bike/Other	Vehicle Trips
Weekday Daily			
Enter	224	91	126
Exit	224	91	126
Total	448	182	252
Weekday Morning			
Enter	91	20	49
Exit	3	6	3
Total	94	26	52
Weekday Evening			
Enter	6	5	4
Exit	81	16	42
Total	87	21	47

Source: Trip Generation, 9th Edition, Institute of Transportation Engineers, Washington D.C. (2012).

Estimated peak hour vehicle trip generation, as a result of the Brick Buildings, results in 52 vehicle trips (49 entering and 3 existing) during the morning peak hour and 47 vehicle trips (4 entering and 42 exiting) during the evening peak hour. Since no parking will be provided with the Brick Buildings, these trips will be dispersed to area garages.

Automobile Trip Distribution

Trip distribution was based on BTD's guidelines for Area 8 (the project area). These guidelines, based on 2000 census data, provide information on where area residents work and where area employees live. Using these data, Project vehicle trips can then be assigned to the roadway network. A summary of the regional trip distribution results is presented in Table 8-10 and shown graphically in Figure 8.15.

Table 8-10 Geographic Trip Distribution

Corridor	Distribution
Summer Street (to/from West)	21%
Congress Street (to/from East)	49%
A Street (to/from South)	30%
Total	100%

Source: BTD Zone 8 Trip Distribution

To be conservative, all Project-generated vehicle trips were assumed to go to the Project Site. In reality, traffic volumes will be distributed throughout the study area since only 30 parking spaces will be provided on-site and drivers will end their trip at other area parking lots/garages.

The net new Project-generated vehicle trips were added to the No-Build traffic networks using the local trip distribution patterns described above. The Project-generated trips are shown in Figure 8.16 and Figure 8.17 for the morning and evening peak hours, respectively. The resulting 2021 Build Condition networks are shown in Figure 8.18 and Figure 8.19 for the morning and evening peak hours, respectively.

8.7.2 Level of Service Analysis

Consistent with MassDOT and BTD guidelines, Synchro 8 software was used to model level of service (LOS) operations at the study area intersections. LOS is a qualitative measure of control delay at an intersection providing an index to the operational qualities of a roadway or intersection.

LOS designations range from A to F, with LOS A representing the best operating conditions and LOS F representing the worst. LOS D is generally considered acceptable in urban areas. LOS E indicates vehicles experience significant delay while LOS F suggests long delays for the average vehicle. LOS thresholds differ for signalized and unsignalized intersections. Longer delays at signalized intersections than at unsignalized intersections are perceived as acceptable.

Table 8-11 below presents the level of service delay threshold criteria as defined in the 2000 Highway Capacity Manual ("HCM").

Table 8-11 Level of Service Criteria

Level of Service	Unsignalized Intersection Control Delay (sec/veh)	Signalized Intersection Control Delay (sec/veh)
LOS A	0-10	≤ 10
LOS B	> 10-15	> 10-20
LOS C	> 15-25	> 20-35
LOS D	> 25-35	> 35-55
LOS E	> 35-50	> 55-80
LOS F	> 50	> 80

Source: Highway Capacity Manual

Adjustments were made to Synchro model to include characteristics of the study area such as heavy vehicles, bus operations, parking activity, and pedestrian crossings. In addition, to better model urban driving behavior at unsignalized intersections, the critical gap a driver on the minor street accepts to enter traffic from a stop was adjusted. After conducting field observations on A Street and Necco Street, this critical gap was lowered from Synchro's default of 6.4 seconds to 3.9 seconds. This created a more realistic model of traffic operations at the intersections of A Street at Necco Court, A Street at Necco Street and at Melcher Street at Necco Street during both morning and evening peak hours.

The capacity analysis results are summarized in the following sections.

8.7.3 Signalized Capacity Analysis

The LOS results of the signalized capacity analyses are summarized in Tables 8-12a and Table 8-12b for the Existing, No-Build, and Build condition peak hours. Detailed Synchro results are presented in Appendix H.

Table 8-12a Signalized Intersection Level of Service (LOS) Summary – Morning Peak Hour

	2016 Existing Condition					2021 No-Build Condition					2021 Build Condition				
				Vehicle Queues					Vehicle Queues					Vehicle Queues	
Location	v/c[1]	Delay[2]	LOS[3]	50th[4]	95th[5]	v/c	Delay	LOS	50th	95th	v/c	Delay	LOS	50th	95th
A St/Thomson St at Congress St	**0.61**	**35.6**	**D**	-	-	**0.68**	**39.1**	**D**	-	-	**0.81**	**47.1**	**D**	-	-
Congress St EB Left/Thru	0.39	31.4	C	105	153	0.46	34.6	C	113	161	0.47	35.6	D	113	161
Congress St EB Right	0.55	37.8	D	134	#271	0.62	43.2	D	141	#283	0.64	45.0	D	141	#283
Congress St WB Left	0.64	23.8	C	154	#240	0.75	29.5	C	186	#253	0.97	62.3	E	~322	#430
Congress St WB Thru/Right	0.52	22.9	C	198	294	0.59	25.3	C	226	328	0.59	25.3	C	226	328
A St NB Left	0.93	>80.0	F	142	#284	0.94	>80.0	F	145	#291	0.94	>80.0	F	145	#291
A St NB Right	0.12	27.1	C	0	45	0.14	26.5	C	0	49	0.15	25.9	C	0	50
Thomson St SB Left/Thru/Right	0.66	68.3	E	29	50	0.63	60.8	E	35	58	0.63	60.8	E	35	58
A St at Melcher St	**0.60**	**9.7**	**A**	-	-	**0.65**	**10.9**	**B**	-	-	**0.67**	**11.3**	**B**	-	-
Melcher St EB Left/Thru/Right	0.67	24.3	C	39	71	0.71	26.3	C	43	78	0.71	26.6	C	80	266
A St NB Left/Thru/Right	0.57	8.8	A	94	190	0.64	10.6	B	113	#256	0.65	11.1	B	119	#307
A St SB Thru/Right	0.43	6.8	A	59	133	0.49	7.7	A	71	153	0.55	8.5	A	85	181
A St at Sobin Park/Richards St	**0.51**	**11.9**	**B**	-	-	**0.56**	**12.0**	**B**	-	-	**0.59**	**12.0**	**B**	-	-
Sobin Park EB Left	0.05	35.8	D	5	11	0.05	35.4	D	5	11	0.05	35.4	D	5	11
Sobin Park EB Thru/Right	0.06	35.8	D	5	12	0.06	35.5	D	5	12	0.06	35.5	D	5	12
Richards St WB Left	0.69	49.7	D	63	105	0.69	50.0	D	65	108	0.69	50.0	D	65	108
Richards St WB Thru/Right	0.35	37.9	D	39	76	0.37	37.7	D	42	78	0.37	37.7	D	42	78
A St NB Left/Thru	0.48	4.8	A	88	143	0.51	5.0	A	97	159	0.57	5.7	A	119	201
A St SB Left/Thru/Right	0.47	6.8	A	120	185	0.53	7.6	A	145	217	0.54	7.5	A	149	220
A St at West 2nd St	**0.55**	**21.2**	**C**	-	-	**0.64**	**26.4**	**C**	-	-	**0.64**	**25.8**	**C**	-	-
West 2nd St EB Left/Thru/Right	0.82	76.3	E	49	#117	>1.0	>80.0	F	~66	#156	>1.00	>80.0	F	~66	#156
West 2nd St WB Left	0.55	38.7	D	71	119	0.56	38.0	D	76	127	0.56	38.0	D	76	127
West 2nd St WB Thru/Right	0.77	48.3	D	146	212	0.78	48.3	D	155	226	0.78	48.3	D	155	226
A St NB Left/Thru	0.45	6.5	A	112	216	0.48	7.2	A	128	235	0.54	8.0	A	154	283
A St SB Thru/Right	0.48	8.9	A	70	92	0.53	9.4	A	72	94	0.53	9.3	A	72	94
Melcher St at Summer St	**0.48**	**19.3**	**B**	-	-	**0.51**	**20.7**	**C**	-	-	**0.52**	**21.2**	**C**	-	-
Summer St EB Thru/Right	0.56	16.2	B	224	317	0.58	17.1	B	243	334	0.61	17.7	B	253	347
Summer St WB Left/ Thru	0.43	14.2	B	153	219	0.45	15.0	B	165	228	0.46	15.2	B	166	230
Melcher St NB Left	0.73	59.7	E	84	144	0.78	64.0	E	94	#174	0.79	66.1	E	96	#180
Melcher St NB Right	0.03	42.5	D	0	31	0.03	41.8	D	0	31	0.03	41.7	D	0	31

Note: Bold denotes average overall delay
1 volume to capacity ratio
2 delay in seconds
3 level of service
4 50th percentile queue (reported in feet)
5 95th percentile queue (reported in feet)
~ Volume exceeds capacity, queue is theoretically infinite
# 95th percentile volume exceeds capacity, queue may be longer
m Volume for 95th percentile queue is metered by upstream signal

Table 8-12b Signalized Intersection Level of Service (LOS) Summary – Evening Peak Hour

	2016 Existing Condition					2021 No-Build Condition					2021 Build Condition				
				Vehicle Queues					Vehicle Queues					Vehicle Queues	
Location	v/c[1]	Delay[2]	LOS[3]	50th[4]	95th[5]	v/c	Delay	LOS	50th	95th	v/c	Delay	LOS	50th	95th
A St/Thomson St at Congress St	**0.66**	**42.8**	**D**	-	-	**0.72**	**47.3**	**D**	-	-	**0.73**	**46.9**	**D**	-	-
Congress St EB Left/Thru	0.48	32.9	C	146	185	0.56	34.7	C	163	203	0.56	35.1	D	163	203
Congress St EB Right	0.72	46.0	D	~192	#315	0.76	49.5	D	~214	#333	0.77	50.6	D	~214	#333
Congress St WB Left	0.58	23.0	C	115	173	0.71	27.8	C	141	#231	0.74	29.4	C	149	#255
Congress St WB Thru/Right	0.49	23.4	C	180	256	0.55	24.5	C	205	286	0.55	24.5	C	205	286
A St NB Left	>1.00	>80.0	F	~176	#329	>1.00	>80.0	F	~192	#350	>1.00	>80.0	F	~192	#350
A St NB Right	0.17	28.8	C	0	58	0.21	29.0	C	0	62	0.27	29.4	C	0	73
Thomson St SB Left/Thru/Right	0.66	62.3	E	43	78	0.72	69.5	E	48	85	0.72	69.5	E	48	85
A St at Melcher St	**0.68**	**17.2**	**B**	-	-	**0.76**	**19.5**	**B**	-	-	**0.84**	**24.1**	**C**	-	-
Melcher St EB Left/Thru/Right	0.80	52.3	D	116	174	0.81	52.5	D	128	187	0.85	54.4	D	156	229
A St NB Left/Thru/Right	0.64	13.4	B	148	286	0.74	17.5	B	180	#342	0.84	23.6	C	211	#567
A St SB Thru/Right	0.37	7.8	A	99	197	0.42	9.1	A	124	239	0.45	10.6	B	140	249
A St at Sobin Park/Richards St	**0.61**	**14.4**	**B**	-	-	**0.67**	**15.6**	**B**	-	-	**0.70**	**16.4**	**B**	-	-
Sobin Park EB Left	0.03	31.4	C	3	12	0.03	30.5	C	3	11	0.03	30.5	C	3	11
Sobin Park EB Thru/Right	0.01	31.3	C	0	0	0.01	30.3	C	0	0	0.01	30.3	C	0	0
Richards St WB Left	0.76	49.2	D	104	126	0.77	48.8	D	111	131	0.77	48.8	D	111	131
Richards St WB Thru/Right	0.07	31.7	C	4	23	0.08	30.8	C	4	23	0.08	30.8	C	4	23
A St NB Left/Thru/Right	0.38	5.7	A	71	153	0.43	6.3	A	78	173	0.44	6.3	A	79	175
A St SB Left/Thru/Right	0.57	10.1	B	136	380	0.63	12.9	B	165	478	0.68	14.9	B	216	534
A St at West 2nd St	**0.71**	**16.8**	**B**	-	-	**0.80**	**19.9**	**B**	-	-	**0.84**	**20.2**	**C**	-	-
West 2nd St EB Left/Thru/Right	0.74	60.5	E	51	95	0.90	>80.0	F	66	113	0.90	>80.0	F	66	113
West 2nd St WB Left	0.68	46.3	D	88	134	0.66	44.4	D	92	135	0.66	44.4	D	92	135
West 2nd St WB Thru/Right	0.56	40.5	D	93	138	0.57	40.0	D	102	144	0.57	40.0	D	102	144
A St NB Left/Thru	0.38	4.8	A	81	175	0.41	5.4	A	93	212	0.42	5.5	A	95	216
A St SB Thru/Right	0.71	8.4	A	292	183	0.78	10.3	B	336	#707	0.83	11.6	B	383	#785
Melcher St at Summer St	**0.52**	**25.2**	**C**	-	-	**0.54**	**26.1**	**C**	-	-	**0.58**	**28.9**	**C**	-	-
Summer St EB Thru/Right	0.58	20.5	C	262	#413	0.61	21.7	C	282	#455	0.64	23.9	C	298	#461
Summer St WB Left/ Thru	0.36	17.1	B	126	191	0.38	17.9	B	133	201	0.41	19.6	B	140	203
Melcher St NB Left	0.79	55.9	E	149	213	0.80	56.2	E	157	222	0.85	59.9	E	184	264
Melcher St NB Right	0.12	37.1	D	10	49	0.14	36.6	D	13	52	0.16	34.9	C	19	58

Note: Bold denotes average overall delay
1 volume to capacity ratio
2 delay in seconds
3 level of service
4 50th percentile queue (reported in feet)
5 95th percentile queue (reported in feet)
~ Volume exceeds capacity, queue is theoretically infinite
# 95th percentile volume exceeds capacity, queue may be longer
m Volume for 95th percentile queue is metered by upstream signal

During the morning peak, all five study area signalized intersections typically operate at a LOS D or better under Existing Conditions. There are several individual approaches that currently experience high delays and poor LOS and these include:

- The northbound left-turn lane on A Street, approaching Congress Street;
- The westbound West Second Street approach to A Street; and
- The northbound left-turn lane on the Melcher Street approach to Summer Street.

During the evening peak hour, all five study area signalized intersections operate at LOS D or better with the exception of the following approaches:

- The northbound left-turn lane on A Street and the Thomson Place approach to Congress Street;
- The westbound West Second Street approach to A Street; and
- The northbound left-turn lane on the Melcher Street approach to Summer Street.

The high delays experienced under Existing Conditions are the result of insufficient green time allocated to the approaches to accommodate the existing demands.

The No-Build Conditions analysis indicates that the study area intersections do not change in overall LOS grade due to the planned area projects or general background growth. However, because of an increase in volume, the West Second Street eastbound movement at the intersection of A Street and West Second Street changes from LOS E to LOS F during the morning and evening peak hours.

The analysis indicates that the Project will not result in a significant reduction in the overall LOS for any of the signalized intersections. The only movement that experiences a notable increase in delay is the Congress Street westbound left-turn movement at the intersection of Congress Street and A Street during the morning peak hour. This movement drops from a LOS C to a LOS E with an increase in delay of 32.8 seconds. However, after signal timings are optimized in the traffic model, the movement is reported to improve to a LOS D with a delay of 40.0 seconds. This suggests that the intersection could be retimed in the future to improve operations to a conditions with the existing geometry.

8.7.4 Unsignalized Capacity Analysis

The capacity analysis results for the unsignalized study area intersections are summarized in Table 8-13. Detailed Synchro results are presented in Appendix H.

Table 8-13 Unsignalized Intersection Level of Service (LOS) Summary

Location	Critical Side Street Movement	Peak Period	2016 Existing Condition				2021 No-Build Condition				2021 Build Condition			
			v/c[1]	Delay[2]	LOS[3]	95th[4] Queue	v/c	Delay	LOS	95th Queue	v/c	Delay	LOS	95th Queue
A St at Necco Ct	Necco Ct EB Left/Right	Weekday AM	0.07	21.9	C	6	0.08	24.9	C	6	0.09	27.4	D	7
		Weekday PM	0.06	14.7	B	5	0.07	15.8	C	6	0.12	17.5	C	10
A St at Necco St	Necco St EB Left/Right	Weekday AM	0.23	14.7	B	22	0.25	15.7	C	25	0.32	18.8	C	34
		Weekday PM	0.49	20.7	C	65	0.54	24.0	C	78	0.80	41.8	E	174
Necco St at Necco Ct	Necco Ct WB Left/Thru/Right	Weekday AM	0.03	10.2	B	2	0.03	10.2	B	2	0.08	12.8	B	6
		Weekday PM	0.05	12.0	B	4	0.05	12.1	B	4	0.06	13.5	B	5
Necco St at Melcher St	Necco St NB Left/Thru/Right	Weekday AM	0.14	15.7	C	12	0.14	16.1	C	12	0.19	18.9	C	18
		Weekday PM	0.43	18.2	C	54	0.45	18.9	C	57	0.64	25.5	D	111

1 volume to capacity ratio
2 delay in seconds
3 level of service
4 95th percentile queue (reported in feet)
\- not analyzed under condition

In the morning peak hour Existing Conditions analysis, all critical side street approaches operate at LOS C or better. With the addition of the planned area projects there are no changes in LOS, except at the A Street at Necco Street intersection, which changes from LOS B to LOS C. However, this change is due to only a 1.0 second increase in delay. With the addition of the Project-generated trips, there is no change in the LOS from the No-Build and Build Conditions, except at the A Street at Necco Court intersection, which changes from LOS C to LOS D. However, this is due to only a 2.5 second increase in delay. All critical movements operate at LOS D or better in the Build Condition.

In the evening peak hour Existing Conditions analysis, all critical side street approaches operate at LOS C or better. Under No-Build Conditions, there is no change in LOS, except at the A Street at Necco Court intersection, which changes from LOS B to LOS C (however, this change is due to only a 1.1 second increase in delay). With the addition of the Project-generated trips, the critical movement at the intersection of A Street at Necco Street degrades from a LOS C to LOS E with an increase in delay of 17.8 seconds from the No-Build to Build Conditions. This is due to an increase in volume at the Necco Street approach due to the Project-generated trips. However, the model assumes that all project-generated trips are assigned to and from the Project Site. Since only 30 spaces will be provided on-site, the resulting trips on Necco Street will be much lower. For this reason, no mitigation is proposed at this intersection. All other critical movements at unsignalized intersections operate at LOS D or better.

8.8 Proposed Transportation Mitigation

8.8.1 Pedestrian Realm Improvements

The Project will result in significant improvement of the pedestrian realm at the Project Site. Currently a surface parking lot, the Project will include a vibrant streetscape with pedestrian connections through and around the Project Site. The Project will offer public open space and public amenities at the ground floor of the New Building and Brick Buildings.

It is anticipated that a new sidewalk will be constructed adjacent to the site on Necco Street to be ADA compliant. The Project will also include a pedestrian connection between the Brick Buildings and the New Building connecting Necco Street to the Harborwalk and Fort Point Channel waterfront. The Project also includes reconstruction of and enhancements to the Harborwalk along the Fort Port Channel with landscaping, lighting, and interpretive signage.

8.8.2 Transportation Demand Management Measures

Consistent with the City's goals to reduce auto-dependency, GE will provide TDM measures to encourage the use of alternative modes of transportation, reduce auto-dependency, and promote healthy lifestyles. Project TDM measures include the following:

- An employee web application that will provide carpool matching services
- An on-site Transportation Coordinator responsible for:
  - Overseeing parking and loading operations
  - Promoting the use of alternative transportation measures and carpooling
  - Organizing commuter challenges and rewards programs
  - Developing an orientation packet to inform new employees of all available transportation options
- Transit information in lobbies including a real time transit arrival time screen
- Directions on GE's website and a website application to encourage use of alternative commute modes
- Short-term public and secure employee bicycle spaces on-site
- A Carshare (i.e., Zipcar) corporate membership
- Various amenities to commuters who walk and bike including:
  - On-site lockers and showers
  - A MyBike Discount for employees to receive discounted annual repair memberships and packages at the MyBike shop in South Boston.
  - On-site bicycle workshops and classes
  - Providing a bicycle tune-up day on-site

- Alternative/staggered work hours or telecommuting for appropriate positions
- Loaner umbrellas

In addition, GE is committed to working with others to understand the opportunities for utilizing consolidated shuttle services as the Project advances and GE is considering sponsorship of a nearby Hubway station. All TDM measures will be codified in the Transportation Access Plan Agreement (“TAPA”) to be executed with BTD.

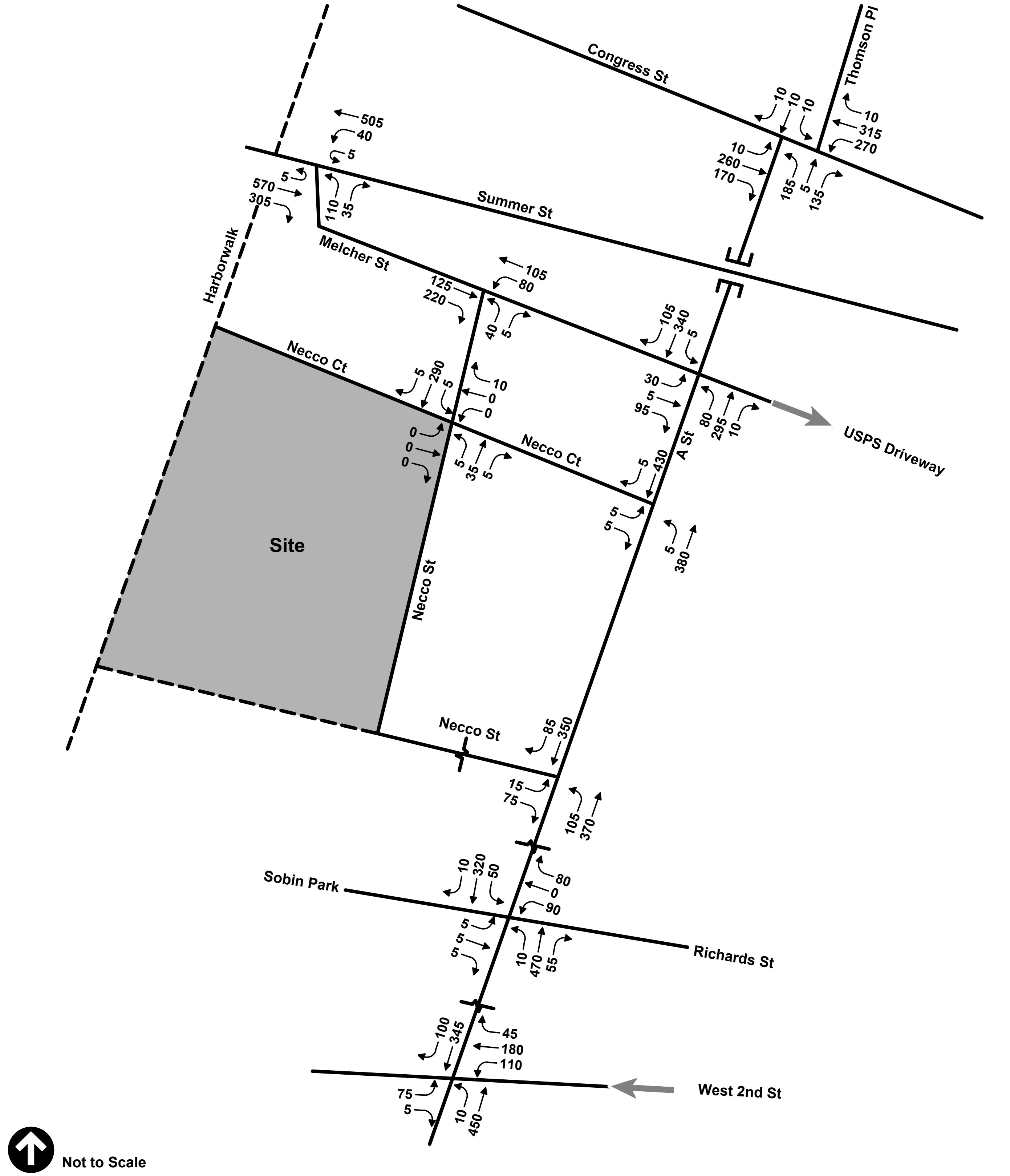
Source: ArcGIS World Street Map

Prepared By: VHB

Figure 8.1

Traffic Study Area

GE Headquarters Project
Boston, Massachusetts

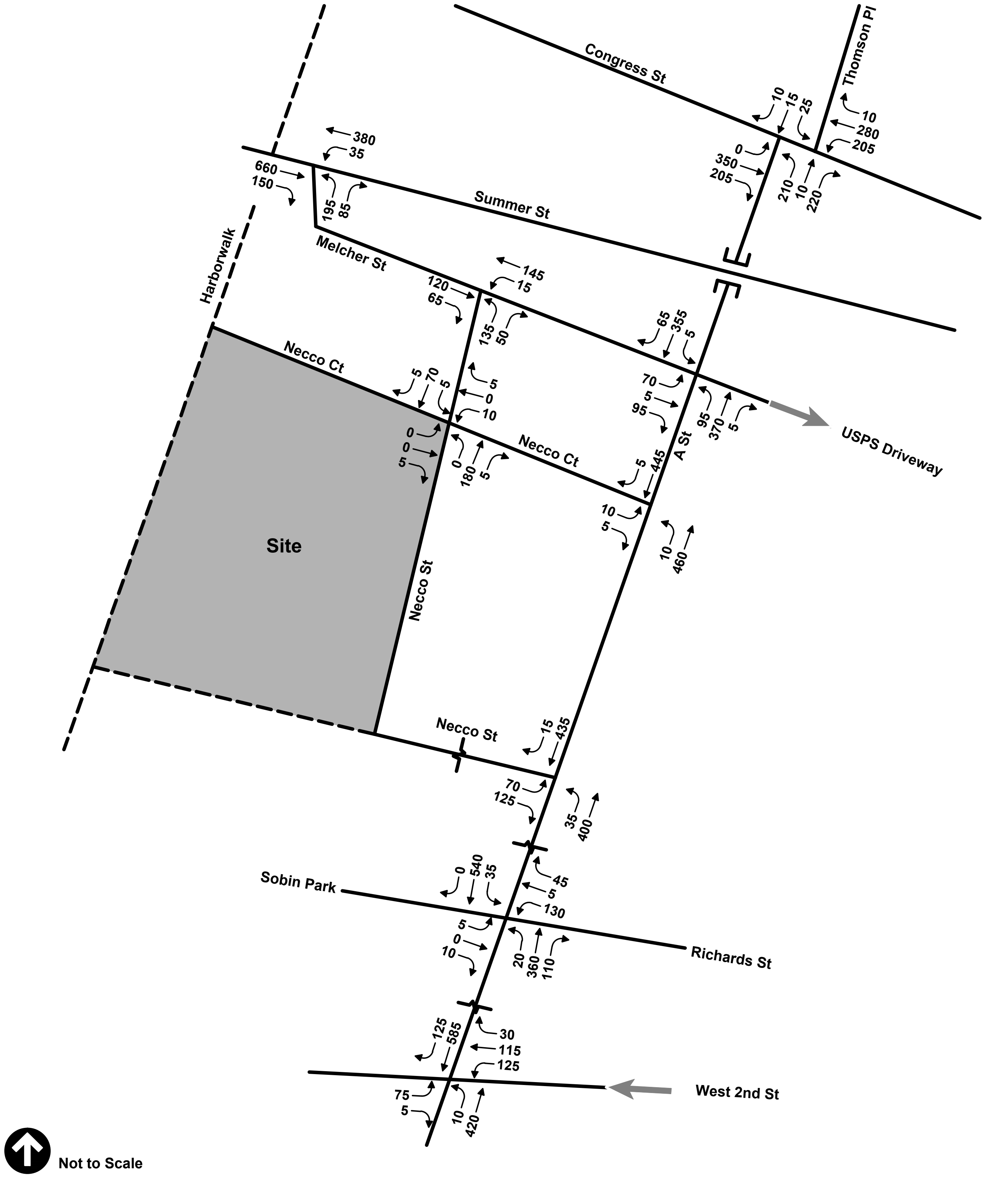


Prepared By: VHB

Figure 8.2

2016 Existing Condition Traffic Volumes
Morning Peak Hour (8:00 AM - 9:00 AM)

GE Headquarters Project
Boston, Massachusetts

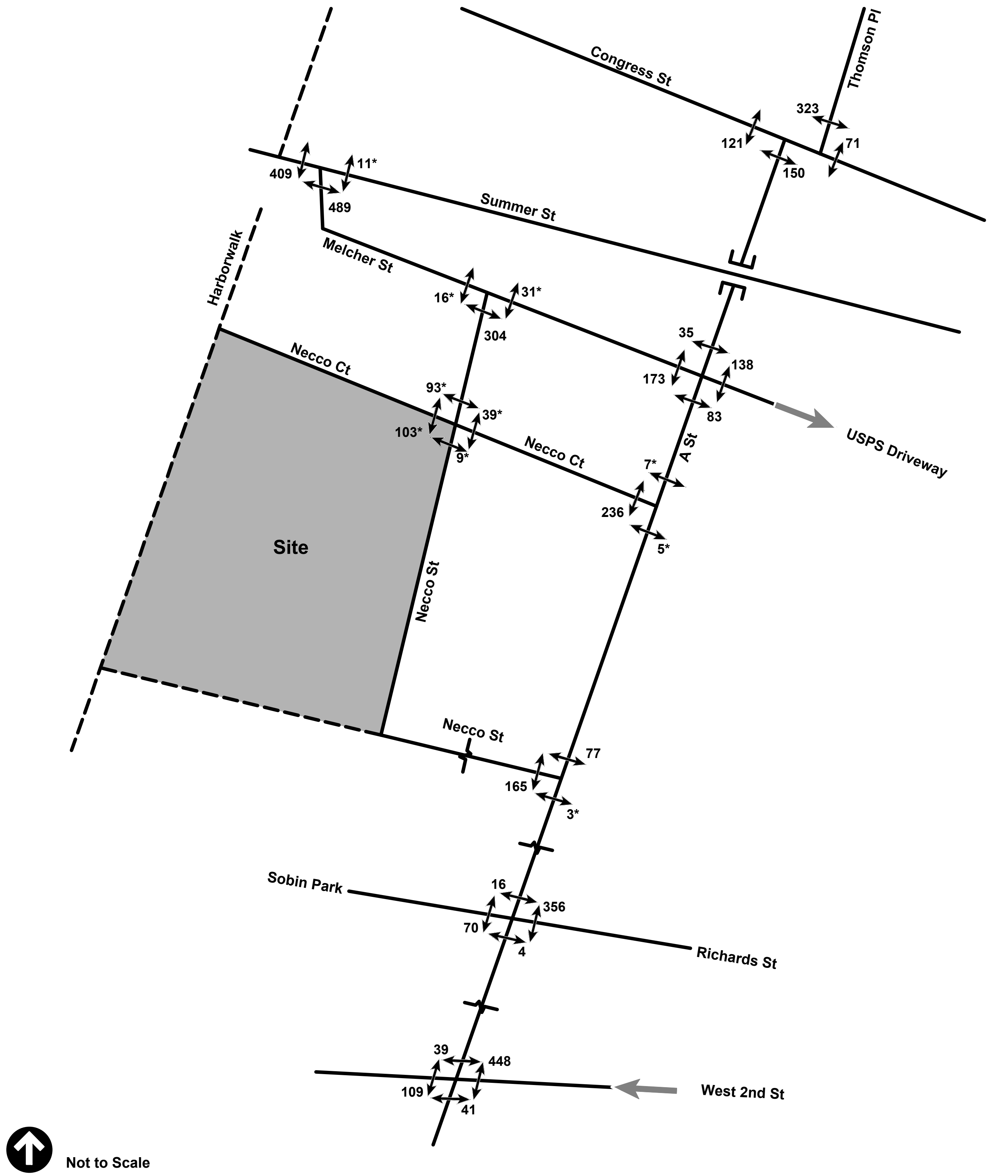


Prepared By: VHB

Figure 8.3

2016 Existing Condition Traffic Volumes
Evening Peak Hour (5:00 PM - 6:00 PM)

GE Headquarters Project
Boston, Massachusetts



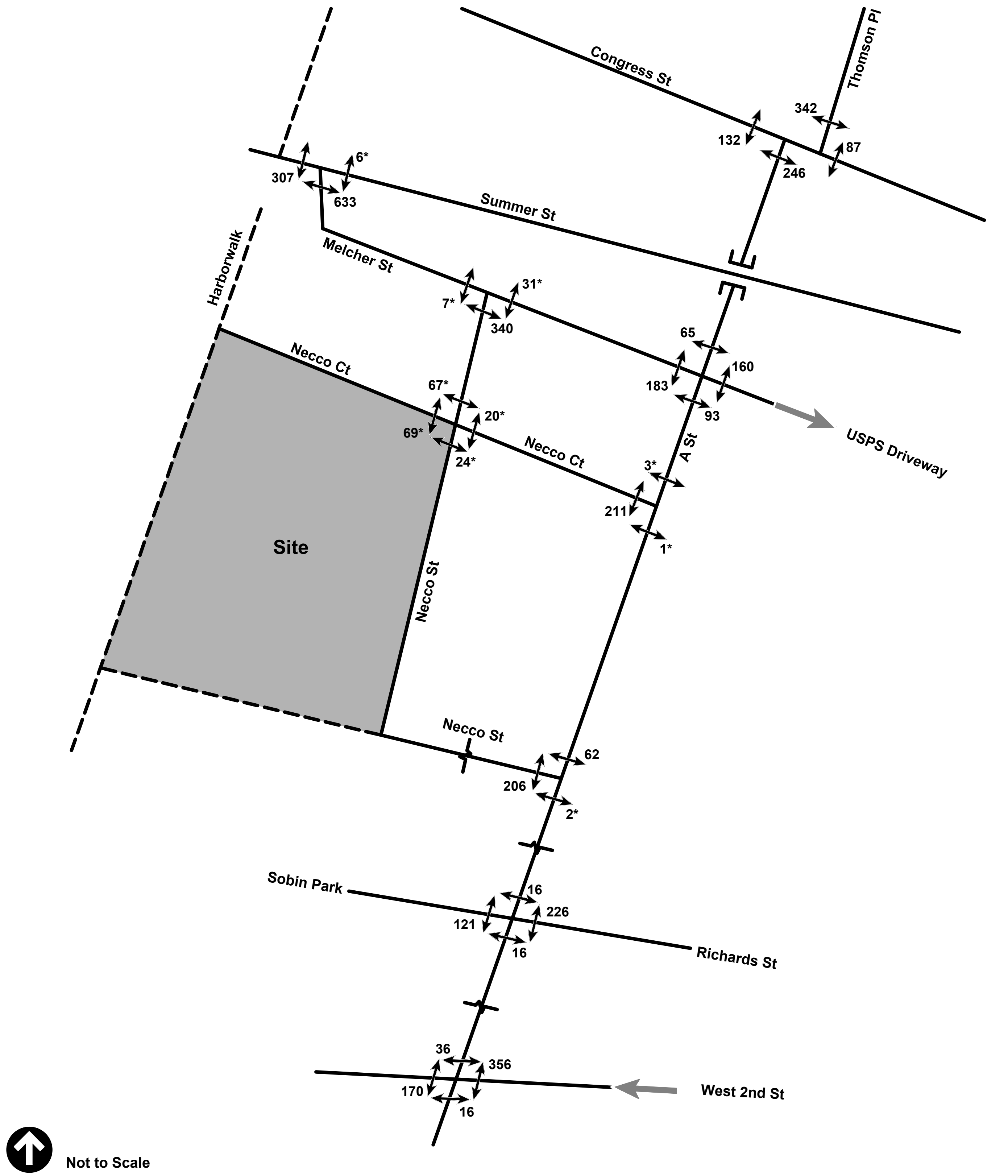
*No crosswalk present.

Prepared By: VHB

Figure 8.4

2016 Existing Condition Pedestrian Volumes
Morning Peak Hour (8:00 AM - 9:00 AM)

GE Headquarters Project
Boston, Massachusetts



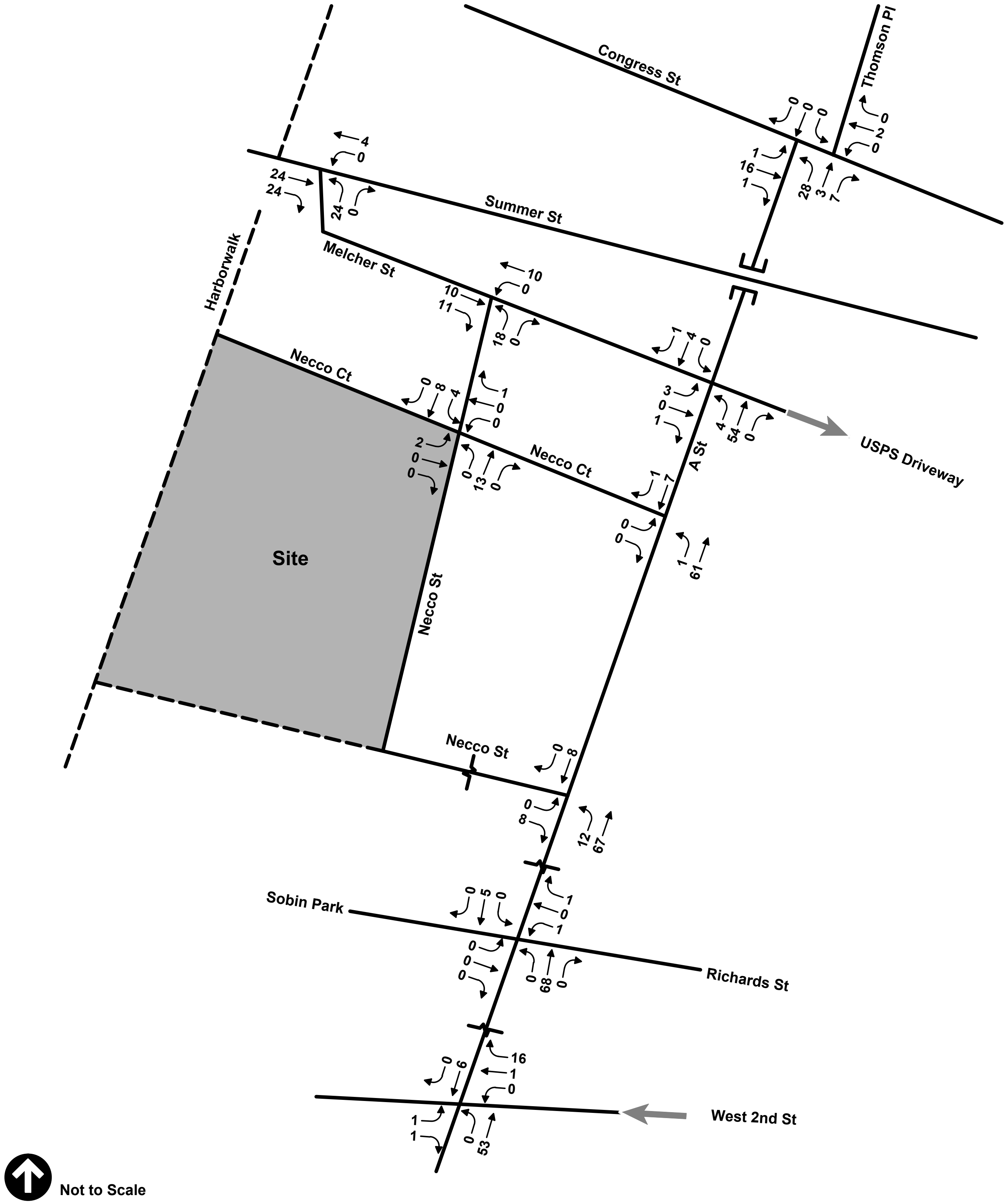
*No crosswalk present.

Prepared By: VHB

Figure 8.5

2016 Existing Condition Pedestrian Volumes
Evening Peak Hour (5:00 PM - 6:00 PM)

GE Headquarters Project
Boston, Massachusetts

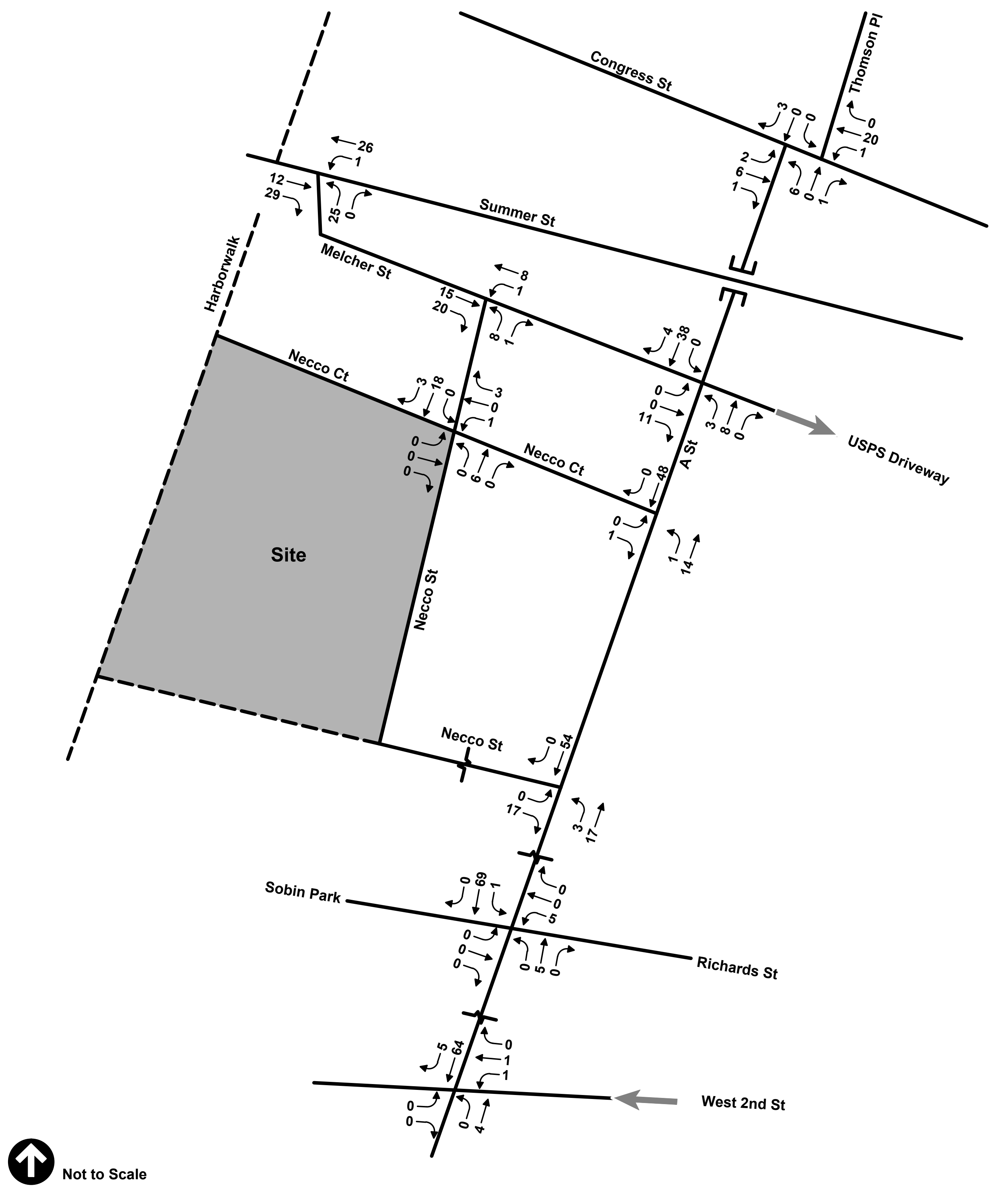


Prepared By: VHB

Figure 8.6

2016 Existing Condition Bicycle Volumes
Morning Peak Hour (8:00 AM - 9:00 AM)

GE Headquarters Project
Boston, Massachusetts

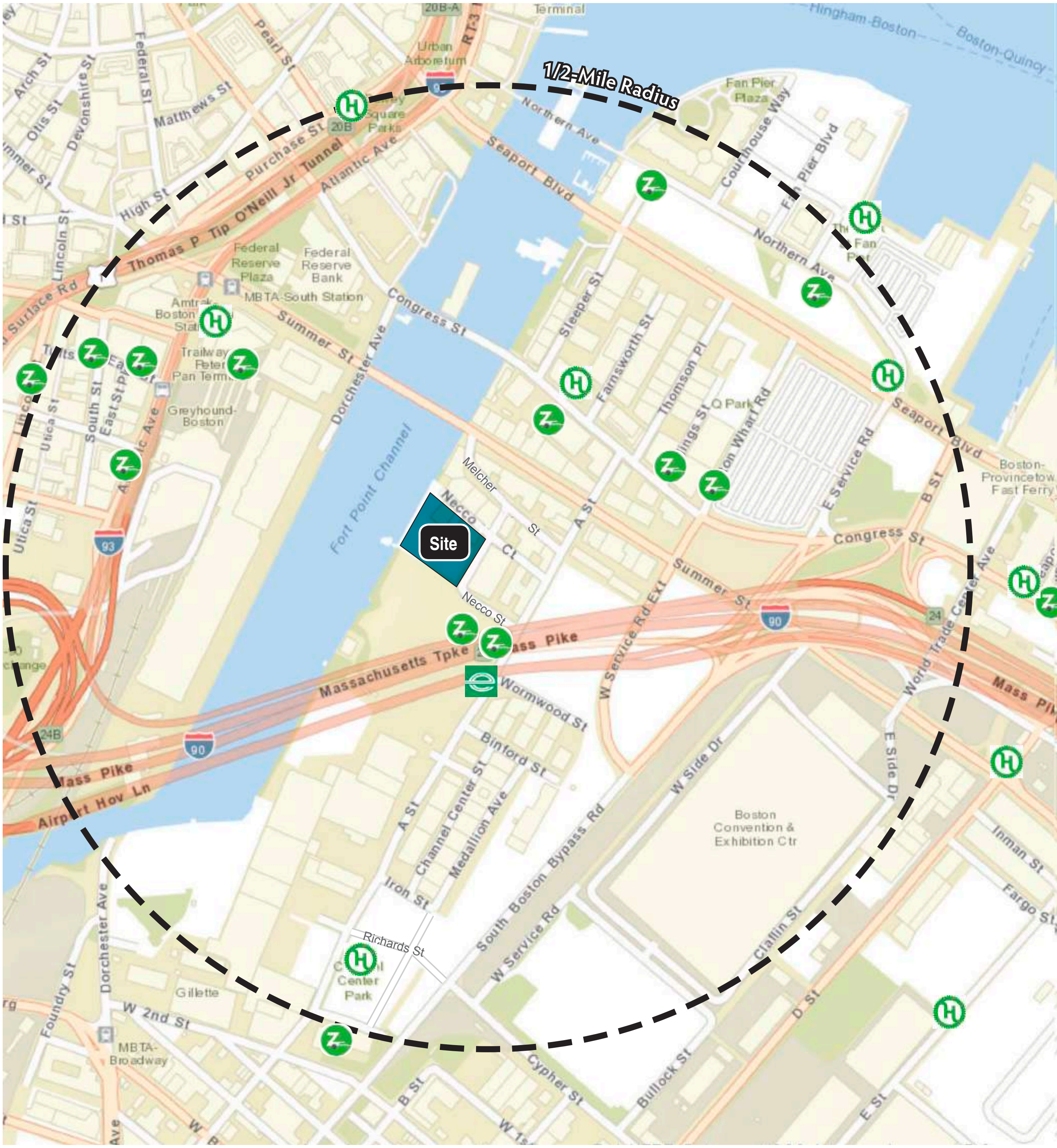


Prepared By: VHB

Figure 8.7

2016 Existing Condition Bicycle Volumes
Evening Peak Hour (5:00 PM - 6:00 PM)

GE Headquarters Project
Boston, Massachusetts



0 400 800 Feet

Source: ArcGIS World Street Map

Hubway

Zipcar

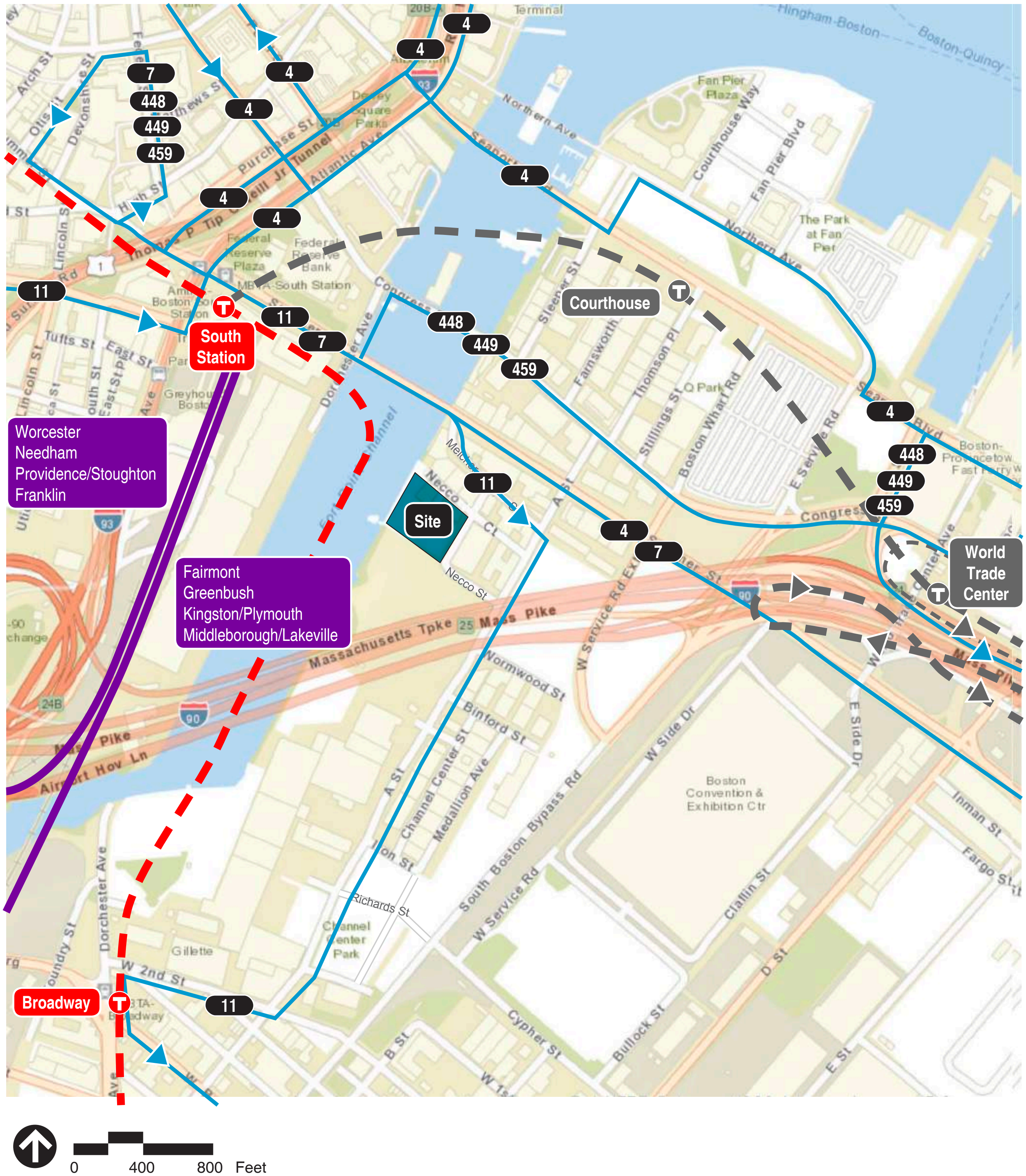
Enterprise

Prepared By: VHB

Figure 8.8

2016 Existing Bikeshare and Carshare Stations

GE Headquarters Project
Boston, Massachusetts



Source: ArcGIS World Street Map

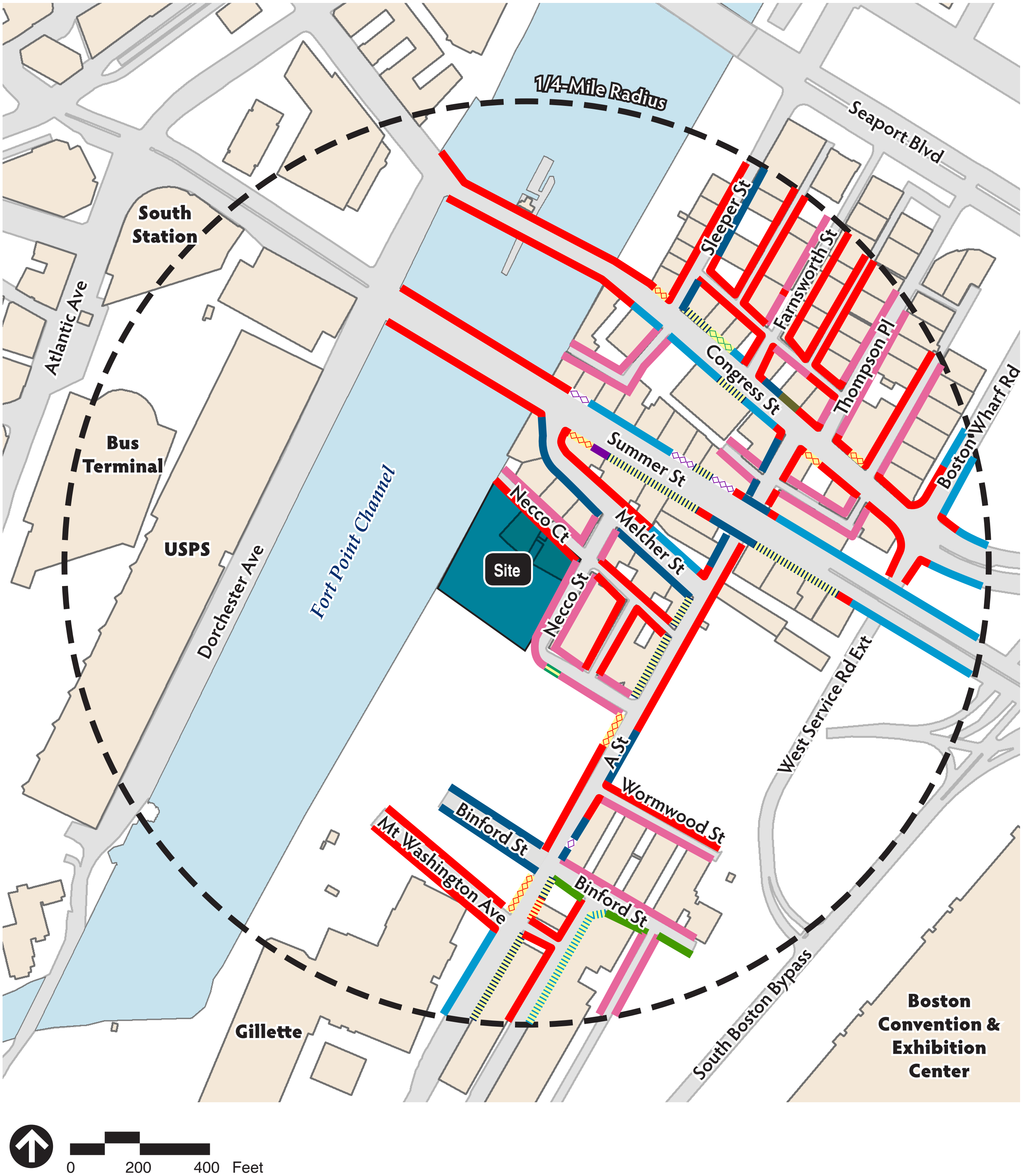
Prepared By: VHB

- Commuter Rail
- Red Line
- Silver Line
- Bus Route

Figure 8.9

Public Transportation

GE Headquarters Project
Boston, Massachusetts



Source: BWSC

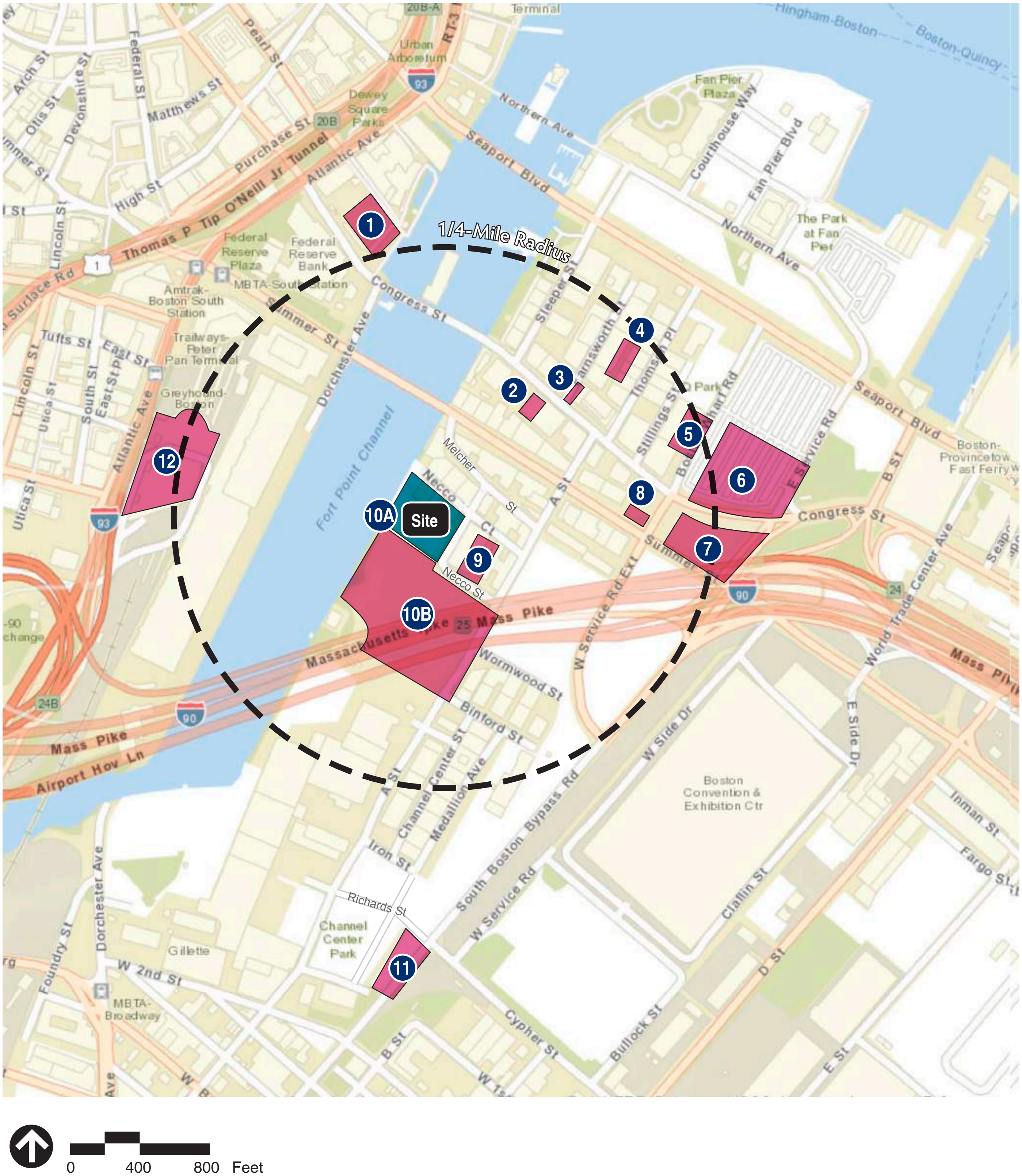
- No Parking
- Resident Only
- Metered - 2-Hour
- 2-Hour, Daytime/ Residential, Overnight
- Handicapped
- Private
- Bus Stop
- Loading
- Valet
- Hubway
- Zipcar
- Unregulated
- 15-Minute

Prepared By: VHB

Figure 8.10

On-Street Parking

GE Headquarters Project
Boston, Massachusetts



Source: ArcGIS World Street Map

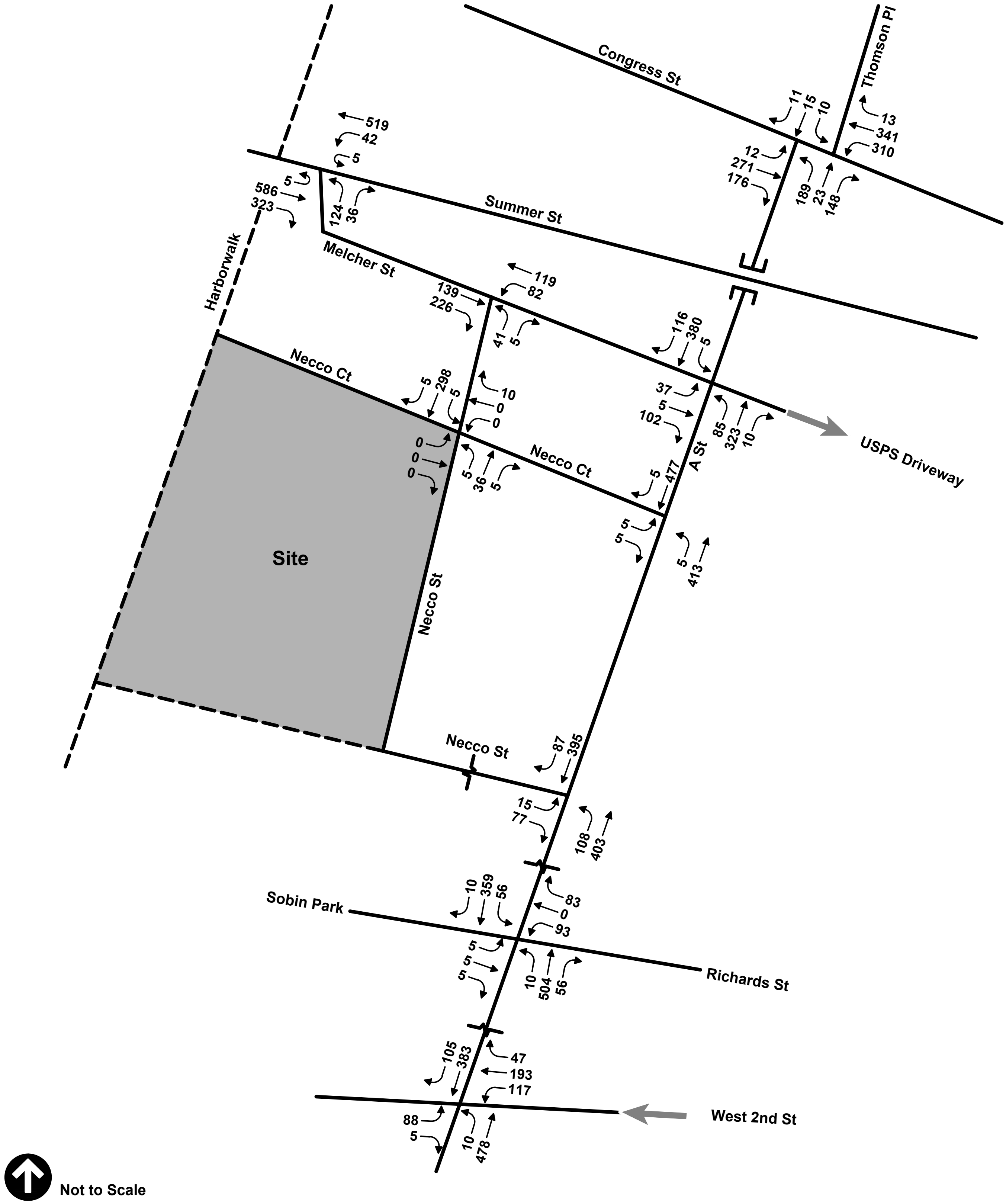
1 Russia Wharf
2 Congress Street Lot #1
3 Congress Street Lot #2
4 Farnsworth Garage
5 Stillings Garage
6 Seaport Lot #1
7 Seaport Lot #2
8 Congress Street Lot #3
9 Necco Garage
10A Necco Lot (Site)
10B Necco Lot (to Remain)
11 Channel Center Garage
12 South Station Garage

Prepared By: VHB

Figure 8.11

Off-Street Parking

GE Headquarters Project
Boston, Massachusetts

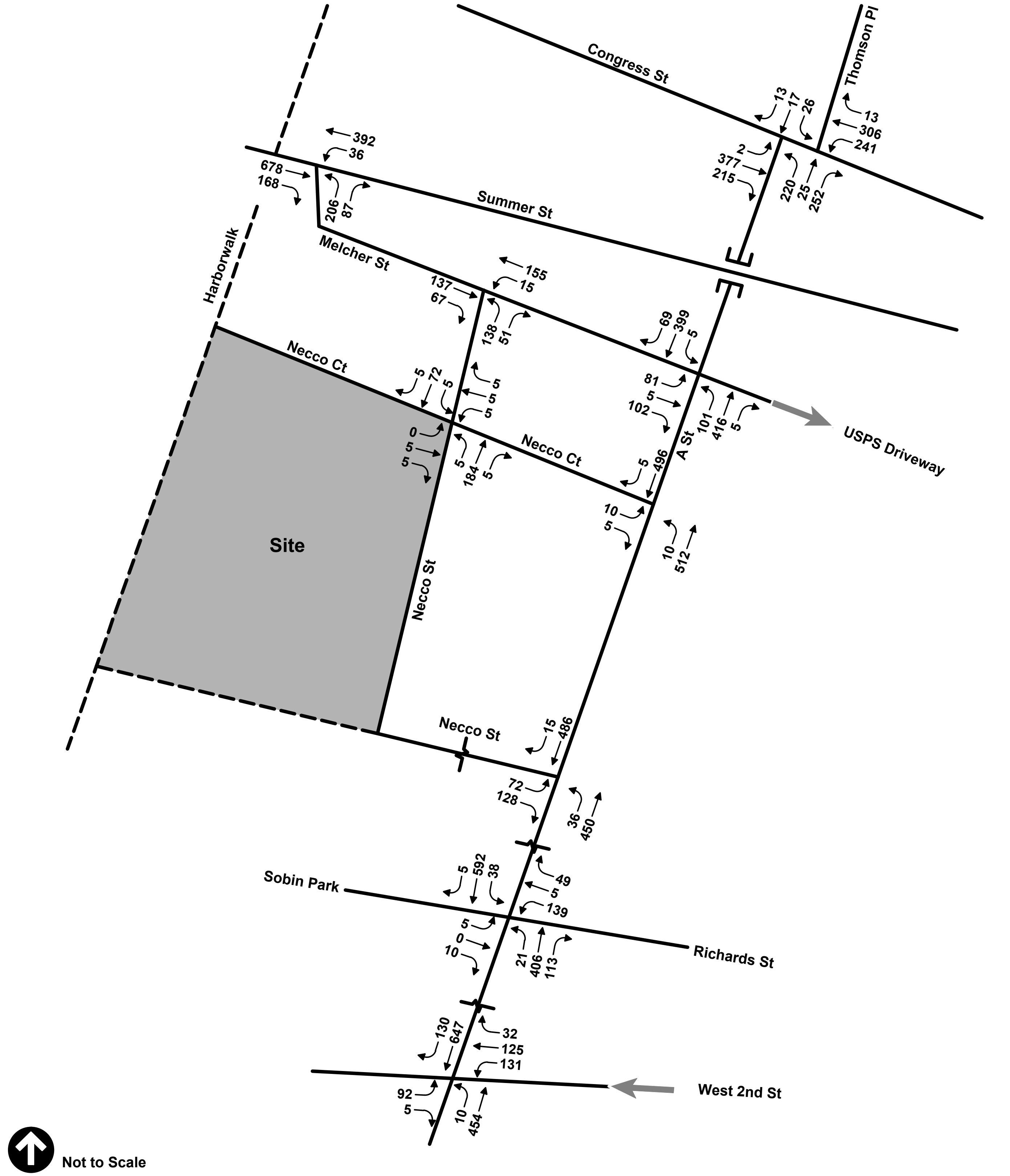


Prepared By: VHB

Figure 8.12

2021 No-Build Condition Traffic Volumes
Morning Peak Hour (8:00 AM - 9:00 AM)

GE Headquarters Project
Boston, Massachusetts

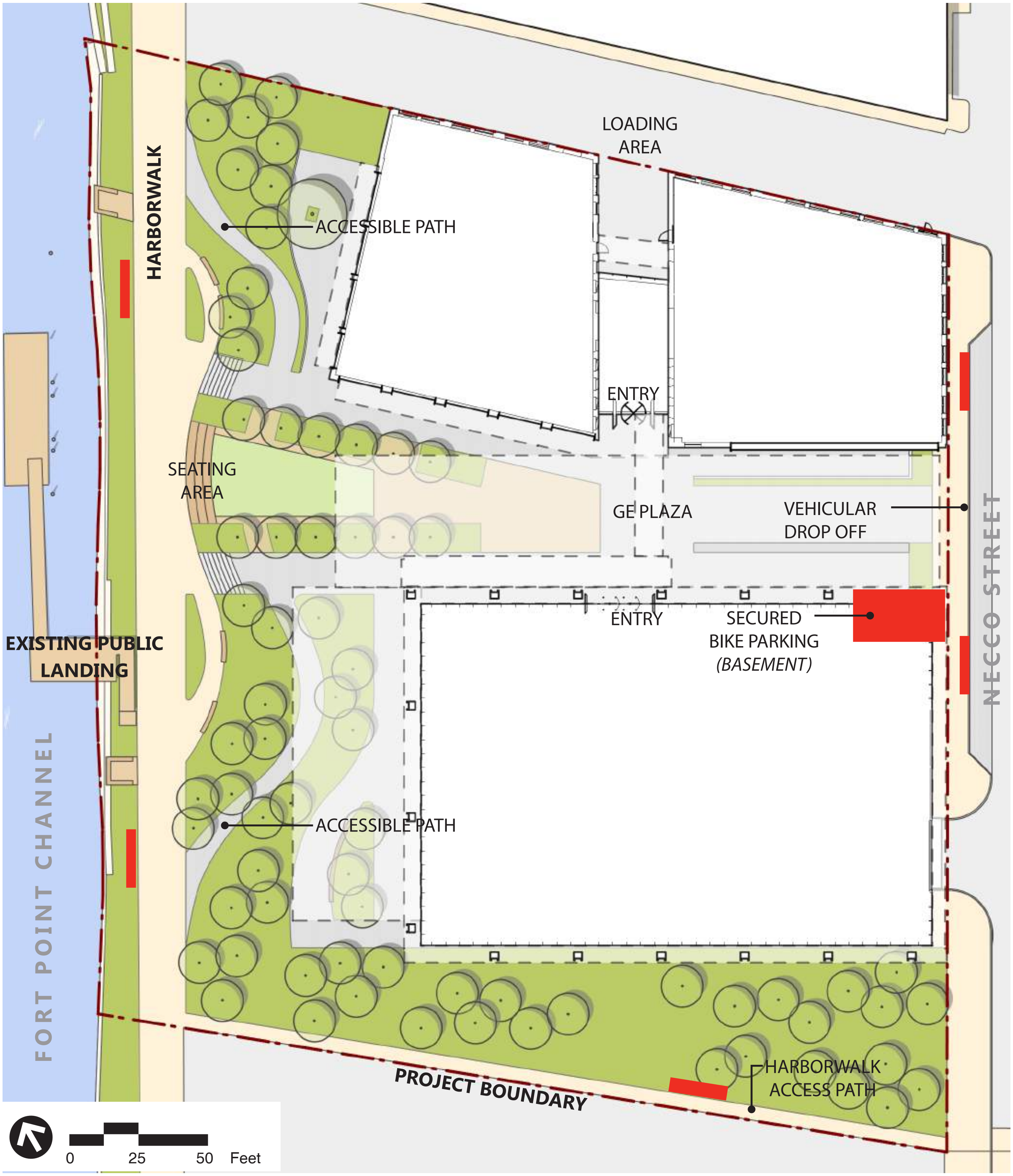


Prepared By: VHB

Figure 8.13

2021 No-Build Condition Traffic Volumes
Evening Peak Hour (5:00 PM - 6:00 PM)

GE Headquarters Project
Boston, Massachusetts



Source: OJB

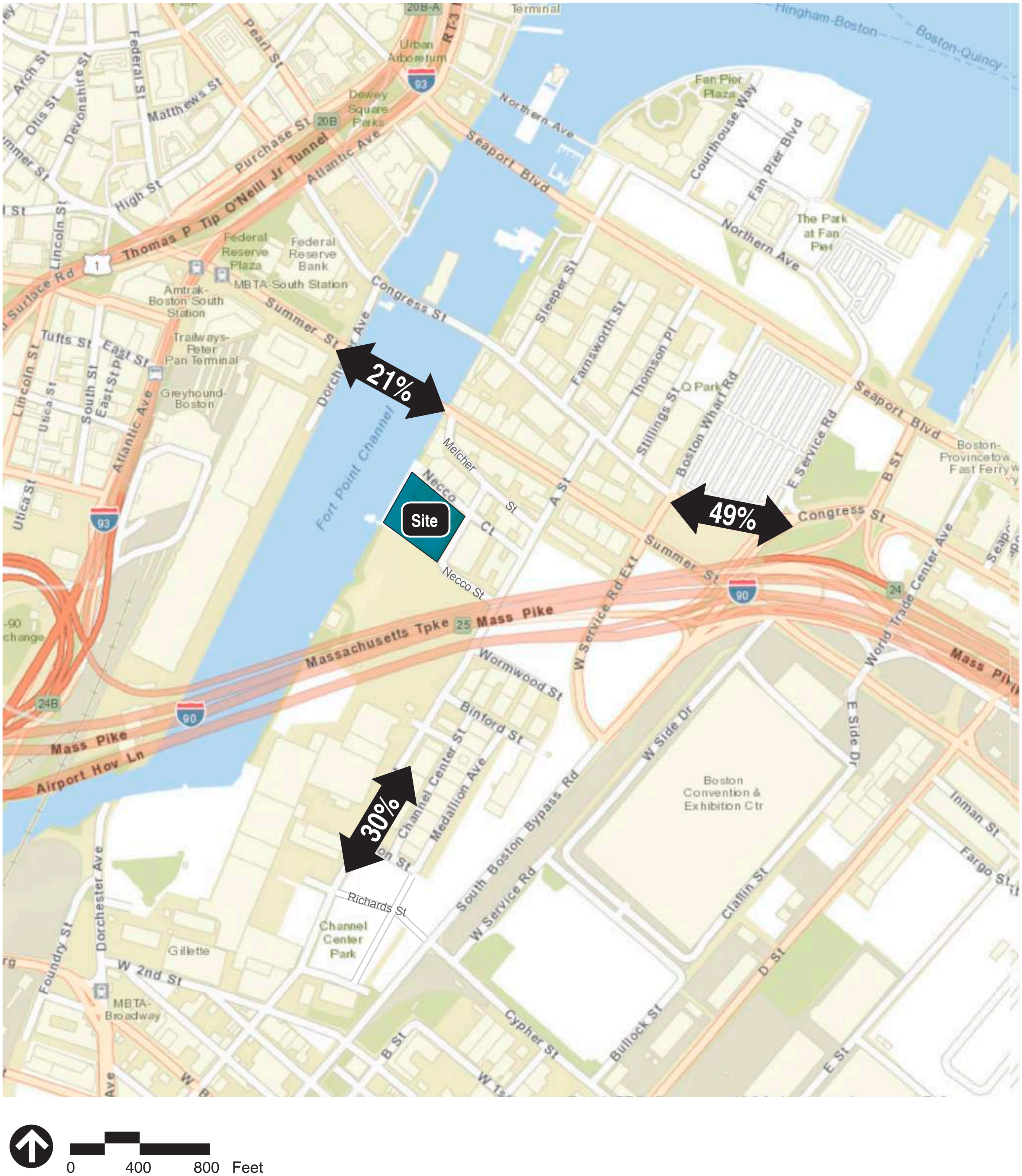
Bike Parking

OJB

Figure 8.14

Site Plan

GE Headquarters Project
Boston, Massachusetts



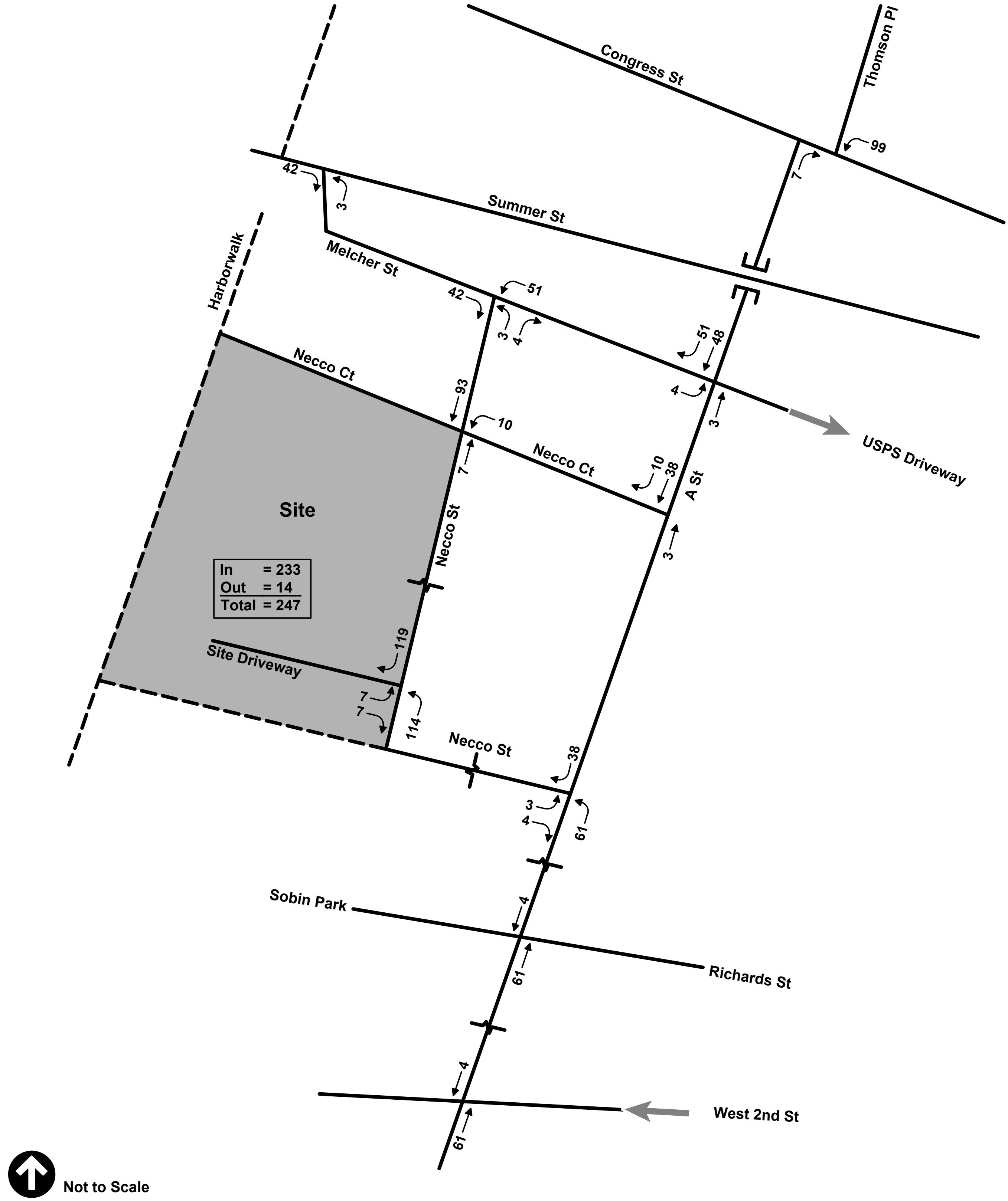
Source: ArcGIS World Street Map

Prepared By: VHB

Figure 8.15

Regional Trip Distribution

GE Headquarters Project
Boston, Massachusetts



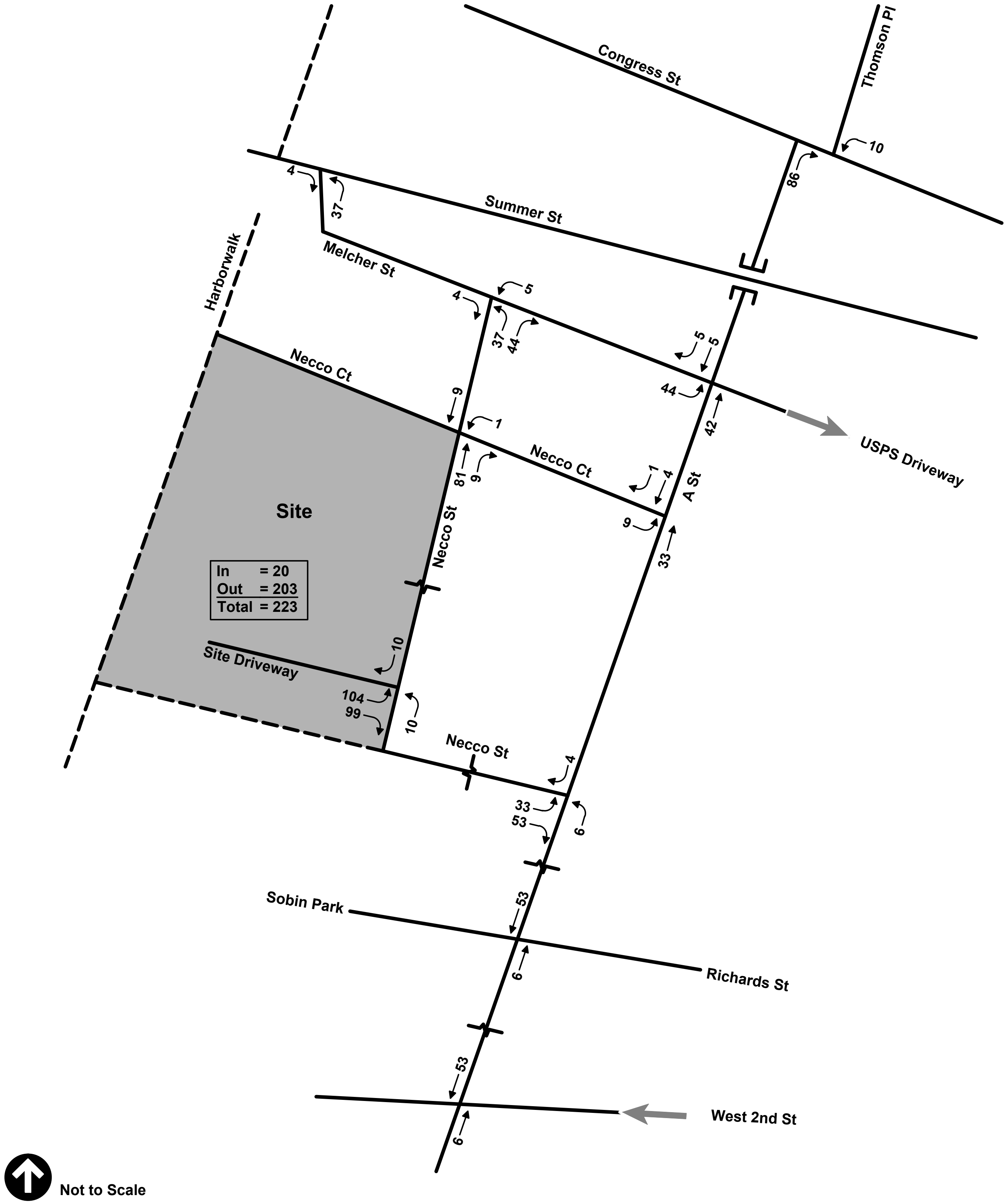
Volumes not balanced on Necco Street north and south of the Site driveway due to trip credit from a reduction of the existing parking supply on the Project Site.

Prepared By: VHB

Figure 8.16

Project Generated Trips
Morning Peak Hour

GE Headquarters Project
Boston, Massachusetts



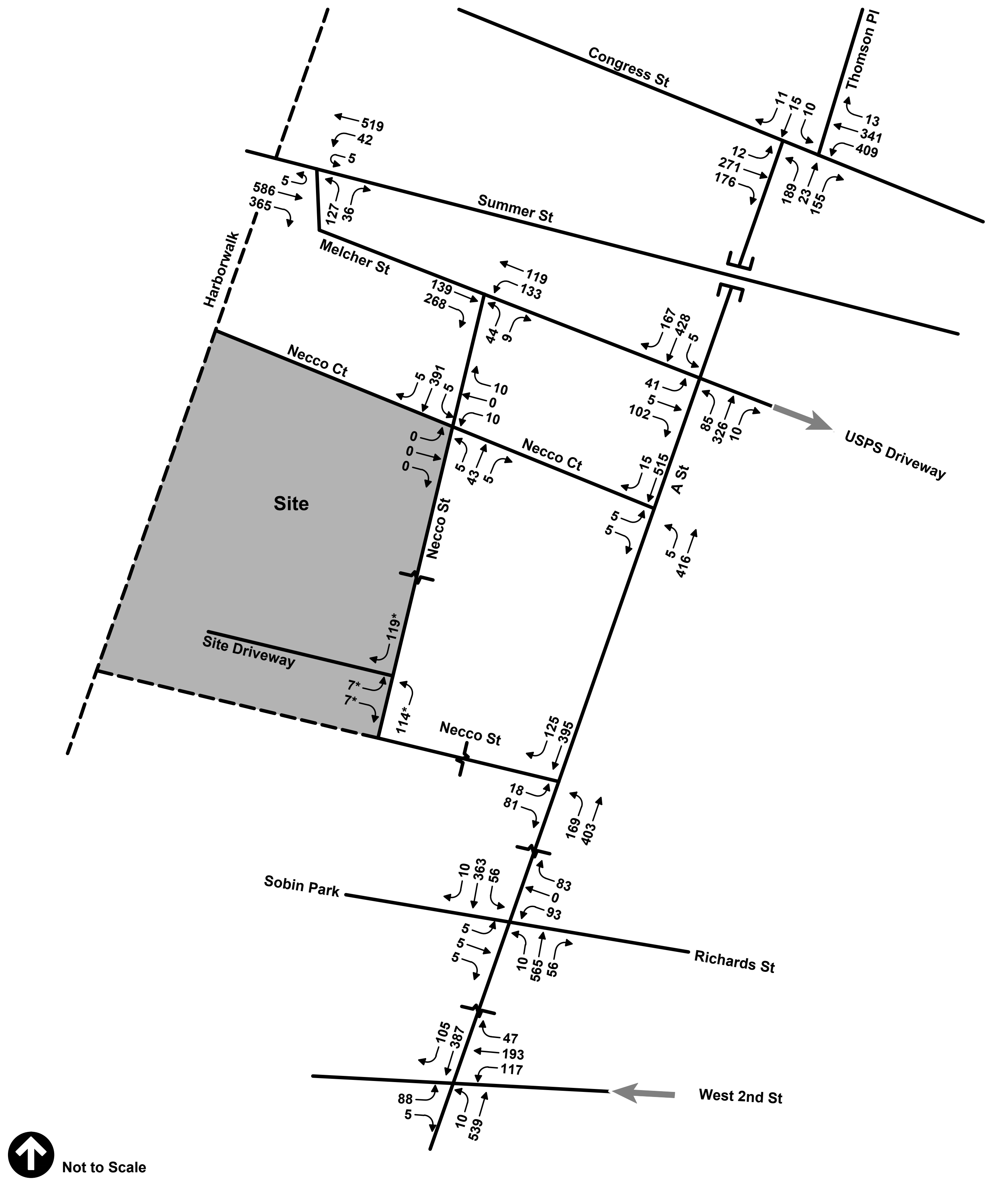
Volumes not balanced on Necco Street north and south of the Site driveway due to trip credit from a reduction of existing parking supply on the Project Site.

Prepared By: VHB

Figure 8.17

Project Generated Trips
Evening Peak Hour

GE Headquarters Project
Boston, Massachusetts



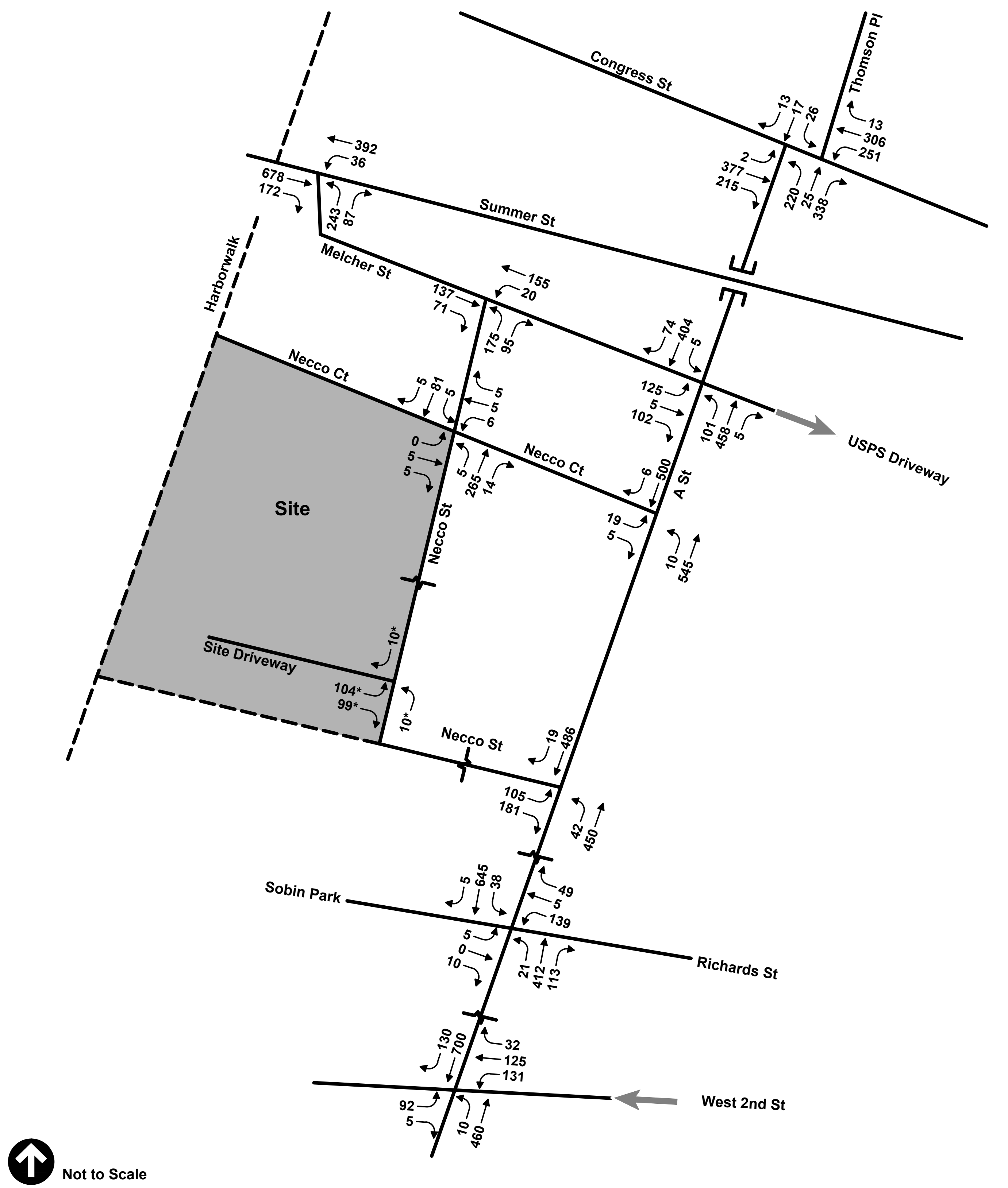
*Project generated volumes only

Prepared By: VHB

Figure 8.18

2021 Build Condition Traffic Volumes
Morning Peak Hour (8:00 AM - 9:00 AM)

GE Headquarters Project
Boston, Massachusetts



*Project generated volumes only

Prepared By: VHB

Figure 8.19

2021 Build Condition Traffic Volumes
Evening Peak Hour (5:00 PM - 6:00 PM)

GE Headquarters Project
Boston, Massachusetts

9

Greenhouse Gas Emissions Assessment

9.1 Introduction

The EEA has developed the current MEPA Greenhouse Gas Emissions Policy and Protocol (the "MEPA GHG Policy"), which requires project proponents to identify and describe feasible measures to minimize related mobile and stationary source GHG emissions. Greenhouse gases ("GHG") include several air pollutants such as Carbon Dioxide ("CO_2"), methane, hydrofluorocarbons, and perfluorocarbons. This evaluation makes use of the terms CO_2 and GHG interchangeably.

As described more fully in Chapter 4, *Sustainability/Green Design and Climate Change Resiliency*, in 2005 GE set targets to reduce its GHG emissions. By 2014, a 31 percent reduction from a 2004 baseline was accomplished surpassing GE's target. GE's 2020 goals include reductions in GHG emissions from a 2011 baseline.

The GHG emissions assessment presented in this chapter demonstrates that the Project has been designed to support GE's 2020 GHG emissions reductions goals as well as those set by both the State and City of Boston. This assessment also satisfies the MEPA GHG Policy because it estimates potential Project-related GHG emissions, and incorporates reasonable and feasible mitigation measures to reduce such emissions for the Build Condition. Appendix I provides the complete building model results and other materials in support of the GHG assessment.

9.2 Key Findings and Benefits

Key findings and benefits related to GHG emissions include:

- The Project will achieve reductions in both stationary source and mobile source GHG emissions consistent with the MEPA GHG Policy.
- Through urban infill development with dense, high-efficiency buildings and reduced single-occupancy vehicle trips through promotion of the use of alternative modes of transportation, the Project will result in significantly less GHG emissions than a suburban "greenfield" development.
- By using the LEED™ version 4 ("v4") rating system as a tool to inform the sustainable design, construction, and operations of the Project, the Proponents are providing a greater emphasis on energy efficiency compared to the current/required version ("LEED 2009", or "version3").
- Through the use of LEEDv4 and energy performance targets, the Project will meet the current Stretch Energy Code requirements, where applicable (i.e., achieve at least a 20 percent overall reduction in annual energy use compared to a baseline

using requirements of ASHRAE 90.1-2007). The Proponents have also considered additional energy efficiencies likely required to meet the future Stretch Energy Code (i.e. approximately 15 percent more efficient than the IECC2012 and ASHRAE standard 90.1-2010).

- Based on preliminary building energy models, the Project will achieve an estimated 26.7 percent reduction in stationary source CO_2 emissions by reducing overall energy consumption by approximately 27 percent through the implementation of energy optimizing building design and systems. (Note, the percentages of energy use are different than emission reductions due to emissions conversion factors.)
  - The estimated energy use reduction for the New Building is 29.9 percent, which equates to a 29.1 percent reduction in stationary source CO_2 emissions when compared to the Base Case.
  - The estimated energy use reduction for the Brick Buildings is approximately 19.8 percent, which equates to approximately 20.0 percent reduction in stationary source CO_2 emissions when compared to the Base Case.
- While not accounted for in the preliminary energy model, the Proponents will continue to consider and evaluate additional measures to further reduce stationary source GHG emissions, such as operational measures (e.g., continuous building system optimization and energy tracking for the life of the Project). Also, the Project will not preclude the possibility of Zero Net Energy ("ZNE") as technology advances.
- A reduction in mobile source GHG emissions is expected with the implementation of a robust TDM Plan.

9.3 Phase 1 Project Impacts

As described in Chapter 1, *Project Description and Alternatives*, the Phase 1 Project includes the renovation of the Brick Buildings for which the Proponents are requesting a Phase 1 Waiver under MEPA and its implementing regulations.

Based on preliminary building energy modeling, the Phase 1 Project is projected to generate approximately 486.6 tons per year ("tpy") in CO_2 emissions, which represents an approximately 20 percent reduction compared to the Base Case. This reduction in stationary source GHG emissions is a result of approximately 19.8 percent energy efficiency for the Phase 1 Project. Refer to Table 9-1 for a summary of proposed building improvements and Table 9-2 for the estimated energy savings and associated stationary source CO_2 emissions reductions.

For mobile source GHG emissions, the Phase 1 Project is projected to generate approximately 808 unadjusted (252 adjusted) daily vehicle trips. These trips do not exceed any transportation-related review thresholds under MEPA. The overall GHG mobile source emissions for the Project are 368.2 tpy, including an estimated 7.5 tpy savings due to the proposed TDM measures.

9.4 Regulatory Context

The following sections provide an overview of the state and local regulatory context related to energy efficiency and GHG emissions.

9.4.1 MEPA Greenhouse Gas Emissions Policy and Protocol

MEPA GHG Policy is an initiative that requires project proponents to identify and describe feasible measures to minimize both mobile and stationary source GHG emissions generated by their proposed project(s). Mobile sources are vehicles traveling to and from a project. Stationary sources are on-site boilers, heaters, and/or internal combustion engines (direct sources) as well as the consumption of energy in the form of fossil fuels (indirect sources) and electricity. GHGs include several air pollutants, including CO_2, methane, hydrofluorocarbons, and perfluorocarbons.

The MEPA GHG Policy states that all projects undergoing MEPA review requiring the submission of an EIR must quantify the project's GHG emissions and identify measures to avoid, minimize, or mitigate such emissions. In addition to quantifying project-related GHG emissions, the MEPA GHG Policy requires proponents to quantify the effectiveness of proposed improvements in terms of energy savings and therefore potential emissions reductions. The goal of the MEPA GHG Policy is to identify and implement measures to minimize or reduce the total GHG emissions anticipated to be generated by that respective project.

9.4.2 State Stretch Energy Code

As part of the *Green Communities Act of 2008*, Massachusetts developed the optional Stretch Energy Code that gives municipalities the option to enact a more strenuous energy performance code for buildings than the conventional state building code. The Stretch Energy Code increases the energy efficiency code requirements for new construction (both residential and commercial) and for major residential renovations or additions in municipalities that adopt it.

The current Stretch Energy Code requires projects to achieve, at minimum, 20 percent energy efficiency compared to the state's energy code (the "Base Energy Code") by either meeting the performance standard of 20 percent better than ASHRAE 90.1 2007, or using a prescriptive energy code. On July 1, 2014, the IECC[1] 2009 and ASHRAE 90.1-2007 ceased to be a code option for non-Stretch Energy Code communities, and the IECC 2012 and ASHRAE standard 90.1-2010 became the new/updated state-wide Base Energy Code. While the updated Stretch Energy Code requirements remain uncertain it is assumed that the City of Boston will automatically adopt any future updates to the Stretch Energy Code. The Massachusetts Department of Energy Resources ("DOER") has

1 The International Energy Conservation Code ("IECC") is a building energy code created by the International Code Council. It is a model code adopted by many state and municipal governments in the United States for the establishment of minimum design and construction requirements for energy efficiency, and is updated on a three year cycle. Since July 1, 2010, the baseline energy conservation requirements of the MA State Building Code defaulted to the latest published edition, currently the IECC 2012, with Massachusetts amendments as approved by the Board of Building Regulations and Standards.

gone through a comprehensive research study that compares building types across the US utilizing ASHRAE 90.1 – 2010 and developed guidance for addressing the pending Stretch Energy Code updates in MEPA GHG assessments. This guidance suggests the Base Case should be equivalent to the minimum requirements of ASHRAE 90.1-2010 and the energy performance goals for proposed projects should aim to be at least 12-15 percent better than the Base Case. This approach results in a more stringent Base Case than what is required under the current Stretch Energy Code.

9.4.3 Greenovate Boston Climate Action Plan

In 2010, the Boston Climate Action Leadership Committee and Community Advisory Committees presented the City's first climate action plan: *Sparking the Climate Revolution 2010*. The report contained wide-ranging recommendations for reducing Boston's contribution to climate change, addressing the changes we cannot avoid, and engaging the Boston community in the effort. Following an update in 2011, which set a goal of reducing GHG emissions by 25 percent by 2020 (*A Climate of Progress*), Mayor Walsh released the *Greenovate Boston 2014 Climate Action Plan Update*, which reported on the City's progress towards reducing GHG emissions and preparing for the impacts of climate change. This report documents that, since 2005, community-wide GHG emissions have decreased by 17 percent, and the City of Boston has made significant progress preparing for climate change. The City, through the BRA, uses the Article 80 Development Review process to include an assessment of likely effects of climate change in new development.

9.5 Stationary Source GHG Emissions Assessment

The GHG stationary assessment estimates CO_2 emissions associated with the Project-related stationary sources, such as fuel burning and estimated building electrical/gas consumption, as required by the MEPA GHG Policy. A MEPA GHG Policy-compliant building energy model software (Energy Plus) was used to develop a baseline case (the Project designed to meet minimum energy code requirements) to compare to a design case (the Project designed with energy reduction measures and strategies, or mitigation measures) in order to document anticipated energy use and stationary source CO_2 emissions reductions based on preliminary design.

Compliance with the MEPA GHG Policy will be met by providing a level of commitment to energy reduction measures and strategies in the form of a draft Letter of Commitment that documents the targeted energy use and stationary source GHG emissions percent reductions (refer to Chapter 11, *Section 61 Findings* for a draft Letter of Commitment). As the Project design advances, the Proponents will continue to test energy conservation measures/strategies and/or an energy performance standard for the Project to meet or exceed these targets where possible.

9.5.1 Methodology

To provide for energy efficiency and reduced stationary source GHG emissions, the Proponents have evaluated the following key planning and design criteria:

1. Strategies to reduce overall energy demand through appropriate building design and sizing of building systems;
2. Evaluation and incorporation, where feasible, of cost-effective energy-optimizing and high-performance systems; and
3. Consideration of the ability to supplement required energy demand with self-generated energy (i.e., on-site clean and/or renewable energy source).

The Project was modeled with the proposed building geometry, HVAC system type, occupancy schedule, and ventilation rates.

Direct stationary source CO_2 emissions include those emissions from boilers, heaters, and internal combustion engines. Indirect stationary source CO_2 emissions include emissions from the consumption of electricity, heat, or cooling from off-site sources, such as electrical utility or district heating and cooling systems. The direct and indirect stationary source CO_2 emissions are calculated using the computer-based Energy Plus model based on the Project's building elements, such as (but not limited to) the specific type of use(s) and users of the buildings, building configuration and architecture type, building envelope (walls/windows), interior fit-out (where known), and HVAC system and equipment efficiency ratings.

The GHG mitigation measures relate to construction materials, architecture, and the heating and cooling processes. The following sections present the specific proposed building improvements in these respects (and their correlating Energy Plus modeling parameters for reference, where applicable) included as part of the Project for the purpose of this analysis. The stationary source GHG emissions reduction goals established by this preliminary assessment will be used to guide final building design.

Energy Plus Model and Analysis Conditions

Energy modeling for the Project was performed utilizing DOE-2 based freeware Energy Plus.[2]

The estimated amount of consumed energy according to the Energy Plus model was converted into an estimated amount of CO_2 emitted using the standardized conversion factors.[3] In accordance with guidance issued by DOER for MEPA GHG assessments to address the pending Stretch Energy Code updates, the baseline case assumes the

2 Energy Plus is an industry proven software package that has a large user base in the United States. It is a robust software package with capabilities of analyzing complex buildings and building systems. This is an approved software of the IRS and, therefore, is also compliant with the MEPA GHG Policy. http://www.energy.gov/eere/buildings/qualified-software-calculating-commercial-building-tax-deductions

3 726 lb CO2/MWh was used to convert electricity consumption into CO2 emissions (2014 ISO-New England Marginal Emissions Report, Annual Average Value, Table 5-2). 117 lb CO2/MMbtu was used to convert natural gas consumption into CO2 emissions (The Energy Information Administration Documentation for Emissions for GHG).

minimum requirements of ASHRAE 90.1-2010 and the energy performance goals for the Project aim to be at least 15 percent better than a baseline case.

The stationary source GHG emissions assessment calculates CO_2 emissions for each component of the Project for the following two build conditions:

- Build Condition with Baseline Energy Code (the "Base Case"): assuming typical construction materials and building equipment/systems that meet the minimum requirements of the current Base Energy Code that reflects IECC 2012 and ASHRAE 90.1-2010 standards.
- Build Condition with Stretch Energy Code (the "Design Case"): assuming building design and system improvements to achieve a minimum 15 percent energy use savings in order to meet or exceed the pending Stretch Energy Code requirements.

9.5.2 Future Stationary Source GHG Emissions

The Project, as described more fully in Chapter 1, *Project Description and Alternatives*, includes two Project Components for building energy modeling purposes: The Brick Buildings and the New Building. [4] Descriptions of the noteworthy building improvements and resulting building energy savings and stationary source GHG emissions reductions for each of the Project Components is presented below. Specific improvements may be subject to design modification, as needed, to achieve the desired GHG emissions reductions for the final building program and design. Other beneficial improvements or measures that are expected to result in further reductions of stationary source GHG emissions, but were not accounted for by the Energy Plus Model, are also discussed.

Energy Conservation Approach Overview

Energy efficiency is as a key objective of the Project with an aspiration for ZNE through adaptive measures over the life of the Project. Site planning and design strategies focus on the building envelope, building mechanical systems, lighting, and ongoing operations. Systems analyses will continue to be conducted throughout design development to determine what will best serve the Project in terms of energy efficiency while providing flexibility in space usage and plug load demand over the life of the Project. Clean and/or renewable energy sources are also being evaluated to further offset energy demand from the grid. As described more fully below, GE is committed to installing a solar photovoltaic ("PV") system as part of the Project. Also, the Proponents are currently working with utility providers to better understand available alternative energy sources.

As discussed in Chapter 4, *Sustainability/Green Building and Climate Change Resiliency*, targets for energy conservation and stationary source GHG emissions reductions have been established. The Proponents are striving for energy

4 Under both the Base Case and Design Case, the Brick Buildings are considered as one building because they will be connected by a new shared lobby on the ground floor and an elevated skywalk, and will have shared building mechanical systems.

performance to be within the top quintile of building performance in 2018 for the New Building (based on energy benchmarking and building energy performance data for similar project types in similar climates, projected out to the year of occupancy, as described in Chapter 4). Energy modeling based on the design concept indicate this goal and the Energy Use Intensity ("EUI") targets of 38.5 for the New Building and 56.3 for the Brick Buildings (Table 4-1) are likely achievable. As presented below in Table 9-6, the as-modeled EUIs for the New Building and Brick Buildings are 39.5 and 61.2 kBTU/SF, respectively. While the overall average EUI is within 3 percent of the target, with the continued evaluation of strategies to optimize energy use demand and renewable strategies, it is expected both buildings will meet or exceed the EUI targets.

The strategies below are part of the Design Case for the building energy modeling. The building energy model demonstrates that the Project would result in an estimated energy savings of 27.0 percent equating to a 26.7 percent reduction in Project-related GHG emissions.

Building Envelope

- Improve building envelope through higher R-value insulation in walls, roof, and, if appropriate, basement walls and ceiling
- Install lower U-value windows to improve envelope performance
- Incorporate window glazing to balance and optimize daylighting, heat loss, and solar heat gain performance

Building Mechanical System and Lighting

- Install high-efficiency HVAC systems and premium efficiency motors
- Use energy efficient boilers, heaters, furnaces, or generators
- Include heat recovery ventilation units (with regenerative desiccant beds)
- Install high efficiency lighting, including CFLs and LED technology as appropriate

The following sections present the building energy model results for each project component.

Brick Buildings

Table 9-1 below presents a summary of the improvements included in the energy model for the Brick Buildings. Key energy savings features include a high efficiency HVAC system, high efficiency boilers, and lighting savings in the form of lower power densities.

Table 9-1 Brick Buildings Key Model Assumptions

Modeling Parameter	Base Case[1]	Design Case
Building Envelope		
External Walls	Existing Brick Masonry	Existing Brick Masonry
Roof	Existing Warehouse Roof (R-15)	Minimum R-30 continuous insulation
Slab Insulation	NONE	NONE
Fenestration and Shading		
Assembly U-value (Existing Construction)	0.62 (CBECS Pre-1980 CZ5a Window Construction)	0.3
Assembly U-value (New Construction)	0.45 (90.1-2010)	0.3
Assembly SHGC (Existing Construction)	0.41 (CBECS Pre-1980 CZ5a Window Construction)	0.25
Assembly SHGC (New Construction)	0.4 (90.1-2010)	0.25
Overall % Window to Wall Ratio	35%	35%
Overall % Skylight to Roof Ratio	3.5%	13.3%
HVAC (Air-side)		
HVAC System	Packaged VAV with Reheat	VAV with Reheat
	Air-side Economizers	Dual Enthalpy Economizers
HVAC (Water-side)		
Boiler Efficiency	82%	90%
DX Efficiency/Chiller Efficiency	1.22 kW/ton (9.8 EER)	0.576 kW/ton
Lighting		
Lighting Power Density (LPD)	1.15 W/SF (80% Office @ 0.98 W/SF, 20% Lab @ 1.81 W/SF)	0.54 W/SF (80% Office @ 0.5 W/SF, 20% Lab @ 0.7 W/SF)
Daylighting Control	NONE	NONE
Plug Loads		
Equipment Power Density (EPD)	1.65 W/SF	10% Reduction Per Energy Star Equipment

1 The Base Case represents current Base Energy Code IECC 2012 and ASHRAE 90.1-2010 standards.

The total estimated annual electricity use, natural gas consumption, and associated emissions for the Existing Building is presented in Table 9-2 below.

Table 9-2 Brick Buildings Stationary Source CO_2 Emissions

	Energy Consumption			CO_2 Emissions		
	Electricity (kBtu/yr)	**Natural Gas (kBtu/yr)**	**Total (kBtu/yr)**	**Electricity (tons/ yr)[1]**	**Natural Gas (tons/ yr)**	**Total (tons/ yr)**
Base Case	4,377,086	2,440,828	6,817,914	465.5	142.8	608.3
Design Case	3,480,281	1,989,980	5,470,261	370.2	116.4	486.6
End-Use Savings	896,805	450,848	1,347,653	95.3	26.4	121.7
Percent Savings			**19.8%**			**20.0%**

tons/yr = short tons per year

Under the Base Case, the CO_2 emissions are estimated to be 608.3 tons per year. With the building design and system improvements, the estimated energy use reduction for the Brick Buildings is approximately 19.8 percent, which equates to an approximately 20.0 percent reduction (121.7 tpy) in stationary source CO_2 emissions when compared to the Base Case. The stationary source CO_2 emissions percent reduction for the Brick Buildings under the Design Case was quantified as follows: 121.7/608.3 = = 0.2000 x 100 = 20.0%.

$$\textit{Reduction \%} = \frac{\textit{Emissions Reductions Due to Project Improvements (End Use Savings)}}{\textit{Project-Generated Emissions (Base Case Emissions)}}$$

This methodology is applied consistently to the building design and system to determine the percent reduction of stationary source emissions and energy savings.

New Building

Table 9-3 below provides a summary of the proposed building improvements assumed for the New Building. Key energy savings features include more efficient building materials (walls and roof), a high efficiency HVAC system, high efficiency boilers, and lighting savings in the form of lower power densities.

Table 9-3 New Building Key Model Assumptions

Modeling Parameter	Base Case[1]	Design Case
Building Envelope		
External Walls	Steel Framed with R-13 cavity insulation and R-7.5 continuous insulation; Assembly U-value = 0.064	Minimum R-13 + R-10 continuous insulation; Assembly U-value = 0.055
Roof	R-20 continuous insulation above deck; Assembly U-value = 0.048	Minimum R-30 continuous insulation
Slab Insulation	F-0.86 minimum; I.E., R-15 for 24 inches or equivalent	F-0.86 minimum; I.E., R-15 for 24 inches or equivalent
Fenestration and Shading		
Assembly U-value	0.45	0.3
Assembly SHGC	0.40	0.25
Overall % Window to Wall Ratio	40%	70%
HVAC (Air-side)		
HVAC System	VAV with Reheat	Active Chilled Beam
	Air-side Economizers	Dual Enthalpy Economizers
HVAC (Water-side)		
Boiler Efficiency	82%	90% (Actual Design TBD)
Chiller Efficiency	0.576 kW/ton	0.576 kW/ton
Lighting		
Lighting Power Density (LPD)	1.15 W/SF (80% Office @ 0.98 W/SF, 20% Lab @ 1.81 W/SF)	0.54 W/SF (80% Office @ 0.5 W/SF, 20% Lab @ 0.7 W/SF)
Daylighting Control	None	None
Plug Loads		
Equipment Power Density (EPD)	1.65 W/SF	10% Reduction Per Energy Star Equipment

1 The Base Case represents current Base Energy Code IECC 2012 and ASHRAE 90.1-2010 standards.

The total estimated annual electricity use, natural gas consumption, and associated emissions for the New Building are presented in Table 9-4 below.

Table 9-4 New Building Stationary Source CO_2 Emissions

	Energy Consumption			CO_2 Emissions		
	Electricity (kBtu/yr)	Natural Gas (kBtu/yr)	Total (kBtu/yr)	Electricity (tons/ yr)[1]	Natural Gas (tons/ yr)	Total (tons/ yr)
Base Case	14,578,915	2,923,163	17,502,078	1,550.6	171.0	1,721.6
Design Case	10,511,122	1,765,253	12,276,375	1,118.0	103.3	1,221.2
End-Use Savings	4,067,793	1,157,910	5,225,703	432.6	67.7	500.4
Percent Savings			**29.9%**			**29.1%**

1 tons/yr = short tons per year

Under the Base Case, the CO_2 emissions are estimated to be 1,721.6 tons per year. With the building design and system improvements, the estimated energy use reduction for the New Building is 29.9 percent, which equates to a 29.1 percent reduction in stationary source CO_2 emissions when compared to the Base Case (using the same equation as above). This impressive conservation is attributable to the creative and aggressive mitigation strategies employed including an energy efficient HVAC system and progressive lighting densities. The Proponents are committing to much higher window U-value and SHGC to improve the energy use of the building.

Overall Project Emissions (Full Build)

The total estimated annual electricity use, natural gas consumption, and associated emissions for the Project (all buildings combined, or full build out) are presented in Table 9-5 below.

Table 9-5 Stationary Source CO_2 Emissions for the Overall Project (Full Build)

	Energy Consumption (kBtu)			CO_2 Emissions (tons/yr)[1]		
Project Component	Base Case[2]	Design Case	Percent Savings	Base Case[2]	Design Case	Percent Reduction
Existing Building	6,817,914	5,470,261	19.8%	608.3	486.6	20.0%
New Building	17,502,078	12,276,375	29.9%	1,721.6	1,221.2	29.1%
Total	**24,319,992**	**17,746,636**	**27.0%**	**2,329.9**	**1,707.8**	**26.7%**

1 tons/yr = short tons per year
2 The Base Case represents current Base Energy Code IECC 2012 and ASHRAE 90.1-2010 standards.

Under the Base Case, the CO_2 emissions for the Project are estimated to be 2,329.9 tons per year. With the building design and system improvements, the estimated CO_2 emissions are 1,707.8 tons per year which is a savings of 622.1 tons per year. The equivalent estimated energy use reduction for the Project is approximately 27.0 percent, which equates to an approximately 26.7 percent overall reduction in stationary source CO_2 emissions when compared to the Base Case. The reduction in stationary source CO_2 emissions is consistent with the Stretch Energy Code.

9.5.3 Energy Use Intensity

Energy Use Intensity, or EUI, is a tool used to provide a common basis of comparison for energy use for various building uses. It is the total amount of energy used at a project over a one-year period, divided by the square footage of that building and represents the energy consumed by a building relative to its size. Based on a recent US Department of Energy ("DOE") research report, the median EUIs for a prototype Small Office Building (5,500 sf) and Large Office Building (498,640 sf) in the state of Massachusetts are 31.5 kBtu/sf and 72.6 kBtu/sf, respectively, under ASHRAE 90.1-2010.[5] Table 9-6 below provides the as-modeled EUI for each component of the Project under the Base and Design Cases.

Table 9-6 Energy Use Intensity (kBtu/sf-yr)

	Energy Use Index (kBtu/sf-yr)		Percent
Project Component	Base Case[1]	Design Case	Improvement
Brick Buildings	76.3	61.2	19.8%
New Building	56.3	39.5	29.9%

1 The Base Case represents current Base Energy Code IECC 2012 and ASHRAE 90.1-2010 standards.

The EUIs and conditioned areas of the two Project Components fall within the range provided by the two types of prototype offices in the DOE study. Note, the New Building considered 310,925 sf of conditioned space while the Brick Buildings considered 89,320 sf of conditioned space. These EUIs are very close to the EUI targets (56.3 for the Brick Buildings and 38.5 for the New Building, as presented in Table 4-1). The EUI targets do not consider the use of on-site renewable energy, such as solar, which is currently being studied. Therefore, with the continued evaluation of such supplemental energy sources and other strategies to optimize energy use demand, it is expected both the Brick Buildings and the New Building will meet or exceed the EUI targets established for the Project.

5 "Cost-Effectiveness of the ASHRAE Standard 90.1-2013 for the State of Massachusetts". *US Department of Energy*. December 2015.

9.5.4 Other Beneficial Stationary Source GHG Emission Measures

Additional Potential Building Improvements

The following list of beneficial measures were not assumed/quantified in the building energy model, but may be implemented.

Building Envelope

- Maximize the thermal mass of walls, roofs and floor to provide thermal damping
- Conduct inspection and comprehensive air sealing of building envelope to minimize air leakage
- Construct green roofs to reduce heat load on roof, further insulate, and retain/filter rainwater
- Maximize interior daylighting through floor plates, and use of skylights, clerestories and light wells

Building Mechanical System and Lighting

- Prevent over-sizing of HVAC or other equipment by sizing only after efficiency measures have been incorporated to reduce HVAC, lighting and other electrical loads
- Eliminate or reduce use of refrigerants or use next generation refrigerants in HVAC systems
- Use demand control ventilation
- Seal and leak-check all supply air ductwork
- Incorporate motion sensors into lighting, daylighting, and climate controls
- Use efficient, directed exterior lighting, such as LED technology
- Install energy-efficient elevators and escalators

Automated Energy Management System

An automated energy management control system, or EMCS, which has the capacity to:

- Adjust and maintain set points and schedules
- Indicate alarms and problems
- Provide information on trends and operating history
- Operate mechanical and lighting systems to minimize overall energy usage
- Learn use patterns and continuously optimize operations

Building Reuse (Brick Buildings)

There are significant GHG emissions associated with energy expended for new building construction from the materials manufacturing processes and transportation of those building materials as well as from construction equipment. By reusing the Brick Buildings, the Project further reduces GHG emissions by preserving the embodied energy and carbon in the existing building materials. Reuse of the Brick Buildings equates to over 29 million BTUs of energy (or over 250 thousand gallons of gasoline) and approximately 2.5 short tons/year of CO_2 emissions. [6]

Building Commissioning, Energy Use Tracking, and Sub-Metering

The intent of commissioning buildings is to ensure energy performance and improve the performance/efficiency of building systems over the life of a Project resulting in energy savings and associated stationary source GHG emissions benefits. Additionally, tracking energy performance and developing a strategy, or specific energy reduction targets, to maintain efficiency, using tools, such as EPA's Target Finder, will result in improved energy efficiency and reduced stationary source GHG emissions. Peak shaving or load shifting strategies and, if applicable, in demand response program with ISO-New England, are such strategies. It is the Proponents' intent to support and comply with the City's recently adopted Building Energy Reporting and Disclosure Ordinance, which encourages building operators to reduce overall energy use.

The Project's buildings systems will be designed so that spaces can be sub-metered for their electricity use so that energy information can be gathered in discrete spaces throughout the Project. Real-time displays could be used to communicate energy usage to promote energy awareness to building users.

Plug Loads

The Proponents are committed to using Energy Star appliances and equipment where available and reasonably practicable. Energy Star reductions were taken in the Energy Plus modeling in a manner consistent with DOER policy where plug loads are reduced by 10 percent in the Design Case; however, such equipment could result in additional energy savings and reductions in associated stationary source GHG emissions. Compared to standard office equipment (non-Energy Star rated), Energy Star-qualified office equipment imaging products and appliances use 30 to 75 percent less electricity.[7]

Net Zero Energy

GE is committed to working towards a NZE campus over the life of the Project, as technology becomes available. The Project is being designed and constructed towards this goal by, first, reducing energy demand through incorporation of efficient building systems and design elements; second by employing on-site

6 Source: http://thegreenestbuilding.org/

7 According to the Energy Star website: http://www.energystar.gov/index.cfm?c=ofc.

renewable energy sources, such as rooftop solar and third by best management practices through the operations team and staff participation. As the technology becomes available, and operational processes are refined, the Project will continuously improve energy performance toward net zero and beyond.

Water Efficiency/Wastewater Reduction

Water efficiency is not only important for conserving potable water and reducing wastewater generation, but also for reducing energy. Nationally, about four percent of electricity use can be attributed to the treatment of potable water and wastewater, excluding the energy use associated with water heating. GE continues to set and surpass targets to reduce its potable water usage. In 2007, a target was set to reduce global water usage by 20 percent between 2006 and 2012. By 2010, a 30 percent reduction had been realized and by 2014 a 42 percent reduction was realized.

As described further in Chapter 4, *Sustainability/Green Building and Climate Change Resiliency*, this aggressive reduction of water usage will be applied to the Project through the establishment of a Water Use Intensity, or WUI, target. Water conservation goals were set to place the Project in the top quintile in 2018 for building performance for a similar type of building. Potable water demand will be reduced through high-efficiency fixtures and rainwater harvesting to provide toilet flushing and site irrigation. Water reuse, or recycling, will further reduce the potable water needs for the Project. Water reuse systems currently being considered include a reverse osmosis system and a blackwater reuse treatment system.

"Green" Tenant Leases/Guidelines

The Proponents will provide Tenant Design and Construction Guidelines to potential restaurant tenants during the leasing process. The intent of these guidelines is to educate future tenants about implementing sustainable design and construction features in their tenant improvement build-out as well as adopting green building practices that support the overall sustainability goals of the Project. The guidelines will also communicate the sustainable and resource-efficient features incorporated into the Project and provide specific suggested sustainable strategies enabling tenants to coordinate their leased space design and construction with the rest of the Project systems.

In summary, the lease guidelines may include the following information:

› Descriptions of sustainable design, construction, and operations features of the Project, including resource conservation goals and features (i.e., low-flow plumbing fixtures, sub-metered systems, lighting controls) as well as building certifications, such as LEED or WELL.
› Descriptions of current regulatory requirements that pertain to leasable spaces (i.e., Stretch Energy Code, City of Boston energy reporting requirements).

- Information on the various high performance building rating systems, such as EPA's Energy Star, Green Globes, and LEED for Commercial Interiors ("CI") as well as information on how the design case building(s) can contribute towards these certifications.
- A list of approved categories of fit-out materials with performance standards, such as recycled content, regional availability, VOC content limits for adhesives, sealants, paints and coatings, NAUF composite wood materials and CRI and/or FloorScore compliant flooring materials.
- Waste reduction goals and recycling facilities/programs.
- Information on Green Cleaning guidelines/policies.
- Information regarding Project-wide features that aim to encourage alternative transportation and TDM measures.
- Information on how to train/inform maintenance staff and employees on sustainable design/operation features.

9.5.5 Evaluation of Clean/Renewable Energy Sources

A variety of clean and renewable energy sources were evaluated or are currently being evaluated for the Project, including solar, geothermal, steam, wind, and combined heat and power, or CHP. Solar is currently under consideration for the Project as the others have been deemed not applicable or infeasible for the reasons described below.

Solar

The Project will feature a solar PV array on the New Building. Depending on configuration chosen and based on preliminary PV modeling, the solar PV array could achieve up to 450 kW DC ratings and yield up to 567,000 kWh per year in alternative energy production. These energy savings would correlate to approximately 206 tons of CO_2 reduced per year. These estimates are based on available PV module technology, and are not included in the building energy model. Exact system specifications will be further developed as the building design is advanced.

Geothermal

GE evaluated the suitability of utilizing geothermal energy for the Project. The system studied included a heat recovery chiller with closed-loop geothermal wells. Geothermal has been deemed not viable because there is insufficient space within the Project Site for the number of wells required to supply the heating/cooling demand of the buildings.

Wind

Wind electricity generation was considered due to the relatively high average wind speed at this location. However, wind generation is not feasible at this site for several reasons. The only space available for a traditional standalone wind installation on the Project Site is between the GE Plaza and the Channel. This would compromise the pedestrian experience the Project hopes to achieve by increasing ambient noise and creating overhead obstructions in otherwise open space. Further, the space available in this location poses clearance issues for all but very small wind turbines, and due to the urban setting the wind in this location is not suitable for wind production.

Small rooftop wind harvesting systems were also considered for the Project. However, there is very limited rooftop space available for wind harvesters because much of the rooftop space is already allocated to accessible rooftop gardens, solar photovoltaics, or a mechanical penthouse space, and is therefore unavailable for wind turbine installation. One possible location for small wind turbines would be along the northeast ridge of the roof of the main building. However, wind in this location is likely to be obstructed by the proposed solar PV installation and the wall of the rooftop mechanical penthouse or café space, and therefore wind turbines in that location are unlikely to be productive.

Steam

The Project is located outside of the area where access to the district's steam energy is available. Boston's Green Steam Territory does not cross the Channel into the area in which the Project is located.

Combined Heat and Power (Co-Generation)

Co-generation, the combined generation of electricity and heat, will continue to be reviewed as the design progresses. Combined heat and power ("CHP") was considered for the Project; however, CHP was ruled out because it is most favorable when there is a significant year-round heat requirement, but the Project has only seasonal heating needs.

Energy Efficiency Assistance

The Proponents are aware that the Project's electricity and natural gas service providers may potentially offer technical assistance and incentives for implementing energy efficiency measures. By working with these utilities throughout the design process, the Proponents will evaluate additional energy conservation strategies. During this process additional energy savings and associated GHG emissions reductions may be achieved.

The design team has already proposed an energy usage target for the Project that will yield significant energy and water performance improvements over a code-compliant building. The Proponents have engaged energy modeling services and the services of multiple environmental and sustainability consultants to drive the Project to be as energy efficient as possible, having the stated goal to have efficiency within the highest-performing 20 percent of similar new buildings in similar climates in 2018.

The Proponents will participate in the MassSave New Construction Program. This program is designed to incentivize energy efficient design for new commercial, industrial and governmental facilities and major renovations thereof. The Project has already elected to pursue the "Custom" energy performance track, wherein whole-building energy modeling software is used to compare energy usage of the as-designed building to that of a baseline code-compliant reference building. The local utility pays incentives on the basis of the calculated savings between the two. Eversource, the local electricity and natural gas utility, has already awarded this effort to one of its Preferred Vendors.

9.6 Mobile Source GHG Emissions Assessment

Mobile source GHG emissions are based upon traffic volumes, the distance vehicles travel and GHG emission rates. The mobile source emissions are calculated by performing a mesoscale analysis to evaluate the changes in CO_2 emissions for the existing and future conditions within the traffic study area. The GHG mobile source analysis estimates the area-wide CO_2 emissions from vehicle traffic for a period of one year. Mobile source emissions were calculated by performing an annual GHG emissions mesoscale analysis to evaluate the estimated change in CO_2 emissions for the existing and future conditions within the study area.

Analysis Conditions

Consistent with the traffic analysis, the following conditions were analyzed: the 2016 Existing Condition and the 2021 future No-Build and Build Conditions. The analysis compares the future No-Build and Build Conditions in order to identify the anticipated changes in traffic conditions and mobile source GHG emissions as a result of the Project. Where applicable, the Existing Condition is considered for comparison purposes only.

Mobile Source Emission Rates and Inventories

EPA's Office of Transportation and Air Quality ("OTAQ") has developed the Motor Vehicle Emission Simulator ("MOVES").[8] MOVES2014a is EPA's latest motor vehicle emissions model for state and local agencies to estimate GHG and other emissions from cars, trucks, buses, and motorcycles.

All the vehicle emissions used in mobile source GHG analysis were obtained using EPA's MOVES2014a emissions model. MOVES2014a calculates emission factors from motor vehicles in a mass per distance format (often grams per mile) for existing and future conditions and applies these factors to Vehicle Miles Travelled ("VMT") data to obtain emissions inventories. The emissions calculated for this air quality

8 MOVES2014a (Motor Vehicles Emission Simulator), December 2015, US EPA, Office of Mobile Sources, Ann Arbor, MI.

assessment assume the implementation of EPA Tier 3 emission standards, including lowering the sulfur content of gasoline, the effect of heavy-duty engine and vehicle greenhouse gas regulations (2014-2018), and the second phase of light-duty vehicle GHG regulations (2017-2025). It also includes Massachusetts specific conditions, such as the state vehicle registration age distribution and the statewide Inspection and Maintenance ("I/M") Program. These stringent emissions regulation programs often result in smaller emissions inventories with the passage of time when comparing similar scenarios. Input data for the model was obtained from DEP and used Project-specific developed inputs where appropriate.

The MOVES2014a model was run at a project-level to obtain emission factors for each link of the mesoscale analysis. The model was set to calculate the emissions burden by choosing to model emissions processes that are specifically related to vehicles in the study area. Links were created that used the appropriate speeds and grades for each roadway segment.

Traffic Data

The air quality study used traffic data (volumes, delays, and speeds) developed for each analysis condition. The mesoscale analysis for CO_2 emissions considered a yearly traffic volume developed from weekday and weekend periods. The vehicle miles traveled data used in the air quality analysis were developed based on the traffic data analyzed in this report (Chapter 8, *Transportation*).

Existing Mobile Source CO_2 Emissions

Table 9-7 presents CO_2 emissions from mobile sources under all conditions. The calculation of Existing Conditions mobile source emissions provides a base for which future years are evaluated. The mobile source analysis calculated the existing CO_2 emissions from the major roadways in the study area. These CO_2 emissions, estimated to be 7,275.1 tons per year, establish a baseline to which future emissions can be compared. Results are presented in short tons (2,000 lbs.) per year.

Future Mobile Source CO_2 Emissions

Future Project-related mobile source CO_2 emissions calculations are based upon changes in traffic and emission's factor data. The traffic data includes traffic volumes, vehicle miles traveled, roadway operations, and physical roadway improvements. The emission factor data includes emission reduction programs and years of analysis.

The mobile source analysis estimated the future study area CO_2 emissions due to changes in traffic and emission data. Under the No-Build Condition, CO_2 emissions were estimated to be 7,021.4 tons per year. Under the Build Condition, the CO_2 emissions were estimated to be 7,397.1 tons per year.

The total Project-related mobile source GHG emissions are 375.7 tons per year, as presented in Table 9-7. The 375.7 tons per year increase in CO_2 emission represents a 5.4 percent increase in CO_2 emissions for the mesoscale study area for future 2021 conditions.

Table 9-7 Mobile Source CO_2 Emissions Analysis Results (tons per year)

Pollutant	2016 Existing Conditions	2021 No-Build Conditions[1]	2021 Build Conditions	Project-related CO_2 Emissions[2]
Greenhouse Gas (CO_2)	7,275.1	7,021.4	7,397.1	375.7

1 The future no build condition emissions are lower than the existing conditions emissions due to the implementation of state and federal emission control programs, such as the Federal Motor Vehicle Emission Control Program (Tier 3) and the Stage II Vapor Recovery System, and the Massachusetts Inspection and Maintenance program.
2 Represents the difference in CO_2 emissions between the Build and No-Build Conditions.

Proposed Mitigation Measures

The mobile source GHG assessment calculated the GHG emissions for Project-related mobile sources. A comprehensive transportation mitigation program has been developed to mitigate impacts of project-related traffic. Specifically, the traffic mitigation measures proposed by the Proponents to minimize the traffic impacts of the full build-out of the Project include TDM measures. A summary of the mitigation emissions reduction is seen in Table 9-8.

Table 9-8 Mobile Source CO_2 Emissions Mitigation Analysis Results (tons per year)

Pollutant	Project-related CO_2 Emissions[1]	Estimated Reductions Due to TDM Measures[2]	Resulting Project-related CO_2 Emissions
Greenhouse Gas (CO_2)	375.7	7.5	368.2

1 Represents the difference in CO_2 emissions between the 2021 Build and No-Build Conditions
2 Mitigation from TDM Measures estimated as 2 percent of unmitigated Project-related emissions.

The Proponents are committed to implementing a comprehensive TDM program. A full description of the TDM program is detailed in Section 8.8.2 of Chapter 8, *Transportation*. Implementation of the TDM program is expected to improve air quality in the study area by promoting the use of alternative forms of transportation over the use of single-occupant motor vehicle trips to the Project Site. Although not easily modeled, previous estimates of similar TDM programs in an urban area have ranged on the order of 2 percent reduction in Vehicle Miles Travelled from the Project generated trips. Assuming a similar relationship to GHG emissions, this would correlate to an approximate 7.5 tons of CO_2 per year reduction in mobile source GHG based on estimated Project emissions. This results in a final Project-related CO_2 emissions of 368.2 tons per year.

10

Infrastructure

10.1 Introduction

This chapter discusses the Project's infrastructure needs. The Project will utilize to the greatest extent possible, the existing water, sewer, electric, natural gas, telephone and telecommunications infrastructure available in the private and public streets proximate to the Project Site. The primary service and main lines of these systems are owned or managed by the Boston Water and Sewer Commission ("BWSC"), and private utility companies. The design team will be in close coordination with these entities, and the private street owner(s) as design progresses and during construction of the Project.

10.2 Key Findings and Benefits

The key findings related to infrastructure systems include:

- Adequate infrastructure facilities and services are available within the Fort Point area to serve the Project. The Project Site is serviced by the BWSC for domestic and fire protection water, sanitary sewage, and stormwater conveyance.
- Construction of the Project will include new stormwater management and treatment systems on-site, which will improve water quality, reduce runoff volume, and control peak rates of runoff in comparison to existing conditions.
- The stormwater management system will be designed to comply with the DEP Stormwater Management Policy and Standards as a redevelopment project as well as with the GCOD, as it will infiltrate a minimum of 1-inch of runoff.
- Based upon sewage generation rates outlined in the DEP Title V regulation 301 CMR 15.203.f, the Project is estimated to generate approximately 42,467 gallons per day (net new) of sanitary sewage and will require approximately 46,714 gallons per day of water (net new).
- As part of the overall sustainability plan for the Project, the Project will capture roof rainwater for reuse for toilet flushing and, if feasible, for irrigation and HVAC make-up water.
- In order to reduce overall water usage for the Project, the Proponents will install low flow and low-consumption plumbing fixtures, in compliance with Article 37 of the Boston Zoning Code.

10.3 Phase 1 Project Impacts

As described in Chapter 1, *Project Description and Alternatives*, the Phase 1 Project includes the rehabilitation of the Brick Buildings for which the Proponents are requesting a Phase 1 Waiver under MEPA and its implementing regulations. Adequate infrastructure facilities and services are available within the Fort Point area to serve the Phase 1 Project, including utilities, water supply, sanitary sewer, and drainage systems. Domestic and fire protection water, and sanitary sewage and stormwater conveyance systems are provided by BWSC in Necco Street and Necco Court.

Changes to the existing stormwater management system will be made in connection with the Phase 1 Project. The Proponents will construct the new roof leader collection system that will redirect, to the maximum extent feasible, stormwater from the Brick Buildings to the Project Site for treatment and infiltration upon full project completion, as required by the BWSC. The interim drainage condition will continue to discharge to Necco Court similar to existing conditions until the full Project Site construction is completed. By enclosing the area between the existing buildings to construct an atrium and capturing a portion of the roof runoff for reuse, overall site runoff associated with the Phase 1 Project will be reduced. The Phase 1 Project will meet DEP stormwater management standards to the maximum extent practicable.

The Phase 1 Project is estimated to generate approximately 10,067 gallons per day of sanitary sewage and will use approximately 11,074 gallons per day of potable water. The Phase 1 Project will include low-flow and low-consumption plumbing fixtures in compliance with Article 37 of the Boston Zoning Code as well as reuse of roof runoff.

Gas, electric, telephone and telecommunications utilities are located within the Seaport District, with several utilities adjacent to the Project Site. The Proponents will continue working with the utility providers to verify demands and serviceability to the Phase 1 Project.

10.4 Regulatory Context

All stormwater connections will be designed and constructed in accordance with applicable city, state, and federal standards. The design process for the Project will include required engineering analyses and will adhere to applicable protocols and design standards, ensuring that the Brick Buildings and the New Building are properly supported by the utility infrastructure of the City and private utilities. Detailed design of the Project-related utility systems will proceed in conjunction with the final design of the proposed buildings and their interior mechanical systems.

10.4.1 USEPA National Pollutant Discharge Elimination System

The US EPA requires that all projects that disturb greater than one acre of land obtain a permit for stormwater discharges through the National Pollutant Discharge Elimination System ("NPDES") Construction General Permit ("CGP") for Stormwater Discharges from Construction Activity (2012, USEPA). Compliance with the CGP is achieved by the following:

- Developing and Implementing a Stormwater Pollution Prevention Plan ("SWPPP");
- Completing, certifying, and submitting a Notice of Intent to the EPA; and
- Complying with the requirements contained in the CGP and the Order of Conditions.

Compliance with the CGP and its Standard Permit Conditions is the responsibility of the site Operator.

10.4.2 DEP Stormwater Standards

In March 1997, DEP adopted a new Stormwater Management Policy to address non-point source pollution. In 1997, DEP published the Massachusetts Stormwater Handbook as guidance on the Stormwater Policy, which was revised in February 2008. The Stormwater Management Standards are regulated under the Wetlands Protection Act Regulations 310 CMR 10.05(6)(k) through (q). The Policy prescribes specific stormwater management standards for redevelopment projects, including urban pollutant removal criteria for projects that may impact environmental resource areas.

10.4.3 Boston Groundwater Conservation Overlay District

The Project Site is located within the GCOD, as defined in Article 32 of the Code. This zoning article specifies requirements promoting the infiltration of runoff from impervious areas within the district. To meet the requirements of this Article, projects within the district must infiltrate to the ground a minimum volume equivalent to 1-inch over the site impervious areas.

10.4.4 BWSC Site Plan Review

All improvements and connections to BWSC infrastructure will be reviewed by BWSC as part of the Site Plan Review process. This process includes a comprehensive design review of the proposed service connections, assessment of system demands and capacity, and establishment of service accounts for water, sewer, and stormwater systems.

10.5 Stormwater Management

10.5.1 Existing Drainage Conditions

Under existing conditions, the Project Site is almost entirely impervious and without infiltration systems or stormwater treatment. Most of the site stormwater runoff is collected and conveyed to the BWSC drainage infrastructure via private stormwater conveyance infrastructure. The surface runoff from the Project Site ultimately discharges to the Channel via an existing outfall that is located approximately 250 feet south of the Project Site. The Brick Buildings have sloped roofs with roof leaders discharging to stormwater infrastructure in Necco Court, which flows to a drainage pipe in Necco Street. The surface parking lot has a number of catch basins, which drain to BWSC infrastructure that convey water away from the Project Site in a southwesterly direction to the existing outfall to the Channel. There is a 12-inch drain serving Necco Court and a 48-inch drain in Necco Street, and there are several catch basins in Necco Street proximate to the Project Site. The portion of the Project Site along the Harborwalk drains over land directly to the Channel. Figure 10.1 shows the existing drainage conditions. Tables 10-1 and 10-2 show the existing site stormwater runoff peak rate and total runoff for the 2-, 10-, 25-, and 100-year design storms, to each Design Point shown in Figure 10.1.

10.5.2 Proposed Drainage Conditions

The proposed drainage conditions will be improved to comply with BWSC requirements, DEP stormwater standards, and the GCOD performance requirements. The Proponents will continue to coordinate with the BWSC on the design of all stormwater infrastructure. In addition, the Proponents will submit a General Service Application and site plan to the BWSC for review as the Project design progresses.

Under proposed conditions, the Project Site will consist of building coverage and pedestrian areas with landscape and bioretention areas to collect and treat stormwater. Roof runoff will be collected and directed from the New Building and Brick Buildings to holding tanks for reuse for toilet flushing and seasonal irrigation. Stormwater will overflow from the buildings to the on-site bioretention ponds and subsurface infiltration systems. The remainder of the site is mixed between landscape features and hardscape plazas, which will direct runoff through the bioretention ponds and subsurface infiltration systems. For the purpose of initial stormwater evaluations, the bioretention areas were assumed to have +/- 13,525-cubic feet of storage based on the likely surficial area and available depth for bioretention storage. In addition, it was assumed that subsurface infiltration systems will have a volume of +/-5,000-cubic feet of storage, based on the available area and depth of systems. During extreme precipitation events, runoff from the Project Site that exceed the infiltration capabilities of the stormwater management system will discharge through upgraded private drainage infrastructure, to the BWSC owned outfall to the Channel.

Figure 10.2 shows the proposed drainage conditions. Tables 10-1 and 10-2 show the proposed site stormwater runoff peak rate and total runoff for the 2-, 10-, 25-, and 100-year design storms, to each Design Point shown in Figure 10.2. The intent for compliance with the relevant stormwater regulations is described in further detail below.

Table 10-1 Peak Discharge Rates (CFS*)

Design Point	2-year	10-year	25-year	100-year
Design Point 1:				
Existing	4.72	7.14	9.04	12.93
Proposed	1.46	5.13	7.36	17.29
Design Point 2:				
Existing	0.63	1.08	1.44	2.15
Proposed	0	0	0	0
Design Point 3:				
Existing	2.05	3.10	3.92	5.60
Proposed	0	0	0	0
Total Net Reduction (CFS)	**5.94**	**6.19**	**7.04**	**3.39**
Total Net Reduction (%)	**80%**	**55%**	**49%**	**16%**

* Expressed in cubic feet per second

Table 10-2 Peak Volume (CF*)

Design Point	2-year	10-year	25-year	100-year
Design Point 1:				
Existing	16,265	25,056	31,978	46,153
Proposed	12,358	25,799	36,570	58,864
Design Point 2:				
Existing	1,955	3,406	4,584	7,035
Proposed	0	0	0	0
Design Point 3:				
Existing	7,050	10,860	13,860	20,004
Proposed	0	0	0	0
Total Net Reduction (cf)	**12,912**	**13,523**	**13,852**	**14,328**
Total Net Reduction (%)	**51%**	**34%**	**28%**	**20%**

* Expressed in cubic feet

10.5.3 Compliance with USEPA National Pollutant Discharge Elimination System

The Project will be required to obtain coverage under the USEPA NPDES permit (CGP), as the disturbance area of the Project is greater than 1 acre. Therefore, the Operator will:

- Develop and implement a SWPPP
- Certify and submit a Notice of Intent to the EPA; and
- Read and comply with the requirements of contained in the CGP and the Order of Conditions

The Proponents will ensure that the Operator perform the NPDES requirements during construction.

10.5.4 Compliance with DEP Stormwater Standards

The Stormwater Policy prescribes specific stormwater management standards including urban pollutant removal criteria for projects that may impact environmental resource areas. A brief explanation of each Policy Standard and the system compliance is provided below:

Standard #1: *No new stormwater conveyances (e.g., outfalls) may discharge untreated stormwater directly to or cause erosion in wetlands or waters of the Commonwealth.*

Compliance: The Project will comply with this Standard. Untreated stormwater will not be directly discharged to, nor will erosion be caused to, wetlands or waters of the Commonwealth as a result of the Project.

The Proponents are implementing surface and subsurface stormwater infiltration systems to ensure that stormwater discharge will be treated before discharge and will not cause surface erosion.

Standard #2: *Stormwater management systems shall be designed so that post-development peak discharge rates do not exceed pre-development peak discharge rates.*

Compliance: The Project will comply with this Standard. The existing discharge rate will decrease as a result of the improvements associated with the Project. Vegetated areas and infiltration systems will treat, at a minimum, 1-inch of runoff over the Project Site, which will be a material improvement over the pre-development conditions under which the Project Site is almost entirely impervious and without infiltration systems or stormwater treatment. The Project will also capture rainwater from the roofs and canopies for use in toilet flushing and, if feasible, for irrigation and HVAC make-up water. The combination of surface material improvement, rainwater capture, and surface/subsurface infiltration techniques that exceed the required capacity will ensure that the post-development peak discharge rates do not exceed the pre-development rates.

The BWSC has agreed to allow the Proponent overflow stormwater during extreme precipitation events to the existing BWSC infrastructure that discharges to the Fort Point Channel provided that the Proponent greatly reduce stormwater peak discharge for smaller design events, and do not exceed existing rates from the Site for the extreme design storm event. BWSC will therefore review stormwater mitigation in greater detail to ensure that discharge rates are reduced, given the increased catchment area discharging to the existing infrastructure.

Standard #3: *Loss of annual recharge to ground water shall be eliminated or minimized through the use of infiltration measures including environmentally sensitive site design, low impact development techniques, stormwater best management practices and good operation and maintenance. At a minimum, the annual recharge from the post-development site shall approximate the annual recharge from the pre-development conditions based on soil type.*

Compliance: The Project will prevent the loss of annual recharge to groundwater by incorporating groundwater recharge techniques. The Proponents will install surface infiltration features, such as bio-retention areas, infiltration swales, rain gardens and/or similar surface treatments and will supplement the surface features with subsurface infiltration chambers as necessary to meet this standard, GCOD, and BWSC infiltration requirements. Infiltration is the largest component of stormwater discharge rate reduction, and will greatly promote annual recharge relative to the existing Site condition, which is entirely impervious paved surface.

Standard #4: *Stormwater management systems shall be designed to remove 80% of the average annual post-construction load of Total Suspended Solids ("TSS"). This Standard is met when: a. Suitable practices for source control and pollution prevention are identified in a long-term pollution prevention plan and thereafter are implemented and maintained; b. Structural stormwater best management practices are sized to capture the required water quality volume determined in accordance with Massachusetts Stormwater Handbook; and c. Pretreatment is provided in accordance with the Massachusetts Stormwater Handbook.*

Compliance: The Project will remove 80 percent of the annual load of TSS by the implementation of BMPs. The Proponent is designed an environmentally sensitive site, which inherently implements source controls and pollution prevention techniques. These include minimizing site impervious areas, incorporating nonstructural stormwater treatment including vegetated stormwater storage, and minimizing the need for fertilizers by using native, durable species. Stormwater overflow from the rain gardens will be collected and treated by structural means, including subsurface drainage systems sized to capture the required volume. Pretreatment will be provided by vegetated rain gardens and deep sump catch basins.

Standard #5: *For land uses with higher potential pollutant loads, source control and pollution prevention shall be implemented in accordance with the Massachusetts Stormwater Handbook to eliminate or reduce the discharge of stormwater runoff from such land uses to the maximum extent practicable. If through source control and/or pollution prevention, all land uses with higher potential pollutant loads cannot be completely protected from exposure to rain, snow, snow melt and stormwater runoff, the proponent shall use the specific structural stormwater BMPs determined by the Department to be suitable for such use as provided in the Massachusetts Stormwater Handbook. Stormwater discharges from land uses with higher potential pollutant loads shall also comply with the requirements of the Massachusetts Clean Waters Act, M.G.L. c. 21, §§ 26 through 53, and the regulations promulgated thereunder at 314 CMR 3.00, 314 CMR 4.00 and 314 CMR 5.00.*

Compliance: The Project Site will be occupied by buildings and open spaces not associated with land uses with higher potential pollutant loads. The proposed parking garage for approximately 30 spaces will be located below-grade and will drain via a gas/oil separator to the sanitary sewer system.

Standard #6: *Stormwater discharges within the Zone II or Interim Wellhead Protection Area of a public water supply and stormwater discharges near or to any other critical area require the use of the specific source control and pollution prevention measures and the specific structural stormwater best management practices determined by the Department to be suitable for managing discharges to such area as provided in the Massachusetts Stormwater Handbook.*

Compliance: The Project Site does not discharge within the Zone II or Interim Wellhead Protection Area of a public water supply or near any other critical area.

Standard #7: *A redevelopment project is required to meet the following Stormwater Management Standards only to the maximum extent practicable: Standard 2, Standard 3, and the pretreatment and structural stormwater best management practice requirements of Standards 4, 5 and 6. Existing stormwater discharges shall comply with Standard 1 only to the maximum extent practicable. A redevelopment project shall also comply with all other requirements of the Stormwater Management Standards and improve existing conditions.*

Compliance: The Project is considered a redevelopment project. The Project will comply with Stormwater Management Standards 1 through 6 to the maximum extent practicable and all other requirements of the Stormwater Management Standards and will thereby materially improve upon existing conditions.

Standard #8: *A plan to control construction related impacts including erosion, sedimentation and other pollutant sources during construction and land disturbance activities (construction period erosion, sedimentation and pollution prevention plan) shall be developed and implemented.*

Compliance: Sedimentation and erosion controls will be employed to prevent construction or land disturbance impacts to groundwater. Erosion and sediment control plans will be submitted to BWSC and the contractor will be required to implement the measures as part of the BWSC general services application process. The implementation of these measures are also a requirement of the NPDES permit that will be obtained for the Project.

Standard 9: *A long-term operation and maintenance plan shall be developed and implemented to ensure that the stormwater management system functions as designed.*

Compliance: An Operation and Maintenance ("O&M") Plan will be developed and implemented. The O&M Plan will be reviewed by the BWSC.

Standard 10: *All illicit discharges to the stormwater management system are prohibited.*

Compliance: There are no currently known illicit discharges. All proposed discharges will be reviewed by the BWSC to ensure consistency with this standard.

10.5.5 Compliance with Boston Groundwater Conservation Overlay District

The Proponents will meet the GCOD requirement through the use of both subsurface infiltration structures and by maximizing the infiltration capacity of the landscape design. The landscape design will include bio-retention areas, infiltration swales, rain gardens and/or similar surface treatments to store, treat and promote infiltration practices. Surface infiltration measures will be supplemented with subsurface infiltration chambers, to the extent practicable, to maximize infiltration opportunities. The local groundwater levels will be improved by the completion of this Project. Refer to Figure 10.2 for the proposed drainage conditions.

10.6 Sanitary Sewage

10.6.1 Existing Sewer System

The Brick Buildings are connected to sanitary sewer laterals, which connect to a 10-inch BWSC sewer main in Necco Street northeast of the Project Site. There is also a 15-inch BWSC sewer main in Necco Street to the east that will service the New Building. The existing buildings are currently unoccupied and do not generate wastewater. Refer to Figure 10.3 for the existing sanitary sewer system.

10.6.2 Proposed Sewage Flow and Connections

Table 10-3 provides wastewater generation estimates for key building uses based on the DEP Title V regulation, 310 CMR 15.203. Both the New Building and Brick Buildings will be served by the municipal sanitary sewer in Necco Street. The Proponents will continue to coordinate with the BWSC on the design for proposed connections to their sewer systems. In addition, the Proponents will submit a General Service Application and site plan to the BWSC for review as the project design progresses.

The existing sewer connections from the Brick Buildings will be demolished. The pipes may be undersized for the proposed uses and may be susceptible to Infiltration/Inflow given the age of the pipes and anticipated degradation of the pipes over time. Any cross connections from stormwater will be separated during the installation of new sewer connections. Two new 6-inch sanitary connections with a proposed combined sanitary flow of approximately 10,067 gallons per day will serve the Brick Buildings. The Brick Buildings also have a Bistro-Café. A grease trap within the Brick Buildings will treat wastewater generated from kitchens.

Table 10-3 Estimated Sanitary Sewage Flow

Use	Quantity	Flow Rate (gpd)	Wastewater Generation (gpd)
Brick Buildings			
Office	81,900	75/1,000 SF	6,142
Lab Space	6,500	200/1000 SF	1300
Bistro-Café[1]	75	35/seat	2,625
Subtotal			10,067
New Building			
Office[2]	246,400	75/1000 SF	18,480
Employee Community Space[3]	325	15/seat	4,875
Coffee Bar[1]	25	35/seat	875
Museum[4]	13,400	50/1,000 SF	670
Convener Space[3]	500	15/seat	7,500
Subtotal			32,400

gpd gallons per day
1 Calculated using the Restaurant flow rate, per Title V.
2 Office includes Community Work Lounge.
3 Calculated using the Function Hall flow rate, per Title V.
4 Calculated using the Retail flow rate, per Title V.

Two new 8-inch and two new 4-inch sanitary connections with a proposed combined sanitary flow of approximately 32,400 gallons per day will serve the New Building. The Project will have parking and a loading dock below grade. A gas/oil separator will treat the drainage from the underground vehicular areas before discharging to BWSC infrastructure. The gas/oil separator will be approved by the Massachusetts Water Resources Authority and inspected by a local plumbing inspector. The New Building also has a cafeteria and coffee shop. A grease trap within the New Building will treat wastewater generated from kitchens. Refer to Figure 10.4 for the proposed sanitary sewer system.

Proposed Sanitary Sewage Mitigation

The BWSC requires that new developments generating greater than 15,000 gallons per day of net new wastewater flow compensate the Commission for the associated generation of Infiltration and Inflow (“I/I”). I/I is the component of flows in sanitary sewer systems that do not come from wastewater generated by building. I/I includes groundwater infiltration from leaking/broken sewer infrastructure, as well as stormwater connections from roof leaders and drainage infrastructure. Proponents that generate flows in excess of the 15,000-gallon threshold are responsible for paying to mitigate I/I at a ratio of 4:1 relative to the net new wastewater generated. Therefore, the Proponents will compensate the BWSC approximately $410,983 based on current flow estimates for both the New and Brick Buildings. The BWSC will review and confirm the appropriate mitigation volume and value of compensation to be paid to the I/I mitigation fund.

10.7 Domestic Water and Fire Protection

10.7.1 Existing Water Supply System

There is currently a 12-inch Ductile Iron Cement Lined water main in Necco Street. The Brick Buildings have a domestic water and fire protection service connection to an 8-inch main in Necco Court, which is fed by the 12-inch main in Necco Street. There is an existing fire hydrant at the end of Necco Court where it meets the Channel, and an existing hydrant on Necco Street in front of the New Building. Refer to Figure 10.3 for the existing water distribution system.

10.7.2 Proposed Water Demand and Connections

The Proponents will continue to coordinate with the BWSC on the design of the domestic water and fire protection service connections to the Necco Street infrastructure. In addition, the Proponents will submit a General Service Application and site plan to the BWSC for review.

The water and fire protection service connections within Necco Court serving the Brick Buildings will be demolished. The service laterals may be undersized, and may be damaged in their current state. A new 4-inch domestic water service and a new 8-inch fire service will be constructed to serve the Brick Buildings. The baseline water demand for the Brick Buildings is approximately 11,074 gallons per day. This was estimated by applying a 10 percent consumption factor to the wastewater generation value.

One 6-inch domestic water service and two 8-inch fire service laterals will serve the New Building. The baseline water demand for the New Building is approximately 35,640 gallons per day. The Proponents are currently preparing a water demand calculation based on unit fixture counts and specific use. The actual water demand will be less than the Title V based estimate, as the Proponents are committed to several water conservation technologies as discussed below. Refer to Figure 10.4 for the proposed water connections and system.

Water Conservation Measures

Consistent with the sustainable design and operations goals for the Project, the Proponents will install low-flow and low-consumption plumbing fixtures to reduce water usage and, consequently, sanitary flow reductions. A water reduction of a minimum of 20 percent over the baseline is a requirement of Article 37 of the Boston Zoning Code, which requires new buildings to be LEED™ "certifiable." The Proponents are also committed to limiting the use of irrigation for any plantings by using local and/or drought resistant plantings. The Project will also capture rainwater from the roofs and canopies for use in toilet flushing and, if feasible, for irrigation and HVAC make-up water.

10.8 Other Utilities

10.8.1 Natural Gas Service

National Grid has a low-pressure gas main in Necco Street adjacent to the Project Site. The Project's HVAC systems will have a gas driven heat source, distributed via hot water. The Brick Buildings and New Building will be heated by gas fired hot water boilers, and domestic hot water will be produced by a central gas fired system. The total net new natural gas demand for the Project is to be determined. The Proponents will work with National Grid to confirm that local infrastructure has adequate system capacity as design progresses. Refer to Figure 10.3 for all existing gas services.

10.8.2 Electrical Service

Electrical service infrastructure is present at or near the Project Site. Eversource Energy will provide electric 15 kV primary service to the Brick Buildings via the existing duct bank on Necco Street to a new pad mounted transformer, while the New Building will be fed via existing duct banks on A Street or on Necco Street. Eversource Energy is currently reviewing where the New Building will connect to its infrastructure.

Dual electric service will be furnished from the existing K street substation, located in South Boston. Each circuit will be served from a separate bus at the substation to allow for redundancy in the event a feeder or bus fails.

The New Building will be provided with a 15 kV class incoming switchgear consisting of two incoming sections, a metering section and two feeder sections. Equipment will be located on the second floor of the building to avoid flooding from storm surge, sea level rise, and precipitation events.

Electric feeders will serve indoor transformers and single ended substations to provide distribution throughout the New Building. The Brick Buildings will be served from the same electric feeders, however pad mount transformers will be provided for the Brick Buildings. The location of these transformers will be coordinated with Eversource. The design team will continue to coordinate with Eversource as the design progresses. Refer to Figure 10.3 for all existing electrical services.

10.8.3 Telephone and Telecommunications

The Project will be fed by both Verizon and AT&T. These services will be redundant into both the New Building and the Brick Buildings. Each of the buildings will have a Main Distribution Frame (“MDF”) and two Intermediate Distribution Frame’s (“IDF”) per floor. Refer to Figure 10.3 for all existing telephone and telecommunication lines.

10.8.4 Protection of Utilities

Existing public and private utility infrastructure will be protected during the duration of the Project with the exception of existing utilities to be capped and removed to accommodate construction. The installation of utilities within the public way will be in accordance with the Dig-Safe Program and all applicable regulatory requirements including those of BWSC, BPWD and utility company requirements. All appropriate permits will be acquired before construction commences. Specific methods of constructing utilities where they are adjacent to, or connect with, existing water, sewer, or drain infrastructure will be reviewed by the BWSC as part of its Site Plan Review process.

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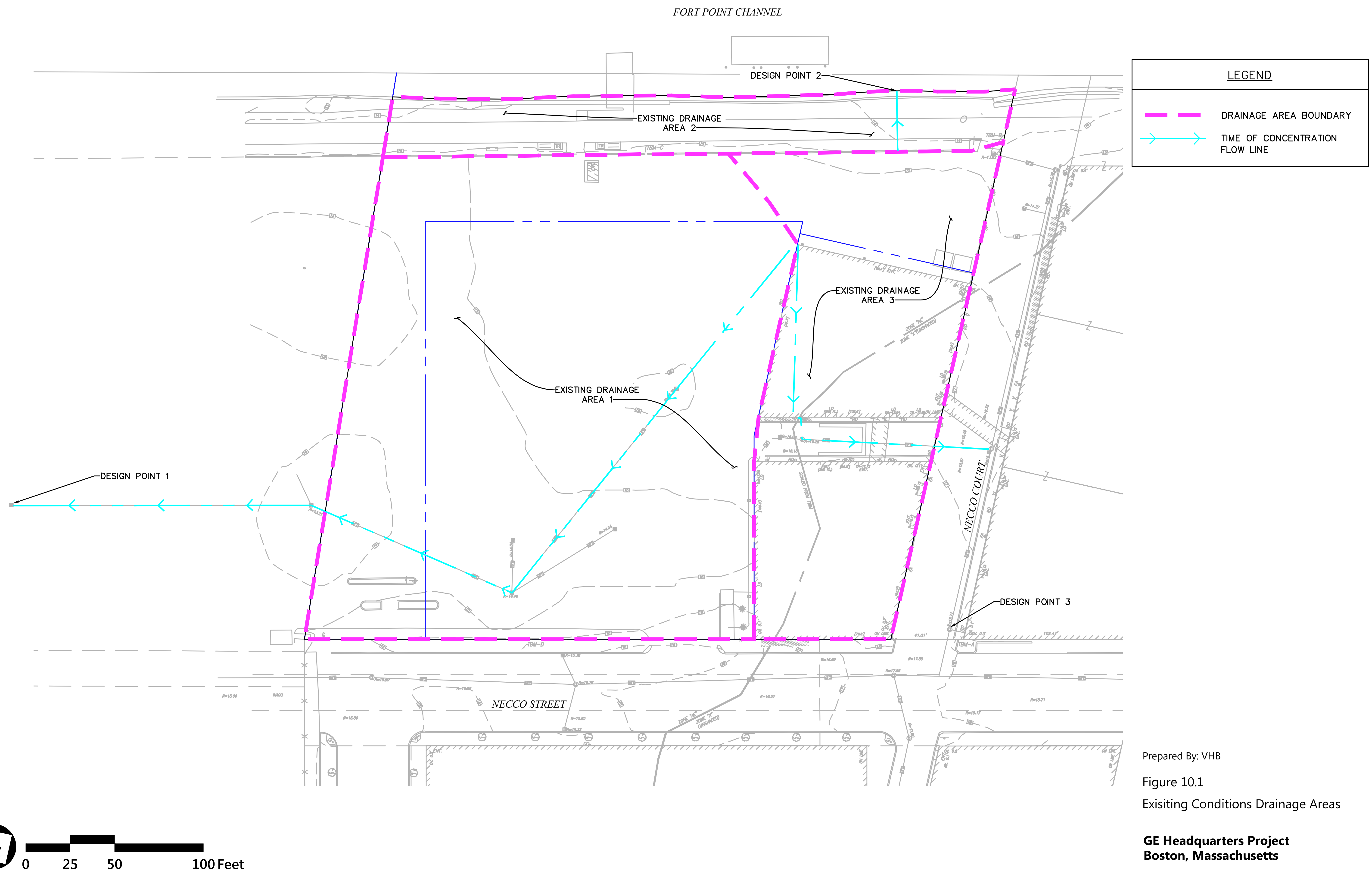
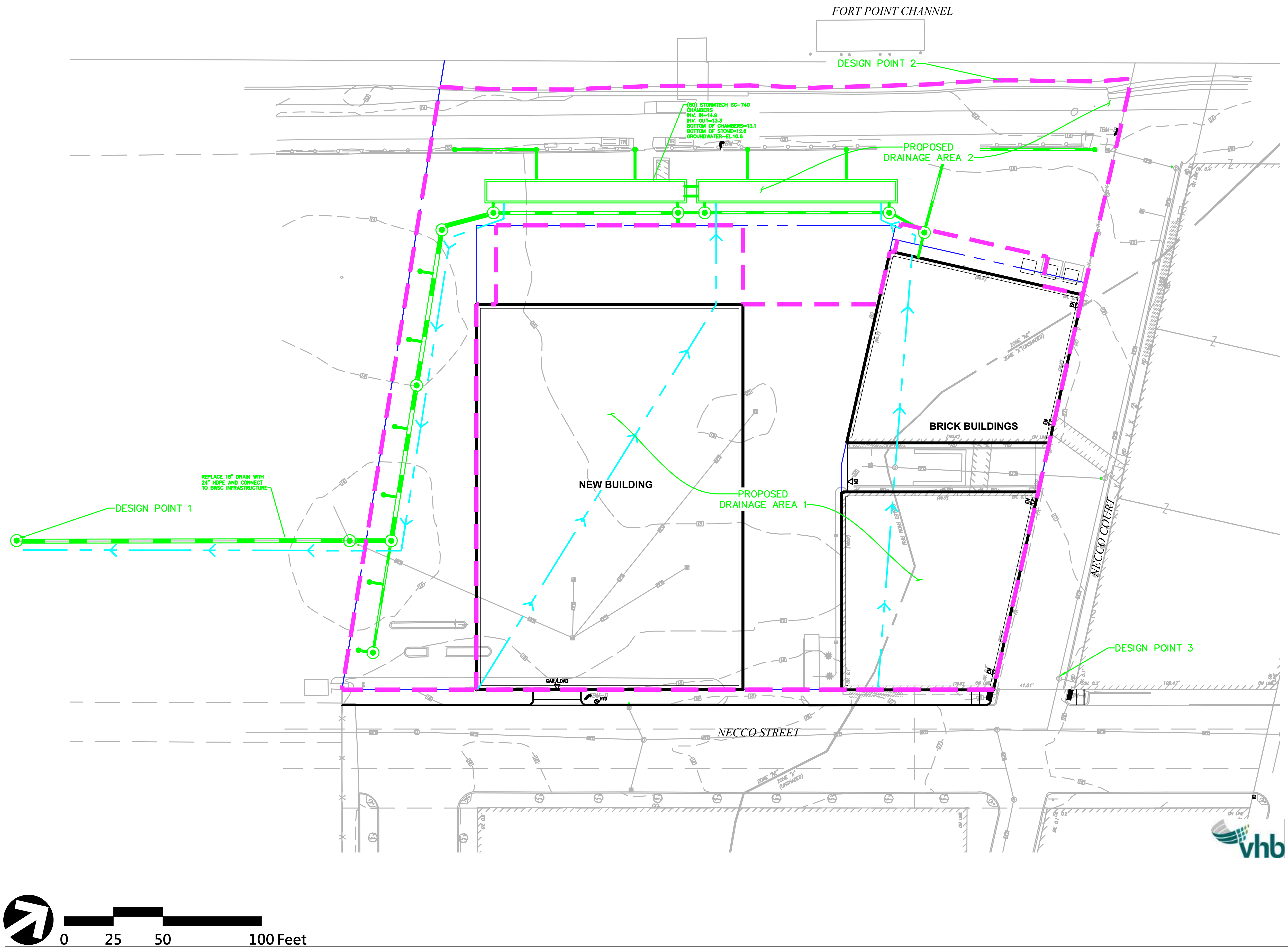


Prepared By: VHB

Figure 10.1

Exisiting Conditions Drainage Areas

GE Headquarters Project
Boston, Massachusetts



LEGEND

DRAINAGE AREA BOUNDARY

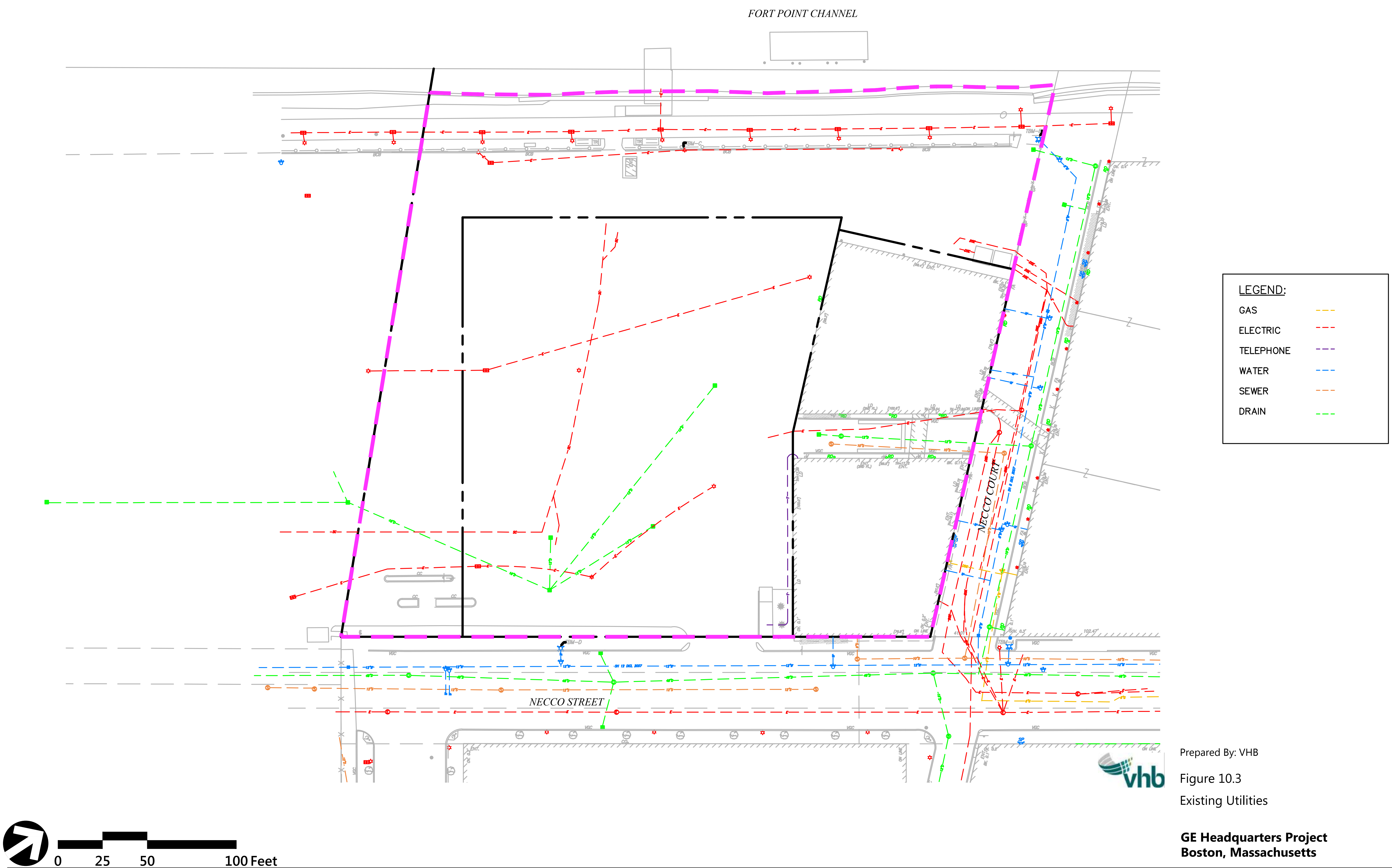
TIME OF CONCENTRATION FLOW LINE

Prepared By: VHB

Figure 10.2

Proposed Conditions Drainage Areas

GE Headquarters Project
Boston, Massachusetts

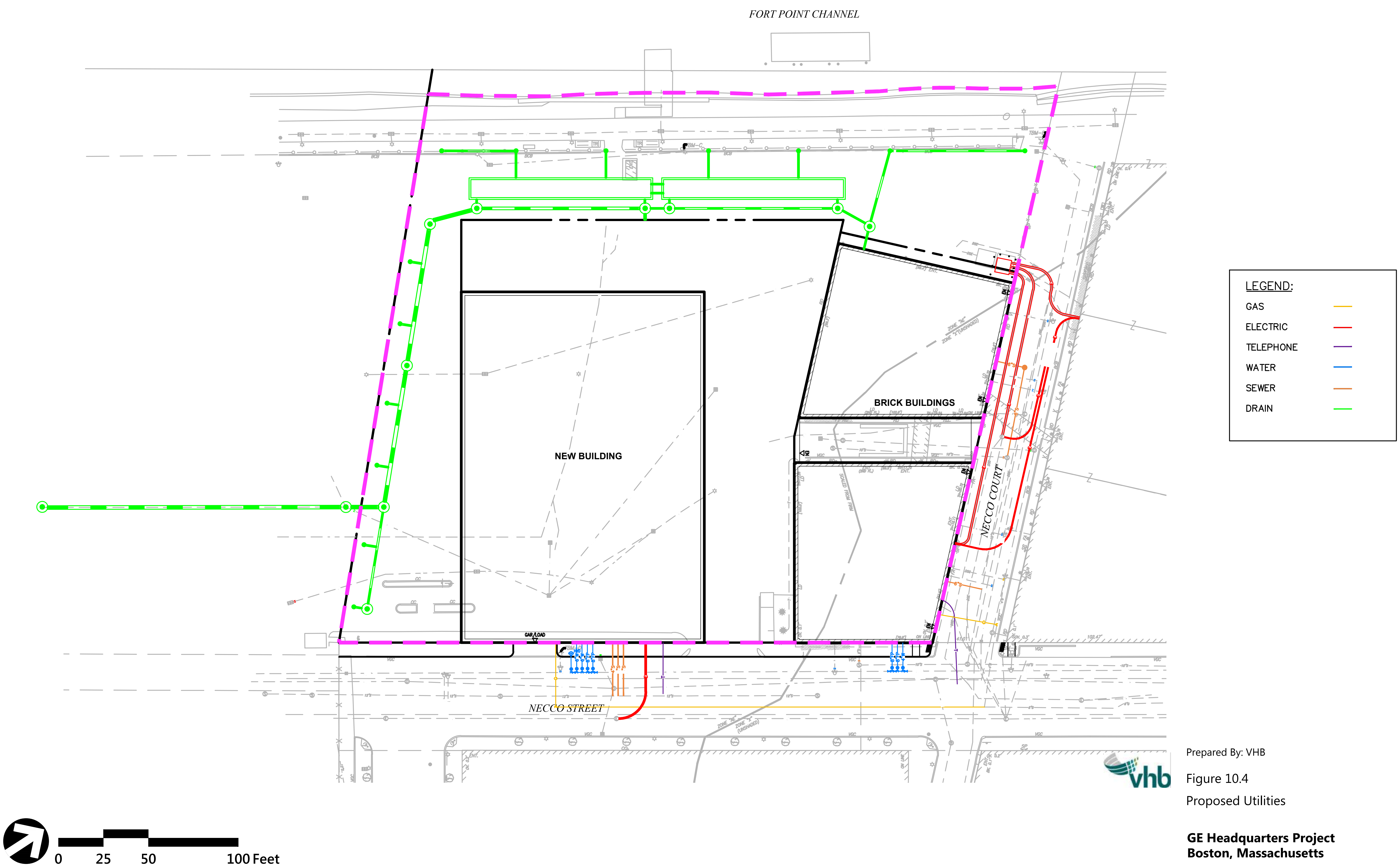


Prepared By: VHB

Figure 10.3

Existing Utilities

GE Headquarters Project
Boston, Massachusetts



Prepared By: VHB

Figure 10.4

Proposed Utilities

GE Headquarters Project
Boston, Massachusetts

11

Section 61 Findings

11.1 Introduction

As required by 301 CMR 11.07(6)(k) of MEPA, this chapter provides draft Section 61 Findings for each agency action to be taken on the Project.

MGL Chapter 30, Section 61, requires that "[a]ll authorities of the Commonwealth … review, evaluate, and determine the impact on the natural environment of all works, projects or activities conducted by them and … use all practicable means and measures to minimize [their] damage to the Environment. … Any determination made by an agency of the commonwealth shall include a finding describing the environmental impact, if any, of the project and a finding that all feasible measures have been taken to avoid or minimize said impact." The finding required by Section 61 "shall be limited to those matters which are within the scope of the environmental impact report, if any, required … [on a project]." MGL Chapter 30, Section 62A.

The only state permit anticipated for the Project is a Chapter 91 license from DEP. Proposed Section 61 findings for DEP are provided below to assist DEP in meeting its obligations. The Proponents will be responsible for implementing all of the mitigation measures. Individual costs have not yet been determined because most are considered to be part of the overall Project design.

In accordance with the MEPA GHG Policy, GE is committed to providing a self-certification to the MEPA Office signed by an appropriate professional (e.g., engineer, architect, transportation planner, general contractor) following completion of construction to demonstrate that the stationary source GHG emissions have been mitigated. A draft commitment letter for this self-certification submission is provided below.

11.2 DEP Division of Wetlands and Waterways Chapter 91 License

The Project is consistent with Chapter 91 regulations as modified by the MHP Amendment, as approved by the Secretary of the EEA in a decision dated October 22, 2009. The Project will replace an existing parking lot and underutilized buildings and result in a highly activated, pedestrian oriented waterfront destination. Key benefits of the Project relative to tidelands are summarized below.

- The Project provides substantial public benefits and is protective of the Public Trust rights inherent in filled tidelands by significantly enhancing public access to and use of the Project Site.
- The Project will not adversely impact any wetland resource areas.
- The Project will transform the Project Site into a hub of technology, innovation, and intellectual stimulation as well as a new meaningful destination on the City's Harborwalk.
- The design and programming of the Project will attract a broad range of visitors, day and night, year-round.
- The Project will provide over 61,940 square feet of outdoor public space, including an inviting Harborwalk, green space, interpretive signage, and amenities.
- The Project will provide approximately 75 percent of ground floor public uses, including the Bistro, Maker Space, Coffee Bar, Museum, Community Work Lounge, and public restrooms.

The Project will create an iconic and magnetic public space that will transform this portion of the Fort Point Channel waterfront into a flagship destination. Through a combination of active public spaces, inspiring architecture, community integration, sustainable design, and intellectual programming, the Campus will serve as a hub of innovation that will advance the progress of science and technology in the region.

The exterior public open spaces throughout the Campus will be designed and programmed to attract and inspire. The landscaping design will be functional, mitigate sea level rise, and manage rainwater, while simultaneously showcasing sustainable innovation and creating an active and appealing public waterfront. The Project will provide significant and innovated sustainability components such as the PV Solar Veil, Predix-powered smart building systems, greywater water reuse systems and rainwater collection which will be integrated into the GE Headquarters Campus experience, including signage identifying the features and educating visitors on their functions.

The Harborwalk will be integrated into the Project Site as an interpretive pathway that accommodates the casual passerby as well as Campus visitors. Expanding the Harborwalk from 12 to 18 feet, and the use of improved and inviting materials, will provide a welcoming and accessible experience for all users, including pedestrians and cyclists. Activation of the public realm will be further achieved through the provision of ground floor interior public uses in the Brick Buildings and New Building that spill into the public realm via the GE Plaza.

In addition to the significant open space and public realm improvements, the Project will provide new FPAs on approximately 75 percent of the ground floor of the buildings, and additional public facilities within the upper floors of the building. These uses include a combination of unique and innovative features which directly support the Proponents' vision of advancing a hub of innovation, along with a museum, café space, a coffee bar, Maker Space, lobbies, and public restrooms. These ground floor public spaces are positioned in a way that supports the interface between the interior facilities and the outdoor public realm to encourage and stimulate the public enjoyment of the Campus.

The above referenced public spaces will also serve to support the GE Brilliant Career Labs program, which is a multimillion dollar commitment by the GE Foundation to provide resources to support Boston Public Schools innovation programs. GE will commit funding, facilities, and opportunities to advance science and technology education in the local school system and to prepare the workforce of the future. In addition to the Boston Public Schools system, GE is committed to working with other local schools, colleges, and universities to advance the City's image as a hub of innovation with the GE Headquarters Campus at its core.

Findings

The DEP hereby finds that all practicable means and measures will be taken to avoid or minimize adverse impacts to the environment as a result of the Project. DEP will include appropriate conditions in the Chapter 91 license to ensure implementation of the mitigation measures described herein.

Date Commissioner

11.3 Stationary Source GHG Emissions Self-Certification

D R A F T   O N L Y

August 1, 2016

Secretary Matthew A. Beaton
Executive Office of Energy & Environmental Affairs
100 Cambridge Street, Suite 900
Boston, MA 02114

ATTN: Deirdre Buckley, Director, MEPA Office

Re: Letter of Commitment for Stationary Source Greenhouse Gas Emissions Self-Certification
GE Headquarters Project
Boston, MA (EEA No. xxx)

Dear Secretary Beaton and Director Buckley:

On behalf of the General Electric Company (GE), VHB has prepared a summary of the estimated reduction in overall energy use and stationary source Greenhouse Gas (GHG) emissions for the GE Headquarters Project in the Fort Point area of the South Boston Waterfront neighborhood (the "Project").

In accordance with the current MEPA Greenhouse Gas Emissions Policy and Protocol (the "GHG Policy") dated May 2010, the stationary source GHG assessment was provided to the MEPA Office as part of the joint Expanded Environmental Notification Form/Project Notification Form (the "EENF/EPNF") filed on August 1, 2016. The design case assumed building design and system improvements that would result in energy reductions, in accordance with the GHG Policy. On XXX, a Certificate was issued stating that the Project's EENF/EPNF adequately and properly complied with the Massachusetts Environmental Policy Act (MEPA) and its implementing regulations was issued by the Secretary of Energy and Environmental Affairs (EEA).

The energy conservation measures proposed for the full build-out of the Project are estimated to reduce the overall energy use by 27.0 percent resulting in a 26.7 percent reduction in stationary source CO_2 emissions when compared to the baseline case. The following table presents the estimated energy savings and CO_2 emissions reductions for each Project Component.

	Energy Consumption (kBtu)			CO_2 Emissions (tons/yr)[1]		
Project Component	**Base Case[2]**	**Design Case**	**Percent Savings**	**Base Case[2]**	**Design Case**	**Percent Reduction**
Brick Buildings	6,817,914	5,470,261	19.8%	608.3	486.6	20.0%
New Building	17,502,078	12,276,375	29.9%	1,721.6	1,221.2	29.1%
Total	24,319,992	17,746,636	**27.0%**	2,329.9	1,707.8	**26.7%**

1 tons/yr = short tons per year
2 The Base Case represents current Base Energy Code IECC 2012 and ASHRAE 90.1-2010 standards.

The building energy model results/energy savings and estimated stationary source GHG emissions reductions are preliminary, as none of the proposed buildings have progressed past a conceptual level of design. Following completion of construction of each element, GE will submit a self-certification to the MEPA Office, signed by an appropriate professional, which identifies the as-built energy conservation measures and documents the stationary source GHG emissions reductions from the baseline case.

If you have any questions, please contact me at (617) 607-0091 or via e mail at ldevoe@vhb.com.

Very truly yours,

VANASSE HANGEN BRUSTLIN, INC.

Lauren DeVoe, AICP, LEED AP BD+C
Senior Environmental Planner

cc: Peter Cavanaugh, General Electric

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12

Project Certification

This EENF/EPNF has been submitted to the Boston Redevelopment Authority, as required by Article 80 of the Zoning Code, on the August 1, 2016.

Proponents
General Electric Company (GE)

Ann R. Klee, Vice President, Global Operations - Environment, Health & Safety

Massachusetts Economic Development and Finance Agency (MassDevelopment)

Marty Jones, President and CEO

Preparer
VHB

(for)

Elizabeth Grob
Principal/Director of Urban Permitting

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APPENDIX A: MEPA Distribution List

Appendix A: MEPA Distribution List

Commonwealth of Massachusetts

Secretary Matthew A. Beaton
Executive Office of Energy and Environmental Affairs
Attn: MEPA Office
100 Cambridge Street, Suite 900
Boston, MA 02114

Undersecretary Ned Bartlett
Executive Office of Energy and Environmental Affairs
Attn: MEPA Office
100 Cambridge Street, Suite 900
Boston, MA 02114

Secretary Jay Ash
Executive Office of Housing and Economic Development
One Ashburton Place, Room 2101
Boston, MA 02108

Undersecretary Mike Kennealy
Executive Office of Housing and Economic Development
One Ashburton Place, Room 2101
Boston, MA 02108

Department of Environmental Protection
Deputy Commissioner Gary Moran
One Winter Street
Boston, MA 02108

Ben Lynch, Program Chief
Department of Environmental Protection, Waterways Program
One Winter Street
Boston, MA 02108

DEP/Northeast Regional Office
Attn: MEPA Coordinator
205B Lowell Street
Wilmington, MA 01887

Massachusetts Department of Transportation
Public/Private Development Unit
ATTN: Lionel Lucien
10 Park Plaza
Boston, MA 02116

Massachusetts Department of Transportation - District #6
Attn: MEPA Coordinator
185 Kneeland Street
Boston, MA 02111

Massachusetts Historical Commission
The MA Archives Building
220 Morrissey Boulevard
Boston, MA 02125

Metropolitan Area Planning Council
60 Temple Place, 6th Floor
Boston, MA 02111

Massachusetts Department of Housing & Community Development
Attn: MEPA Coordinator
100 Cambridge Street,
Suite 300
Boston, MA 02114

Massachusetts Water Resource
Authority
Attn: MEPA Coordinator
Charlestown Navy Yard
100 First Avenue, Building 39
Boston, MA 02129

Massachusetts Department of
Energy Resources
Attn: MEPA Coordinator
100 Cambridge Street, 10th Floor
Boston, MA 02114

Massachusetts Bay Transportation
Authority
Attn: MEPA Coordinator
10 Park Plaza, 6th Fl.
Boston, MA 02116-3966

Division of Marine Fisheries
(North Shore)
Attn: Environmental Reviewer
30 Emerson Avenue
Gloucester, MA 01930

City of Boston

Boston Redevelopment Authority
Attn: Brian P. Golden, Director
One City Hall Square, 9th Floor
Boston, MA 02201

Office of Environment, Energy &
Open Space
Attn: Austin Blackmon, Chief
One City Hall Square, Room 709
Boston, MA 02201

Chief of Economic Development
John Barros
One City Hall Square, 9th Floor
Boston, MA 02201

Boston City Council
One City Hall Square, 5th Floor
Boston, MA 02201

Boston Transportation Department
200 I-93 Frontage Rd
Boston, MA 02118

Boston Department of Public Works
1 City hall Square, Room 714
Boston, MA 02201

Boston Conservation Commission
One City Hall Square, Room 805
Boston, MA 02201

Boston Landmarks Commission
One City Hall Square, Room 805
Boston, MA 02201

Boston Public Health Commission
Attn: Monica Valdes Lupi
1010 Massachusetts Avenue
Boston, MA 02118

Boston Water and Sewer Commission
Attn: MEPA Reviewer
980 Harrison Avenue
Boston, MA 02119

Boston Public Library
South Boston Branch
646 East Broadway
South Boston, MA 02127

Other Interested Parties

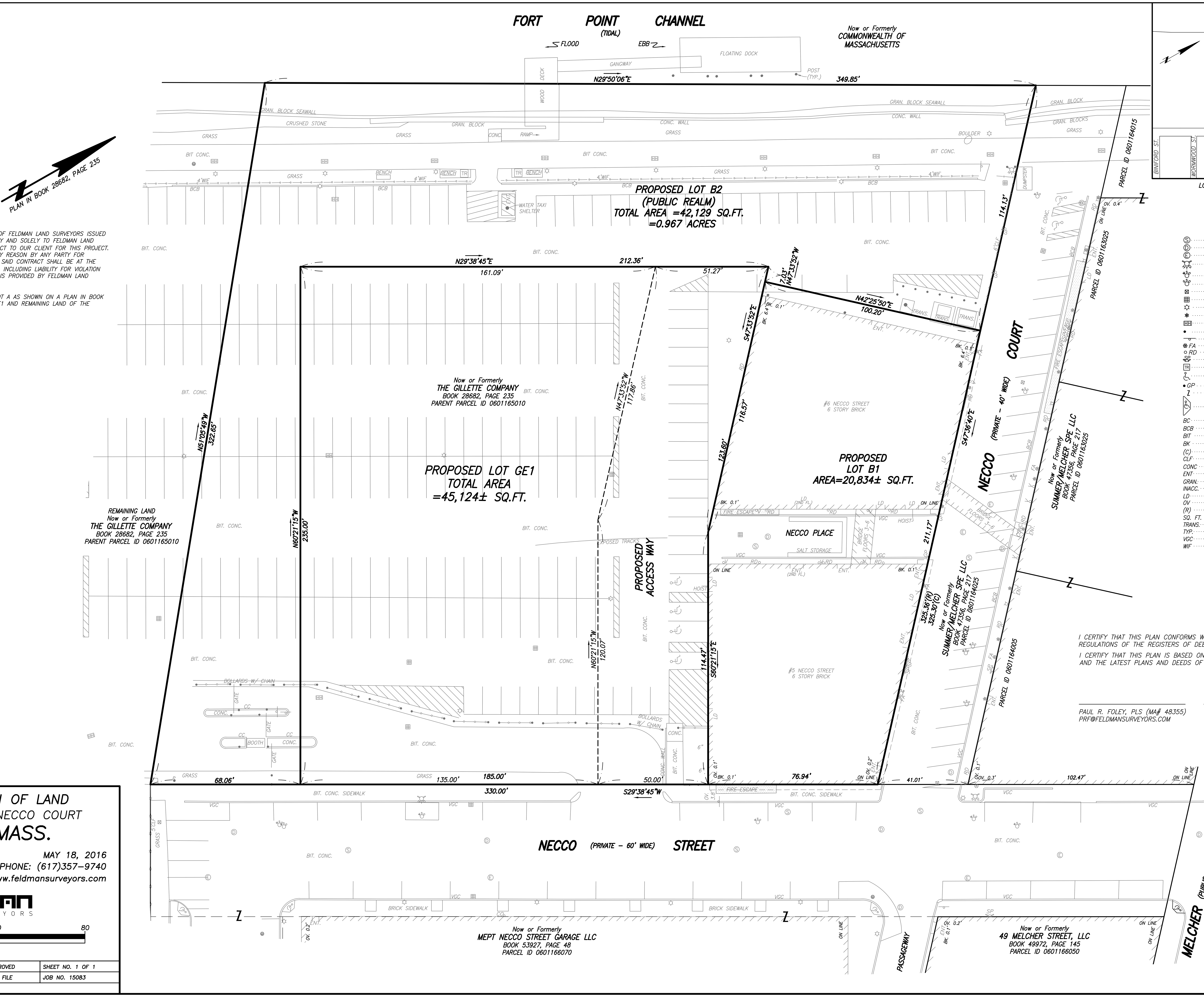
Boston Harbor Now
374 Congress Street, Suite 307
Boston, MA 02210

APPENDIX B: Survey and Metes & Bounds

ALTA/ASCM Survey

Metes and Bounds Description

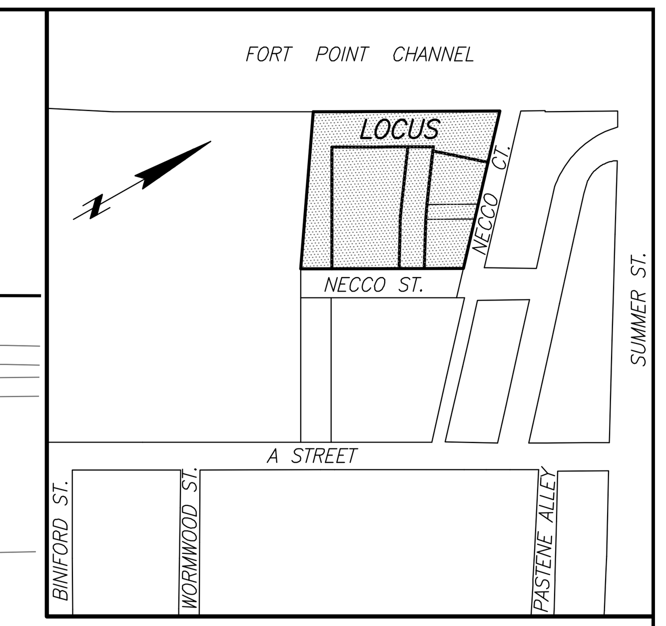
FOR REGISTRY USE ONLY



<u>NOTES:</u>

1) THIS DOCUMENT IS AN INSTRUMENT OF SERVICE OF FELDMAN LAND SURVEYORS ISSUED TO OUR CLIENT FOR PURPOSES RELATED DIRECTLY AND SOLELY TO FELDMAN LAND SURVEYORS' SCOPE OF SERVICES UNDER CONTRACT TO OUR CLIENT FOR THIS PROJECT. ANY USE OR REUSE OF THIS DOCUMENT FOR ANY REASON BY ANY PARTY FOR PURPOSES UNRELATED DIRECTLY AND SOLELY TO SAID CONTRACT SHALL BE AT THE USER'S SOLE AND EXCLUSIVE RISK AND LIABILITY, INCLUDING LIABILITY FOR VIOLATION OF COPYRIGHT LAWS, UNLESS WRITTEN CONSENT IS PROVIDED BY FELDMAN LAND SURVEYORS.

2) THE PURPOSE OF THIS PLAN IS TO SUBDIVIDE LOT A AS SHOWN ON A PLAN IN BOOK 28682, PAGE 235 INTO LOT B1, LOT B2, LOT GE1 AND REMAINING LAND OF THE GILLETTE COMPANY.



LOCUS MAP NOT TO SCALE

<u>LEGEND</u>

- SEWER MANHOLE
- DRAIN MANHOLE
- ELECTRIC MANHOLE
- HYDRANT
- WATER SHUT OFF/WATER GATE
- GAS SHUT OFF/GAS GATE
- BOSTON WATER VALVE
- CATCH BASIN
- LIGHT POLE
- WALK LIGHT
- ELECTRIC HANDHOLE
- BOLLARD
- SIGN
- FA ········ FIRE ALARM
- RD ········ ROOF DRAIN
- SP ········ STAND PIPE/SIAMESE CONNECTION
- TR ········ TRASH RECEPTACLE
- HANDICAP PARKING SPACE
- GP ········ GATE POST
- INDICATES COMMON OWNERSHIP
- HANDICAP RAMP
- BC ········ BOTTOM OF CURB
- BCB ········ BIT. CONC. BERM
- BIT ········ BITUMINOUS
- BK ········ BACK
- (C) ········ CALCULATED
- CLF ········ CHAIN LINK FENCE
- CONC ········ CONCRETE
- ENT ········ ENTRANCE
- GRAN. ········ GRANITE
- INACC. ········ INACCESSIBLE
- LD ········ LOADING DOCK
- OV ········ OVER
- (R) ········ RECORD
- SQ. FT. ········ SQUARE FEET
- TRANS. ········ TRANSFORMER
- TYP. ········ TYPICAL
- VGC ········ VERTICAL GRANITE CURB
- WIF ········ WROUGHT IRON FENCE

I CERTIFY THAT THIS PLAN CONFORMS WITH THE RULES AND REGULATIONS OF THE REGISTERS OF DEEDS.

I CERTIFY THAT THIS PLAN IS BASED ON AN ACTUAL FIELD SURVEY AND THE LATEST PLANS AND DEEDS OF RECORD.

PAUL R. FOLEY, PLS (MA# 48355)
PRF@FELDMANSURVEYORS.COM

DATE

SUBDIVISION PLAN OF LAND
NECCO STREET AND NECCO COURT
BOSTON, MASS.

FELDMAN LAND SURVEYORS
112 SHAWMUT AVENUE
BOSTON, MASS. 02118

MAY 18, 2016
PHONE: (617)357-9740
www.feldmansurveyors.com

FELDMAN
LAND SURVEYORS

20 0 10 20 40 80

SCALE: 1"=20'

RESEARCH TRA	FIELD CHIEF JM	PROJ MGR PRF	APPROVED	SHEET NO. 1 OF 1
CALC TRA	CADD TRA	FIELD CHECKED	CRD FILE	JOB NO. 15083

FILENAME: S:\PROJECTS\15000s\15083\DWG\15083-SUB.dwg

BOUNDARY DESCRIPTION (PER SURVEY)

A CERTAIN PARCEL OF LAND SITUATED IN THE CITY OF BOSTON, COUNTY OF SUFFOLK AND THE COMMONWEALTH OF MASSACHUSETTS MORE PARTICULARLY DESCRIBED AS FOLLOWS:

BEGINNING AT A POINT AT THE INTERSECTION OF THE SOUTHWESTERLY SIDELINE OF NECCO COURT AND THE NORTHWESTERLY SIDELINE OF NECCO STREET, SAID POINT BEING S 29°38'45" W, A DISTANCE OF 143.48 FEET FROM THE INTERSECTION OF SAID NECCO COURT AND THE SOUTHWESTERLY SIDELINE OF MELCHER STREET;

THENCE RUNNING S 29°38'45" W, BY SAID NECCO STREET, A DISTANCE OF 330.00 FEET TO A POINT;

THENCE TURNING AND RUNNING N 51°05'49" W, BY LAND NOW OR FORMERLY OF THE GILLETTE COMPANY, A DISTANCE OF 322.65 FEET TO A POINT ON THE SOUTHEASTERLY SIDELINE OF THE FORT POINT CHANNEL;

THENCE TURNING AND RUNNING N 29°50'06" E, BY SAID FORT PORT CHANNEL, A DISTANCE OF 349.85 FEET TO A POINT ON SAID NECCO COURT;

THENCE TURNING AND RUNNING S 47°36'40" E, BY SAID NECCO COURT, A DISTANCE OF 325.30 FEET TO THE POINT OF BEGINNING.

SAID PARCEL CONTAINING 108,087 SQUARE FEET, OR 2.481 ACRES.

APPENDIX C: BRA Letter of Intent

Ann R. Klee
Vice President, Global Operations
Environment, Health & Safety

3135 Easton Turnpike
Fairfield, CT 06828
USA

T +1 203 373 3198
F +1 203 373 3342
ann.klee@ge.com

June 23, 2016

By Hand

Mr. Brian P. Golden, Director
Boston Redevelopment Authority
One City Hall Plaza, 9th Floor
Boston, MA 02201-1007

Re: General Electric Headquarters Project

Dear Director Golden:

This letter constitutes a letter of intent pursuant to the Mayoral Executive Order dated October 10, 2000, as amended on April 3, 2001, with respect to the proposed GE Headquarters Campus in the Fort Point neighborhood of South Boston.

The GE Headquarters Campus project ("Project") will include the following:

(a) the rehabilitation of the existing brick buildings located at 5 and 6 Necco Court, including the connection of the brick buildings by a shared lobby with elevators set within an atrium and winter garden;

(b) the construction of a new approximately 293,000 square foot, 12-story building that will be connected to the brick buildings by a pedestrian bridge and GE Plaza, a new pedestrian passageway that will run from Necco Street to the Fort Point Channel, with a portion of GE Plaza to be located beneath a transparent canopy; and

(c) the construction of public realm improvements, including approximately 42,430 square feet of new open space for the public and 15,100± square feet of covered open space, as well as improvements to the City's Harborwalk along the Fort Point Channel.

The Project will be developed on an approximately 2.48 acres site bounded by the Fort Point Channel to the west, Necco Court to the north, Necco Street to the east, and land of The Gillette Company to the south ("Project Site"). GE currently has the Project Site under a binding contract of sale with The Gillette Company.

General Electric Company
*Admitted in DC
Authorized House Counsel in Connecticut

The Project Site will be the subject of a Development Plan pursuant to Section 3.1A. and Article 80C of the Boston Zoning Code in accordance with the Master Plan for Planned Development Area No. 69 (100 Acres/South Boston). The proposed height and density of the Project will be consistent with the PDA Master Plan. In addition, the proposed uses at the Project – office, maker space, bistro-café, cafeteria, coffee bar, museum, convener space, community co-work lounge, and laboratory – are consistent with the PDA Master Plan and with the 100 Acres Master Plan approved by the BRA in 2006. In particular, the ground floors of the buildings will comply with M.G.L. Ch. 91 regulations, including the requirement that 75% of ground level space be devoted to Facilities of Public Accommodation and thus, will contain uses intended to activate tidelands and promote public use and enjoyment of the Fort Point Channel shoreline.

The Project will reflect both the Project Site's industrial past and GE's digital future. GE is committed to maintaining resiliency, sustainability and transparency as thematic pillars for the overall design of the Project. A "vertical village," a glass enclosed core of activity, will connect GE employees and visitors across floors and teams, and will celebrate GE's commitment to transparency and collaboration. The existing Harborwalk will be integrated with the Project Site and supplemented with a network of amenity spaces.

We are appreciative of the BRA's assistance thus far, and look forward to working with BRA and other City agency staff on the successful completion of the Article 80 Large Project Review process.

If you have any questions about the Project, please feel free to contact Sue Bishop at susan.bishop@ge.com or 203-253-2735. Thank you.

Sincerely,

Ann R. Klee
Vice President
Global Operations – Environment, Health & Safety

APPENDIX D: BRA Checklists

BRA Accessibility Checklist

BRA Climate Change Preparedness and Resilience Checklist

BRA Accessibility Checklist

Accessibility Checklist

(to be added to the BRA Development Review Guidelines)

In 2009, a nine-member Advisory Board was appointed to the Commission for Persons with Disabilities in an effort to reduce architectural, procedural, attitudinal, and communication barriers affecting persons with disabilities in the City of Boston. These efforts were instituted to work toward creating universal access in the built environment.

In line with these priorities, the Accessibility Checklist aims to support the inclusion of people with disabilities. In order to complete the Checklist, you must provide specific detail, including descriptions, diagrams and data, of the universal access elements that will ensure all individuals have an equal experience that includes full participation in the built environment throughout the proposed buildings and open space.

In conformance with this directive, all development projects subject to Boston Zoning Article 80 Small and Large Project Review, including all Institutional Master Plan modifications and updates, are to complete the following checklist and provide any necessary responses regarding the following:

- improvements for pedestrian and vehicular circulation and access;
- encourage new buildings and public spaces to be designed to enhance and preserve Boston's system of parks, squares, walkways, and active shopping streets;
- ensure that persons with disabilities have full access to buildings open to the public;
- afford such persons the educational, employment, and recreational opportunities available to all citizens; and
- preserve and increase the supply of living space accessible to persons with disabilities.

We would like to thank you in advance for your time and effort in advancing best practices and progressive approaches to expand accessibility throughout Boston's built environment.

Accessibility Analysis Information Sources:

1. Americans with Disabilities Act – 2010 ADA Standards for Accessible Design
    a. http://www.ada.gov/2010ADAstandards_index.htm
2. Massachusetts Architectural Access Board 521 CMR
    a. http://www.mass.gov/eopss/consumer-prot-and-bus-lic/license-type/aab/aab-rules-and-regulations-pdf.html
3. Boston Complete Street Guidelines
    a. http://bostoncompletestreets.org/
4. City of Boston Mayors Commission for Persons with Disabilities Advisory Board
    a. http://www.cityofboston.gov/Disability
5. City of Boston – Public Works Sidewalk Reconstruction Policy
    a. http://www.cityofboston.gov/images_documents/sidewalk%20policy%200114_tcm3-41668.pdf
6. Massachusetts Office On Disability Accessible Parking Requirements
    a. www.mass.gov/anf/docs/mod/hp-parking-regulations-mod.doc
7. MBTA Fixed Route Accessible Transit Stations
    a. http://www.mbta.com/about_the_mbta/accessibility/

Project Information

Project Name:	GE Headquarters Project
Project Address Primary:	244-284 A Street
Project Address Additional:	
Project Contact (name / Title / Company / email / phone):	Tim Kruppenbacher, Operations Manager, Corporate Environmental Programs, General Electric timothy.kruppenbacher@ge.com 518.746.5247

Team Description

Owner / Developer:	General Electric (GE) and the Massachusetts Development Finance Agency (MassDevelopment)
Architect:	Gensler
Engineer (building systems):	RDK
Sustainability / LEED:	Paladino and Company
Permitting:	VHB, Inc.
Construction Management:	AECOM

Project Permitting and Phase

At what phase is the project – at time of this questionnaire?

PNF / Expanded PNF Submitted	Draft / Final Project Impact Report Submitted	BRA Board Approved
BRA Design Approved	Under Construction	Construction just completed:

Building Classification and Description

What are the principal Building Uses - select all appropriate uses?

Residential – One to Three Unit	Residential - Multi-unit, Four +	Institutional	Education
Commercial	**Office**	Retail	Assembly
Laboratory / Medical	Manufacturing / Industrial	Mercantile	Storage, Utility and Other

First Floor Uses (List)

Brick Buildings: Maker Space, Bistro-Café, Lobby/Reception.

New Building: Museum, Community Co-Work Lounge (lobby/reception), Coffee Bar, loading/below-grade parking ramp.

What is the Construction Type – select most appropriate type? (New Building)

Wood Frame	Masonry	**Steel Frame**	Concrete

Describe the building?

Site Area:	104,000 SF (2.4 acres)	Total Building Area (gross sq ft):	394,100 GSF
		Total Building Footprint Area (sq ft):	45,160 SF
Building Height:	180 Ft.	Number of Stories (New Building):	12 Flrs
		Number of Stories (Brick Buildings):	6 Flrs
First Floor Elevation:	19.5 Elev.	Are there below grade spaces:	**Yes** / *No*

Assessment of Existing Infrastructure for Accessibility:

This section explores the proximity to accessible transit lines and proximate institutions such as, but not limited to hospitals, elderly and disabled housing, and general neighborhood information. The proponent should identify how the area surrounding the development is accessible for people with mobility impairments and should analyze the existing condition of the accessible routes through sidewalk and pedestrian ramp reports.

Provide a description of the development neighborhood and identifying characteristics.	The Project Site is located within the Fort Point area of the South Boston Waterfront neighborhood, and is comprised of two existing historic brick buildings at 5 and 6 Necco Court (the "Brick Buildings"), a surface parking lot, and a portion of the Boston Harborwalk. The Project Site is bounded to the east by Necco Street, to the south by additional surface parking owned by The Gillette Company to the

	west by the Fort Point Channel, and to the north by Necco Court, which is a private way. The Project Site is also in close proximity to key area destinations including the Boston Convention and Exhibition Center (BCEC) and the booming development in the Seaport. The surrounding neighborhood is part of the Fort Point Channel Planning District and has been rapidly changing over the past decade with new construction and rehabilitation and repurposing of historic industrial buildings.
List the surrounding ADA compliant MBTA transit lines and the proximity to the development site: Commuter rail, subway, bus, etc.	The Project Site is well served by public transportation as it is located approximately 0.5 miles from South Station (MBTA Red and Silver Lines, Commuter Rail, and Amtrak), approximately 0.7 miles from Broadway Station (Red Line), and Courthouse Station (Silver Line), and a local and regional bus services. South Station, Courthouse Station, and Broadway Station are accessible stations according to MBTA's website.
List the surrounding institutions: hospitals, public housing and elderly and disabled housing developments, educational facilities, etc.	Artists for Humanity and JF Condon Elementary School (Boston public school) are both located in nearby South Boston neighborhood.
Is the proposed development on a priority accessible route to a key public use facility? List the surrounding: government buildings, libraries, community centers and recreational facilities and other related facilities.	The following public use facilities are within proximity of the Project Site: • Boston Convention & Exhibition Center • Boston Public Library – South Boston • Condon Community Center • District Hall • John Joseph Moakley U.S. Courthouse • Our Lady of Good Voyage Catholic Church

Surrounding Site Conditions – Existing:

This section identifies the current condition of the sidewalks and pedestrian ramps around the development site.

Are there sidewalks and pedestrian ramps existing at the development site?	Yes
If yes above, list the existing sidewalk and pedestrian ramp materials and physical condition at the development site.	There is an existing, nominally 8-foot wide, concrete sidewalk along Necco Street with no ramps into current structures. There is also an existing, nominally 12-foot wide, bituminous harbor walk which runs along the West portion of the Project Site with no accessible ramps.

Are the sidewalks and pedestrian ramps existing-to-remain? If yes, have the sidewalks and pedestrian ramps been verified as compliant? If yes, please provide surveyors report.	No. All existing sidewalks and pedestrian ways are to be removed and replaced. Any non-compliant conditions will also be improved and brought to compliance.
Is the development site within a historic district? If yes, please identify.	A portion of the Project Site is located in the Fort Point Channel National Register Historic District and Fort Point Channel Landmark District. Refer to Figure 7.1 for the limits of these historic districts.

Surrounding Site Conditions – Proposed

This section identifies the proposed condition of the walkways and pedestrian ramps in and around the development site. The width of the sidewalk contributes to the degree of comfort and enjoyment of walking along a street. Narrow sidewalks do not support lively pedestrian activity, and may create dangerous conditions that force people to walk in the street. Typically, a five foot wide Pedestrian Zone supports two people walking side by side or two wheelchairs passing each other. An eight foot wide Pedestrian Zone allows two pairs of people to comfortable pass each other, and a ten foot or wider Pedestrian Zone can support high volumes of pedestrians.

Are the proposed sidewalks consistent with the Boston Complete Street Guidelines? See: www.bostoncompletestreets.org	Yes. The proposed sidewalk along Necco Street will be consistent with Boston Complete Streets Guidelines. And, the proposed Harborwalk improvements will be consistent with Boston Municipal Harbor Plan requirements.
If yes above, choose which Street Type was applied: Downtown Commercial, Downtown Mixed-use, Neighborhood Main, Connector, Residential, Industrial, Shared Street, Parkway, Boulevard.	Industrial
What is the total width of the proposed sidewalk? List the widths of the proposed zones: Frontage, Pedestrian and Furnishing Zone.	8 feet total: 6-foot Pedestrian Zone; and 2-foot Furnishing Zone.
List the proposed materials for each Zone. Will the proposed materials be on private property or will the proposed materials be on the City of Boston pedestrian right-of-way?	Pedestrian Zone: Cast in place concrete. Furnishing Zone: Concrete Unit Pavers The materials will be on the City of Boston pedestrian right-of-way.
If the pedestrian right-of-way is on private property, will the proponent	No

seek a pedestrian easement with the City of Boston Public Improvement Commission?	
Will sidewalk cafes or other furnishings be programmed for the pedestrian right-of-way?	No. The set dimensions of the sidewalk along Necco Street will not allow for sidewalk café or other programming.
If yes above, what are the proposed dimensions of the sidewalk café or furnishings and what will the right-of-way clearance be?	

Proposed Accessible Parking:

See Massachusetts Architectural Access Board Rules and Regulations 521 CMR Section 23.00 regarding accessible parking requirement counts and the Massachusetts Office of Disability Handicap Parking Regulations.

What is the total number of parking spaces provided at the development site parking lot or garage?	The Project will provide approximately 30 parking spaces below the New Building.
What is the total number of accessible spaces provided at the development site?	1 space, as required.
Will any on street accessible parking spaces be required? If yes, has the proponent contacted the Commission for Persons with Disabilities and City of Boston Transportation Department regarding this need?	The Project is not proposing to add any on-street parking.
Where is accessible visitor parking located?	No visitor parking is proposed on-site.
Has a drop-off area been identified? If yes, will it be accessible?	An accessible drop-off area will be provided along Necco Street.
Include a diagram of the accessible routes to and from the accessible parking lot/garage and drop-off	Refer to Figure 3.11 for the access and circulation plan.

areas to the development entry locations. Please include route distances.	

Circulation and Accessible Routes:

The primary objective in designing smooth and continuous paths of travel is to accommodate persons of all abilities that allow for universal access to entryways, common spaces and the visit-ability* of neighbors.

**Visit-ability – Neighbors ability to access and visit with neighbors without architectural barrier limitations*

Provide a diagram of the accessible route connections through the site.	Figure D.1 attached identifies the accessible routes through the Project Site.
Describe accessibility at each entryway: Flush Condition, Stairs, Ramp Elevator.	Each key entry point into the Campus will include stairs as well as accessible ramps.
Are the accessible entrance and the standard entrance integrated?	Yes. All entries will have integrated access.
If no above, what is the reason?	
Will there be a roof deck or outdoor courtyard space? If yes, include diagram of the accessible route.	Yes. The proposed rooftop spaces will be made accessible via elevators from building lobbies.
Has an accessible routes way-finding and signage package been developed? If yes, please describe.	No. Such signage will be developed further into the design process.

Accessible Units: (If applicable)

In order to facilitate access to housing opportunities this section addresses the number of accessible units that are proposed for the development site that remove barriers to housing choice.

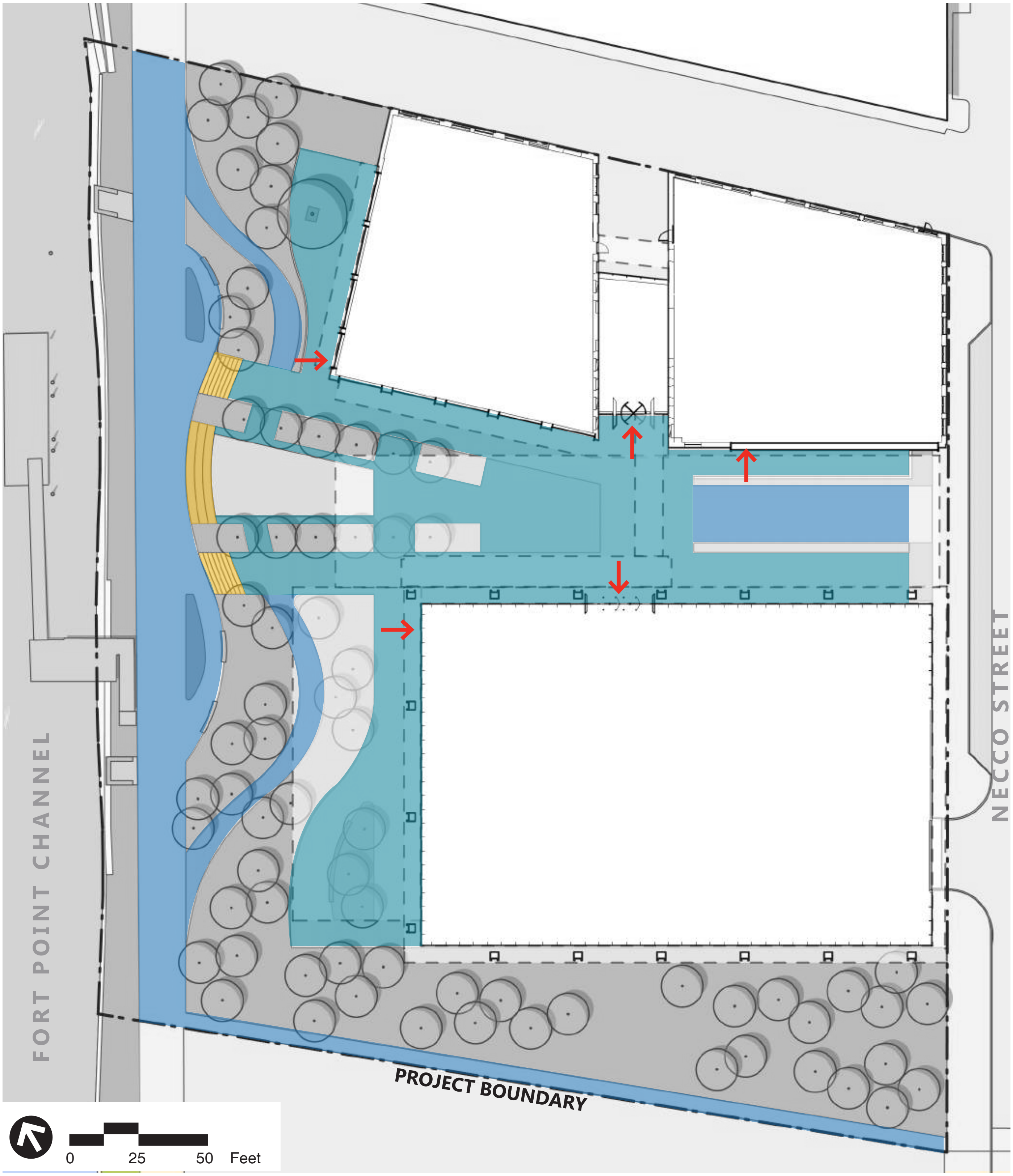
What is the total number of proposed units for the development?	No residential units are proposed as part of the Project.
How many units are for sale; how many are for rent? What is the market value vs. affordable breakdown?	N/A

How many accessible units are being proposed?	N/A
Please provide plan and diagram of the accessible units.	N/A
How many accessible units will also be affordable? If none, please describe reason.	N/A
Do standard units have architectural barriers that would prevent entry or use of common space for persons with mobility impairments? Example: stairs at entry or step to balcony. If yes, please provide reason.	N/A
Has the proponent reviewed or presented the proposed plan to the City of Boston Mayor's Commission for Persons with Disabilities Advisory Board?	No
Did the Advisory Board vote to support this project? If no, what recommendations did the Advisory Board give to make this project more accessible?	No

Thank you for completing the Accessibility Checklist!

For questions or comments about this checklist or accessibility practices, please contact:

kathryn.quigley@boston.gov | Mayors Commission for Persons with Disabilities



Source: OJB

Terraces/ Landings - 2-3% Slope

Walkways - <5% / 2% max cross slope

Stairs

Building Entry/ Egress

OJB

Figure D.1

Accessibility Diagram

GE Headquarters Project
Boston, Massachusetts

BRA Climate Change Preparedness and Resilience Checklist

Climate Change Preparedness and Resiliency Checklist for New Construction

In November 2013, in conformance with the Mayor's 2011 Climate Action Leadership Committee's recommendations, the Boston Redevelopment Authority adopted policy for all development projects subject to Boston Zoning Article 80 Small and Large Project Review, including all Institutional Master Plan modifications and updates, are to complete the following checklist and provide any necessary responses regarding project resiliency, preparedness, and to mitigate any identified adverse impacts that might arise under future climate conditions.

For more information about the City of Boston's climate policies and practices, and the 2011 update of the climate action plan, *A Climate of Progress*, please see the City's climate action web pages at http://www.cityofboston.gov/climate

In advance we thank you for your time and assistance in advancing best practices in Boston.

Climate Change Analysis and Information Sources:

1. Northeast Climate Impacts Assessment (www.climatechoices.org/ne/)
2. USGCRP 2009 (http://www.globalchange.gov/publications/reports/scientific-assessments/us-impacts/)
3. Army Corps of Engineers guidance on sea level rise (http://planning.usace.army.mil/toolbox/library/ECs/EC11652212Nov2011.pdf)
4. Proceeding of the National Academy of Science, "Global sea level rise linked to global temperature", Vermeer and Rahmstorf, 2009 (http://www.pnas.org/content/early/2009/12/04/0907765106.full.pdf)
5. "Hotspot of accelerated sea-level rise on the Atlantic coast of North America", Asbury H. Sallenger Jr*, Kara S. Doran and Peter A. Howd, 2012 (http://www.bostonredevelopmentauthority.org/planning/Hotspot of Accelerated Sea-level Rise 2012.pdf)
6. "Building Resilience in Boston": Best Practices for Climate Change Adaptation and Resilience for Existing Buildings, Linnean Solutions, The Built Environment Coalition, The Resilient Design Institute, 2103 (http://www.greenribboncommission.org/downloads/Building_Resilience_in_Boston_SML.pdf)

Checklist

Please respond to all of the checklist questions to the fullest extent possible. For projects that respond "Yes" to any of the D.1 – Sea-Level Rise and Storms, Location Description and Classification questions, please respond to all of the remaining Section D questions.

Checklist responses are due at the time of initial project filing or Notice of Project Change and final filings just prior seeking Final BRA Approval. A PDF of your response to the Checklist should be submitted to the Boston Redevelopment Authority via your project manager.

Please Note: When initiating a new project, please visit the BRA web site for the most current Climate Change Preparedness & Resiliency Checklist.

A.1 - Project Information

Project Name:	GE Headquarters Project
Project Address Primary:	244-284 A Street
Project Address Additional:	
Project Contact (name / Title / Company / email / phone):	Tim Kruppenbacher, Operations Manager, Corporate Environmental Programs, General Electric timothy.kruppenbacher@ge.com 518.746.5247

A.2 - Team Description

Owner / Developer:	General Electric (GE)
Architect:	Gensler
Engineer (building systems):	RDK
Sustainability / LEED:	Paladino and Company
Permitting:	VHB, Inc.
Construction Management:	AECOM
Climate Change Expert:	VHB, Inc.

A.3 - Project Permitting and Phase

At what phase is the project – most recent completed submission at the time of this response?

PNF / Expanded PNF Submission	Draft / Final Project Impact Report Submission	BRA Board Approved	Notice of Project Change
Planned Development Area	BRA Final Design Approved	Under Construction	Construction just completed:

A.4 - Building Classification and Description

List the principal Building Uses:	Office with accessory uses
List the First Floor Uses:	New Building: Museum, Community Co-Work Lounge (lobby/reception), Coffee Bar, loading/below-grade parking ramp.

What is the principal Construction Type – select most appropriate type?

Wood Frame	Masonry	**Steel Frame**	Concrete

Describe the building?

Site Area:	104,000 SF (2.4 acres)	Total Building Area (gross sq ft): Building Footprint Area (sq ft):	293,300 GFA 23,200 SF
Building Height:	180 Ft.	Number of Stories:	12 Flrs.
First Floor Elevation (reference Boston City Base):	19.5 Elev.	Are there below grade spaces/levels, if yes how many:	Yes / 1 Level

A.5 - Green Building

Which LEED Rating System(s) and version has or will your project use (by area for multiple rating systems)?

Select by Primary Use:	**New Construction (v4)**	Core & Shell	Healthcare	Schools
	Retail	Homes Midrise	Homes	Other
Select LEED Outcome:	**Certified**	Silver	Gold	Platinum

Will the project be USGBC Registered and / or USGBC Certified?

Registered:	**Yes** / *No*	Certified:	*Yes* / **No**

A.6 - Building Energy

What are the base and peak operating energy loads for the building?

Electric:	1,141 (kW)	Heating:	12.2 (MMBtu/hr)
What is the planned building Energy Use Intensity:	34.5 (kbut/SF)	Cooling:	945 (Tons/hr)

What are the peak energy demands of your critical systems in the event of a service interruption?

Electric:	*(kW)*	Heating:	0 (MMBtu/hr)
		Cooling:	30 (Tons/hr)

What is nature and source of your back-up / emergency generators?

Electrical Generation:	1,000 (kW)		Fuel Source:	**Diesel**
System Type and Number of Units:	**Combustion Engine**	Gas Turbine	Combine Heat and Power	*(Units)*

B - Extreme Weather and Heat Events

Climate change will result in more extreme weather events including higher year round average temperatures, higher peak temperatures, and more periods of extended peak temperatures. The section explores how a project responds to higher temperatures and heat waves.

B.1 – Analysis

What is the full expected life of the project?

Select most appropriate:	10 Years	25 Years	**50 Years**	75 Years

What is the full expected operational life of key building systems (e.g. heating, cooling, ventilation)?

Select most appropriate:	10 Years	**25 Years**	50 Years	75 Years

What time span of future Climate Conditions was considered?

Select most appropriate:	10 Years	25 Years	**50 Years**	75 Years

Analysis Conditions - What range of temperatures will be used for project planning – Low/High?

7/91 Deg.

What Extreme Heat Event characteristics will be used for project planning – Peak High, Duration, and Frequency?

95 Deg.	1 Day	6 / yr.

What Drought characteristics will be used for project planning – Duration and Frequency?

Days	*Events / yr.*

Drought tolerance will be addressed through a combination of native/adaptive plantings that require less water and maintenance, and a water-efficient irrigation system to reduce water needs by approximately 80% compared to a conventional irrigation system.

What Extreme Rain Event characteristics will be used for project planning – Seasonal Rain Fall, Peak Rain Fall, and Frequency of Events per year?

44 *Inches / yr.*	6.19 *Inches*	127 *Events / yr.*

What Extreme Wind Storm Event characteristics will be used for project planning – Peak Wind Speed, Duration of Storm Event, and Frequency of Events per year?

105 mph Peak Wind	3-sec Guests	1 Event /50 yr.

B.2 - Mitigation Strategies

What will be the overall energy performance, based on use, of the project and how will performance be determined?

Building energy use below code:	29.9 %
How is performance determined:	Energy modeling via Energy Plus

What specific measures will the project employ to reduce building energy consumption?

Select all appropriate:	High performance building envelop	High performance lighting & controls	Building day lighting	EnergyStar equip. / appliances
	High performance HVAC equipment	Energy recovery ventilation	No active cooling	No active heating
Describe any added measures:	None at this time			

What are the insulation (R) values for building envelop elements?

Roof:	R = 30	Walls / Curtain Wall Assembly:	R = 20.0 Minimum
Foundation:	R = 7.5 Minimum	Basement / Slab:	F = 0.86 Minimum
Windows:	U =0.3 Minimum	Doors:	U =0.5 Minimum

What specific measures will the project employ to reduce building energy demands on the utilities and infrastructure?

	On-site clean energy / CHP system(s)	Building-wide power dimming	Thermal energy storage systems	Ground source heat pump
	On-site Solar PV	On-site Solar Thermal	Wind power	None
Describe any added measures:	None at this time			

Will the project employ Distributed Energy / Smart Grid Infrastructure and /or Systems?

Select all appropriate:	**Connected to local distributed electrical**	Building will be Smart Grid ready	Connected to distributed steam, hot, chilled water	Distributed thermal energy ready

Will the building remain operable without utility power for an extended period?

	Yes / **No**	If yes, for how long:		*Days*
If Yes, is building "Islandable?				
If Yes, describe strategies:				

Describe any non-mechanical strategies that will support building functionality and use during an extended interruption(s) of utility services and infrastructure:

Select all appropriate:	Solar oriented – longer south walls	Prevailing winds oriented	External shading devices	Tuned glazing,
	Building cool zones	Operable windows	Natural ventilation	Building shading
	Potable water for drinking / food preparation	Potable water for sinks / sanitary systems	Waste water storage capacity	**High Performance Building Envelop**
Describe any added measures:	**None at this time**			

What measures will the project employ to reduce urban heat-island effect?

Select all appropriate:	**High reflective paving materials**	**Shade trees & shrubs**	**High reflective roof materials**	**Vegetated roofs**
Describe other strategies:	**Bio-infiltrative stormwater management, which will provide cooling via evapotranspiration**			

What measures will the project employ to accommodate rain events and more rain fall?

Select all appropriate:	**On-site retention systems & ponds**	**Infiltration galleries & areas**	**vegetated water capture systems**	**Vegetated roofs**
Describe other strategies:	**Stormwater infrastructure designed to convey the 25-year design storm event**			

What measures will the project employ to accommodate extreme storm events and high winds?

Select all appropriate:	Hardened building structure & elements	**Buried utilities & hardened infrastructure**	Hazard removal & protective landscapes	**Soft & permeable surfaces (water infiltration)**
Describe other strategies:	**None at this time**			

C - Sea-Level Rise and Storms

Rising Sea-Levels and more frequent Extreme Storms increase the probability of coastal and river flooding and enlarging the extent of the 100 Year Flood Plain. This section explores if a project is or might be subject to Sea-Level Rise and Storm impacts.

C.1 - Location Description and Classification:

Do you believe the building to susceptible to flooding now or during the full expected life of the building?

Yes / *No*

Describe site conditions?

Site Elevation – Low/High Points:	Boston City Base 14.0/19.5 Elev.(Ft.)
Building Proximity to Water:	110 Ft.

Is the site or building located in any of the following?

Coastal Zone:	Yes / *No*	Velocity Zone:	*Yes* / No
Flood Zone:	Yes / *No*	Area Prone to Flooding:	Yes / *No*

Will the 2013 Preliminary FEMA Flood Insurance Rate Maps or future floodplain delineation updates due to Climate Change result in a change of the classification of the site or building location?

2013 FEMA Prelim. FIRMs:	*Yes* / No	Future floodplain delineation updates:	*Yes* / No

What is the project or building proximity to nearest Coastal, Velocity or Flood Zone or Area Prone to Flooding?

0 Ft.

If you answered YES to any of the above Location Description and Classification questions, please complete the following questions. ***Otherwise you have completed the questionnaire; thank you!***

C - Sea-Level Rise and Storms

This section explores how a project responds to Sea-Level Rise and / or increase in storm frequency or severity.

C.2 - Analysis

How were impacts from higher sea levels and more frequent and extreme storm events analyzed:

Sea Level Rise:	3 Ft.*	Frequency of storms:	Not Analyzed

*The 500-year flood elevation plus two (2) feet was analyzed, which is equal to three (3) feet of sea level rise coupled with the FEMA FIRM 100-year flood elevation

C.3 - Building Flood Proofing

Describe any strategies to limit storm and flood damage and to maintain functionality during an extended periods of disruption.

What will be the Building Flood Proof Elevation and First Floor Elevation:

Flood Proof Elevation:	Boston City Base 19.5 Elev.(Ft.)	First Floor Elevation:	Boston City Base 19.5 Elev.(Ft.)

Will the project employ temporary measures to prevent building flooding (e.g. barricades, flood gates):

	Yes / *No*	If Yes, to what elevation	Boston City Base 19.5 Elev.(Ft.)
If Yes, describe:	Movable and permanent flood barriers at the garage/loading dock entrance will continue to be evaluated as the entrance is at street grade approximately three (3) feet below the building finish floor elevation. Additionally, the building systems and operations located in the basement of the New Building will be limited to those, which can withstand inundation or are not critical to the operation of the building.		

What measures will be taken to ensure the integrity of critical building systems during a flood or severe storm event:

Systems located above 1st Floor.	Water tight utility conduits	Waste water back flow prevention	Storm water back flow prevention

Were the differing effects of fresh water and salt water flooding considered:

Yes / *No*

Will the project site / building(s) be accessible during periods of inundation or limited access to transportation:

Yes / No	If yes, to what height above 100 Year Floodplain:	*Boston City Base Elev. (Ft.)*

Based on current 100-year floodplain portions of the Project Site would not be accessible during inundation and roadways along site frontage and the Harborwalk would be under water whereas the elevated site would essentially be an island.

Will the project employ hard and / or soft landscape elements as velocity barriers to reduce wind or wave impacts?

Yes / *No*

If Yes, describe: The landscaping adjacent to Fort Point Channel will be designed with native/adaptive landscape, such as tidal zone planting materials that will be resilient against flooding and potential saltwater intrusion. Hard landscape elements, such as walls, walkways, stairways, railings, benches and bike racks will also be designed using materials that can withstand potential saltwater inundation.

Will the building remain occupiable without utility power during an extended period of inundation:

Yes / No	If Yes, for how long:	*days*

Raising the site grade so that the finished floor elevation for the New Building is at +19.5 BCB will ensure the building will maintain operational capacity during a 100-year flood event evaluated by FEMA under the future Intermediate High Emission Sea Level Rise Scenario for the year 2075.

Describe any additional strategies to addressing sea level rise and or severe storm impacts:

Critical mechanical and life safety/standby emergency building systems outside of vulnerable elevations (the 100-year floodplain with 2.47 feet of sea level rise). Standby generator will be located on roof.

The Project will provide oversized stormwater conveyance infrastructure to effectively remove stormwater from the Project Site. Also, the site design will include an overland drainage path around the buildings and elevated pedestrian areas for inland flooding.

C.4 - Building Resilience and Adaptability

Describe any strategies that would support rapid recovery after a weather event and accommodate future building changes that respond to climate change:

Will the building be able to withstand severe storm impacts and endure temporary inundation?

Select appropriate:				
	Yes / *No*	Hardened / Resilient Ground Floor Construction	Temporary shutters and or barricades	Resilient site design, materials and construction

Can the site and building be reasonably modified to increase Building Flood Proof Elevation?

Select appropriate:				
	Yes / No	Surrounding site elevation can be raised	Building ground floor can be raised	Construction been engineered

Describe additional strategies:	**Surrounding site elevation has already been raised to be resilient to flooding from storm events with sea level rise.**

Has the building been planned and designed to accommodate future resiliency enhancements?

Select appropriate:	**Yes** / *No*	**Solar PV**	Solar Thermal	Clean Energy / CHP System(s)
		Potable water storage	Wastewater storage	**Back up energy systems & fuel**
Describe any specific or additional strategies:	**None at this time**			

Thank you for completing the Boston Climate Change Resilience and Preparedness Checklist!

For questions or comments about this checklist or Climate Change Resiliency and Preparedness best practices, please contact: John.Dalzell.BRA@cityofboston.gov

APPENDIX E: Regulatory Supporting Documentation

PDA Master Plan No. 69

5-6 Necco Court Amnesty License

Public Landing License

PDA Master Plan No. 69

BOSTON REDEVELOPMENT AUTHORITY

MASTER PLAN
for
PLANNED DEVELOPMENT AREA NO. 69

SOUTH BOSTON/THE 100 ACRES

January 10, 2007

Pursuant to (i) Section 3-lA and Article 80C of the Boston Zoning Code (the "**Code**"), and (ii) general concepts and principles set forth in the Memorandum of Agreement, dated January 10, 2007, by and among the Gillette Company ("**Gillette**"); the United States Postal Service ("**USPS**"); A Street Properties I, LLC, A Street Properties II, LLC, A Street Properties III, LLC, and A Street Properties IV, LLC (collectively, "**Beacon**"); Boston HSR South Boston LLC ("**Melcher Owner**"); W2005 BWH II Realty, LLC, and W2005 BWH III Realty, LLC, ("**Archon**"): Brickman Real Estate Fund II, L.P. ("Brickman"); Boston Gold LLC ("Boston Gold"); APCA Property Fund I, L.P. ("APCA") (all as further identified on **Exhibit A**, and collectively, the "**Proponents**"); and the Boston Redevelopment Authority (the "**BRA**"), this plan constitutes a Master Plan for Planned Development Area ("**PDA**") No. 69 (this "**PDA Master Plan**"), regarding the development of approximately 47 acres of land located in Boston, Massachusetts, and bounded generally by the Fort Point Channel and A Street to the west, Summer Street to the north, the South Boston Bypass Road/Haul Road to the east, and West First Street and Mt. Washington Avenue to the south, but excluding those properties identified as 249 A Street, 326 A Street, 21 Wormwood Street, 33 Wormwood Street, and 285 Summer Street, which excluded areas are not subject to the provisions of this PDA Master Plan (the "**Site**"). The Site is described more particularly in **Exhibit B** attached hereto, and is depicted on a plan dated January 2, 2007, entitled "Perimeter Survey – PDA No. 69," prepared by Surveying and Mapping Consultants, Inc. (the "**Survey**"), a copy of which is attached hereto as **Exhibit C**. The Site constitutes a portion of a BRA planning area bounded by the Fort Point Channel and Dorchester Avenue to the west, Summer Street to the north, the South Boston Bypass Road/Haul Road to the east, and West First Street and West Second Street to the south (the "**100 Acres**").

This PDA Master Plan sets forth a statement of the development concept for the Site, including, *inter alia*, the planning objectives and character of the development, the proposed uses of the area, the range of dimensional requirements contemplated for each of the proposed uses, and the proposed phasing of construction of the development, and (ii) provides for one or more PDA Development Plans (each such plan, a "**PDA Development Plan**") to be submitted providing more specific information about various Proposed Projects and components thereof. Notwithstanding any contrary provisions of this PDA Master Plan, those properties within PDA No. 53 will continue to be governed by the Development Plan for PDA No. 53.

This PDA Master Plan consists of 12 pages of text plus attachments designated **Exhibits A** through **K**. All references to this PDA Master Plan contained herein will pertain only to these 12 pages and exhibits. Unless otherwise set forth herein, all references to terms defined by the

Code will have the meanings set forth in the Code, as amended to the effective date hereof, and not as it may be amended hereafter.

Planning Objectives and Character of Development.

Planning Backdrop. The plan entitled, "The Fort Point District 100 Acres Master Plan," approved by the BRA on September 7, 2006 (the "**BRA Master Plan**"), serves as the planning basis for the dimensional and use regulations, public realm improvements, and design guidelines of this PDA Master Plan. Many of its essential concepts were first articulated in the City of Boston's February, 1999, Seaport Public Realm Plan (the "**Public Realm Plan**"), which the BRA Master Plan now supersedes. That plan envisioned the Fort Point Channel as a great public space between the Downtown and the South Boston Waterfront, similar to a riverfront in the heart of an historic European city, with active edges, an abundance of water activities, and multiple bridge crossings. The Public Realm Plan also sought to strengthen the area's street connections, particularly those linking new and existing developments to the water. Finally, it called for a vibrant, 24-hour, mixed-use neighborhood incorporating a significant residential component.

To implement the Public Realm Plan's goals within those areas subject to the jurisdiction of Chapter 91 of the Massachusetts General Laws ("**Chapter 91**"), the City of Boston submitted its South Boston Municipal Harbor Plan (the "**Municipal Harbor Plan**") to the Massachusetts Executive Office of Environmental Affairs. The Secretary of Environmental Affairs (the "**Secretary**") approved the Municipal Harbor Plan by decision dated December 6, 2000, but conditioned this approval upon the BRA's undertaking a further master planning process, aimed at exploring specific potential amendments to the Municipal Harbor Plan. The goals of such planning included ensuring, among other things, the ongoing viability of Gillette's South Boston Manufacturing Center (the "**SBMC**"), which is discussed further below; public access to high-quality waterfront open space along the Fort Point Channel; pedestrian links connecting the waterfront to inland areas; and compatibility of new development with the historic character of the existing built environment.

In response to the Secretary's decision, the BRA initiated and oversaw a multi-year planning process, involving the Proponents, City of Boston agencies, members of the South Boston/Fort Point community, elected officials, and other interested parties, to develop a plan for growth and development within the 100 Acres, taking into account existing and planned infrastructure capacity such as utilities, open spaces, streets, and public transit facilities. That process has resulted in the development of the BRA Master Plan, and, in turn, this PDA Master Plan.

Conceptual Plan for Development of the 100 Acres. The BRA Master Plan envisions the 100 Acres as a dense, varied, and lively urban district. To encourage the desired 24-hour vibrancy, new development within the Site will be at least one-third residential or artist live/work in character, with the remainder composed of a broad range of uses, principal among them industrial, manufacturing, research and development, office, retail, service, open space, tourism-related, and art and cultural uses, as well as supporting uses such as accessory and non-accessory parking.

The existing development within the 100 Acres (inclusive of the existing and approved but unbuilt Channel Center Project approved pursuant to PDA Plan for Planned Development Area No. 53 and the associated contract documents) comprises approximately 4.4 million square feet of gross floor area (the "**Existing Development**"), which Existing Development is included in the "existing condition," or "base case," transportation assumptions utilized in preparing the BRA Master Plan. The BRA Master Plan anticipates that the 100 Acres may ultimately accommodate 5.9 million square feet of gross floor area of new development.

This PDA Master Plan authorizes the buildout of approximately seventy percent of that amount, or approximately 4.1 million square feet of gross floor area, within the Site. The residual 1.8 million square feet of potential development may take place, without further amendment of this PDA Master Plan, if and to the extent it is demonstrated to the reasonable satisfaction of the BRA (and, with respect to subsection (c) of this sentence, the Boston Transportation Department ("**BTD**")) that (a) actual density achieved on a parcel-by-parcel basis as construction proceeds on the surrounding land within the overall area bounded by West First Street, the Fort Point Channel, and Boston Harbor (the "**1000 Acres**") is less than the density assumed for such parcels in the transportation analysis underlying the BRA Master Plan, (b) significant improvements capable of supporting additional development are made to the transportation infrastructure within the 100 Acres, the 1000 Acres, or both, or (c) analysis conducted subsequent to the enactment of this PDA Master Plan establishes that the existing transportation infrastructure serving these areas can support buildout in addition to the initial 4.1 million square feet of gross floor area authorized by this PDA Master Plan.

This PDA Master Plan also aims to ensure the ongoing viability of the adjoining SBMC. The SBMC is a key component of Gillette's worldwide operations; as a water-dependent use employing thousands of workers in Boston, it is no less critical to the health of the area's and larger city's economy. This plan therefore provides for the continued operations of and future improvements to the SBMC by mandating compatible uses as buffers to transition between that facility and the surrounding neighborhood.

An illustrative site plan of the proposed final configuration for the area is attached hereto as **Exhibit D**.

<u>Proposed Uses of the Area and Structures</u>. The allocation of use categories throughout the Site is shown on the plan attached hereto as **Exhibit E**. In order to ensure an appropriate balance of uses, a minimum of one-third of the gross floor area of the new buildout (on an aggregate, rather than parcel-specific, basis) within each of the three parcel groupings identified as A_1-A_7, G_1-G_8, and U_1-U_8 (the "**Parcel Groupings**") must be devoted to residential and artist live/work uses (collectively, "**Housing**"). Subject to the BRA's reasonable approval, the obligation to build Housing applicable to each Parcel Grouping may be transferred outside of that Parcel Grouping, but within the Site, under two circumstances: where (a) insufficient Housing is to be provided within a given Parcel Grouping or portion thereof, but sufficient assurances as to the ultimate completion of such Housing within the Site are provided by the transferor and transferee of this obligation; or (b) Housing in excess of the minimum one-third obligation (but not including excess Housing to the extent it is located within a Special Site, as defined below) has been provided on the transferor's portion of the Site, and this excess is to be transferred in the form of a credit for Housing density.

Other uses, which cannot constitute more than two-thirds of the buildout within each Parcel Grouping, may be a combination of a broad range of use categories, including, among others, industrial, research and development, office, retail, service, art and cultural, and open space uses, as well as supporting uses such as accessory and non-accessory parking. As part of its mixed-use strategy, this PDA Master Plan minimizes conflicts between these different uses by mandating appropriate buffers, land-use allocations, and built-in community benefits, as well as providing for strong design guidelines. The specific use items within those categories that are allowed by this PDA Master Plan are listed on the use item table attached hereto as **Exhibit F**.

Industrial and Industrial Buffer Uses. The BRA Master Plan calls for the protection and enhancement of existing industrial uses, as well as manufacturing, research and development, and office uses. It also proposes specific buffering strategies to protect against encroachment on industrial zones, and suggests ways to limit and mitigate industrial impacts on the surrounding new development.

The designated harmonious land uses for the parcels adjacent to the SBMC are shown on Exhibit E. These compatible uses include office, commercial, and artist live/work spaces.

Residential Uses. The BRA Master Plan calls for clustering residential development around parks and other landscape amenities not only to assure their accessibility, but also to foster a sense of ownership among their users. Accordingly, as shown on Exhibit E, this PDA Master Plan lays out large, new mixed-use parcels that may include residential uses alongside Fort Point Park East, Fort Point Park West, New Street Park, and Channel Park. Parcels south of these open spaces are also potential residential blocks, depending on Gillette's future expansion plans.

Commercial Uses. Significant office and other commercial uses, such as research and development, retail, and tourism-related uses, are to be located at the northern edge of the Site near Summer Street, as detailed on Exhibit E. This siting reflects Summer Street's commercial character and takes advantage of this area's proximity to the Boston Convention & Exhibition Center and commercial development on the waterfront north of Summer Street.

Ground Level Uses. The ground floors of all buildings within Chapter 91 jurisdiction will contain publicly-accessible uses, such as restaurants, theaters, lobbies, fitness facilities, civic spaces, cultural and educational institutions, tourism-related, and retail uses, consistent with the applicable provisions of the Commonwealth's Waterways regulations, 310 CMR 9.00, as those provisions may be modified pursuant to 301 CMR 23.00, Review and Approval of Municipal Harbor Plans. These ground-floor uses may be included where appropriate elsewhere within the Site.

New Public Open Space and Infrastructure Improvements. Proposed Projects approved subject to this PDA Master Plan will be accompanied by approximately 6.9 acres of new and expanded open spaces and recreational fields within the Site (the "**New Open Spaces**"), to be constructed primarily on land owned by the Proponents, as shown on the plan attached as **Exhibit G** hereto. These parks and other publicly-accessible open spaces will enhance and promote enjoyment of the area for residents and visitors. The open space system will be integrated into and become an extension of the city's greater Harborwalk system and the South Bay Harbor Trail, which will connect the existing Fort Point Channel waterfront resources and new public spaces within the Site to other neighborhoods outside of South Boston. Any regulation of public access to or use of privately-owned New Open Space will be subject to the reasonable approval of the BRA.

Development of the Proponents' land within the Site will require significant expansions of and upgrades to the local transportation infrastructure. These include expanding the district's street grid in a manner consistent with the historic warehouse area's block scale and street pattern; improving connections between the local street network and the highway system; upgrading A Street; and providing direct truck access from A Street to the South Boston Bypass Road/Haul Road. The expanded network of streets and sidewalks, which will involve the reconfiguration and extension of existing public rights-of-way, as well as the creation of new rights-of-way, will require approximately 9.8 acres of land owned by the Proponents. A plan showing these improvements, including planned new rights of way within the 100 Acres (the "**Infrastructure Improvements**"), is attached hereto as **Exhibit H**.

These New Open Spaces and Infrastructure Improvements are, collectively, the "**Public Realm Enhancements**."

Parking. Based on BTD's guidelines for desired parking ratios of 0.7 spaces per 1,000 square feet of commercial, industrial, and cultural use, 1.0-1.5 spaces per dwelling unit, and the South Boston Parking Freeze regulations, the total parking requirement for the Site is projected to be approximately 7,000 spaces. The Site falls within the Industrial/Commercial and the Piers Zones of the South Boston Parking Freeze, adopted by the Massachusetts Department of Environmental Protection in 2004. Parking for Proposed Projects approved pursuant to this PDA Master Plan will be subject to the provisions of the South Boston Parking Freeze and the jurisdiction of the Boston Air Pollution Control Commission.

<u>Range of Dimensional Requirements</u>. To reinforce the prevailing physical conditions within the historic areas of the 100 Acres and maintain strong, consistent urban street walls throughout the district, new buildings are intended to conform to a zero-lot-line standard and be constructed to the sidewalk. In general, therefore, other than as specified in this PDA Master Plan or an approved Development Plan, the sole dimensional regulations applicable to Proposed Projects for the Site are those of building height and floor-area ratio ("FAR").

New Construction: Building Heights. The buildout plan attached hereto as **Exhibit I** sets forth the building height limits for the development parcels within the Site. The anticipated development parcels within the Site as shown on Exhibit I may be further subdivided or, where appropriate, combined, in whole or in part. Accordingly, actual sites for future individual PDA Development Plans may be greater or lesser in number, and smaller or larger in size, than those depicted.

Most Proposed Projects for new buildings are limited to a height of one hundred feet (100') or less to reinforce the general massing and cornice height established by the existing wharf structures, as well as infrastructure constraints upon the Site. Nine (9) specific sites, however, permit heights in excess of the 100-foot limit. These sites, as identified on Exhibit I, are grouped into three different height zones. Zone 1 is bounded by Summer Street and Wormwood Street (with the latter street being extended to the Fort Point Channel, as depicted on Exhibit I), and includes five (5) sites that will have a height limit of one hundred eighty feet (180'): Parcels A_3, G_3, G_4, U_1, and U_2. To create a consistent visual relationship among the buildings to be constructed on those parcels with frontage on the important Fort Point/Financial

District connector of Summer Street, Parcels U_1 and A_3 will be deemed, for purposes of determining grade, to abut Summer Street only. Zone 2 encompasses the area between Wormwood Street and Mount Washington Avenue, and contains three sites where building heights may reach one hundred fifty feet (150'): Parcels G_8, U_4, and U_5. Zone 3, which covers all the area south of Mount Washington Avenue, contains only one site that exceeds 100 feet, with a height limit of one hundred twenty-five feet (125'): Parcel U_8. This last zone, with its lower building heights, will provide a transition to the surrounding urban fabric of the existing neighborhood.

As identified in Exhibit I, in certain areas along Summer Street and/or east of A Street, there are three sites (the "**Special Sites**") where, notwithstanding any other provision of this PDA Master Plan to the contrary, Proposed Projects are eligible for additional buildout, as well as height beyond one hundred eighty feet (180'), if such proposals (a) undergo review pursuant to Article 80B of the Code, and (b) provide exceptional public benefits: Parcels A_3, U_1, and U_2. These benefits at a minimum include significant contributions toward one or more of the following objectives:

- **Increasing the city's housing supply**: proposing to create residential units on a parcel for which alternate, non-residential uses are allowed; or exceeding, in terms of the number of affordable units, depth of affordability, or both, the minimum level of affordability required by the City's guidelines on affordable housing then in effect;

- **Expanding the city's economic base**: supporting the diversification and expansion of Boston's economy and job opportunities through economic activity, such as private investment in manufacturing, commercial uses, or research and development; or creating new job opportunities and establishing educational facilities, career counseling, or technical assistance providing instruction or technical assistance in fields related to such jobs;

- **Enhancing the environment**: providing significant open space and related public-realm facilities in addition to those otherwise required by this PDA Master Plan; or incorporating green design principles within a Proposed Project;

- **Strengthening transportation infrastructure**: contributing to area-wide transportation and transit improvements beyond the required traffic mitigation; or

- **Mitigating development impacts**: otherwise exceeding the City's requirements for community benefits and mitigation.

The appropriate additional building height to be allowed for a Proposed Project for a Special Site will be determined through the Article 80B review process. Any new development on Parcel A_3 must incorporate, to the extent practicable, existing buildings fronting on Summer Street.

New Construction: Floor Area Ratios. The following **Table 1** sets forth the maximum FARs, on an aggregate basis by Parcel Grouping, for all Proposed Projects within the Site, calculated without exclusion of land to be dedicated to Public Realm Enhancements, and without inclusion of Existing Development. Because these FAR limits apply to the specified Parcel Groupings in the aggregate, individual sites within them may have higher or lower FARs. The aggregate FAR limits are applicable as follows:

Table 1

Parcel Groupings	**Full build-out (contingent)**	**70% build-out (approved)**
$A_1 – A_7$	1.8	1.3
G_1- G_8	3.7	2.5
U_1- U_8	3.4	2.5

Existing Buildings. The heights and gross floor areas of all buildings existing within the Site as of the effective date of this PDA Master Plan, as set forth in the following **Table 2** (the "**Existing Buildings**"), as well as all other structural dimensions of these buildings, are deemed to be in compliance with this PDA Master Plan.

Table 2

Parcel	Building	Height	Gross Floor Area (square feet)
	Binford Street Intake Structure	22 feet	4,276
A_1	263 Summer Street	105 feet	60,108
A_1	273 Summer Street	110 feet	78,743
A_1	281 Summer Street	110 feet	56,000
A_2	319 A Street	80 feet	45,703
A_2	323 A Street (311 Summer Street)	95 feet	44,000
A_2	321 Summer Street	135 feet	89,096
A_3	319 A Street Rear	65 feet	37,920
A_3	327 Summer Street	95 feet	32,710
A_3	337 Summer Street	95 feet	41,390
A_4	49 Melcher Street	80 feet	35,500
A_4	51 Melcher Street	130 feet	99,000
A_4	63 Melcher Street	80 feet	28,725
A_5	10 Necco Street	75 feet	209,500
A_6	300 A Street	80 feet	91,429
A_7	324 A Street	15 feet	2,500
G_2	40 Necco Court	85 feet	54,336
G_2	50 Necco Court	85 feet	55,344
M_1	253 Summer Street	74 feet	124,382
M_1	11-39 Melcher Street	70 feet	105,006
PDA #53	10 Channel Center	75 feet	104,570
PDA #53	15 Channel Center	75 feet	178,873
PDA #53	20 Channel Center	75 feet	61,150
PDA #53	25 Channel Center	128 feet	164,836
PDA #53	30 Channel Center	75 feet	81,214
PDA #53	35 Channel Center	69 feet, 10 inches	85,090
PDA #53	40 Channel Center	60 feet	46,410
PDA #53	5 Channel Center	75 feet	76,650

The 100 Acres includes sections of the Fort Point Channel National Register District and a proposed new Boston Landmark District. These distinctive blocks are characterized by large, ornamental brick warehouses constructed in the late 19th and early 20 centuries. Preservation of the historic scale and character of the 100 Acres is a primary goal of the BRA Master Plan and, accordingly, this PDA Master Plan. Demolition of the area's Existing Buildings must thus be minimized, other than on Parcel A_7, and the building heights and gross floor areas of structures on the sites that are already built out (those Parcels identified as A_1, A_2, A_4, A_5, A_6, G_2, and M_1 on Exhibit I) will be maintained, other than as set forth in this section.

Existing Buildings, other than that located on Parcel A_5, may be extended in any or all of the following three manners, provided that the resulting buildings remain consistent with the aggregate FAR limits set forth in Table 1, above:

1. Infill extensions to a single Existing Building (e.g., the filling in of lightwells, or an extension to the lot line) should be clearly visually demarcated from the original structure, and must conform to the building's cornice line.

2. Where an extension joins an Existing Building to one or more other detached buildings, such extension should likewise be an architecturally distinct element. The building height of such extension need not, however, conform to the Existing Building's cornice line, but such extensions must be set back a minimum of ten (10) feet from all street walls of the Existing Building, and may be approved only if the BRA finds no resulting detriment to area pedestrian circulation.

3. Rooftop additions to an Existing Building must (i) be equivalent to no more than ten percent (10%) of the Existing Building's preexisting gross floor area as set forth in Table 2, above (i.e., without consideration of any new gross floor area added pursuant to this section), (ii) be set back from the cornice line of the Existing Building sufficiently to minimize, and eliminate where feasible, visibility from nearby streets, and (iii) add no more than two (2) stories. Any portion of the extensions subject to the first two paragraphs of this section that extend above the cornice line will be considered to be rooftop additions subject to this paragraph.

Any extension of an Existing Building must undergo BRA Site Plan and Design Review pursuant to BRA guidelines then in effect, as well as Boston Landmarks Commission review, and will require the approval or amendment of a PDA Development Plan for that extension.

Notwithstanding any contrary provisions of the above paragraph, (i) new development on Parcel A_3 shall be governed by the provisions of this PDA Master Plan pertaining to the Special Sites, and (ii) the maximum building height applicable to the parcel identified on Exhibit I as Parcel A_5, which currently contains the Necco Street Garage, is one hundred fifty feet (150'), provided that this Existing Building is (a) substantially demolished, or (b) substantially rehabilitated, which rehabilitation and extension must (i) promote activation of the abutting streets by incorporating ground-floor uses, including within the façade facing Fort Point Park West, that are publicly-accessible and pedestrian-friendly, and (ii) add no net new parking spaces.

<u>Development Review</u>:

Review Guidelines: The BRA Master Plan sets forth architectural and landscape guidelines for the 100 Acres, which will serve as the conceptual basis for future BRA design review guidelines applicable to Proposed Projects subject to this PDA Master Plan. The BRA will also promulgate performance standards for environmental impacts, including but not limited to those relating to shadow and wind impacts on proposed new open spaces.

Shadow Studies: Any scoping determination by the BRA with respect to shadow studies will deem shadows cast by Proposed Projects to be existing shadows (a) with respect to those

Proposed Projects governed by the Municipal Harbor Plan, to the extent that such shadows would be cast by buildings constructed to the Chapter 91 as-of-right building heights, and (b) with respect to all other Proposed Projects on development sites within the Site, to the extent that such shadows are cast by building heights that are consistent with this PDA Master Plan.

Proposed Phasing of Construction.

Timing of Phasing. The buildout of the Site is expected to occur in multiple phases over approximately twenty (20) years. Portions of the Site will not become available for new development until existing activities on those areas are relocated. Market factors will also impact the rate of development, and a Proponent's ability to construct a given Proposed Project within the Site will depend upon the Proposed Project's financial feasibility.

Legal Effect of Phasing. Current parcels within the Site may be reconfigured into multiple parcels, which may be under common or separate ownership and may include a condominium structure, developed sequentially or simultaneously, and separately developed and/or financed (each such parcel is referred to herein as a "**Project Component**"). Any such reconfiguration of those parcels identified in Exhibit I of this PDA Master Plan shall be deemed to be in compliance with this plan as permitted by this section upon the provision of a statement to the BRA setting forth the details of such reconfiguration, including the identities of the transferor(s) and transferee(s) (other than purchasers of individual condominium units), a description as to which land, air rights, and/or development rights have been transferred and which retained, and an itemization as to the height, FAR, and use allocations of buildings permitted and/or erected within the original parcel pursuant to this PDA Master Plan as of the statement date. For purposes of this PDA Master Plan, compliance of the individual Project Components with the requirements of this PDA Master Plan will be determined on an individual Project Component, rather than a Site-wide, basis, except as otherwise expressly provided in this PDA Master Plan. The compliance or non-compliance of any one Project Component will not affect the compliance of any other Project Component. In the event that current parcels within the Site are divided into Project Components, a Certification of Consistency may be issued for any such Project Component.

In the future, and from time to time, one or more of the Project Components may be further subdivided into one or more separate parcels which may be under separate ownership, or one or more of the Project Components may be combined to create one single parcel, or a condominium ownership structure or another ownership structure may be created for all or part of the Site. This PDA Master Plan approves any zoning nonconformity created or increased solely by the separation of ownership of individual Project Components, or by the subdivision, re-subdivision, combination, or submission to condominium ownership or other forms of ownership of Project Components, provided that (i) the use, height, and locational requirements of this Plan with respect to each Project Component are met by the resulting parcel or parcels; (ii) the FAR of each Parcel Grouping does not exceed the maximum density permitted under this PDA Master Plan for that Parcel Grouping; (iii) the parking and loading requirements of this PDA Master Plan are met with respect to each Parcel Grouping as a whole; and (iv) the public benefit obligations required by this PDA Master Plan and any other agreements entered into by a Proponent as a condition of the BRA's Article 80 approval of a Proposed Project are not modified, nor their implementation changed, without the prior written consent of the BRA, and the scope of the public benefit obligations required by this PDA Master Plan and any other agreements entered into by a Proponent as a condition of the BRA's Article 80 approval of a Proposed Project are not diminished.

<u>Effect of PDA Master Plan</u>. This PDA Master Plan supersedes the provisions of underlying zoning, including, without limitation, Code Article 27P, the South Boston Interim Planning Overlay District, and governs all Proposed Projects for the Site. It is inapplicable, however, to those areas governed by PDA No. 53, which associated PDA Development Plan, and all development thereunder and future amendments thereto, will be deemed to be consistent with this PDA Master Plan. Upon approval by the BRA and the Boston Zoning Commission, any PDA Development Plan for a Proposed Project within the Site that is consistent with this PDA Master Plan will be presumed to be consistent with underlying zoning and all other provisions of the Code.

The (i) conveyance, whether voluntarily by the Proponents or pursuant to takings from the Proponents (a "**Conveyance**"), or (ii) placing into escrow with the BRA of a mutually-acceptable agreement that enables the BRA to make the acquisition, for nominal consideration (an "**Escrow**"), of all of the real property interests owned by the Proponents necessary to construct those Public Realm Enhancements that are shown on the plan entitled "First Phase Public Realm Enhancements," attached hereto as <u>Exhibit J,</u> and itemized on the list attached hereto as <u>Exhibit K</u> (the "**First Phase Public Realm Enhancements**"), including without limitation conveyance of either fee interests or easement interests or both (a "**First Phase Contribution**"), shall be deemed to be the issuance of a permit, for the purpose of applying Section 5 of Chapter 665 of the Acts of 1956, as amended from time to time, for that portion of the development authorized by this PDA Master Plan for the Parcel Grouping of each Proponent making such a First Phase Contribution.

The BRA may condition approval of Proponent's PDA Development Plans upon the Conveyance or Escrow of such real property interests belonging to that Proponent as are necessary to construct or cause the construction of those additional portions of the Public Realm Enhancements related to or appropriate in light of the undertaking of the development described in such PDA Development Plan.

Notwithstanding the foregoing, this PDA Master Plan shall terminate and expire as to each Parcel Grouping, as follows:

(i) with respect to each of the separate parcels within the USPS Parcel Grouping for which no building permit has been issued, twenty (20) years from the date of conveyance by USPS of each such parcel, or portion thereof, to a third party that is not a successor to the functions of the USPS, but shall continue in force and effect with respect to any such separate parcels, or portions thereof, owned by USPS or such successor;

(ii) with respect to each of the separate parcels within the Gillette Parcel Grouping for which no building permit has been issued, twenty (20) years from the date of conveyance by Gillette of each such parcel, or portion thereof, to a third party that is not a successor to Gillette [it being acknowledged that any entity (i) so succeeding by merger, acquisition, or transfer amongst entities (a) that own at least a 50% interest in Gillette, (b) in which Gillette owns at least a 50% interest, or (c) that are in common ownership with Gillette involving at least a 50% interest, or (ii) to which any of such separate parcels is conveyed, will be deemed for these purposes to be a successor to Gillette, so long as that entity owns and operates pursuant to a similar use substantially all of Gillette's South Boston Manufacturing Center], but shall continue in force and effect with respect to any such separate parcels, or portion thereof, owned by Gillette or such successor;

(iii) with respect to each of the separate parcels within the Archon Parcel Grouping for which no building permit has been issued, twenty (20) years from the date of approval of this PDA Master Plan.

Provided that, upon request of affected owner of land within the USPS Parcel Grouping, the Gillette Parcel Grouping or the Archon Parcel Grouping, the BRA shall have the power to extend each of the aforementioned twenty (20) year periods, whether before or after expiration thereof, for such period of time as the BRA may determine to be appropriate from time to time in order to further the orderly development of the 100 Acres.

<u>Exhibit A</u>
to PDA Master Plan

Project Proponents

1. The Gillette Company is a Delaware corporation with an address of The Prudential Tower, 800 Boylston Street, Boston, Massachusetts 02199.

2. The United States Postal Service is an independent establishment of the Executive Branch of the United States, with an address of 4301 Wilson Boulevard, Suite 300, Arlington, Virginia 22203-1861.

3. A Street Properties I, LLC, A Street Properties II, LLC, A Street Properties III, LLC, and A Street Properties IV, LLC, are all Delaware limited liability companies, each having an address c/o Beacon Capital Partners, Inc., One Federal Street, 26th Floor, Boston, Massachusetts 02110.

4. Boston HSR South Boston LLC is a Delaware limited liability company with an address c/o Beacon Capital Partners, Inc., One Federal Street, 26th Floor, Boston, Massachusetts 02110.

5. W2005 BWH II Realty, L.L.C., and W2005 BWH III Realty, LLC, are Delaware limited liability companies with an address c/o Archon Group, LP, 99 High Street, Boston, Massachusetts 02110

6. Brickman Real Estate Fund II, L.P. is a Delaware limited partnership with an address c/o Brickman Associates, 712 Fifth Avenue, New York, New York 10019.

7. Boston Gold LLC is a Delaware limited liability company with an address of 311 Summer Street, 2nd Floor, Boston, Massachusetts 02210.

8. APCA Property Fund I, L.P. is a Delaware limited partnership with an address c/o Paradigm Properties, 31 Milk Street, Suite 901, Boston, Massachusetts, 02109.

Exhibit B
to PDA Master Plan

Legal Description of the Site

Beginning at the intersection of the Harbor Line on the easterly side of Fort Point Channel and the southerly sideline of Summer Street;

Thence bounded northerly by the southerly sideline of Summer Street to the point where such sideline intersects the westerly sideline of the South Boston Bypass/Haul Road;

Thence bounded easterly by the westerly sideline of the South Boston Bypass/Haul Road to the point where such sideline intersects the northerly sideline of West First Street;

Thence bounded southerly by the northerly sideline of West First Street to the point where such sideline intersects the easterly sideline of A Street;

Thence bounded westerly by the westerly sideline of A Street to the point where such sideline intersects a straight line parallel to and offset 185 feet south of the Layout Line for Binford Street, as described in the Order of Taking recorded on March 18, 2004 as Instrument No. 324 in Book 34037, Page 297, as such line is extended across A Street to such easterly sideline of A Street;

Thence bounded southerly by the aforesaid straight line parallel to and offset 185 feet south of the Layout Line for Binford Street to the point where such straight line intersects the Harbor Line on the easterly sideline of Fort Point Channel; and

Thence bounded westerly by such Harbor Line to the point of beginning.

Containing 49 acres, more or less.

Exhibit C
to PDA Master Plan

Perimeter Survey – PDA No. 69.

Exhibit D
to PDA Master Plan

Illustrative Plan for 100 Acres Development

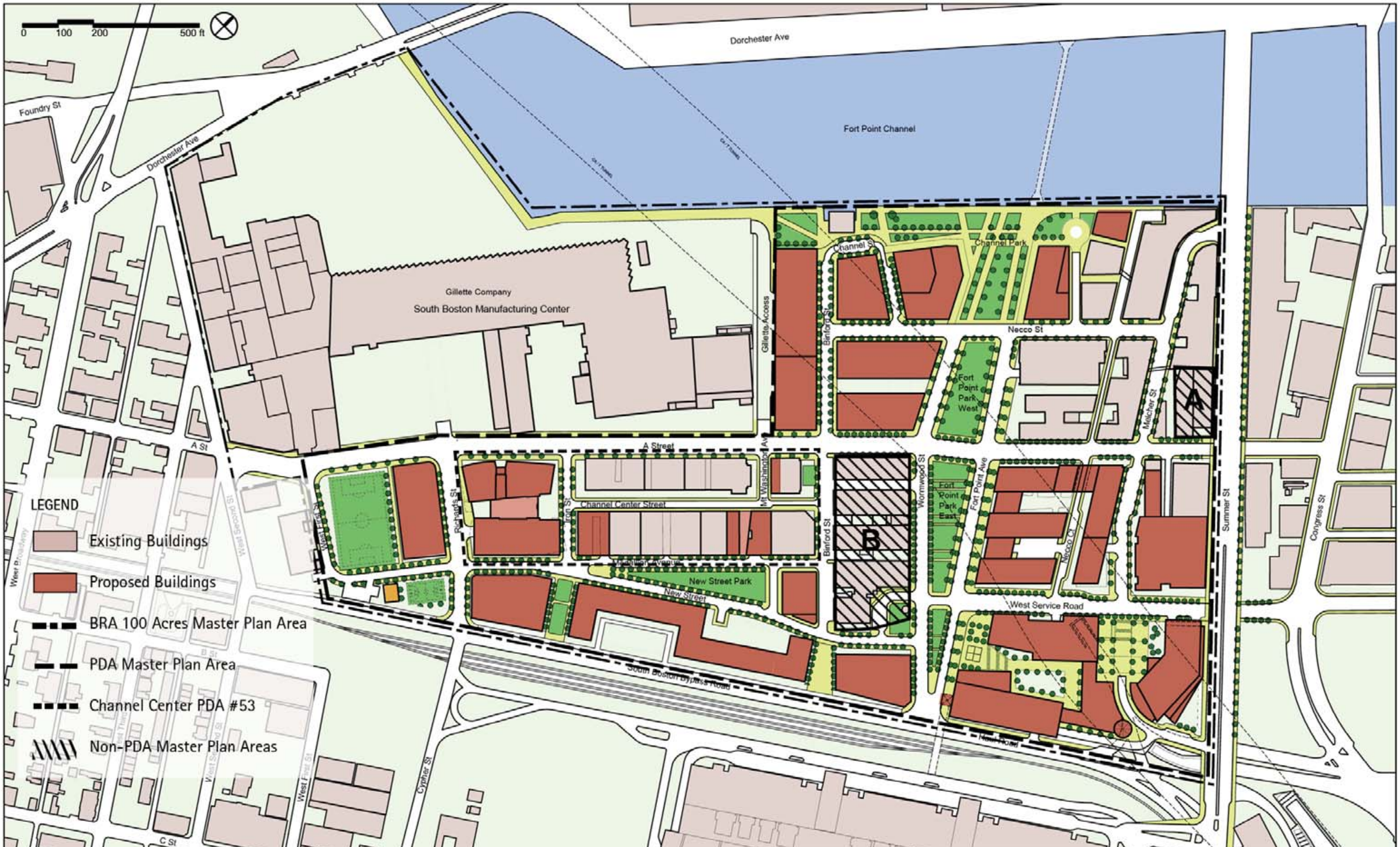


Exhibit D: 100 Acres Planning and PDA Master Plan Areas

Exhibit E
to PDA Master Plan

Use Plan

Exhibit E : Use Plan

Exhibit F
to PDA Master Plan

Use Item Table

Exhibit E Parcel Category	Use Category	Allowed Use Items
Residential/Commercial Mixed Use and Industrial/Commercial Mixed Use	Banking and Postal Uses	• Automatic teller machine • Bank • Drive-in bank • Post office
	Community	• Adult education center • Community center • Day care center • Day care center, elderly • Library • Place of worship; monastery; convent; parish house
	Cultural	• Art gallery • Art use • Auditorium • Cinema • Concert hall • Museum • Public art, display space • Studios, arts • Studios, production • Theater • Ticket sales
	Entertainment, Restaurant, and Recreational	• Amusement game machines • Bar • Bar with live entertainment • Bowling alley • Billiard parlor • Dance hall • Fitness center or gymnasium • Private club not serving alcohol • Private club serving alcohol

Exhibit E Parcel Category	Use Category	Allowed Use Items
		• Restaurant • Restaurant with live entertainment • Take-out restaurant
	Office	• Agency or professional office • General office • Office of wholesale business
	Industrial	• Artist live/work space
	Research and Development	• Product development or • prototype manufacturing • Research laboratory
	Retail	• Arts and crafts shop • Bakery • General retail business • Liquor store • Local retail business • Outdoor sale of garden supplies
	Service	• Animal hospital • Barber or beauty shop • Caterer's establishment • Dry-cleaning shop • Laundry, retail service • Laundry, self-service • Photocopying establishment • Shoe repair • Tailor shop
	Temporary Facility	• Structure to house any permitted use during any construction period or any other period not exceeding one year
	Tourism-related	
	Trade	• Carpenter’s shop • Electrician’s shop • Machine shop • Photographer's studio • Plumber’s shop • Radio/television repair

Exhibit E Parcel Category	Use Category	Allowed Use Items
		• Upholsterer's shop • Welder's shop
	Transportation	• Marina
	Vehicular	• Parking garage • Parking lot
	Accessory	• Subject to the provisions of Article 10, all uses customarily incident to, and on the same lot as, a main use
	Ancillary	• All uses on a lot adjacent to, or across the street from, but in the same district as, a lawful use to which it is ancillary and ordinarily incident and for which it would be a lawful accessory use if it were on the same lot
Industrial/Commercial Mixed Use only	Industrial and Storage	• Cleaning plant • General manufacturing use • Light manufacturing use • Printing plant • Warehousing
	Public Service Uses	• Automatic telephone exchange • Courthouse • Outdoor payphone • Penal institution • Police station • Pumping station • Recycling facility (excluding facilities handling toxic waste) • Solid waste transfer station • Sub-station • Telecommunication data distribution center • Telephone exchange
	Transportation	• Water terminal

Exhibit E Parcel Category	Use Category	Allowed Use Items
	Vehicular	• Repair garage
	Wholesale	• Wholesale business
Residential/Commercial Mixed Use only	Residential and residential-related	• Row House • Town House • Multi-Family Dwelling • Boarding or Lodging House • Congregate Housing • Continuing Care Retirement Facilities • Assisted Living Facilities • Any occupation customarily operated from a dwelling unit, not involving on premises sales, outside storage, or vehicular repair
Open Space		• Open space • Open space recreational building

Exhibit G
to PDA Master Plan

Open Space Plan

Exhibit G : Open Space Plan

Exhibit H
to PDA Master Plan

Rights-of-Way Plan

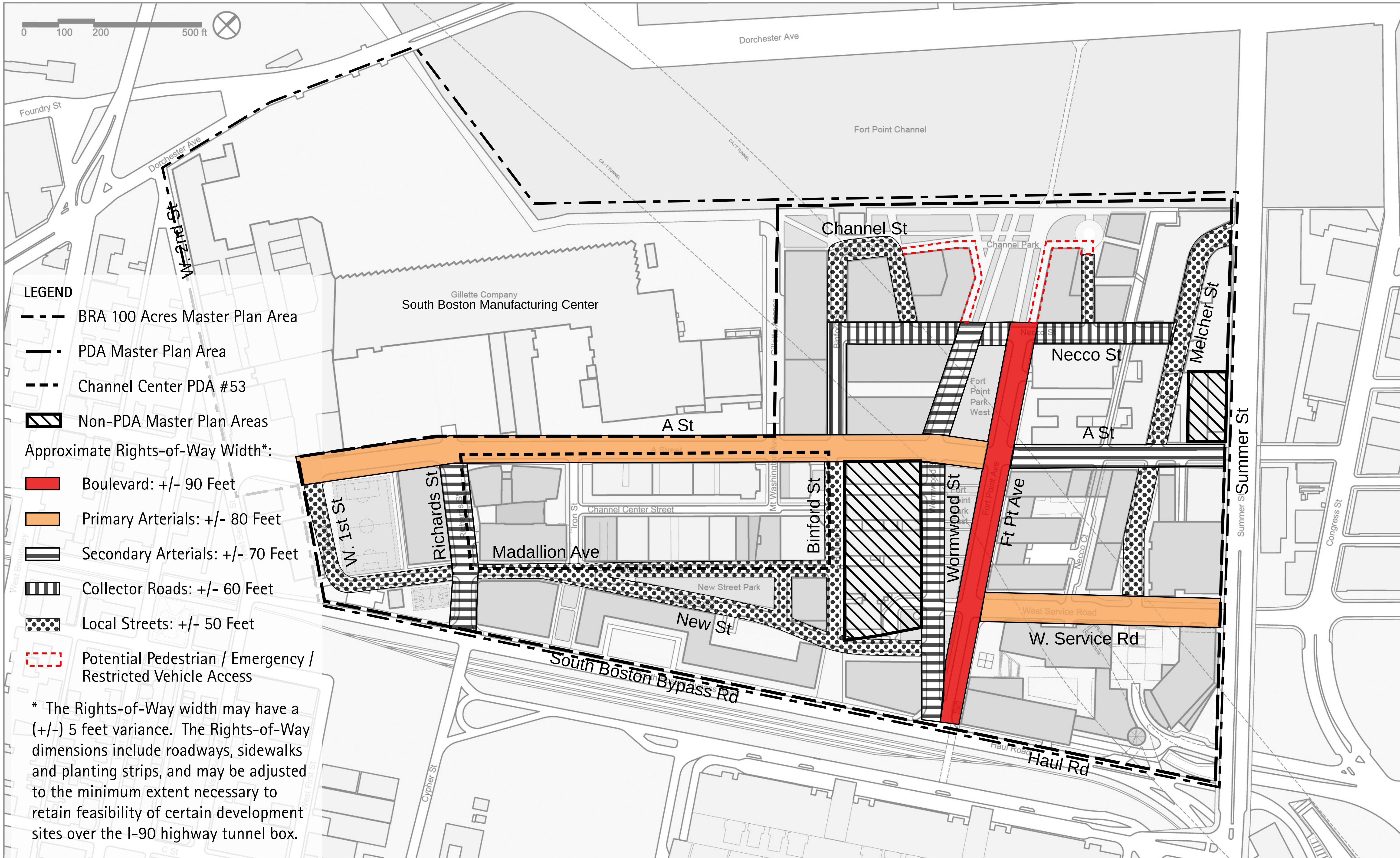


Exhibit H : Rights-of-Way Plan

Exhibit I
to PDA Master Plan

Buildout Plan

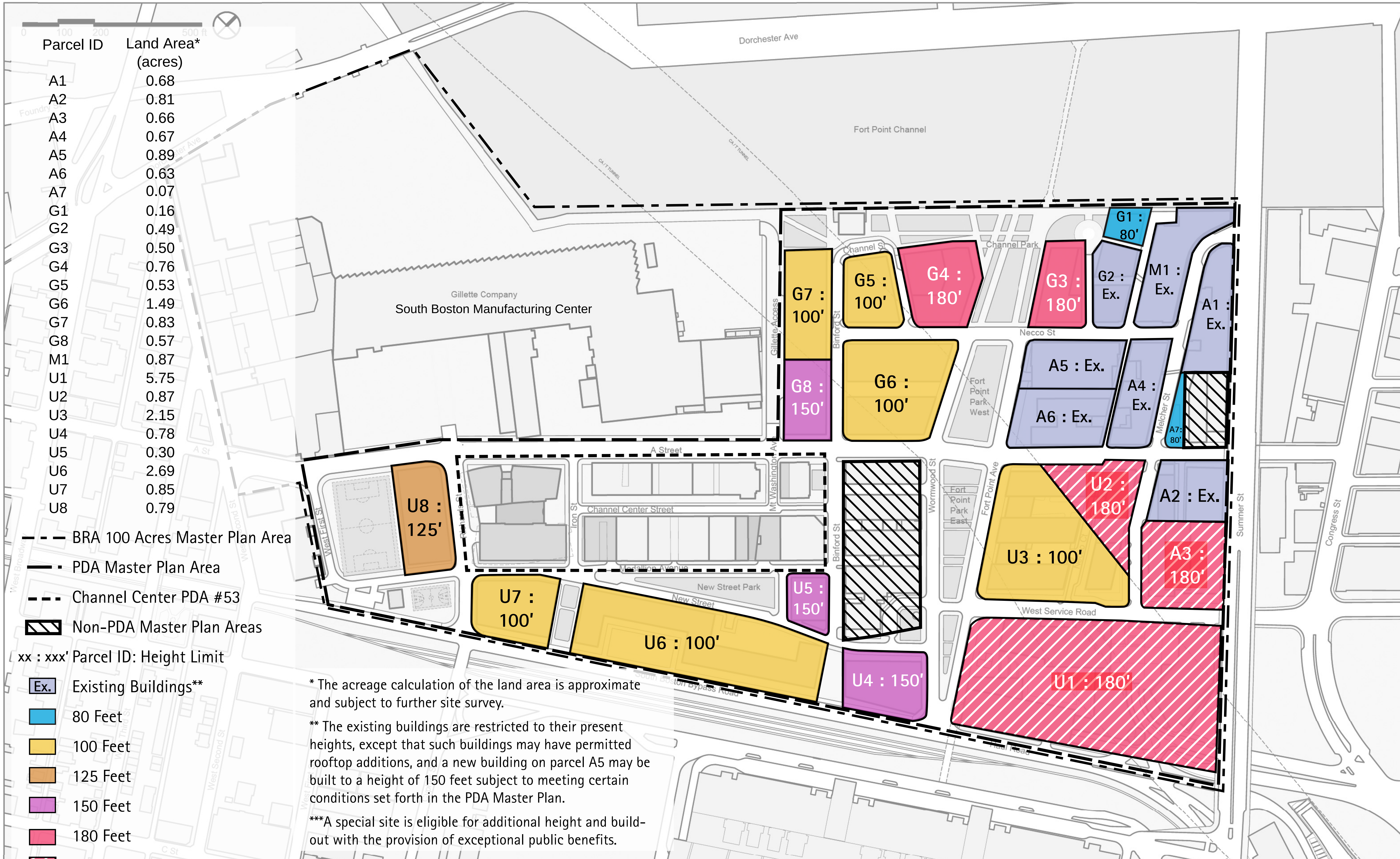


Exhibit I : Buildout Plan

Exhibit J
to PDA Master Plan

First Phase Public Realm Enhancements

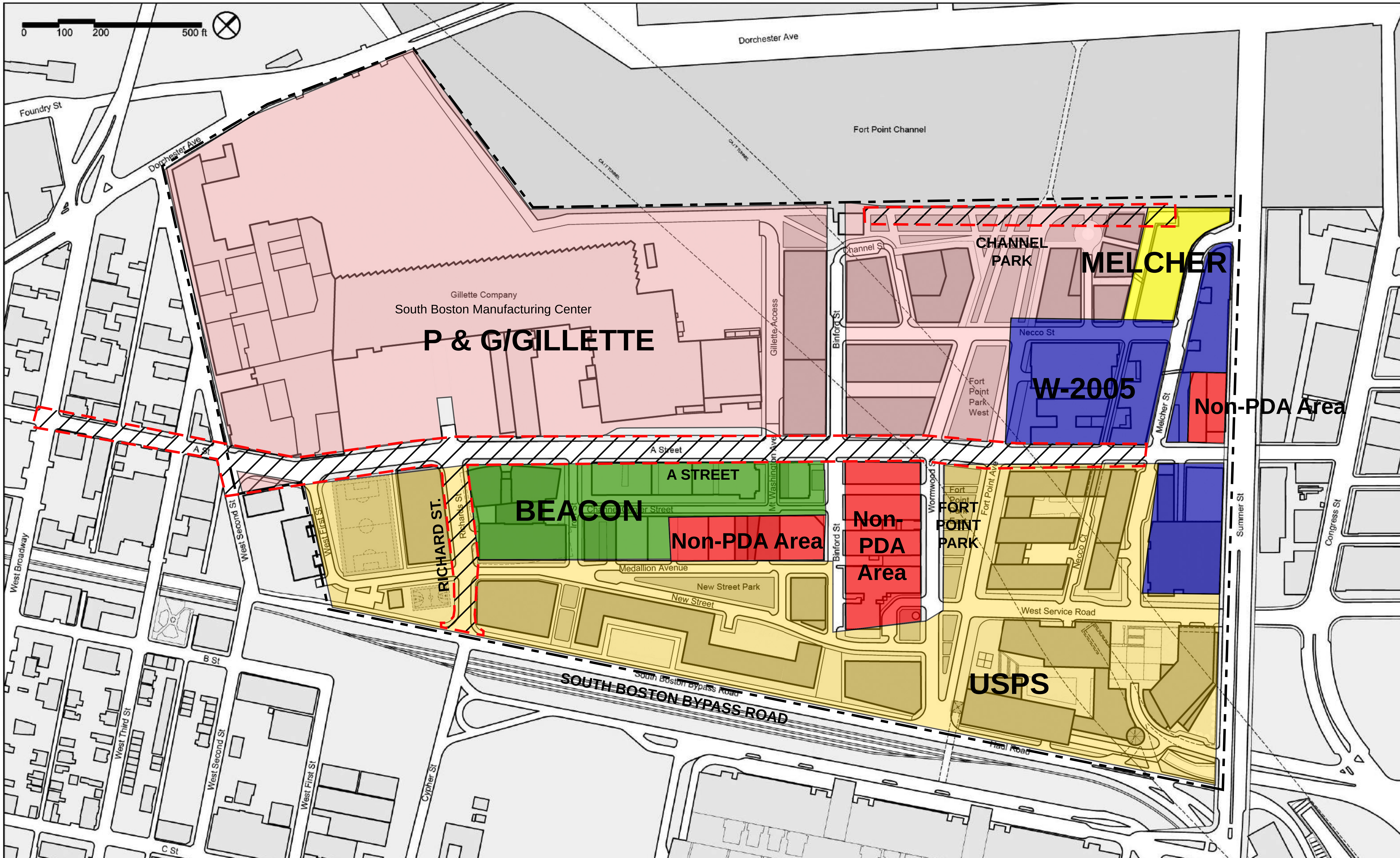


Exhibit J : First Phase Public Realm Enhancements

Exhibit K
to PDA Master Plan

List of First Phase Public Realm Enhancements

1. Melcher Street Signalization and Sequencing

2. Binford Street Signalization and Sequencing

3. Traffic Direction Demonstration Project South of W. 2nd Street or Intersection Widening at A Street/W. 2nd Street (Gillette property, USPS property, and property from other parties not part of this PDA Master Plan required)

4. Richard Street Connector Construction (USPS and Beacon property required)

5. Interim Harborwalk Landscaping/Irrigation (Gillette and Melcher property required)

5-6 Necco Court Amnesty License

The Commonwealth of Massachusetts

No. 9342a

Whereas, Gillette Corporation

of -- Boston -- in the County of -- Suffolk -- have applied to the Department of Environmental Protection to -- maintain existing fill, structures, office buildings, roads, site drives and parking at: 5 & 6 Necco Court; in the municipality of Boston in the filled tidelands of the Fort Point Channel; --

and has submitted plans of the same; and whereas due notice of said application, and of the time and place fixed for a hearing thereon, has been given, as required by law, to the -- Mayor and City Council -- of the -- City -- of -- Boston.-----------------------------------

NOW, said Department, having heard all parties desiring to be heard, and having fully considered said application, hereby, subject to the approval of the Governor, authorizes and licenses the said --

-- Gillette Corporation -- subject to the provisions of the ninety-first chapter of the General Laws, and of all laws which are or may be in force applicable thereto, to -- maintain existing fill, structures, office buildings, roads, site drives and parking at: 5 & 6 Necco Court; in the municipality of Boston in the filled tidelands of the Fort Point Channel; --

in and over filled tidelands of -- the Fort Point Channel -- in the -- City -- of -- Boston -- and in accordance with the locations shown and details indicated on the accompanying DEP License Plan No. 9342a dated September 30, 1996 and received by the Department on October 4, 1996. (7 sheets).

The structures authorized hereby shall be limited to the following uses: commercial office, manufacturing, storage, artist studios, residential, parking, vehicular access and public pedestrian access to the Fort Point Channel.

This License is valid for a term of ninety-nine (99) years from the date of issuance. By written request of the Licensee for an amendment, the Department may grant a renewal for the term of years not to exceed that authorized in this License.

This License is subject to the following Special Conditions and Standard Conditions:

Special Condition #1: The Licensee shall reserve a corridor eighteen (18) feet in width, beginning at the landward edge of the existing seawall, for the construction of the City of Boston Interim Harborwalk facility. The construction of said facility shall be the sole responsibility of the Central Artery/Tunnel Project ("CA/T") in accordance with Special Conditions #49 and #51 of the December 5, 1996 Amended Consolidated Written Determination of the Department of Environmental Protection ("DEP") Waterways Application No. W91-1000.

Special Condition #2: The Licensee shall permit the CA/T to construct the Interim Harborwalk on filled tidelands along the landward edge of the existing seawall of the Fort Point Channel from the boundary of the Gillette Company (U.S.A.) (Parcel ID 1168-1) to the southwest side of Necco Court, at its intersection with the Boston Wharf parcel, approximately 758 feet in length. The Licensee shall provide such permission to the CA/T at no cost. The Interim Harborwalk shall be located as close as practicable to the edge of the seawall; however, the actual location of the walkway within the corridor described in Special Condition #1 shall be jointly determined by the Licensee and the CA/T and shall be subject to the approval of the Licensee. The facility shall be consistent with City of Boston Harborwalk Design Guidelines and the applicable provisions of 521 CMR, the Massachusetts Architectural Access Board. A plan with the Interim Harborwalk location shall be submitted to the Department prior to its construction. Said facility shall be located in a manner to form a seamless alignment with the Interim Harborwalk to be constructed on the adjacent Boston Wharf property.

Special Condition #3: Said Interim Harborwalk shall be designed and constructed by the CA/T at its sole expense, in accordance with Special Conditions #1 & #2 herein, and shall consist of a twelve (12) foot clear walkway and typical pedestrian amenities including, but not limited to, benches, lighting, landscaping, signage and trash receptacles. The Licensee shall be wholly responsible for the maintenance of said Interim Harborwalk. The Licensee's obligation shall be in force and effect for the length of the term of the License to be issued pursuant hereto.

Special Condition #4: The Licensee shall cause to be installed and maintain a ramp and float system suitable for launching small, hand launched vessels (including, but not limited to kayaks, canoes, dinghies) to activate the watersheet. The final design and location shall be subject to the prior review and approval of the Department as described herein, but shall conform substantially to the design and location described on Exhibit A, attached hereto. The Licensee shall submit a separate Chapter 91 water-dependent License application for Department approval of said facility. The timing of said processes shall occur as follows: Within six (6) months of the expiration of the Central Artery/Tunnel's (CA/T) temporary taking of the project site and the return of the site to the Licensee, the Licensee shall submit a c.91 License application for the referenced ramp and float system. Prior to the submission of the Application, the Licensee shall arrange a pre-application meeting with the Department for consultation and review of said proposed project. The Licensee shall use all reasonable efforts to obtain the necessary municipal, state and federal approvals that may be required for said facility and, upon obtaining the same, shall complete construction of said water-based facility and open it for public use within eighteen (18) months of the date of the License issued for that facility. The License application must be consistent with all applicable local, state and federal regulations. Said facility shall be available to the public twenty-four (24) hours per day, seven days per week and include clear signage in a prominent location indicating such availability. Use of said facility shall be free of charge. The Licensee shall be responsible for all maintenance and upkeep of the facility for the term of the License.

Special Condition #5: The Licensee shall make the Interim Harborwalk and ramp and float facility, as described in Special Condition #4 herein, available to the general public, free of charge, for passive and active recreational purposes. These facilities shall be accessible to the general public 24 hours per day, seven days per week, unless DEP approves other hours of operation in accordance with Special Condition #6. The exercise by the public of free on-foot passage in accordance with Special Conditions #1- #5 shall be considered a permitted use to which the limited liability provisions of M.G.L. Chapter 21, section 17c shall apply.

Special Condition #6: The Licensee or its designee may adopt rules governing the publicly accessible areas of the site, subject to review and written approval by the DEP, as are necessary for the protection of public health and safety and private property, and to ensure public use and enjoyment by minimizing conflicts between user groups. No amendment to said rules shall be made without written approval by the DEP.

Special Condition #7: Upon completion of the Interim Harborwalk, and upon completion of the ramp and float system pursuant to Special Condition #4, the Licensee shall place and maintain in good repair Department approved signage of an adequate size which shall be clearly visible to pedestrians entering the sites from all entrances to the Interim Harborwalk on the project site. Said signage shall meet the Boston Redevelopment Authority (BRA) Harborwalk Signage Program standards, shall encourage public patronage of the facilities, state the hours of public access, and any rules for their use in accordance with Special Condition #6. At least one sign shall be placed in a prominent location stating the Waterways License number and a place on the site where a copy of the License may be inspected by the public.

Special Condition #8: The Licensee shall escrow $16,341.65 in a local South Boston Bank and provide an accounting of said deposit to the DEP and the BRA. These funds shall be used, subject to the prior written approval of DEP and the BRA, to install and /or improve pedestrian facilities on the project site or adjacent thereto. The Licensee shall use guidance contained within the approved Fort Point Channel Watersheet Activation Plan recommendations. Said improvements shall be in addition to those required in Special Conditions #1 - #4. Said funds shall be made in lieu of an earlier requirement by the Boston Conservation Commission to construct a temporary walkway in the footprint of the former Channel building. Said escrow shall be funded hereto and documentation verifying the same shall be provided to the Department within sixty (60) days of License issuance.

Special Condition #9: The Licensee shall allow agents of the DEP to enter the project site to verify compliance with the conditions of this License prior to and following completion of individual sections of the project.

Special Condition #10: All fill, structures, facilities and landscaping to be licensed shall be maintained in good repair for the term of the License.

Special Condition #11: The project to be authorized in the prospective License has been completed in conformance with the accompanying License plan. The issuance of this prospective License, therefore, fulfills the Licensee's obligation to obtain a Certificate of Compliance pursuant to 310 CMR 9.19. The water-dependent facility required pursuant to Special Condition #4 herein shall be subject to the submission of a Certificate of Compliance as a requirement of a separate Licensing process associated with the approval of that facility.

Special Condition #12: The Licensee shall submit to the Department (Waterways Regulation Program) periodic compliance inspection reports at least once every five (5) years from the date of License issuance detailing the Licensee's compliance with the Special and Standard Conditions herein.

Special Condition #13: This License shall be subject to an annual compliance fee for nonwater-dependent uses pursuant to 310 CMR 4.00.--

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Duplicate of said plan, number 9342a (7 Sheets) is on file in the office of said Department, and original of said plan accompanies this License, and is to be referred to as a part hereof.

STANDARD WATERWAYS LICENSE CONDITIONS

1. Acceptance of this Waterways License shall constitute an agreement by the Licensee to conform with all terms and conditions stated herein.

2. This License is granted upon the express condition that any and all other applicable authorizations necessitated due to the provisions hereof shall be secured by the Licensee prior to the commencement of any activity or use authorized pursuant to this License.

3. Any change in use or any substantial structural alteration of any structure or fill authorized herein shall require the issuance by the Department of a new Waterways License in accordance with the provisions and procedures established in Chapter 91 of the Massachusetts General Laws. Any unauthorized substantial change in use or unauthorized substantial structural alteration of any structure or fill authorized herein shall render this Waterways License void.

4. This Waterways License shall be revocable by the Department for noncompliance with the terms and conditions set forth herein. This License may be revoked after the Department has given written notice of the alleged noncompliance to the Licensee and those persons who have filed a written request for such notice with the Department and afforded them a reasonable opportunity to correct said noncompliance. Failure to correct said noncompliance after the issuance of a written notice by the Department shall render this Waterways License void and the Commonwealth may proceed to remove or cause removal of any structure or fill authorized herein at the expense of the Licensee, its successors and assigns as an unauthorized and unlawful structure and/or fill.

5. The structures and/or fill authorized herein shall be maintained in good repair and in accordance with the terms and conditions stated herein and the details indicated on the accompanying License plans.

6. Nothing in this Waterways License shall be construed as authorizing encroachment in, on or over property not owned or controlled by the Licensee, except with the written consent of the owner or owners thereof.

7. This Waterways License is granted subject to all applicable Federal, State, County, and Municipal laws, ordinances and regulations including but not limited to a valid final Order of Conditions issued pursuant to the Wetlands Protection Act, G.L. Chapter 131, s.40.

8. This Waterways License is granted upon the express condition that the use of the structures and/or fill authorized hereby shall be in strict conformance with all applicable requirements and authorizations of the DEP, Division of Water Pollution Control.

9. This License authorizes structure(s) and/or fill on:
[__] Private Tidelands. In accordance with the public easement that exists by law on private tidelands, the Licensee shall allow the public to use and to pass freely upon the area of the subject property lying between the high and low water marks, for the purposes of fishing, fowling, navigation, and the natural derivatives thereof.

[X] Commonwealth Tidelands. The Licensee shall not restrict the public's right to use and to pass freely, for any lawful purpose, upon lands lying seaward of the low water mark. Said lands are held in trust by the Commonwealth for the benefit of the public.

[__] a Great Pond of the Commonwealth. The Licensee shall not restrict the public's right to use and to pass freely upon lands lying seaward of the high water mark for any lawful purpose.

10. No restriction on the exercise of these public rights shall be imposed unless otherwise expressly provided in this license.

Unless otherwise expressly provided by this license, the Licensee shall not limit the hours of availability of any areas of the subject property designated for public passage, nor place any gates, fences, or other structures on such areas in a manner that would impede or discourage the free flow of pedestrian movement thereon.

~~The amount of tidewater displaced by the work hereby authorized has been ascertained~~ by said Department, and compensation thereof has been ~~made by the~~ said by paying into the treasury of the Commonwealth ~~-- ten~~ dollars and zero cents ($10.00) -- for each cubic yard so ~~displaced,~~ being the amount hereby assessed by said Department. (to be ~~determined at License issuance).~~

Nothing in this License shall be so construed as to impair the legal rights of any person.

This License shall be void unless the same and the accompanying plan are recorded within 60 days from the date hereof, in the Registry of Deeds for the County of Suffolk.

IN WITNESS WHEREAS, said Department of Environmental Protection have hereunto set their hands this 29 th day of May in the year two thousand three.

Acting Program Chief ____________________

Program Director ____________________

Commissioner ____________________

Department of Environmental Protection

THE COMMONWEALTH OF MASSACHUSETTS

This License is approved in consideration of the payment into the treasury of the Commonwealth by the said -- Gillette Corporation --------------------

of the further sum of – $0.00 --

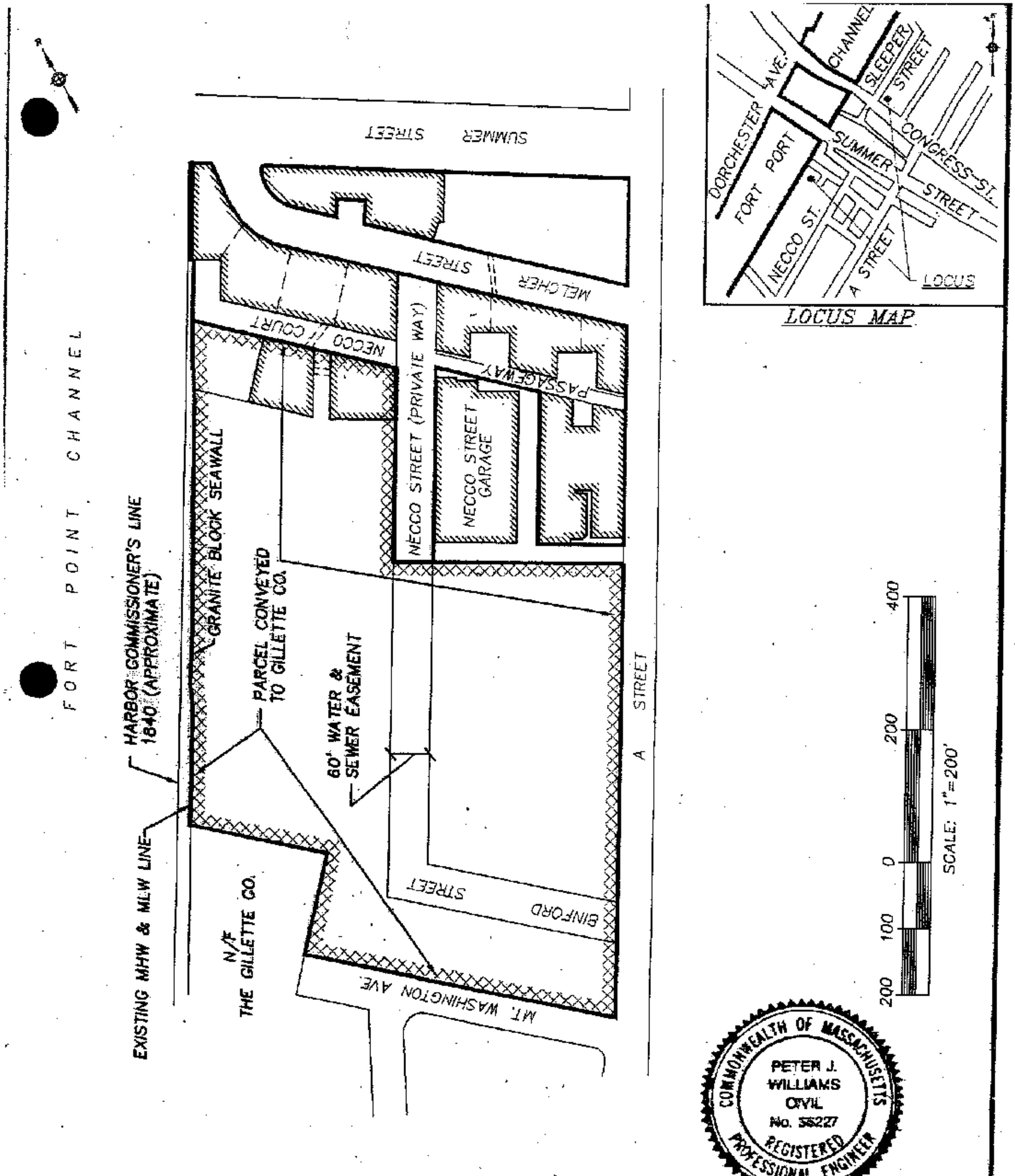
the amount determined by the Governor as a just and equitable charge for rights and privileges hereby granted in the land of the Commonwealth.

BOSTON

Approved by the Governor.

____

Governor



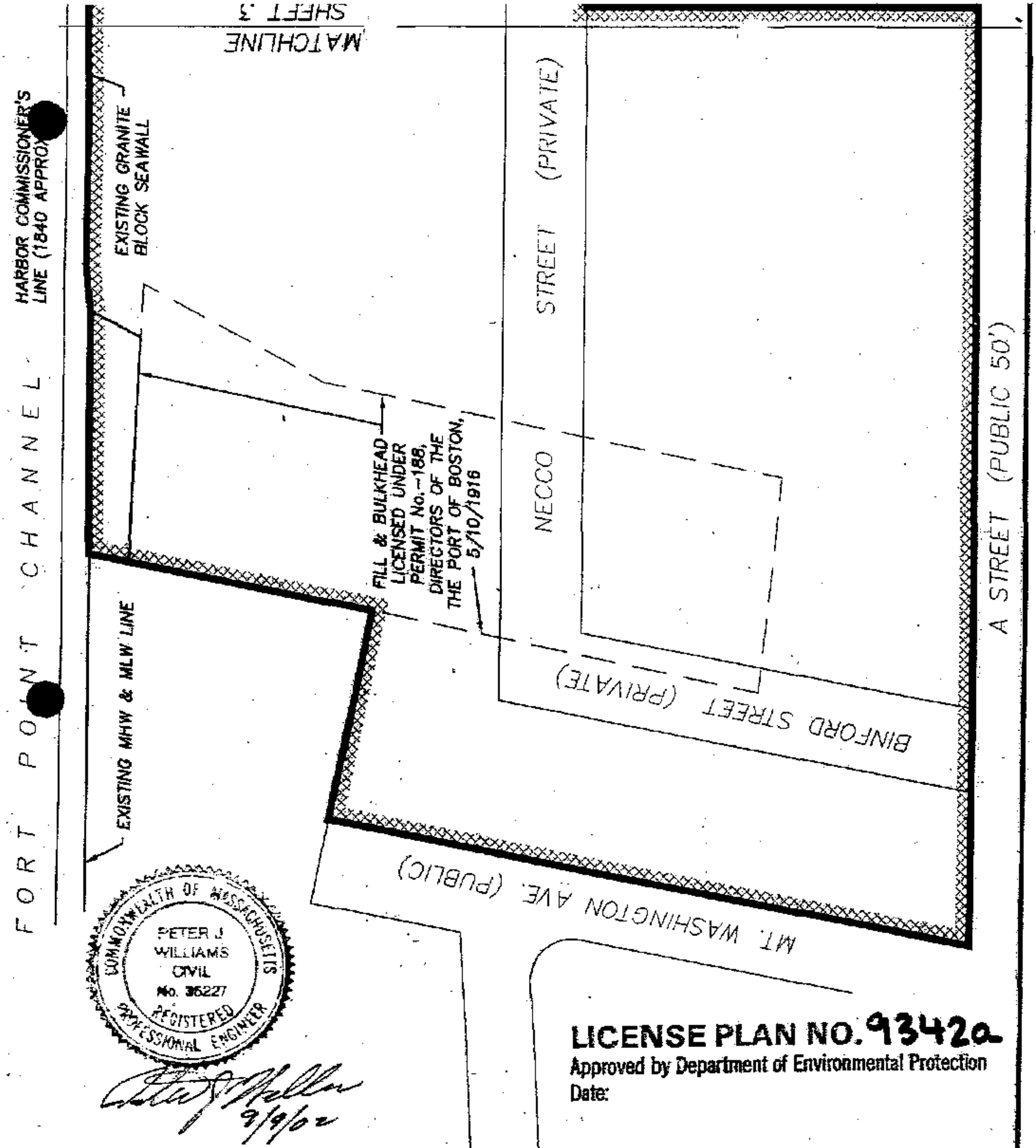
A STREET/SUMMER STREET VICINITY PLAN

BOSTON WHARF CO. PROPERTIES
FORT POINT CHANNEL
BOSTON, MA

PLANS ACCOMPANYING PETITION OF
BOSTON WHARF CO.
PREPARED BY:
VINE ASSOCIATES INC./HINGHAM, MA
REVISED: AUGUST 16, 2002

LICENSE PLAN NO. 9342a

Approved by Department of Environmental Protection of Massachusetts



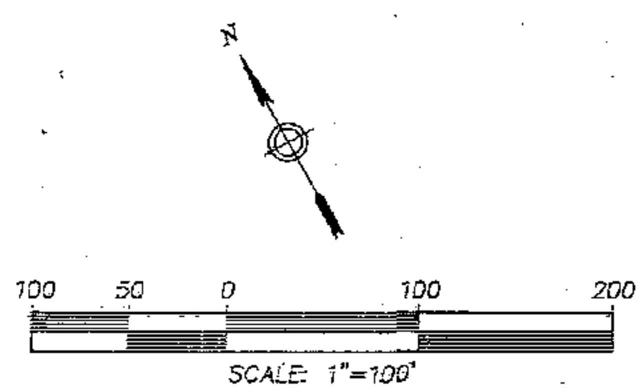
LICENSE PLAN NO. 9342a
Approved by Department of Environmental Protection
Date:

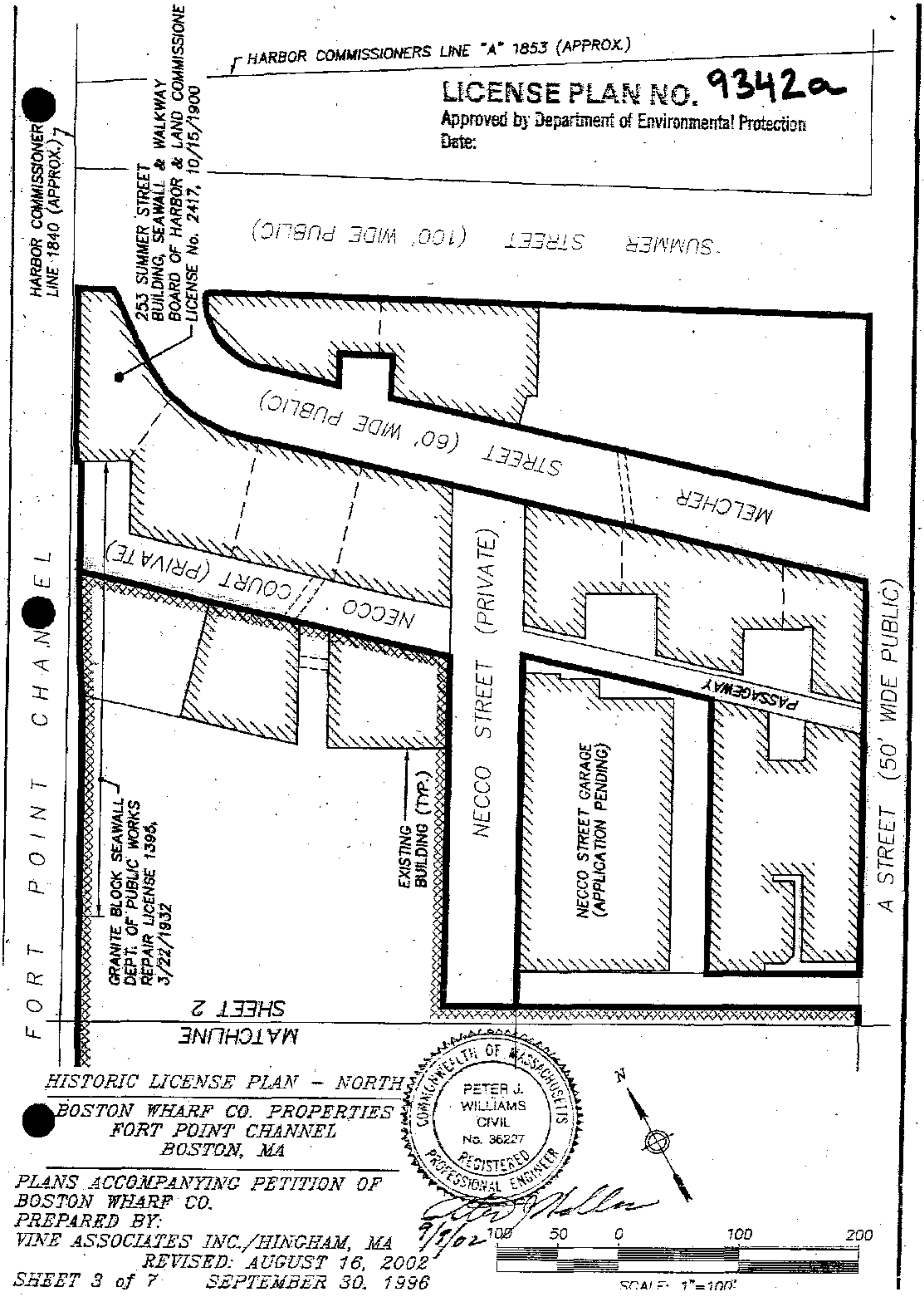
HISTORIC LICENSE PLAN – SOUTH

BOSTON WHARF CO. PROPERTIES
FORT POINT CHANNEL
BOSTON, MA

PLANS ACCOMPANYING PETITION OF
BOSTON WHARF CO.
PREPARED BY:
VINE ASSOCIATES INC./HINGHAM, MA

REVISED: AUGUST 16, 2002
SHEET 2 of 7 SEPTEMBER 30, 1996

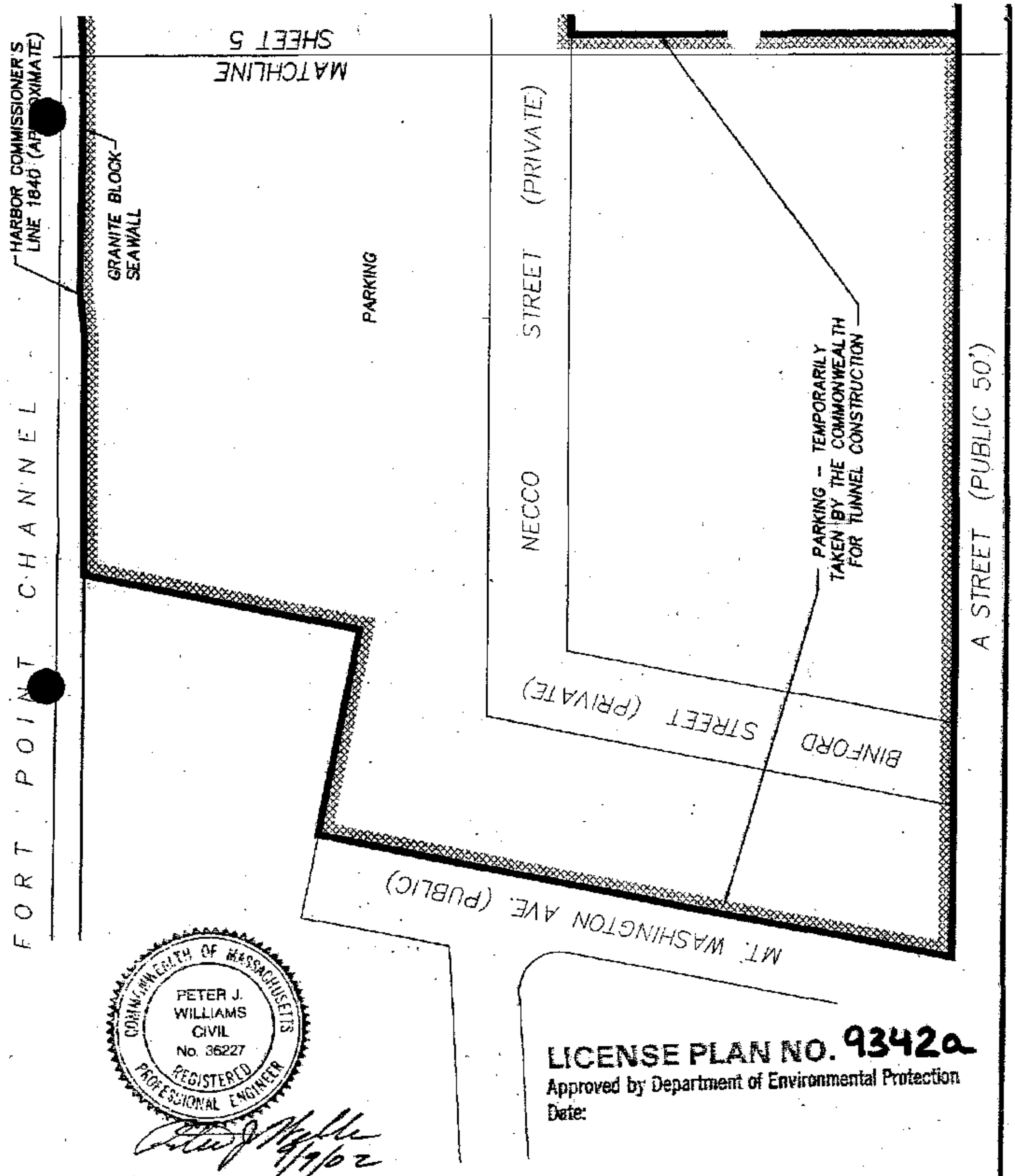




HISTORIC LICENSE PLAN – NORTH

BOSTON WHARF CO. PROPERTIES
FORT POINT CHANNEL
BOSTON, MA

PLANS ACCOMPANYING PETITION OF
BOSTON WHARF CO.
PREPARED BY:
VINE ASSOCIATES INC./HINGHAM, MA
REVISED: AUGUST 16, 2002
SHEET 3 of 7 SEPTEMBER 30, 1996



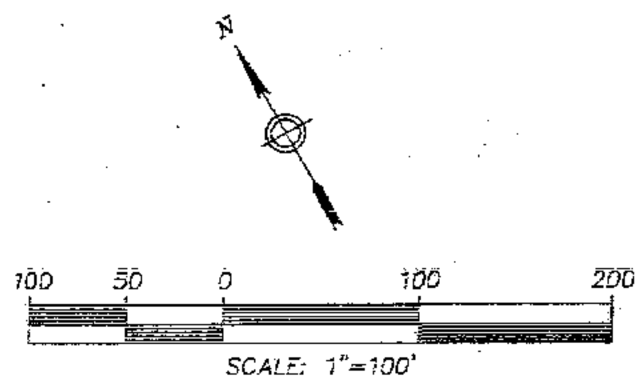
LICENSE PLAN NO. 9342a
Approved by Department of Environmental Protection
Date:

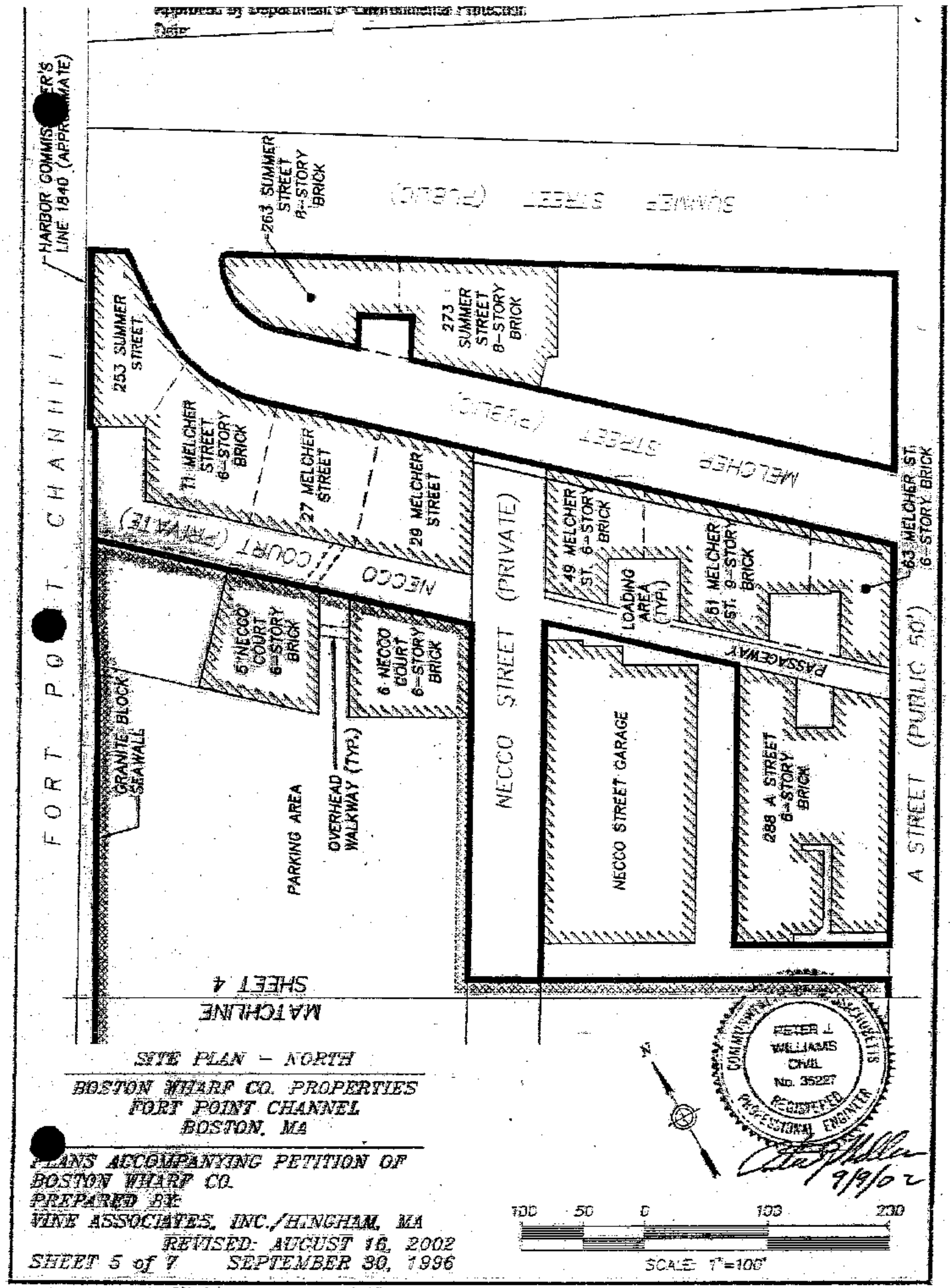
SITE PLAN — SOUTH

BOSTON WHARF CO. PROPERTIES
FORT POINT CHANNEL
BOSTON, MA

PLANS ACCOMPANYING PETITION OF
BOSTON WHARF CO.
PREPARED BY:
VINE ASSOCIATES, INC./HINGHAM, MA

REVISED: AUGUST 16, 2002
SHEET 4 of 7 SEPTEMBER 30, 1996

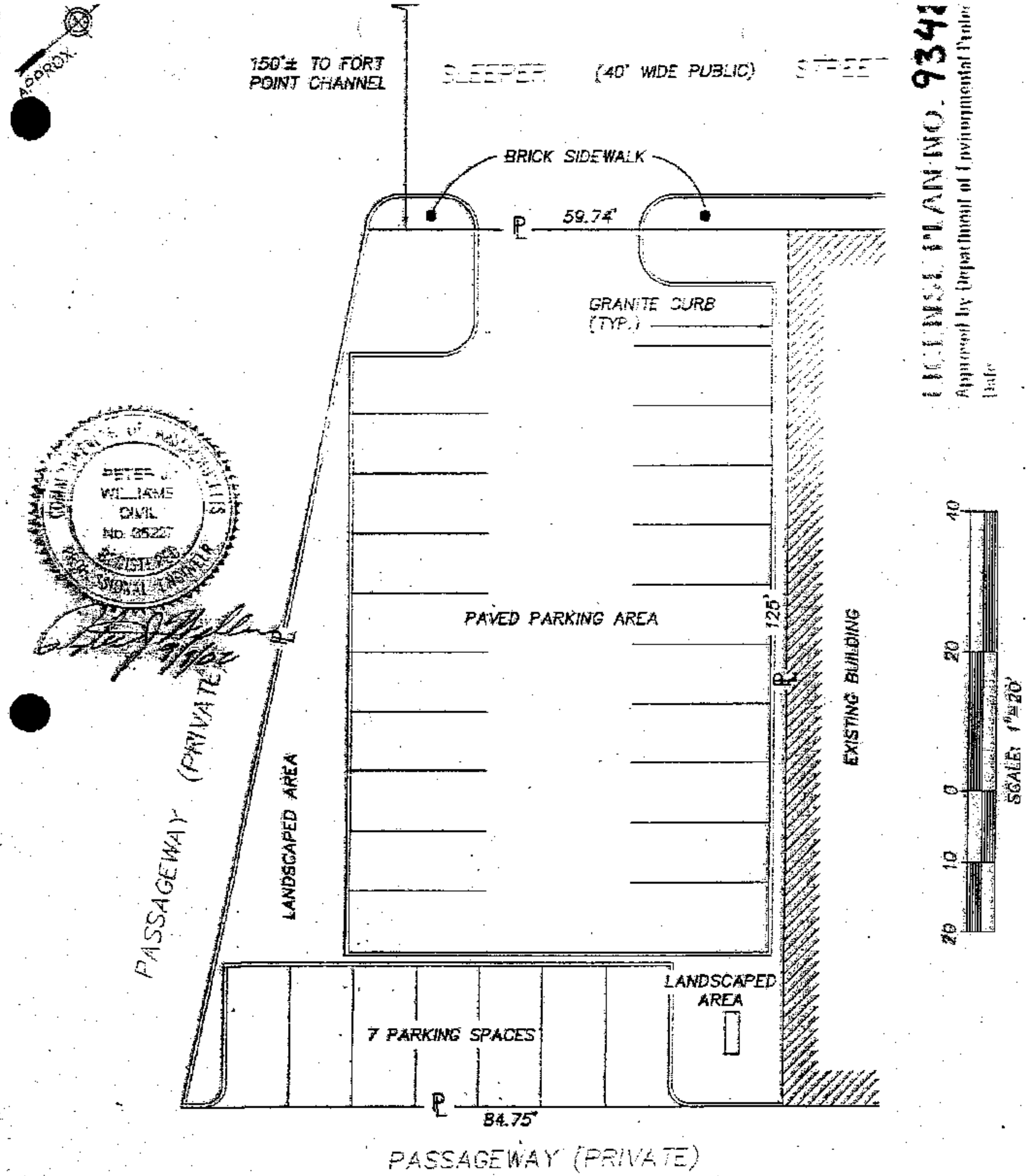




SITE PLAN – NORTH

BOSTON WHARF CO. PROPERTIES
FORT POINT CHANNEL
BOSTON, MA

PLANS ACCOMPANYING PETITION OF
BOSTON WHARF CO.
PREPARED BY:
VINE ASSOCIATES, INC./HINGHAM, MA
REVISED: AUGUST 16, 2002
SHEET 5 of 7 SEPTEMBER 30, 1996



11–13 SLEEPER ST. SITE PLAN

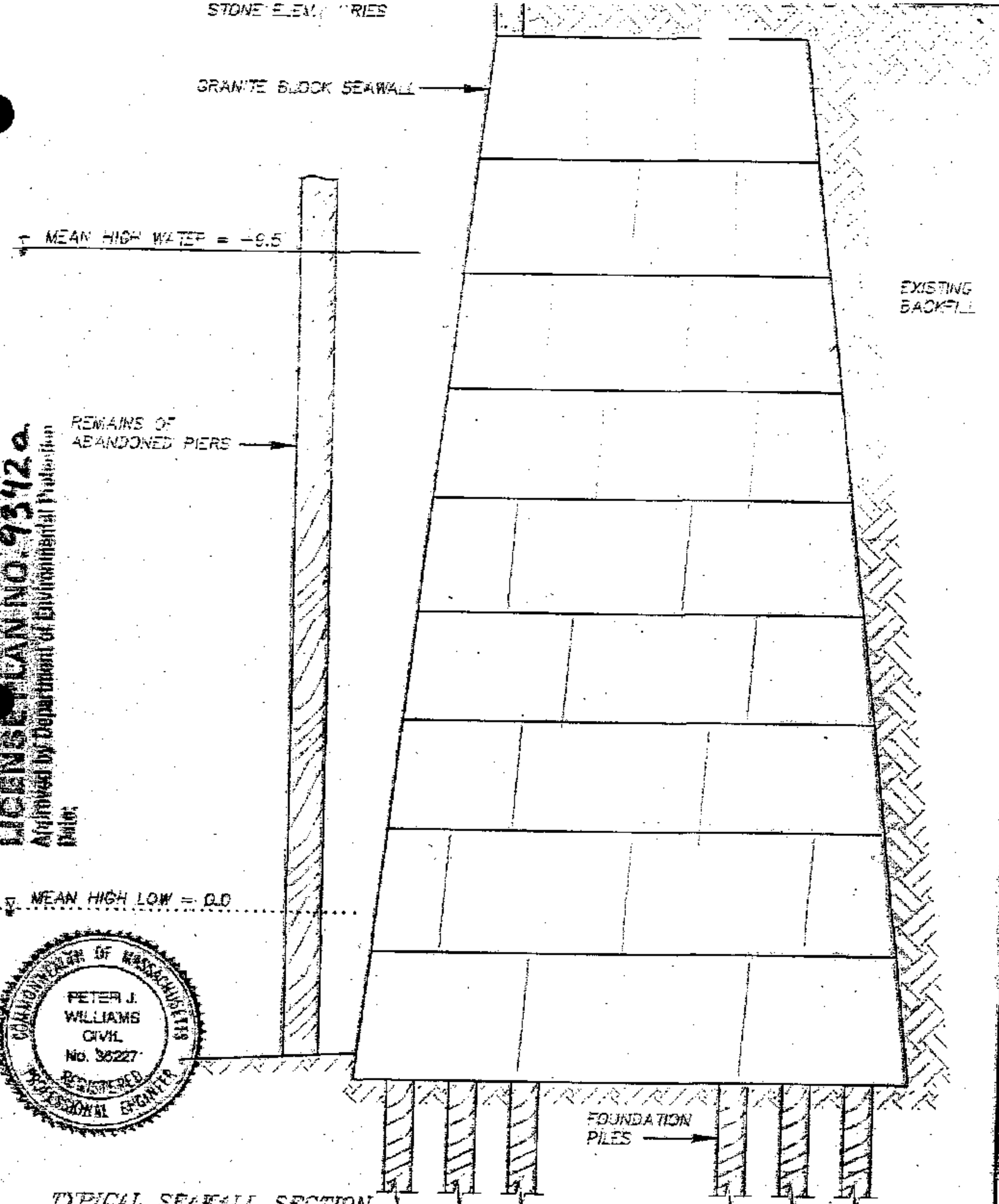
BOSTON WHARF CO. PROPERTIES
FORT POINT CHANNEL
BOSTON, MA

PLANS ACCOMPANYING PETITION OF
BOSTON WHARF CO.
PREPARED BY:
VINE ASSOCIATES, INC./HINGHAM, MA
REVISED: AUGUST 16, 2002
SHEET 6 of 7 SEPTEMBER 30, 1996

NOTES:

1. PROPERTY LINE INFORMATION IS BASED ON A PLAN ENTITLED "PLAN OF LAND, BOSTON, MASS. SOUTH BOSTON DISTRICT OF THE BOSTON WHARF COMPANY" PREPARED BY, JOSEPH SELWYN, BELMONT, DATED JUNE 1, 1963.

2. EXISTING TOPOGRAPHIC INFORMATION BASED ON FIELD MEASUREMENTS BY DOLER & COLANTOINIO INC., ON SEPTEMBER 23, 1996.



LICENSE PLAN NO. 9312a
Approved by Department of Environmental Protection
Date:

COMMONWEALTH OF MASSACHUSETTS
PETER J. WILLIAMS
CIVIL
No. 36227
REGISTERED PROFESSIONAL ENGINEER

TYPICAL SEAWALL SECTION

BOSTON WHARF CO. PROPERTIES
FORT POINT CHANNEL
BOSTON, MA

PLANS ACCOMPANYING PETITION OF
BOSTON WHARF CO.
PREPARED BY:
VINE ASSOCIATES INC./HINGHAM, MA

NOTE:
SECTION BASED ON RECORD PLANS IN PUBLIC WORKS LICENSE No. 1395.

REVISED: AUGUST 16, 2002
SHEET 7 of 7 SEPTEMBER 30, 1996

Recorded
7/15/03
BK 32060
Pg 59

Public Landing License

The Commonwealth of Massachusetts

No.

12906

Whereas,

Ken Fields
Fort Hill Infrastructure Services, LLC
54 Canal Street
Boston, MA 02114

The Gillette Company

of -- Boston --, in the County of -- Suffolk -- and Commonwealth aforesaid, has applied to the Department of Environmental Protection for license to construct and maintain --- a public landing ---

and has submitted plans of the same; and whereas due notice of said application, ~~and of the time and place fixed for a hearing thereon~~, has been given, as required by law, to the -- Mayor and City Council -- of the -- city of Boston --;

NOW, said Department, having heard all parties desiring to be heard, and having fully considered said application, hereby, subject to the approval of the Governor, authorizes and licenses the said

The Gillette Company, subject to the provisions of the ninety-first chapter of the General Laws, and of all laws which are or may be in force applicable thereto, to construct and maintain --- a public floating dock, ramp, and fixed platform --------------

in and over the waters of -- Fort Point Channel -- at --244 A Street-- in the -- city of Boston -- and in accordance with the locations shown and details indicated on the accompanying DEP License Plan No. 12906, (7 sheets).

7

MARGINAL REFERENCE
BOOK 25039 **PAGE** 96

Plan Book 2011 Page 89

The structures authorized hereby shall be limited to the following uses: noncommercial boating access to navigable waters for the public.

Fill and structures on site were authorized by the following authorizations: DPW 1395(1932) and DEP 9342a (2003). Harbor Line exception provided in chapter 204 of the Acts of 2010. For a complete license history on the project site see License Plan sheets 6 and 7 of 7.

This License shall be valid for thirty (30) years from the date of license issuance. By written request of the Licensee for an amendment, the Department may grant a renewal for the term of years not to exceed that authorized in the original license.

SPECIAL WATERWAYS LICENSE CONDITIONS

All terms and conditions of License # 9342a, including maintenance of the interim Harborwalk, shall remain in full force except as modified below.

Special Condition #1: Special Conditions #4 and #5 of waterways License #9342a shall be modified in the following manner. The Licensee shall install and maintain the public landing authorized in this license for launching small, hand launched vessels (including, but not limited to kayaks, canoes, dinghies) to activate the watersheet. The Licensee shall complete construction of said water-based facility and open it for public use within eighteen (18) months of the date of the License issuance. The fixed platform shall be available to the public twenty-four (24) hours per day, seven days per week. A gate may be installed to limit the public use of the ramp and floating dock to the hours between dawn and dusk each day or during adverse weather conditions. Clear signage shall be designed in accordance with city of Boston Harborwalk standards and be posted and maintained in a prominent location indicating such availability. Use of said facility shall be free of charge. The Licensee shall be responsible for all maintenance and upkeep of the facility for the term of the License in accordance with the updated maintenance plan described in Special Condition # 7, below.

Special Condition #2: As stated in Special Condition #7 of License # 9342a, upon completion of the public landing, the Licensee shall place and maintain in good repair signage, of an adequate size which shall be clearly visible to pedestrians, located at each entrance to the parking lot on the project site, next to the fixed platform of the public landing, and at the head of each public parking space. The Department has approved the sign layouts attached to the GEI Consultants letter of October 7, 2010, subject to final review and approval by the Boston Redevelopment Authority (BRA). Signs shall encourage public patronage of the Harborwalk and public landing, state the hours of public access, and any rules for their use in accordance with License # 9342a Special Condition #6. At least one sign shall be placed in a prominent location stating the Waterways License number and a place on the site where a copy of the License may be inspected by the public.

Special Condition #3: The Licensee shall reserve four (4) parking spaces in the parking lot on the project site near the public landing for the public that wish to use the public landing. For specific location, see the undated sketch plan on file with the Department, entitled "Public

Floating Dock Parking of Users of Floating Dock" drawn by GEI Consultants. The designated spaces shall be available free of charge during the hours from 7 PM to Midnight on weekdays and 6 AM to Midnight weekends and holidays, unless other hours are approved by the Department, in order to accommodate employee use during the normal business hours. Signs shall be posted at the head of each of the four spaces at completion of the public landing.

Special Condition #4: Any lighting at the public landing shall be limited to the fixed platform and designed to minimize interference with navigation by reflection, glare or interference with aids to navigation.

Special Condition #5: The Licensee shall maintain clearance between the bottom of the float and the channel bottom of at least 3 feet. No dredging (including, but not limited to the effects of prop wash) is permitted herein. A railing shall be installed along the landside of the floats to discourage boaters from berthing or launching from the landside.

Special Condition #6: The Licensee shall post sign(s) on the seawall adjacent to the seawater intake and outfall structures notifying boaters to stay at least 50 feet away from the structures. The specific location of the signs shall be determined in consultation with the Boston Harbormaster.

Special Condition #7: The Maintenance Plan for the Harborwalk, dated July 6 2005 and on file with the Department, shall be updated to include maintenance, advertisement, and management of the public landing authorized in this license.

a) Purpose: The objectives of the Plan are, over the short-term, to advertise over a broad geographic area and to diverse user groups the availability of the public facilities; and, over the long-term, to achieve effective public use and enjoyment of all publicly accessible facilities while minimizing conflicts with other legitimate interests including the protection of private property and natural resources.
b) Management Oversight: The plan shall clearly describe the roles, responsibilities and contact information for building and grounds management entity at the *project site*.
c) Review: The updated plan shall be submitted to the Department within three (3) months of license issuance and, at the same time, circulated to the Boston Redevelopment Authority, Harbormaster, Conservation Commission and those that commented on the license application for a 30-day comment period. The Department's review and approval of the plan shall be coordinated with the Conservation Commission approval required by the Order of Conditions.
d) Periodic Review: The management plan shall be reviewed and revised as necessary based on changes in the operation or type of public uses on the *project site*. When the plan is revised it should be submitted to the Department for review and approval.

Special Condition #8: Within three (3) months of completion of the public landing, the Licensee shall request in writing that the Department issue a Certificate of Compliance for this license and for license # 9342a. In accordance with 310 CMR 9.19, the request shall be accompanied by a certification by a registered professional engineer licensed in the Commonwealth that the project was completed in accordance with the License.

Please see page 4 for additional conditions of this license. -------------------------

Duplicate of said plan, number 12906 is on file in the office of said Department, and original of said plan accompanies this License, and is to be referred to as a part hereof.

STANDARD WATERWAYS LICENSE CONDITIONS

1. Acceptance of this Waterways License shall constitute an agreement by the Licensee to conform with all terms and conditions stated herein.

2. This License is granted upon the express condition that any and all other applicable authorizations necessitated due to the provisions hereof shall be secured by the Licensee prior to the commencement of any activity or use authorized pursuant to this License.

3. Any change in use or any substantial structural alteration of any structure or fill authorized herein shall require the issuance by the Department of a new Waterways License in accordance with the provisions and procedures established in Chapter 91 of the Massachusetts General Laws. Any unauthorized substantial change in use or unauthorized substantial structural alteration of any structure or fill authorized herein shall render this Waterways License void.

4. This Waterways License shall be revocable by the Department for noncompliance with the terms and conditions set forth herein. This license may be revoked after the Department has given written notice of the alleged noncompliance to the Licensee and those persons who have filed a written request for such notice with the Department and afforded them a reasonable opportunity to correct said noncompliance. Failure to correct said noncompliance after the issuance of a written notice by the Department shall render this Waterways License void and the Commonwealth may proceed to remove or cause removal of any structure or fill authorized herein at the expense of the Licensee, its successors and assigns as an unauthorized and unlawful structure and/or fill.

5. The structures and/or fill authorized herein shall be maintained in good repair and in accordance with the terms and conditions stated herein and the details indicated on the accompanying license plans.

6. Nothing in this Waterways License shall be construed as authorizing encroachment in, on or over property not owned or controlled by the Licensee, except with the written consent of the owner or owners thereof. The Licensee stated that The Gillette Company was the property owner at the time the application was submitted in May, 2010.

7. This Waterways License is granted subject to all applicable Federal, State, County, and Municipal laws, ordinances and regulations including but not limited to a valid final Order of Conditions issued pursuant to the Wetlands Protection Act, G.L. Chapter 131, s.40.

8. This Waterways License is granted upon the express condition that the use of the structures and/or fill authorized hereby shall be in strict conformance with all applicable requirements and authorizations of the Department.

9. This License authorizes structure(s) and/or fill on:

[ ] Private Tidelands. In accordance with the public easement that exists by law on private tidelands, the licensee shall allow the public to use and to pass freely upon the area of the subject property lying between the high and low water marks, for the purposes of fishing, fowling, navigation, and the natural derivatives thereof.

[X] Commonwealth Tidelands. The Licensee shall not restrict the public's right to use and to pass freely, for any lawful purpose, upon lands lying seaward of the low water mark. Said lands are held in trust by the Commonwealth for the benefit of the public.

[ ] a Great Pond of the Commonwealth. The Licensee shall not restrict the public's right to use and to pass freely upon lands lying seaward of the high water mark for any lawful purpose.

10. No restriction on the exercise of these public rights shall be imposed unless otherwise expressly provided in this license.

Unless otherwise expressly provided by this license, the licensee shall not limit the hours of availability of any areas of the subject property designated for public passage, nor place any gates, fences, or other structures on such areas in a manner that would impede or discourage the free flow of pedestrian movement thereon.

The amount of tidewater displaced by the work hereby authorized has been ascertained by said Department, and compensation thereof has been made by the said -- The Gillette Company -- by paying into the treasury of the Commonwealth – two dollars ($2.00)- - for each cubic yard so displaced, being the amount hereby assessed by said Department (5 cubic yards = $ 10.00).

Nothing in this License shall be so construed as to impair the legal rights of any person.

This License shall be void unless the same and the accompanying plan are recorded within 60 days from the date hereof, in the Suffolk County Registry of Deeds.

IN WITNESS WHEREAS, said Department of Environmental Protection have hereunto set their hands this 11th day of March in the year Two Thousand and eleven.

Commissioner ____________________

Program Chief ____________________

Department of Environmental Protection

THE COMMONWEALTH OF MASSACHUSETTS

This license is approved in consideration of the payment into the treasury of the Commonwealth by the said ------ The Gillette Company ----------------------------

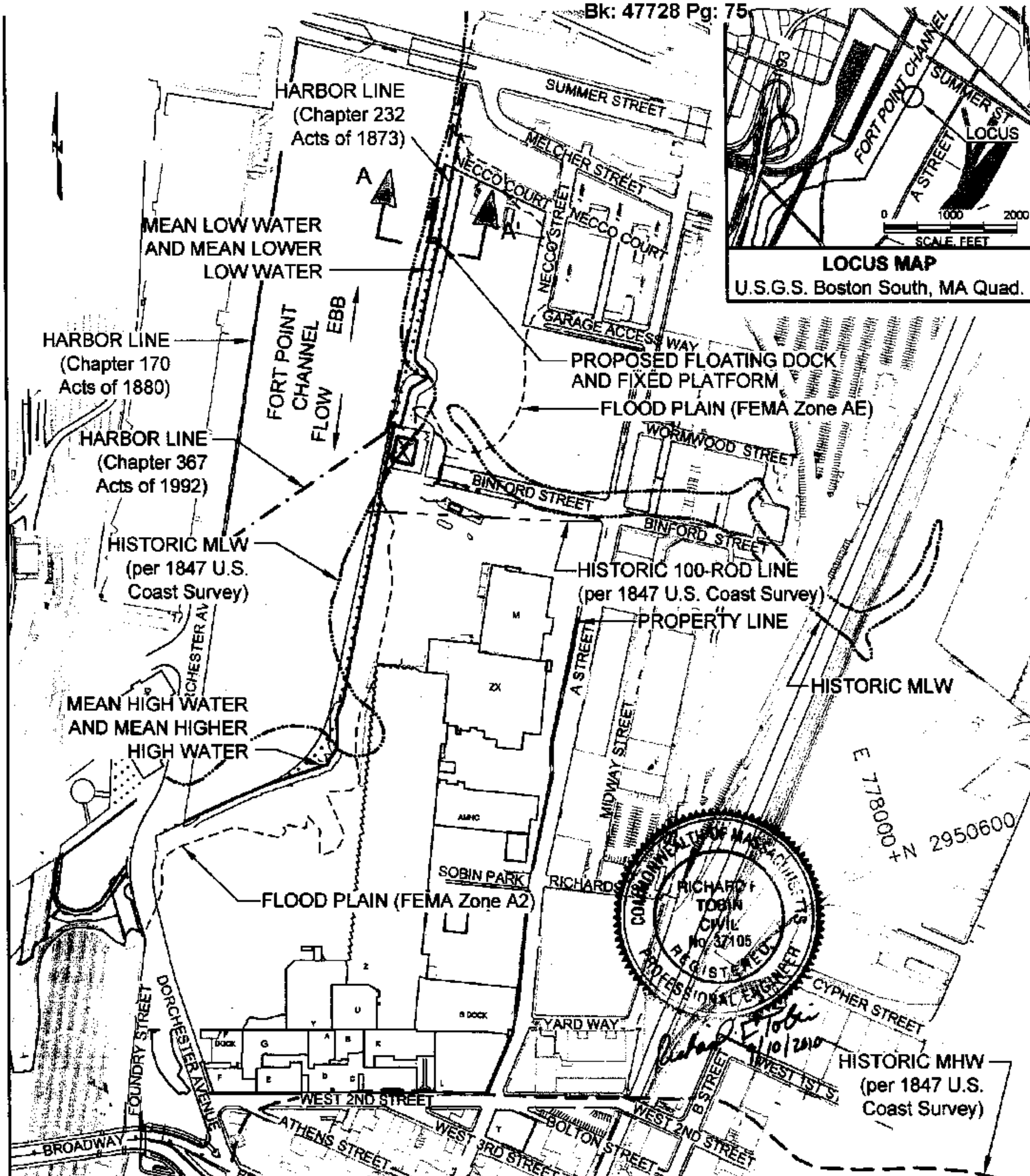
of the further sum of – Five thousand five hundred and thirteen dollars ($ 5,513.00) –

the amount determined by the Governor as a just and equitable charge for rights and privileges hereby granted in the land of the Commonwealth.

BOSTON,

Approved by the Governor.

____
Governor



LEGEND: SEE SHEET 2

VERTICAL DATUM NGVD 1929.
MHW EL. = 5.13
MLW EL. = -4.36

0 400 800
SCALE, FEET

W10-3072

PLANS ACCOMPANYING PETITION OF THE GILLETTE COMPANY TO CONSTRUCT AND A MAINTAIN PUBLIC FLOATING DOCK, RAMP, AND FIXED PLATFORM AT FORT POINT CHANNEL, BOSTON, MA

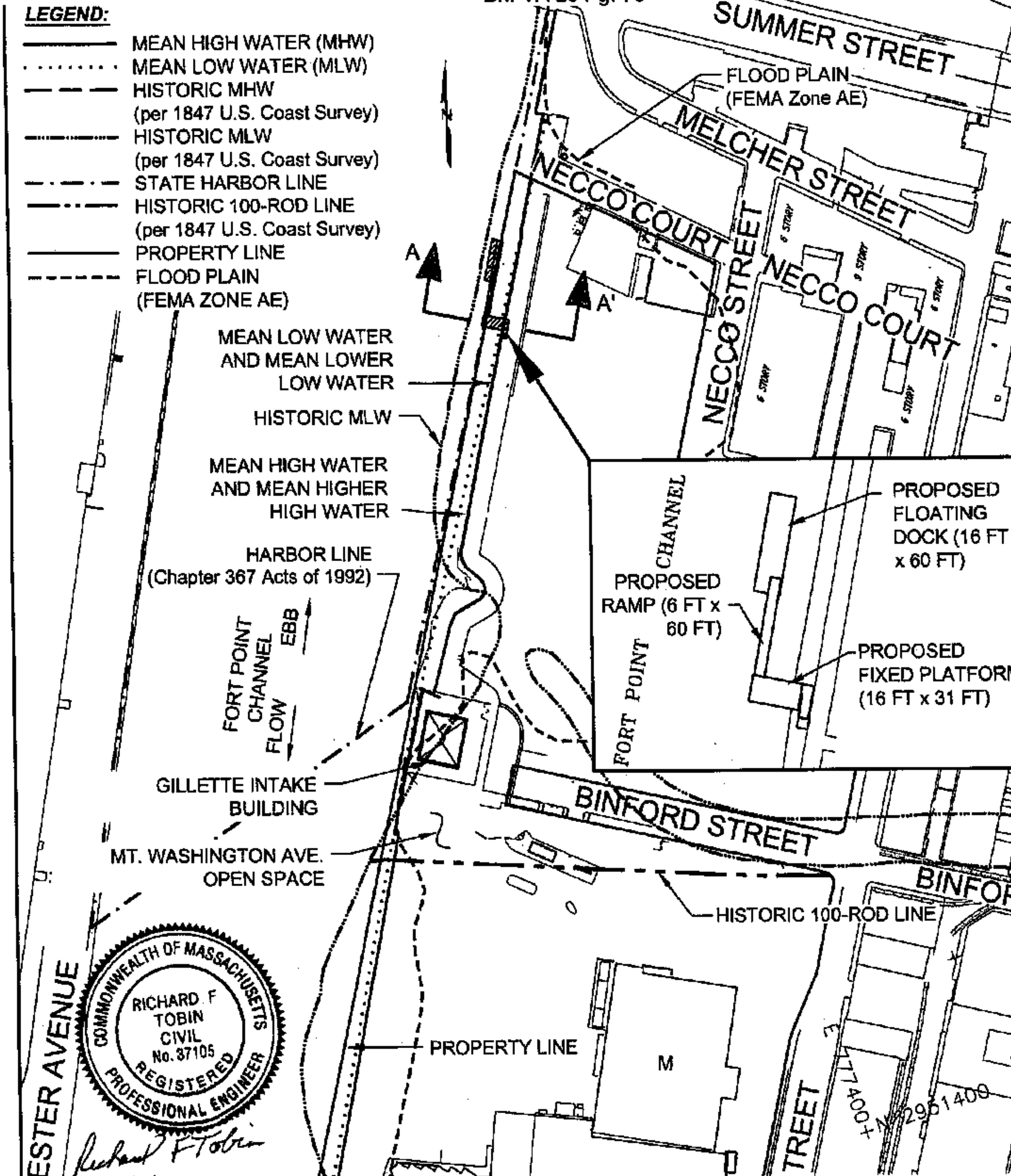
REVISED SEPT. 9, 2010
Sheet 1 of 7

GEI Consultants

LICENSE PLAN NO. 12906

Approved by Department of Environmental Protection of Massachusetts

MAR 11 2011



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SCALE, FEET

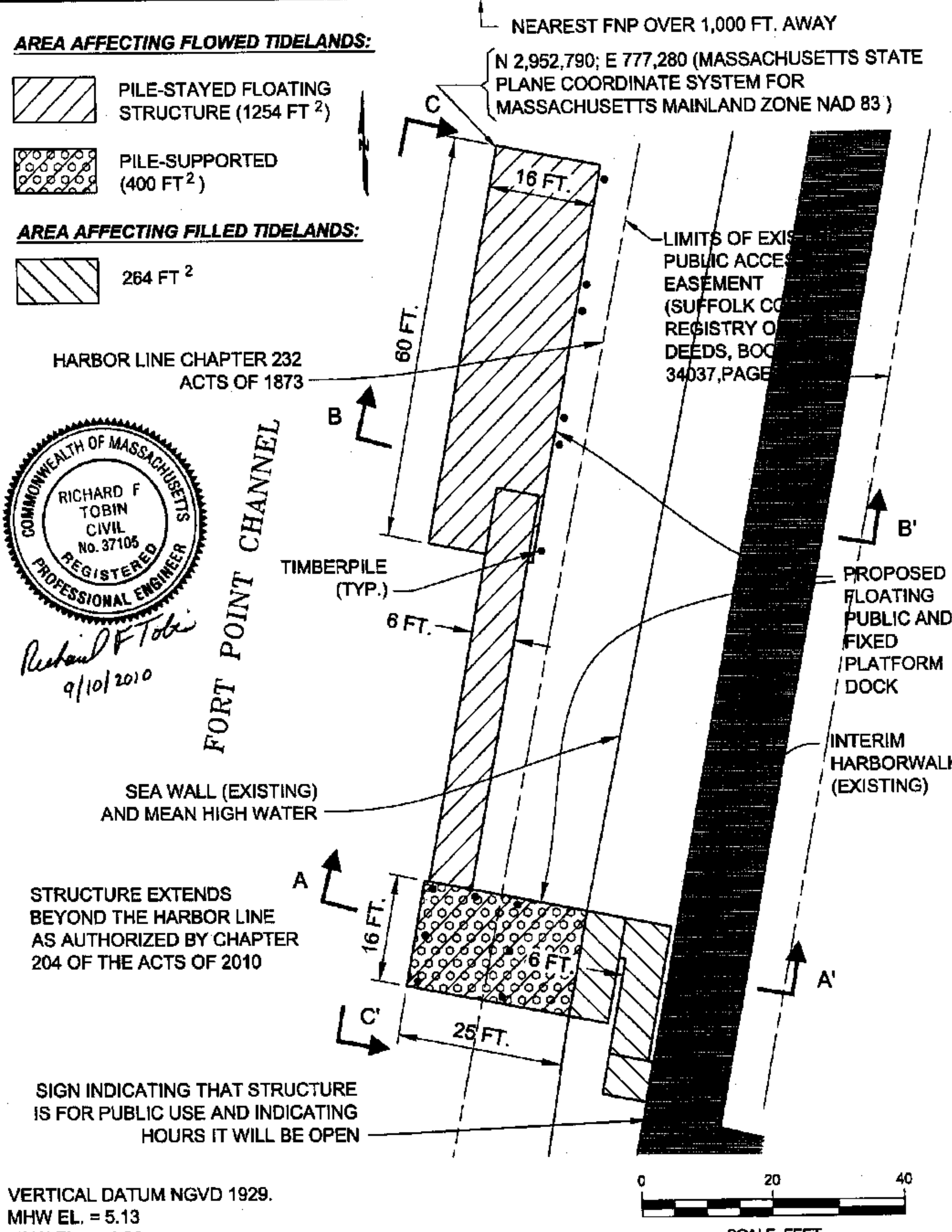
VERTICAL DATUM NGVD 1929.
MHW EL. = 5.13
MLW EL. = -4.36

PLANS ACCOMPANYING PETITION OF THE GILLETTE COMPANY TO CONSTRUCT AND MAINTAIN A PUBLIC FLOATING DOCK, RAMP, AND FIXED PLATFORM AT FORT POINT CHANNEL, BOSTON, MA

REVISED SEPT. 9, 2010

GEI

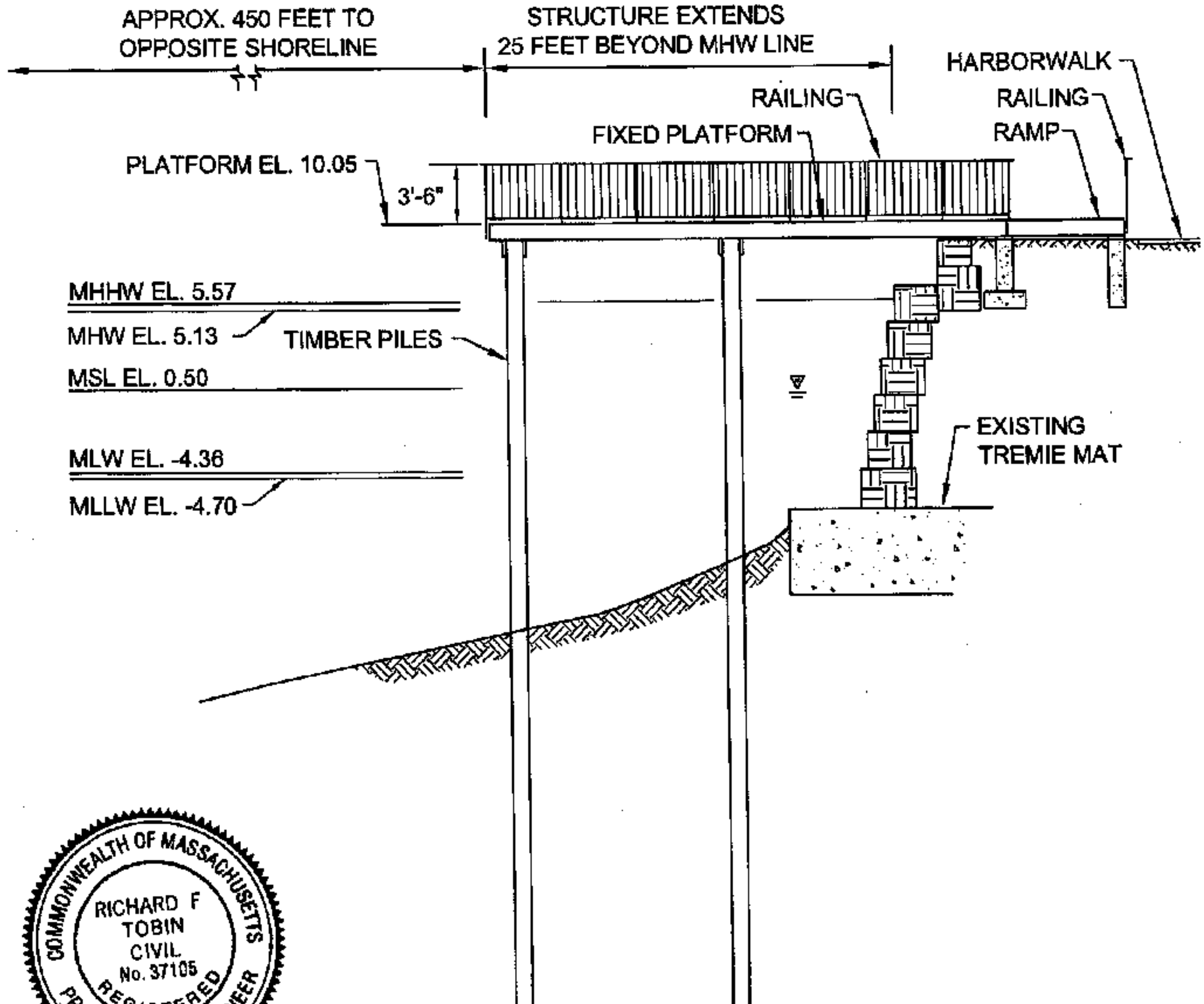
LICENSE PLAN NO.
Approved by Department of Environmental Protection
Date: MAR 11 2011



VERTICAL DATUM NGVD 1929.
MHW EL. = 5.13
MLW EL. = -4.36

PLANS ACCOMPANYING PETITION OF THE GILLETTE COMPANY
TO CONSTRUCT AND MAINTAIN A PUBLIC FLOATING DOCK, RAMP, AND FIXED PLATFORM AT FORT POINT CHANNEL, BOSTON, MA

LICENSE PLAN NO.
Approved by Department of Environmental Protection
Date: MAR 11 2011



COMMONWEALTH OF MASSACHUSETTS
RICHARD F TOBIN
CIVIL
No. 37105
REGISTERED
PROFESSIONAL ENGINEER

Richard F Tobin
9/10/2010

PUBLIC FLOATING DOCK, RAMP, AND FIXED PLATFORM
SECTION A - A'

VERTICAL DATUM NGVD 1929.
MHW EL. = 5.13
MLW EL. = -4.36

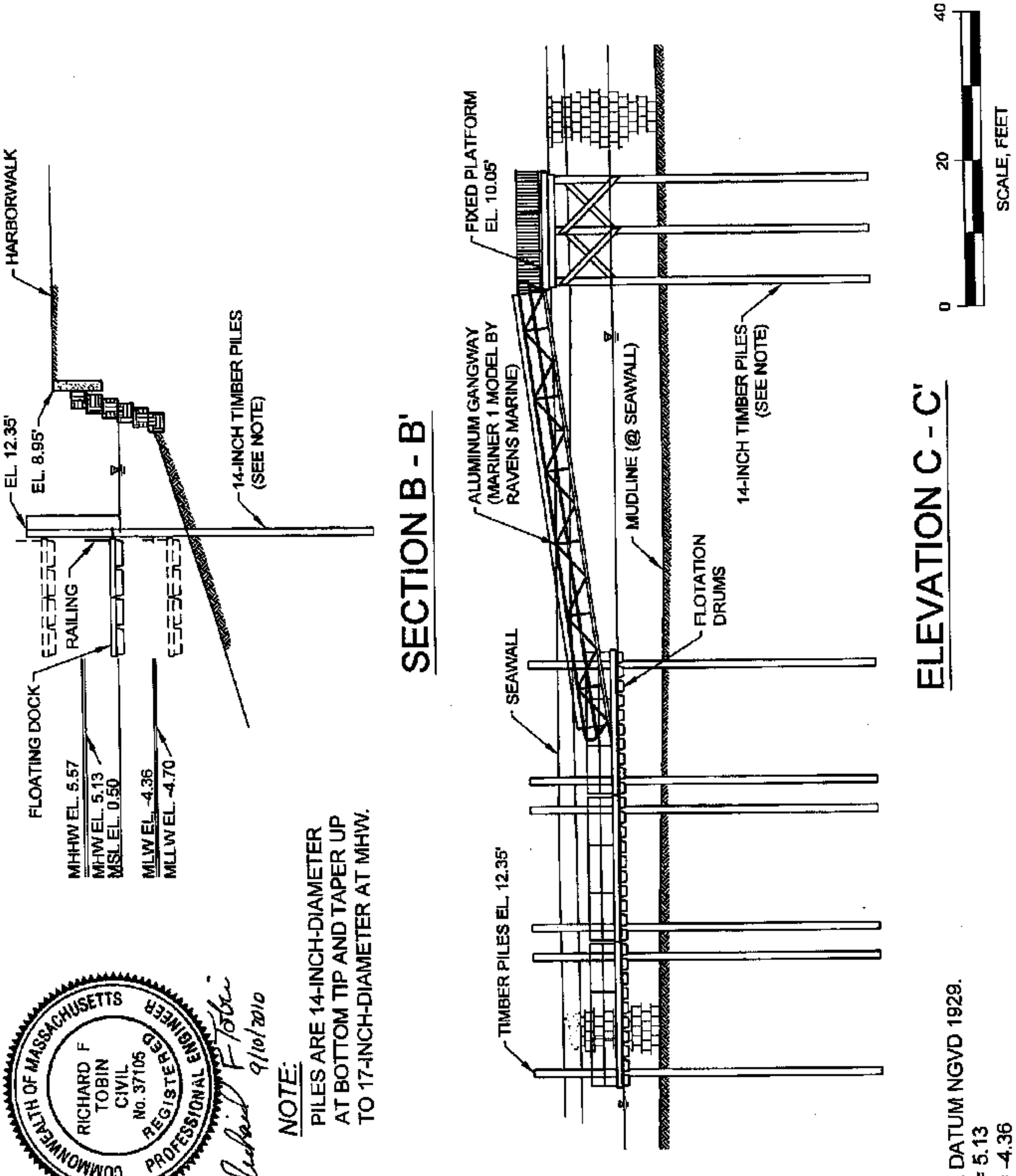
0 10 20
SCALE, FEET

PLANS ACCOMPANYING PETITION OF THE GILLETTE COMPANY TO CONSTRUCT AND MAINTAIN A PUBLIC FLOATING DOCK, RAMP, AND FIXED PLATFORM AT FORT POINT CHANNEL, BOSTON, MA

REVISED SEPT. 9, 2010

GEI

LICENSE PLAN NO.
Approved by Department of Environmental Protection
Date MAR 11 2011



NOTE:
PILES ARE 14-INCH-DIAMETER AT BOTTOM TIP AND TAPER UP TO 17-INCH-DIAMETER AT MHW.

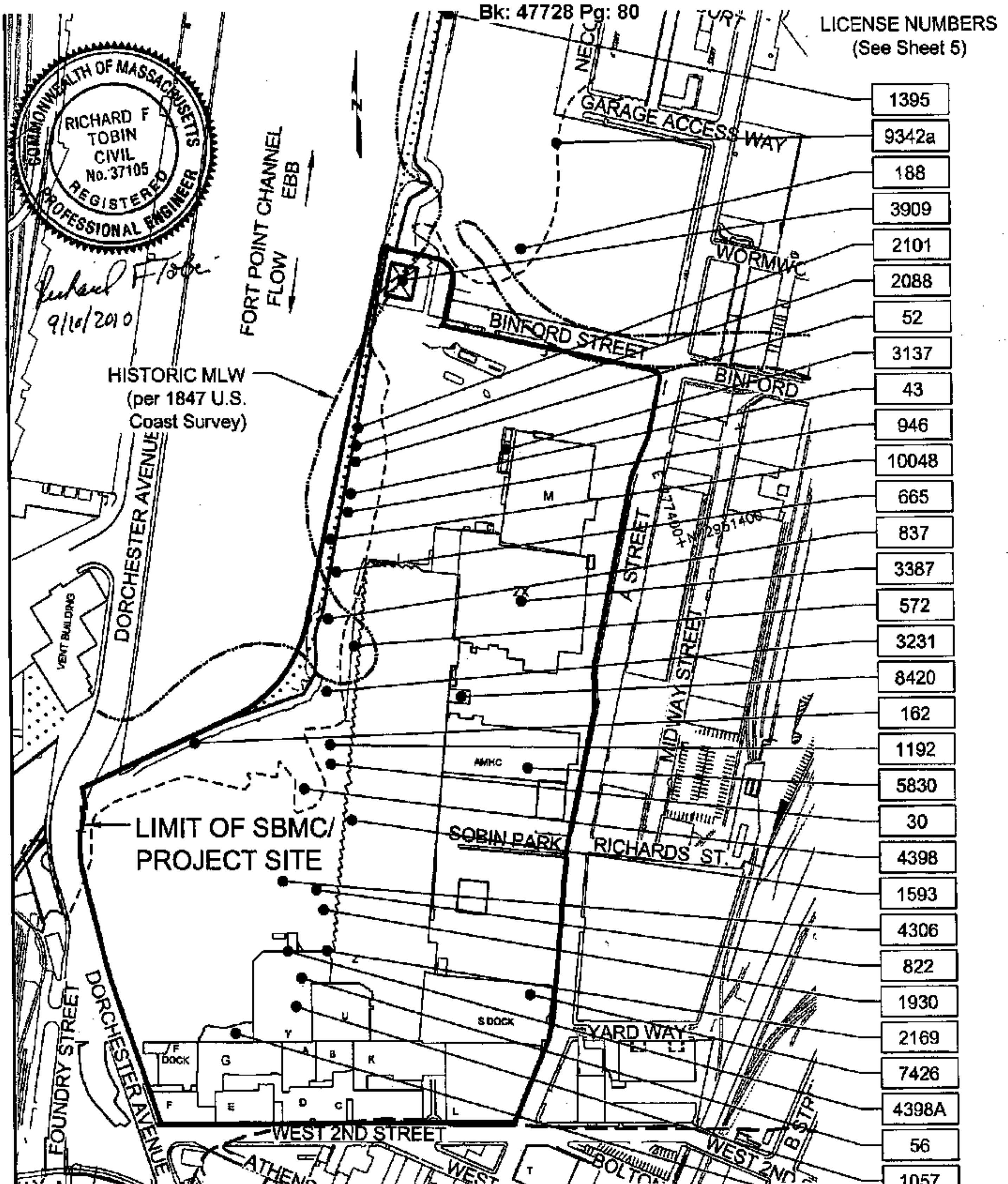
PUBLIC FLOATING DOCK, RAMP, AND FIXED PLATFORM

PLANS ACCOMPANYING PETITION OF THE
GILLETTE COMPANY
TO CONSTRUCT AND MAINTAIN A PUBLIC
FLOATING DOCK, RAMP, AND FIXED PLATFORM AT
FORT POINT CHANNEL, BOSTON, MA

REVISED SEPT. 9, 2010

GEI

LICENSE PLAN NO.
Approved by Department of Environmental Protection
Date; MAR 11 2011



0 300 600

SCALE, FEET

VERTICAL DATUM NGVD 1929.
MHW EL. = 5.13
MLW EL. = -4.36

PLANS ACCOMPANYING PETITION OF THE GILLETTE COMPANY
TO CONSTRUCT AND MAINTAIN A PUBLIC FLOATING DOCK, RAMP, AND FIXED PLATFORM AT FORT POINT CHANNEL, BOSTON, MA

REVISED SEPT. 9, 2010

GEI

LICENSE PLAN NO.
Approved by Department of Environmental Protection
Date; MAR 11 2011

LICENSE HISTORY

NUMBER	YEAR	ISSUED BY:	DESCRIPTION:
162	1873	HARBOR & LAND COMMISSION	SEA WALL & FILL
572	1880	HARBOR & LAND COMMISSION	PILE WHARF
665	1882	HARBOR & LAND COMMISSION	PILE WHARF
822	1884	HARBOR & LAND COMMISSION	SEA WALL & FILL
837	1884	HARBOR & LAND COMMISSION	SEA WALL FILL & PILE WHARF
1057	1888	HARBOR & LAND COMMISSION	BULKHEAD & FILL
1593	1893	HARBOR & LAND COMMISSION	SEA WALL & FILL
1930	1896	HARBOR & LAND COMMISSION	PILE WHARF
2088	1897	HARBOR & LAND COMMISSION	SEA WALL & FILL
2101	1898	HARBOR & LAND COMMISSION	PILE WHARF
2169	1899	HARBOR & LAND COMMISSION	BULKHEAD & FILL
3231	1907	HARBOR & LAND COMMISSION	FENDER PILES
30	1912	DIR. PORT OF BOSTON	DRIVE PILES
52	1912	DIR. PORT OF BOSTON	REBUILD SEA WALL & WHARF
188	1916	DIR. PORT OF BOSTON	FILL & BULKHEAD
56	1917	COMM. ON WATERWAYS AND PUBLIC LANDS	SEA WALL & FILL
946	1928	DEPARTMENT OF PUBLIC WORKS	REBUILD WHARF
1192	1930	DEPARTMENT OF PUBLIC WORKS	REBUILD WHARF
1395	1932	DEPARTMENT OF PUBLIC WORKS	REPAIR WHARF & DRIVE PILES
43	1947	PORT OF BOSTON AUTHORITY	REBUILD WHARF
4398	1960	DEPARTMENT OF PUBLIC WORKS	FILL EXISTING INLET IN CHANNEL
3137	1993	DEPT. OF ENVIRON. PROTECTION	RELOCATE RESIN SILOS
3387	1993	DEPT. OF ENVIRON. PROTECTION	BUILD ZX BUILDING
3909	1994	DEPT. OF ENVIRON. PROTECTION	BUILD INTAKE STRUCTURE
4306	1994	DEPT. OF ENVIRON. PROTECTION	RELOCATE FUEL TANK
5803	1996	DEPT. OF ENVIRON. PROTECTION	BUILD AUTOMATED MATERIAL HANDLING CENTER
7426	1998	DEPT. OF ENVIRON. PROTECTION	BUILD SOUTH DOCK EXTENSION
8420	1999	DEPT. OF ENVIRON. PROTECTION	SHARPENING OIL FILTRATION BUILDING
9342a	2003	DEPT. OF ENVIRON. PROTECTION	AMNESTY LICENSE (FILL & STRUCTURES)
10048	2004	DEPT. OF ENVIRON. PROTECTION	CA/T SURFACE RESTORATION
12063	2008	DEPT. OF ENVIRON. PROTECTION	G BUILDING LOBBY EXTENSION
4398A	2009	DEPT. OF ENVIRON. PROTECTION	COGENERATION FACILITY UPGRADE

COMMONWEALTH OF MASSACHUSETTS
RICHARD F. TOBIN
CIVIL
No. 37105
REGISTERED PROFESSIONAL ENGINEER

Richard F. Tobin
9/10/2010

SOURCE: DEPARTMENT OF ENVIRONMENTAL PROTECTION DIVISION OF WETLANDS AND WATERWAYS

PLANS ACCOMPANYING PETITION OF THE GILLETTE COMPANY TO CONSTRUCT AND A MAINTAIN PUBLIC FLOATING DOCK, RAMP, AND FIXED PLATFORM AT FORT POINT CHANNEL, BOSTON, MA

REVISED SEPT. 9, 2010

GEI

LICENSE PLAN NO.
Approved by Department of Environmental Protection
Date; MAR 11 2011

APPENDIX F: SUSTAINABILITY SUPPORTING DOCUMENTATION

LEED Credit Evaluation

The Project will be designed and constructed to be LEED certifiable, in accordance with the requirements of Article 37. The Project is targeting LEED Silver under LEEDv4, which requires the achievement of a minimum 50 points. As demonstrated by the draft LEED Scorecards for each project component, the Brick Buildings is targeting a total of 54 ‘yes’ points with 38 ‘maybe’ points (Figure F.1). The New Building is targeting a total of 52 ‘yes’ points with 40 ‘maybe’ points (Figure F.2).

GE is committed to registering the Project with Green Business Certification Inc. (GBCI) in order to demonstrate that it meets the requirements for certification. The New Building will be registered as an individual project registration and the Brick Buildings will be considered as one building due to architectural cohesiveness and shared mechanical elements. The registration approach for the Brick Buildings will be confirmed based on discussions with the USGBC, but for the purposes of demonstrating compliance with Article 37, the Brick Buildings are being tracked with one scorecard.

While the design will continue to be refined and the status of individual credits may change as the strategies and requirements associated with those credits are assessed against the design and construction strategies, the overall LEEDv4 Certified level will be maintained as a minimum standard. This will be demonstrated through Green Building reports as part of the continued BRA review during the Design Development and Construction phases of the Project, in accordance with the City’s Article 37 submission requirements.

Master Site LEED Credit Approach

A Master Site LEED documentation approach is proposed to accommodate the multiple buildings on a shared site, in accordance with the *USGBC LEED Campus Guidance for Projects on a Shared Site* (updated April 1, 2014). Under the LEED v4 rating system, projects with multiple buildings can pursue some of the New Construction prerequisites, Location and Transportation, Sustainable Sites, and Water Efficiency credits for the Site using a Master Site documentation approach. This approach streamlines the documentation process where applicable prerequisites and credits are documented only one time under the Master Site project.

While the Master Site project is registered in LEED Online, it does not achieve LEED certification; only buildings may pursue certification. The individual buildings associated with the Master Site must independently achieve certification, using in part the Master Site credits. Many credits can be documented once for both buildings under the group approach. For the purposes of demonstrating compliance with Article 37, the Brick Buildings are being tracked with one scorecard. The LEED prerequisites and credits available to be documented through the Master Site process are as follows:

- LT: High Priority Site
- LT: Bicycle Facilities
- LT: Reduced Parking Footprint
- LT: Green Vehicles
- SS: Site Assessment
- SS: Site Development – Protect or Restore Habitat
- SS: Open Space
- SS: Rainwater Management
- SS: Heat Island Reduction
- SS: Light Pollution Reduction
- WE: Prerequisite - Outdoor Water Use Reduction
- WE: Outdoor Water Use Reduction
- WE: Cooling Tower Water Use
- EA: Prerequisite - Fundamental Commissioning and Verification
- EA: Prerequisite – Fundamental Refrigerant Management
- MR: Prerequisite – Storage and Collection of Recyclables
- MR: Prerequisite – Construction and Demolition Waste Management Planning
- EQ: Prerequisite – Environmental Tobacco Smoke Control
- ID: Innovation in Design Credit(s) (where applicable to the Master Site)

Applicable LEED Credits by Category

Integrative Process (IP)

This is a new credit opportunity under LEED v4. This credit is being tracked to be achieved for both the New Building and the Brick Buildings. The credit requires the team to identify and use opportunities to achieve synergies across disciplines and energy-related and water-related building systems. Preliminary energy modeling and water budgeting are completed before the end of schematic design and design use targets are set. The analyses to inform the owner's project requirements (OPR), basis of design (BOD), design documents, and construction documents.

Location and Transportation (LT)

This is a new credit category in LEEDv4 that encourages project reams to take advantage of the infrastructure elements in existing communities that provide environmental and human health benefits. The LT category considers how this infrastructure affects occupants' behavior and environmental performance. The location of the Project in the Fort Point Channel Historic District in the heart of Boston on a previously developed parcel provides the opportunity to earn many of the credits in this category.

- **Sensitive Land Protection:** The Project is located on land that is previously developed and therefore meets the credit requirements.
- **High Priority Site:** The Project is located on an infill location in a historic district (Fort Point Channel Historic District) and therefore meets the credit requirements. This will be documented as a Master Site credit.
- **Surrounding Density and Diverse Uses:** The Project appears to meet both aspects of the credit due to its proximity to other offices and businesses. Credit compliance will be evaluated during design and the credit will be documented as part of the Master Site.
- **Access to Quality Transit:** The Project is within walking distance (less than ½ mile) of the South Station commuter rail transit hub, which also serves as a bus depot. The credit will be documented as part of the Master Site.
- **Bicycle Facilities:** Bicycle storage will be provided in the garage; shower rooms will be provided in the employee gym. Compliance with the bicycle network requirements is being evaluated; if met, the credit will be documented as part of the Master Site.
- **Reduced Parking Footprint:** The Project meets the intent of this credit by providing approximately 30 parking spaces, all underground and encouraging the use of non-automobile modes of commuting. The available parking at this site is significantly reduced with the redevelopment of current paved parking to landscaped area for the campus. It has not yet been determined if this is a 40% or greater reduction from the base ratio or if carpool parking is desired. If achieved, this credit will be documented as a Master Site credit.
- **Green Vehicles:** With only approximately 30 parking spaces, it has not yet been determined if 5% of them will be reserved for green vehicles. Eight charging stations are currently planned.

Sustainable Sites (SS)

- **Prerequisite - Construction Activity Pollution Prevention:** The Project-specific construction documents will include erosion and sedimentation control guidance for onsite implementation by the Construction Manager, (CM). The CM is required to implement a compliant erosion and sedimentation control plan that meets local requirements and the 2012 U.S. Environmental Protection Agency (EPA) Construction General Permit or local equivalent.
- **Site Assessment:** A site assessment of key attributes is completed and documented at the start of design to evaluate sustainable options and inform related decision about site design. The credit will be documented as a Master Site credit.
- **Site Development – Protect or Restore Habitat:** The intent of the credit is met by the design – to restore damaged areas to provide habitat and promote

biodiversity. Achievement of this credit, requiring 30% of previously disturbed area to be restored, is contingent on the final design. If achieved, the credit will be documented as a Master Site credit.

- **Open Space:** The proposed site design meets the intent of the credit – to create exterior open space that encourages interaction with the environment, social interaction, passive recreation, and physical activities. Achievement of the credit is contingent the final design. If achieved, the credit will be documented as a Master Site credit.
- **Rainwater Management:** The Project will contain an extensive stormwater management system to capture one inch of surface runoff for recharge. This should qualify for Option 1 of the credit – managing the 95th percentile rainfall event. This credit will be documented as a Master Site credit.
- **Heat Island Reduction:** A SRI-compliant roof will be specified where the roof is not vegetated. Compliant hardscapes will be installed. The credit will be documented as a Master Site credit.
- **Light Pollution Reduction:** The Project will evaluate the use of compliant exterior and site light fixtures and if the light trespass from the site can be minimized. If achieved, the credit will be documented as a Master Site credit.

Water Efficiency (WE)

Preliminary water balance calculations indicate that the selection of low-flow, high-efficiency fixtures, WaterSense appliances and roof rainwater capture/reuse reduces the potable water demand for the Project to below the targeted 20 gpd/person. Native and salt-water tolerant plantings will reduce potable water demand for the landscape features.

- **Prerequisite/Credit: Outdoor Water Use Reduction:** Both can be met if no permanent irrigation is required. Reducing the Project's landscape water requirement by at least 30% from the calculated baseline for the site's peak watering month meets the prerequisite; 50-100% earns points for the credit. A minimum of a 50% reduction from baseline is expected; the credit will be documented as a Master Site credit.
- **Prerequisite/Credit: Indoor Water Use Reduction:** Through the specification of low-flow high-efficiency plumbing fixtures, the Project will exceed the required 20 percent annual potable water use reduction and will target the annual potable water use by at least 30 percent.
- **Prerequisite/Credit: Water Metering:** Permanent meters for building and associated grounds must be installed and the data shared with USGBC for a minimum of five years. The credit can be earned by installing meters for two or more subsystems; this is being evaluated as design progresses and will likely be pursued.
- **Cooling Tower Water Use:** A potable water analysis is conducted to measure five control parameters in order to maximize the number of cooling tower cycles

that can be achieved without exceeding the allowed concentration level of the parameters. Achievement of this credit is contingent on the final design.

Energy and Atmosphere (EA)

- **Prerequisite: Fundamental Commissioning and Verification:** The Owner will need to engage a Commissioning Agent (CxA) during all phases of the Project to review the proposed design and ultimately confirm the building systems are installed and function as intended and desired. This will be documented as a Master Site credit.
- **Prerequisite/Credit: Energy Performance:** As design progresses, the design team will continue to use whole building energy modeling to document the annual energy use and cost savings. Early energy modeling results indicate an estimated annual energy cost savings of 28% for the main building and 20% for the existing building when compared to a baseline building performance as calculated using the rating method in Appendix G of ANSI/ASHREA/IESNA Standard 90.1-2010.
- **Prerequisite/Credit: Energy Metering:** Permanent meters for buildings must be installed and the data shared with USGBC for a minimum of five years. The credit can be earned by installing meters for all whole-building energy sources used by the building and any individual energy end uses that represent 10% or more of the total annual consumption of the building; this is being evaluated as design progresses.
- **Prerequisite: Fundamental Refrigerant Management:** As per the prerequisite requirements, the specifications for refrigerants used in the building HVAC & R systems will not permit the use of CFC based refrigerants. This will be documented as a Master Site credit.
- **Demand Response:** The credit requires designing building and equipment for participation in demand response programs through load shedding or shifting. This credit is being evaluated.
- **Renewable Energy Production:** Renewable energy systems are being evaluated for the Project. Achievement of this credit is contingent on the final design.
- **Enhanced Refrigerant Management:** Once the mechanical cooling equipment has been specified, submitted, and approved, final calculations will be run to confirm if credit requirements are met.
- **Green Power and Carbon Offsets:** The Proponents do not desire to purchase green power.

Materials and Resources (MR)

This category now focuses on minimizing the embodied energy and other impacts associated with the extraction, processing, transport, maintenance, and disposal of building materials. The requirements are designed to support a life-cycle approach that improves performance and promotes resource efficiency. Each requirement identifies a specific action that fits into the larger context of a life-cycle approach to embodied impact reduction.

- **Prerequisite: Storage and Collection of Recyclables:** Recyclables will be collected throughout the buildings and designated storage for collected recyclables will be provided in the Project. The recyclables will be collected by a contracted waste management company on a regular basis. This will be documented as a Master Site credit.
- **Prerequisite/Credit: Construction and Demolition Waste Management:** A Construction Waste Management Plan (CWMP) must be submitted for the prerequisite. The CM will endeavor to divert as much demolition debris and construction waste from area landfills as possible with a minimum diversion rate of 75% overall.
- **Building Life-Cycle Impact Reduction:** The existing buildings are eligible for this credit under either Option 1 (Historic Building Reuse) or 2 (renovation of abandoned or blighted building).
- **Building Product Disclosure and Optimization – Environmental Product Declarations:** The Project building(s) must each use at least 20 different permanently installed products sourced from at least five different manufacturers with EPD documentation.
- **Building Product Disclosure and Optimization – Sourcing of Raw Materials:** The Project building(s) must each use at least 20 different permanently installed products sourced from at least five different manufacturers that have publically released a report from their raw material suppliers.
- **Building Product Disclosure and Optimization – Material Ingredients:** Both buildings must each use at least 20 different permanently installed products sourced from at least five different manufacturers that use approved programs to demonstrate the chemical inventory of the product to at least 0.1%.

Indoor Environmental Quality (EQ)

Construction practices will promote a high level of indoor air quality during construction. Low-emitting materials (low to no Volatile Organic Compounds, or VOCs) will be used throughout the project to promote health and wellness for occupants. Quality views of the Boston skyline and Fort Point Channel will be provided for occupants. Design strategies will focus on occupant comfort, controllability, and well-being.

- **Prerequisite - Minimum Indoor Air Quality Performance:** The office building mechanical systems are designed to meet or exceed the requirements of ASHRAE Standard 62.1-2010 sections 4 through 7. Outdoor air intake flow is monitored.
- **Prerequisite - Environmental Tobacco Smoke Control:** The campus will be smoke-free in accordance with corporate policy. Signage will be posted as required.

- **Enhanced Indoor Air Quality Strategies:** The design team will aim to minimize and control the entry of pollutants into the building and to contain chemical use areas. Achievement of this credit is contingent on the final design.
- **Low-Emitting Materials:** This credit now includes requirements for product manufacturing as well as project teams. It covers VOC emissions in the indoor air and the VOC content of materials, as well as the testing methods by which indoor VOC emissions are determined. Different materials must meet different requirements to be considered compliant for this credit. The building interior and exterior are organized in six categories, each with different thresholds of compliance. The building interior is defined as everything within the waterproofing membrane. The building exterior is defined as everything outside and inclusive of the primary and secondary weatherproofing system, such as waterproofing membranes and air- and water-resistive barrier materials. Two points are currently targeted to be achieved, which will require meeting the thresholds of compliance for four of the six product categories. Categories being targeted for compliance are: interior paints and coatings applied on site; interior adhesives and sealants applied on site (including flooring adhesive); and ceiling, walls, thermal and acoustic insulation.
- **Construction Indoor Air Quality Management Plan:** The CM will be required to develop and implement a compliant Indoor Air Quality Management Plan for the construction and pre-occupancy phases of the Project to meet/exceed the recommended Control Measures of the SMACNA IAQ Guidelines for Occupied buildings Under Construction 2nd Edition 2007, ANSI/SMACNA 008-2008 (Chapter 3). Other credit requirements include protecting absorptive materials, providing proper filtration media, and prohibiting the use of tobacco products inside and within 25 feet of the building entrances during construction.
- **Indoor Air Quality Assessment:** It has not yet been decided if this credit will be pursued. It will require either air quality testing or a building flush-out.
- **Thermal Comfort:** The design team plans to design the building systems to meet the requirements of ASHRAE 55-2010 for all applicable mechanically ventilated regularly occupied spaces. The feasibility of providing the thermal comfort controls as required is still being evaluated.
- **Interior Lighting:** Lighting is one of GE's core businesses and one of the WELL Building Standard® typologies. The design will incorporate both the lighting control and lighting quality strategies of the credit.
- **Daylight:** The design will meet the intent of the credit to connect building occupants with the outdoors, reinforce circadian rhythms, and reduce the use of electrical lighting by introducing daylight into the space. It is still being determined to what extent the credit requirements can be met for each building. Additionally, the documentation requirements for this credit are extensive.
- **Quality Views:** A direct line of sight to the outdoors via vision glazing must be provided for 75% of all regularly occupied floor area; a clear image must be provided of the exterior. The proposed PV south façade may preclude earning this credit; this will be evaluated during final design.

- **Acoustic Performance:** All occupied spaces must meet requirements, as applicable, for HVAC background noise, sound isolation, reverberation time, and sound reinforcement and masking. Credit compliance will continue to be evaluated during final design.

Innovation in Design (IN)

- **Pilot Credit – Assessment and Planning for Resilience:** This new LEED pilot credit aligns closely with the BRA Climate Change Preparedness and Resiliency Checklist and is planned to be achieved as a Master Site Credit. The pilot credit requires a hazard assessment to be completed in pre-design and then complete a vulnerability assessment of predicted climate change impacts.
- **Pilot Credit – Design for Enhanced Resilience:** This new LEED pilot credit requires that mitigation strategies be implemented for each of the top three hazards identified in the Hazard Assessment. The intent of this credit is being met for the Project; compliance with all requirements is being evaluated; this may be achieved as a Master Site Credit.
- **WELL Building Standard® "Light" Strategies:** The Project is planned to be designed and operated within the guardrails of WELL. As such, a number of strategies under the 'Light" category are planned to be packaged as a LEED IN credit. Strategies being evaluated include visual lighting design, circadian lighting design, electric light glare control, solar glare control, color quality, right to light, and dimming controls.
- **WELL Building Standard® "Green Occupant Comfort" Strategies:** The Project is planned to be designed and operated within the guardrails of WELL. As such, a number of WELL strategies related to occupant comfort are planned to be packaged as a LEED IN credit. Strategies being evaluated include interior fitness circulation, visual and physical ergonomics, exterior noise intrusion, internally generated noise, and biophilia.
- **Boston Green Building Credit - Groundwater Recharge:** The Project Site is located within the GCOD and, therefore, is required to promote the recharge of one inch of surface runoff over the Project. The capacity of the proposed groundwater recharge infrastructure can be increased by 50 percent to promote the recharge of no less than one and one-half inches of surface runoff over the Project.
- **Boston Green Building Credit - Historic Preservation:** The Brick Buildings component includes the renovation of 5 and 6 Necco Court, which are both listed in the State and National Registers of Historic Places as contributing structures to the Fort Point Channel Historic District. The proposed renovation of the Brick Buildings will be undertaken in accordance with the Fort Point Channel Landmark District design standards and criteria.
- **LEED Accredited Professional:** The design team for the Project includes several LEED Accredited Professionals (AP), including Leonard Sciarra and Todd Dundon of Gensler, Conrad Hertz and Ian Robinson of RDK, Ryan Steib of OJB, and Tom

Paladino, of Paladino and Company. Therefore, this credit is achievable for both project components.

Regional Priority Credits

Applicable Regional Priority Credits (RPC) for the Project include:

- High Priority Site (2 points threshold)
- Rainwater Management (2 points threshold)
- Renewable Energy Production (5% - 2 points threshold)
- Optimize Energy Performance (8 points threshold)
- Indoor Water Use Reduction (40% - 4 points threshold)

The High Priority Site credit will be met as a Master Site credit. The Rainwater Management RPC may be achievable as a Master Site credit; the credit is still being evaluated. Both buildings are tracking to achieve the Optimize Energy Performance credit. The New Building may be able to achieve the Renewable Energy Production credit; final energy cost savings provided by the PV system will be determined later in design.

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

Project Checklist

Project Name: GE Headquarters Project - Brick Buildings
Date: 06/14/16

Y	?	N			
1			Credit	Integrative Process	1

Y	?	N		Location and Transportation	
10	5	1		**Location and Transportation**	**16**
			Credit	LEED for Neighborhood Development Location	16
1			Credit	Sensitive Land Protection	1
2			Credit	High Priority Site	2
2	2	1	Credit	Surrounding Density and Diverse Uses	5
5			Credit	Access to Quality Transit	5
	1		Credit	Bicycle Facilities	1
	1		Credit	Reduced Parking Footprint	1
	1		Credit	Green Vehicles	1

Y	?	N		Sustainable Sites	
3	6	1		**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	1
	2	1	Credit	Rainwater Management	3
2			Credit	Heat Island Reduction	2
	1		Credit	Light Pollution Reduction	1

Y	?	N		Water Efficiency	
3	5	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	2
2	1	3	Credit	Indoor Water Use Reduction	6
	2		Credit	Cooling Tower Water Use	2
	1		Credit	Water Metering	1

Y	?	N		Energy and Atmosphere	
12	9	12		**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
3	3		Credit	Enhanced Commissioning	6
9	1	8	Credit	Optimize Energy Performance	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

Y	?	N		Materials and Resources	
10	3	0		**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	2

Y	?	N		Indoor Environmental Quality	
7	9	0		**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
	2		Credit	Indoor Air Quality Assessment	2
1			Credit	Thermal Comfort	1
2			Credit	Interior Lighting	2
	3		Credit	Daylight	3
1			Credit	Quality Views	1
	1		Credit	Acoustic Performance	1

Y	?	N		Innovation	
6	0	0		**Innovation**	**6**
1			Credit	ID: Pilot Credit - Assessment and Planning for Resilience	5
1			Credit	Boston Green Building Credit: Groundwater Recharge	5
1			Credit	Boston Green Building Credit: Historic Preservation	5
1			Credit	ID: WELL "Light" Strategies	5
1			Credit	ID WELL "Green Occupant Comfort" Strategies	5
1			Credit	LEED Accredited Professional	1

Y	?	N		Regional Priority	
2	1	1		**Regional Priority**	**4**
1			Credit	Regional Priority: High Priority Site (2pt threshold)	1
	1		Credit	Regional Priority: Rainwater Management (2 pt threshold)	1
		1	Credit	Regional Priority: Renewable Energy Production (5%)	1
1			Credit	Regional Priority: Opt Energy Perform 8pts, or Ind Water Use Reduction 40%	1

Y	?	N			
54	38	18		**TOTALS**	Possible Points: **110**

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

Figure F.1

Draft LEED scorecard - Brick Buildings

GE Headquarters Project
Boston, Massachusetts

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

Project Checklist

Project Name: GE Headquarters Project - New Building

Date: 06/14/16

Y	?	N			
1			Credit	Integrative Process	1
10	**5**	**1**		**Location and Transportation**	**16**
			Credit	LEED for Neighborhood Development Location	16
1			Credit	Sensitive Land Protection	1
2			Credit	High Priority Site	2
2	2	1	Credit	Surrounding Density and Diverse Uses	5
5			Credit	Access to Quality Transit	5
	1		Credit	Bicycle Facilities	1
	1		Credit	Reduced Parking Footprint	1
	1		Credit	Green Vehicles	1
3	**6**	**1**		**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	1
	2	1	Credit	Rainwater Management	3
2			Credit	Heat Island Reduction	2
	1		Credit	Light Pollution Reduction	1
3	**5**	**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	2
2	1	3	Credit	Indoor Water Use Reduction	6
	2		Credit	Cooling Tower Water Use	2
	1		Credit	Water Metering	1
15	**10**	**8**		**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
3	3		Credit	Enhanced Commissioning	6
11	2	5	Credit	Optimize Energy Performance	18
	1		Credit	Advanced Energy Metering	1
	2		Credit	Demand Response	2
1	1	1	Credit	Renewable Energy Production	3
	1		Credit	Enhanced Refrigerant Management	1
		2	Credit	Green Power and Carbon Offsets	2
5	**3**	**5**		**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	2
8	**8**	**0**		**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
	2		Credit	Indoor Air Quality Assessment	2
1			Credit	Thermal Comfort	1
2			Credit	Interior Lighting	2
1	2		Credit	Daylight	3
1			Credit	Quality Views	1
	1		Credit	Acoustic Performance	1
5	**1**	**0**		**Innovation**	**6**
1			Credit	ID: Pilot Credit - Assessment and Planning for Resilience	5
	1		Credit	ID: Pilot Credit - Design for Enhanced Resilience	5
1			Credit	Boston Green Building Credit: Groundwater Recharge	5
1			Credit	ID: WELL "Light" Strategies	5
1			Credit	ID WELL "Green Occupant Comfort" Strategies	5
1			Credit	LEED Accredited Professional	1
2	**2**	**0**		**Regional Priority**	**4**
1			Credit	Regional Priority: High Priority Site (2pt threshold)	1
	1		Credit	Regional Priority: Rainwater Management (2 pt threshold)	1
	1		Credit	Regional Priority: Renewable Energy Production (5%)	1
1			Credit	Regional Priority: Opt Energy Perform 8pts, or Ind Water Use Reduction 40%	1
52	**40**	**18**		**TOTALS** Possible Points:	**110**

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

Figure F.2

Draft LEED scorecard - New Building

GE Headquarters Project
Boston, Massachusetts

APPENDIX G: Environmental Supporting Documentation

Wind Supporting Documentation

Solar Supporting Documentation

Noise Supporting Documentation

Wind Supporting Documentation

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CONSULTING ENGINEERS
& SCIENTISTS

GE Boston Headquarters

Boston, Massachusetts

Final Report

Pedestrian Wind Consultation

RWDI # 1602325
July 27, 2016

SUBMITTED TO

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1. INTRODUCTION

A pedestrian wind study was conducted on the proposed GE Boston Headquarters located in Boston, Massachusetts. The objective of the study was to assess the effect of the proposed development on local conditions in pedestrian areas around the study site and provide recommendations for minimizing adverse effects.

The study involved wind simulations on a 1:300 scale model of the proposed building and surroundings. These simulations were then conducted in RWDI's boundary-layer wind tunnel at Guelph, Ontario, for the purpose of quantifying local wind speed conditions and comparing to appropriate criteria for gauging wind comfort in pedestrian areas. A list of the drawings used for the construction of the model can be found in Appendix A. The criteria recommended by the Boston Redevelopment Authority (BRA) were used in this study. The present report describes the methods and presents the results of the wind tunnel simulations.

2. OVERVIEW

Major buildings, especially those that protrude above their surroundings, often cause increased local wind speeds at the pedestrian level. Typically, wind speeds increase with elevation above the ground surface, and taller buildings intercept these faster winds and deflect them down to the pedestrian level. The funneling of wind through gaps between buildings and the acceleration of wind around corners of buildings may also cause increases in wind speed. Conversely, if a building is surrounded by others of equivalent height, it may be protected from the prevailing upper-level winds, resulting in no significant changes to the local pedestrian-level wind environment. The most effective way to assess potential pedestrian-level wind impacts around a proposed new building is to conduct scale model tests in a wind tunnel.

The consideration of wind in planning outdoor activity areas is important since high winds in an area tend to deter pedestrian use. For example, winds should be light or relatively light in areas where people would be sitting, such as outdoor cafes or playgrounds. For bus stops and other locations where people would be standing, somewhat higher winds can be tolerated. For frequently used sidewalks, where people are primarily walking, stronger winds are acceptable. For infrequently used areas, the wind comfort criteria can be relaxed even further. The actual effects of wind can range from pedestrian inconvenience, due to the blowing of dust and other loose material in a moderate breeze, to severe difficulty with walking due to the wind forces on the pedestrian.

3. METHODOLOGY

Information concerning the site and surroundings was derived from: information on surrounding buildings and terrain; site plans and elevations of the proposed development provided by the design team. The following configurations were simulated:

No Build: includes the existing site all existing surrounding buildings; and

Build: includes the proposed GE Boston Headquarters, proposed landscaping and all existing surroundings and existing landscaping along Necco Street.

As shown in Figures 1a and 1b, the wind tunnel model included the proposed development and all relevant surrounding buildings and topography within a 1200 ft radius of the study site. For the purposes of this study a simplified massing model of the proposed building was used during testing as is typically warranted given by the early stage of the design process. More refined results are anticipated with the use of a more detailed model as design continues to evolve and exterior massing is further developed. Throughout the tests the mean speed profile and turbulence of natural wind approaching the modelled area were also simulated in RWDI's boundary layer wind tunnel. The scale model was equipped with 89 specially designed wind speed sensors that were connected to the wind tunnel's data acquisition system to record the mean and fluctuating components of wind speed at a full-scale height of 5 feet above grade in pedestrian areas throughout the study site. Wind speeds were measured for 36 wind directions, in 10 degree increments, starting from true north. The measurements at each sensor location were recorded in the form of ratios of local mean and gust speeds to the reference wind speed in the free stream above the model. The results were then combined with long-term meteorological data, recorded during the years from 1995 to 2015 at Boston's Logan International Airport, in order to predict full scale wind conditions. The analysis was performed separately for each of the four seasons and for the entire year.

Figure 2 presents "wind roses", summarizing the annual and seasonal wind climates in the Boston area, based on the data from Boston Logan International Airport. The first wind rose on the left side in Figure 2, for example summarizes the spring (March, April, and May) wind data. In general, the prevailing winds at this time of year are from the west-northwest, northwest, west, south-southwest and east-southeast. In addition to these directions, strong winds are also prevalent from the northeast direction as indicated by the red and yellow color bands on the wind rose.

On an annual basis the most common wind directions are those between southwest and northwest. Winds from east-southeast are also relatively common. In the case of strong winds, northeast and west through northwest are the dominant wind directions.

This study involved state-of-the-art measurement and analysis techniques to predict wind conditions at the study site. Nevertheless, some uncertainty remains in predicting wind comfort, and this must be kept in mind. For example, the sensation of comfort among individuals can be quite variable. Variations in age, individual health, clothing, and other human factors can change a particular response of an individual. The comfort limits used in this report represent an average for the total population. Also, unforeseen changes in the project area, such as the construction or removal of buildings, can affect the conditions experienced at the site. Finally, the prediction of wind speeds is necessarily a statistical procedure. The wind speeds reported are for the frequency of occurrence stated (one percent of the time). Higher wind speeds will occur but on a less frequent basis.

4. PEDESTRIAN WIND COMFORT CRITERIA

The BRA has adopted two standards for assessing the relative wind comfort of pedestrians. First, the BRA wind design guidance criterion states that an effective gust velocity (hourly mean wind speed +1.5 times the root-mean-square wind speed) of 31 mph should not be exceeded more than one percent of the time. The second set of criteria used by the BRA to determine the acceptability of specific locations is based on the work of Melbourne[1]. This set of criteria is used to determine the relative level of pedestrian wind comfort for activities such as sitting, standing, or walking. The criteria are expressed in terms of benchmarks for the 1-hour mean wind speed exceeded 1% of the time (i.e., the 99-percentile mean wind speed). They are as follows:

BRA Mean Wind Criteria*

Dangerous	> 27 mph
Uncomfortable for Walking	> 19 and ≤ 27 mph
Comfortable for Walking	> 15 and ≤ 19 mph
Comfortable for Standing	> 12 and ≤ 15 mph
Comfortable for Sitting	< 12 mph

* Applicable to the hourly mean wind speed exceeded one percent of the time.

The wind climate found in a typical downtown location in Boston is generally comfortable for the pedestrian use of sidewalks and thoroughfares and meets the BRA effective gust velocity criterion of 31 mph. However, without any mitigation measures, this wind climate is likely to be frequently uncomfortable for more passive activities such as sitting.

5. TEST RESULTS

For each model configuration, Figure 3 graphically depicts the mean wind speeds and Figure 4 depicts the effective gust speeds at each wind measurement location based on the annual winds. Table 1 presents the mean and effective gust wind speeds for each season as well as annually. Typically the summer and fall winds tend to be more comfortable than the annual winds while the winter and spring winds are less comfortable than the annual winds. The following summary of pedestrian wind comfort is based on the annual winds for each configuration studied, except where noted below in the text.

A wind comfort categorization of walking is considered appropriate for sidewalks. Lower wind speeds conducive to standing are preferred at building entrances.

---

[1] Melbourne, W.H., 1978, "Criteria for Environmental Wind Conditions", Journal of Industrial Aerodynamics, 3 (1978) 241 - 249.

5.1 No Build

As shown in Figure 3a the no build configuration did not include any existing landscaping features. This was done in order to obtain an unbiased base-line assessment of the wind comfort conditions. From Figure 3a it can also be seen that the wind conditions at most of the on-site locations are comfortable for sitting or standing on an annual basis. Wind speeds at off-site locations are generally comfortable for walking or better. Wind speeds categorized as uncomfortable for walking exist to the southeast of the project site along the sidewalks of A Street, and isolated locations on Pastene Alley to the east and on the Summer Street Bridge to the north of the project site, on an annual basis (Locations 23, 31, 78, 82 and 85 in Figure 3a).

The annual effective gust criterion for wind safety is not met at one location at the intersection of A Street and Wormwood Street, on the southeast side of the project site (Location 85 in Figure 4a).

5.2 Build

With the addition of the GE Boston Headquarters which includes existing and proposed landscaping, the wind conditions around the site are expected to be similar to the No Build conditions at most of the locations (Figure 3b). An increase in wind speeds is predicted along the perimeter of the project to the north, south and east in the covered passage (Table 1). While winds at most of these locations are comfortable for walking, standing or sitting, wind conditions categorized as uncomfortable for walking are predicted on the north side of the proposed development at the entrance of the covered passage, west side of the development and at the south side on Necco Street (Locations 4, 11, 12, 26, 44 and 53 in Figure 3b).

As shown in Figure 3b, winds at isolated locations along Necco Street, A Street and Pastene Alley (Locations 28, 32, 82 and 85) are expected to be uncomfortable for walking. The exceedance of the effective gust criterion at the intersection of A Street and Wormwood Street is expected to remain unchanged for the Build configuration (Location 85 in Figure 4b). Winds at this location are not influenced adversely by the addition of the proposed building. Winds at all other locations are predicted to meet the effective gust criterion.

Higher-than-desired or uncomfortable wind conditions on-site are mainly caused by the winds from west (Location 4), north, south (Locations 11, 12, 26 and 53) and southwest (Location 44). If lower wind speeds are desired in these areas, wind control measures in the form of additional coniferous landscaping or wind screens can be considered upwind of these locations. Such features should be at least 6 ft. tall and approximately 30% porous to be effective. Examples of these are shown in Image 1.

Image 1 – Examples of coniferous landscaping and vertical porous wind screen

6. DISCUSSION

As previously mentioned, the results of this study are based on a simplified model that was developed early in the design process. Some of the architectural features that were omitted from the model in these tests included porous screens, vertical fins, and general building articulation. Additional tests will be done in the future with a more refined study model as the design evolves. In doing so this may further improve wind comfort conditions throughout the Project Site and in adjacent areas.

From the No Build to Build Configurations there were a number of locations changed from sitting or walking to uncomfortable such as locations 4 and 53, but this is balanced by several areas of improvement such as locations 49 and 51 making the overall wind comfort experience throughout the site similar between the two configurations. Moreover, the design team will continue to focus on design changes intended to improve wind comfort levels across and adjacent to the site. Particular improvements are anticipated along the Harborwalk (sensor 53) and at the entrance to GE Plaza (sensor 4).

Based on these test results, the overall wind comfort experience throughout the Project Site is consistent with pedestrian experiences across the city of Boston and is better than many waterfront open areas and plazas.

7. APPLICABILITY OF RESULTS

The results presented in this report pertain to the model of the proposed GE Boston Headquarters development constructed using the architectural design drawings listed in Appendix A. Should there be any design changes that deviate from this list of drawings, the results presented may change. Therefore, if changes in the design are made, it is recommended that RWDI be contacted and requested to review their potential effects on wind conditions.

FIGURES

Wind Tunnel Study Model
No Build

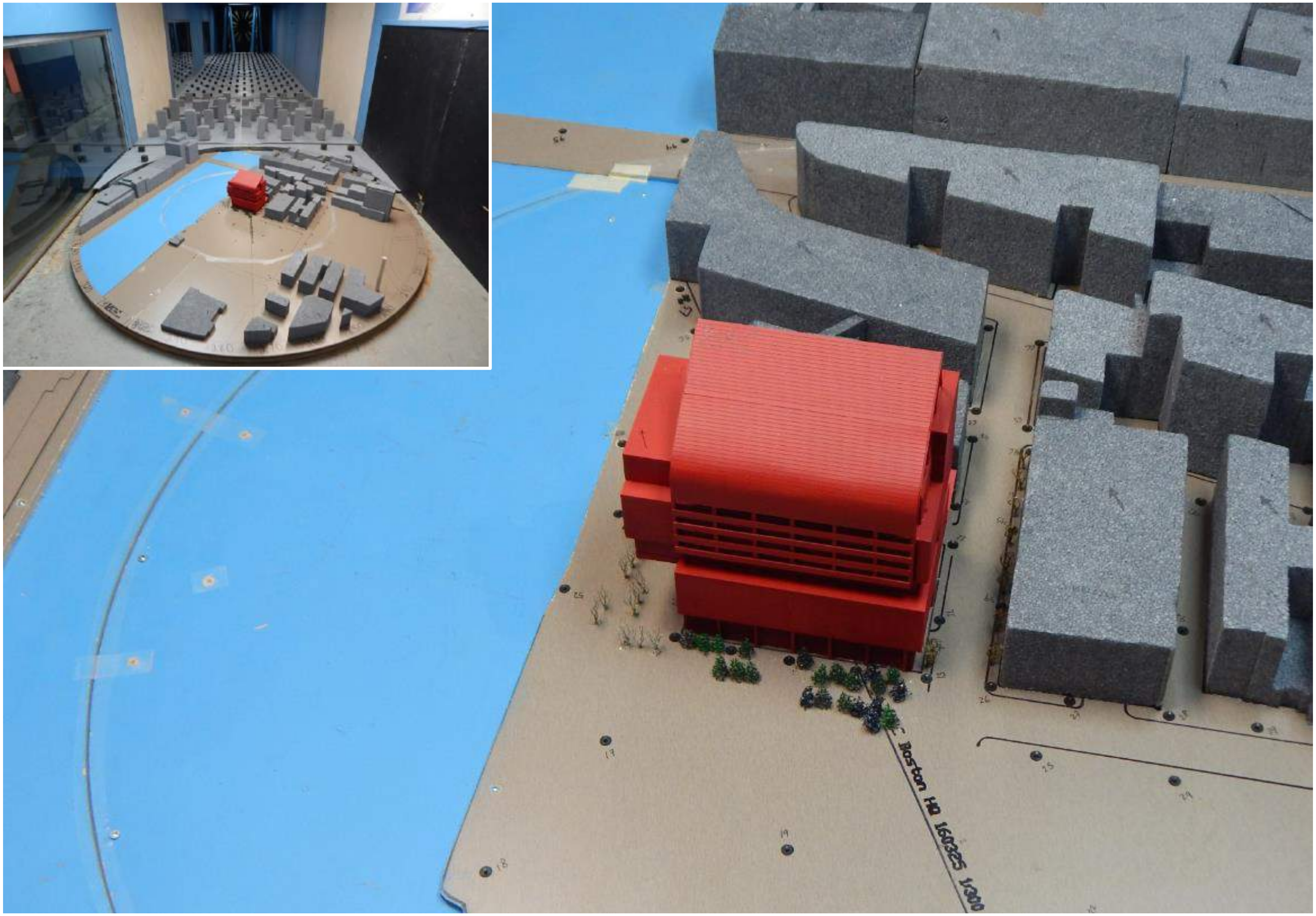
GE Boston Headquarters – Boston, Massachusetts

Project #1602325

Figure No. 1a

Date: July 27, 2016

RWDI



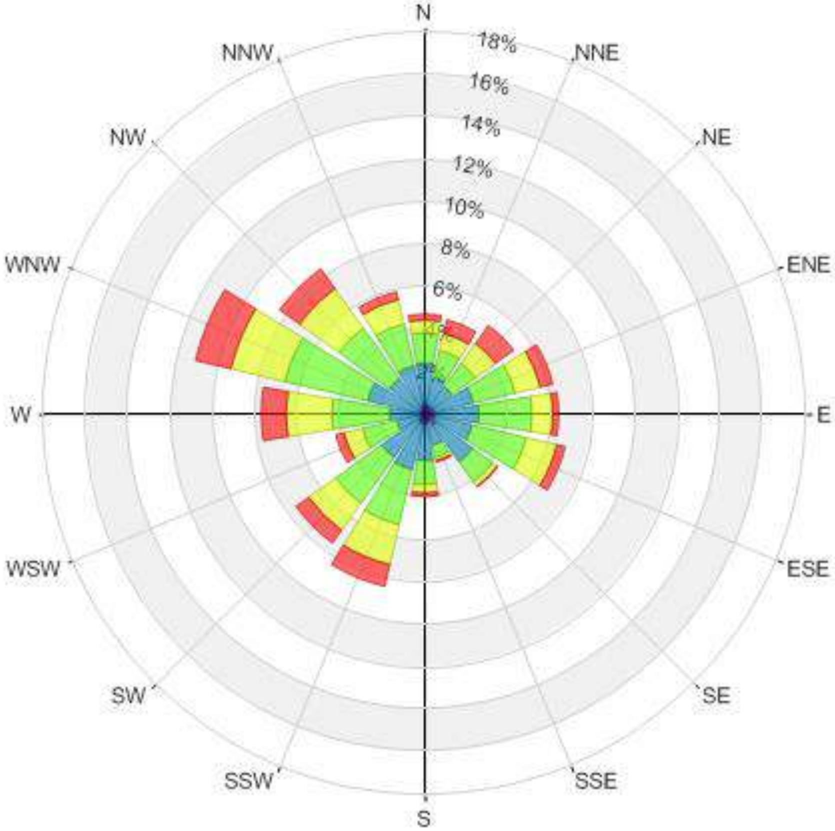
Wind Tunnel Study Model
Build

GE Boston Headquarters – Boston, Massachusetts

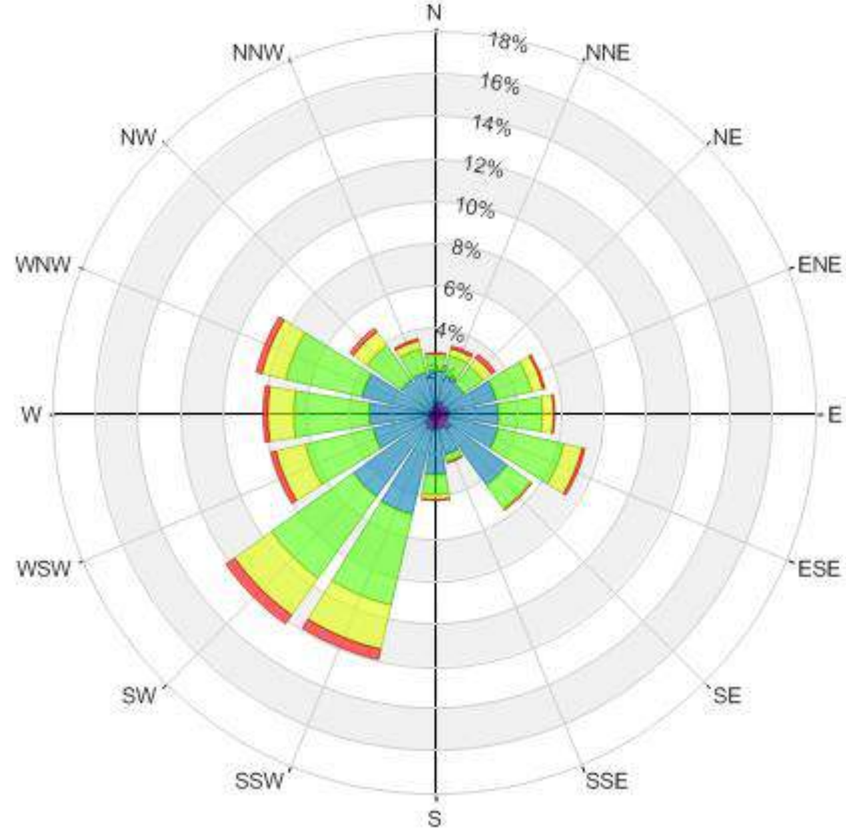
Project #1602325

Figure No. 1b

Date: July 27, 2016



Spring
(March - May)



Summer
(June - August)

Wind Speed (mph)	Probability (%) Spring	Summer
Calm	2.4	2.7
1-5	6.4	8.9
6-10	28.5	38.1
11-15	32.9	35.1
16-20	19.7	12.6
>20	10.2	2.7

Directional Distribution (%) of Winds (Blowing From)
Boston Logan International Airport (1991 - 2015)

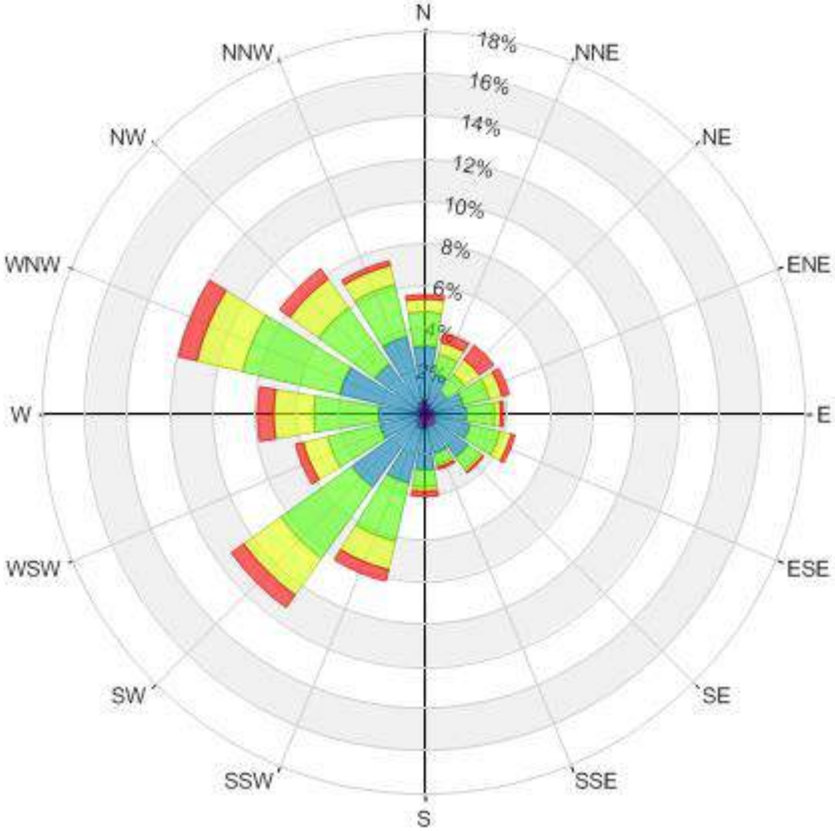
GE Boston Headquarters – Boston, Massachusetts

Project #1602325

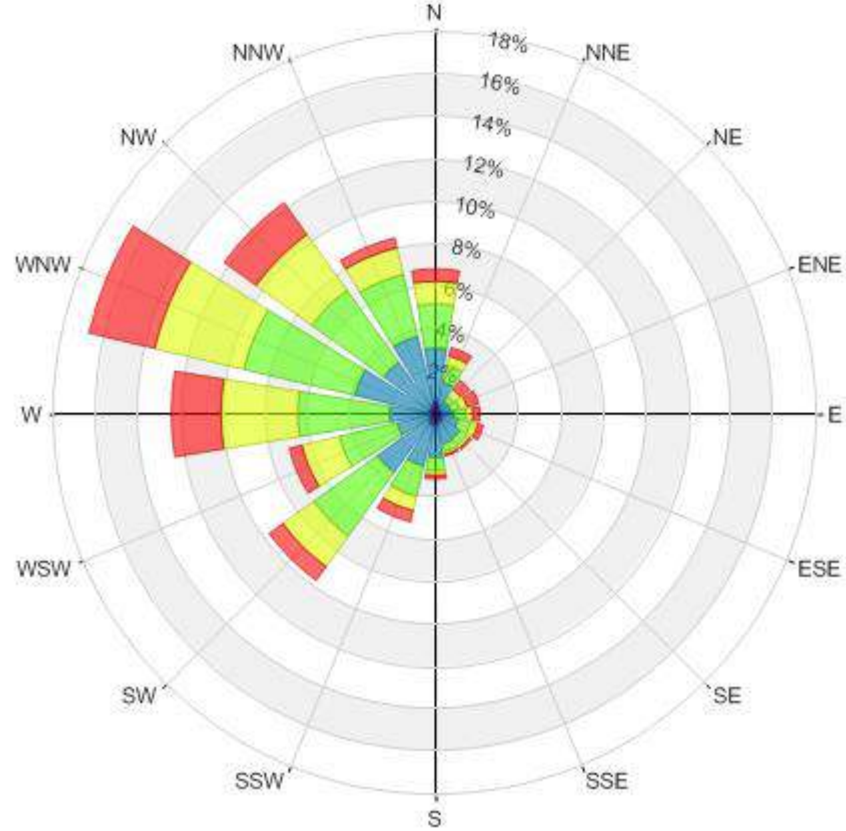
Figure No. 2

Date: July 27, 2016

RWDI



Fall
(September - November)



Winter
(December - February)

Wind Speed (mph)	Probability (%) Fall	Winter
Calm	2.9	2.3
1-5	8.0	6.2
6-10	34.3	27.5
11-15	32.8	31.1
16-20	15.3	20.1
>20	6.7	12.8

Directional Distribution (%) of Winds (Blowing From)
Boston Logan International Airport (1991 - 2015)

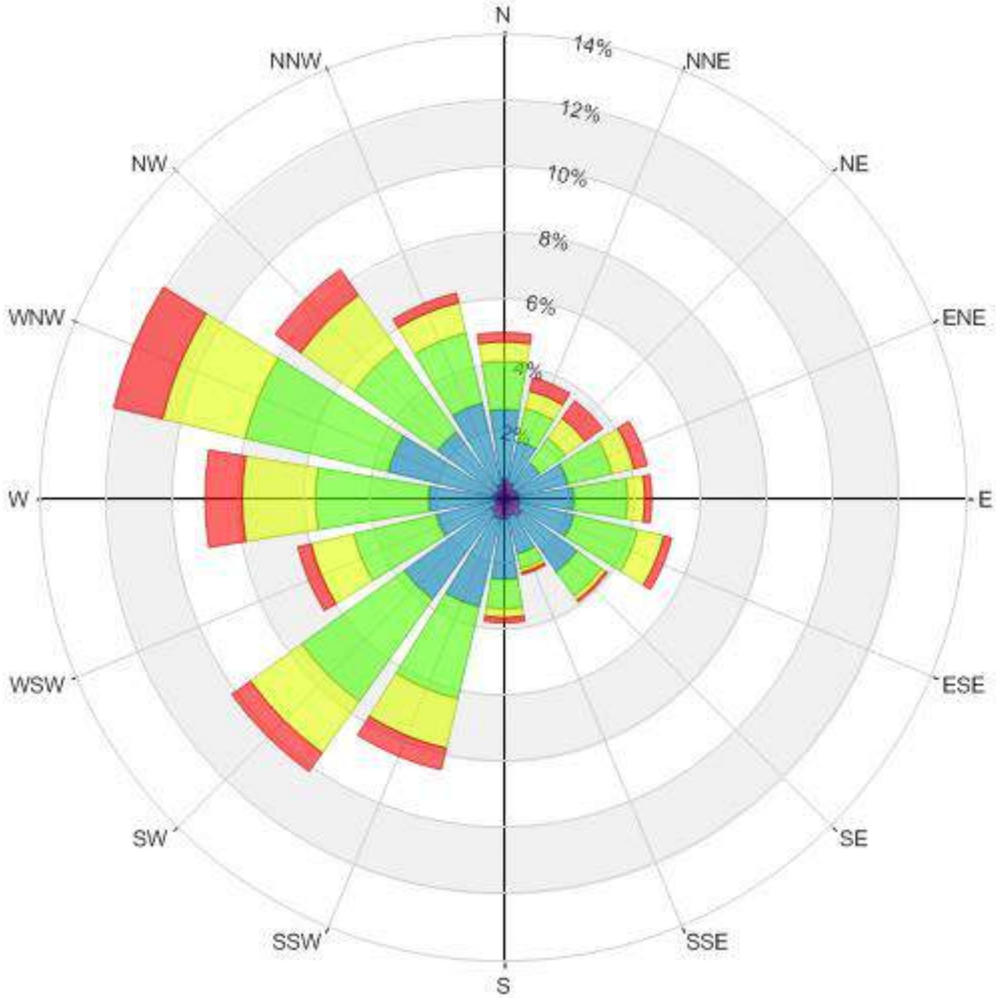
GE Boston Headquarters – Boston, Massachusetts

Project #1602325

Figure No. 2

Date: July 27, 2016

RWDI



Annual Winds

Wind Speed (mph)	Probability (%)
Calm	2.5
1-5	7.4
6-10	32.1
11-15	33.0
16-20	16.9
>20	8.1

Directional Distribution (%) of Winds (Blowing From)
Boston Logan International Airport (1991 - 2015)

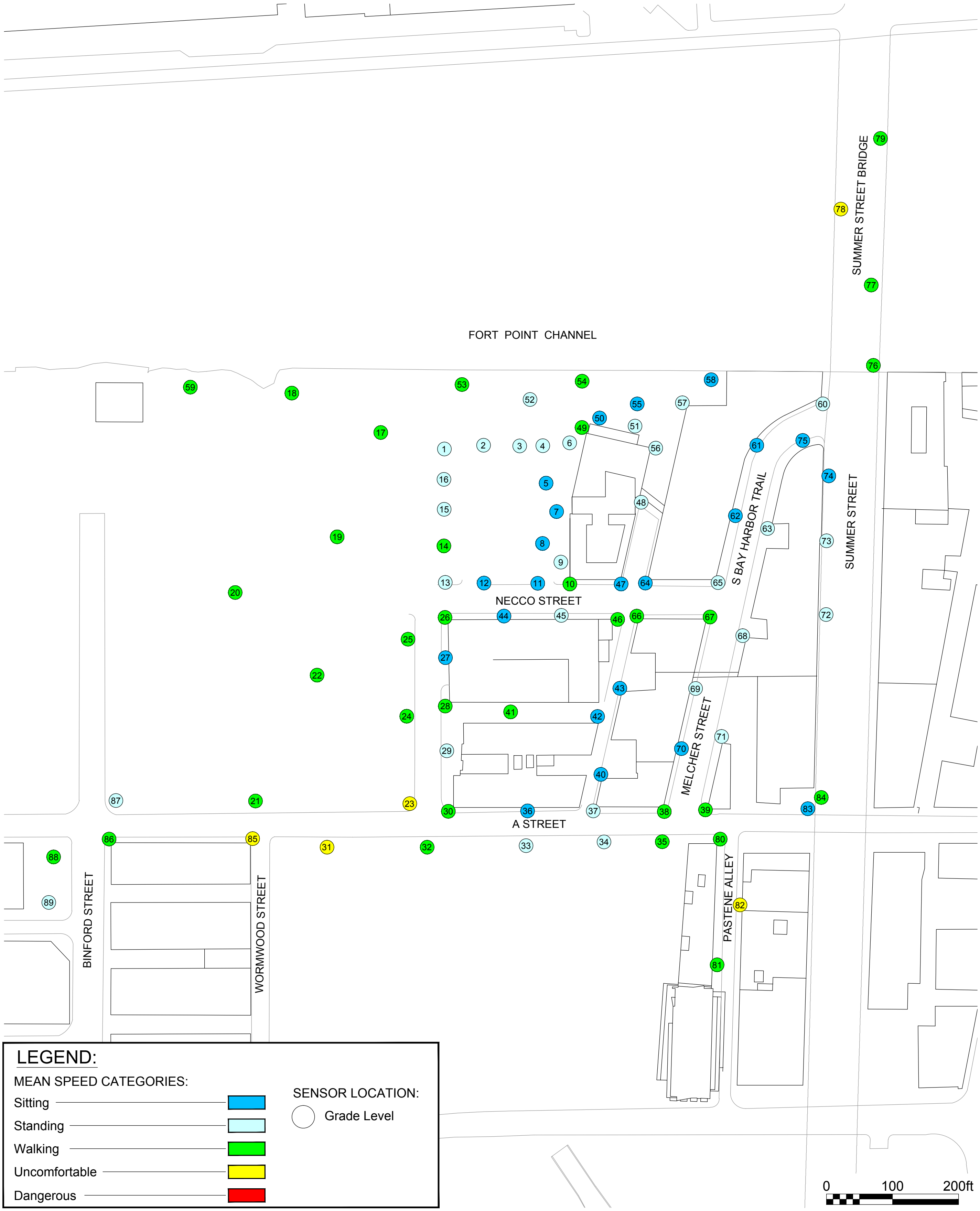
GE Boston Headquarters – Boston, Massachusetts

Project #1602325

Figure No. 2

Date: July 27, 2016

RWDI



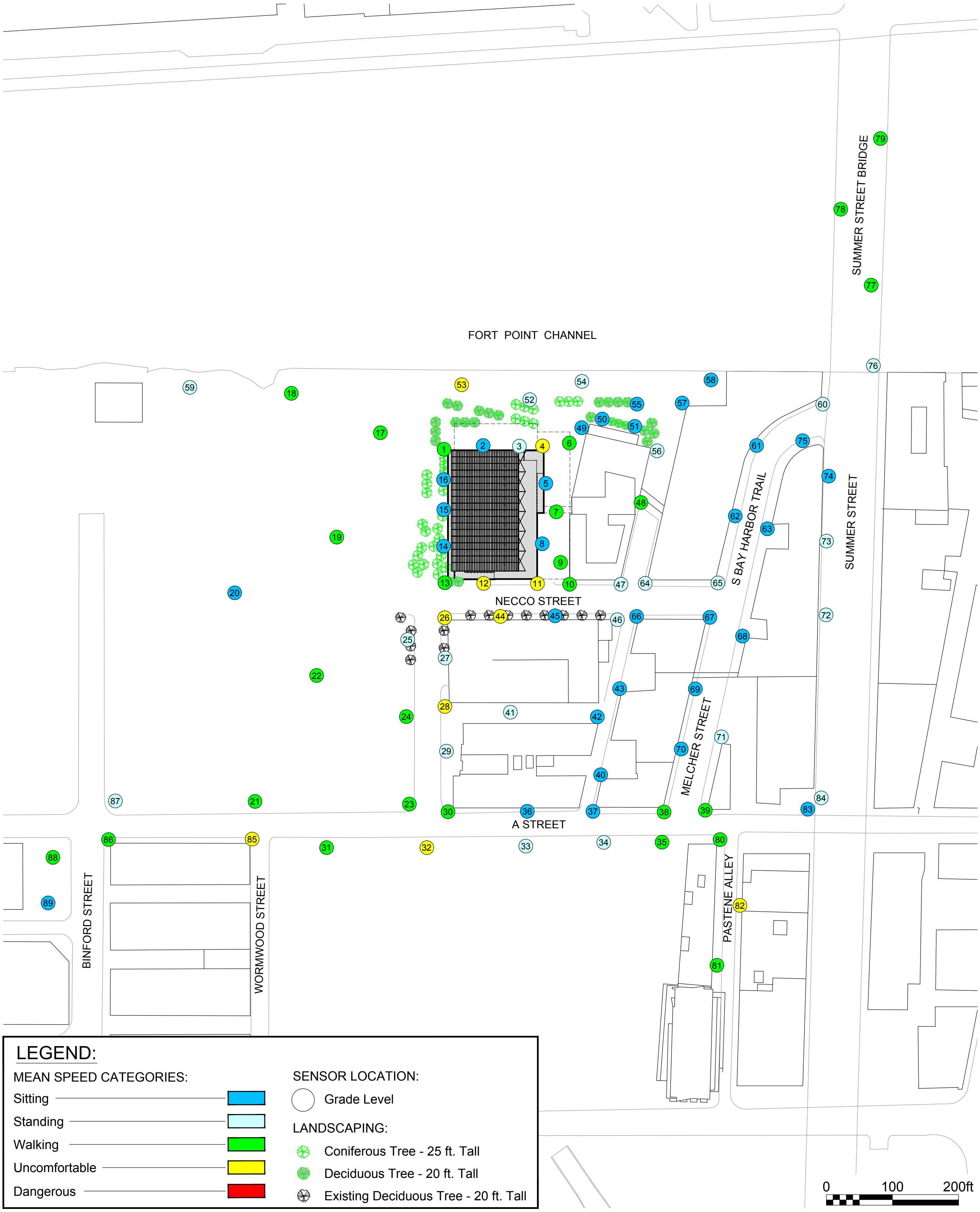
Pedestrian Wind Conditions - Mean Speed - No Build
Annual (January to December)

True North

GE Boston Headquarters - Boston, Massachusetts

Project #1602325

Drawn by: ESM	Figure: 3a	RWDI
Approx. Scale: 1"=200'		
Date Revised: July 27, 2016		



Pedestrian Wind Conditions - Mean Speed Build Annual (January to December)	Drawn by: ESM	Figure: 3b
True North	Approx. Scale:	1"=200'
GE Boston Headquarters - Boston, Massachusetts / Project #1602325	Date Revised:	July 27, 2016

RWDI

LEGEND:

EFFECTIVE GUST CATEGORIES:

Acceptable

Unacceptable

SENSOR LOCATION:

Grade Level

Pedestrian Wind Conditions - Effective Gust - No Build

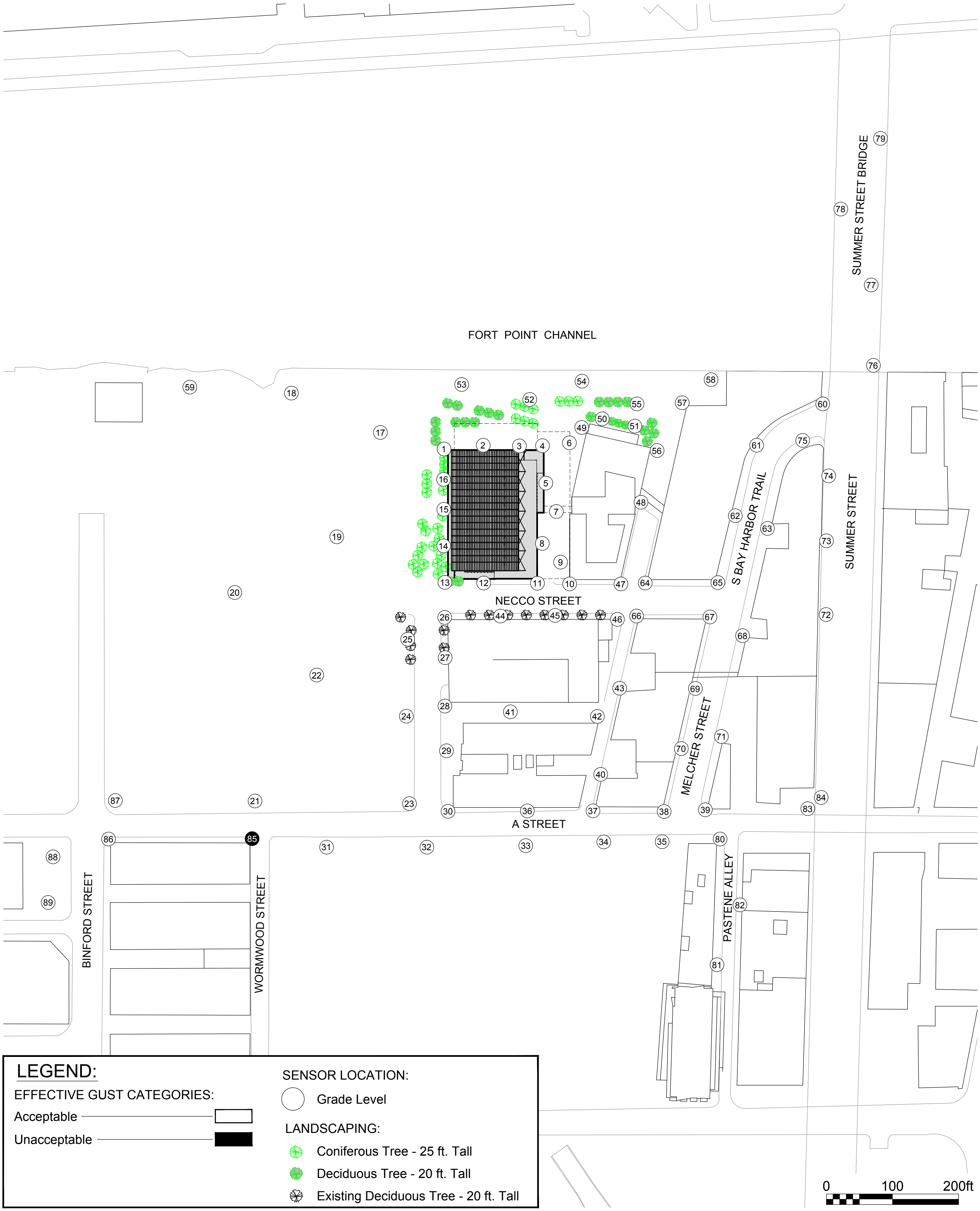
Annual (January to December)

GE Boston Headquarters - Boston, Massachusetts

True North

Project #1602325

Drawn by: ESM	Figure: 4a
Approx. Scale:	1"=200'
Date Revised:	July 27, 2016



Pedestrian Wind Conditions - Effective Gust Build Annual (January to December) GE Boston Headquarters - Boston, Massachusetts	True North Project #1602325	Drawn by: ESM	Figure: 4b
		Approx. Scale:	1"=200'
		Date Revised:	July 27, 2016

RWDI

TABLES

Table 1: Mean Speed and Effective Gust Categories - Multiple Seasons

BRA Criteria			Mean Wind Speed			Effective Gust Wind Speed		
Loc.	Config.	Season	Speed(mph)		RATING	Speed(mph)		RATING
1	A	Spring	15		Standing	22		Acceptable
		Summer	12		Sitting	17		Acceptable
		Fall	14		Standing	21		Acceptable
		Winter	16		Walking	23		Acceptable
		Annual	15		Standing	21		Acceptable
	B	Spring	18	+20%	Walking	26	+18%	Acceptable
		Summer	14	+17%	Standing	20	+18%	Acceptable
		Fall	16	+14%	Walking	24	+14%	Acceptable
		Winter	19	+19%	Walking	28	+22%	Acceptable
		Annual	17	+13%	Walking	26	+24%	Acceptable
2	A	Spring	15		Standing	22		Acceptable
		Summer	12		Sitting	17		Acceptable
		Fall	14		Standing	21		Acceptable
		Winter	15		Standing	23		Acceptable
		Annual	14		Standing	21		Acceptable
	B	Spring	12	-20%	Sitting	19	-14%	Acceptable
		Summer	10	-17%	Sitting	16		Acceptable
		Fall	12	-14%	Sitting	18	-14%	Acceptable
		Winter	13	-13%	Standing	20	-13%	Acceptable
		Annual	12	-14%	Sitting	18	-14%	Acceptable
3	A	Spring	15		Standing	21		Acceptable
		Summer	11		Sitting	17		Acceptable
		Fall	14		Standing	20		Acceptable
		Winter	15		Standing	22		Acceptable
		Annual	14		Standing	21		Acceptable
	B	Spring	16		Walking	24	+14%	Acceptable
		Summer	14	+27%	Standing	21	+24%	Acceptable
		Fall	15		Standing	23	+15%	Acceptable
		Winter	17	+13%	Walking	26	+18%	Acceptable
		Annual	15		Standing	24	+14%	Acceptable
4	A	Spring	13		Standing	20		Acceptable
		Summer	10		Sitting	16		Acceptable
		Fall	12		Sitting	19		Acceptable
		Winter	14		Standing	22		Acceptable
		Annual	13		Standing	20		Acceptable
	B	Spring	20	+54%	Uncomfortable	28	+40%	Acceptable
		Summer	17	+70%	Walking	24	+50%	Acceptable
		Fall	19	+58%	Walking	27	+42%	Acceptable
		Winter	23	+64%	Uncomfortable	31	+41%	Acceptable
		Annual	20	+54%	Uncomfortable	28	+40%	Acceptable

Notes:
1) Wind speeds are for a 1% probability of exceedance; and,
2) % Change is based on comparison with Configuration C and only those that are greater than 10% are listed.

Configuration	Mean Wind Speed Criteria		Effective Gust Criteria	
A – No Build;	Comfortable for Sitting:	≤ 12 mph	Acceptable:	≤ 31 mph
B – Build;	Comfortable for Standing:	> 12 and ≤ 15 mph	Unacceptable:	> 31 mph
	Comfortable for Walking:	> 15 and ≤ 19 mph		
	Uncomfortable for Walking:	> 19 and ≤ 27 mph		
	Dangerous Conditions:	> 27 mph		

Table 1: Mean Speed and Effective Gust Categories - Multiple Seasons

BRA Criteria			Mean Wind Speed			Effective Gust Wind Speed		
Loc.	Config.	Season	Speed(mph)		RATING	Speed(mph)		RATING
5	A	Spring	11		Sitting	18		Acceptable
		Summer	9		Sitting	14		Acceptable
		Fall	10		Sitting	17		Acceptable
		Winter	12		Sitting	19		Acceptable
		Annual	11		Sitting	17		Acceptable
	B	Spring	10		Sitting	16	-11%	Acceptable
		Summer	8	-11%	Sitting	12	-14%	Acceptable
		Fall	9		Sitting	14	-18%	Acceptable
		Winter	11		Sitting	17	-11%	Acceptable
		Annual	10		Sitting	16		Acceptable
6	A	Spring	14		Standing	21		Acceptable
		Summer	12		Sitting	18		Acceptable
		Fall	13		Standing	20		Acceptable
		Winter	14		Standing	22		Acceptable
		Annual	13		Standing	20		Acceptable
	B	Spring	20	+43%	Uncomfortable	28	+33%	Acceptable
		Summer	16	+33%	Walking	23	+28%	Acceptable
		Fall	18	+38%	Walking	26	+30%	Acceptable
		Winter	21	+50%	Uncomfortable	30	+36%	Acceptable
		Annual	19	+46%	Walking	28	+40%	Acceptable
7	A	Spring	13		Standing	21		Acceptable
		Summer	11		Sitting	18		Acceptable
		Fall	12		Sitting	20		Acceptable
		Winter	13		Standing	22		Acceptable
		Annual	12		Sitting	21		Acceptable
	B	Spring	18	+38%	Walking	26	+24%	Acceptable
		Summer	15	+36%	Standing	21	+17%	Acceptable
		Fall	17	+42%	Walking	25	+25%	Acceptable
		Winter	20	+54%	Uncomfortable	29	+32%	Acceptable
		Annual	18	+50%	Walking	26	+24%	Acceptable
8	A	Spring	10		Sitting	17		Acceptable
		Summer	8		Sitting	14		Acceptable
		Fall	10		Sitting	16		Acceptable
		Winter	11		Sitting	18		Acceptable
		Annual	10		Sitting	17		Acceptable
	B	Spring	11		Sitting	19	+12%	Acceptable
		Summer	9	+12%	Sitting	14		Acceptable
		Fall	10		Sitting	17		Acceptable
		Winter	12		Sitting	19		Acceptable
		Annual	11		Sitting	18		Acceptable

Notes: 1) Wind speeds are for a 1% probability of exceedance; and,
2) % Change is based on comparison with Configuration C and only those that are greater than 10% are listed.

<u>Configuration</u>

A – No Build;
B – Build;

<u>Mean Wind Speed Criteria</u>

Comfortable for Sitting: ≤ 12 mph
Comfortable for Standing: > 12 and ≤ 15 mph
Comfortable for Walking: > 15 and ≤ 19 mph
Uncomfortable for Walking: > 19 and ≤ 27 mph
Dangerous Conditions: > 27 mph

<u>Effective Gust Criteria</u>

Acceptable: ≤ 31 mph
Unacceptable: > 31 mph

CONSULTING ENGINEERS & SCIENTISTS

Table 1: Mean Speed and Effective Gust Categories - Multiple Seasons

BRA Criteria			Mean Wind Speed			Effective Gust Wind Speed		
Loc.	Config.	Season	Speed(mph)		RATING	Speed(mph)		RATING
9	A	Spring	13		Standing	21		Acceptable
		Summer	12		Sitting	18		Acceptable
		Fall	13		Standing	20		Acceptable
		Winter	14		Standing	22		Acceptable
		Annual	13		Standing	20		Acceptable
	B	Spring	19	+46%	Walking	27	+29%	Acceptable
		Summer	16	+33%	Walking	22	+22%	Acceptable
		Fall	18	+38%	Walking	26	+30%	Acceptable
		Winter	19	+36%	Walking	27	+23%	Acceptable
		Annual	18	+38%	Walking	26	+30%	Acceptable
10	A	Spring	18		Walking	25		Acceptable
		Summer	16		Walking	22		Acceptable
		Fall	17		Walking	24		Acceptable
		Winter	19		Walking	27		Acceptable
		Annual	18		Walking	25		Acceptable
	B	Spring	22	+22%	Uncomfortable	31	+24%	Acceptable
		Summer	15		Standing	21		Acceptable
		Fall	20	+18%	Uncomfortable	28	+17%	Acceptable
		Winter	20		Uncomfortable	29		Acceptable
		Annual	19		Walking	28	+12%	Acceptable
11	A	Spring	13		Standing	19		Acceptable
		Summer	11		Sitting	16		Acceptable
		Fall	12		Sitting	18		Acceptable
		Winter	13		Standing	20		Acceptable
		Annual	12		Sitting	19		Acceptable
	B	Spring	22	+69%	Uncomfortable	32	+68%	Unacceptable
		Summer	16	+45%	Walking	23	+44%	Acceptable
		Fall	21	+75%	Uncomfortable	30	+67%	Acceptable
		Winter	21	+62%	Uncomfortable	31	+55%	Acceptable
		Annual	20	+67%	Uncomfortable	29	+53%	Acceptable
12	A	Spring	13		Standing	21		Acceptable
		Summer	12		Sitting	18		Acceptable
		Fall	12		Sitting	19		Acceptable
		Winter	13		Standing	20		Acceptable
		Annual	12		Sitting	20		Acceptable
	B	Spring	21	+62%	Uncomfortable	29	+38%	Acceptable
		Summer	17	+42%	Walking	24	+33%	Acceptable
		Fall	20	+67%	Uncomfortable	27	+42%	Acceptable
		Winter	21	+62%	Uncomfortable	29	+45%	Acceptable
		Annual	20	+67%	Uncomfortable	27	+35%	Acceptable

Notes: 1) Wind speeds are for a 1% probability of exceedance; and,
2) % Change is based on comparison with Configuration C and only those that are greater than 10% are listed.

Configuration

A – No Build;
B – Build;

Mean Wind Speed Criteria

Comfortable for Sitting: ≤ 12 mph
Comfortable for Standing: > 12 and ≤ 15 mph
Comfortable for Walking: > 15 and ≤ 19 mph
Uncomfortable for Walking: > 19 and ≤ 27 mph
Dangerous Conditions: > 27 mph

Effective Gust Criteria

Acceptable: ≤ 31 mph
Unacceptable: > 31 mph

Table 1: Mean Speed and Effective Gust Categories - Multiple Seasons

BRA Criteria			Mean Wind Speed			Effective Gust Wind Speed		
Loc.	Config.	Season	Speed(mph)		RATING	Speed(mph)		RATING
13	A	Spring	16		Walking	23		Acceptable
		Summer	14		Standing	20		Acceptable
		Fall	15		Standing	22		Acceptable
		Winter	15		Standing	23		Acceptable
		Annual	15		Standing	22		Acceptable
	B	Spring	19	+19%	Walking	27	+17%	Acceptable
		Summer	16	+14%	Walking	21		Acceptable
		Fall	18	+20%	Walking	25	+14%	Acceptable
		Winter	20	+33%	Uncomfortable	27	+17%	Acceptable
		Annual	18	+20%	Walking	26	+18%	Acceptable
14	A	Spring	15		Walking	22		Acceptable
		Summer	13		Standing	19		Acceptable
		Fall	15		Walking	21		Acceptable
		Winter	15		Walking	23		Acceptable
		Annual	16		Walking	22		Acceptable
	B	Spring	12		Sitting	18		Acceptable
		Summer	10		Sitting	15		Acceptable
		Fall	10	-17%	Sitting	16	-11%	Acceptable
		Winter	12	-14%	Sitting	18		Acceptable
		Annual	11	-15%	Sitting	17		Acceptable
15	A	Spring	14		Standing	21		Acceptable
		Summer	12		Sitting	17		Acceptable
		Fall	14		Standing	20		Acceptable
		Winter	15		Standing	23		Acceptable
		Annual	14		Standing	21		Acceptable
	B	Spring	7	-50%	Sitting	11	-48%	Acceptable
		Summer	6	-50%	Sitting	9	-47%	Acceptable
		Fall	6	-57%	Sitting	10	-50%	Acceptable
		Winter	7	-53%	Sitting	12	-48%	Acceptable
		Annual	7	-50%	Sitting	11	-48%	Acceptable
16	A	Spring	15		Standing	22		Acceptable
		Summer	12		Sitting	18		Acceptable
		Fall	14		Standing	21		Acceptable
		Winter	16		Walking	23		Acceptable
		Annual	15		Standing	21		Acceptable
	B	Spring	6	-60%	Sitting	9	-59%	Acceptable
		Summer	5	-58%	Sitting	8	-56%	Acceptable
		Fall	5	-64%	Sitting	9	-57%	Acceptable
		Winter	6	-62%	Sitting	10	-57%	Acceptable
		Annual	6	-60%	Sitting	9	-57%	Acceptable

Notes: 1) Wind speeds are for a 1% probability of exceedance; and,
2) % Change is based on comparison with Configuration C and only those that are greater than 10% are listed.

Configuration

A – No Build;
B – Build;

Mean Wind Speed Criteria

Comfortable for Sitting:	≤ 12 mph
Comfortable for Standing:	> 12 and ≤ 15 mph
Comfortable for Walking:	> 15 and ≤ 19 mph
Uncomfortable for Walking:	> 19 and ≤ 27 mph
Dangerous Conditions:	> 27 mph

Effective Gust Criteria

Acceptable:	≤ 31 mph
Unacceptable:	> 31 mph

Table 1: Mean Speed and Effective Gust Categories - Multiple Seasons

BRA Criteria			Mean Wind Speed			Effective Gust Wind Speed		
Loc.	Config.	Season	Speed(mph)		RATING	Speed(mph)		RATING
17	A	Spring	17		Walking	24		Acceptable
		Summer	14		Standing	19		Acceptable
		Fall	16		Walking	23		Acceptable
		Winter	17		Walking	25		Acceptable
		Annual	16		Walking	23		Acceptable
	B	Spring	16		Walking	24		Acceptable
		Summer	13		Standing	19		Acceptable
		Fall	15		Standing	23		Acceptable
		Winter	17		Walking	25		Acceptable
		Annual	16		Walking	23		Acceptable
18	A	Spring	18		Walking	25		Acceptable
		Summer	14		Standing	19		Acceptable
		Fall	17		Walking	24		Acceptable
		Winter	19		Walking	27		Acceptable
		Annual	17		Walking	24		Acceptable
	B	Spring	17		Walking	24		Acceptable
		Summer	13		Standing	19		Acceptable
		Fall	16		Walking	23		Acceptable
		Winter	18		Walking	26		Acceptable
		Annual	16		Walking	24		Acceptable
19	A	Spring	16		Walking	24		Acceptable
		Summer	13		Standing	19		Acceptable
		Fall	16		Walking	22		Acceptable
		Winter	18		Walking	26		Acceptable
		Annual	16		Walking	23		Acceptable
	B	Spring	17		Walking	26		Acceptable
		Summer	13		Standing	19		Acceptable
		Fall	16		Walking	24		Acceptable
		Winter	19		Walking	27		Acceptable
		Annual	17		Walking	25		Acceptable
20	A	Spring	18		Walking	25		Acceptable
		Summer	14		Standing	20		Acceptable
		Fall	17		Walking	23		Acceptable
		Winter	20		Uncomfortable	27		Acceptable
		Annual	18		Walking	25		Acceptable
	B	Spring	13	-28%	Standing	21	-16%	Acceptable
		Summer	10	-29%	Sitting	16	-20%	Acceptable
		Fall	12	-29%	Sitting	19	-17%	Acceptable
		Winter	13	-35%	Standing	22	-19%	Acceptable
		Annual	12	-33%	Sitting	20	-20%	Acceptable

Notes: 1) Wind speeds are for a 1% probability of exceedance; and,
2) % Change is based on comparison with Configuration C and only those that are greater than 10% are listed.

Configuration	Mean Wind Speed Criteria		Effective Gust Criteria	
A – No Build;	Comfortable for Sitting:	≤ 12 mph	Acceptable:	≤ 31 mph
B – Build;	Comfortable for Standing:	> 12 and ≤ 15 mph	Unacceptable:	> 31 mph
	Comfortable for Walking:	> 15 and ≤ 19 mph		
	Uncomfortable for Walking:	> 19 and ≤ 27 mph		
	Dangerous Conditions:	> 27 mph		

Table 1: Mean Speed and Effective Gust Categories - Multiple Seasons

BRA Criteria			**Mean Wind Speed**		**Effective Gust Wind Speed**	
Loc.	Config.	Season	Speed(mph)	RATING	Speed(mph)	RATING
21	A	Spring	19	Walking	26	Acceptable
		Summer	15	Standing	20	Acceptable
		Fall	17	Walking	23	Acceptable
		Winter	20	Uncomfortable	27	Acceptable
		Annual	18	Walking	24	Acceptable
	B	Spring	19	Walking	26	Acceptable
		Summer	15	Standing	20	Acceptable
		Fall	17	Walking	24	Acceptable
		Winter	19	Walking	27	Acceptable
		Annual	18	Walking	25	Acceptable
22	A	Spring	17	Walking	24	Acceptable
		Summer	14	Standing	19	Acceptable
		Fall	16	Walking	22	Acceptable
		Winter	19	Walking	27	Acceptable
		Annual	17	Walking	24	Acceptable
	B	Spring	18	Walking	25	Acceptable
		Summer	14	Standing	19	Acceptable
		Fall	17	Walking	23	Acceptable
		Winter	20	Uncomfortable	27	Acceptable
		Annual	18	Walking	24	Acceptable
23	A	Spring	20	Uncomfortable	27	Acceptable
		Summer	16	Walking	22	Acceptable
		Fall	18	Walking	25	Acceptable
		Winter	22	Uncomfortable	30	Acceptable
		Annual	20	Uncomfortable	27	Acceptable
	B	Spring	19	Walking	27	Acceptable
		Summer	16	Walking	21	Acceptable
		Fall	18	Walking	25	Acceptable
		Winter	22	Uncomfortable	29	Acceptable
		Annual	19	Walking	26	Acceptable
24	A	Spring	17	Walking	24	Acceptable
		Summer	13	Standing	19	Acceptable
		Fall	16	Walking	22	Acceptable
		Winter	19	Walking	27	Acceptable
		Annual	17	Walking	24	Acceptable
	B	Spring	16	Walking	24	Acceptable
		Summer	13	Standing	19	Acceptable
		Fall	15	Standing	22	Acceptable
		Winter	18	Walking	26	Acceptable
		Annual	16	Walking	24	Acceptable

Notes: 1) Wind speeds are for a 1% probability of exceedance; and,
2) % Change is based on comparison with Configuration C and only those that are greater than 10% are listed.

Configuration

A – No Build;
B – Build;

Mean Wind Speed Criteria

Comfortable for Sitting: ≤ 12 mph
Comfortable for Standing: > 12 and ≤ 15 mph
Comfortable for Walking: > 15 and ≤ 19 mph
Uncomfortable for Walking: > 19 and ≤ 27 mph
Dangerous Conditions: > 27 mph

Effective Gust Criteria

Acceptable: ≤ 31 mph
Unacceptable: > 31 mph

Table 1: Mean Speed and Effective Gust Categories - Multiple Seasons

BRA Criteria			Mean Wind Speed			Effective Gust Wind Speed		
Loc.	Config.	Season	Speed(mph)		RATING	Speed(mph)		RATING
25	A	Spring	17		Walking	25		Acceptable
		Summer	13		Standing	19		Acceptable
		Fall	16		Walking	23		Acceptable
		Winter	19		Walking	28		Acceptable
		Annual	17		Walking	25		Acceptable
	B	Spring	14	-18%	Standing	20	-20%	Acceptable
		Summer	11	-15%	Sitting	17	-11%	Acceptable
		Fall	13	-19%	Standing	19	-17%	Acceptable
		Winter	15	-21%	Standing	23	-18%	Acceptable
		Annual	14	-18%	Standing	20	-20%	Acceptable
26	A	Spring	16		Walking	25		Acceptable
		Summer	14		Standing	21		Acceptable
		Fall	15		Standing	24		Acceptable
		Winter	17		Walking	27		Acceptable
		Annual	16		Walking	25		Acceptable
	B	Spring	21	+31%	Uncomfortable	30	+20%	Acceptable
		Summer	17	+21%	Walking	24	+14%	Acceptable
		Fall	20	+33%	Uncomfortable	28	+17%	Acceptable
		Winter	21	+24%	Uncomfortable	30	+11%	Acceptable
		Annual	20	+25%	Uncomfortable	28	+12%	Acceptable
27	A	Spring	11		Sitting	18		Acceptable
		Summer	9		Sitting	14		Acceptable
		Fall	10		Sitting	17		Acceptable
		Winter	12		Sitting	20		Acceptable
		Annual	11		Sitting	18		Acceptable
	B	Spring	15	+36%	Standing	22	+22%	Acceptable
		Summer	12	+33%	Sitting	19	+36%	Acceptable
		Fall	14	+40%	Standing	22	+29%	Acceptable
		Winter	17	+42%	Walking	25	+25%	Acceptable
		Annual	15	+36%	Standing	22	+22%	Acceptable
28	A	Spring	17		Walking	25		Acceptable
		Summer	15		Standing	22		Acceptable
		Fall	17		Walking	25		Acceptable
		Winter	18		Walking	28		Acceptable
		Annual	17		Walking	25		Acceptable
	B	Spring	20	+18%	Uncomfortable	28	+12%	Acceptable
		Summer	18	+20%	Walking	24		Acceptable
		Fall	19	+12%	Walking	26		Acceptable
		Winter	22	+22%	Uncomfortable	30		Acceptable
		Annual	20	+18%	Uncomfortable	27		Acceptable

Notes: 1) Wind speeds are for a 1% probability of exceedance; and,
2) % Change is based on comparison with Configuration C and only those that are greater than 10% are listed.

<u>Configuration</u>

A – No Build;
B – Build;

<u>Mean Wind Speed Criteria</u>

Comfortable for Sitting: ≤ 12 mph
Comfortable for Standing: > 12 and ≤ 15 mph
Comfortable for Walking: > 15 and ≤ 19 mph
Uncomfortable for Walking: > 19 and ≤ 27 mph
Dangerous Conditions: > 27 mph

<u>Effective Gust Criteria</u>

Acceptable: ≤ 31 mph
Unacceptable: > 31 mph

Table 1: Mean Speed and Effective Gust Categories - Multiple Seasons

BRA Criteria			Mean Wind Speed			Effective Gust Wind Speed	
Loc.	Config.	Season	Speed(mph)		RATING	Speed(mph)	RATING
29	A	Spring	13		Standing	21	Acceptable
		Summer	11		Sitting	18	Acceptable
		Fall	13		Standing	20	Acceptable
		Winter	14		Standing	22	Acceptable
		Annual	13		Standing	21	Acceptable
	B	Spring	14		Standing	22	Acceptable
		Summer	11		Sitting	18	Acceptable
		Fall	13		Standing	21	Acceptable
		Winter	15		Standing	24	Acceptable
		Annual	14		Standing	22	Acceptable
30	A	Spring	19		Walking	28	Acceptable
		Summer	16		Walking	22	Acceptable
		Fall	18		Walking	26	Acceptable
		Winter	21		Uncomfortable	29	Acceptable
		Annual	19		Walking	27	Acceptable
	B	Spring	20		Uncomfortable	27	Acceptable
		Summer	17		Walking	23	Acceptable
		Fall	19		Walking	26	Acceptable
		Winter	21		Uncomfortable	29	Acceptable
		Annual	19		Walking	27	Acceptable
31	A	Spring	20		Uncomfortable	27	Acceptable
		Summer	16		Walking	21	Acceptable
		Fall	19		Walking	25	Acceptable
		Winter	23		Uncomfortable	30	Acceptable
		Annual	20		Uncomfortable	27	Acceptable
	B	Spring	19		Walking	26	Acceptable
		Summer	15		Standing	20	Acceptable
		Fall	18		Walking	24	Acceptable
		Winter	22		Uncomfortable	28	Acceptable
		Annual	19		Walking	26	Acceptable
32	A	Spring	18		Walking	26	Acceptable
		Summer	15		Standing	20	Acceptable
		Fall	17		Walking	24	Acceptable
		Winter	20		Uncomfortable	28	Acceptable
		Annual	18		Walking	25	Acceptable
	B	Spring	20	+11%	Uncomfortable	27	Acceptable
		Summer	16		Walking	22	Acceptable
		Fall	19	+12%	Walking	26	Acceptable
		Winter	22		Uncomfortable	30	Acceptable
		Annual	20	+11%	Uncomfortable	27	Acceptable

Notes: 1) Wind speeds are for a 1% probability of exceedance; and,
2) % Change is based on comparison with Configuration C and only those that are greater than 10% are listed.

Configuration

A – No Build;
B – Build;

Mean Wind Speed Criteria

Comfortable for Sitting:	≤ 12 mph
Comfortable for Standing:	> 12 and ≤ 15 mph
Comfortable for Walking:	> 15 and ≤ 19 mph
Uncomfortable for Walking:	> 19 and ≤ 27 mph
Dangerous Conditions:	> 27 mph

Effective Gust Criteria

Acceptable:	≤ 31 mph
Unacceptable:	> 31 mph

Table 1: Mean Speed and Effective Gust Categories - Multiple Seasons

BRA Criteria			Mean Wind Speed			Effective Gust Wind Speed	
Loc.	Config.	Season	Speed(mph)		RATING	Speed(mph)	RATING
33	A	Spring	15		Standing	24	Acceptable
		Summer	11		Sitting	18	Acceptable
		Fall	14		Standing	22	Acceptable
		Winter	14		Standing	23	Acceptable
		Annual	13		Standing	22	Acceptable
	B	Spring	14		Standing	23	Acceptable
		Summer	11		Sitting	17	Acceptable
		Fall	13		Standing	21	Acceptable
		Winter	14		Standing	22	Acceptable
		Annual	13		Standing	21	Acceptable
34	A	Spring	15		Standing	23	Acceptable
		Summer	11		Sitting	18	Acceptable
		Fall	14		Standing	21	Acceptable
		Winter	15		Standing	23	Acceptable
		Annual	14		Standing	21	Acceptable
	B	Spring	14		Standing	22	Acceptable
		Summer	11		Sitting	17	Acceptable
		Fall	13		Standing	21	Acceptable
		Winter	14		Standing	23	Acceptable
		Annual	13		Standing	21	Acceptable
35	A	Spring	18		Walking	26	Acceptable
		Summer	15		Standing	21	Acceptable
		Fall	17		Walking	25	Acceptable
		Winter	19		Walking	27	Acceptable
		Annual	17		Walking	25	Acceptable
	B	Spring	18		Walking	26	Acceptable
		Summer	15		Standing	21	Acceptable
		Fall	17		Walking	24	Acceptable
		Winter	18		Walking	26	Acceptable
		Annual	17		Walking	25	Acceptable
36	A	Spring	11		Sitting	19	Acceptable
		Summer	8		Sitting	14	Acceptable
		Fall	10		Sitting	17	Acceptable
		Winter	10		Sitting	18	Acceptable
		Annual	10		Sitting	17	Acceptable
	B	Spring	11		Sitting	18	Acceptable
		Summer	9	+12%	Sitting	14	Acceptable
		Fall	10		Sitting	17	Acceptable
		Winter	11		Sitting	18	Acceptable
		Annual	10		Sitting	17	Acceptable

Notes:
1) Wind speeds are for a 1% probability of exceedance; and,
2) % Change is based on comparison with Configuration C and only those that are greater than 10% are listed.

<u>Configuration</u>

A – No Build;
B – Build;

<u>Mean Wind Speed Criteria</u>

Comfortable for Sitting:	≤ 12 mph
Comfortable for Standing:	> 12 and ≤ 15 mph
Comfortable for Walking:	> 15 and ≤ 19 mph
Uncomfortable for Walking:	> 19 and ≤ 27 mph
Dangerous Conditions:	> 27 mph

<u>Effective Gust Criteria</u>

Acceptable:	≤ 31 mph
Unacceptable:	> 31 mph

Table 1: Mean Speed and Effective Gust Categories - Multiple Seasons

BRA Criteria			Mean Wind Speed			Effective Gust Wind Speed		
Loc.	Config.	Season	Speed(mph)		RATING	Speed(mph)		RATING
37	A	Spring	14		Standing	20		Acceptable
		Summer	11		Sitting	16		Acceptable
		Fall	13		Standing	19		Acceptable
		Winter	14		Standing	21		Acceptable
		Annual	13		Standing	19		Acceptable
	B	Spring	12	-14%	Sitting	19		Acceptable
		Summer	10		Sitting	15		Acceptable
		Fall	12		Sitting	18		Acceptable
		Winter	13		Standing	20		Acceptable
		Annual	12		Sitting	18		Acceptable
38	A	Spring	19		Walking	26		Acceptable
		Summer	16		Walking	21		Acceptable
		Fall	18		Walking	25		Acceptable
		Winter	19		Walking	26		Acceptable
		Annual	18		Walking	25		Acceptable
	B	Spring	20		Uncomfortable	27		Acceptable
		Summer	17		Walking	22		Acceptable
		Fall	19		Walking	25		Acceptable
		Winter	20		Uncomfortable	27		Acceptable
		Annual	19		Walking	25		Acceptable
39	A	Spring	18		Walking	25		Acceptable
		Summer	14		Standing	20		Acceptable
		Fall	16		Walking	24		Acceptable
		Winter	17		Walking	25		Acceptable
		Annual	16		Walking	24		Acceptable
	B	Spring	17		Walking	25		Acceptable
		Summer	14		Standing	21		Acceptable
		Fall	16		Walking	24		Acceptable
		Winter	17		Walking	25		Acceptable
		Annual	16		Walking	24		Acceptable
40	A	Spring	12		Sitting	20		Acceptable
		Summer	10		Sitting	15		Acceptable
		Fall	12		Sitting	18		Acceptable
		Winter	13		Standing	21		Acceptable
		Annual	12		Sitting	19		Acceptable
	B	Spring	11		Sitting	18		Acceptable
		Summer	9		Sitting	14		Acceptable
		Fall	10	-17%	Sitting	17		Acceptable
		Winter	11	-15%	Sitting	19		Acceptable
		Annual	10	-17%	Sitting	17	-11%	Acceptable

Notes: 1) Wind speeds are for a 1% probability of exceedance; and,
2) % Change is based on comparison with Configuration C and only those that are greater than 10% are listed.

Configuration	Mean Wind Speed Criteria		Effective Gust Criteria	
A – No Build;	Comfortable for Sitting:	≤ 12 mph	Acceptable:	≤ 31 mph
B – Build;	Comfortable for Standing:	> 12 and ≤ 15 mph	Unacceptable:	> 31 mph
	Comfortable for Walking:	> 15 and ≤ 19 mph		
	Uncomfortable for Walking:	> 19 and ≤ 27 mph		
	Dangerous Conditions:	> 27 mph		

Table 1: Mean Speed and Effective Gust Categories - Multiple Seasons

BRA Criteria			Mean Wind Speed			Effective Gust Wind Speed		
Loc.	Config.	Season	Speed(mph)		RATING	Speed(mph)		RATING
41	A	Spring	17		Walking	24		Acceptable
		Summer	14		Standing	20		Acceptable
		Fall	16		Walking	23		Acceptable
		Winter	16		Walking	23		Acceptable
		Annual	16		Walking	23		Acceptable
	B	Spring	16		Walking	23		Acceptable
		Summer	14		Standing	20		Acceptable
		Fall	15		Standing	22		Acceptable
		Winter	15		Standing	23		Acceptable
		Annual	15		Standing	22		Acceptable
42	A	Spring	11		Sitting	18		Acceptable
		Summer	10		Sitting	16		Acceptable
		Fall	11		Sitting	17		Acceptable
		Winter	12		Sitting	19		Acceptable
		Annual	11		Sitting	18		Acceptable
	B	Spring	10		Sitting	17		Acceptable
		Summer	9		Sitting	15		Acceptable
		Fall	10		Sitting	16		Acceptable
		Winter	11		Sitting	18		Acceptable
		Annual	10		Sitting	17		Acceptable
43	A	Spring	11		Sitting	17		Acceptable
		Summer	9		Sitting	14		Acceptable
		Fall	10		Sitting	16		Acceptable
		Winter	11		Sitting	18		Acceptable
		Annual	10		Sitting	17		Acceptable
	B	Spring	10		Sitting	16		Acceptable
		Summer	9		Sitting	14		Acceptable
		Fall	10		Sitting	16		Acceptable
		Winter	11		Sitting	17		Acceptable
		Annual	10		Sitting	16		Acceptable
44	A	Spring	11		Sitting	18		Acceptable
		Summer	10		Sitting	15		Acceptable
		Fall	10		Sitting	17		Acceptable
		Winter	11		Sitting	19		Acceptable
		Annual	11		Sitting	18		Acceptable
	B	Spring	23	+109%	Uncomfortable	31	+72%	Acceptable
		Summer	19	+90%	Walking	26	+73%	Acceptable
		Fall	21	+110%	Uncomfortable	29	+71%	Acceptable
		Winter	23	+109%	Uncomfortable	32	+68%	Unacceptable
		Annual	22	+100%	Uncomfortable	30	+67%	Acceptable

Notes: 1) Wind speeds are for a 1% probability of exceedance; and,
2) % Change is based on comparison with Configuration C and only those that are greater than 10% are listed.

Configuration	Mean Wind Speed Criteria		Effective Gust Criteria	
A – No Build;	Comfortable for Sitting:	≤ 12 mph	Acceptable:	≤ 31 mph
B – Build;	Comfortable for Standing:	> 12 and ≤ 15 mph	Unacceptable:	> 31 mph
	Comfortable for Walking:	> 15 and ≤ 19 mph		
	Uncomfortable for Walking:	> 19 and ≤ 27 mph		
	Dangerous Conditions:	> 27 mph		

Table 1: Mean Speed and Effective Gust Categories - Multiple Seasons

BRA Criteria			Mean Wind Speed			Effective Gust Wind Speed		
Loc.	Config.	Season	Speed(mph)		RATING	Speed(mph)		RATING
45	A	Spring	14		Standing	22		Acceptable
		Summer	12		Sitting	19		Acceptable
		Fall	13		Standing	21		Acceptable
		Winter	15		Standing	25		Acceptable
		Annual	14		Standing	22		Acceptable
	B	Spring	12	-14%	Sitting	19	-14%	Acceptable
		Summer	11		Sitting	16	-16%	Acceptable
		Fall	12		Sitting	18	-14%	Acceptable
		Winter	13	-13%	Standing	19	-24%	Acceptable
		Annual	12	-14%	Sitting	18	-18%	Acceptable
46	A	Spring	19		Walking	27		Acceptable
		Summer	16		Walking	23		Acceptable
		Fall	18		Walking	26		Acceptable
		Winter	22		Uncomfortable	31		Acceptable
		Annual	19		Walking	27		Acceptable
	B	Spring	16	-16%	Walking	23	-15%	Acceptable
		Summer	11	-31%	Sitting	16	-30%	Acceptable
		Fall	15	-17%	Standing	21	-19%	Acceptable
		Winter	15	-32%	Standing	22	-29%	Acceptable
		Annual	15	-21%	Standing	21	-22%	Acceptable
47	A	Spring	11		Sitting	18		Acceptable
		Summer	9		Sitting	14		Acceptable
		Fall	10		Sitting	16		Acceptable
		Winter	11		Sitting	19		Acceptable
		Annual	10		Sitting	17		Acceptable
	B	Spring	16	+45%	Walking	23	+28%	Acceptable
		Summer	14	+56%	Standing	19	+36%	Acceptable
		Fall	15	+50%	Standing	22	+38%	Acceptable
		Winter	15	+36%	Standing	22	+16%	Acceptable
		Annual	15	+50%	Standing	22	+29%	Acceptable
48	A	Spring	15		Standing	23		Acceptable
		Summer	13		Standing	20		Acceptable
		Fall	14		Standing	22		Acceptable
		Winter	15		Standing	23		Acceptable
		Annual	14		Standing	22		Acceptable
	B	Spring	17	+13%	Walking	22		Acceptable
		Summer	14		Standing	19		Acceptable
		Fall	16	+14%	Walking	21		Acceptable
		Winter	18	+20%	Walking	24		Acceptable
		Annual	17	+21%	Walking	22		Acceptable

Notes: 1) Wind speeds are for a 1% probability of exceedance; and,
2) % Change is based on comparison with Configuration C and only those that are greater than 10% are listed.

<u>Configuration</u>

A – No Build;
B – Build;

<u>Mean Wind Speed Criteria</u>

Comfortable for Sitting: ≤ 12 mph
Comfortable for Standing: > 12 and ≤ 15 mph
Comfortable for Walking: > 15 and ≤ 19 mph
Uncomfortable for Walking: > 19 and ≤ 27 mph
Dangerous Conditions: > 27 mph

<u>Effective Gust Criteria</u>

Acceptable: ≤ 31 mph
Unacceptable: > 31 mph

Table 1: Mean Speed and Effective Gust Categories - Multiple Seasons

BRA Criteria			Mean Wind Speed			Effective Gust Wind Speed		
Loc.	Config.	Season	Speed(mph)		RATING	Speed(mph)		RATING
49	A	Spring	20		Uncomfortable	28		Acceptable
		Summer	18		Walking	24		Acceptable
		Fall	19		Walking	26		Acceptable
		Winter	19		Walking	27		Acceptable
		Annual	19		Walking	26		Acceptable
	B	Spring	10	-50%	Sitting	16	-43%	Acceptable
		Summer	8	-56%	Sitting	13	-46%	Acceptable
		Fall	9	-53%	Sitting	15	-42%	Acceptable
		Winter	10	-47%	Sitting	18	-33%	Acceptable
		Annual	9	-53%	Sitting	16	-38%	Acceptable
50	A	Spring	12		Sitting	19		Acceptable
		Summer	10		Sitting	16		Acceptable
		Fall	11		Sitting	18		Acceptable
		Winter	12		Sitting	20		Acceptable
		Annual	11		Sitting	19		Acceptable
	B	Spring	9	-25%	Sitting	14	-26%	Acceptable
		Summer	7	-30%	Sitting	12	-25%	Acceptable
		Fall	8	-27%	Sitting	13	-28%	Acceptable
		Winter	9	-25%	Sitting	16	-20%	Acceptable
		Annual	8	-27%	Sitting	14	-26%	Acceptable
51	A	Spring	16		Walking	24		Acceptable
		Summer	14		Standing	22		Acceptable
		Fall	15		Standing	23		Acceptable
		Winter	16		Walking	25		Acceptable
		Annual	15		Standing	24		Acceptable
	B	Spring	8	-50%	Sitting	14	-42%	Acceptable
		Summer	6	-57%	Sitting	10	-55%	Acceptable
		Fall	7	-53%	Sitting	13	-43%	Acceptable
		Winter	8	-50%	Sitting	15	-40%	Acceptable
		Annual	8	-47%	Sitting	13	-46%	Acceptable
52	A	Spring	16		Walking	23		Acceptable
		Summer	13		Standing	18		Acceptable
		Fall	15		Standing	21		Acceptable
		Winter	16		Walking	24		Acceptable
		Annual	15		Standing	22		Acceptable
	B	Spring	15		Standing	23		Acceptable
		Summer	12		Sitting	18		Acceptable
		Fall	14		Standing	21		Acceptable
		Winter	15		Standing	23		Acceptable
		Annual	14		Standing	22		Acceptable

Notes: 1) Wind speeds are for a 1% probability of exceedance; and,
2) % Change is based on comparison with Configuration C and only those that are greater than 10% are listed.

Configuration	Mean Wind Speed Criteria		Effective Gust Criteria	
A – No Build;	Comfortable for Sitting:	≤ 12 mph	Acceptable:	≤ 31 mph
B – Build;	Comfortable for Standing:	> 12 and ≤ 15 mph	Unacceptable:	> 31 mph
	Comfortable for Walking:	> 15 and ≤ 19 mph		
	Uncomfortable for Walking:	> 19 and ≤ 27 mph		
	Dangerous Conditions:	> 27 mph		

Table 1: Mean Speed and Effective Gust Categories - Multiple Seasons

BRA Criteria			**Mean Wind Speed**			**Effective Gust Wind Speed**		
Loc.	Config.	Season	Speed(mph)		RATING	Speed(mph)		RATING
53	A	Spring	18		Walking	23		Acceptable
		Summer	14		Standing	19		Acceptable
		Fall	16		Walking	22		Acceptable
		Winter	18		Walking	24		Acceptable
		Annual	17		Walking	22		Acceptable
	B	Spring	22	+22%	Uncomfortable	30	+30%	Acceptable
		Summer	18	+29%	Walking	23	+21%	Acceptable
		Fall	21	+31%	Uncomfortable	28	+27%	Acceptable
		Winter	22	+22%	Uncomfortable	29	+21%	Acceptable
		Annual	21	+24%	Uncomfortable	28	+27%	Acceptable
54	A	Spring	18		Walking	24		Acceptable
		Summer	15		Standing	20		Acceptable
		Fall	17		Walking	23		Acceptable
		Winter	17		Walking	24		Acceptable
		Annual	17		Walking	23		Acceptable
	B	Spring	14	-22%	Standing	21	-12%	Acceptable
		Summer	12	-20%	Sitting	18		Acceptable
		Fall	13	-24%	Standing	20	-13%	Acceptable
		Winter	14	-18%	Standing	22		Acceptable
		Annual	13	-24%	Standing	21		Acceptable
55	A	Spring	12		Sitting	20		Acceptable
		Summer	10		Sitting	17		Acceptable
		Fall	12		Sitting	19		Acceptable
		Winter	12		Sitting	21		Acceptable
		Annual	12		Sitting	19		Acceptable
	B	Spring	10	-17%	Sitting	17	-15%	Acceptable
		Summer	8	-20%	Sitting	14	-18%	Acceptable
		Fall	10	-17%	Sitting	16	-16%	Acceptable
		Winter	11		Sitting	19		Acceptable
		Annual	10	-17%	Sitting	17	-11%	Acceptable
56	A	Spring	14		Standing	20		Acceptable
		Summer	12		Sitting	17		Acceptable
		Fall	13		Standing	19		Acceptable
		Winter	14		Standing	21		Acceptable
		Annual	13		Standing	20		Acceptable
	B	Spring	15		Standing	21		Acceptable
		Summer	13		Standing	18		Acceptable
		Fall	15	+15%	Standing	20		Acceptable
		Winter	16	+14%	Walking	22		Acceptable
		Annual	15	+15%	Standing	21		Acceptable

Notes:
1) Wind speeds are for a 1% probability of exceedance; and,
2) % Change is based on comparison with Configuration C and only those that are greater than 10% are listed.

<u>Configuration</u>

A – No Build;
B – Build;

<u>Mean Wind Speed Criteria</u>

Comfortable for Sitting:	≤ 12 mph
Comfortable for Standing:	> 12 and ≤ 15 mph
Comfortable for Walking:	> 15 and ≤ 19 mph
Uncomfortable for Walking:	> 19 and ≤ 27 mph
Dangerous Conditions:	> 27 mph

<u>Effective Gust Criteria</u>

Acceptable:	≤ 31 mph
Unacceptable:	> 31 mph

Table 1: Mean Speed and Effective Gust Categories - Multiple Seasons

BRA Criteria			**Mean Wind Speed**			**Effective Gust Wind Speed**		
Loc.	Config.	Season	Speed(mph)		RATING	Speed(mph)		RATING
57	A	Spring	14		Standing	22		Acceptable
		Summer	11		Sitting	18		Acceptable
		Fall	13		Standing	21		Acceptable
		Winter	15		Standing	24		Acceptable
		Annual	13		Standing	22		Acceptable
	B	Spring	12	-14%	Sitting	19	-14%	Acceptable
		Summer	10		Sitting	16	-11%	Acceptable
		Fall	11	-15%	Sitting	18	-14%	Acceptable
		Winter	12	-20%	Sitting	21	-12%	Acceptable
		Annual	11	-15%	Sitting	19	-14%	Acceptable
58	A	Spring	12		Sitting	19		Acceptable
		Summer	10		Sitting	17		Acceptable
		Fall	11		Sitting	18		Acceptable
		Winter	12		Sitting	20		Acceptable
		Annual	11		Sitting	18		Acceptable
	B	Spring	11		Sitting	18		Acceptable
		Summer	10		Sitting	15	-12%	Acceptable
		Fall	10		Sitting	17		Acceptable
		Winter	12		Sitting	19		Acceptable
		Annual	11		Sitting	18		Acceptable
59	A	Spring	17		Walking	24		Acceptable
		Summer	13		Standing	19		Acceptable
		Fall	16		Walking	22		Acceptable
		Winter	18		Walking	25		Acceptable
		Annual	16		Walking	23		Acceptable
	B	Spring	16		Walking	23		Acceptable
		Summer	12		Sitting	18		Acceptable
		Fall	15		Standing	21		Acceptable
		Winter	17		Walking	25		Acceptable
		Annual	15		Standing	22		Acceptable
60	A	Spring	15		Standing	23		Acceptable
		Summer	11		Sitting	18		Acceptable
		Fall	14		Standing	21		Acceptable
		Winter	15		Standing	25		Acceptable
		Annual	14		Standing	23		Acceptable
	B	Spring	13	-13%	Standing	22		Acceptable
		Summer	10		Sitting	17		Acceptable
		Fall	12	-14%	Sitting	20		Acceptable
		Winter	15		Standing	25		Acceptable
		Annual	13		Standing	22		Acceptable

Notes: 1) Wind speeds are for a 1% probability of exceedance; and,
2) % Change is based on comparison with Configuration C and only those that are greater than 10% are listed.

Configuration	Mean Wind Speed Criteria		Effective Gust Criteria	
A – No Build;	Comfortable for Sitting:	≤ 12 mph	Acceptable:	≤ 31 mph
B – Build;	Comfortable for Standing:	> 12 and ≤ 15 mph	Unacceptable:	> 31 mph
	Comfortable for Walking:	> 15 and ≤ 19 mph		
	Uncomfortable for Walking:	> 19 and ≤ 27 mph		
	Dangerous Conditions:	> 27 mph		

Table 1: Mean Speed and Effective Gust Categories - Multiple Seasons

BRA Criteria			**Mean Wind Speed**			**Effective Gust Wind Speed**		
Loc.	Config.	Season	Speed(mph)		RATING	Speed(mph)		RATING
61	A	Spring	9		Sitting	13		Acceptable
		Summer	8		Sitting	12		Acceptable
		Fall	8		Sitting	13		Acceptable
		Winter	9		Sitting	14		Acceptable
		Annual	9		Sitting	13		Acceptable
	B	Spring	7	-22%	Sitting	12		Acceptable
		Summer	6	-25%	Sitting	10	-17%	Acceptable
		Fall	7	-12%	Sitting	12		Acceptable
		Winter	8	-11%	Sitting	13		Acceptable
		Annual	7	-22%	Sitting	12		Acceptable
62	A	Spring	13		Standing	19		Acceptable
		Summer	9		Sitting	14		Acceptable
		Fall	11		Sitting	17		Acceptable
		Winter	12		Sitting	19		Acceptable
		Annual	12		Sitting	17		Acceptable
	B	Spring	10	-23%	Sitting	17	-11%	Acceptable
		Summer	8	-11%	Sitting	12	-14%	Acceptable
		Fall	9	-18%	Sitting	15	-12%	Acceptable
		Winter	11		Sitting	18		Acceptable
		Annual	10	-17%	Sitting	16		Acceptable
63	A	Spring	14		Standing	20		Acceptable
		Summer	11		Sitting	16		Acceptable
		Fall	13		Standing	19		Acceptable
		Winter	14		Standing	21		Acceptable
		Annual	13		Standing	19		Acceptable
	B	Spring	13		Standing	19		Acceptable
		Summer	10		Sitting	15		Acceptable
		Fall	12		Sitting	18		Acceptable
		Winter	14		Standing	21		Acceptable
		Annual	12		Sitting	19		Acceptable
64	A	Spring	11		Sitting	18		Acceptable
		Summer	9		Sitting	14		Acceptable
		Fall	10		Sitting	16		Acceptable
		Winter	12		Sitting	19		Acceptable
		Annual	11		Sitting	17		Acceptable
	B	Spring	14	+27%	Standing	20	+11%	Acceptable
		Summer	11	+22%	Sitting	16	+14%	Acceptable
		Fall	13	+30%	Standing	19	+19%	Acceptable
		Winter	14	+17%	Standing	20		Acceptable
		Annual	13	+18%	Standing	19	+12%	Acceptable

Notes:
1) Wind speeds are for a 1% probability of exceedance; and,
2) % Change is based on comparison with Configuration C and only those that are greater than 10% are listed.

<u>Configuration</u>

A – No Build;
B – Build;

<u>Mean Wind Speed Criteria</u>

Comfortable for Sitting:	≤ 12 mph
Comfortable for Standing:	> 12 and ≤ 15 mph
Comfortable for Walking:	> 15 and ≤ 19 mph
Uncomfortable for Walking:	> 19 and ≤ 27 mph
Dangerous Conditions:	> 27 mph

<u>Effective Gust Criteria</u>

Acceptable:	≤ 31 mph
Unacceptable:	> 31 mph

Table 1: Mean Speed and Effective Gust Categories - Multiple Seasons

BRA Criteria			Mean Wind Speed			Effective Gust Wind Speed		
Loc.	Config.	Season	Speed(mph)		RATING	Speed(mph)		RATING
65	A	Spring	14		Standing	21		Acceptable
		Summer	11		Sitting	17		Acceptable
		Fall	13		Standing	19		Acceptable
		Winter	14		Standing	22		Acceptable
		Annual	13		Standing	20		Acceptable
	B	Spring	15		Standing	23		Acceptable
		Summer	12		Sitting	18		Acceptable
		Fall	14		Standing	21	+11%	Acceptable
		Winter	15		Standing	24		Acceptable
		Annual	14		Standing	21		Acceptable
66	A	Spring	17		Walking	25		Acceptable
		Summer	15		Standing	21		Acceptable
		Fall	17		Walking	24		Acceptable
		Winter	19		Walking	28		Acceptable
		Annual	17		Walking	25		Acceptable
	B	Spring	13	-24%	Standing	21	-16%	Acceptable
		Summer	10	-33%	Sitting	15	-29%	Acceptable
		Fall	12	-29%	Sitting	19	-21%	Acceptable
		Winter	13	-32%	Standing	20	-29%	Acceptable
		Annual	12	-29%	Sitting	19	-24%	Acceptable
67	A	Spring	17		Walking	25		Acceptable
		Summer	13		Standing	19		Acceptable
		Fall	16		Walking	23		Acceptable
		Winter	18		Walking	26		Acceptable
		Annual	16		Walking	24		Acceptable
	B	Spring	13	-24%	Standing	20	-20%	Acceptable
		Summer	10	-23%	Sitting	15	-21%	Acceptable
		Fall	12	-25%	Sitting	18	-22%	Acceptable
		Winter	13	-28%	Standing	20	-23%	Acceptable
		Annual	12	-25%	Sitting	19	-21%	Acceptable
68	A	Spring	15		Standing	22		Acceptable
		Summer	11		Sitting	16		Acceptable
		Fall	13		Standing	19		Acceptable
		Winter	16		Walking	23		Acceptable
		Annual	14		Standing	21		Acceptable
	B	Spring	14		Standing	20		Acceptable
		Summer	11		Sitting	15		Acceptable
		Fall	13		Standing	19		Acceptable
		Winter	15		Standing	21		Acceptable
		Annual	12		Sitting	19		Acceptable

Notes: 1) Wind speeds are for a 1% probability of exceedance; and,
2) % Change is based on comparison with Configuration C and only those that are greater than 10% are listed.

<u>Configuration</u>

A – No Build;
B – Build;

<u>Mean Wind Speed Criteria</u>

Comfortable for Sitting: ≤ 12 mph
Comfortable for Standing: > 12 and ≤ 15 mph
Comfortable for Walking: > 15 and ≤ 19 mph
Uncomfortable for Walking: > 19 and ≤ 27 mph
Dangerous Conditions: > 27 mph

<u>Effective Gust Criteria</u>

Acceptable: ≤ 31 mph
Unacceptable: > 31 mph

Table 1: Mean Speed and Effective Gust Categories - Multiple Seasons

BRA Criteria			**Mean Wind Speed**			**Effective Gust Wind Speed**		
Loc.	Config.	Season	Speed(mph)		RATING	Speed(mph)		RATING
69	A	Spring	15		Standing	22		Acceptable
		Summer	12		Sitting	17		Acceptable
		Fall	14		Standing	21		Acceptable
		Winter	16		Walking	24		Acceptable
		Annual	15		Standing	21		Acceptable
	B	Spring	13	-13%	Standing	20		Acceptable
		Summer	10	-17%	Sitting	15	-12%	Acceptable
		Fall	12	-14%	Sitting	18	-14%	Acceptable
		Winter	14	-12%	Standing	21	-12%	Acceptable
		Annual	12	-20%	Sitting	19		Acceptable
70	A	Spring	9		Sitting	15		Acceptable
		Summer	7		Sitting	12		Acceptable
		Fall	8		Sitting	14		Acceptable
		Winter	9		Sitting	15		Acceptable
		Annual	9		Sitting	14		Acceptable
	B	Spring	10	+11%	Sitting	16		Acceptable
		Summer	9	+29%	Sitting	14	+17%	Acceptable
		Fall	9	+12%	Sitting	15		Acceptable
		Winter	10	+11%	Sitting	16		Acceptable
		Annual	9		Sitting	15		Acceptable
71	A	Spring	15		Standing	23		Acceptable
		Summer	12		Sitting	18		Acceptable
		Fall	14		Standing	22		Acceptable
		Winter	15		Standing	23		Acceptable
		Annual	14		Standing	22		Acceptable
	B	Spring	15		Standing	23		Acceptable
		Summer	12		Sitting	17		Acceptable
		Fall	14		Standing	21		Acceptable
		Winter	15		Standing	23		Acceptable
		Annual	14		Standing	21		Acceptable
72	A	Spring	15		Standing	21		Acceptable
		Summer	13		Standing	18		Acceptable
		Fall	15		Standing	21		Acceptable
		Winter	17		Walking	24		Acceptable
		Annual	15		Standing	21		Acceptable
	B	Spring	14		Standing	21		Acceptable
		Summer	12		Sitting	18		Acceptable
		Fall	14		Standing	20		Acceptable
		Winter	16		Walking	23		Acceptable
		Annual	14		Standing	21		Acceptable

Notes: 1) Wind speeds are for a 1% probability of exceedance; and,
2) % Change is based on comparison with Configuration C and only those that are greater than 10% are listed.

Configuration

A – No Build;
B – Build;

Mean Wind Speed Criteria

Comfortable for Sitting:	≤ 12 mph
Comfortable for Standing:	> 12 and ≤ 15 mph
Comfortable for Walking:	> 15 and ≤ 19 mph
Uncomfortable for Walking:	> 19 and ≤ 27 mph
Dangerous Conditions:	> 27 mph

Effective Gust Criteria

Acceptable:	≤ 31 mph
Unacceptable:	> 31 mph

Table 1: Mean Speed and Effective Gust Categories - Multiple Seasons

BRA Criteria			Mean Wind Speed			Effective Gust Wind Speed	
Loc.	Config.	Season	Speed(mph)		RATING	Speed(mph)	RATING
73	A	Spring	14		Standing	20	Acceptable
		Summer	12		Sitting	17	Acceptable
		Fall	13		Standing	19	Acceptable
		Winter	15		Standing	22	Acceptable
		Annual	14		Standing	20	Acceptable
	B	Spring	15		Standing	22	Acceptable
		Summer	12		Sitting	18	Acceptable
		Fall	14		Standing	20	Acceptable
		Winter	16		Walking	24	Acceptable
		Annual	15		Standing	21	Acceptable
74	A	Spring	11		Sitting	18	Acceptable
		Summer	9		Sitting	14	Acceptable
		Fall	10		Sitting	16	Acceptable
		Winter	12		Sitting	20	Acceptable
		Annual	11		Sitting	18	Acceptable
	B	Spring	12		Sitting	19	Acceptable
		Summer	9		Sitting	15	Acceptable
		Fall	11		Sitting	17	Acceptable
		Winter	13		Standing	21	Acceptable
		Annual	12		Sitting	18	Acceptable
75	A	Spring	13		Standing	21	Acceptable
		Summer	10		Sitting	16	Acceptable
		Fall	12		Sitting	19	Acceptable
		Winter	13		Standing	22	Acceptable
		Annual	12		Sitting	20	Acceptable
	B	Spring	12		Sitting	20	Acceptable
		Summer	9		Sitting	15	Acceptable
		Fall	11		Sitting	18	Acceptable
		Winter	13		Standing	23	Acceptable
		Annual	12		Sitting	20	Acceptable
76	A	Spring	17		Walking	25	Acceptable
		Summer	14		Standing	20	Acceptable
		Fall	16		Walking	23	Acceptable
		Winter	18		Walking	26	Acceptable
		Annual	17		Walking	24	Acceptable
	B	Spring	16		Walking	23	Acceptable
		Summer	13		Standing	18	Acceptable
		Fall	15		Standing	21	Acceptable
		Winter	16	-11%	Walking	24	Acceptable
		Annual	15	-12%	Standing	22	Acceptable

Notes: 1) Wind speeds are for a 1% probability of exceedance; and,
2) % Change is based on comparison with Configuration C and only those that are greater than 10% are listed.

Configuration	Mean Wind Speed Criteria		Effective Gust Criteria	
A – No Build;	Comfortable for Sitting:	≤ 12 mph	Acceptable:	≤ 31 mph
B – Build;	Comfortable for Standing:	> 12 and ≤ 15 mph	Unacceptable:	> 31 mph
	Comfortable for Walking:	> 15 and ≤ 19 mph		
	Uncomfortable for Walking:	> 19 and ≤ 27 mph		
	Dangerous Conditions:	> 27 mph		

Table 1: Mean Speed and Effective Gust Categories - Multiple Seasons

BRA Criteria			Mean Wind Speed			Effective Gust Wind Speed	
Loc.	Config.	Season	Speed(mph)		RATING	Speed(mph)	RATING
77	A	Spring	19		Walking	26	Acceptable
		Summer	16		Walking	22	Acceptable
		Fall	18		Walking	24	Acceptable
		Winter	19		Walking	26	Acceptable
		Annual	18		Walking	25	Acceptable
	B	Spring	19		Walking	25	Acceptable
		Summer	16		Walking	22	Acceptable
		Fall	18		Walking	24	Acceptable
		Winter	19		Walking	26	Acceptable
		Annual	18		Walking	25	Acceptable
78	A	Spring	21		Uncomfortable	28	Acceptable
		Summer	18		Walking	23	Acceptable
		Fall	20		Uncomfortable	26	Acceptable
		Winter	21		Uncomfortable	28	Acceptable
		Annual	20		Uncomfortable	26	Acceptable
	B	Spring	20		Uncomfortable	26	Acceptable
		Summer	16	-11%	Walking	22	Acceptable
		Fall	18		Walking	24	Acceptable
		Winter	20		Uncomfortable	26	Acceptable
		Annual	19		Walking	25	Acceptable
79	A	Spring	20		Uncomfortable	26	Acceptable
		Summer	17		Walking	22	Acceptable
		Fall	19		Walking	24	Acceptable
		Winter	20		Uncomfortable	26	Acceptable
		Annual	19		Walking	25	Acceptable
	B	Spring	19		Walking	26	Acceptable
		Summer	17		Walking	22	Acceptable
		Fall	18		Walking	24	Acceptable
		Winter	19		Walking	26	Acceptable
		Annual	18		Walking	25	Acceptable
80	A	Spring	20		Uncomfortable	28	Acceptable
		Summer	15		Standing	21	Acceptable
		Fall	18		Walking	26	Acceptable
		Winter	19		Walking	28	Acceptable
		Annual	18		Walking	26	Acceptable
	B	Spring	18		Walking	27	Acceptable
		Summer	14		Standing	20	Acceptable
		Fall	17		Walking	25	Acceptable
		Winter	18		Walking	27	Acceptable
		Annual	17		Walking	25	Acceptable

Notes: 1) Wind speeds are for a 1% probability of exceedance; and,
2) % Change is based on comparison with Configuration C and only those that are greater than 10% are listed.

Configuration	Mean Wind Speed Criteria		Effective Gust Criteria	
A – No Build;	Comfortable for Sitting:	≤ 12 mph	Acceptable:	≤ 31 mph
B – Build;	Comfortable for Standing:	> 12 and ≤ 15 mph	Unacceptable:	> 31 mph
	Comfortable for Walking:	> 15 and ≤ 19 mph		
	Uncomfortable for Walking:	> 19 and ≤ 27 mph		
	Dangerous Conditions:	> 27 mph		

Table 1: Mean Speed and Effective Gust Categories - Multiple Seasons

BRA Criteria			Mean Wind Speed			Effective Gust Wind Speed		
Loc.	Config.	Season	Speed(mph)		RATING	Speed(mph)		RATING
81	A	Spring	19		Walking	27		Acceptable
		Summer	13		Standing	19		Acceptable
		Fall	17		Walking	24		Acceptable
		Winter	17		Walking	25		Acceptable
		Annual	17		Walking	24		Acceptable
	B	Spring	21	+11%	Uncomfortable	30	+11%	Acceptable
		Summer	15	+15%	Standing	21	+11%	Acceptable
		Fall	19	+12%	Walking	27	+12%	Acceptable
		Winter	19	+12%	Walking	27		Acceptable
		Annual	19	+12%	Walking	27	+12%	Acceptable
82	A	Spring	27		Uncomfortable	34		Unacceptable
		Summer	19		Walking	24		Acceptable
		Fall	25		Uncomfortable	31		Acceptable
		Winter	26		Uncomfortable	33		Unacceptable
		Annual	24		Uncomfortable	31		Acceptable
	B	Spring	24	-11%	Uncomfortable	31		Acceptable
		Summer	17	-11%	Walking	22		Acceptable
		Fall	22	-12%	Uncomfortable	28		Acceptable
		Winter	23	-12%	Uncomfortable	30		Acceptable
		Annual	22		Uncomfortable	28		Acceptable
83	A	Spring	11		Sitting	18		Acceptable
		Summer	8		Sitting	13		Acceptable
		Fall	10		Sitting	16		Acceptable
		Winter	11		Sitting	18		Acceptable
		Annual	10		Sitting	16		Acceptable
	B	Spring	11		Sitting	18		Acceptable
		Summer	9	+12%	Sitting	13		Acceptable
		Fall	10		Sitting	15		Acceptable
		Winter	11		Sitting	18		Acceptable
		Annual	10		Sitting	16		Acceptable
84	A	Spring	17		Walking	24		Acceptable
		Summer	13		Standing	18		Acceptable
		Fall	15		Standing	22		Acceptable
		Winter	18		Walking	25		Acceptable
		Annual	16		Walking	23		Acceptable
	B	Spring	16		Walking	24		Acceptable
		Summer	12		Sitting	18		Acceptable
		Fall	15		Standing	22		Acceptable
		Winter	17		Walking	25		Acceptable
		Annual	15		Standing	23		Acceptable

Notes: 1) Wind speeds are for a 1% probability of exceedance; and,
2) % Change is based on comparison with Configuration C and only those that are greater than 10% are listed.

Configuration

A – No Build;
B – Build;

Mean Wind Speed Criteria

Comfortable for Sitting: ≤ 12 mph
Comfortable for Standing: > 12 and ≤ 15 mph
Comfortable for Walking: > 15 and ≤ 19 mph
Uncomfortable for Walking: > 19 and ≤ 27 mph
Dangerous Conditions: > 27 mph

Effective Gust Criteria

Acceptable: ≤ 31 mph
Unacceptable: > 31 mph

Table 1: Mean Speed and Effective Gust Categories - Multiple Seasons

BRA Criteria			Mean Wind Speed			Effective Gust Wind Speed	
Loc.	Config.	Season	Speed(mph)		RATING	Speed(mph)	RATING
85	A	Spring	25		Uncomfortable	34	Unacceptable
		Summer	19		Walking	26	Acceptable
		Fall	23		Uncomfortable	31	Acceptable
		Winter	27		Uncomfortable	37	Unacceptable
		Annual	25		Uncomfortable	33	Unacceptable
	B	Spring	25		Uncomfortable	34	Unacceptable
		Summer	19		Walking	26	Acceptable
		Fall	23		Uncomfortable	32	Unacceptable
		Winter	27		Uncomfortable	37	Unacceptable
		Annual	25		Uncomfortable	33	Unacceptable
86	A	Spring	18		Walking	27	Acceptable
		Summer	14		Standing	21	Acceptable
		Fall	17		Walking	25	Acceptable
		Winter	20		Uncomfortable	30	Acceptable
		Annual	18		Walking	27	Acceptable
	B	Spring	19		Walking	28	Acceptable
		Summer	17	+21%	Walking	23	Acceptable
		Fall	18		Walking	26	Acceptable
		Winter	20		Uncomfortable	29	Acceptable
		Annual	19		Walking	27	Acceptable
87	A	Spring	14		Standing	22	Acceptable
		Summer	12		Sitting	17	Acceptable
		Fall	13		Standing	20	Acceptable
		Winter	15		Standing	22	Acceptable
		Annual	14		Standing	21	Acceptable
	B	Spring	15		Standing	22	Acceptable
		Summer	12		Sitting	18	Acceptable
		Fall	14		Standing	21	Acceptable
		Winter	15		Standing	22	Acceptable
		Annual	14		Standing	21	Acceptable
88	A	Spring	19		Walking	26	Acceptable
		Summer	14		Standing	20	Acceptable
		Fall	17		Walking	24	Acceptable
		Winter	21		Uncomfortable	29	Acceptable
		Annual	18		Walking	26	Acceptable
	B	Spring	18		Walking	25	Acceptable
		Summer	14		Standing	20	Acceptable
		Fall	17		Walking	24	Acceptable
		Winter	20		Uncomfortable	28	Acceptable
		Annual	18		Walking	25	Acceptable

Notes: 1) Wind speeds are for a 1% probability of exceedance; and,
2) % Change is based on comparison with Configuration C and only those that are greater than 10% are listed.

Configuration	Mean Wind Speed Criteria		Effective Gust Criteria	
A – No Build;	Comfortable for Sitting:	≤ 12 mph	Acceptable:	≤ 31 mph
B – Build;	Comfortable for Standing:	> 12 and ≤ 15 mph	Unacceptable:	> 31 mph
	Comfortable for Walking:	> 15 and ≤ 19 mph		
	Uncomfortable for Walking:	> 19 and ≤ 27 mph		
	Dangerous Conditions:	> 27 mph		

Table 1: Mean Speed and Effective Gust Categories - Multiple Seasons

BRA Criteria			Mean Wind Speed		Effective Gust Wind Speed	
Loc.	Config.	Season	Speed(mph)	RATING	Speed(mph)	RATING
89	A	Spring	13	Standing	21	Acceptable
		Summer	10	Sitting	16	Acceptable
		Fall	12	Sitting	19	Acceptable
		Winter	14	Standing	22	Acceptable
		Annual	13	Standing	20	Acceptable
	B	Spring	13	Standing	20	Acceptable
		Summer	9	Sitting	15	Acceptable
		Fall	12	Sitting	19	Acceptable
		Winter	14	Standing	21	Acceptable
		Annual	12	Sitting	20	Acceptable

Notes: 1) Wind speeds are for a 1% probability of exceedance; and,
2) % Change is based on comparison with Configuration C and only those that are greater than 10% are listed.

Configuration	Mean Wind Speed Criteria		Effective Gust Criteria	
A – No Build;	Comfortable for Sitting:	≤ 12 mph	Acceptable:	≤ 31 mph
B – Build;	Comfortable for Standing:	> 12 and ≤ 15 mph	Unacceptable:	> 31 mph
	Comfortable for Walking:	> 15 and ≤ 19 mph		
	Uncomfortable for Walking:	> 19 and ≤ 27 mph		
	Dangerous Conditions:	> 27 mph		

APPENDIX A

APPENDIX A: DRAWING LIST FOR MODEL CONSTRUCTION

The drawings and information listed below were received from Gensler and were used to construct the scale model of the proposed GE Boston Headquarters. Should there be any design changes that deviate from this list of drawings, the results may change. Therefore, if changes in the design are made, it is recommended that RWDI be contacted and requested to review their potential effects on wind conditions.

File Name	File Type	Date Received (dd/mm/yyyy)
11.7057.000 GE HQ CORESHELL 2016	rvt.	16/5/2016
2016-07-15 SV 01	SketchUp	18/7/2016
GE-WHQ-OJB Masterbase	JPEG	18/7/2016

Solar Glare Supporting Documentation

GE Headquarters Building

Boston, MA

Reflected Sunlight Assessment

RWDI #1602325
May 30, 2016

SUBMITTED TO

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1. INTRODUCTION

This report provides the computer modelling results of reflected sunlight from the proposed GE Headquarters building in Boston. The building will be constructed adjacent to the Fort Point Channel in the Seaport District (as shown in Figure 1). It is our understanding that the development will be surrounded by typical urban spaces such as busy roadways, other buildings, museums and waterfront amenities.

RWDI has been retained to investigate the impact that solar reflections emanating from the development will have on the surrounding environment.

This report outlines the results of the analysis based on a simplified massing model of the building. The current study aims to provide a high-level understanding of how the proposed building may reflect light assuming the majority of the façades are reflective. This can be used to inform the detailed design of the façade.

As the façade design of the building finalizes, this analysis should be updated using the finalized façade geometry and material properties.

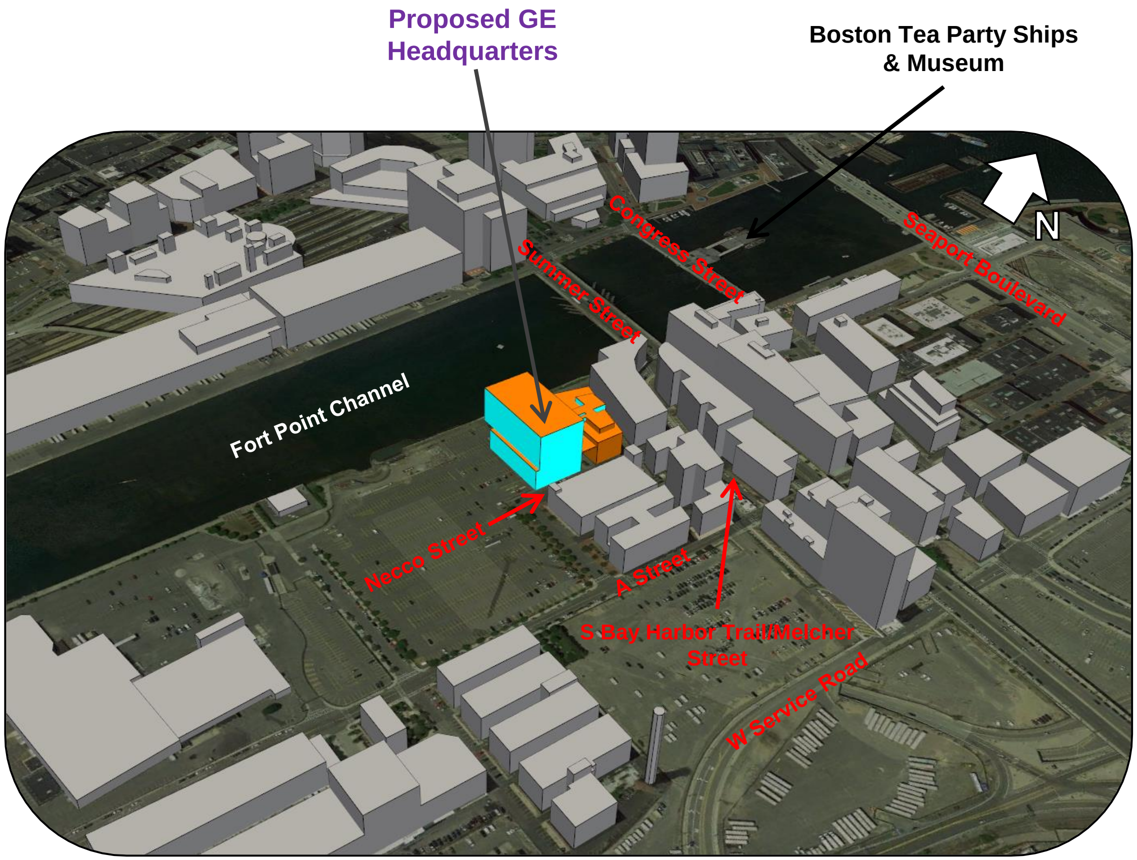


Figure 1: Proposed GE Headquarters Building

2. BACKGROUND – URBAN REFLECTIONS

It is a common experience in urban areas to occasionally experience reflected light from glass and metallic surfaces. The interactions between a building and the sun can lead to numerous visual and thermal issues.

Visual glare can:

- impair the vision of motorists and others who cannot simply look away from the source because of an important activity;
- cause nuisance to pedestrians or occupants of nearby buildings; and,
- create undesirable patterns of light throughout the urban fabric.

Heat gain can***:***

- affect human thermal comfort;
- be a safety concern for people and materials, particularly if insolation levels are high as a result of focusing of multiple reflections to a single point; and,
- alter heating and cooling loads of conditioned spaces affected by the reflections.

The most significant safety concerns with solar reflections occur with concave facades which act to focus the reflected light in a single area. In contrast, convex facades act to scatter reflections in a "pinwheel" pattern. RWDI does not expect issues with solar focusing to be present in this case because all the glazed surfaces on the tower are planar.

To quantify the impact of solar reflections from the development, it is important to understand four critical characteristics:

1. ***Frequency*** (how often glare events occur);

2. ***Duration*** (how long each instance of glare lasts);

3. ***Intensity*** (how "bright"; the events are based on a combination of solar intensity, surface size and orientation, and the distance from the point of interest); and,

4. ***Location*** (does the reflection fall on a sensitive location).

3. GENERAL METHODOLOGY

RWDI assessed the potential reflection issues using computer modelling based on RWDI's proprietary software called *Eclipse*, as per the steps outlined below:

- A 3D model of the area of interest (as shown in Figure 2) was developed and subdivided into many smaller triangular patches (see Figure 3). The reflective properties of the various surfaces were defined using the data presented in Appendix A.

- For each hour in a year, the expected solar position was determined, and "virtual rays" were drawn from the sun to each triangular patch of the 3D model. Each ray that was considered to be "unobstructed" was reflected from the building surface onto a horizontal plane called a 'Receiving Surface' just above ground level.

- This analysis used "clear sky" solar data at the location of Logan Airport. That is to say, a data set where it is assumed that no cloud cover ever occurs, which provides a "worst case" scenario showing the full extent of when and where glare could ever occur (refer to sun path diagram shown in Appendix B).

- Finally, a statistical analysis was performed to assess the frequency, and intensity of the glare events.

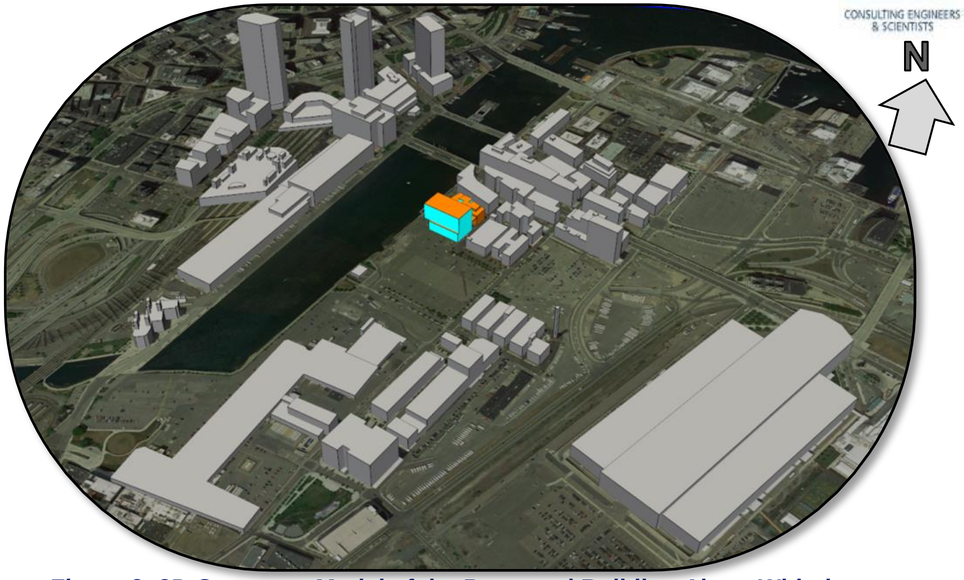


Figure 2: 3D Computer Model of the Proposed Building Along With the Surrounding Neighborhood

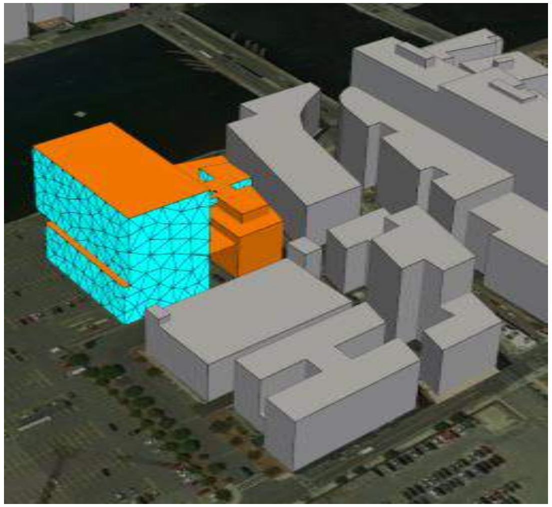


Figure 3: Close-up View of the Model, Showing Surface Subdivisions on the Facade

4. ASSUMPTIONS AND LIMITATIONS

The key assumptions and simplifications of the modelling process are discussed here.

Model

- The analysis was conducted based on the geometry provided by Gensler to RWDI on May 16, 2016. It should be noted that this study is highly dependent on building geometry, and any significant changes to the building's geometry will likely require a new analysis.
- Potential reductions of solar reflections due to the presence of vegetation, or other non-architectural obstructions, were not included.
- Only a single reflection from the development is included in the analysis. That is to say, light that has reflected off several surfaces before reaching the 'Receiving Surface' is assumed to have a negligible impact.
- Only the façade areas indicated in Figure 4 were considered as potentially reflective in the current model. Existing structures were included for shading purposes but were not considered reflective.

Glazing

- All glazed surfaces were treated as if they were the current preferred glazing, which is Viracon VRE1-59. Figure 4 shows the location of the glazing units. Further details of the reflectance values are available in Appendix A.
- It is our understanding that there are no other specular façade elements which need to be considered.
- Any light reflections from other buildings and surfaces are not accounted for.

Meteorological Data

- Irradiance levels were computed using "clear sky" solar data at the location of Logan Airport. This data uses mathematical algorithms to artificially derive solar intensity values for a given latitude and altitude, ignoring local effects such as cloud cover. For a screening calculation to assess potential risk, this is the most appropriate approach.

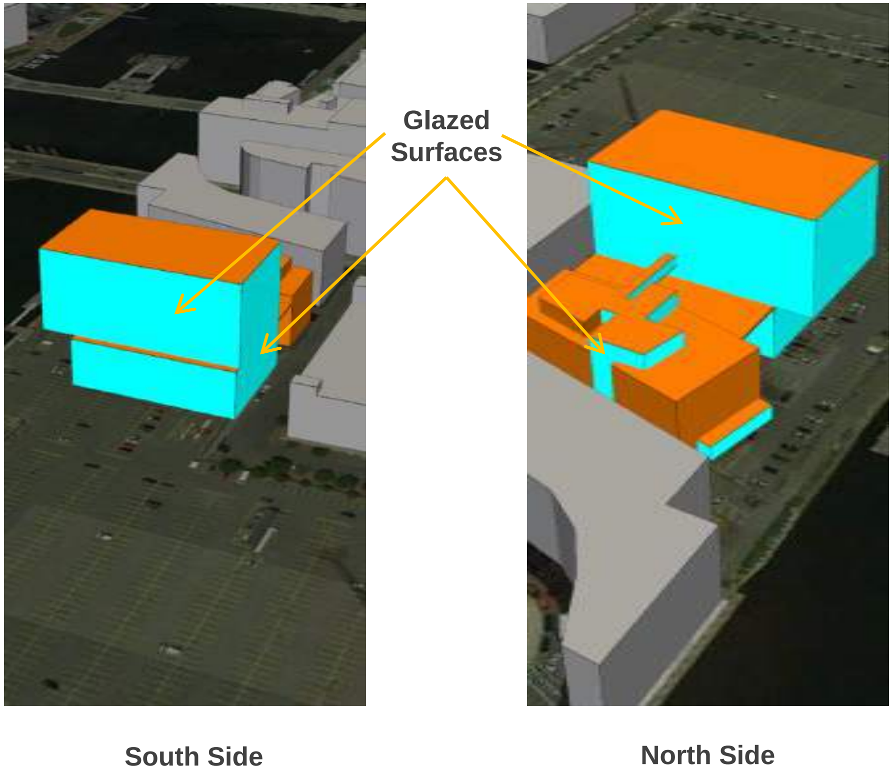


Figure 4: Location of the Glazing Surfaces (North and South Views)

5. CRITERIA – SOLAR THERMAL

Solar Focusing

Solar focusing is a phenomenon where reflections from more than one location fall on the same point. This can occur when reflection from multiple flat surfaces converge at a single point, but are more common on inward-curving (concave) facades. Although this feature is not present in this project, attention must be taken to understand the potential solar insolation levels that reflections from the buildings may create.

There are currently no existing universal criteria or standards that define an “acceptable” level of reflected solar radiation from buildings. RWDI has conducted a literature review of available scientific sources to determine levels of solar radiation we would consider acceptable to an individual in the urban realm.

Irradiance Limits – People

The National Fire Protection Association (NFPA) sets thermal radiation criteria which define a tenable environment for people exiting a fire event in building or tunnel (NFPA 130). They set the upper limit for thermal radiation at 2,500 W/m². Irradiance levels at or below this value can be tolerated for at least several minutes without significantly affecting an individual’s ability to escape from a fire event. That being said, skin damage (sun burns) and pain can occur at this 2,500 W/m² threshold. According to British fire standards[1], the onset of pain for ***bare*** skin can occur within 30 seconds at an irradiance of 2,500 W/m². This threshold closely matches the irradiance exposure guidelines published by the U.S. Federal Emergency Management Agency (FEMA), summarized in the table to the right. This table also includes the length of time required before the onset of a second degree burn due to thermal radiation. It should be noted that these numbers are guideline values only, and that in reality many factors (skin colour, age, clothing choice, etc.) influence how a person reacts to thermal radiation. For our work RWDI have established **2,500 W/m² as a ceiling exposure limit**.

Due to the public nature of the tower, the significant variability in both how individuals will respond to thermal irradiation exposure, and the fact that individuals may not fully appreciate the impact of the reflection until they are exposed, it is RWDI’s opinion that a lower threshold value may be more appropriate for human thermal comfort.

Thus, we suggest that for ground level areas where the public will be present, reflected irradiance levels should not exceed 1,500 W/m². This threshold value is a conservative one, which is based around the potential for damage to human skin, requiring several minutes of exposure before damage or discomfort potentially occurs.

For these reasons, we have applied a **short-term exposure limit of 1,500 W/m²** for our work.

Table 1: Time for Physiological Effects on Bare Skin at Specific Thermal Radiation Levels[2]

Thermal Irradiance [W/m²]	Time To Onset of Pain [s]	Time To Onset of Second Degree Burn [s]
1,000	115	663
2,000	45	187
3,000	27	92
4,000	18	57
5,000	13	40
6,000	11	30
8,000	7	20
10,000	5	14
12,000	4	11

[1] The application of fire safety engineering principles to fire safety design of buildings – Part 6: Human Factors’ PD 7974-6:2004, British Standards Institution 2004.
[2] Federal Emergency Management Agency, U.S. Department of Transportation, and U.S. Environmental Protection Agency. 1988. Handbook of Chemical Hazard Analysis Procedures. Washington, D.C.: Federal Emergency Management Agency Publications Office.

5. CRITERIA – VISUAL GLARE

To account for the high variability in how individuals experience bright light, RWDI would classify any reflection as “significant” if it is calculated to be at least 50% as intense as one that would cause temporary flash blindness (i.e. the after images visible after one sees a camera flash in a dark room).

As a reference, Figure 5 on the right illustrates where looking directly at the sun falls in terms of irradiance on the retina (on average about 8 W/cm²), and the size of the angle that the sun subtends in the sky (about 9.8 milliradians). This puts it just at the border of causing serious damage. This methodology assumes that the exposure time is equivalent to the length of an average person's blink response.

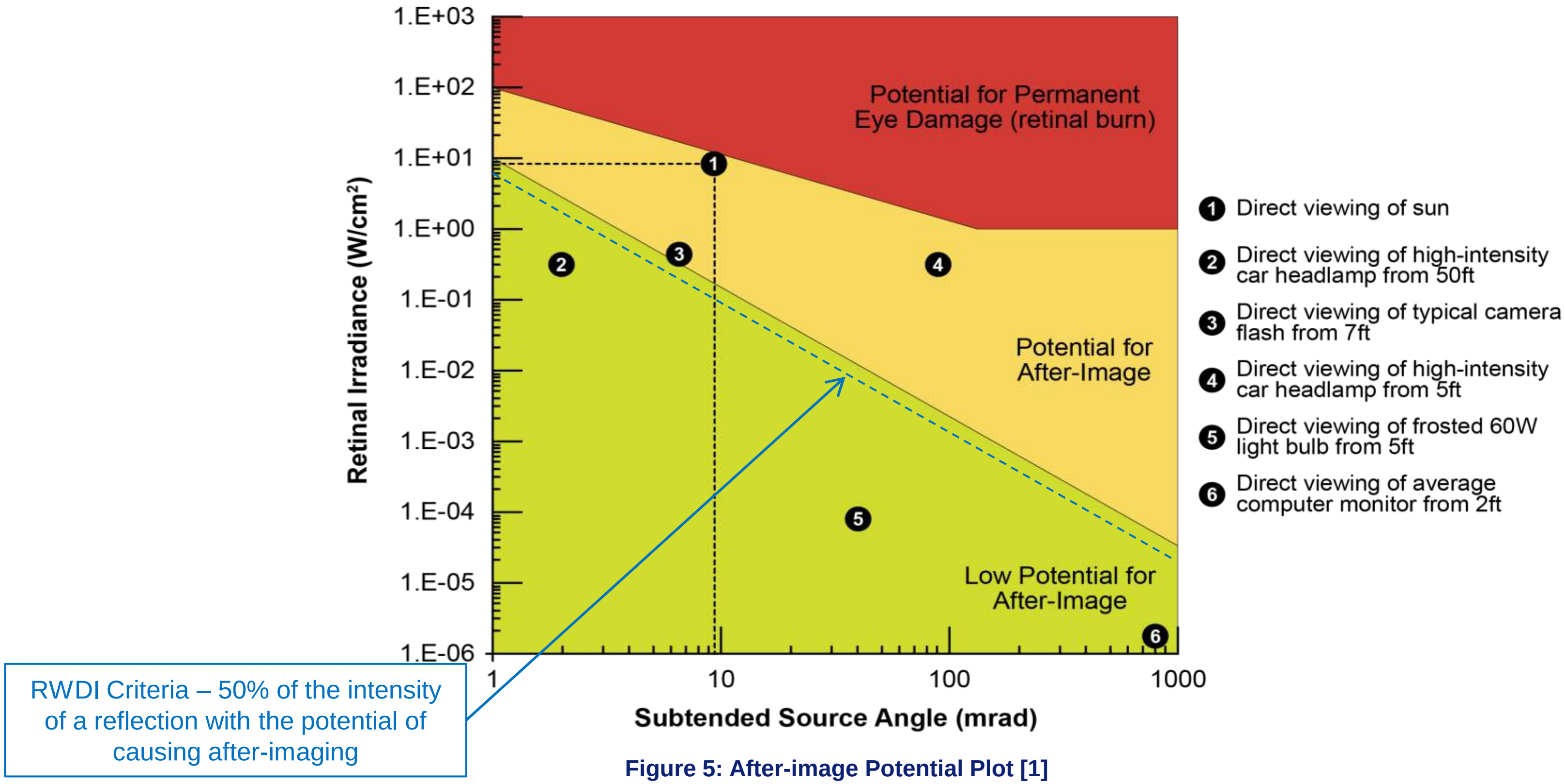


Figure 5: After-image Potential Plot [1]

[1]C. Ho, C. Ghanbari and R. Diver, "Methodology to Assess Potential Glint and Glare Hazards From Concentrating Solar Power Plants: Analytical Models and Experimental Validation," *J. Sol. Energy Eng.*, vol. 133, no. 3, pp. 031021-1 - 031022-9, 2011. http://dx.doi.org/10.1115/1.4004349.

6. PRELIMINARY RESULTS

The following plots are presented in this section:

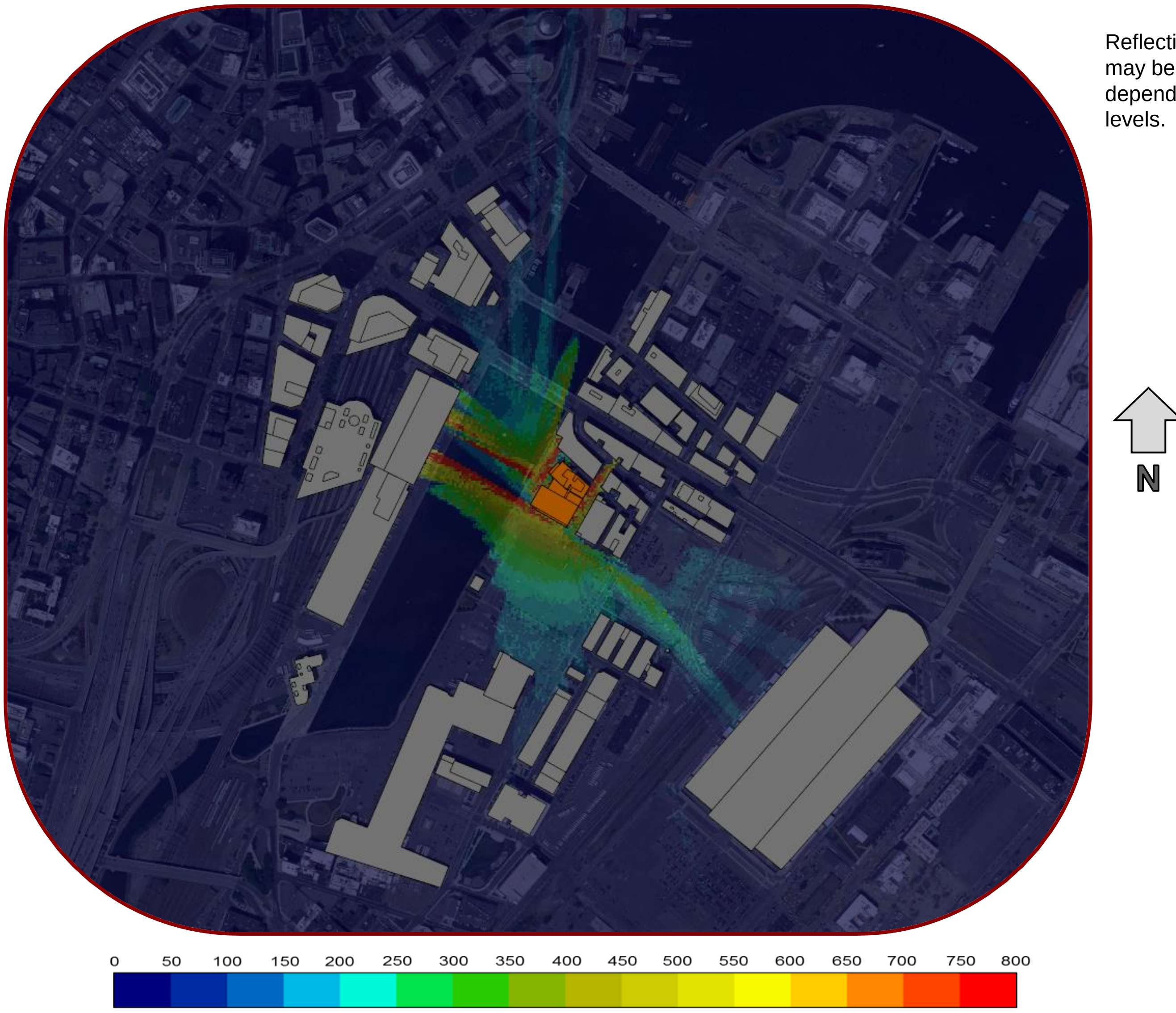
1. ***Peak Annual Reflected Irradiance:***
   This plot displays the annual peak values of the reflections for each grid cell emanating from the building at pedestrian height, which is 5 ft (1.5 m) above grade.
2. ***Percentage of Daylit Hours (or Frequency) of Reflected Light:***
   This plot identifies the locations of the most frequent significant reflections emanating from the facades. In this context a 'significant' reflection is one that is at least 50% as intense as one that would cause after imaging on a viewer (As defined in the Visual Glare Criteria Section 5). The plot shows results 5 ft (1.5 m) above grade.

Due to the significant difference between the selected glazing's reflectivity to visible and thermal energy, two sets of results are presented.

a) ***Visible Reflectance:***
   These plots displays the intensity of visible light reflections only.

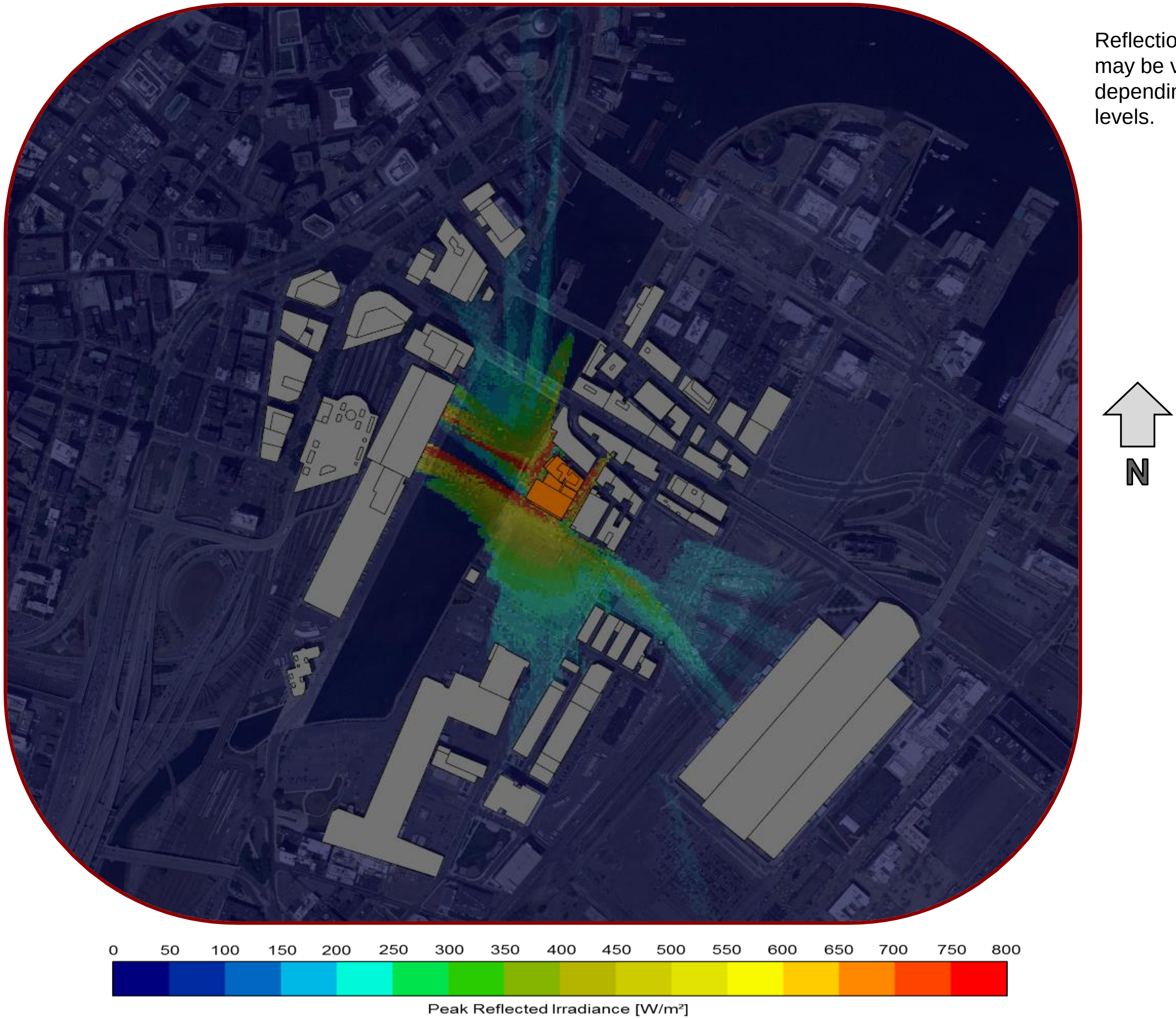
b) ***Full Spectrum Reflectance:***
   These plots presents the total intensity of a reflection, including both visible light and thermal energy.

1a) Peak Annual Reflected Irradiance – Visible Spectrum



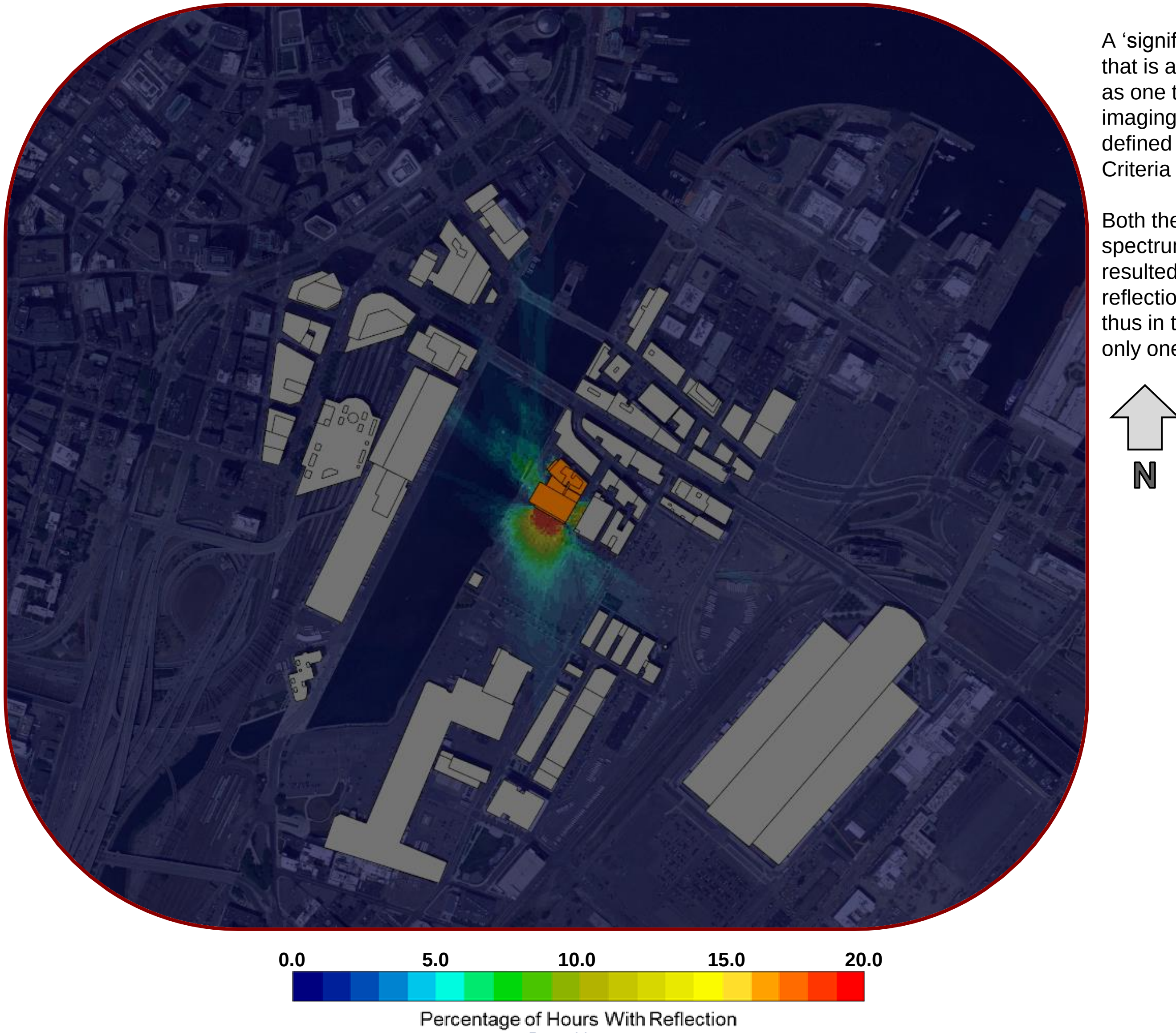
Reflections as low as 150 W/m² may be visible to people, depending on ambient lighting levels.

1b) Peak Annual Reflected Irradiance – Full Spectrum



Reflections as low as 150 W/m² may be visible to people, depending on ambient lighting levels.

2a,b) Percentage of Daylit Hours with Significant Reflections – Full & Visible Spectrum



A 'significant' reflection is one that is at least 50% as intense as one that would cause after imaging on a viewer (As defined in the Visual Glare Criteria Section 5).

Both the visible and full spectrum reflectance analyses resulted in very similar reflection frequency results, thus in the interest of brevity only one result is shown here.

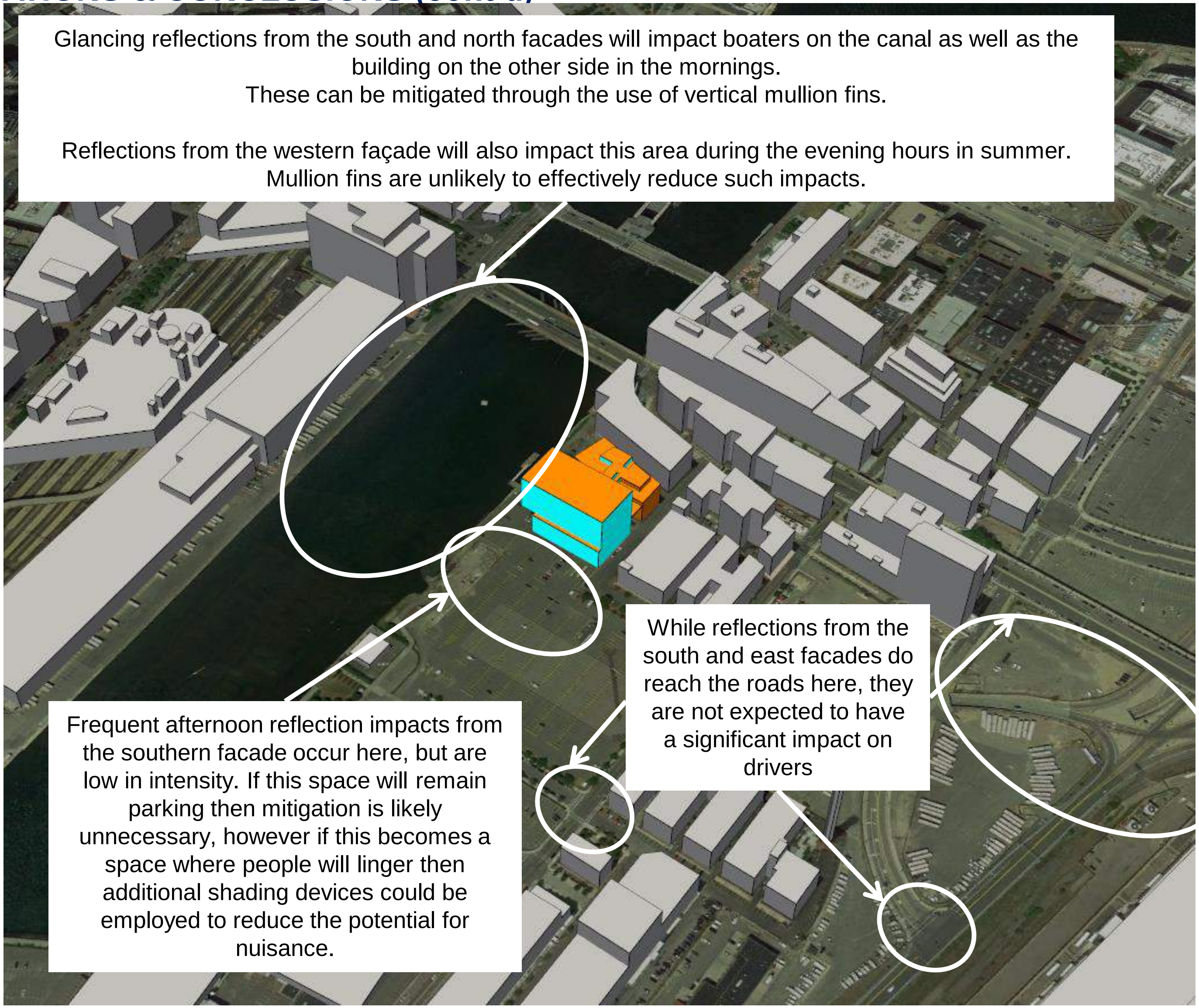
7. OBSERVATIONS & CONCLUSIONS

1. Generally speaking, the reflection results for this building are typical of buildings in an urban environment with a similar level of glazing.
2. Due to the geometry of the building, focusing of reflections will not occur, thus we do not anticipate issues related to heat gains in the surrounding neighborhood.
3. Reflections will occur most frequently within the parking lot to the south of the building, and along Necco St. to the east, however these reflections are generally low in intensity.
4. Frequent reflections will also impact the western façade of the building immediately to the east of the building, typically in late morning. We do not expect this to result in heat gain issues, though it could cause some visual nuisance which could be mitigated by the occupants closing blinds.
5. Glancing reflections from the eastern façade may have some impact on drivers travelling south along Necco St., particularly during the winter months. Employing vertical mullion fins is one option to obstruct these reflections.
6. Similarly, glancing reflections from the north and south facades may impact boaters on the canal, and potentially occupants of the buildings along Dorchester Avenue during the morning hours. Likewise, vertical mullion fins could be used to reduce the frequency of these reflections.
7. Reflections from the western façade could potentially reach drivers along the bridges to the north, as well at pedestrians at the Boston Tea Party Ship & Museum, during the evening hours for short periods but does not pose a risk to safety.
8. Reflections from the northern façade of the taller part of the building can impact the rooftop of the shorter part of the building during the morning. If these rooftops are planned to be used as amenity spaces, then shading devices (i.e. umbrellas, canopies) could be considered to mitigate any potential nuisance.

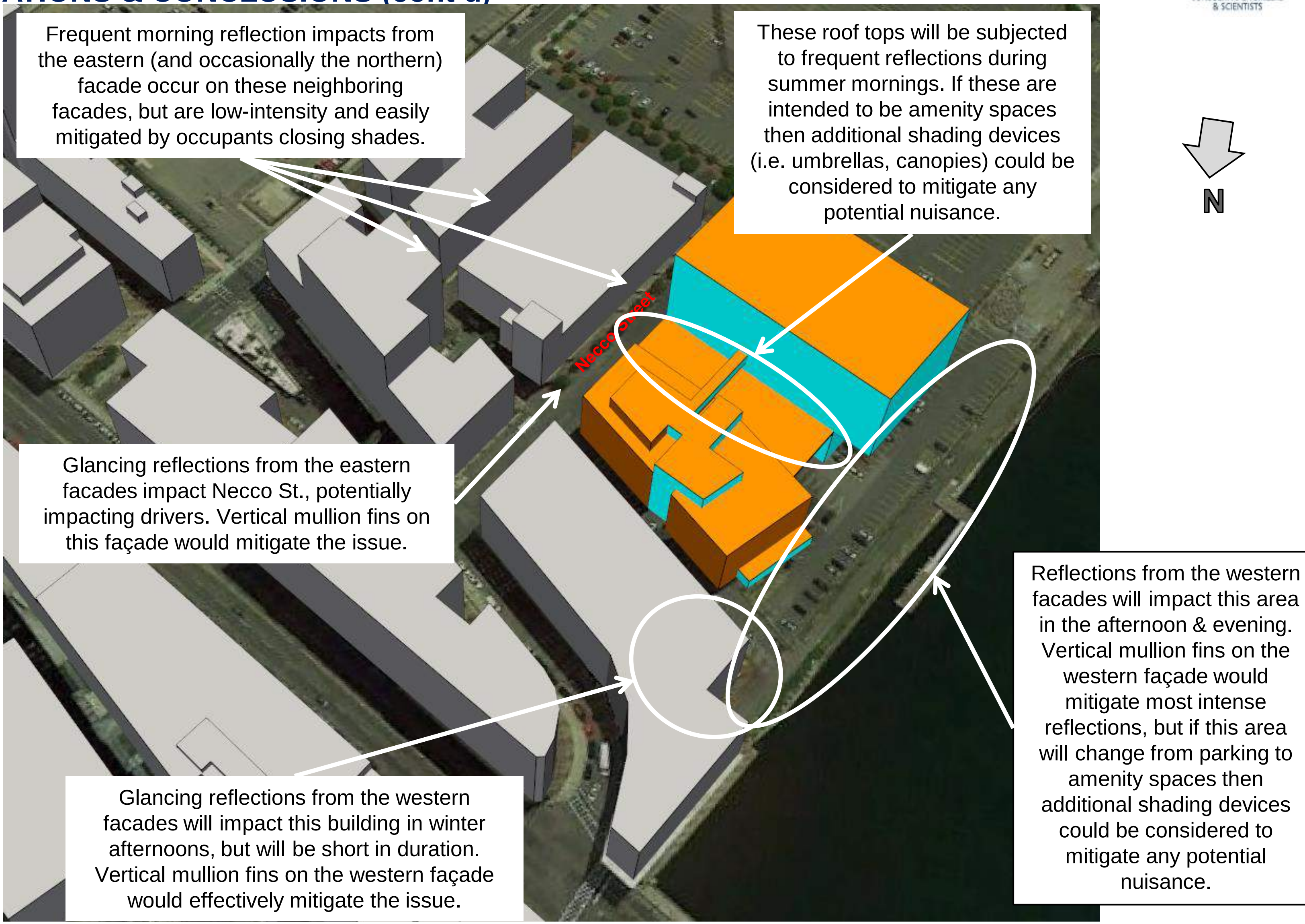
Further detail of these observations and conclusions can be found on the following pages.

The observations made and conclusions drawn in this report are intended to provide high-level guidance on how reflections from the proposed GE Headquarters building will impact nearby people and property assuming the majority of the facades are clad in Viracon VRE1-59 glazing units to inform the detailed design of the façade. As the design of the façade evolves, this analysis should be repeated to understand how the final design reflects sunlight and how those reflections will impact the surrounding urban environment.

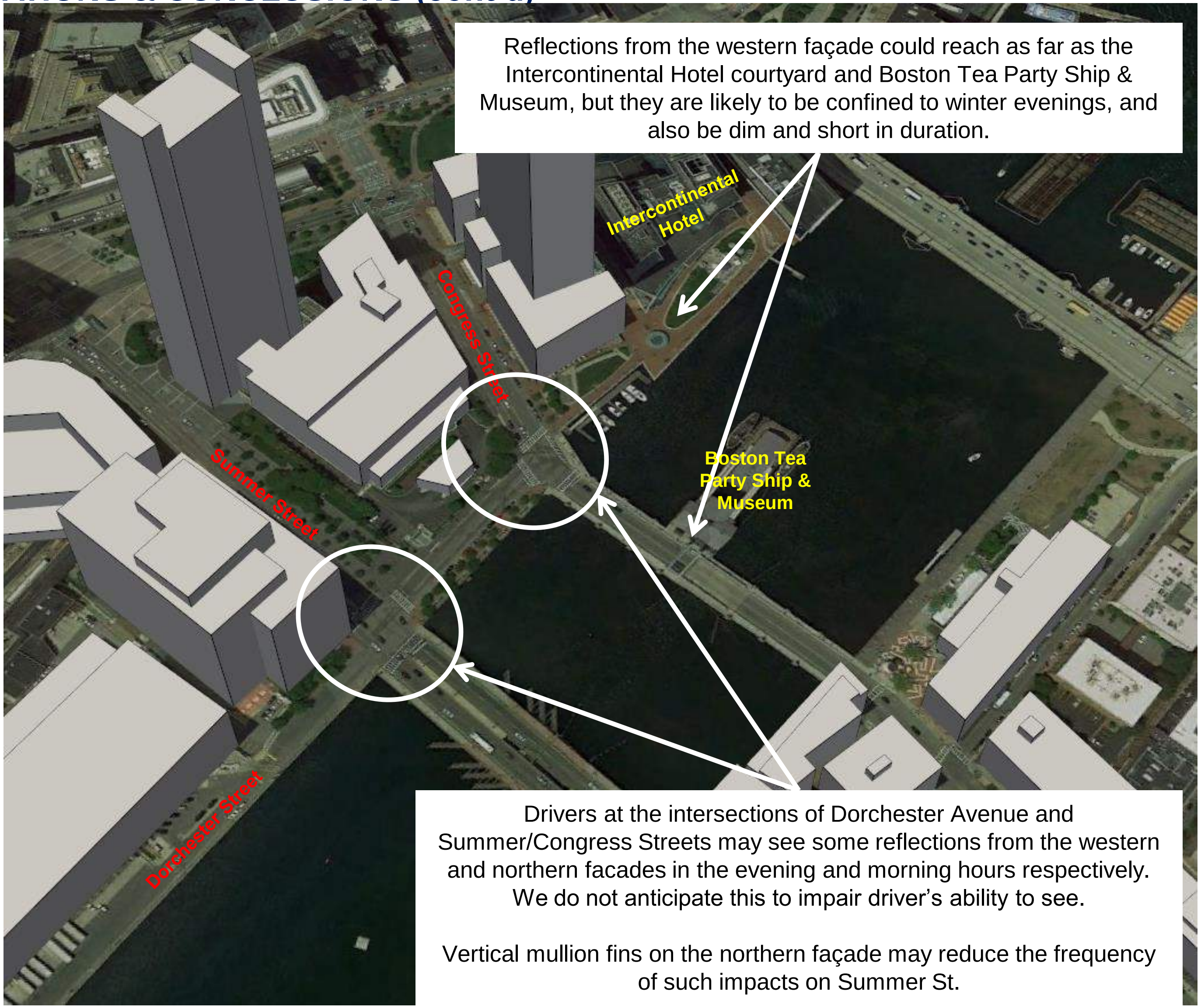
7. OBSERVATIONS & CONCLUSIONS (cont'd)



7. OBSERVATIONS & CONCLUSIONS (cont'd)



7. OBSERVATIONS & CONCLUSIONS (cont'd)



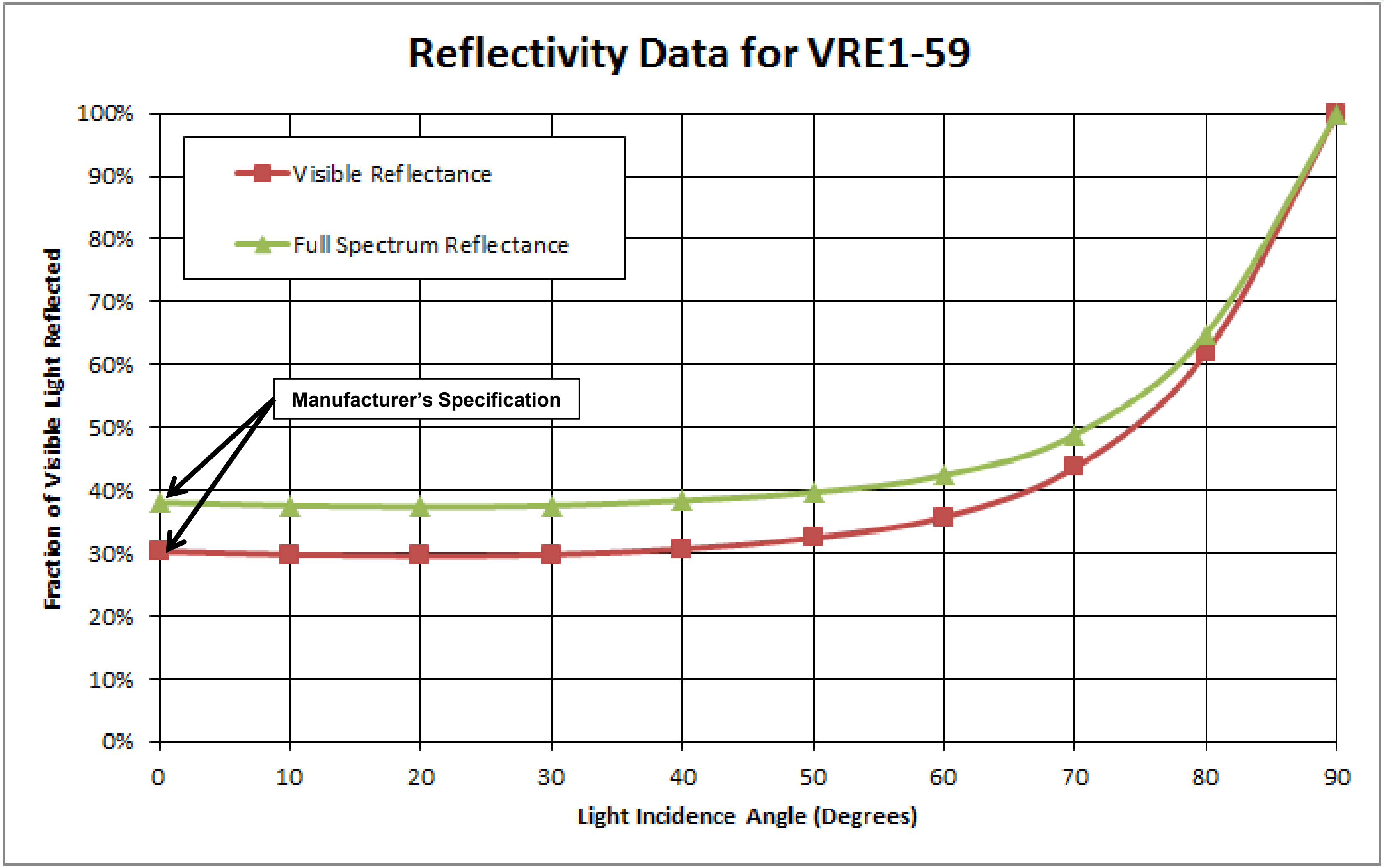
Reflections from the western façade could reach as far as the Intercontinental Hotel courtyard and Boston Tea Party Ship & Museum, but they are likely to be confined to winter evenings, and also be dim and short in duration.

Drivers at the intersections of Dorchester Avenue and Summer/Congress Streets may see some reflections from the western and northern facades in the evening and morning hours respectively. We do not anticipate this to impair driver's ability to see.

Vertical mullion fins on the northern façade may reduce the frequency of such impacts on Summer St.

APPENDIX A - BUILDING FACADE GLASS PROPERTIES

A. FACADE GLASS PROPERTIES



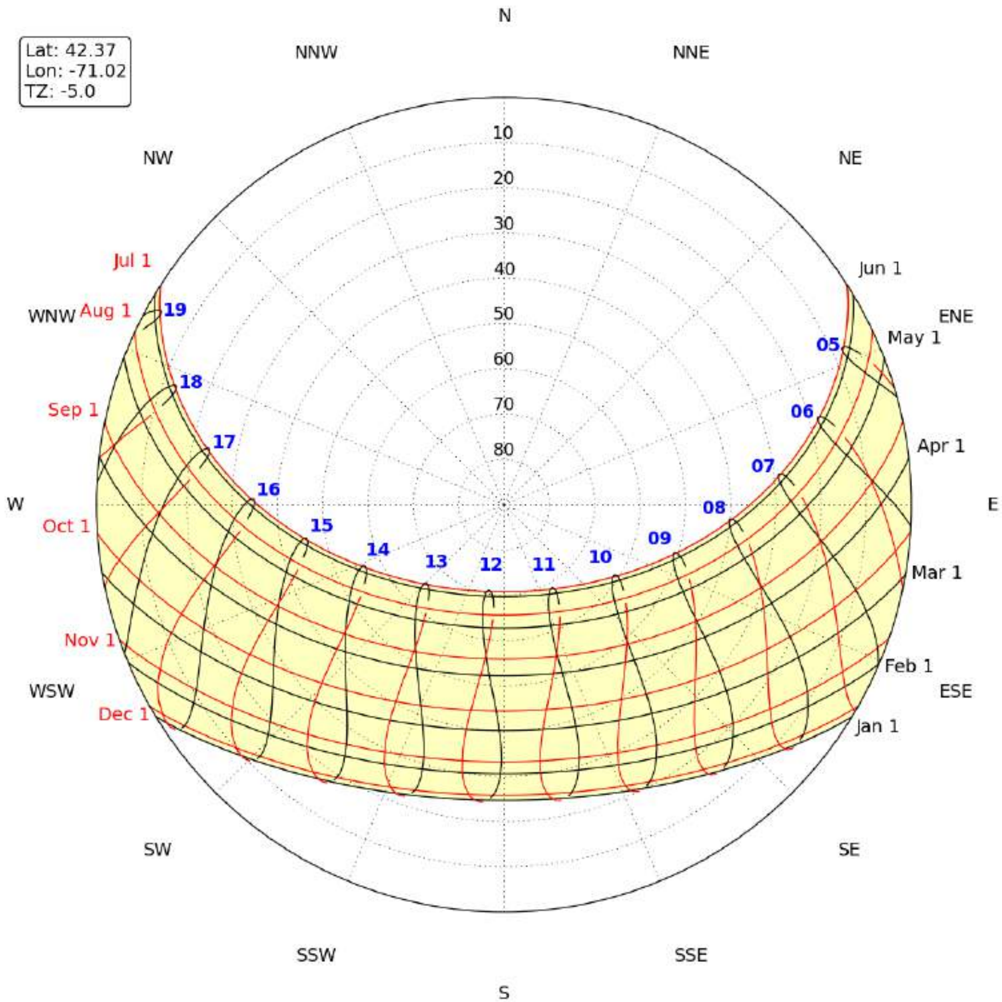
Reflectance data was computed using WINDOW v.7.3, published by Lawrence Berkeley National Laboratory.

APPENDIX B

SUN PATH AT LOGAN AIRPORT

B. SUN'S PATH DIAGRAM FOR BOSTON, MA

The diagram presented here shows the projection of the sky illustrating the sun's path over Boston for a complete year. The diagram is overlaid with red and black lines indicating the position of the sun at every time during the year.



Noise Supporting Documentation

Noise Monitoring Data

Summary	
Filename	LxT_Data.003
Serial Number	3707
Firmware Version	2.301
User	LC
Location	M1 - Necco Ct
Job Description	GE HQ
Note	Day
Measurement Description	
Start	2016/04/27 13:52:29
Stop	2016/04/27 14:22:39
Duration	0:30:09.3
Run Time	0:30:09.3
Pause	0:00:00.0
Pre Calibration	2016/04/27 13:52:17
Post Calibration	2016/04/27 14:23:02
Calibration Deviation	-0.13 dB
Overall Settings	
RMS Weight	A Weighting
Peak Weight	A Weighting
Detector	Slow
Preamp	PRMLxT1L
Microphone Correction	Off
Integration Method	Exponential
OBA Range	Normal
OBA Bandwidth	1/1 and 1/3
OBA Freq. Weighting	A Weighting
Results	
LASeq	64.2 dB
LAS1.00	72.0 dB
LAS10.00	67.7 dB
LAS33.30	63.0 dB
LAS50.00	61.3 dB
LAS90.00	59.3 dB
LAS99.00	58.7 dB

Summary	
Filename	LxT_Data.004
Serial Number	3707
Firmware Version	2.301
User	LC
Location	M2 - A St
Job Description	GE HQ
Note	Day
Measurement Description	
Start	2016/04/27 14:37:42
Stop	2016/04/27 15:07:07
Duration	0:29:25.1
Run Time	0:29:25.1
Pause	0:00:00.0
Pre Calibration	2016/04/27 14:37:21
Post Calibration	None
Calibration Deviation	---
Overall Settings	
RMS Weight	A Weighting
Peak Weight	A Weighting
Detector	Slow
Preamp	PRMLxT1L
Microphone Correction	Off
Integration Method	Exponential
OBA Range	Normal
OBA Bandwidth	1/1 and 1/3
OBA Freq. Weighting	A Weighting
Results	
LASeq	60.5 dB
LAS1.00	71.9 dB
LAS10.00	60.4 dB
LAS33.30	57.6 dB
LAS50.00	56.5 dB
LAS90.00	54.1 dB
LAS99.00	52.6 dB

Summary	
Filename	LxT_Data.001
Serial Number	3707
Firmware Version	2.301
User	LC
Location	M1 - Necco Ct
Job Description	GE HQ
Note	Night
Measurement Description	
Start	2016/04/27 3:06:57
Stop	2016/04/27 3:30:35
Duration	0:23:37.7
Run Time	0:23:37.7
Pause	0:00:00.0
Pre Calibration	2016/04/27 3:05:58
Post Calibration	2016/04/27 3:31:42
Calibration Deviation	-0.11 dB
Overall Settings	
RMS Weight	A Weighting
Peak Weight	A Weighting
Detector	Slow
Preamp	PRMLxT1L
Microphone Correction	Off
Integration Method	Exponential
OBA Range	Normal
OBA Bandwidth	1/1 and 1/3
OBA Freq. Weighting	A Weighting

Results		
LASeq	57.4	dB
LAS1.00	64.3	dB
LAS10.00	58.6	dB
LAS33.30	56.8	dB
LAS50.00	56.4	dB
LAS90.00	55.5	dB
LAS99.00	54.8	dB

Summary	
Filename	LxT_Data.002
Serial Number	3707
Firmware Version	2.301
User	LC
Location	M2 - A St
Job Description	GE HQ
Note	Night
Measurement Description	
Start	2016/04/27 3:43:46
Stop	2016/04/27 4:01:38
Duration	0:17:51.4
Run Time	0:17:51.4
Pause	0:00:00.0
Pre Calibration	2016/04/27 3:42:52
Post Calibration	2016/04/27 4:02:18
Calibration Deviation	-0.06 dB
Overall Settings	
RMS Weight	A Weighting
Peak Weight	A Weighting
Detector	Slow
Preamp	PRMLxT1L
Microphone Correction	Off
Integration Method	Exponential
OBA Range	Normal
OBA Bandwidth	1/1 and 1/3
OBA Freq. Weighting	A Weighting
Results	
LASeq	54.6 dB
LAS1.00	62.5 dB
LAS10.00	56.9 dB
LAS33.30	53.5 dB
LAS50.00	52.8 dB
LAS90.00	51.5 dB
LAS99.00	50.9 dB

APPENDIX H: Transportation Supporting Documentation

Traffic Volume Count Data

Intersection Capacity Analyses

- **2016 Existing Condition**
- **2021 No-Build Condition**
- **2021 Build Condition**

Traffic Volume Count Data

N/S: Thompson Street/ A Street
E/W: Congress Street
City, State: South Boston, MA
Client: VHB/ A. Santiago

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01752
Office: 508.875.0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

File Name : 165050 A
Site Code : 13421
Start Date : 4/27/2016

Groups Printed- Cars - Heavy Vehicles

	Thompson Street From North				Congress Street From East				A Street From South				Congress Street From West				
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Int. Total
07:00 AM	3	0	2	0	2	61	54	0	14	0	25	0	41	50	2	0	254
07:15 AM	6	2	4	0	7	69	56	0	22	1	23	0	37	60	1	0	288
07:30 AM	2	2	1	0	2	55	51	0	33	1	49	0	38	66	0	0	300
07:45 AM	2	1	2	0	2	68	64	0	18	1	34	0	27	57	2	0	278
Total	13	5	9	0	13	253	225	0	87	3	131	0	143	233	5	0	1120
08:00 AM	2	4	4	0	3	86	78	0	25	1	29	0	43	66	3	0	344
08:15 AM	4	0	1	0	2	78	55	0	29	0	47	0	49	69	3	0	337
08:30 AM	3	3	3	0	3	79	72	0	37	2	39	0	33	67	1	0	342
08:45 AM	2	0	2	0	3	72	54	0	34	2	53	0	32	57	2	0	313
Total	11	7	10	0	11	315	259	0	125	5	168	0	157	259	9	0	1336
Grand Total	24	12	19	0	24	568	484	0	212	8	299	0	300	492	14	0	2456
Apprch %	43.6	21.8	34.5	0	2.2	52.8	45	0	40.8	1.5	57.6	0	37.2	61	1.7	0	
Total %	1	0.5	0.8	0	1	23.1	19.7	0	8.6	0.3	12.2	0	12.2	20	0.6	0	
Cars	22	10	17	0	20	535	473	0	192	7	261	0	275	436	14	0	2262
% Cars	91.7	83.3	89.5	0	83.3	94.2	97.7	0	90.6	87.5	87.3	0	91.7	88.6	100	0	92.1
Heavy Vehicles	2	2	2	0	4	33	11	0	20	1	38	0	25	56	0	0	194
% Heavy Vehicles	8.3	16.7	10.5	0	16.7	5.8	2.3	0	9.4	12.5	12.7	0	8.3	11.4	0	0	7.9

	Thompson Street From North					Congress Street From East					A Street From South					Congress Street From West					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 08:00 AM																					
08:00 AM	2	4	4	0	10	3	86	78	0	167	25	1	29	0	55	43	66	3	0	112	344
08:15 AM	4	0	1	0	5	2	78	55	0	135	29	0	47	0	76	49	69	3	0	121	337
08:30 AM	3	3	3	0	9	3	79	72	0	154	37	2	39	0	78	33	67	1	0	101	342
08:45 AM	2	0	2	0	4	3	72	54	0	129	34	2	53	0	89	32	57	2	0	91	313
Total Volume	11	7	10	0	28	11	315	259	0	585	125	5	168	0	298	157	259	9	0	425	1336
% App. Total	39.3	25	35.7	0		1.9	53.8	44.3	0		41.9	1.7	56.4	0		36.9	60.9	2.1	0		
PHF	.688	.438	.625	.000	.700	.917	.916	.830	.000	.876	.845	.625	.792	.000	.837	.801	.938	.750	.000	.878	.971
Cars	10	5	10	0	25	9	303	254	0	566	111	4	151	0	266	144	235	9	0	388	1245
% Cars	90.9	71.4	100	0	89.3	81.8	96.2	98.1	0	96.8	88.8	80.0	89.9	0	89.3	91.7	90.7	100	0	91.3	93.2
Heavy Vehicles	1	2	0	0	3	2	12	5	0	19	14	1	17	0	32	13	24	0	0	37	91
% Heavy Vehicles	9.1	28.6	0	0	10.7	18.2	3.8	1.9	0	3.2	11.2	20.0	10.1	0	10.7	8.3	9.3	0	0	8.7	6.8

N/S: Thompson Street/ A Street
E/W: Congress Street
City, State: South Boston, MA
Client: VHB/ A. Santiago

PRECISION
D A T A
INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01752
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Email: datarequests@pdillc.com

File Name : 165050 A
Site Code : 13421
Start Date : 4/27/2016
Page No : 1

Groups Printed- Cars

	Thompson Street From North				**Congress Street From East**				**A Street From South**				**Congress Street From West**				
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Int. Total
07:00 AM	3	0	2	0	2	56	54	0	14	0	22	0	39	39	2	0	233
07:15 AM	6	2	3	0	5	64	54	0	21	1	19	0	36	53	1	0	265
07:30 AM	1	2	1	0	2	50	49	0	29	1	42	0	33	57	0	0	267
07:45 AM	2	1	1	0	2	62	62	0	17	1	27	0	23	52	2	0	252
Total	12	5	7	0	11	232	219	0	81	3	110	0	131	201	5	0	1017
08:00 AM	2	2	4	0	2	83	76	0	24	0	28	0	41	60	3	0	325
08:15 AM	3	0	1	0	2	74	54	0	23	0	42	0	46	60	3	0	308
08:30 AM	3	3	3	0	3	78	71	0	32	2	34	0	29	63	1	0	322
08:45 AM	2	0	2	0	2	68	53	0	32	2	47	0	28	52	2	0	290
Total	10	5	10	0	9	303	254	0	111	4	151	0	144	235	9	0	1245
Grand Total	22	10	17	0	20	535	473	0	192	7	261	0	275	436	14	0	2262
Apprch %	44.9	20.4	34.7	0	1.9	52	46	0	41.7	1.5	56.7	0	37.9	60.1	1.9	0	
Total %	1	0.4	0.8	0	0.9	23.7	20.9	0	8.5	0.3	11.5	0	12.2	19.3	0.6	0	

Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 08:00 AM

	Thompson Street From North					**Congress Street From East**					**A Street From South**					**Congress Street From West**					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
08:00 AM	2	2	4	0	8	2	83	76	0	161	24	0	28	0	52	41	60	3	0	104	325
08:15 AM	3	0	1	0	4	2	74	54	0	130	23	0	42	0	65	46	60	3	0	109	308
08:30 AM	3	3	3	0	9	3	78	71	0	152	32	2	34	0	68	29	63	1	0	93	322
08:45 AM	2	0	2	0	4	2	68	53	0	123	32	2	47	0	81	28	52	2	0	82	290
Total Volume	10	5	10	0	25	9	303	254	0	566	111	4	151	0	266	144	235	9	0	388	1245
% App. Total	40	20	40	0		1.6	53.5	44.9	0		41.7	1.5	56.8	0		37.1	60.6	2.3	0		
PHF	.833	.417	.625	.000	.694	.750	.913	.836	.000	.879	.867	.500	.803	.000	.821	.783	.933	.750	.000	.890	.958

N/S: Thompson Street/ A Street
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PRECISION
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File Name : 165050 A
Site Code : 13421
Start Date : 4/27/2016

Groups Printed- Heavy Vehicles

	Thompson Street From North				Congress Street From East				A Street From South				Congress Street From West				
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Int. Total
07:00 AM	0	0	0	0	0	5	0	0	0	0	3	0	2	11	0	0	21
07:15 AM	0	0	1	0	2	5	2	0	1	0	4	0	1	7	0	0	23
07:30 AM	1	0	0	0	0	5	2	0	4	0	7	0	5	9	0	0	33
07:45 AM	0	0	1	0	0	6	2	0	1	0	7	0	4	5	0	0	26
Total	1	0	2	0	2	21	6	0	6	0	21	0	12	32	0	0	103
08:00 AM	0	2	0	0	1	3	2	0	1	1	1	0	2	6	0	0	19
08:15 AM	1	0	0	0	0	4	1	0	6	0	5	0	3	9	0	0	29
08:30 AM	0	0	0	0	0	1	1	0	5	0	5	0	4	4	0	0	20
08:45 AM	0	0	0	0	1	4	1	0	2	0	6	0	4	5	0	0	23
Total	1	2	0	0	2	12	5	0	14	1	17	0	13	24	0	0	91
Grand Total	2	2	2	0	4	33	11	0	20	1	38	0	25	56	0	0	194
Apprch %	33.3	33.3	33.3	0	8.3	68.8	22.9	0	33.9	1.7	64.4	0	30.9	69.1	0	0	
Total %	1	1	1	0	2.1	17	5.7	0	10.3	0.5	19.6	0	12.9	28.9	0	0	

	Thompson Street From North					Congress Street From East					A Street From South					Congress Street From West					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:30 AM																					
07:30 AM	1	0	0	0	1	0	5	2	0	7	4	0	7	0	11	5	9	0	0	14	33
07:45 AM	0	0	1	0	1	0	6	2	0	8	1	0	7	0	8	4	5	0	0	9	26
08:00 AM	0	2	0	0	2	1	3	2	0	6	1	1	1	0	3	2	6	0	0	8	19
08:15 AM	1	0	0	0	1	0	4	1	0	5	6	0	5	0	11	3	9	0	0	12	29
Total Volume	2	2	1	0	5	1	18	7	0	26	12	1	20	0	33	14	29	0	0	43	107
% App. Total	40	40	20	0		3.8	69.2	26.9	0		36.4	3	60.6	0		32.6	67.4	0	0		
PHF	.500	.250	.250	.000	.625	.250	.750	.875	.000	.813	.500	.250	.714	.000	.750	.700	.806	.000	.000	.768	.811

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File Name : 165050 A
Site Code : 13421
Start Date : 4/27/2016
Page No : 1

Groups Printed- Peds and Bikes

	Thompson Street From North					Congress Street From East					A Street From South					Congress Street From West					
Start Time	Right	Thru	Left	Peds EB	Peds WB	Right	Thru	Left	Peds SB	Peds NB	Right	Thru	Left	Peds WB	Peds EB	Right	Thru	Left	Peds NB	Peds SB	Int. Total
07:00 AM	0	0	0	16	20	0	0	0	3	3	0	0	1	8	3	1	2	0	6	2	65
07:15 AM	0	0	0	12	20	0	0	0	1	5	0	0	1	7	3	1	0	0	8	4	62
07:30 AM	0	0	0	25	13	0	0	0	1	5	0	0	2	8	5	0	0	0	9	3	71
07:45 AM	0	0	0	32	28	0	0	0	1	5	0	1	5	11	11	0	2	0	4	6	106
Total	0	0	0	85	81	0	0	0	6	18	0	1	9	34	22	2	4	0	27	15	304
08:00 AM	0	0	0	39	37	0	0	0	7	1	0	0	5	18	13	0	2	0	14	7	143
08:15 AM	0	0	0	49	36	0	0	0	11	16	1	1	9	22	18	0	5	0	27	11	206
08:30 AM	0	0	0	39	36	0	0	0	12	6	1	2	9	24	16	0	4	1	13	18	181
08:45 AM	0	0	0	52	35	0	2	0	4	14	5	0	5	27	12	1	5	0	22	9	193
Total	0	0	0	179	144	0	2	0	34	37	7	3	28	91	59	1	16	1	76	45	723
Grand Total	0	0	0	264	225	0	2	0	40	55	7	4	37	125	81	3	20	1	103	60	1027
Apprch %	0	0	0	54	46	0	2.1	0	41.2	56.7	2.8	1.6	14.6	49.2	31.9	1.6	10.7	0.5	55.1	32.1	
Total %	0	0	0	25.7	21.9	0	0.2	0	3.9	5.4	0.7	0.4	3.6	12.2	7.9	0.3	1.9	0.1	10	5.8	

Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Entire Intersection Begins at 08:00 AM

	Thompson Street From North						Congress Street From East						A Street From South						Congress Street From West						
Start Time	Right	Thru	Left	Peds EB	Peds WB	App. Total	Right	Thru	Left	Peds SB	Peds NB	App. Total	Right	Thru	Left	Peds WB	Peds EB	App. Total	Right	Thru	Left	Peds NB	Peds SB	App. Total	Int. Total
08:00 AM	0	0	0	39	37	76	0	0	0	7	1	8	0	0	5	18	13	36	0	2	0	14	7	23	143
08:15 AM	0	0	0	49	36	85	0	0	0	11	16	27	1	1	9	22	18	51	0	5	0	27	11	43	206
08:30 AM	0	0	0	39	36	75	0	0	0	12	6	18	1	2	9	24	16	52	0	4	1	13	18	36	181
08:45 AM	0	0	0	52	35	87	0	2	0	4	14	20	5	0	5	27	12	49	1	5	0	22	9	37	193
Total Volume	0	0	0	179	144	323	0	2	0	34	37	73	7	3	28	91	59	188	1	16	1	76	45	139	723
% App. Total	0	0	0	55.4	44.6		0	2.7	0	46.6	50.7		3.7	1.6	14.9	48.4	31.4		0.7	11.5	0.7	54.7	32.4		
PHF	.000	.000	.000	.861	.973	.928	.000	.250	.000	.708	.578	.676	.350	.375	.778	.843	.819	.904	.250	.800	.250	.704	.625	.808	.877

N/S: Thompson Street/ A Street
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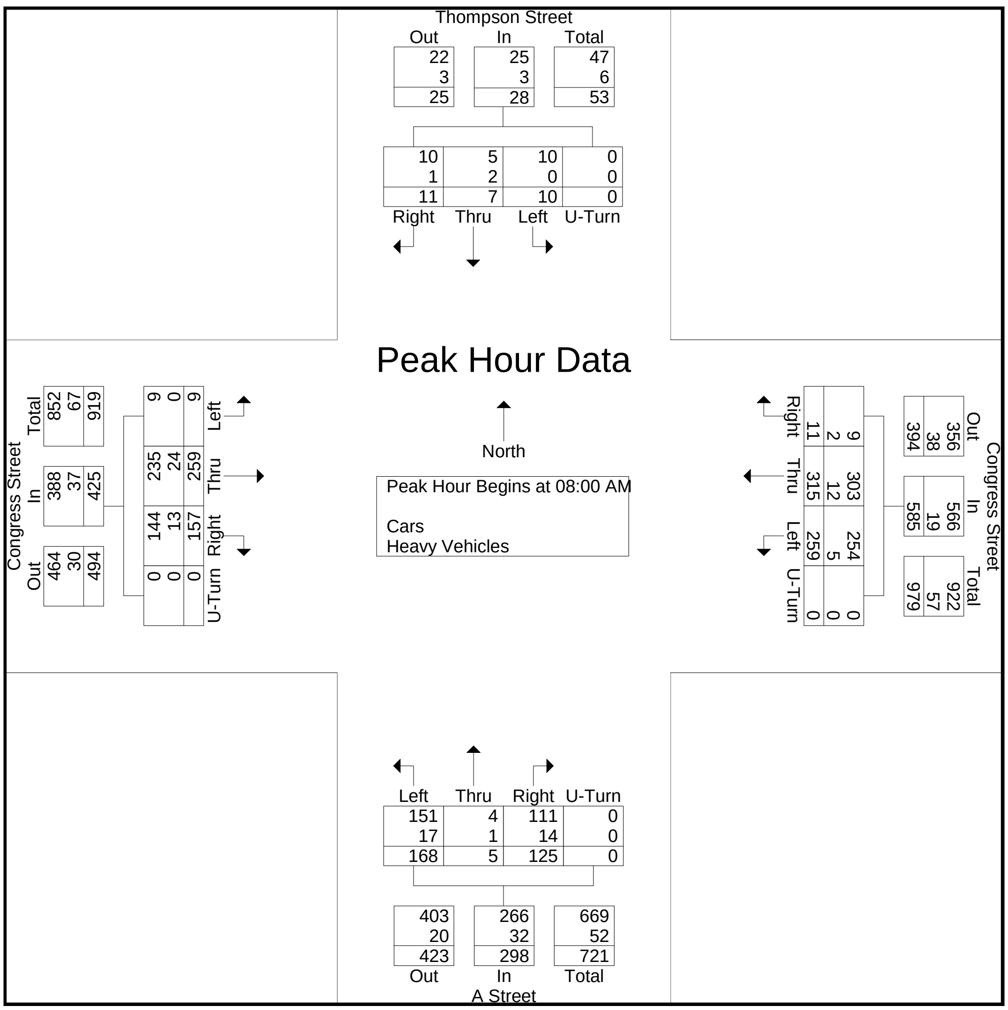
File Name : 165050 A
Site Code : 13421
Start Date : 4/27/2016

	Thompson Street From North					Congress Street From East					A Street From South					Congress Street From West					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 08:00 AM																					
08:00 AM	2	4	4	0	10	3	86	78	0	167	25	1	29	0	55	43	66	3	0	112	344
08:15 AM	4	0	1	0	5	2	78	55	0	135	29	0	47	0	76	49	69	3	0	121	337
08:30 AM	3	3	3	0	9	3	79	72	0	154	37	2	39	0	78	33	67	1	0	101	342
08:45 AM	2	0	2	0	4	3	72	54	0	129	34	2	53	0	89	32	57	2	0	91	313
Total Volume	11	7	10	0	28	11	315	259	0	585	125	5	168	0	298	157	259	9	0	425	1336
% App. Total	39.3	25	35.7	0		1.9	53.8	44.3	0		41.9	1.7	56.4	0		36.9	60.9	2.1	0		
PHF	.688	.438	.625	.000	.700	.917	.916	.830	.000	.876	.845	.625	.792	.000	.837	.801	.938	.750	.000	.878	.971
Cars	10	5	10	0	25	9	303	254	0	566	111	4	151	0	266	144	235	9	0	388	1245
% Cars	90.9	71.4	100	0	89.3	81.8	96.2	98.1	0	96.8	88.8	80.0	89.9	0	89.3	91.7	90.7	100	0	91.3	93.2
Heavy Vehicles	1	2	0	0	3	2	12	5	0	19	14	1	17	0	32	13	24	0	0	37	91
% Heavy Vehicles	9.1	28.6	0	0	10.7	18.2	3.8	1.9	0	3.2	11.2	20.0	10.1	0	10.7	8.3	9.3	0	0	8.7	6.8



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File Name : 165050 AA
Site Code : 13421
Start Date : 4/27/2016

Groups Printed- Cars - Heavy Vehicles

	Thompson Street From North				Congress Street From East				A Street From South				Congress Street From West				
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Int. Total
04:00 PM	3	0	7	0	2	55	36	0	36	0	34	0	42	81	2	0	298
04:15 PM	3	1	8	0	5	63	41	0	40	0	45	0	51	85	2	0	344
04:30 PM	2	0	5	0	1	51	39	1	40	0	42	0	65	84	0	0	330
04:45 PM	1	2	4	0	2	68	47	0	34	1	49	0	60	90	0	0	358
Total	9	3	24	0	10	237	163	1	150	1	170	0	218	340	4	0	1330
05:00 PM	0	5	5	0	1	60	46	0	59	2	48	0	55	105	0	0	386
05:15 PM	4	1	5	0	3	83	54	0	49	3	37	0	52	89	0	0	380
05:30 PM	1	0	8	0	4	67	45	0	64	3	51	0	39	85	0	0	367
05:45 PM	3	4	6	0	4	72	43	0	39	2	63	0	38	70	1	0	345
Total	8	10	24	0	12	282	188	0	211	10	199	0	184	349	1	0	1478
Grand Total	17	13	48	0	22	519	351	1	361	11	369	0	402	689	5	0	2808
Apprch %	21.8	16.7	61.5	0	2.5	58.1	39.3	0.1	48.7	1.5	49.8	0	36.7	62.9	0.5	0	
Total %	0.6	0.5	1.7	0	0.8	18.5	12.5	0	12.9	0.4	13.1	0	14.3	24.5	0.2	0	
Cars	16	13	46	0	22	495	345	1	358	9	348	0	377	654	5	0	2689
% Cars	94.1	100	95.8	0	100	95.4	98.3	100	99.2	81.8	94.3	0	93.8	94.9	100	0	95.8
Heavy Vehicles	1	0	2	0	0	24	6	0	3	2	21	0	25	35	0	0	119
% Heavy Vehicles	5.9	0	4.2	0	0	4.6	1.7	0	0.8	18.2	5.7	0	6.2	5.1	0	0	4.2

	Thompson Street From North					Congress Street From East					A Street From South					Congress Street From West					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:45 PM																					
04:45 PM	1	2	4	0	7	2	68	47	0	117	34	1	49	0	84	60	90	0	0	150	358
05:00 PM	0	5	5	0	10	1	60	46	0	107	59	2	48	0	109	55	105	0	0	160	386
05:15 PM	4	1	5	0	10	3	83	54	0	140	49	3	37	0	89	52	89	0	0	141	380
05:30 PM	1	0	8	0	9	4	67	45	0	116	64	3	51	0	118	39	85	0	0	124	367
Total Volume	6	8	22	0	36	10	278	192	0	480	206	9	185	0	400	206	369	0	0	575	1491
% App. Total	16.7	22.2	61.1	0		2.1	57.9	40	0		51.5	2.2	46.2	0		35.8	64.2	0	0		
PHF	.375	.400	.688	.000	.900	.625	.837	.889	.000	.857	.805	.750	.907	.000	.847	.858	.879	.000	.000	.898	.966
Cars	5	8	22	0	35	10	268	188	0	466	204	7	176	0	387	193	354	0	0	547	1435
% Cars	83.3	100	100	0	97.2	100	96.4	97.9	0	97.1	99.0	77.8	95.1	0	96.8	93.7	95.9	0	0	95.1	96.2
Heavy Vehicles	1	0	0	0	1	0	10	4	0	14	2	2	9	0	13	13	15	0	0	28	56
% Heavy Vehicles	16.7	0	0	0	2.8	0	3.6	2.1	0	2.9	1.0	22.2	4.9	0	3.3	6.3	4.1	0	0	4.9	3.8

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Groups Printed- Cars

	Thompson Street From North				Congress Street From East				A Street From South				Congress Street From West				
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Int. Total
04:00 PM	3	0	7	0	2	50	35	0	36	0	32	0	39	74	2	0	280
04:15 PM	3	1	8	0	5	60	40	0	39	0	40	0	49	82	2	0	329
04:30 PM	2	0	3	0	1	48	39	1	40	0	39	0	62	78	0	0	313
04:45 PM	1	2	4	0	2	65	46	0	34	1	46	0	56	84	0	0	341
Total	9	3	22	0	10	223	160	1	149	1	157	0	206	318	4	0	1263
05:00 PM	0	5	5	0	1	59	43	0	59	1	46	0	54	102	0	0	375
05:15 PM	3	1	5	0	3	80	54	0	48	2	35	0	50	88	0	0	369
05:30 PM	1	0	8	0	4	64	45	0	63	3	49	0	33	80	0	0	350
05:45 PM	3	4	6	0	4	69	43	0	39	2	61	0	34	66	1	0	332
Total	7	10	24	0	12	272	185	0	209	8	191	0	171	336	1	0	1426
Grand Total	16	13	46	0	22	495	345	1	358	9	348	0	377	654	5	0	2689
Apprch %	21.3	17.3	61.3	0	2.5	57.4	40	0.1	50.1	1.3	48.7	0	36.4	63.1	0.5	0	
Total %	0.6	0.5	1.7	0	0.8	18.4	12.8	0	13.3	0.3	12.9	0	14	24.3	0.2	0	

	Thompson Street From North					Congress Street From East					A Street From South					Congress Street From West					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total

Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 04:45 PM

04:45 PM	1	2	4	0	7	2	65	46	0	113	34	1	46	0	81	56	84	0	0	140	341
05:00 PM	0	5	5	0	10	1	59	43	0	103	59	1	46	0	106	54	102	0	0	156	375
05:15 PM	3	1	5	0	9	3	80	54	0	137	48	2	35	0	85	50	88	0	0	138	369
05:30 PM	1	0	8	0	9	4	64	45	0	113	63	3	49	0	115	33	80	0	0	113	350
Total Volume	5	8	22	0	35	10	268	188	0	466	204	7	176	0	387	193	354	0	0	547	1435
% App. Total	14.3	22.9	62.9	0		2.1	57.5	40.3	0		52.7	1.8	45.5	0		35.3	64.7	0	0		
PHF	.417	.400	.688	.000	.875	.625	.838	.870	.000	.850	.810	.583	.898	.000	.841	.862	.868	.000	.000	.877	.957

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01752
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Groups Printed- Heavy Vehicles

	Thompson Street From North				Congress Street From East				A Street From South				Congress Street From West				
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Int. Total
04:00 PM	0	0	0	0	0	5	1	0	0	0	2	0	3	7	0	0	18
04:15 PM	0	0	0	0	0	3	1	0	1	0	5	0	2	3	0	0	15
04:30 PM	0	0	2	0	0	3	0	0	0	0	3	0	3	6	0	0	17
04:45 PM	0	0	0	0	0	3	1	0	0	0	3	0	4	6	0	0	17
Total	0	0	2	0	0	14	3	0	1	0	13	0	12	22	0	0	67
05:00 PM	0	0	0	0	0	1	3	0	0	1	2	0	1	3	0	0	11
05:15 PM	1	0	0	0	0	3	0	0	1	1	2	0	2	1	0	0	11
05:30 PM	0	0	0	0	0	3	0	0	1	0	2	0	6	5	0	0	17
05:45 PM	0	0	0	0	0	3	0	0	0	0	2	0	4	4	0	0	13
Total	1	0	0	0	0	10	3	0	2	2	8	0	13	13	0	0	52
Grand Total	1	0	2	0	0	24	6	0	3	2	21	0	25	35	0	0	119
Apprch %	33.3	0	66.7	0	0	80	20	0	11.5	7.7	80.8	0	41.7	58.3	0	0	
Total %	0.8	0	1.7	0	0	20.2	5	0	2.5	1.7	17.6	0	21	29.4	0	0	

Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 04:00 PM

	Thompson Street From North					Congress Street From East					A Street From South					Congress Street From West					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
04:00 PM	0	0	0	0	0	0	5	1	0	6	0	0	2	0	2	3	7	0	0	10	18
04:15 PM	0	0	0	0	0	0	3	1	0	4	1	0	5	0	6	2	3	0	0	5	15
04:30 PM	0	0	2	0	2	0	3	0	0	3	0	0	3	0	3	3	6	0	0	9	17
04:45 PM	0	0	0	0	0	0	3	1	0	4	0	0	3	0	3	4	6	0	0	10	17
Total Volume	0	0	2	0	2	0	14	3	0	17	1	0	13	0	14	12	22	0	0	34	67
% App. Total	0	0	100	0		0	82.4	17.6	0		7.1	0	92.9	0		35.3	64.7	0	0		
PHF	.000	.000	.250	.000	.250	.000	.700	.750	.000	.708	.250	.000	.650	.000	.583	.750	.786	.000	.000	.850	.931

N/S: Thompson Street/ A Street
E/W: Congress Street
City, State: South Boston, MA
Client: VHB/ A. Santiago

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46 Morton Street, Framingham, MA 01752
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File Name : 165050 AA
Site Code : 13421
Start Date : 4/27/2016
Page No : 1

Groups Printed- Peds and Bikes

	Thompson Street From North					Congress Street From East					A Street From South					Congress Street From West					
Start Time	Right	Thru	Left	Peds EB	Peds WB	Right	Thru	Left	Peds SB	Peds NB	Right	Thru	Left	Peds WB	Peds EB	Right	Thru	Left	Peds NB	Peds SB	Int. Total
04:00 PM	1	1	0	28	26	0	1	0	7	10	0	1	1	25	23	1	1	0	9	23	158
04:15 PM	0	0	0	36	23	0	5	1	9	7	0	0	0	13	19	1	1	0	8	8	131
04:30 PM	0	0	0	33	35	0	0	0	8	8	0	0	0	25	16	1	2	0	11	12	151
04:45 PM	0	0	0	36	40	0	2	1	4	2	0	0	2	12	14	1	1	0	7	14	136
Total	1	1	0	133	124	0	8	2	28	27	0	1	3	75	72	4	5	0	35	57	576
05:00 PM	1	0	0	49	47	0	6	0	10	4	0	0	2	23	28	0	0	0	12	23	205
05:15 PM	1	0	0	39	48	0	1	0	13	13	1	0	0	34	57	0	2	1	11	18	239
05:30 PM	1	0	0	35	48	0	5	0	18	6	0	0	3	27	20	0	1	1	21	16	202
05:45 PM	0	0	0	30	46	0	8	1	13	10	0	0	1	21	36	1	3	0	12	19	201
Total	3	0	0	153	189	0	20	1	54	33	1	0	6	105	141	1	6	2	56	76	847
Grand Total	4	1	0	286	313	0	28	3	82	60	1	1	9	180	213	5	11	2	91	133	1423
Apprch %	0.7	0.2	0	47.4	51.8	0	16.2	1.7	47.4	34.7	0.2	0.2	2.2	44.6	52.7	2.1	4.5	0.8	37.6	55	
Total %	0.3	0.1	0	20.1	22	0	2	0.2	5.8	4.2	0.1	0.1	0.6	12.6	15	0.4	0.8	0.1	6.4	9.3	

	Thompson Street From North						Congress Street From East						A Street From South						Congress Street From West						
Start Time	Right	Thru	Left	Peds EB	Peds WB	App. Total	Right	Thru	Left	Peds SB	Peds NB	App. Total	Right	Thru	Left	Peds WB	Peds EB	App. Total	Right	Thru	Left	Peds NB	Peds SB	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 05:00 PM																									
05:00 PM	1	0	0	49	47	97	0	6	0	10	4	20	0	0	2	23	28	53	0	0	0	12	23	35	205
05:15 PM	1	0	0	39	48	88	0	1	0	13	13	27	1	0	0	34	57	92	0	2	1	11	18	32	239
05:30 PM	1	0	0	35	48	84	0	5	0	18	6	29	0	0	3	27	20	50	0	1	1	21	16	39	202
05:45 PM	0	0	0	30	46	76	0	8	1	13	10	32	0	0	1	21	36	58	1	3	0	12	19	35	201
Total Volume	3	0	0	153	189	345	0	20	1	54	33	108	1	0	6	105	141	253	1	6	2	56	76	141	847
% App. Total	0.9	0	0	44.3	54.8		0	18.5	0.9	50	30.6		0.4	0	2.4	41.5	55.7		0.7	4.3	1.4	39.7	53.9		
PHF	.750	.000	.000	.781	.984	.889	.000	.625	.250	.750	.635	.844	.250	.000	.500	.772	.618	.688	.250	.500	.500	.667	.826	.904	.886

N/S: Thompson Street/ A Street
E/W: Congress Street
City, State: South Boston, MA
Client: VHB/ A. Santiago

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01752
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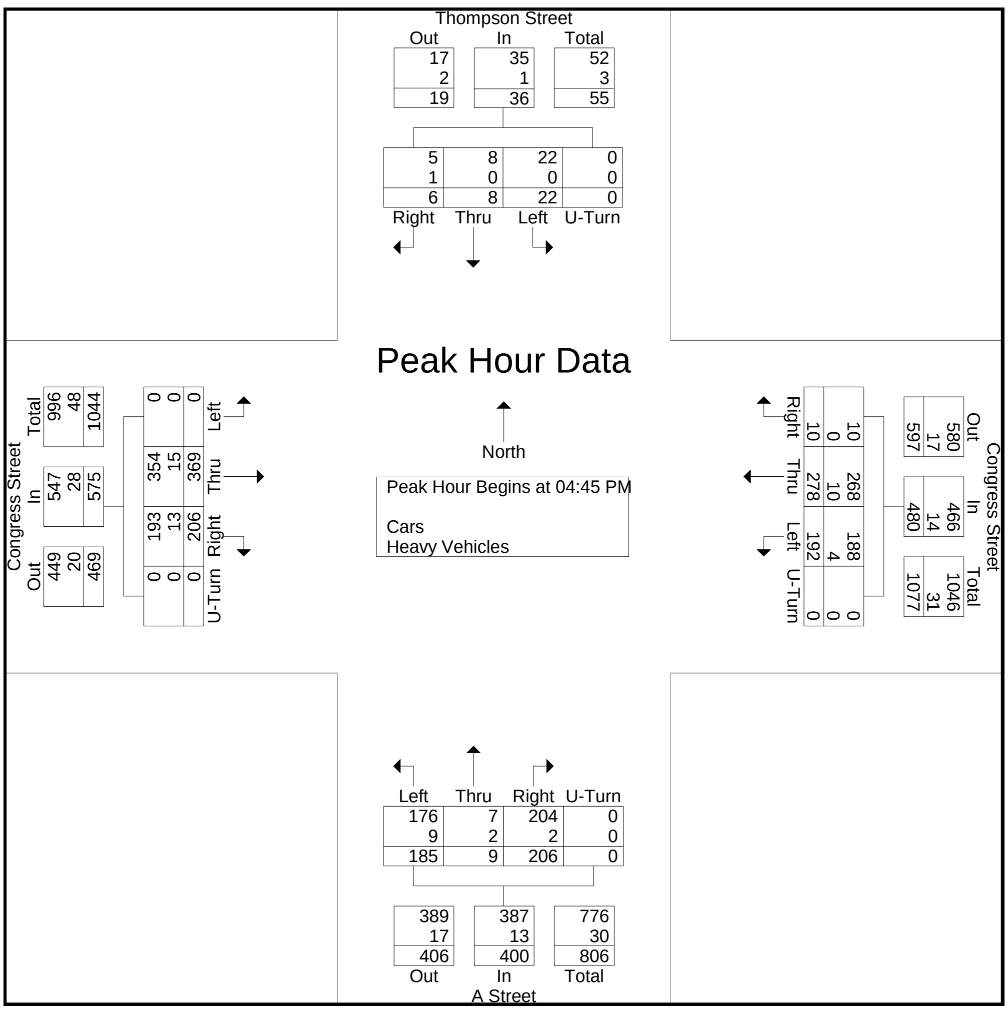
File Name : 165050 AA
Site Code : 13421
Start Date : 4/27/2016
Page No : 1

	Thompson Street From North					Congress Street From East					A Street From South					Congress Street From West					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:45 PM																					
04:45 PM	1	2	4	0	7	2	68	47	0	117	34	1	49	0	84	60	90	0	0	150	358
05:00 PM	0	5	5	0	10	1	60	46	0	107	59	2	48	0	109	55	105	0	0	160	386
05:15 PM	4	1	5	0	10	3	83	54	0	140	49	3	37	0	89	52	89	0	0	141	380
05:30 PM	1	0	8	0	9	4	67	45	0	116	64	3	51	0	118	39	85	0	0	124	367
Total Volume	6	8	22	0	36	10	278	192	0	480	206	9	185	0	400	206	369	0	0	575	1491
% App. Total	16.7	22.2	61.1	0		2.1	57.9	40	0		51.5	2.2	46.2	0		35.8	64.2	0	0		
PHF	.375	.400	.688	.000	.900	.625	.837	.889	.000	.857	.805	.750	.907	.000	.847	.858	.879	.000	.000	.898	.966
Cars	5	8	22	0	35	10	268	188	0	466	204	7	176	0	387	193	354	0	0	547	1435
% Cars	83.3	100	100	0	97.2	100	96.4	97.9	0	97.1	99.0	77.8	95.1	0	96.8	93.7	95.9	0	0	95.1	96.2
Heavy Vehicles	1	0	0	0	1	0	10	4	0	14	2	2	9	0	13	13	15	0	0	28	56
% Heavy Vehicles	16.7	0	0	0	2.8	0	3.6	2.1	0	2.9	1.0	22.2	4.9	0	3.3	6.3	4.1	0	0	4.9	3.8



N/S: A Street
E/W:Post Office Driveway/ Melcher Street
City, State: South Boston, MA
Client: VHB/ A. Santiago

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01752
Office: 508.875.0100 Fax: 508-875-0118
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File Name : 165050 B
Site Code : 13421
Start Date : 4/27/2016
Page No : 1

Groups Printed- Cars - Heavy Vehicles

	A Street From North				Post Office Driveway From East				A Street From South				Melcher Street From West				
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Int. Total
07:00 AM	17	68	10	0	0	0	0	0	2	35	9	0	17	7	10	0	175
07:15 AM	19	80	5	0	0	0	0	0	4	46	14	0	12	5	9	0	194
07:30 AM	19	75	3	0	0	0	0	0	2	68	13	0	23	5	7	0	215
07:45 AM	18	58	2	0	0	0	1	0	1	56	17	1	20	3	4	0	181
Total	73	281	20	0	0	0	1	0	9	205	53	1	72	20	30	0	765
08:00 AM	25	108	3	0	0	0	0	0	3	46	18	0	26	1	8	0	238
08:15 AM	28	82	0	0	0	0	0	0	2	78	23	0	23	1	5	0	242
08:30 AM	27	72	1	0	0	0	1	0	5	77	21	0	19	2	8	0	233
08:45 AM	27	79	2	0	0	0	0	0	1	84	18	0	25	1	6	0	243
Total	107	341	6	0	0	0	1	0	11	285	80	0	93	5	27	0	956
Grand Total	180	622	26	0	0	0	2	0	20	490	133	1	165	25	57	0	1721
Apprch %	21.7	75.1	3.1	0	0	0	100	0	3.1	76.1	20.7	0.2	66.8	10.1	23.1	0	
Total %	10.5	36.1	1.5	0	0	0	0.1	0	1.2	28.5	7.7	0.1	9.6	1.5	3.3	0	
Cars	177	584	26	0	0	0	1	0	18	438	115	0	145	21	50	0	1575
% Cars	98.3	93.9	100	0	0	0	50	0	90	89.4	86.5	0	87.9	84	87.7	0	91.5
Heavy Vehicles	3	38	0	0	0	0	1	0	2	52	18	1	20	4	7	0	146
% Heavy Vehicles	1.7	6.1	0	0	0	0	50	0	10	10.6	13.5	100	12.1	16	12.3	0	8.5

	A Street From North					Post Office Driveway From East					A Street From South					Melcher Street From West					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 08:00 AM																					
08:00 AM	25	108	3	0	136	0	0	0	0	0	3	46	18	0	67	26	1	8	0	35	238
08:15 AM	28	82	0	0	110	0	0	0	0	0	2	78	23	0	103	23	1	5	0	29	242
08:30 AM	27	72	1	0	100	0	0	1	0	1	5	77	21	0	103	19	2	8	0	29	233
08:45 AM	27	79	2	0	108	0	0	0	0	0	1	84	18	0	103	25	1	6	0	32	243
Total Volume	107	341	6	0	454	0	0	1	0	1	11	285	80	0	376	93	5	27	0	125	956
% App. Total	23.6	75.1	1.3	0		0	0	100	0		2.9	75.8	21.3	0		74.4	4	21.6	0		
PHF	.955	.789	.500	.000	.835	.000	.000	.250	.000	.250	.550	.848	.870	.000	.913	.894	.625	.844	.000	.893	.984
Cars	104	319	6	0	429	0	0	1	0	1	10	255	72	0	337	82	3	24	0	109	876
% Cars	97.2	93.5	100	0	94.5	0	0	100	0	100	90.9	89.5	90.0	0	89.6	88.2	60.0	88.9	0	87.2	91.6
Heavy Vehicles	3	22	0	0	25	0	0	0	0	0	1	30	8	0	39	11	2	3	0	16	80
% Heavy Vehicles	2.8	6.5	0	0	5.5	0	0	0	0	0	9.1	10.5	10.0	0	10.4	11.8	40.0	11.1	0	12.8	8.4

N/S: A Street
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File Name : 165050 B
Site Code : 13421
Start Date : 4/27/2016
Page No : 1

Groups Printed- Cars

	A Street From North				Post Office Driveway From East				A Street From South				Melcher Street From West				
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Int. Total
07:00 AM	17	65	10	0	0	0	0	0	2	33	8	0	12	6	9	0	162
07:15 AM	19	77	5	0	0	0	0	0	4	42	11	0	10	5	8	0	181
07:30 AM	19	69	3	0	0	0	0	0	2	61	10	0	23	4	5	0	196
07:45 AM	18	54	2	0	0	0	0	0	0	47	14	0	18	3	4	0	160
Total	73	265	20	0	0	0	0	0	8	183	43	0	63	18	26	0	699
08:00 AM	24	99	3	0	0	0	0	0	3	44	18	0	22	0	8	0	221
08:15 AM	28	77	0	0	0	0	0	0	2	64	21	0	21	1	5	0	219
08:30 AM	26	69	1	0	0	0	1	0	4	70	18	0	18	1	6	0	214
08:45 AM	26	74	2	0	0	0	0	0	1	77	15	0	21	1	5	0	222
Total	104	319	6	0	0	0	1	0	10	255	72	0	82	3	24	0	876
Grand Total	177	584	26	0	0	0	1	0	18	438	115	0	145	21	50	0	1575
Apprch %	22.5	74.2	3.3	0	0	0	100	0	3.2	76.7	20.1	0	67.1	9.7	23.1	0	
Total %	11.2	37.1	1.7	0	0	0	0.1	0	1.1	27.8	7.3	0	9.2	1.3	3.2	0	

	A Street From North					Post Office Driveway From East					A Street From South					Melcher Street From West					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 08:00 AM																					
08:00 AM	24	99	3	0	126	0	0	0	0	0	3	44	18	0	65	22	0	8	0	30	221
08:15 AM	28	77	0	0	105	0	0	0	0	0	2	64	21	0	87	21	1	5	0	27	219
08:30 AM	26	69	1	0	96	0	0	1	0	1	4	70	18	0	92	18	1	6	0	25	214
08:45 AM	26	74	2	0	102	0	0	0	0	0	1	77	15	0	93	21	1	5	0	27	222
Total Volume	104	319	6	0	429	0	0	1	0	1	10	255	72	0	337	82	3	24	0	109	876
% App. Total	24.2	74.4	1.4	0		0	0	100	0		3	75.7	21.4	0		75.2	2.8	22	0		
PHF	.929	.806	.500	.000	.851	.000	.000	.250	.000	.250	.625	.828	.857	.000	.906	.932	.750	.750	.000	.908	.986

N/S: A Street
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File Name : 165050 B
Site Code : 13421
Start Date : 4/27/2016

Groups Printed- Heavy Vehicles

	A Street From North				Post Office Driveway From East				A Street From South				Melcher Street From West				
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Int. Total
07:00 AM	0	3	0	0	0	0	0	0	0	2	1	0	5	1	1	0	13
07:15 AM	0	3	0	0	0	0	0	0	0	4	3	0	2	0	1	0	13
07:30 AM	0	6	0	0	0	0	0	0	0	7	3	0	0	1	2	0	19
07:45 AM	0	4	0	0	0	0	1	0	1	9	3	1	2	0	0	0	21
Total	0	16	0	0	0	0	1	0	1	22	10	1	9	2	4	0	66
08:00 AM	1	9	0	0	0	0	0	0	0	2	0	0	4	1	0	0	17
08:15 AM	0	5	0	0	0	0	0	0	0	14	2	0	2	0	0	0	23
08:30 AM	1	3	0	0	0	0	0	0	1	7	3	0	1	1	2	0	19
08:45 AM	1	5	0	0	0	0	0	0	0	7	3	0	4	0	1	0	21
Total	3	22	0	0	0	0	0	0	1	30	8	0	11	2	3	0	80
Grand Total	3	38	0	0	0	0	1	0	2	52	18	1	20	4	7	0	146
Apprch %	7.3	92.7	0	0	0	0	100	0	2.7	71.2	24.7	1.4	64.5	12.9	22.6	0	
Total %	2.1	26	0	0	0	0	0.7	0	1.4	35.6	12.3	0.7	13.7	2.7	4.8	0	

	A Street From North					Post Office Driveway From East					A Street From South					Melcher Street From West					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:30 AM																					
07:30 AM	0	6	0	0	6	0	0	0	0	0	0	7	3	0	10	0	1	2	0	3	19
07:45 AM	0	4	0	0	4	0	0	1	0	1	1	9	3	1	14	2	0	0	0	2	21
08:00 AM	1	9	0	0	10	0	0	0	0	0	0	2	0	0	2	4	1	0	0	5	17
08:15 AM	0	5	0	0	5	0	0	0	0	0	0	14	2	0	16	2	0	0	0	2	23
Total Volume	1	24	0	0	25	0	0	1	0	1	1	32	8	1	42	8	2	2	0	12	80
% App. Total	4	96	0	0		0	0	100	0		2.4	76.2	19	2.4		66.7	16.7	16.7	0		
PHF	.250	.667	.000	.000	.625	.000	.000	.250	.000	.250	.250	.571	.667	.250	.656	.500	.500	.250	.000	.600	.870

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01752
Office: 508.875.0100 Fax: 508-875-0118
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N/S: A Street
E/W:Post Office Driveway/ Melcher Street
City, State: South Boston, MA
Client: VHB/ A. Santiago

File Name : 165050 B
Site Code : 13421
Start Date : 4/27/2016
Page No : 1

Groups Printed- Peds and Bikes

	A Street From North					Post Office Driveway From East					A Street From South					Melcher Street From West					
Start Time	Right	Thru	Left	Peds EB	Peds WB	Right	Thru	Left	Peds SB	Peds NB	Right	Thru	Left	Peds WB	Peds EB	Right	Thru	Left	Peds NB	Peds SB	Int. Total
07:00 AM	0	0	0	1	2	0	0	0	5	15	0	2	1	13	29	0	0	0	10	2	80
07:15 AM	0	0	0	0	8	0	0	0	3	12	0	3	2	10	7	0	0	0	15	3	63
07:30 AM	0	1	0	4	8	0	0	0	4	9	0	4	1	9	20	2	0	0	14	8	84
07:45 AM	0	0	0	6	9	0	0	0	12	24	0	6	0	10	7	0	0	0	19	7	100
Total	0	1	0	11	27	0	0	0	24	60	0	15	4	42	63	2	0	0	58	20	327
08:00 AM	0	0	0	1	2	0	0	0	6	11	0	10	0	6	9	0	0	0	25	13	83
08:15 AM	0	1	0	5	4	0	0	0	15	32	0	14	1	15	5	1	0	0	27	10	130
08:30 AM	1	2	0	8	1	0	0	0	10	24	0	16	0	20	10	0	0	0	20	25	137
08:45 AM	0	1	0	8	6	0	0	0	7	33	0	14	3	9	9	0	0	3	32	21	146
Total	1	4	0	22	13	0	0	0	38	100	0	54	4	50	33	1	0	3	104	69	496
Grand Total	1	5	0	33	40	0	0	0	62	160	0	69	8	92	96	3	0	3	162	89	823
Apprch %	1.3	6.3	0	41.8	50.6	0	0	0	27.9	72.1	0	26	3	34.7	36.2	1.2	0	1.2	63	34.6	
Total %	0.1	0.6	0	4	4.9	0	0	0	7.5	19.4	0	8.4	1	11.2	11.7	0.4	0	0.4	19.7	10.8	

Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 08:00 AM

	A Street From North						Post Office Driveway From East						A Street From South						Melcher Street From West						
Start Time	Right	Thru	Left	Peds EB	Peds WB	App. Total	Right	Thru	Left	Peds SB	Peds NB	App. Total	Right	Thru	Left	Peds WB	Peds EB	App. Total	Right	Thru	Left	Peds NB	Peds SB	App. Total	Int. Total
08:00 AM	0	0	0	1	2	3	0	0	0	6	11	17	0	10	0	6	9	25	0	0	0	25	13	38	83
08:15 AM	0	1	0	5	4	10	0	0	0	15	32	47	0	14	1	15	5	35	1	0	0	27	10	38	130
08:30 AM	1	2	0	8	1	12	0	0	0	10	24	34	0	16	0	20	10	46	0	0	0	20	25	45	137
08:45 AM	0	1	0	8	6	15	0	0	0	7	33	40	0	14	3	9	9	35	0	0	3	32	21	56	146
Total Volume	1	4	0	22	13	40	0	0	0	38	100	138	0	54	4	50	33	141	1	0	3	104	69	177	496
% App. Total	2.5	10	0	55	32.5		0	0	0	27.5	72.5		0	38.3	2.8	35.5	23.4		0.6	0	1.7	58.8	39		
PHF	.250	.500	.000	.688	.542	.667	.000	.000	.000	.633	.758	.734	.000	.844	.333	.625	.825	.766	.250	.000	.250	.813	.690	.790	.849

PRECISION DATA INDUSTRIES, LLC
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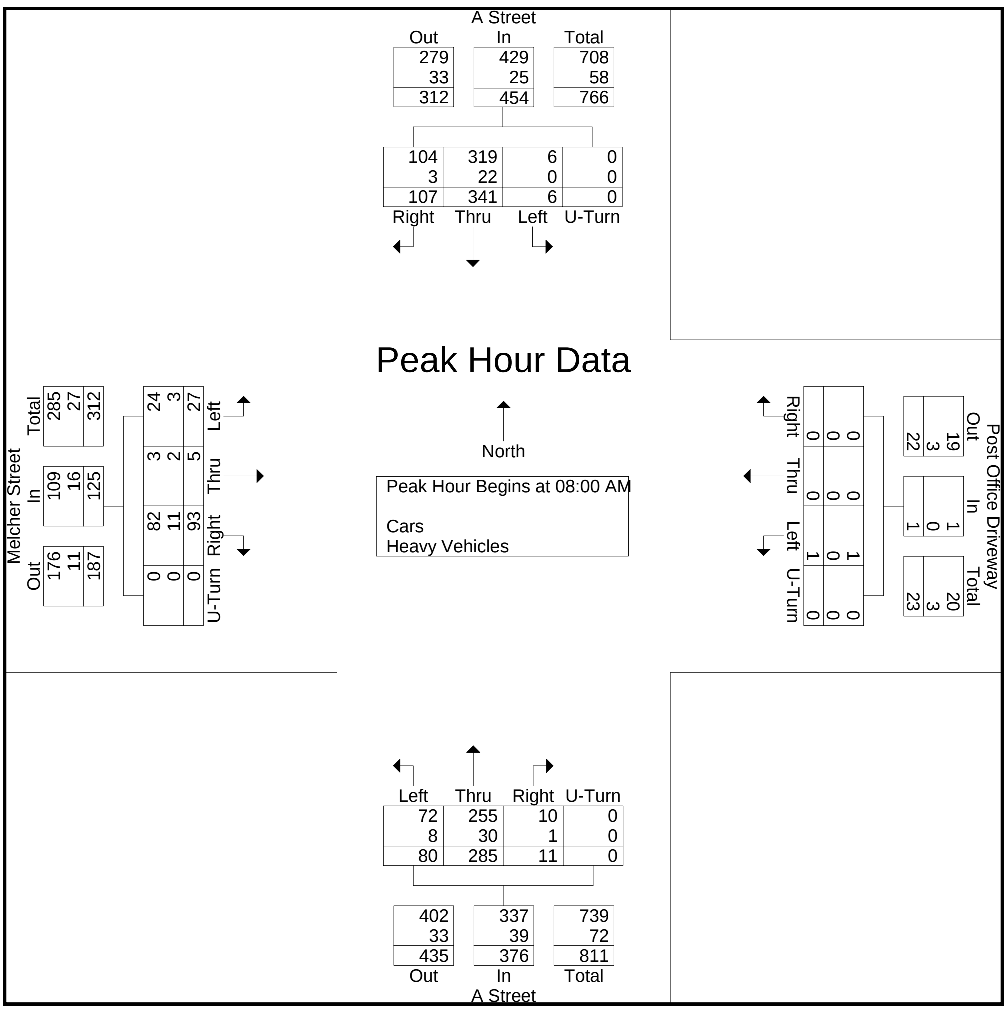
N/S: A Street
E/W:Post Office Driveway/ Melcher Street
City, State: South Boston, MA
Client: VHB/ A. Santiago

File Name : 165050 B
Site Code : 13421
Start Date : 4/27/2016
Page No : 1

	A Street From North					Post Office Driveway From East					A Street From South					Melcher Street From West					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 08:00 AM																					
08:00 AM	25	108	3	0	136	0	0	0	0	0	3	46	18	0	67	26	1	8	0	35	238
08:15 AM	28	82	0	0	110	0	0	0	0	0	2	78	23	0	103	23	1	5	0	29	242
08:30 AM	27	72	1	0	100	0	0	1	0	1	5	77	21	0	103	19	2	8	0	29	233
08:45 AM	27	79	2	0	108	0	0	0	0	0	1	84	18	0	103	25	1	6	0	32	243
Total Volume	107	341	6	0	454	0	0	1	0	1	11	285	80	0	376	93	5	27	0	125	956
% App. Total	23.6	75.1	1.3	0		0	0	100	0		2.9	75.8	21.3	0		74.4	4	21.6	0		
PHF	.955	.789	.500	.000	.835	.000	.000	.250	.000	.250	.550	.848	.870	.000	.913	.894	.625	.844	.000	.893	.984
Cars	104	319	6	0	429	0	0	1	0	1	10	255	72	0	337	82	3	24	0	109	876
% Cars	97.2	93.5	100	0	94.5	0	0	100	0	100	90.9	89.5	90.0	0	89.6	88.2	60.0	88.9	0	87.2	91.6
Heavy Vehicles	3	22	0	0	25	0	0	0	0	0	1	30	8	0	39	11	2	3	0	16	80
% Heavy Vehicles	2.8	6.5	0	0	5.5	0	0	0	0	0	9.1	10.5	10.0	0	10.4	11.8	40.0	11.1	0	12.8	8.4



N/S: A Street
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City, State: South Boston, MA
Client: VHB/ A. Santiago

PRECISION
DATA
INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01752
Office: 508.875.0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

File Name : 165050 BB
Site Code : 13421
Start Date : 4/27/2016

Groups Printed- Cars - Heavy Vehicles

	A Street From North				Post Office Driveway From East				A Street From South				Melcher Street From West				
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Int. Total
04:00 PM	8	71	6	0	0	0	0	0	4	75	20	0	28	3	13	0	228
04:15 PM	8	90	1	0	0	0	0	0	3	67	18	0	30	1	12	0	230
04:30 PM	9	103	6	0	0	0	0	0	11	75	8	0	25	5	8	0	250
04:45 PM	14	98	3	0	0	0	0	0	7	72	24	0	29	1	14	0	262
Total	39	362	16	0	0	0	0	0	25	289	70	0	112	10	47	0	970
05:00 PM	20	98	1	0	0	0	0	0	3	92	23	0	18	1	16	0	272
05:15 PM	20	99	1	0	0	0	0	0	1	66	25	0	17	1	23	0	253
05:30 PM	14	75	1	0	0	0	0	0	2	109	24	0	28	3	16	0	272
05:45 PM	9	84	0	0	0	0	0	0	1	98	18	0	26	1	17	0	254
Total	63	356	3	0	0	0	0	0	7	365	90	0	89	6	72	0	1051
Grand Total	102	718	19	0	0	0	0	0	32	654	160	0	201	16	119	0	2021
Apprch %	12.2	85.6	2.3	0	0	0	0	0	3.8	77.3	18.9	0	59.8	4.8	35.4	0	
Total %	5	35.5	0.9	0	0	0	0	0	1.6	32.4	7.9	0	9.9	0.8	5.9	0	
Cars	99	689	19	0	0	0	0	0	32	626	138	0	174	6	119	0	1902
% Cars	97.1	96	100	0	0	0	0	0	100	95.7	86.2	0	86.6	37.5	100	0	94.1
Heavy Vehicles	3	29	0	0	0	0	0	0	0	28	22	0	27	10	0	0	119
% Heavy Vehicles	2.9	4	0	0	0	0	0	0	0	4.3	13.8	0	13.4	62.5	0	0	5.9

	A Street From North					Post Office Driveway From East					A Street From South					Melcher Street From West					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:45 PM																					
04:45 PM	14	98	3	0	115	0	0	0	0	0	7	72	24	0	103	29	1	14	0	44	262
05:00 PM	20	98	1	0	119	0	0	0	0	0	3	92	23	0	118	18	1	16	0	35	272
05:15 PM	20	99	1	0	120	0	0	0	0	0	1	66	25	0	92	17	1	23	0	41	253
05:30 PM	14	75	1	0	90	0	0	0	0	0	2	109	24	0	135	28	3	16	0	47	272
Total Volume	68	370	6	0	444	0	0	0	0	0	13	339	96	0	448	92	6	69	0	167	1059
% App. Total	15.3	83.3	1.4	0		0	0	0	0		2.9	75.7	21.4	0		55.1	3.6	41.3	0		
PHF	.850	.934	.500	.000	.925	.000	.000	.000	.000	.000	.464	.778	.960	.000	.830	.793	.500	.750	.000	.888	.973
Cars	66	355	6	0	427	0	0	0	0	0	13	328	83	0	424	80	1	69	0	150	1001
% Cars	97.1	95.9	100	0	96.2	0	0	0	0	0	100	96.8	86.5	0	94.6	87.0	16.7	100	0	89.8	94.5
Heavy Vehicles	2	15	0	0	17	0	0	0	0	0	0	11	13	0	24	12	5	0	0	17	58
% Heavy Vehicles	2.9	4.1	0	0	3.8	0	0	0	0	0	0	3.2	13.5	0	5.4	13.0	83.3	0	0	10.2	5.5

N/S: A Street
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City, State: South Boston, MA
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PRECISION DATA INDUSTRIES, LLC
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File Name : 165050 BB
Site Code : 13421
Start Date : 4/27/2016

Groups Printed- Cars

	A Street From North				Post Office Driveway From East				A Street From South				Melcher Street From West				
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Int. Total
04:00 PM	7	69	6	0	0	0	0	0	4	70	16	0	21	2	13	0	208
04:15 PM	8	86	1	0	0	0	0	0	3	61	15	0	29	1	12	0	216
04:30 PM	9	100	6	0	0	0	0	0	11	72	6	0	19	2	8	0	233
04:45 PM	14	94	3	0	0	0	0	0	7	70	22	0	25	0	14	0	249
Total	38	349	16	0	0	0	0	0	25	273	59	0	94	5	47	0	906
05:00 PM	19	96	1	0	0	0	0	0	3	89	20	0	18	0	16	0	262
05:15 PM	20	96	1	0	0	0	0	0	1	62	21	0	13	0	23	0	237
05:30 PM	13	69	1	0	0	0	0	0	2	107	20	0	24	1	16	0	253
05:45 PM	9	79	0	0	0	0	0	0	1	95	18	0	25	0	17	0	244
Total	61	340	3	0	0	0	0	0	7	353	79	0	80	1	72	0	996
Grand Total	99	689	19	0	0	0	0	0	32	626	138	0	174	6	119	0	1902
Apprch %	12.3	85.4	2.4	0	0	0	0	0	4	78.6	17.3	0	58.2	2	39.8	0	
Total %	5.2	36.2	1	0	0	0	0	0	1.7	32.9	7.3	0	9.1	0.3	6.3	0	

Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 04:45 PM

	A Street From North					Post Office Driveway From East					A Street From South					Melcher Street From West					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
04:45 PM	14	94	3	0	111	0	0	0	0	0	7	70	22	0	99	25	0	14	0	39	249
05:00 PM	19	96	1	0	116	0	0	0	0	0	3	89	20	0	112	18	0	16	0	34	262
05:15 PM	20	96	1	0	117	0	0	0	0	0	1	62	21	0	84	13	0	23	0	36	237
05:30 PM	13	69	1	0	83	0	0	0	0	0	2	107	20	0	129	24	1	16	0	41	253
Total Volume	66	355	6	0	427	0	0	0	0	0	13	328	83	0	424	80	1	69	0	150	1001
% App. Total	15.5	83.1	1.4	0		0	0	0	0		3.1	77.4	19.6	0		53.3	0.7	46	0		
PHF	.825	.924	.500	.000	.912	.000	.000	.000	.000	.000	.464	.766	.943	.000	.822	.800	.250	.750	.000	.915	.955

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File Name : 165050 BB
Site Code : 13421
Start Date : 4/27/2016

Groups Printed- Heavy Vehicles

	A Street From North				Post Office Driveway From East				A Street From South				Melcher Street From West				
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Int. Total
04:00 PM	1	2	0	0	0	0	0	0	0	5	4	0	7	1	0	0	20
04:15 PM	0	4	0	0	0	0	0	0	0	6	3	0	1	0	0	0	14
04:30 PM	0	3	0	0	0	0	0	0	0	3	2	0	6	3	0	0	17
04:45 PM	0	4	0	0	0	0	0	0	0	2	2	0	4	1	0	0	13
Total	1	13	0	0	0	0	0	0	0	16	11	0	18	5	0	0	64
05:00 PM	1	2	0	0	0	0	0	0	0	3	3	0	0	1	0	0	10
05:15 PM	0	3	0	0	0	0	0	0	0	4	4	0	4	1	0	0	16
05:30 PM	1	6	0	0	0	0	0	0	0	2	4	0	4	2	0	0	19
05:45 PM	0	5	0	0	0	0	0	0	0	3	0	0	1	1	0	0	10
Total	2	16	0	0	0	0	0	0	0	12	11	0	9	5	0	0	55
Grand Total	3	29	0	0	0	0	0	0	0	28	22	0	27	10	0	0	119
Apprch %	9.4	90.6	0	0	0	0	0	0	0	56	44	0	73	27	0	0	
Total %	2.5	24.4	0	0	0	0	0	0	0	23.5	18.5	0	22.7	8.4	0	0	

	A Street From North					Post Office Driveway From East					A Street From South					Melcher Street From West					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:00 PM																					
04:00 PM	1	2	0	0	3	0	0	0	0	0	0	5	4	0	9	7	1	0	0	8	20
04:15 PM	0	4	0	0	4	0	0	0	0	0	0	6	3	0	9	1	0	0	0	1	14
04:30 PM	0	3	0	0	3	0	0	0	0	0	0	3	2	0	5	6	3	0	0	9	17
04:45 PM	0	4	0	0	4	0	0	0	0	0	0	2	2	0	4	4	1	0	0	5	13
Total Volume	1	13	0	0	14	0	0	0	0	0	0	16	11	0	27	18	5	0	0	23	64
% App. Total	7.1	92.9	0	0		0	0	0	0		0	59.3	40.7	0		78.3	21.7	0	0		
PHF	.250	.813	.000	.000	.875	.000	.000	.000	.000	.000	.000	.667	.688	.000	.750	.643	.417	.000	.000	.639	.800

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File Name : 165050 BB
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Start Date : 4/27/2016
Page No : 1

Groups Printed- Peds and Bikes

	A Street From North					Post Office Driveway From East					A Street From South					Melcher Street From West					
Start Time	Right	Thru	Left	Peds EB	Peds WB	Right	Thru	Left	Peds SB	Peds NB	Right	Thru	Left	Peds WB	Peds EB	Right	Thru	Left	Peds NB	Peds SB	Int. Total
04:00 PM	0	6	0	2	3	0	0	0	17	8	0	4	0	8	14	1	0	0	3	19	85
04:15 PM	0	4	0	5	5	0	0	0	7	10	0	0	0	13	10	1	0	0	16	19	90
04:30 PM	0	3	0	4	3	0	1	0	11	10	0	1	0	11	10	0	0	0	7	21	82
04:45 PM	1	6	0	4	9	0	0	0	13	10	0	4	1	18	9	3	0	1	6	24	109
Total	1	19	0	15	20	0	1	0	48	38	0	9	1	50	43	5	0	1	32	83	366
05:00 PM	1	5	0	6	9	0	0	0	16	21	0	1	0	16	10	1	0	0	9	50	145
05:15 PM	1	16	0	10	6	0	0	0	14	22	0	0	2	12	14	1	0	0	7	34	139
05:30 PM	1	6	0	4	15	0	0	0	29	14	0	5	0	10	16	4	0	0	12	31	147
05:45 PM	1	11	0	10	5	0	0	0	29	15	0	2	1	7	8	5	0	0	10	30	134
Total	4	38	0	30	35	0	0	0	88	72	0	8	3	45	48	11	0	0	38	145	565
Grand Total	5	57	0	45	55	0	1	0	136	110	0	17	4	95	91	16	0	1	70	228	931
Apprch %	3.1	35.2	0	27.8	34	0	0.4	0	55.1	44.5	0	8.2	1.9	45.9	44	5.1	0	0.3	22.2	72.4	
Total %	0.5	6.1	0	4.8	5.9	0	0.1	0	14.6	11.8	0	1.8	0.4	10.2	9.8	1.7	0	0.1	7.5	24.5	

	A Street From North						Post Office Driveway From East						A Street From South						Melcher Street From West						
Start Time	Right	Thru	Left	Peds EB	Peds WB	App. Total	Right	Thru	Left	Peds SB	Peds NB	App. Total	Right	Thru	Left	Peds WB	Peds EB	App. Total	Right	Thru	Left	Peds NB	Peds SB	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 05:00 PM																									
05:00 PM	1	5	0	6	9	21	0	0	0	16	21	37	0	1	0	16	10	27	1	0	0	9	50	60	145
05:15 PM	1	16	0	10	6	33	0	0	0	14	22	36	0	0	2	12	14	28	1	0	0	7	34	42	139
05:30 PM	1	6	0	4	15	26	0	0	0	29	14	43	0	5	0	10	16	31	4	0	0	12	31	47	147
05:45 PM	1	11	0	10	5	27	0	0	0	29	15	44	0	2	1	7	8	18	5	0	0	10	30	45	134
Total Volume	4	38	0	30	35	107	0	0	0	88	72	160	0	8	3	45	48	104	11	0	0	38	145	194	565
% App. Total	3.7	35.5	0	28	32.7		0	0	0	55	45		0	7.7	2.9	43.3	46.2		5.7	0	0	19.6	74.7		
PHF	1.0 0	.594	.000	.750	.583	.811	.000	.000	.000	.759	.818	.909	.000	.400	.375	.703	.750	.839	.550	.000	.000	.792	.725	.808	.961

N/S: A Street
E/W:Post Office Driveway/ Melcher Street
City, State: South Boston, MA
Client: VHB/ A. Santiago

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01752
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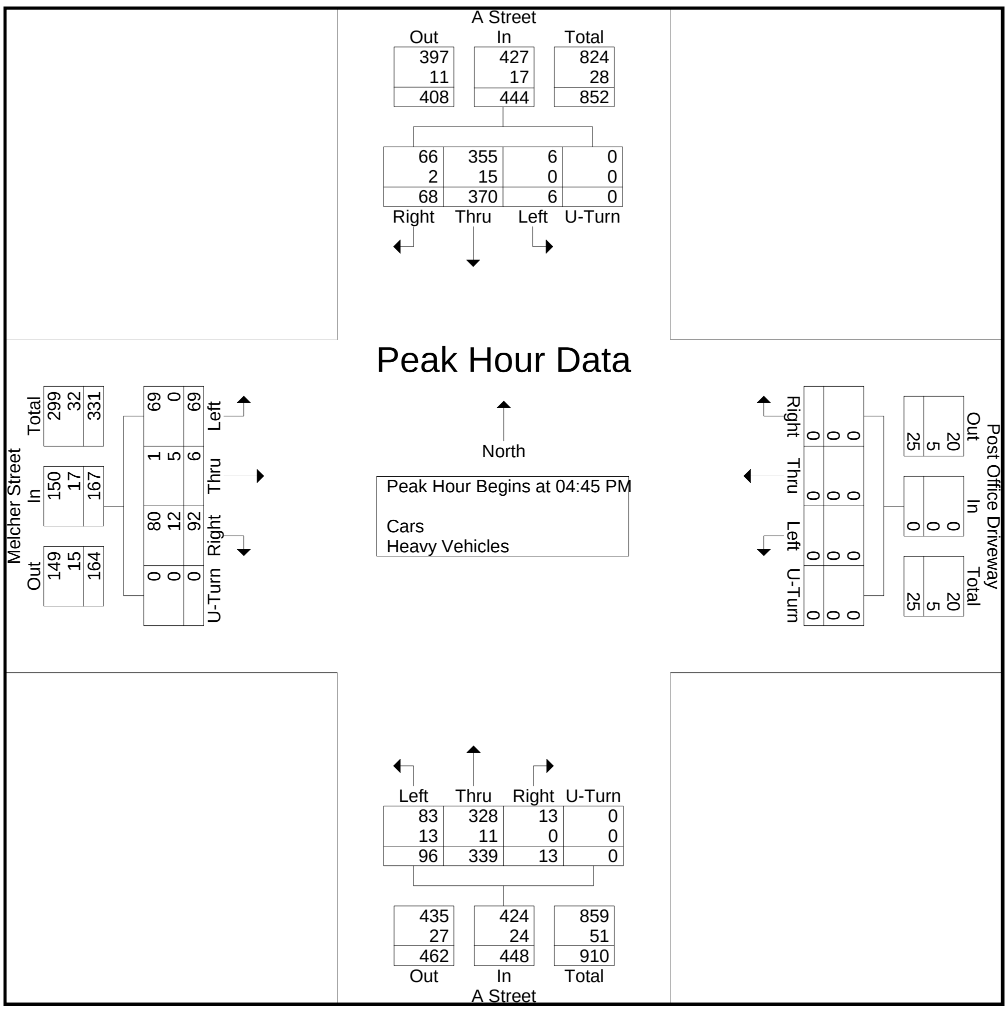
Email: datarequests@pdillc.com

File Name : 165050 BB
Site Code : 13421
Start Date : 4/27/2016
Page No : 1

	A Street From North					Post Office Driveway From East					A Street From South					Melcher Street From West					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:45 PM																					
04:45 PM	14	98	3	0	115	0	0	0	0	0	7	72	24	0	103	29	1	14	0	44	262
05:00 PM	20	98	1	0	119	0	0	0	0	0	3	92	23	0	118	18	1	16	0	35	272
05:15 PM	20	99	1	0	120	0	0	0	0	0	1	66	25	0	92	17	1	23	0	41	253
05:30 PM	14	75	1	0	90	0	0	0	0	0	2	109	24	0	135	28	3	16	0	47	272
Total Volume	68	370	6	0	444	0	0	0	0	0	13	339	96	0	448	92	6	69	0	167	1059
% App. Total	15.3	83.3	1.4	0		0	0	0	0		2.9	75.7	21.4	0		55.1	3.6	41.3	0		
PHF	.850	.934	.500	.000	.925	.000	.000	.000	.000	.000	.464	.778	.960	.000	.830	.793	.500	.750	.000	.888	.973
Cars	66	355	6	0	427	0	0	0	0	0	13	328	83	0	424	80	1	69	0	150	1001
% Cars	97.1	95.9	100	0	96.2	0	0	0	0	0	100	96.8	86.5	0	94.6	87.0	16.7	100	0	89.8	94.5
Heavy Vehicles	2	15	0	0	17	0	0	0	0	0	0	11	13	0	24	12	5	0	0	17	58
% Heavy Vehicles	2.9	4.1	0	0	3.8	0	0	0	0	0	0	3.2	13.5	0	5.4	13.0	83.3	0	0	10.2	5.5



N/S: A Street
W: Necco Court
City, State: South Boston, MA
Client: VHB/ A. Santiago

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01752
Office: 508.875.0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

File Name : 165050 C
Site Code : 13421
Start Date : 4/27/2016

Groups Printed- Cars - Heavy Vehicles

	A Street From North			A Street From South			Necco Court From West			
Start Time	Right	Thru	U-Turn	Thru	Left	U-Turn	Right	Left	U-Turn	Int. Total
07:00 AM	1	81	0	44	0	0	1	1	0	128
07:15 AM	1	89	0	67	1	0	1	0	0	159
07:30 AM	1	95	0	83	1	0	0	0	0	180
07:45 AM	0	84	0	74	1	0	0	0	0	159
Total	3	349	0	268	3	0	2	1	0	626
08:00 AM	1	129	0	70	1	0	0	0	0	201
08:15 AM	0	108	0	102	1	0	0	1	0	212
08:30 AM	3	93	0	100	1	0	1	1	0	199
08:45 AM	1	99	0	108	3	0	2	0	0	213
Total	5	429	0	380	6	0	3	2	0	825
Grand Total	8	778	0	648	9	0	5	3	0	1451
Apprch %	1	99	0	98.6	1.4	0	62.5	37.5	0	
Total %	0.6	53.6	0	44.7	0.6	0	0.3	0.2	0	
Cars	6	719	0	580	8	0	4	1	0	1318
% Cars	75	92.4	0	89.5	88.9	0	80	33.3	0	90.8
Heavy Vehicles	2	59	0	68	1	0	1	2	0	133
% Heavy Vehicles	25	7.6	0	10.5	11.1	0	20	66.7	0	9.2

Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Entire Intersection Begins at 08:00 AM

	A Street From North				A Street From South				Necco Court From West				
Start Time	Right	Thru	U-Turn	App. Total	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Int. Total
08:00 AM	1	129	0	130	70	1	0	71	0	0	0	0	201
08:15 AM	0	108	0	108	102	1	0	103	0	1	0	1	212
08:30 AM	3	93	0	96	100	1	0	101	1	1	0	2	199
08:45 AM	1	99	0	100	108	3	0	111	2	0	0	2	213
Total Volume	5	429	0	434	380	6	0	386	3	2	0	5	825
% App. Total	1.2	98.8	0		98.4	1.6	0		60	40	0		
PHF	.417	.831	.000	.835	.880	.500	.000	.869	.375	.500	.000	.625	.968
Cars	4	399	0	403	345	5	0	350	3	1	0	4	757
% Cars	80.0	93.0	0	92.9	90.8	83.3	0	90.7	100	50.0	0	80.0	91.8
Heavy Vehicles	1	30	0	31	35	1	0	36	0	1	0	1	68
% Heavy Vehicles	20.0	7.0	0	7.1	9.2	16.7	0	9.3	0	50.0	0	20.0	8.2

N/S: A Street
W: Necco Court
City, State: South Boston, MA
Client: VHB/ A. Santiago

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01752
Office: 508.875.0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

File Name : 165050 C
Site Code : 13421
Start Date : 4/27/2016

Groups Printed- Cars

	A Street From North			A Street From South			Necco Court From West			
Start Time	Right	Thru	U-Turn	Thru	Left	U-Turn	Right	Left	U-Turn	Int. Total
07:00 AM	0	75	0	41	0	0	1	0	0	117
07:15 AM	1	84	0	60	1	0	0	0	0	146
07:30 AM	1	86	0	72	1	0	0	0	0	160
07:45 AM	0	75	0	62	1	0	0	0	0	138
Total	2	320	0	235	3	0	1	0	0	561
08:00 AM	1	119	0	67	0	0	0	0	0	187
08:15 AM	0	100	0	89	1	0	0	0	0	190
08:30 AM	3	89	0	88	1	0	1	1	0	183
08:45 AM	0	91	0	101	3	0	2	0	0	197
Total	4	399	0	345	5	0	3	1	0	757
Grand Total	6	719	0	580	8	0	4	1	0	1318
Apprch %	0.8	99.2	0	98.6	1.4	0	80	20	0	
Total %	0.5	54.6	0	44	0.6	0	0.3	0.1	0	

	A Street From North				A Street From South				Necco Court From West				
Start Time	Right	Thru	U-Turn	App. Total	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 08:00 AM													
08:00 AM	1	119	0	120	67	0	0	67	0	0	0	0	187
08:15 AM	0	100	0	100	89	1	0	90	0	0	0	0	190
08:30 AM	3	89	0	92	88	1	0	89	1	1	0	2	183
08:45 AM	0	91	0	91	101	3	0	104	2	0	0	2	197
Total Volume	4	399	0	403	345	5	0	350	3	1	0	4	757
% App. Total	1	99	0		98.6	1.4	0		75	25	0		
PHF	.333	.838	.000	.840	.854	.417	.000	.841	.375	.250	.000	.500	.961

N/S: A Street
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Client: VHB/ A. Santiago

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File Name : 165050 C
Site Code : 13421
Start Date : 4/27/2016
Page No : 1

Groups Printed- Heavy Vehicles

	A Street From North			A Street From South			Necco Court From West			
Start Time	Right	Thru	U-Turn	Thru	Left	U-Turn	Right	Left	U-Turn	Int. Total
07:00 AM	1	6	0	3	0	0	0	1	0	11
07:15 AM	0	5	0	7	0	0	1	0	0	13
07:30 AM	0	9	0	11	0	0	0	0	0	20
07:45 AM	0	9	0	12	0	0	0	0	0	21
Total	1	29	0	33	0	0	1	1	0	65
08:00 AM	0	10	0	3	1	0	0	0	0	14
08:15 AM	0	8	0	13	0	0	0	1	0	22
08:30 AM	0	4	0	12	0	0	0	0	0	16
08:45 AM	1	8	0	7	0	0	0	0	0	16
Total	1	30	0	35	1	0	0	1	0	68
Grand Total	2	59	0	68	1	0	1	2	0	133
Apprch %	3.3	96.7	0	98.6	1.4	0	33.3	66.7	0	
Total %	1.5	44.4	0	51.1	0.8	0	0.8	1.5	0	

	A Street From North				A Street From South				Necco Court From West				
Start Time	Right	Thru	U-Turn	App. Total	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 07:30 AM													
07:30 AM	0	9	0	9	11	0	0	11	0	0	0	0	20
07:45 AM	0	9	0	9	12	0	0	12	0	0	0	0	21
08:00 AM	0	10	0	10	3	1	0	4	0	0	0	0	14
08:15 AM	0	8	0	8	13	0	0	13	0	1	0	1	22
Total Volume	0	36	0	36	39	1	0	40	0	1	0	1	77
% App. Total	0	100	0		97.5	2.5	0		0	100	0		
PHF	.000	.900	.000	.900	.750	.250	.000	.769	.000	.250	.000	.250	.875

N/S: A Street
W: Necco Court
City, State: South Boston, MA
Client: VHB/ A. Santiago

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46 Morton Street, Framingham, MA 01752
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File Name : 165050 C
Site Code : 13421
Start Date : 4/27/2016
Page No : 1

Groups Printed- Peds and Bikes

	A Street From North				A Street From South				Necco Court From West				
Start Time	Right	Thru	Peds EB	Peds WB	Thru	Left	Peds WB	Peds EB	Right	Left	Peds NB	Peds SB	Int. Total
07:00 AM	0	0	0	0	3	1	0	0	0	0	13	5	22
07:15 AM	0	2	1	0	6	0	0	0	0	0	20	3	32
07:30 AM	0	1	0	0	3	0	0	0	0	0	16	9	29
07:45 AM	0	1	0	0	9	0	2	0	0	0	24	13	49
Total	0	4	1	0	21	1	2	0	0	0	73	30	132
08:00 AM	0	3	0	0	10	0	1	0	0	0	28	19	61
08:15 AM	0	2	1	1	13	0	0	2	0	0	35	21	75
08:30 AM	1	1	3	0	20	1	0	0	0	0	30	35	91
08:45 AM	0	1	1	1	18	0	1	1	0	0	40	28	91
Total	1	7	5	2	61	1	2	3	0	0	133	103	318
Grand Total	1	11	6	2	82	2	4	3	0	0	206	133	450
Apprch %	5	55	30	10	90.1	2.2	4.4	3.3	0	0	60.8	39.2	
Total %	0.2	2.4	1.3	0.4	18.2	0.4	0.9	0.7	0	0	45.8	29.6	

	A Street From North					A Street From South					Necco Court From West					
Start Time	Right	Thru	Peds EB	Peds WB	App. Total	Thru	Left	Peds WB	Peds EB	App. Total	Right	Left	Peds NB	Peds SB	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																
Peak Hour for Entire Intersection Begins at 08:00 AM																
08:00 AM	0	3	0	0	3	10	0	1	0	11	0	0	28	19	47	61
08:15 AM	0	2	1	1	4	13	0	0	2	15	0	0	35	21	56	75
08:30 AM	1	1	3	0	5	20	1	0	0	21	0	0	30	35	65	91
08:45 AM	0	1	1	1	3	18	0	1	1	20	0	0	40	28	68	91
Total Volume	1	7	5	2	15	61	1	2	3	67	0	0	133	103	236	318
% App. Total	6.7	46.7	33.3	13.3		91	1.5	3	4.5		0	0	56.4	43.6		
PHF	.250	.583	.417	.500	.750	.763	.250	.500	.375	.798	.000	.000	.831	.736	.868	.874

N/S: A Street
W: Necco Court
City, State: South Boston, MA
Client: VHB/ A. Santiago

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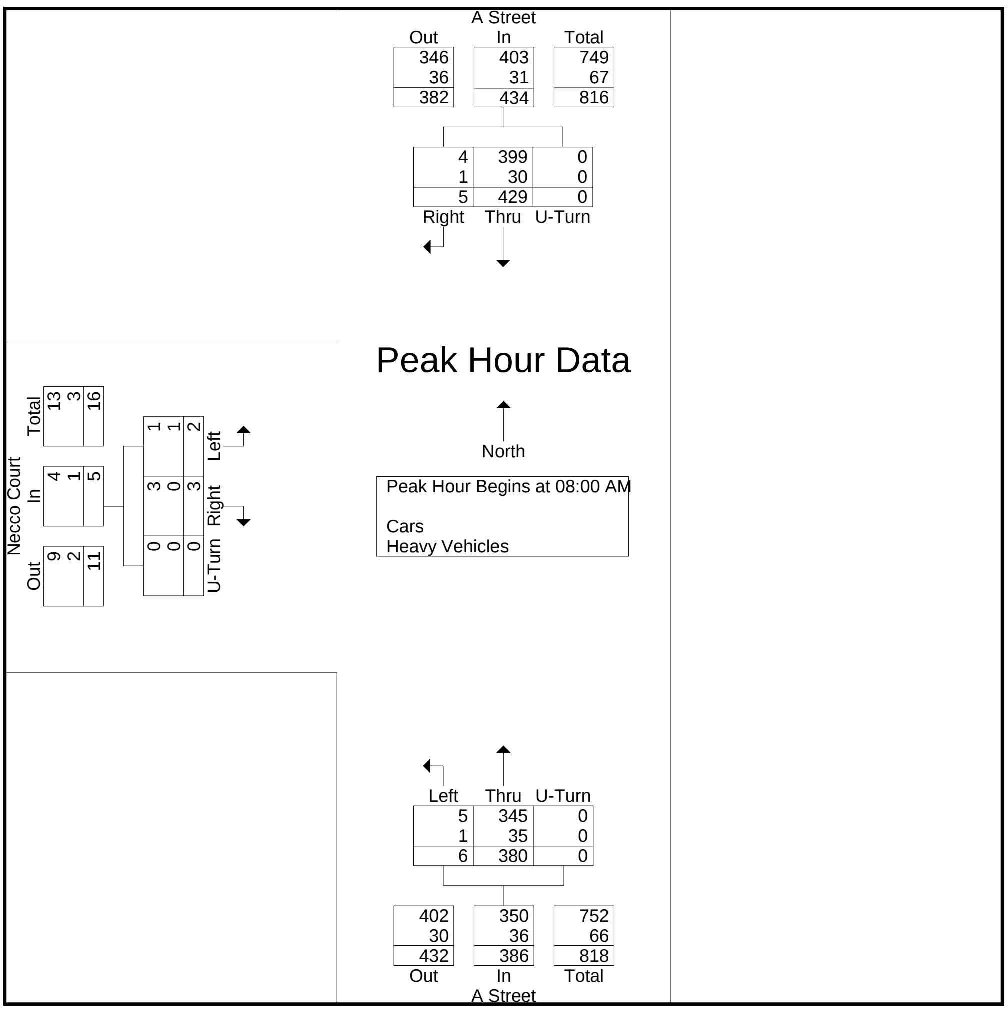
File Name : 165050 C
Site Code : 13421
Start Date : 4/27/2016
Page No : 1

	A Street **From North**				**A Street** **From South**				**Necco Court** **From West**				
Start Time	Right	Thru	U-Turn	App. Total	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 08:00 AM													
08:00 AM	1	129	0	130	70	1	0	71	0	0	0	0	201
08:15 AM	0	108	0	108	102	1	0	103	0	1	0	1	212
08:30 AM	3	93	0	96	100	1	0	101	1	1	0	2	199
08:45 AM	1	99	0	100	108	3	0	111	2	0	0	2	213
Total Volume	5	429	0	434	380	6	0	386	3	2	0	5	825
% App. Total	1.2	98.8	0		98.4	1.6	0		60	40	0		
PHF	.417	.831	.000	.835	.880	.500	.000	.869	.375	.500	.000	.625	.968
Cars	4	399	0	403	345	5	0	350	3	1	0	4	757
% Cars	80.0	93.0	0	92.9	90.8	83.3	0	90.7	100	50.0	0	80.0	91.8
Heavy Vehicles	1	30	0	31	35	1	0	36	0	1	0	1	68
% Heavy Vehicles	20.0	7.0	0	7.1	9.2	16.7	0	9.3	0	50.0	0	20.0	8.2



N/S: A Street
W: Necco Court
City, State: South Boston, MA
Client: VHB/ A. Santiago

PRECISION DATA INDUSTRIES, LLC

46 Morton Street, Framingham, MA 01752
Office: 508.875.0100 Fax: 508-875-0118
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File Name : 165050 CC
Site Code : 13421
Start Date : 4/27/2016

Groups Printed- Cars - Heavy Vehicles

	A Street From North			A Street From South			Necco Court From West			
Start Time	Right	Thru	U-Turn	Thru	Left	U-Turn	Right	Left	U-Turn	Int. Total
04:00 PM	0	106	0	93	0	0	1	3	0	203
04:15 PM	0	118	0	91	0	0	1	0	0	210
04:30 PM	1	123	0	92	0	0	1	0	0	217
04:45 PM	2	125	0	107	1	0	1	0	0	236
Total	3	472	0	383	1	0	4	3	0	866
05:00 PM	1	116	0	113	3	0	2	3	0	238
05:15 PM	3	114	1	101	1	0	1	1	0	222
05:30 PM	0	104	0	130	1	0	1	2	0	238
05:45 PM	1	110	0	123	3	0	1	1	0	239
Total	5	444	1	467	8	0	5	7	0	937
Grand Total	8	916	1	850	9	0	9	10	0	1803
Apprch %	0.9	99	0.1	99	1	0	47.4	52.6	0	
Total %	0.4	50.8	0.1	47.1	0.5	0	0.5	0.6	0	
Cars	7	861	1	803	8	0	8	10	0	1698
% Cars	87.5	94	100	94.5	88.9	0	88.9	100	0	94.2
Heavy Vehicles	1	55	0	47	1	0	1	0	0	105
% Heavy Vehicles	12.5	6	0	5.5	11.1	0	11.1	0	0	5.8

	A Street From North				A Street From South				Necco Court From West				
Start Time	Right	Thru	U-Turn	App. Total	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 05:00 PM													
05:00 PM	1	116	0	117	113	3	0	116	2	3	0	5	238
05:15 PM	3	114	1	118	101	1	0	102	1	1	0	2	222
05:30 PM	0	104	0	104	130	1	0	131	1	2	0	3	238
05:45 PM	1	110	0	111	123	3	0	126	1	1	0	2	239
Total Volume	5	444	1	450	467	8	0	475	5	7	0	12	937
% App. Total	1.1	98.7	0.2		98.3	1.7	0		41.7	58.3	0		
PHF	.417	.957	.250	.953	.898	.667	.000	.906	.625	.583	.000	.600	.980
Cars	5	420	1	426	444	7	0	451	4	7	0	11	888
% Cars	100	94.6	100	94.7	95.1	87.5	0	94.9	80.0	100	0	91.7	94.8
Heavy Vehicles	0	24	0	24	23	1	0	24	1	0	0	1	49
% Heavy Vehicles	0	5.4	0	5.3	4.9	12.5	0	5.1	20.0	0	0	8.3	5.2

N/S: A Street
W: Necco Court
City, State: South Boston, MA
Client: VHB/ A. Santiago

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01752
Office: 508.875.0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

File Name : 165050 CC
Site Code : 13421
Start Date : 4/27/2016

Groups Printed- Cars

	A Street From North			A Street From South			Necco Court From West			
Start Time	Right	Thru	U-Turn	Thru	Left	U-Turn	Right	Left	U-Turn	Int. Total
04:00 PM	0	96	0	85	0	0	1	3	0	185
04:15 PM	0	114	0	84	0	0	1	0	0	199
04:30 PM	1	114	0	87	0	0	1	0	0	203
04:45 PM	1	117	0	103	1	0	1	0	0	223
Total	2	441	0	359	1	0	4	3	0	810
05:00 PM	1	113	0	107	2	0	2	3	0	228
05:15 PM	3	108	1	94	1	0	1	1	0	209
05:30 PM	0	96	0	123	1	0	0	2	0	222
05:45 PM	1	103	0	120	3	0	1	1	0	229
Total	5	420	1	444	7	0	4	7	0	888
Grand Total	7	861	1	803	8	0	8	10	0	1698
Apprch %	0.8	99.1	0.1	99	1	0	44.4	55.6	0	
Total %	0.4	50.7	0.1	47.3	0.5	0	0.5	0.6	0	

	A Street From North				A Street From South				Necco Court From West				
Start Time	Right	Thru	U-Turn	App. Total	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 05:00 PM													
05:00 PM	1	113	0	114	107	2	0	109	2	3	0	5	228
05:15 PM	3	108	1	112	94	1	0	95	1	1	0	2	209
05:30 PM	0	96	0	96	123	1	0	124	0	2	0	2	222
05:45 PM	1	103	0	104	120	3	0	123	1	1	0	2	229
Total Volume	5	420	1	426	444	7	0	451	4	7	0	11	888
% App. Total	1.2	98.6	0.2		98.4	1.6	0		36.4	63.6	0		
PHF	.417	.929	.250	.934	.902	.583	.000	.909	.500	.583	.000	.550	.969

N/S: A Street
W: Necco Court
City, State: South Boston, MA
Client: VHB/ A. Santiago

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01752
Office: 508.875.0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

File Name : 165050 CC
Site Code : 13421
Start Date : 4/27/2016
Page No : 1

Groups Printed- Heavy Vehicles

	A Street From North			A Street From South			Necco Court From West			
Start Time	Right	Thru	U-Turn	Thru	Left	U-Turn	Right	Left	U-Turn	Int. Total
04:00 PM	0	10	0	8	0	0	0	0	0	18
04:15 PM	0	4	0	7	0	0	0	0	0	11
04:30 PM	0	9	0	5	0	0	0	0	0	14
04:45 PM	1	8	0	4	0	0	0	0	0	13
Total	1	31	0	24	0	0	0	0	0	56
05:00 PM	0	3	0	6	1	0	0	0	0	10
05:15 PM	0	6	0	7	0	0	0	0	0	13
05:30 PM	0	8	0	7	0	0	1	0	0	16
05:45 PM	0	7	0	3	0	0	0	0	0	10
Total	0	24	0	23	1	0	1	0	0	49
Grand Total	1	55	0	47	1	0	1	0	0	105
Apprch %	1.8	98.2	0	97.9	2.1	0	100	0	0	
Total %	1	52.4	0	44.8	1	0	1	0	0	

	A Street From North				A Street From South				Necco Court From West				
Start Time	Right	Thru	U-Turn	App. Total	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 04:00 PM													
04:00 PM	0	10	0	10	8	0	0	8	0	0	0	0	18
04:15 PM	0	4	0	4	7	0	0	7	0	0	0	0	11
04:30 PM	0	9	0	9	5	0	0	5	0	0	0	0	14
04:45 PM	1	8	0	9	4	0	0	4	0	0	0	0	13
Total Volume	1	31	0	32	24	0	0	24	0	0	0	0	56
% App. Total	3.1	96.9	0		100	0	0		0	0	0		
PHF	.250	.775	.000	.800	.750	.000	.000	.750	.000	.000	.000	.000	.778

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N/S: A Street
W: Necco Court
City, State: South Boston, MA
Client: VHB/ A. Santiago

File Name : 165050 CC
Site Code : 13421
Start Date : 4/27/2016
Page No : 1

Groups Printed- Peds and Bikes

	A Street From North				A Street From South				Necco Court From West				
Start Time	Right	Thru	Peds EB	Peds WB	Thru	Left	Peds WB	Peds EB	Right	Left	Peds NB	Peds SB	Int. Total
04:00 PM	1	5	0	2	3	0	1	0	0	0	9	17	38
04:15 PM	0	6	0	1	0	0	0	0	1	0	5	16	29
04:30 PM	0	3	0	0	2	0	0	0	0	0	3	19	27
04:45 PM	0	9	0	0	4	0	0	0	0	0	5	29	47
Total	1	23	0	3	9	0	1	0	1	0	22	81	141
05:00 PM	0	7	1	0	2	0	0	1	1	0	13	48	73
05:15 PM	0	17	0	0	3	1	0	0	0	0	14	34	69
05:30 PM	0	10	0	1	5	0	0	0	0	0	18	37	71
05:45 PM	0	14	1	0	4	0	0	0	0	0	9	38	66
Total	0	48	2	1	14	1	0	1	1	0	54	157	279
Grand Total	1	71	2	4	23	1	1	1	2	0	76	238	420
Apprch %	1.3	91	2.6	5.1	88.5	3.8	3.8	3.8	0.6	0	24.1	75.3	
Total %	0.2	16.9	0.5	1	5.5	0.2	0.2	0.2	0.5	0	18.1	56.7	

Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 05:00 PM

	A Street From North					A Street From South					Necco Court From West					
Start Time	Right	Thru	Peds EB	Peds WB	App. Total	Thru	Left	Peds WB	Peds EB	App. Total	Right	Left	Peds NB	Peds SB	App. Total	Int. Total
05:00 PM	0	7	1	0	8	2	0	0	1	3	1	0	13	48	62	73
05:15 PM	0	17	0	0	17	3	1	0	0	4	0	0	14	34	48	69
05:30 PM	0	10	0	1	11	5	0	0	0	5	0	0	18	37	55	71
05:45 PM	0	14	1	0	15	4	0	0	0	4	0	0	9	38	47	66
Total Volume	0	48	2	1	51	14	1	0	1	16	1	0	54	157	212	279
% App. Total	0	94.1	3.9	2		87.5	6.2	0	6.2		0.5	0	25.5	74.1		
PHF	.000	.706	.500	.250	.750	.700	.250	.000	.250	.800	.250	.000	.750	.818	.855	.955

N/S: A Street
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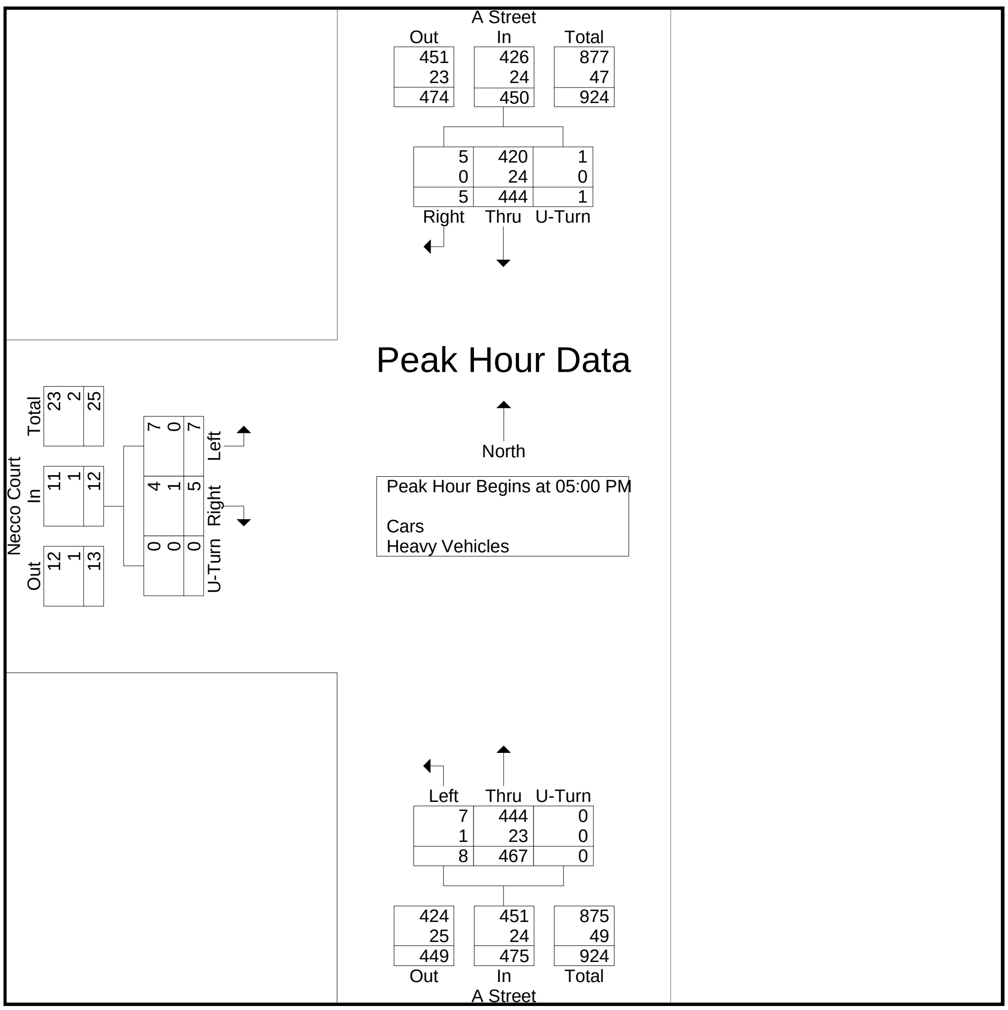
File Name : 165050 CC
Site Code : 13421
Start Date : 4/27/2016

	A Street From North				A Street From South				Necco Court From West				
Start Time	Right	Thru	U-Turn	App. Total	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 05:00 PM													
05:00 PM	1	116	0	117	113	3	0	116	2	3	0	5	238
05:15 PM	3	114	1	118	101	1	0	102	1	1	0	2	222
05:30 PM	0	104	0	104	130	1	0	131	1	2	0	3	238
05:45 PM	1	110	0	111	123	3	0	126	1	1	0	2	239
Total Volume	5	444	1	450	467	8	0	475	5	7	0	12	937
% App. Total	1.1	98.7	0.2		98.3	1.7	0		41.7	58.3	0		
PHF	.417	.957	.250	.953	.898	.667	.000	.906	.625	.583	.000	.600	.980
Cars	5	420	1	426	444	7	0	451	4	7	0	11	888
% Cars	100	94.6	100	94.7	95.1	87.5	0	94.9	80.0	100	0	91.7	94.8
Heavy Vehicles	0	24	0	24	23	1	0	24	1	0	0	1	49
% Heavy Vehicles	0	5.4	0	5.3	4.9	12.5	0	5.1	20.0	0	0	8.3	5.2



N/S: A Street
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File Name : 165050 D
Site Code : 13421
Start Date : 4/27/2016
Page No : 1

Groups Printed- Cars - Heavy Vehicles

	A Street From North			A Street From South			Necco Street From West			
Start Time	Right	Thru	U-Turn	Thru	Left	U-Turn	Right	Left	U-Turn	Int. Total
07:00 AM	14	71	0	43	8	1	9	2	0	148
07:15 AM	18	75	0	69	14	0	16	1	0	193
07:30 AM	16	78	0	81	21	0	19	1	0	216
07:45 AM	14	70	0	73	20	0	18	1	0	196
Total	62	294	0	266	63	1	62	5	0	753
08:00 AM	24	105	0	69	32	0	22	1	0	253
08:15 AM	17	91	0	98	16	0	15	5	0	242
08:30 AM	27	67	0	100	30	0	13	4	0	241
08:45 AM	15	86	0	102	28	0	24	3	0	258
Total	83	349	0	369	106	0	74	13	0	994
Grand Total	145	643	0	635	169	1	136	18	0	1747
Apprch %	18.4	81.6	0	78.9	21	0.1	88.3	11.7	0	
Total %	8.3	36.8	0	36.3	9.7	0.1	7.8	1	0	
Cars	145	585	0	568	152	1	119	16	0	1586
% Cars	100	91	0	89.4	89.9	100	87.5	88.9	0	90.8
Heavy Vehicles	0	58	0	67	17	0	17	2	0	161
% Heavy Vehicles	0	9	0	10.6	10.1	0	12.5	11.1	0	9.2

	A Street From North				A Street From South				Necco Street From West				
Start Time	Right	Thru	U-Turn	App. Total	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 08:00 AM													
08:00 AM	24	105	0	129	69	32	0	101	22	1	0	23	253
08:15 AM	17	91	0	108	98	16	0	114	15	5	0	20	242
08:30 AM	27	67	0	94	100	30	0	130	13	4	0	17	241
08:45 AM	15	86	0	101	102	28	0	130	24	3	0	27	258
Total Volume	83	349	0	432	369	106	0	475	74	13	0	87	994
% App. Total	19.2	80.8	0		77.7	22.3	0		85.1	14.9	0		
PHF	.769	.831	.000	.837	.904	.828	.000	.913	.771	.650	.000	.806	.963
Cars	83	320	0	403	333	97	0	430	62	13	0	75	908
% Cars	100	91.7	0	93.3	90.2	91.5	0	90.5	83.8	100	0	86.2	91.3
Heavy Vehicles	0	29	0	29	36	9	0	45	12	0	0	12	86
% Heavy Vehicles	0	8.3	0	6.7	9.8	8.5	0	9.5	16.2	0	0	13.8	8.7

N/S: A Street
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File Name : 165050 D
Site Code : 13421
Start Date : 4/27/2016

Groups Printed- Cars

	A Street From North			A Street From South			Necco Street From West			
Start Time	Right	Thru	U-Turn	Thru	Left	U-Turn	Right	Left	U-Turn	Int. Total
07:00 AM	14	65	0	41	7	1	8	1	0	137
07:15 AM	18	69	0	61	14	0	16	1	0	179
07:30 AM	16	69	0	71	18	0	18	1	0	193
07:45 AM	14	62	0	62	16	0	15	0	0	169
Total	62	265	0	235	55	1	57	3	0	678
08:00 AM	24	95	0	65	28	0	18	1	0	231
08:15 AM	17	84	0	85	15	0	12	5	0	218
08:30 AM	27	63	0	88	28	0	12	4	0	222
08:45 AM	15	78	0	95	26	0	20	3	0	237
Total	83	320	0	333	97	0	62	13	0	908
Grand Total	145	585	0	568	152	1	119	16	0	1586
Apprch %	19.9	80.1	0	78.8	21.1	0.1	88.1	11.9	0	
Total %	9.1	36.9	0	35.8	9.6	0.1	7.5	1	0	

	A Street From North				A Street From South				Necco Street From West				
Start Time	Right	Thru	U-Turn	App. Total	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 08:00 AM													
08:00 AM	24	95	0	119	65	28	0	93	18	1	0	19	231
08:15 AM	17	84	0	101	85	15	0	100	12	5	0	17	218
08:30 AM	27	63	0	90	88	28	0	116	12	4	0	16	222
08:45 AM	15	78	0	93	95	26	0	121	20	3	0	23	237
Total Volume	83	320	0	403	333	97	0	430	62	13	0	75	908
% App. Total	20.6	79.4	0		77.4	22.6	0		82.7	17.3	0		
PHF	.769	.842	.000	.847	.876	.866	.000	.888	.775	.650	.000	.815	.958

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File Name : 165050 D
Site Code : 13421
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Page No : 1

Groups Printed- Heavy Vehicles

	A Street From North			A Street From South			Necco Street From West			
Start Time	Right	Thru	U-Turn	Thru	Left	U-Turn	Right	Left	U-Turn	Int. Total
07:00 AM	0	6	0	2	1	0	1	1	0	11
07:15 AM	0	6	0	8	0	0	0	0	0	14
07:30 AM	0	9	0	10	3	0	1	0	0	23
07:45 AM	0	8	0	11	4	0	3	1	0	27
Total	0	29	0	31	8	0	5	2	0	75
08:00 AM	0	10	0	4	4	0	4	0	0	22
08:15 AM	0	7	0	13	1	0	3	0	0	24
08:30 AM	0	4	0	12	2	0	1	0	0	19
08:45 AM	0	8	0	7	2	0	4	0	0	21
Total	0	29	0	36	9	0	12	0	0	86
Grand Total	0	58	0	67	17	0	17	2	0	161
Apprch %	0	100	0	79.8	20.2	0	89.5	10.5	0	
Total %	0	36	0	41.6	10.6	0	10.6	1.2	0	

	A Street From North				A Street From South				Necco Street From West				
Start Time	Right	Thru	U-Turn	App. Total	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 07:30 AM													
07:30 AM	0	9	0	9	10	3	0	13	1	0	0	1	23
07:45 AM	0	8	0	8	11	4	0	15	3	1	0	4	27
08:00 AM	0	10	0	10	4	4	0	8	4	0	0	4	22
08:15 AM	0	7	0	7	13	1	0	14	3	0	0	3	24
Total Volume	0	34	0	34	38	12	0	50	11	1	0	12	96
% App. Total	0	100	0		76	24	0		91.7	8.3	0		
PHF	.000	.850	.000	.850	.731	.750	.000	.833	.688	.250	.000	.750	.889

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Groups Printed- Peds and Bikes

	A Street From North				A Street From South				Necco Street From West				
Start Time	Right	Thru	Peds EB	Peds WB	Thru	Left	Peds WB	Peds EB	Right	Left	Peds NB	Peds SB	Int. Total
07:00 AM	0	0	5	5	4	4	0	1	0	0	14	7	40
07:15 AM	0	2	1	5	6	2	0	0	0	0	13	1	30
07:30 AM	0	1	3	6	4	1	0	0	2	0	13	3	33
07:45 AM	0	1	5	7	10	0	0	0	0	0	24	12	59
Total	0	4	14	23	24	7	0	1	2	0	64	23	162
08:00 AM	0	4	9	10	11	3	0	0	2	0	17	14	70
08:15 AM	0	2	6	11	14	2	0	1	3	0	26	10	75
08:30 AM	0	1	8	5	22	5	0	1	1	0	21	27	91
08:45 AM	0	1	16	12	20	2	0	1	2	0	34	16	104
Total	0	8	39	38	67	12	0	3	8	0	98	67	340
Grand Total	0	12	53	61	91	19	0	4	10	0	162	90	502
Apprch %	0	9.5	42.1	48.4	79.8	16.7	0	3.5	3.8	0	61.8	34.4	
Total %	0	2.4	10.6	12.2	18.1	3.8	0	0.8	2	0	32.3	17.9	

	A Street From North					A Street From South					Necco Street From West					
Start Time	Right	Thru	Peds EB	Peds WB	App. Total	Thru	Left	Peds WB	Peds EB	App. Total	Right	Left	Peds NB	Peds SB	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																
Peak Hour for Entire Intersection Begins at 08:00 AM																
08:00 AM	0	4	9	10	23	11	3	0	0	14	2	0	17	14	33	70
08:15 AM	0	2	6	11	19	14	2	0	1	17	3	0	26	10	39	75
08:30 AM	0	1	8	5	14	22	5	0	1	28	1	0	21	27	49	91
08:45 AM	0	1	16	12	29	20	2	0	1	23	2	0	34	16	52	104
Total Volume	0	8	39	38	85	67	12	0	3	82	8	0	98	67	173	340
% App. Total	0	9.4	45.9	44.7		81.7	14.6	0	3.7		4.6	0	56.6	38.7		
PHF	.000	.500	.609	.792	.733	.761	.600	.000	.750	.732	.667	.000	.721	.620	.832	.817

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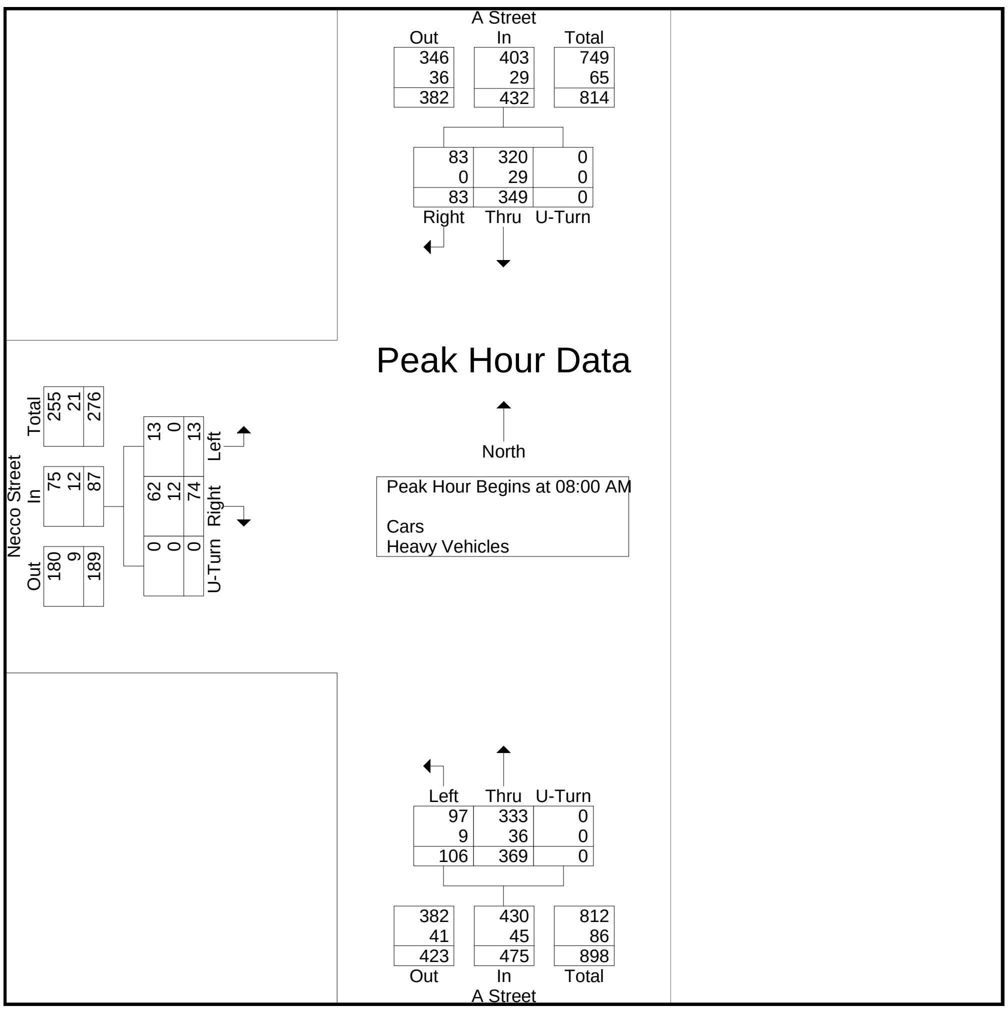
	A Street From North				A Street From South				Necco Street From West				
Start Time	Right	Thru	U-Turn	App. Total	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 08:00 AM													
08:00 AM	24	105	0	129	69	32	0	101	22	1	0	23	253
08:15 AM	17	91	0	108	98	16	0	114	15	5	0	20	242
08:30 AM	27	67	0	94	100	30	0	130	13	4	0	17	241
08:45 AM	15	86	0	101	102	28	0	130	24	3	0	27	258
Total Volume	83	349	0	432	369	106	0	475	74	13	0	87	994
% App. Total	19.2	80.8	0		77.7	22.3	0		85.1	14.9	0		
PHF	.769	.831	.000	.837	.904	.828	.000	.913	.771	.650	.000	.806	.963
Cars	83	320	0	403	333	97	0	430	62	13	0	75	908
% Cars	100	91.7	0	93.3	90.2	91.5	0	90.5	83.8	100	0	86.2	91.3
Heavy Vehicles	0	29	0	29	36	9	0	45	12	0	0	12	86
% Heavy Vehicles	0	8.3	0	6.7	9.8	8.5	0	9.5	16.2	0	0	13.8	8.7



N/S: A Street
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PRECISION
D A T A
INDUSTRIES, LLC
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Email: datarequests@pdillc.com

File Name : 165050 DD
Site Code : 13421
Start Date : 4/27/2016

Groups Printed- Cars - Heavy Vehicles

	A Street From North			A Street From South			Necco Street From West			
Start Time	Right	Thru	U-Turn	Thru	Left	U-Turn	Right	Left	U-Turn	Int. Total
04:00 PM	3	101	0	77	4	0	22	16	0	223
04:15 PM	1	119	0	72	5	0	24	18	0	239
04:30 PM	2	123	0	83	9	0	39	9	0	265
04:45 PM	3	123	0	94	11	0	34	15	0	280
Total	9	466	0	326	29	0	119	58	0	1007
05:00 PM	2	115	0	98	6	1	35	17	0	274
05:15 PM	2	115	0	88	5	0	29	16	0	255
05:30 PM	4	98	0	111	11	0	35	22	0	281
05:45 PM	5	106	0	105	13	0	25	15	0	269
Total	13	434	0	402	35	1	124	70	0	1079
Grand Total	22	900	0	728	64	1	243	128	0	2086
Apprch %	2.4	97.6	0	91.8	8.1	0.1	65.5	34.5	0	
Total %	1.1	43.1	0	34.9	3.1	0	11.6	6.1	0	
Cars	22	843	0	679	58	1	236	127	0	1966
% Cars	100	93.7	0	93.3	90.6	100	97.1	99.2	0	94.2
Heavy Vehicles	0	57	0	49	6	0	7	1	0	120
% Heavy Vehicles	0	6.3	0	6.7	9.4	0	2.9	0.8	0	5.8

Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 04:45 PM

	A Street From North				A Street From South				Necco Street From West				
Start Time	Right	Thru	U-Turn	App. Total	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Int. Total
04:45 PM	3	123	0	126	94	11	0	105	34	15	0	49	280
05:00 PM	2	115	0	117	98	6	1	105	35	17	0	52	274
05:15 PM	2	115	0	117	88	5	0	93	29	16	0	45	255
05:30 PM	4	98	0	102	111	11	0	122	35	22	0	57	281
Total Volume	11	451	0	462	391	33	1	425	133	70	0	203	1090
% App. Total	2.4	97.6	0		92	7.8	0.2		65.5	34.5	0		
PHF	.688	.917	.000	.917	.881	.750	.250	.871	.950	.795	.000	.890	.970
Cars	11	424	0	435	365	31	1	397	130	70	0	200	1032
% Cars	100	94.0	0	94.2	93.4	93.9	100	93.4	97.7	100	0	98.5	94.7
Heavy Vehicles	0	27	0	27	26	2	0	28	3	0	0	3	58
% Heavy Vehicles	0	6.0	0	5.8	6.6	6.1	0	6.6	2.3	0	0	1.5	5.3

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01752
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N/S: A Street
W: Necco Street
City, State: South Boston, MA
Client: VHB/ A. Santiago

File Name : 165050 DD
Site Code : 13421
Start Date : 4/27/2016
Page No : 1

Groups Printed- Cars

	A Street From North			A Street From South			Necco Street From West			
Start Time	Right	Thru	U-Turn	Thru	Left	U-Turn	Right	Left	U-Turn	Int. Total
04:00 PM	3	91	0	69	3	0	21	15	0	202
04:15 PM	1	116	0	65	5	0	23	18	0	228
04:30 PM	2	114	0	78	8	0	37	9	0	248
04:45 PM	3	115	0	90	11	0	34	15	0	268
Total	9	436	0	302	27	0	115	57	0	946
05:00 PM	2	112	0	91	6	1	33	17	0	262
05:15 PM	2	110	0	80	5	0	28	16	0	241
05:30 PM	4	87	0	104	9	0	35	22	0	261
05:45 PM	5	98	0	102	11	0	25	15	0	256
Total	13	407	0	377	31	1	121	70	0	1020
Grand Total	22	843	0	679	58	1	236	127	0	1966
Apprch %	2.5	97.5	0	92	7.9	0.1	65	35	0	
Total %	1.1	42.9	0	34.5	3	0.1	12	6.5	0	

	A Street From North				A Street From South				Necco Street From West				
Start Time	Right	Thru	U-Turn	App. Total	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 04:45 PM													
04:45 PM	3	115	0	118	90	11	0	101	34	15	0	49	268
05:00 PM	2	112	0	114	91	6	1	98	33	17	0	50	262
05:15 PM	2	110	0	112	80	5	0	85	28	16	0	44	241
05:30 PM	4	87	0	91	104	9	0	113	35	22	0	57	261
Total Volume	11	424	0	435	365	31	1	397	130	70	0	200	1032
% App. Total	2.5	97.5	0		91.9	7.8	0.3		65	35	0		
PHF	.688	.922	.000	.922	.877	.705	.250	.878	.929	.795	.000	.877	.963

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File Name : 165050 DD
Site Code : 13421
Start Date : 4/27/2016

Groups Printed- Heavy Vehicles

	A Street From North			A Street From South			Necco Street From West			
Start Time	Right	Thru	U-Turn	Thru	Left	U-Turn	Right	Left	U-Turn	Int. Total
04:00 PM	0	10	0	8	1	0	1	1	0	21
04:15 PM	0	3	0	7	0	0	1	0	0	11
04:30 PM	0	9	0	5	1	0	2	0	0	17
04:45 PM	0	8	0	4	0	0	0	0	0	12
Total	0	30	0	24	2	0	4	1	0	61
05:00 PM	0	3	0	7	0	0	2	0	0	12
05:15 PM	0	5	0	8	0	0	1	0	0	14
05:30 PM	0	11	0	7	2	0	0	0	0	20
05:45 PM	0	8	0	3	2	0	0	0	0	13
Total	0	27	0	25	4	0	3	0	0	59
Grand Total	0	57	0	49	6	0	7	1	0	120
Apprch %	0	100	0	89.1	10.9	0	87.5	12.5	0	
Total %	0	47.5	0	40.8	5	0	5.8	0.8	0	

	A Street From North				A Street From South				Necco Street From West				
Start Time	Right	Thru	U-Turn	App. Total	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 04:00 PM													
04:00 PM	0	10	0	10	8	1	0	9	1	1	0	2	21
04:15 PM	0	3	0	3	7	0	0	7	1	0	0	1	11
04:30 PM	0	9	0	9	5	1	0	6	2	0	0	2	17
04:45 PM	0	8	0	8	4	0	0	4	0	0	0	0	12
Total Volume	0	30	0	30	24	2	0	26	4	1	0	5	61
% App. Total	0	100	0		92.3	7.7	0		80	20	0		
PHF	.000	.750	.000	.750	.750	.500	.000	.722	.500	.250	.000	.625	.726

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File Name : 165050 DD
Site Code : 13421
Start Date : 4/27/2016

Groups Printed- Peds and Bikes

	A Street From North				A Street From South				Necco Street From West				
Start Time	Right	Thru	Peds EB	Peds WB	Thru	Left	Peds WB	Peds EB	Right	Left	Peds NB	Peds SB	Int. Total
04:00 PM	0	5	2	12	1	0	0	0	1	0	3	19	43
04:15 PM	0	6	2	3	0	0	1	0	1	0	4	15	32
04:30 PM	0	4	3	4	2	0	0	0	3	0	4	18	38
04:45 PM	0	8	2	5	4	0	0	0	1	0	3	25	48
Total	0	23	9	24	7	0	1	0	6	0	14	77	161
05:00 PM	0	8	4	17	2	0	0	0	1	0	7	53	92
05:15 PM	0	18	4	12	4	1	1	0	5	0	10	40	95
05:30 PM	0	11	5	11	7	2	1	0	8	0	5	41	91
05:45 PM	0	17	3	6	4	0	0	0	3	0	8	42	83
Total	0	54	16	46	17	3	2	0	17	0	30	176	361
Grand Total	0	77	25	70	24	3	3	0	23	0	44	253	522
Apprch %	0	44.8	14.5	40.7	80	10	10	0	7.2	0	13.8	79.1	
Total %	0	14.8	4.8	13.4	4.6	0.6	0.6	0	4.4	0	8.4	48.5	

	A Street From North					A Street From South					Necco Street From West					
Start Time	Right	Thru	Peds EB	Peds WB	App. Total	Thru	Left	Peds WB	Peds EB	App. Total	Right	Left	Peds NB	Peds SB	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																
Peak Hour for Entire Intersection Begins at 05:00 PM																
05:00 PM	0	8	4	17	29	2	0	0	0	2	1	0	7	53	61	92
05:15 PM	0	18	4	12	34	4	1	1	0	6	5	0	10	40	55	95
05:30 PM	0	11	5	11	27	7	2	1	0	10	8	0	5	41	54	91
05:45 PM	0	17	3	6	26	4	0	0	0	4	3	0	8	42	53	83
Total Volume	0	54	16	46	116	17	3	2	0	22	17	0	30	176	223	361
% App. Total	0	46.6	13.8	39.7		77.3	13.6	9.1	0		7.6	0	13.5	78.9		
PHF	.000	.750	.800	.676	.853	.607	.375	.500	.000	.550	.531	.000	.750	.830	.914	.950

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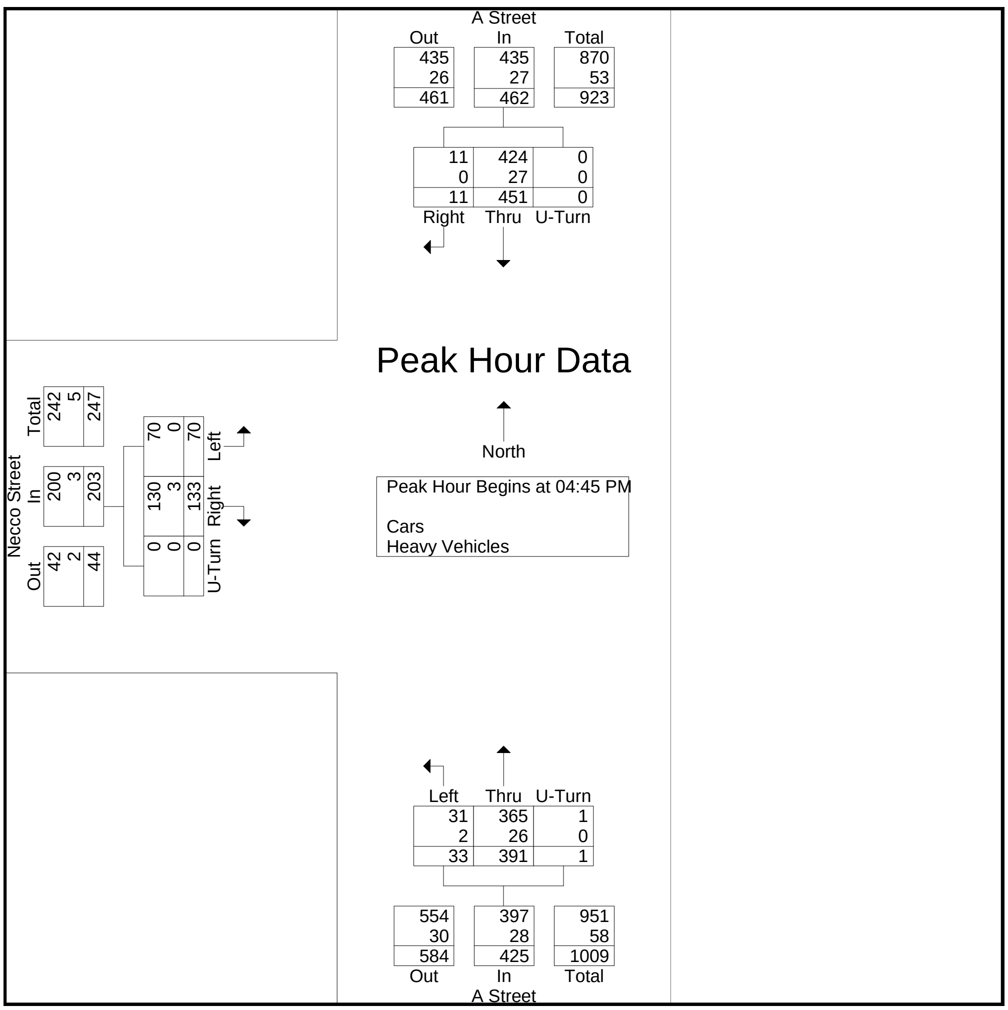
	A Street From North				A Street From South				Necco Street From West				
Start Time	Right	Thru	U-Turn	App. Total	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 04:45 PM													
04:45 PM	3	123	0	126	94	11	0	105	34	15	0	49	280
05:00 PM	2	115	0	117	98	6	1	105	35	17	0	52	274
05:15 PM	2	115	0	117	88	5	0	93	29	16	0	45	255
05:30 PM	4	98	0	102	111	11	0	122	35	22	0	57	281
Total Volume	11	451	0	462	391	33	1	425	133	70	0	203	1090
% App. Total	2.4	97.6	0		92	7.8	0.2		65.5	34.5	0		
PHF	.688	.917	.000	.917	.881	.750	.250	.871	.950	.795	.000	.890	.970
Cars	11	424	0	435	365	31	1	397	130	70	0	200	1032
% Cars	100	94.0	0	94.2	93.4	93.9	100	93.4	97.7	100	0	98.5	94.7
Heavy Vehicles	0	27	0	27	26	2	0	28	3	0	0	3	58
% Heavy Vehicles	0	6.0	0	5.8	6.6	6.1	0	6.6	2.3	0	0	1.5	5.3



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N/S: A Street
E/W: Richard Street/ Sobin Park
City, State: South Boston, MA
Client: VHB/ A. Santiago

File Name : 165050 F
Site Code : 13421
Start Date : 4/27/2016
Page No : 1

Groups Printed- Cars - Heavy Vehicles

	A Street From North				Richard Street From East				A Street From South				Sobin Park From West				
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Int. Total
07:00 AM	2	56	11	0	9	4	20	0	7	47	0	0	3	1	0	0	160
07:15 AM	1	74	8	0	18	1	9	0	4	73	2	0	2	0	1	0	193
07:30 AM	2	70	11	0	14	2	16	0	16	84	1	0	0	0	2	0	218
07:45 AM	2	59	10	0	21	1	24	0	13	74	1	0	1	0	2	0	208
Total	7	259	40	0	62	8	69	0	40	278	4	0	6	1	5	0	779
08:00 AM	2	96	10	0	21	0	20	0	12	100	2	0	1	1	0	0	265
08:15 AM	1	75	10	0	12	0	25	0	11	110	2	0	1	1	2	0	250
08:30 AM	0	61	9	0	25	0	24	0	12	120	3	0	2	0	0	0	256
08:45 AM	1	72	11	0	21	1	21	0	22	131	2	0	0	1	0	0	283
Total	4	304	40	0	79	1	90	0	57	461	9	0	4	3	2	0	1054
Grand Total	11	563	80	0	141	9	159	0	97	739	13	0	10	4	7	0	1833
Apprch %	1.7	86.1	12.2	0	45.6	2.9	51.5	0	11.4	87	1.5	0	47.6	19	33.3	0	
Total %	0.6	30.7	4.4	0	7.7	0.5	8.7	0	5.3	40.3	0.7	0	0.5	0.2	0.4	0	
Cars	7	520	77	0	128	5	124	0	82	694	11	0	9	2	3	0	1662
% Cars	63.6	92.4	96.2	0	90.8	55.6	78	0	84.5	93.9	84.6	0	90	50	42.9	0	90.7
Heavy Vehicles	4	43	3	0	13	4	35	0	15	45	2	0	1	2	4	0	171
% Heavy Vehicles	36.4	7.6	3.8	0	9.2	44.4	22	0	15.5	6.1	15.4	0	10	50	57.1	0	9.3

Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 08:00 AM

	A Street From North					Richard Street From East					A Street From South					Sobin Park From West					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
08:00 AM	2	96	10	0	108	21	0	20	0	41	12	100	2	0	114	1	1	0	0	2	265
08:15 AM	1	75	10	0	86	12	0	25	0	37	11	110	2	0	123	1	1	2	0	4	250
08:30 AM	0	61	9	0	70	25	0	24	0	49	12	120	3	0	135	2	0	0	0	2	256
08:45 AM	1	72	11	0	84	21	1	21	0	43	22	131	2	0	155	0	1	0	0	1	283
Total Volume	4	304	40	0	348	79	1	90	0	170	57	461	9	0	527	4	3	2	0	9	1054
% App. Total	1.1	87.4	11.5	0		46.5	0.6	52.9	0		10.8	87.5	1.7	0		44.4	33.3	22.2	0		
PHF	.500	.792	.909	.000	.806	.790	.250	.900	.000	.867	.648	.880	.750	.000	.850	.500	.750	.250	.000	.563	.931
Cars	2	282	38	0	322	74	0	68	0	142	47	436	7	0	490	4	1	1	0	6	960
% Cars	50.0	92.8	95.0	0	92.5	93.7	0	75.6	0	83.5	82.5	94.6	77.8	0	93.0	100	33.3	50.0	0	66.7	91.1
Heavy Vehicles	2	22	2	0	26	5	1	22	0	28	10	25	2	0	37	0	2	1	0	3	94
% Heavy Vehicles	50.0	7.2	5.0	0	7.5	6.3	100	24.4	0	16.5	17.5	5.4	22.2	0	7.0	0	66.7	50.0	0	33.3	8.9

N/S: A Street
E/W: Richard Street/ Sobin Park
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File Name : 165050 F
Site Code : 13421
Start Date : 4/27/2016
Page No : 1

Groups Printed- Cars

	A Street From North				Richard Street From East				A Street From South				Sobin Park From West				
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Int. Total
07:00 AM	1	50	11	0	8	3	14	0	6	46	0	0	2	1	0	0	142
07:15 AM	1	71	8	0	16	1	7	0	4	67	2	0	2	0	0	0	179
07:30 AM	1	65	10	0	13	1	13	0	13	78	1	0	0	0	1	0	196
07:45 AM	2	52	10	0	17	0	22	0	12	67	1	0	1	0	1	0	185
Total	5	238	39	0	54	5	56	0	35	258	4	0	5	1	2	0	702
08:00 AM	1	86	9	0	20	0	15	0	11	99	1	0	1	0	0	0	243
08:15 AM	1	67	9	0	10	0	20	0	5	101	1	0	1	0	1	0	216
08:30 AM	0	60	9	0	24	0	17	0	12	108	3	0	2	0	0	0	235
08:45 AM	0	69	11	0	20	0	16	0	19	128	2	0	0	1	0	0	266
Total	2	282	38	0	74	0	68	0	47	436	7	0	4	1	1	0	960
Grand Total	7	520	77	0	128	5	124	0	82	694	11	0	9	2	3	0	1662
Apprch %	1.2	86.1	12.7	0	49.8	1.9	48.2	0	10.4	88.2	1.4	0	64.3	14.3	21.4	0	
Total %	0.4	31.3	4.6	0	7.7	0.3	7.5	0	4.9	41.8	0.7	0	0.5	0.1	0.2	0	

	A Street From North					Richard Street From East					A Street From South					Sobin Park From West					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 08:00 AM																					
08:00 AM	1	86	9	0	96	20	0	15	0	35	11	99	1	0	111	1	0	0	0	1	243
08:15 AM	1	67	9	0	77	10	0	20	0	30	5	101	1	0	107	1	0	1	0	2	216
08:30 AM	0	60	9	0	69	24	0	17	0	41	12	108	3	0	123	2	0	0	0	2	235
08:45 AM	0	69	11	0	80	20	0	16	0	36	19	128	2	0	149	0	1	0	0	1	266
Total Volume	2	282	38	0	322	74	0	68	0	142	47	436	7	0	490	4	1	1	0	6	960
% App. Total	0.6	87.6	11.8	0		52.1	0	47.9	0		9.6	89	1.4	0		66.7	16.7	16.7	0		
PHF	.500	.820	.864	.000	.839	.771	.000	.850	.000	.866	.618	.852	.583	.000	.822	.500	.250	.250	.000	.750	.902

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File Name : 165050 F
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Groups Printed- Heavy Vehicles

	A Street From North				**Richard Street From East**				**A Street From South**				**Sobin Park From West**				
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Int. Total
07:00 AM	1	6	0	0	1	1	6	0	1	1	0	0	1	0	0	0	18
07:15 AM	0	3	0	0	2	0	2	0	0	6	0	0	0	0	1	0	14
07:30 AM	1	5	1	0	1	1	3	0	3	6	0	0	0	0	1	0	22
07:45 AM	0	7	0	0	4	1	2	0	1	7	0	0	0	0	1	0	23
Total	2	21	1	0	8	3	13	0	5	20	0	0	1	0	3	0	77
08:00 AM	1	10	1	0	1	0	5	0	1	1	1	0	0	1	0	0	22
08:15 AM	0	8	1	0	2	0	5	0	6	9	1	0	0	1	1	0	34
08:30 AM	0	1	0	0	1	0	7	0	0	12	0	0	0	0	0	0	21
08:45 AM	1	3	0	0	1	1	5	0	3	3	0	0	0	0	0	0	17
Total	2	22	2	0	5	1	22	0	10	25	2	0	0	2	1	0	94
Grand Total	4	43	3	0	13	4	35	0	15	45	2	0	1	2	4	0	171
Apprch %	8	86	6	0	25	7.7	67.3	0	24.2	72.6	3.2	0	14.3	28.6	57.1	0	
Total %	2.3	25.1	1.8	0	7.6	2.3	20.5	0	8.8	26.3	1.2	0	0.6	1.2	2.3	0	

	A Street From North					**Richard Street From East**					**A Street From South**					**Sobin Park From West**					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:30 AM																					
07:30 AM	1	5	1	0	7	1	1	3	0	5	3	6	0	0	9	0	0	1	0	1	22
07:45 AM	0	7	0	0	7	4	1	2	0	7	1	7	0	0	8	0	0	1	0	1	23
08:00 AM	1	10	1	0	12	1	0	5	0	6	1	1	1	0	3	0	1	0	0	1	22
08:15 AM	0	8	1	0	9	2	0	5	0	7	6	9	1	0	16	0	1	1	0	2	34
Total Volume	2	30	3	0	35	8	2	15	0	25	11	23	2	0	36	0	2	3	0	5	101
% App. Total	5.7	85.7	8.6	0		32	8	60	0		30.6	63.9	5.6	0		0	40	60	0		
PHF	.500	.750	.750	.000	.729	.500	.500	.750	.000	.893	.458	.639	.500	.000	.563	.000	.500	.750	.000	.625	.743

N/S: A Street
E/W: Richard Street/ Sobin Park
City, State: South Boston, MA
Client: VHB/ A. Santiago

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01752
Office: 508.875.0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

File Name : 165050 F
Site Code : 13421
Start Date : 4/27/2016
Page No : 1

Groups Printed- Peds and Bikes

	A Street From North					Richard Street From East					A Street From South					Sobin Park From West					
Start Time	Right	Thru	Left	Peds EB	Peds WB	Right	Thru	Left	Peds SB	Peds NB	Right	Thru	Left	Peds WB	Peds EB	Right	Thru	Left	Peds NB	Peds SB	Int. Total
07:00 AM	0	1	0	1	0	0	0	0	5	7	0	10	0	0	0	0	0	0	3	2	29
07:15 AM	0	0	0	0	0	0	1	0	4	47	0	6	0	0	1	0	0	0	5	1	65
07:30 AM	0	1	0	1	1	0	0	2	5	33	0	4	0	0	1	0	0	0	8	1	57
07:45 AM	0	3	0	3	1	0	0	0	4	51	0	8	0	0	1	0	0	0	9	2	82
Total	0	5	0	5	2	0	1	2	18	138	0	28	0	0	3	0	0	0	25	6	233
08:00 AM	0	3	0	3	2	0	0	1	4	55	0	12	0	0	0	0	0	0	11	0	91
08:15 AM	0	0	0	3	1	1	0	0	2	98	0	13	0	0	0	0	0	0	16	2	136
08:30 AM	0	2	0	2	1	0	0	0	5	81	0	27	0	0	0	0	0	0	15	3	136
08:45 AM	0	0	0	4	0	0	0	0	5	106	0	16	0	0	4	0	0	0	21	2	158
Total	0	5	0	12	4	1	0	1	16	340	0	68	0	0	4	0	0	0	63	7	521
Grand Total	0	10	0	17	6	1	1	3	34	478	0	96	0	0	7	0	0	0	88	13	754
Apprch %	0	30.3	0	51.5	18.2	0.2	0.2	0.6	6.6	92.5	0	93.2	0	0	6.8	0	0	0	87.1	12.9	
Total %	0	1.3	0	2.3	0.8	0.1	0.1	0.4	4.5	63.4	0	12.7	0	0	0.9	0	0	0	11.7	1.7	

	A Street From North						Richard Street From East						A Street From South						Sobin Park From West						
Start Time	Right	Thru	Left	Peds EB	Peds WB	App. Total	Right	Thru	Left	Peds SB	Peds NB	App. Total	Right	Thru	Left	Peds WB	Peds EB	App. Total	Right	Thru	Left	Peds NB	Peds SB	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 08:00 AM																									
08:00 AM	0	3	0	3	2	8	0	0	1	4	55	60	0	12	0	0	0	12	0	0	0	11	0	11	91
08:15 AM	0	0	0	3	1	4	1	0	0	2	98	101	0	13	0	0	0	13	0	0	0	16	2	18	136
08:30 AM	0	2	0	2	1	5	0	0	0	5	81	86	0	27	0	0	0	27	0	0	0	15	3	18	136
08:45 AM	0	0	0	4	0	4	0	0	0	5	106	111	0	16	0	0	4	20	0	0	0	21	2	23	158
Total Volume	0	5	0	12	4	21	1	0	1	16	340	358	0	68	0	0	4	72	0	0	0	63	7	70	521
% App. Total	0	23.8	0	57.1	19		0.3	0	0.3	4.5	95		0	94.4	0	0	5.6		0	0	0	90	10		
PHF	.000	.417	.000	.750	.500	.656	.250	.000	.250	.800	.802	.806	.000	.630	.000	.000	.250	.667	.000	.000	.000	.750	.583	.761	.824

N/S: A Street
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46 Morton Street, Framingham, MA 01752
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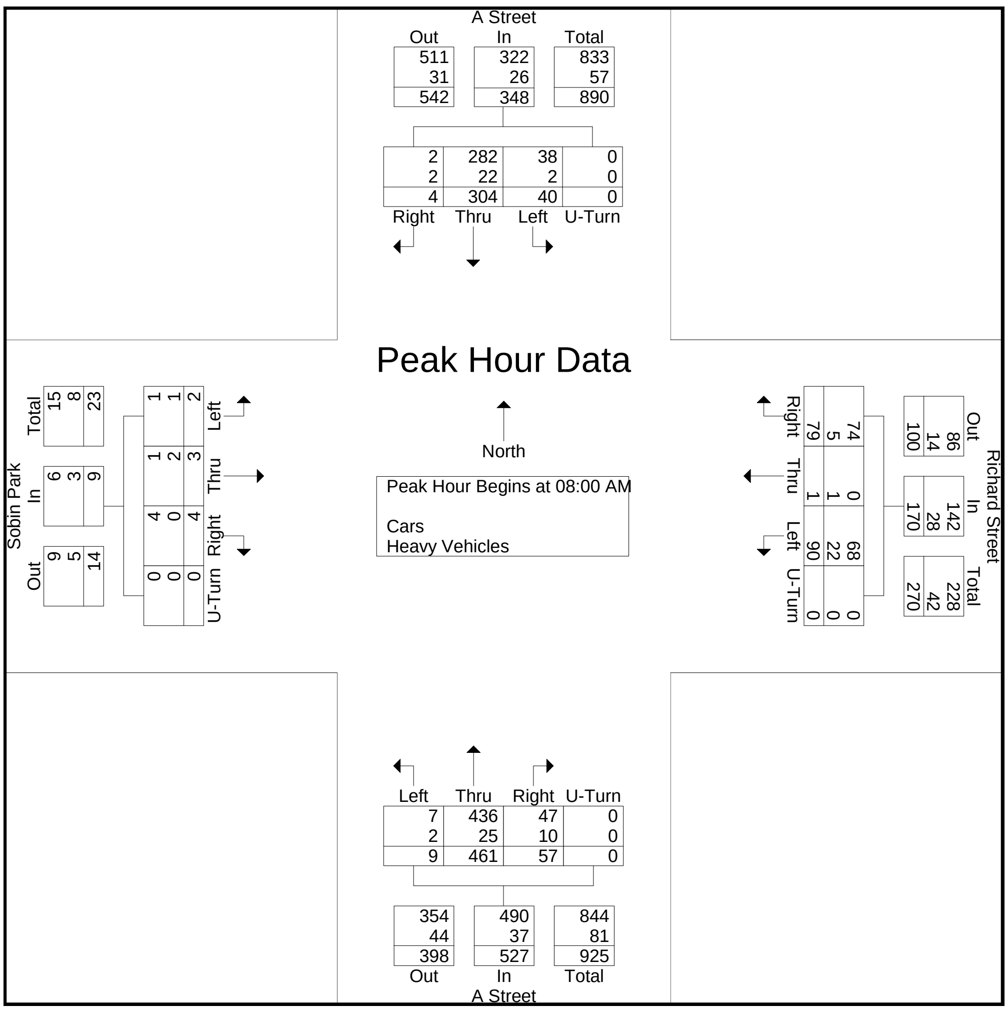
Email: datarequests@pdillc.com

File Name : 165050 F
Site Code : 13421
Start Date : 4/27/2016

	A Street From North					Richard Street From East					A Street From South					Sobin Park From West					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 08:00 AM																					
08:00 AM	2	96	10	0	108	21	0	20	0	41	12	100	2	0	114	1	1	0	0	2	265
08:15 AM	1	75	10	0	86	12	0	25	0	37	11	110	2	0	123	1	1	2	0	4	250
08:30 AM	0	61	9	0	70	25	0	24	0	49	12	120	3	0	135	2	0	0	0	2	256
08:45 AM	1	72	11	0	84	21	1	21	0	43	22	131	2	0	155	0	1	0	0	1	283
Total Volume	4	304	40	0	348	79	1	90	0	170	57	461	9	0	527	4	3	2	0	9	1054
% App. Total	1.1	87.4	11.5	0		46.5	0.6	52.9	0		10.8	87.5	1.7	0		44.4	33.3	22.2	0		
PHF	.500	.792	.909	.000	.806	.790	.250	.900	.000	.867	.648	.880	.750	.000	.850	.500	.750	.250	.000	.563	.931
Cars	2	282	38	0	322	74	0	68	0	142	47	436	7	0	490	4	1	1	0	6	960
% Cars	50.0	92.8	95.0	0	92.5	93.7	0	75.6	0	83.5	82.5	94.6	77.8	0	93.0	100	33.3	50.0	0	66.7	91.1
Heavy Vehicles	2	22	2	0	26	5	1	22	0	28	10	25	2	0	37	0	2	1	0	3	94
% Heavy Vehicles	50.0	7.2	5.0	0	7.5	6.3	100	24.4	0	16.5	17.5	5.4	22.2	0	7.0	0	66.7	50.0	0	33.3	8.9



N/S: A Street
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Email: datarequests@pdillc.com

File Name : 165050 FF
Site Code : 13421
Start Date : 4/27/2016

Groups Printed- Cars - Heavy Vehicles

	A Street From North				Richard Street From East				A Street From South				Sobin Park From West				
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Int. Total
04:00 PM	0	128	8	0	9	0	15	0	20	65	1	0	5	1	1	0	253
04:15 PM	0	143	8	0	9	0	19	0	25	67	0	0	2	3	0	0	276
04:30 PM	0	161	5	0	12	0	24	0	24	76	1	0	2	0	0	0	305
04:45 PM	0	157	10	0	8	2	26	0	17	90	1	0	3	0	1	0	315
Total	0	589	31	0	38	2	84	0	86	298	3	0	12	4	2	0	1149
05:00 PM	0	145	8	0	14	2	26	0	27	90	3	0	3	0	1	0	319
05:15 PM	1	133	7	0	11	0	23	0	25	78	6	0	4	0	0	0	288
05:30 PM	1	131	12	0	12	0	48	0	26	102	9	0	1	0	1	0	343
05:45 PM	0	129	7	0	10	0	35	0	33	91	4	0	2	0	2	0	313
Total	2	538	34	0	47	2	132	0	111	361	22	0	10	0	4	0	1263
Grand Total	2	1127	65	0	85	4	216	0	197	659	25	0	22	4	6	0	2412
Apprch %	0.2	94.4	5.4	0	27.9	1.3	70.8	0	22.4	74.8	2.8	0	68.8	12.5	18.8	0	
Total %	0.1	46.7	2.7	0	3.5	0.2	9	0	8.2	27.3	1	0	0.9	0.2	0.2	0	
Cars	2	1099	63	0	74	3	202	0	187	650	24	0	21	3	5	0	2333
% Cars	100	97.5	96.9	0	87.1	75	93.5	0	94.9	98.6	96	0	95.5	75	83.3	0	96.7
Heavy Vehicles	0	28	2	0	11	1	14	0	10	9	1	0	1	1	1	0	79
% Heavy Vehicles	0	2.5	3.1	0	12.9	25	6.5	0	5.1	1.4	4	0	4.5	25	16.7	0	3.3

	A Street From North					Richard Street From East					A Street From South					Sobin Park From West					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:45 PM																					
04:45 PM	0	157	10	0	167	8	2	26	0	36	17	90	1	0	108	3	0	1	0	4	315
05:00 PM	0	145	8	0	153	14	2	26	0	42	27	90	3	0	120	3	0	1	0	4	319
05:15 PM	1	133	7	0	141	11	0	23	0	34	25	78	6	0	109	4	0	0	0	4	288
05:30 PM	1	131	12	0	144	12	0	48	0	60	26	102	9	0	137	1	0	1	0	2	343
Total Volume	2	566	37	0	605	45	4	123	0	172	95	360	19	0	474	11	0	3	0	14	1265
% App. Total	0.3	93.6	6.1	0		26.2	2.3	71.5	0		20	75.9	4	0		78.6	0	21.4	0		
PHF	.500	.901	.771	.000	.906	.804	.500	.641	.000	.717	.880	.882	.528	.000	.865	.688	.000	.750	.000	.875	.922
Cars	2	554	36	0	592	41	3	115	0	159	92	354	19	0	465	11	0	2	0	13	1229
% Cars	100	97.9	97.3	0	97.9	91.1	75.0	93.5	0	92.4	96.8	98.3	100	0	98.1	100	0	66.7	0	92.9	97.2
Heavy Vehicles	0	12	1	0	13	4	1	8	0	13	3	6	0	0	9	0	0	1	0	1	36
% Heavy Vehicles	0	2.1	2.7	0	2.1	8.9	25.0	6.5	0	7.6	3.2	1.7	0	0	1.9	0	0	33.3	0	7.1	2.8

N/S: A Street
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File Name : 165050 FF
Site Code : 13421
Start Date : 4/27/2016
Page No : 1

Groups Printed- Cars

	A Street From North				Richard Street From East				A Street From South				Sobin Park From West				
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Int. Total
04:00 PM	0	123	8	0	6	0	14	0	19	64	0	0	4	1	1	0	240
04:15 PM	0	140	7	0	8	0	16	0	23	65	0	0	2	2	0	0	263
04:30 PM	0	155	5	0	10	0	23	0	22	76	1	0	2	0	0	0	294
04:45 PM	0	153	10	0	8	1	25	0	17	89	1	0	3	0	1	0	308
Total	0	571	30	0	32	1	78	0	81	294	2	0	11	3	2	0	1105
05:00 PM	0	144	8	0	12	2	24	0	27	89	3	0	3	0	0	0	312
05:15 PM	1	129	7	0	10	0	23	0	23	75	6	0	4	0	0	0	278
05:30 PM	1	128	11	0	11	0	43	0	25	101	9	0	1	0	1	0	331
05:45 PM	0	127	7	0	9	0	34	0	31	91	4	0	2	0	2	0	307
Total	2	528	33	0	42	2	124	0	106	356	22	0	10	0	3	0	1228
Grand Total	2	1099	63	0	74	3	202	0	187	650	24	0	21	3	5	0	2333
Apprch %	0.2	94.4	5.4	0	26.5	1.1	72.4	0	21.7	75.5	2.8	0	72.4	10.3	17.2	0	
Total %	0.1	47.1	2.7	0	3.2	0.1	8.7	0	8	27.9	1	0	0.9	0.1	0.2	0	

	A Street From North					Richard Street From East					A Street From South					Sobin Park From West					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:45 PM																					
04:45 PM	0	153	10	0	163	8	1	25	0	34	17	89	1	0	107	3	0	1	0	4	308
05:00 PM	0	144	8	0	152	12	2	24	0	38	27	89	3	0	119	3	0	0	0	3	312
05:15 PM	1	129	7	0	137	10	0	23	0	33	23	75	6	0	104	4	0	0	0	4	278
05:30 PM	1	128	11	0	140	11	0	43	0	54	25	101	9	0	135	1	0	1	0	2	331
Total Volume	2	554	36	0	592	41	3	115	0	159	92	354	19	0	465	11	0	2	0	13	1229
% App. Total	0.3	93.6	6.1	0		25.8	1.9	72.3	0		19.8	76.1	4.1	0		84.6	0	15.4	0		
PHF	.500	.905	.818	.000	.908	.854	.375	.669	.000	.736	.852	.876	.528	.000	.861	.688	.000	.500	.000	.813	.928

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File Name : 165050 FF
Site Code : 13421
Start Date : 4/27/2016

Groups Printed- Heavy Vehicles

	A Street From North				Richard Street From East				A Street From South				Sobin Park From West				
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Int. Total
04:00 PM	0	5	0	0	3	0	1	0	1	1	1	0	1	0	0	0	13
04:15 PM	0	3	1	0	1	0	3	0	2	2	0	0	0	1	0	0	13
04:30 PM	0	6	0	0	2	0	1	0	2	0	0	0	0	0	0	0	11
04:45 PM	0	4	0	0	0	1	1	0	0	1	0	0	0	0	0	0	7
Total	0	18	1	0	6	1	6	0	5	4	1	0	1	1	0	0	44
05:00 PM	0	1	0	0	2	0	2	0	0	1	0	0	0	0	1	0	7
05:15 PM	0	4	0	0	1	0	0	0	2	3	0	0	0	0	0	0	10
05:30 PM	0	3	1	0	1	0	5	0	1	1	0	0	0	0	0	0	12
05:45 PM	0	2	0	0	1	0	1	0	2	0	0	0	0	0	0	0	6
Total	0	10	1	0	5	0	8	0	5	5	0	0	0	0	1	0	35
Grand Total	0	28	2	0	11	1	14	0	10	9	1	0	1	1	1	0	79
Apprch %	0	93.3	6.7	0	42.3	3.8	53.8	0	50	45	5	0	33.3	33.3	33.3	0	
Total %	0	35.4	2.5	0	13.9	1.3	17.7	0	12.7	11.4	1.3	0	1.3	1.3	1.3	0	

Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 04:00 PM

	A Street From North					Richard Street From East					A Street From South					Sobin Park From West					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
04:00 PM	0	5	0	0	5	3	0	1	0	4	1	1	1	0	3	1	0	0	0	1	13
04:15 PM	0	3	1	0	4	1	0	3	0	4	2	2	0	0	4	0	1	0	0	1	13
04:30 PM	0	6	0	0	6	2	0	1	0	3	2	0	0	0	2	0	0	0	0	0	11
04:45 PM	0	4	0	0	4	0	1	1	0	2	0	1	0	0	1	0	0	0	0	0	7
Total Volume	0	18	1	0	19	6	1	6	0	13	5	4	1	0	10	1	1	0	0	2	44
% App. Total	0	94.7	5.3	0		46.2	7.7	46.2	0		50	40	10	0		50	50	0	0		
PHF	.000	.750	.250	.000	.792	.500	.250	.500	.000	.813	.625	.500	.250	.000	.625	.250	.250	.000	.000	.500	.846

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Groups Printed- Peds and Bikes

	A Street From North					Richard Street From East					A Street From South					Sobin Park From West					
Start Time	Right	Thru	Left	Peds EB	Peds WB	Right	Thru	Left	Peds SB	Peds NB	Right	Thru	Left	Peds WB	Peds EB	Right	Thru	Left	Peds NB	Peds SB	Int. Total
04:00 PM	0	6	0	0	1	0	0	2	20	9	0	1	0	2	0	0	0	0	2	5	48
04:15 PM	0	7	1	0	1	0	0	0	20	17	0	0	0	0	2	0	0	0	2	7	57
04:30 PM	0	5	0	1	1	0	0	0	27	9	0	1	0	0	0	0	0	0	0	8	52
04:45 PM	0	10	0	3	0	0	0	1	32	7	0	4	0	1	5	0	0	0	2	13	78
Total	0	28	1	4	3	0	0	3	99	42	0	6	0	3	7	0	0	0	6	33	235
05:00 PM	0	7	0	0	1	0	0	0	44	5	0	0	0	1	7	0	0	0	2	20	87
05:15 PM	0	23	0	5	1	0	0	0	50	5	0	1	0	0	5	0	0	0	3	30	123
05:30 PM	0	19	0	0	8	0	0	2	46	4	0	1	0	0	1	0	0	0	3	34	118
05:45 PM	0	20	1	0	1	0	0	3	60	12	0	3	0	0	2	0	0	0	4	25	131
Total	0	69	1	5	11	0	0	5	200	26	0	5	0	1	15	0	0	0	12	109	459
Grand Total	0	97	2	9	14	0	0	8	299	68	0	11	0	4	22	0	0	0	18	142	694
Apprch %	0	79.5	1.6	7.4	11.5	0	0	2.1	79.7	18.1	0	29.7	0	10.8	59.5	0	0	0	11.2	88.8	
Total %	0	14	0.3	1.3	2	0	0	1.2	43.1	9.8	0	1.6	0	0.6	3.2	0	0	0	2.6	20.5	

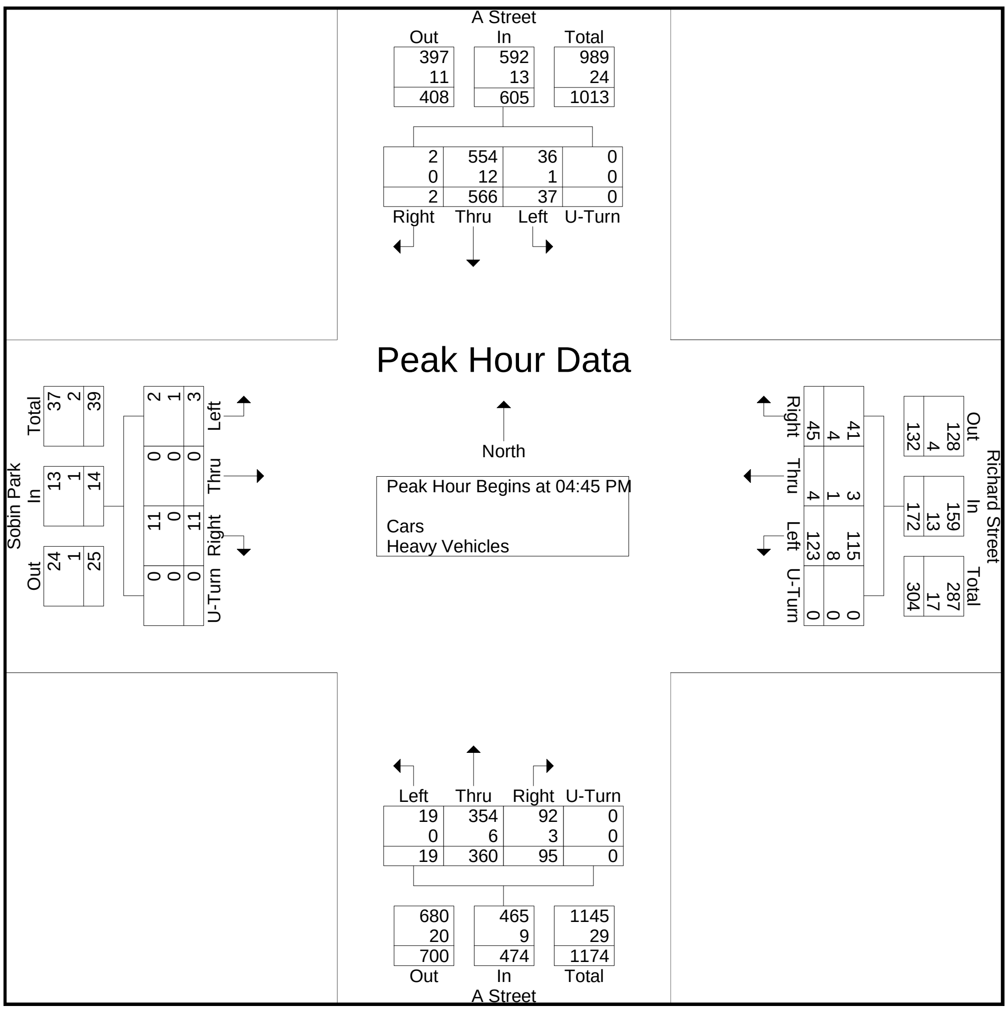
	A Street From North						Richard Street From East						A Street From South						Sobin Park From West						
Start Time	Right	Thru	Left	Peds EB	Peds WB	App. Total	Right	Thru	Left	Peds SB	Peds NB	App. Total	Right	Thru	Left	Peds WB	Peds EB	App. Total	Right	Thru	Left	Peds NB	Peds SB	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 05:00 PM																									
05:00 PM	0	7	0	0	1	8	0	0	0	44	5	49	0	0	0	1	7	8	0	0	0	2	20	22	87
05:15 PM	0	23	0	5	1	29	0	0	0	50	5	55	0	1	0	0	5	6	0	0	0	3	30	33	123
05:30 PM	0	19	0	0	8	27	0	0	2	46	4	52	0	1	0	0	1	2	0	0	0	3	34	37	118
05:45 PM	0	20	1	0	1	22	0	0	3	60	12	75	0	3	0	0	2	5	0	0	0	4	25	29	131
Total Volume	0	69	1	5	11	86	0	0	5	200	26	231	0	5	0	1	15	21	0	0	0	12	109	121	459
% App. Total	0	80.2	1.2	5.8	12.8		0	0	2.2	86.6	11.3		0	23.8	0	4.8	71.4		0	0	0	9.9	90.1		
PHF	.000	.750	.250	.250	.344	.741	.000	.000	.417	.833	.542	.770	.000	.417	.000	.250	.536	.656	.000	.000	.000	.750	.801	.818	.876

N/S: A Street
E/W: Richard Street/ Sobin Park
City, State: South Boston, MA
Client: VHB/ A. Santiago

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01752
Office: 508.875.0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

File Name : 165050 FF
Site Code : 13421
Start Date : 4/27/2016

	A Street From North					Richard Street From East					A Street From South					Sobin Park From West					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:45 PM																					
04:45 PM	0	157	10	0	167	8	2	26	0	36	17	90	1	0	108	3	0	1	0	4	315
05:00 PM	0	145	8	0	153	14	2	26	0	42	27	90	3	0	120	3	0	1	0	4	319
05:15 PM	1	133	7	0	141	11	0	23	0	34	25	78	6	0	109	4	0	0	0	4	288
05:30 PM	1	131	12	0	144	12	0	48	0	60	26	102	9	0	137	1	0	1	0	2	343
Total Volume	2	566	37	0	605	45	4	123	0	172	95	360	19	0	474	11	0	3	0	14	1265
% App. Total	0.3	93.6	6.1	0		26.2	2.3	71.5	0		20	75.9	4	0		78.6	0	21.4	0		
PHF	.500	.901	.771	.000	.906	.804	.500	.641	.000	.717	.880	.882	.528	.000	.865	.688	.000	.750	.000	.875	.922
Cars	2	554	36	0	592	41	3	115	0	159	92	354	19	0	465	11	0	2	0	13	1229
% Cars	100	97.9	97.3	0	97.9	91.1	75.0	93.5	0	92.4	96.8	98.3	100	0	98.1	100	0	66.7	0	92.9	97.2
Heavy Vehicles	0	12	1	0	13	4	1	8	0	13	3	6	0	0	9	0	0	1	0	1	36
% Heavy Vehicles	0	2.1	2.7	0	2.1	8.9	25.0	6.5	0	7.6	3.2	1.7	0	0	1.9	0	0	33.3	0	7.1	2.8



N/S: A Street
E/W: W. Second Street
City, State: South Boston, MA
Client: VHB/ A. Santiago

PRECISION
D A T A
INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01752
Office: 508.875.0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

File Name : 165050 G
Site Code : 13421
Start Date : 4/27/2016
Page No : 1

Groups Printed- Cars - Heavy Vehicles

	A Street From North				W. Second Street From East				A Street From South				W. Second Street From West				
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Int. Total
07:00 AM	12	72	0	0	3	41	17	0	0	58	5	0	4	0	3	0	215
07:15 AM	13	82	0	0	8	43	35	0	0	86	5	0	1	0	2	0	275
07:30 AM	18	89	0	0	9	49	23	0	0	106	2	0	3	0	8	0	307
07:45 AM	15	83	0	0	9	50	25	0	0	78	7	0	1	0	13	0	281
Total	58	326	0	0	29	183	100	0	0	328	19	0	9	0	26	0	1078
08:00 AM	30	109	0	0	11	49	20	0	0	108	4	0	1	0	17	0	349
08:15 AM	24	82	0	0	9	46	30	0	0	111	2	0	1	0	25	0	330
08:30 AM	17	77	0	0	14	42	37	0	0	126	3	0	1	0	11	0	328
08:45 AM	27	76	1	0	12	44	22	0	0	140	2	0	3	0	22	0	349
Total	98	344	1	0	46	181	109	0	0	485	11	0	6	0	75	0	1356
Grand Total	156	670	1	0	75	364	209	0	0	813	30	0	15	0	101	0	2434
Apprch %	18.9	81	0.1	0	11.6	56.2	32.3	0	0	96.4	3.6	0	12.9	0	87.1	0	
Total %	6.4	27.5	0	0	3.1	15	8.6	0	0	33.4	1.2	0	0.6	0	4.1	0	
Cars	113	620	1	0	71	340	191	0	0	767	30	0	13	0	82	0	2228
% Cars	72.4	92.5	100	0	94.7	93.4	91.4	0	0	94.3	100	0	86.7	0	81.2	0	91.5
Heavy Vehicles	43	50	0	0	4	24	18	0	0	46	0	0	2	0	19	0	206
% Heavy Vehicles	27.6	7.5	0	0	5.3	6.6	8.6	0	0	5.7	0	0	13.3	0	18.8	0	8.5

Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 08:00 AM

	A Street From North					W. Second Street From East					A Street From South					W. Second Street From West					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
08:00 AM	30	109	0	0	139	11	49	20	0	80	0	108	4	0	112	1	0	17	0	18	349
08:15 AM	24	82	0	0	106	9	46	30	0	85	0	111	2	0	113	1	0	25	0	26	330
08:30 AM	17	77	0	0	94	14	42	37	0	93	0	126	3	0	129	1	0	11	0	12	328
08:45 AM	27	76	1	0	104	12	44	22	0	78	0	140	2	0	142	3	0	22	0	25	349
Total Volume	98	344	1	0	443	46	181	109	0	336	0	485	11	0	496	6	0	75	0	81	1356
% App. Total	22.1	77.7	0.2	0		13.7	53.9	32.4	0		0	97.8	2.2	0		7.4	0	92.6	0		
PHF	.817	.789	.250	.000	.797	.821	.923	.736	.000	.903	.000	.866	.688	.000	.873	.500	.000	.750	.000	.779	.971
Cars	71	321	1	0	393	45	164	98	0	307	0	461	11	0	472	6	0	60	0	66	1238
% Cars	72.4	93.3	100	0	88.7	97.8	90.6	89.9	0	91.4	0	95.1	100	0	95.2	100	0	80.0	0	81.5	91.3
Heavy Vehicles	27	23	0	0	50	1	17	11	0	29	0	24	0	0	24	0	0	15	0	15	118
% Heavy Vehicles	27.6	6.7	0	0	11.3	2.2	9.4	10.1	0	8.6	0	4.9	0	0	4.8	0	0	20.0	0	18.5	8.7

N/S: A Street
E/W: W. Second Street
City, State: South Boston, MA
Client: VHB/ A. Santiago

PRECISION
D A T A
INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01752
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Email: datarequests@pdillc.com

File Name : 165050 G
Site Code : 13421
Start Date : 4/27/2016
Page No : 1

Groups Printed- Cars

	A Street From North				W. Second Street From East				A Street From South				W. Second Street From West				
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Int. Total
07:00 AM	8	63	0	0	3	40	14	0	0	56	5	0	3	0	2	0	194
07:15 AM	10	78	0	0	7	41	33	0	0	81	5	0	0	0	2	0	257
07:30 AM	12	85	0	0	9	48	22	0	0	97	2	0	3	0	7	0	285
07:45 AM	12	73	0	0	7	47	24	0	0	72	7	0	1	0	11	0	254
Total	42	299	0	0	26	176	93	0	0	306	19	0	7	0	22	0	990
08:00 AM	21	100	0	0	11	47	18	0	0	105	4	0	1	0	16	0	323
08:15 AM	18	75	0	0	9	46	28	0	0	105	2	0	1	0	15	0	299
08:30 AM	12	74	0	0	13	36	32	0	0	115	3	0	1	0	10	0	296
08:45 AM	20	72	1	0	12	35	20	0	0	136	2	0	3	0	19	0	320
Total	71	321	1	0	45	164	98	0	0	461	11	0	6	0	60	0	1238
Grand Total	113	620	1	0	71	340	191	0	0	767	30	0	13	0	82	0	2228
Apprch %	15.4	84.5	0.1	0	11.8	56.5	31.7	0	0	96.2	3.8	0	13.7	0	86.3	0	
Total %	5.1	27.8	0	0	3.2	15.3	8.6	0	0	34.4	1.3	0	0.6	0	3.7	0	

	A Street From North					W. Second Street From East					A Street From South					W. Second Street From West					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 08:00 AM																					
08:00 AM	21	100	0	0	121	11	47	18	0	76	0	105	4	0	109	1	0	16	0	17	323
08:15 AM	18	75	0	0	93	9	46	28	0	83	0	105	2	0	107	1	0	15	0	16	299
08:30 AM	12	74	0	0	86	13	36	32	0	81	0	115	3	0	118	1	0	10	0	11	296
08:45 AM	20	72	1	0	93	12	35	20	0	67	0	136	2	0	138	3	0	19	0	22	320
Total Volume	71	321	1	0	393	45	164	98	0	307	0	461	11	0	472	6	0	60	0	66	1238
% App. Total	18.1	81.7	0.3	0		14.7	53.4	31.9	0		0	97.7	2.3	0		9.1	0	90.9	0		
PHF	.845	.803	.250	.000	.812	.865	.872	.766	.000	.925	.000	.847	.688	.000	.855	.500	.000	.789	.000	.750	.958

N/S: A Street
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PRECISION DATA INDUSTRIES, LLC
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Email: datarequests@pdillc.com

File Name : 165050 G
Site Code : 13421
Start Date : 4/27/2016
Page No : 1

Groups Printed- Heavy Vehicles

	A Street From North				W. Second Street From East				A Street From South				W. Second Street From West				
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Int. Total
07:00 AM	4	9	0	0	0	1	3	0	0	2	0	0	1	0	1	0	21
07:15 AM	3	4	0	0	1	2	2	0	0	5	0	0	1	0	0	0	18
07:30 AM	6	4	0	0	0	1	1	0	0	9	0	0	0	0	1	0	22
07:45 AM	3	10	0	0	2	3	1	0	0	6	0	0	0	0	2	0	27
Total	16	27	0	0	3	7	7	0	0	22	0	0	2	0	4	0	88
08:00 AM	9	9	0	0	0	2	2	0	0	3	0	0	0	0	1	0	26
08:15 AM	6	7	0	0	0	0	2	0	0	6	0	0	0	0	10	0	31
08:30 AM	5	3	0	0	1	6	5	0	0	11	0	0	0	0	1	0	32
08:45 AM	7	4	0	0	0	9	2	0	0	4	0	0	0	0	3	0	29
Total	27	23	0	0	1	17	11	0	0	24	0	0	0	0	15	0	118
Grand Total	43	50	0	0	4	24	18	0	0	46	0	0	2	0	19	0	206
Apprch %	46.2	53.8	0	0	8.7	52.2	39.1	0	0	100	0	0	9.5	0	90.5	0	
Total %	20.9	24.3	0	0	1.9	11.7	8.7	0	0	22.3	0	0	1	0	9.2	0	

	A Street From North					W. Second Street From East					A Street From South					W. Second Street From West					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 08:00 AM																					
08:00 AM	9	9	0	0	18	0	2	2	0	4	0	3	0	0	3	0	0	1	0	1	26
08:15 AM	6	7	0	0	13	0	0	2	0	2	0	6	0	0	6	0	0	10	0	10	31
08:30 AM	5	3	0	0	8	1	6	5	0	12	0	11	0	0	11	0	0	1	0	1	32
08:45 AM	7	4	0	0	11	0	9	2	0	11	0	4	0	0	4	0	0	3	0	3	29
Total Volume	27	23	0	0	50	1	17	11	0	29	0	24	0	0	24	0	0	15	0	15	118
% App. Total	54	46	0	0		3.4	58.6	37.9	0		0	100	0	0		0	0	100	0		
PHF	.750	.639	.000	.000	.694	.250	.472	.550	.000	.604	.000	.545	.000	.000	.545	.000	.000	.375	.000	.375	.922

N/S: A Street
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46 Morton Street, Framingham, MA 01752
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File Name : 165050 G
Site Code : 13421
Start Date : 4/27/2016
Page No : 1

Groups Printed- Peds and Bikes

	A Street From North					W. Second Street From East					A Street From South					W. Second Street From West					
Start Time	Right	Thru	Left	Peds EB	Peds WB	Right	Thru	Left	Peds SB	Peds NB	Right	Thru	Left	Peds WB	Peds EB	Right	Thru	Left	Peds NB	Peds SB	Int. Total
07:00 AM	0	1	0	3	3	2	0	0	2	20	0	6	0	0	1	0	0	0	10	1	49
07:15 AM	0	0	0	4	3	3	0	0	1	40	0	3	0	0	1	0	0	0	9	2	66
07:30 AM	1	2	0	2	4	1	0	0	5	45	0	3	0	1	2	1	0	0	12	2	81
07:45 AM	0	3	0	4	5	1	0	0	3	52	0	7	0	2	3	0	0	0	26	2	108
Total	1	6	0	13	15	7	0	0	11	157	0	19	0	3	7	1	0	0	57	7	304
08:00 AM	0	4	0	3	8	3	1	0	2	90	0	9	0	4	6	0	0	0	14	0	144
08:15 AM	0	0	0	4	2	5	0	0	4	110	0	7	0	5	10	0	0	0	23	2	172
08:30 AM	0	2	0	7	0	6	0	0	2	96	0	23	0	3	3	1	0	1	33	3	180
08:45 AM	0	0	0	14	1	2	0	0	8	136	0	14	0	2	8	0	0	0	29	5	219
Total	0	6	0	28	11	16	1	0	16	432	0	53	0	14	27	1	0	1	99	10	715
Grand Total	1	12	0	41	26	23	1	0	27	589	0	72	0	17	34	2	0	1	156	17	1019
Apprch %	1.2	15	0	51.2	32.5	3.6	0.2	0	4.2	92	0	58.5	0	13.8	27.6	1.1	0	0.6	88.6	9.7	
Total %	0.1	1.2	0	4	2.6	2.3	0.1	0	2.6	57.8	0	7.1	0	1.7	3.3	0.2	0	0.1	15.3	1.7	

	A Street From North						W. Second Street From East						A Street From South						W. Second Street From West						
Start Time	Right	Thru	Left	Peds EB	Peds WB	App. Total	Right	Thru	Left	Peds SB	Peds NB	App. Total	Right	Thru	Left	Peds WB	Peds EB	App. Total	Right	Thru	Left	Peds NB	Peds SB	App. Total	Int. Total

Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 08:00 AM

Start Time	Right	Thru	Left	Peds EB	Peds WB	App. Total	Right	Thru	Left	Peds SB	Peds NB	App. Total	Right	Thru	Left	Peds WB	Peds EB	App. Total	Right	Thru	Left	Peds NB	Peds SB	App. Total	Int. Total
08:00 AM	0	4	0	3	8	15	3	1	0	2	90	96	0	9	0	4	6	19	0	0	0	14	0	14	144
08:15 AM	0	0	0	4	2	6	5	0	0	4	110	119	0	7	0	5	10	22	0	0	0	23	2	25	172
08:30 AM	0	2	0	7	0	9	6	0	0	2	96	104	0	23	0	3	3	29	1	0	1	33	3	38	180
08:45 AM	0	0	0	14	1	15	2	0	0	8	136	146	0	14	0	2	8	24	0	0	0	29	5	34	219
Total Volume	0	6	0	28	11	45	16	1	0	16	432	465	0	53	0	14	27	94	1	0	1	99	10	111	715
% App. Total	0	13.3	0	62.2	24.4		3.4	0.2	0	3.4	92.9		0	56.4	0	14.9	28.7		0.9	0	0.9	89.2	9		
PHF	.000	.375	.000	.500	.344	.750	.667	.250	.000	.500	.794	.796	.000	.576	.000	.700	.675	.810	.250	.000	.250	.750	.500	.730	.816

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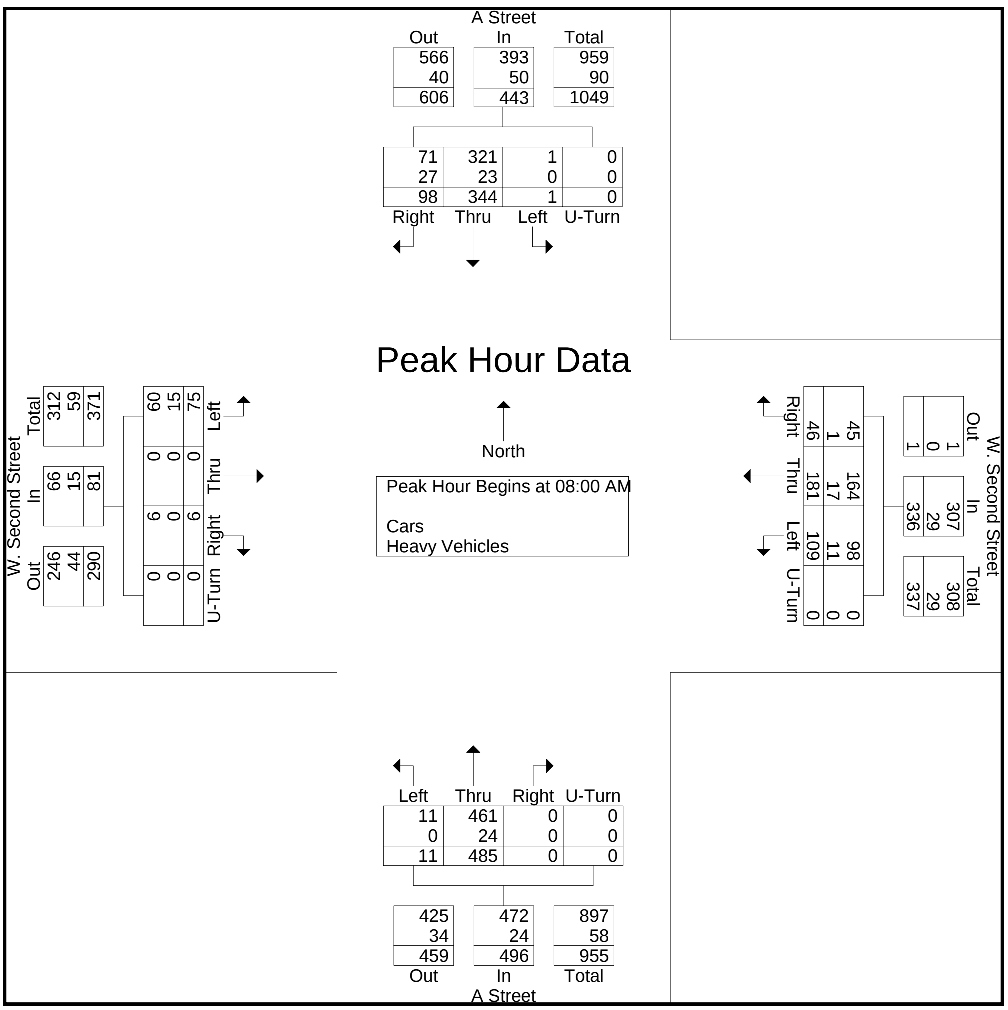
	A Street From North					W. Second Street From East					A Street From South					W. Second Street From West					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 08:00 AM																					
08:00 AM	30	109	0	0	139	11	49	20	0	80	0	108	4	0	112	1	0	17	0	18	349
08:15 AM	24	82	0	0	106	9	46	30	0	85	0	111	2	0	113	1	0	25	0	26	330
08:30 AM	17	77	0	0	94	14	42	37	0	93	0	126	3	0	129	1	0	11	0	12	328
08:45 AM	27	76	1	0	104	12	44	22	0	78	0	140	2	0	142	3	0	22	0	25	349
Total Volume	98	344	1	0	443	46	181	109	0	336	0	485	11	0	496	6	0	75	0	81	1356
% App. Total	22.1	77.7	0.2	0		13.7	53.9	32.4	0		0	97.8	2.2	0		7.4	0	92.6	0		
PHF	.817	.789	.250	.000	.797	.821	.923	.736	.000	.903	.000	.866	.688	.000	.873	.500	.000	.750	.000	.779	.971
Cars	71	321	1	0	393	45	164	98	0	307	0	461	11	0	472	6	0	60	0	66	1238
% Cars	72.4	93.3	100	0	88.7	97.8	90.6	89.9	0	91.4	0	95.1	100	0	95.2	100	0	80.0	0	81.5	91.3
Heavy Vehicles	27	23	0	0	50	1	17	11	0	29	0	24	0	0	24	0	0	15	0	15	118
% Heavy Vehicles	27.6	6.7	0	0	11.3	2.2	9.4	10.1	0	8.6	0	4.9	0	0	4.8	0	0	20.0	0	18.5	8.7



N/S: A Street
E/W: W. Second Street
City, State: South Boston, MA
Client: VHB/ A. Santiago

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01752
Office: 508.875.0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

File Name : 165050 GG
Site Code : 13421
Start Date : 4/27/2016

Groups Printed- Cars - Heavy Vehicles

	A Street From North				W. Second Street From East				A Street From South				W. Second Street From West				
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Int. Total
04:00 PM	33	144	0	0	5	22	13	0	0	76	1	0	0	0	13	0	307
04:15 PM	17	158	0	0	9	24	32	0	0	81	0	0	0	0	9	0	330
04:30 PM	30	159	0	0	5	27	23	0	0	92	0	0	0	0	6	0	342
04:45 PM	30	180	0	0	6	26	17	0	0	101	1	0	1	0	12	0	374
Total	110	641	0	0	25	99	85	0	0	350	2	0	1	0	40	0	1353
05:00 PM	30	156	0	0	8	30	38	0	0	99	3	1	0	0	18	0	383
05:15 PM	26	139	0	0	8	41	30	0	0	101	3	0	1	0	12	0	361
05:30 PM	41	171	0	0	5	23	21	0	0	119	1	0	3	0	24	0	408
05:45 PM	26	158	0	0	8	23	37	0	0	122	1	0	0	0	21	0	396
Total	123	624	0	0	29	117	126	0	0	441	8	1	4	0	75	0	1548
Grand Total	233	1265	0	0	54	216	211	0	0	791	10	1	5	0	115	0	2901
Apprch %	15.6	84.4	0	0	11.2	44.9	43.9	0	0	98.6	1.2	0.1	4.2	0	95.8	0	
Total %	8	43.6	0	0	1.9	7.4	7.3	0	0	27.3	0.3	0	0.2	0	4	0	
Cars	215	1238	0	0	53	212	199	0	0	775	10	1	5	0	105	0	2813
% Cars	92.3	97.9	0	0	98.1	98.1	94.3	0	0	98	100	100	100	0	91.3	0	97
Heavy Vehicles	18	27	0	0	1	4	12	0	0	16	0	0	0	0	10	0	88
% Heavy Vehicles	7.7	2.1	0	0	1.9	1.9	5.7	0	0	2	0	0	0	0	8.7	0	3

Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 05:00 PM

	A Street From North					W. Second Street From East					A Street From South					W. Second Street From West					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
05:00 PM	30	156	0	0	186	8	30	38	0	76	0	99	3	1	103	0	0	18	0	18	383
05:15 PM	26	139	0	0	165	8	41	30	0	79	0	101	3	0	104	1	0	12	0	13	361
05:30 PM	41	171	0	0	212	5	23	21	0	49	0	119	1	0	120	3	0	24	0	27	408
05:45 PM	26	158	0	0	184	8	23	37	0	68	0	122	1	0	123	0	0	21	0	21	396
Total Volume	123	624	0	0	747	29	117	126	0	272	0	441	8	1	450	4	0	75	0	79	1548
% App. Total	16.5	83.5	0	0		10.7	43	46.3	0		0	98	1.8	0.2		5.1	0	94.9	0		
PHF	.750	.912	.000	.000	.881	.906	.713	.829	.000	.861	.000	.904	.667	.250	.915	.333	.000	.781	.000	.731	.949
Cars	114	615	0	0	729	29	115	120	0	264	0	432	8	1	441	4	0	70	0	74	1508
% Cars	92.7	98.6	0	0	97.6	100	98.3	95.2	0	97.1	0	98.0	100	100	98.0	100	0	93.3	0	93.7	97.4
Heavy Vehicles	9	9	0	0	18	0	2	6	0	8	0	9	0	0	9	0	0	5	0	5	40
% Heavy Vehicles	7.3	1.4	0	0	2.4	0	1.7	4.8	0	2.9	0	2.0	0	0	2.0	0	0	6.7	0	6.3	2.6

N/S: A Street
E/W: W. Second Street
City, State: South Boston, MA
Client: VHB/ A. Santiago

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Office: 508.875.0100 Fax: 508-875-0118
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File Name : 165050 GG
Site Code : 13421
Start Date : 4/27/2016

Groups Printed- Cars

	A Street From North				W. Second Street From East				A Street From South				W. Second Street From West				
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Int. Total
04:00 PM	30	139	0	0	5	21	12	0	0	75	1	0	0	0	12	0	295
04:15 PM	16	153	0	0	8	24	30	0	0	78	0	0	0	0	8	0	317
04:30 PM	27	155	0	0	5	26	22	0	0	90	0	0	0	0	4	0	329
04:45 PM	28	176	0	0	6	26	15	0	0	100	1	0	1	0	11	0	364
Total	101	623	0	0	24	97	79	0	0	343	2	0	1	0	35	0	1305
05:00 PM	29	155	0	0	8	29	36	0	0	97	3	1	0	0	18	0	376
05:15 PM	24	137	0	0	8	40	27	0	0	98	3	0	1	0	10	0	348
05:30 PM	37	166	0	0	5	23	21	0	0	117	1	0	3	0	22	0	395
05:45 PM	24	157	0	0	8	23	36	0	0	120	1	0	0	0	20	0	389
Total	114	615	0	0	29	115	120	0	0	432	8	1	4	0	70	0	1508
Grand Total	215	1238	0	0	53	212	199	0	0	775	10	1	5	0	105	0	2813
Apprch %	14.8	85.2	0	0	11.4	45.7	42.9	0	0	98.6	1.3	0.1	4.5	0	95.5	0	
Total %	7.6	44	0	0	1.9	7.5	7.1	0	0	27.6	0.4	0	0.2	0	3.7	0	

	A Street From North					W. Second Street From East					A Street From South					W. Second Street From West					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 05:00 PM																					
05:00 PM	29	155	0	0	184	8	29	36	0	73	0	97	3	1	101	0	0	18	0	18	376
05:15 PM	24	137	0	0	161	8	40	27	0	75	0	98	3	0	101	1	0	10	0	11	348
05:30 PM	37	166	0	0	203	5	23	21	0	49	0	117	1	0	118	3	0	22	0	25	395
05:45 PM	24	157	0	0	181	8	23	36	0	67	0	120	1	0	121	0	0	20	0	20	389
Total Volume	114	615	0	0	729	29	115	120	0	264	0	432	8	1	441	4	0	70	0	74	1508
% App. Total	15.6	84.4	0	0		11	43.6	45.5	0		0	98	1.8	0.2		5.4	0	94.6	0		
PHF	.770	.926	.000	.000	.898	.906	.719	.833	.000	.880	.000	.900	.667	.250	.911	.333	.000	.795	.000	.740	.954

N/S: A Street
E/W: W. Second Street
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File Name : 165050 GG
Site Code : 13421
Start Date : 4/27/2016
Page No : 1

Groups Printed- Heavy Vehicles

	A Street From North				W. Second Street From East				A Street From South				W. Second Street From West				
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Int. Total
04:00 PM	3	5	0	0	0	1	1	0	0	1	0	0	0	0	1	0	12
04:15 PM	1	5	0	0	1	0	2	0	0	3	0	0	0	0	1	0	13
04:30 PM	3	4	0	0	0	1	1	0	0	2	0	0	0	0	2	0	13
04:45 PM	2	4	0	0	0	0	2	0	0	1	0	0	0	0	1	0	10
Total	9	18	0	0	1	2	6	0	0	7	0	0	0	0	5	0	48
05:00 PM	1	1	0	0	0	1	2	0	0	2	0	0	0	0	0	0	7
05:15 PM	2	2	0	0	0	1	3	0	0	3	0	0	0	0	2	0	13
05:30 PM	4	5	0	0	0	0	0	0	0	2	0	0	0	0	2	0	13
05:45 PM	2	1	0	0	0	0	1	0	0	2	0	0	0	0	1	0	7
Total	9	9	0	0	0	2	6	0	0	9	0	0	0	0	5	0	40
Grand Total	18	27	0	0	1	4	12	0	0	16	0	0	0	0	10	0	88
Apprch %	40	60	0	0	5.9	23.5	70.6	0	0	100	0	0	0	0	100	0	
Total %	20.5	30.7	0	0	1.1	4.5	13.6	0	0	18.2	0	0	0	0	11.4	0	

Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 04:00 PM

	A Street From North					W. Second Street From East					A Street From South					W. Second Street From West					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
04:00 PM	3	5	0	0	8	0	1	1	0	2	0	1	0	0	1	0	0	1	0	1	12
04:15 PM	1	5	0	0	6	1	0	2	0	3	0	3	0	0	3	0	0	1	0	1	13
04:30 PM	3	4	0	0	7	0	1	1	0	2	0	2	0	0	2	0	0	2	0	2	13
04:45 PM	2	4	0	0	6	0	0	2	0	2	0	1	0	0	1	0	0	1	0	1	10
Total Volume	9	18	0	0	27	1	2	6	0	9	0	7	0	0	7	0	0	5	0	5	48
% App. Total	33.3	66.7	0	0		11.1	22.2	66.7	0		0	100	0	0		0	0	100	0		
PHF	.750	.900	.000	.000	.844	.250	.500	.750	.000	.750	.000	.583	.000	.000	.583	.000	.000	.625	.000	.625	.923

N/S: A Street
E/W: W. Second Street
City, State: South Boston, MA
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PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01752
Office: 508.875.0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

File Name : 165050 GG
Site Code : 13421
Start Date : 4/27/2016
Page No : 1

Groups Printed- Peds and Bikes

	A Street From North					W. Second Street From East					A Street From South					W. Second Street From West					
Start Time	Right	Thru	Left	Peds EB	Peds WB	Right	Thru	Left	Peds SB	Peds NB	Right	Thru	Left	Peds WB	Peds EB	Right	Thru	Left	Peds NB	Peds SB	Int. Total
04:00 PM	1	6	0	6	7	0	0	0	44	12	0	1	0	5	0	0	0	0	5	21	108
04:15 PM	0	7	0	1	5	0	0	1	28	6	0	0	0	5	1	0	0	0	4	16	74
04:30 PM	0	4	0	3	3	0	0	0	45	11	0	0	0	6	1	0	0	0	0	23	96
04:45 PM	0	9	0	6	3	3	0	0	62	6	0	1	0	4	1	0	0	0	2	20	117
Total	1	26	0	16	18	3	0	1	179	35	0	2	0	20	3	0	0	0	11	80	395
05:00 PM	2	4	0	1	9	0	0	1	92	10	0	0	0	1	0	0	0	0	2	41	163
05:15 PM	0	21	0	5	5	0	0	0	84	6	0	1	0	4	0	0	0	0	5	35	166
05:30 PM	1	13	1	2	7	0	0	0	79	5	0	1	0	5	3	0	0	0	3	44	164
05:45 PM	2	26	0	3	4	0	1	0	70	10	0	2	0	3	0	0	0	0	6	34	161
Total	5	64	1	11	25	0	1	1	325	31	0	4	0	13	3	0	0	0	16	154	654
Grand Total	6	90	1	27	43	3	1	2	504	66	0	6	0	33	6	0	0	0	27	234	1049
Apprch %	3.6	53.9	0.6	16.2	25.7	0.5	0.2	0.3	87.5	11.5	0	13.3	0	73.3	13.3	0	0	0	10.3	89.7	
Total %	0.6	8.6	0.1	2.6	4.1	0.3	0.1	0.2	48	6.3	0	0.6	0	3.1	0.6	0	0	0	2.6	22.3	

	A Street From North						W. Second Street From East						A Street From South						W. Second Street From West						
Start Time	Right	Thru	Left	Peds EB	Peds WB	App. Total	Right	Thru	Left	Peds SB	Peds NB	App. Total	Right	Thru	Left	Peds WB	Peds EB	App. Total	Right	Thru	Left	Peds NB	Peds SB	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 05:00 PM																									
05:00 PM	2	4	0	1	9	16	0	0	1	92	10	103	0	0	0	1	0	1	0	0	0	2	41	43	163
05:15 PM	0	21	0	5	5	31	0	0	0	84	6	90	0	1	0	4	0	5	0	0	0	5	35	40	166
05:30 PM	1	13	1	2	7	24	0	0	0	79	5	84	0	1	0	5	3	9	0	0	0	3	44	47	164
05:45 PM	2	26	0	3	4	35	0	1	0	70	10	81	0	2	0	3	0	5	0	0	0	6	34	40	161
Total Volume	5	64	1	11	25	106	0	1	1	325	31	358	0	4	0	13	3	20	0	0	0	16	154	170	654
% App. Total	4.7	60.4	0.9	10.4	23.6		0	0.3	0.3	90.8	8.7		0	20	0	65	15		0	0	0	9.4	90.6		
PHF	.625	.615	.250	.550	.694	.757	.000	.250	.250	.883	.775	.869	.000	.500	.000	.650	.250	.556	.000	.000	.000	.667	.875	.904	.985

N/S: A Street
E/W: W. Second Street
City, State: South Boston, MA
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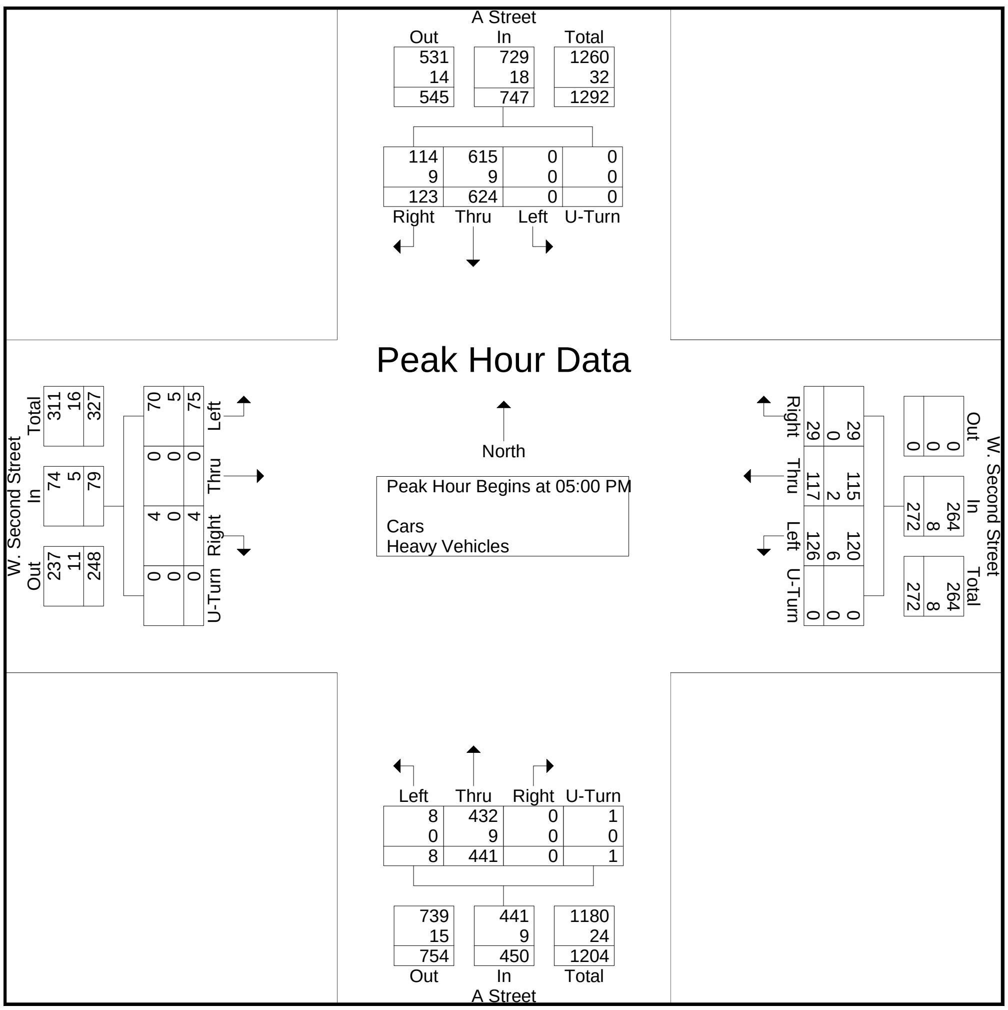
Site Code : 13421
Start Date : 4/27/2016
Page No : 1

	A Street From North					W. Second Street From East					A Street From South					W. Second Street From West					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 05:00 PM																					
05:00 PM	30	156	0	0	186	8	30	38	0	76	0	99	3	1	103	0	0	18	0	18	383
05:15 PM	26	139	0	0	165	8	41	30	0	79	0	101	3	0	104	1	0	12	0	13	361
05:30 PM	41	171	0	0	212	5	23	21	0	49	0	119	1	0	120	3	0	24	0	27	408
05:45 PM	26	158	0	0	184	8	23	37	0	68	0	122	1	0	123	0	0	21	0	21	396
Total Volume	123	624	0	0	747	29	117	126	0	272	0	441	8	1	450	4	0	75	0	79	1548
% App. Total	16.5	83.5	0	0		10.7	43	46.3	0		0	98	1.8	0.2		5.1	0	94.9	0		
PHF	.750	.912	.000	.000	.881	.906	.713	.829	.000	.861	.000	.904	.667	.250	.915	.333	.000	.781	.000	.731	.949
Cars	114	615	0	0	729	29	115	120	0	264	0	432	8	1	441	4	0	70	0	74	1508
% Cars	92.7	98.6	0	0	97.6	100	98.3	95.2	0	97.1	0	98.0	100	100	98.0	100	0	93.3	0	93.7	97.4
Heavy Vehicles	9	9	0	0	18	0	2	6	0	8	0	9	0	0	9	0	0	5	0	5	40
% Heavy Vehicles	7.3	1.4	0	0	2.4	0	1.7	4.8	0	2.9	0	2.0	0	0	2.0	0	0	6.7	0	6.3	2.6



N/S: Necco Street
E/W: Necco Court
City, State: South Boston, MA
Client: VHB/ A. Santiago

PRECISION
D A T A
INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01752
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File Name : 165050 H
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Start Date : 4/27/2016
Page No : 1

Groups Printed- Cars - Heavy Vehicles

	Necco Street From North				Necco Court From East				Necco Street From South				Necco Court From West				
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Int. Total
07:00 AM	0	39	0	2	1	0	0	0	1	5	0	0	0	0	0	0	48
07:15 AM	0	60	0	1	0	1	1	0	0	5	1	0	0	0	1	0	70
07:30 AM	1	51	1	2	1	0	1	0	0	9	0	1	1	0	1	0	69
07:45 AM	0	73	0	0	0	0	0	0	0	14	0	0	0	0	0	0	87
Total	1	223	1	5	2	1	2	0	1	33	1	1	1	0	2	0	274
08:00 AM	2	76	0	0	3	0	0	0	0	14	1	0	0	0	0	0	96
08:15 AM	0	66	1	0	0	0	0	0	0	6	1	0	0	0	0	0	74
08:30 AM	2	71	1	0	2	0	0	0	0	7	1	0	1	0	0	0	85
08:45 AM	1	77	1	0	0	0	1	0	1	10	0	0	0	0	0	0	91
Total	5	290	3	0	5	0	1	0	1	37	3	0	1	0	0	0	346
Grand Total	6	513	4	5	7	1	3	0	2	70	4	1	2	0	2	0	620
Apprch %	1.1	97.2	0.8	0.9	63.6	9.1	27.3	0	2.6	90.9	5.2	1.3	50	0	50	0	
Total %	1	82.7	0.6	0.8	1.1	0.2	0.5	0	0.3	11.3	0.6	0.2	0.3	0	0.3	0	
Cars	6	494	3	2	6	0	3	0	2	55	4	1	2	0	1	0	579
% Cars	100	96.3	75	40	85.7	0	100	0	100	78.6	100	100	100	0	50	0	93.4
Heavy Vehicles	0	19	1	3	1	1	0	0	0	15	0	0	0	0	1	0	41
% Heavy Vehicles	0	3.7	25	60	14.3	100	0	0	0	21.4	0	0	0	0	50	0	6.6

Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 08:00 AM

	Necco Street From North					Necco Court From East					Necco Street From South					Necco Court From West					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
08:00 AM	2	76	0	0	78	3	0	0	0	3	0	14	1	0	15	0	0	0	0	0	96
08:15 AM	0	66	1	0	67	0	0	0	0	0	0	6	1	0	7	0	0	0	0	0	74
08:30 AM	2	71	1	0	74	2	0	0	0	2	0	7	1	0	8	1	0	0	0	1	85
08:45 AM	1	77	1	0	79	0	0	1	0	1	1	10	0	0	11	0	0	0	0	0	91
Total Volume	5	290	3	0	298	5	0	1	0	6	1	37	3	0	41	1	0	0	0	1	346
% App. Total	1.7	97.3	1	0		83.3	0	16.7	0		2.4	90.2	7.3	0		100	0	0	0		
PHF	.625	.942	.750	.000	.943	.417	.000	.250	.000	.500	.250	.661	.750	.000	.683	.250	.000	.000	.000	.250	.901
Cars	5	278	2	0	285	4	0	1	0	5	1	30	3	0	34	1	0	0	0	1	325
% Cars	100	95.9	66.7	0	95.6	80.0	0	100	0	83.3	100	81.1	100	0	82.9	100	0	0	0	100	93.9
Heavy Vehicles	0	12	1	0	13	1	0	0	0	1	0	7	0	0	7	0	0	0	0	0	21
% Heavy Vehicles	0	4.1	33.3	0	4.4	20.0	0	0	0	16.7	0	18.9	0	0	17.1	0	0	0	0	0	6.1

N/S: Necco Street
E/W: Necco Court
City, State: South Boston, MA
Client: VHB/ A. Santiago

PRECISION DATA INDUSTRIES, LLC

46 Morton Street, Framingham, MA 01752
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File Name : 165050 H
Site Code : 13421
Start Date : 4/27/2016
Page No : 1

Groups Printed- Cars

	Necco Street From North				Necco Court From East				Necco Street From South				Necco Court From West				
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Int. Total
07:00 AM	0	38	0	0	1	0	0	0	1	4	0	0	0	0	0	0	44
07:15 AM	0	59	0	0	0	0	1	0	0	5	1	0	0	0	0	0	66
07:30 AM	1	49	1	2	1	0	1	0	0	6	0	1	1	0	1	0	64
07:45 AM	0	70	0	0	0	0	0	0	0	10	0	0	0	0	0	0	80
Total	1	216	1	2	2	0	2	0	1	25	1	1	1	0	1	0	254
08:00 AM	2	72	0	0	2	0	0	0	0	11	1	0	0	0	0	0	88
08:15 AM	0	63	0	0	0	0	0	0	0	5	1	0	0	0	0	0	69
08:30 AM	2	70	1	0	2	0	0	0	0	5	1	0	1	0	0	0	82
08:45 AM	1	73	1	0	0	0	1	0	1	9	0	0	0	0	0	0	86
Total	5	278	2	0	4	0	1	0	1	30	3	0	1	0	0	0	325
Grand Total	6	494	3	2	6	0	3	0	2	55	4	1	2	0	1	0	579
Apprch %	1.2	97.8	0.6	0.4	66.7	0	33.3	0	3.2	88.7	6.5	1.6	66.7	0	33.3	0	
Total %	1	85.3	0.5	0.3	1	0	0.5	0	0.3	9.5	0.7	0.2	0.3	0	0.2	0	

Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 08:00 AM

	Necco Street From North					Necco Court From East					Necco Street From South					Necco Court From West					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
08:00 AM	2	72	0	0	74	2	0	0	0	2	0	11	1	0	12	0	0	0	0	0	88
08:15 AM	0	63	0	0	63	0	0	0	0	0	0	5	1	0	6	0	0	0	0	0	69
08:30 AM	2	70	1	0	73	2	0	0	0	2	0	5	1	0	6	1	0	0	0	1	82
08:45 AM	1	73	1	0	75	0	0	1	0	1	1	9	0	0	10	0	0	0	0	0	86
Total Volume	5	278	2	0	285	4	0	1	0	5	1	30	3	0	34	1	0	0	0	1	325
% App. Total	1.8	97.5	0.7	0		80	0	20	0		2.9	88.2	8.8	0		100	0	0	0		
PHF	.625	.952	.500	.000	.950	.500	.000	.250	.000	.625	.250	.682	.750	.000	.708	.250	.000	.000	.000	.250	.923

N/S: Necco Street
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City, State: South Boston, MA
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File Name : 165050 H
Site Code : 13421
Start Date : 4/27/2016
Page No : 1

Groups Printed- Heavy Vehicles

	Necco Street From North				Necco Court From East				Necco Street From South				Necco Court From West				
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Int. Total
07:00 AM	0	1	0	2	0	0	0	0	0	1	0	0	0	0	0	0	4
07:15 AM	0	1	0	1	0	1	0	0	0	0	0	0	0	0	1	0	4
07:30 AM	0	2	0	0	0	0	0	0	0	3	0	0	0	0	0	0	5
07:45 AM	0	3	0	0	0	0	0	0	0	4	0	0	0	0	0	0	7
Total	0	7	0	3	0	1	0	0	0	8	0	0	0	0	1	0	20
08:00 AM	0	4	0	0	1	0	0	0	0	3	0	0	0	0	0	0	8
08:15 AM	0	3	1	0	0	0	0	0	0	1	0	0	0	0	0	0	5
08:30 AM	0	1	0	0	0	0	0	0	0	2	0	0	0	0	0	0	3
08:45 AM	0	4	0	0	0	0	0	0	0	1	0	0	0	0	0	0	5
Total	0	12	1	0	1	0	0	0	0	7	0	0	0	0	0	0	21
Grand Total	0	19	1	3	1	1	0	0	0	15	0	0	0	0	1	0	41
Apprch %	0	82.6	4.3	13	50	50	0	0	0	100	0	0	0	0	100	0	
Total %	0	46.3	2.4	7.3	2.4	2.4	0	0	0	36.6	0	0	0	0	2.4	0	

	Necco Street From North					Necco Court From East					Necco Street From South					Necco Court From West					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:30 AM																					
07:30 AM	0	2	0	0	2	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	5
07:45 AM	0	3	0	0	3	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	7
08:00 AM	0	4	0	0	4	1	0	0	0	1	0	3	0	0	3	0	0	0	0	0	8
08:15 AM	0	3	1	0	4	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	5
Total Volume	0	12	1	0	13	1	0	0	0	1	0	11	0	0	11	0	0	0	0	0	25
% App. Total	0	92.3	7.7	0		100	0	0	0		0	100	0	0		0	0	0	0		
PHF	.000	.750	.250	.000	.813	.250	.000	.000	.000	.250	.000	.688	.000	.000	.688	.000	.000	.000	.000	.000	.781

N/S: Necco Street
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City, State: South Boston, MA
Client: VHB/ A. Santiago

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File Name : 165050 H
Site Code : 13421
Start Date : 4/27/2016
Page No : 1

Groups Printed- Peds and Bikes

	Necco Street From North					Necco Court From East					Necco Street From South					Necco Court From West					
Start Time	Right	Thru	Left	Peds EB	Peds WB	Right	Thru	Left	Peds SB	Peds NB	Right	Thru	Left	Peds WB	Peds EB	Right	Thru	Left	Peds NB	Peds SB	Int. Total
07:00 AM	1	0	1	0	10	1	0	0	1	1	0	4	0	2	0	0	0	0	8	1	30
07:15 AM	0	0	0	1	19	0	0	0	0	15	0	4	0	1	1	0	0	1	6	3	51
07:30 AM	0	2	0	0	17	0	0	0	1	12	0	1	0	0	2	0	0	1	13	1	50
07:45 AM	0	0	0	0	15	0	0	0	2	7	0	0	0	1	2	0	0	1	9	2	39
Total	1	2	1	1	61	1	0	0	4	35	0	9	0	4	5	0	0	3	36	7	170
08:00 AM	0	2	0	2	20	0	0	0	2	5	0	4	0	1	0	0	0	0	8	7	51
08:15 AM	0	3	1	4	24	1	0	0	4	4	0	3	0	1	0	0	0	2	26	4	77
08:30 AM	0	2	1	2	20	0	0	0	3	7	0	3	0	2	2	0	0	0	18	8	68
08:45 AM	0	1	2	9	12	0	0	0	9	5	0	3	0	3	0	0	0	0	24	8	76
Total	0	8	4	17	76	1	0	0	18	21	0	13	0	7	2	0	0	2	76	27	272
Grand Total	1	10	5	18	137	2	0	0	22	56	0	22	0	11	7	0	0	5	112	34	442
Apprch %	0.6	5.8	2.9	10.5	80.1	2.5	0	0	27.5	70	0	55	0	27.5	17.5	0	0	3.3	74.2	22.5	
Total %	0.2	2.3	1.1	4.1	31	0.5	0	0	5	12.7	0	5	0	2.5	1.6	0	0	1.1	25.3	7.7	

	Necco Street From North						Necco Court From East						Necco Street From South						Necco Court From West						
Start Time	Right	Thru	Left	Peds EB	Peds WB	App. Total	Right	Thru	Left	Peds SB	Peds NB	App. Total	Right	Thru	Left	Peds WB	Peds EB	App. Total	Right	Thru	Left	Peds NB	Peds SB	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 08:00 AM																									
08:00 AM	0	2	0	2	20	24	0	0	0	2	5	7	0	4	0	1	0	5	0	0	0	8	7	15	51
08:15 AM	0	3	1	4	24	32	1	0	0	4	4	9	0	3	0	1	0	4	0	0	2	26	4	32	77
08:30 AM	0	2	1	2	20	25	0	0	0	3	7	10	0	3	0	2	2	7	0	0	0	18	8	26	68
08:45 AM	0	1	2	9	12	24	0	0	0	9	5	14	0	3	0	3	0	6	0	0	0	24	8	32	76
Total Volume	0	8	4	17	76	105	1	0	0	18	21	40	0	13	0	7	2	22	0	0	2	76	27	105	272
% App. Total	0	7.6	3.8	16.2	72.4		2.5	0	0	45	52.5		0	59.1	0	31.8	9.1		0	0	1.9	72.4	25.7		
PHF	.000	.667	.500	.472	.792	.820	.250	.000	.000	.500	.750	.714	.000	.813	.000	.583	.250	.786	.000	.000	.250	.731	.844	.820	.883

PRECISION
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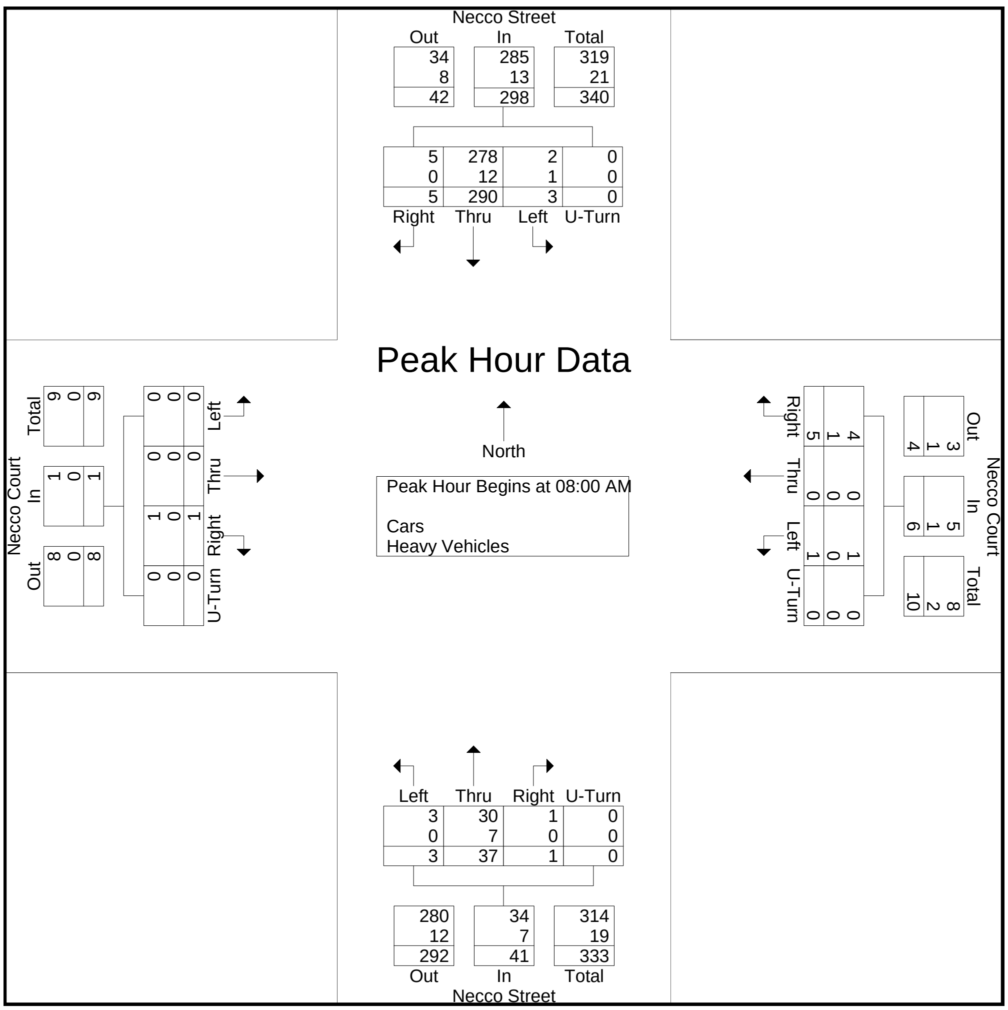
N/S: Necco Street
E/W: Necco Court
City, State: South Boston, MA
Client: VHB/ A. Santiago

File Name : 165050 H
Site Code : 13421
Start Date : 4/27/2016
Page No : 1

	Necco Street From North					Necco Court From East					Necco Street From South					Necco Court From West					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 08:00 AM																					
08:00 AM	2	76	0	0	78	3	0	0	0	3	0	14	1	0	15	0	0	0	0	0	96
08:15 AM	0	66	1	0	67	0	0	0	0	0	0	6	1	0	7	0	0	0	0	0	74
08:30 AM	2	71	1	0	74	2	0	0	0	2	0	7	1	0	8	1	0	0	0	1	85
08:45 AM	1	77	1	0	79	0	0	1	0	1	1	10	0	0	11	0	0	0	0	0	91
Total Volume	5	290	3	0	298	5	0	1	0	6	1	37	3	0	41	1	0	0	0	1	346
% App. Total	1.7	97.3	1	0		83.3	0	16.7	0		2.4	90.2	7.3	0		100	0	0	0		
PHF	.625	.942	.750	.000	.943	.417	.000	.250	.000	.500	.250	.661	.750	.000	.683	.250	.000	.000	.000	.250	.901
Cars	5	278	2	0	285	4	0	1	0	5	1	30	3	0	34	1	0	0	0	1	325
% Cars	100	95.9	66.7	0	95.6	80.0	0	100	0	83.3	100	81.1	100	0	82.9	100	0	0	0	100	93.9
Heavy Vehicles	0	12	1	0	13	1	0	0	0	1	0	7	0	0	7	0	0	0	0	0	21
% Heavy Vehicles	0	4.1	33.3	0	4.4	20.0	0	0	0	16.7	0	18.9	0	0	17.1	0	0	0	0	0	6.1



N/S: Necco Street
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File Name : 165050 HH
Site Code : 13421
Start Date : 4/27/2016
Page No : 1

Groups Printed- Cars - Heavy Vehicles

	Necco Street From North				Necco Court From East				Necco Street From South				Necco Court From West				
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Int. Total
04:00 PM	0	17	1	0	0	0	0	0	2	19	1	0	0	0	0	0	40
04:15 PM	1	11	0	0	1	0	0	0	0	34	0	0	1	0	1	0	49
04:30 PM	1	21	0	0	1	0	1	0	1	31	0	0	2	0	2	0	60
04:45 PM	0	16	1	0	0	0	1	0	1	39	0	0	0	0	0	0	58
Total	2	65	2	0	2	0	2	0	4	123	1	0	3	0	3	0	207
05:00 PM	1	18	1	0	1	0	1	0	1	51	0	0	2	0	1	0	77
05:15 PM	3	20	3	0	2	2	1	0	2	37	1	0	0	0	0	0	71
05:30 PM	0	15	0	0	1	0	1	0	1	38	1	0	2	2	0	0	61
05:45 PM	0	19	1	0	0	0	3	0	3	54	0	0	0	0	0	0	80
Total	4	72	5	0	4	2	6	0	7	180	2	0	4	2	1	0	289
Grand Total	6	137	7	0	6	2	8	0	11	303	3	0	7	2	4	0	496
Apprch %	4	91.3	4.7	0	37.5	12.5	50	0	3.5	95.6	0.9	0	53.8	15.4	30.8	0	
Total %	1.2	27.6	1.4	0	1.2	0.4	1.6	0	2.2	61.1	0.6	0	1.4	0.4	0.8	0	
Cars	6	130	7	0	5	2	8	0	11	298	3	0	7	2	4	0	483
% Cars	100	94.9	100	0	83.3	100	100	0	100	98.3	100	0	100	100	100	0	97.4
Heavy Vehicles	0	7	0	0	1	0	0	0	0	5	0	0	0	0	0	0	13
% Heavy Vehicles	0	5.1	0	0	16.7	0	0	0	0	1.7	0	0	0	0	0	0	2.6

Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 05:00 PM

	Necco Street From North					Necco Court From East					Necco Street From South					Necco Court From West					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
05:00 PM	1	18	1	0	20	1	0	1	0	2	1	51	0	0	52	2	0	1	0	3	77
05:15 PM	3	20	3	0	26	2	2	1	0	5	2	37	1	0	40	0	0	0	0	0	71
05:30 PM	0	15	0	0	15	1	0	1	0	2	1	38	1	0	40	2	2	0	0	4	61
05:45 PM	0	19	1	0	20	0	0	3	0	3	3	54	0	0	57	0	0	0	0	0	80
Total Volume	4	72	5	0	81	4	2	6	0	12	7	180	2	0	189	4	2	1	0	7	289
% App. Total	4.9	88.9	6.2	0		33.3	16.7	50	0		3.7	95.2	1.1	0		57.1	28.6	14.3	0		
PHF	.333	.900	.417	.000	.779	.500	.250	.500	.000	.600	.583	.833	.500	.000	.829	.500	.250	.250	.000	.438	.903
Cars	4	70	5	0	79	3	2	6	0	11	7	177	2	0	186	4	2	1	0	7	283
% Cars	100	97.2	100	0	97.5	75.0	100	100	0	91.7	100	98.3	100	0	98.4	100	100	100	0	100	97.9
Heavy Vehicles	0	2	0	0	2	1	0	0	0	1	0	3	0	0	3	0	0	0	0	0	6
% Heavy Vehicles	0	2.8	0	0	2.5	25.0	0	0	0	8.3	0	1.7	0	0	1.6	0	0	0	0	0	2.1

N/S: Necco Street
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File Name : 165050 HH
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Page No : 1

Groups Printed- Cars

	Necco Street From North				Necco Court From East				Necco Street From South				Necco Court From West				
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Int. Total
04:00 PM	0	15	1	0	0	0	0	0	2	18	1	0	0	0	0	0	37
04:15 PM	1	10	0	0	1	0	0	0	0	34	0	0	1	0	1	0	48
04:30 PM	1	19	0	0	1	0	1	0	1	30	0	0	2	0	2	0	57
04:45 PM	0	16	1	0	0	0	1	0	1	39	0	0	0	0	0	0	58
Total	2	60	2	0	2	0	2	0	4	121	1	0	3	0	3	0	200
05:00 PM	1	17	1	0	1	0	1	0	1	51	0	0	2	0	1	0	76
05:15 PM	3	19	3	0	1	2	1	0	2	37	1	0	0	0	0	0	69
05:30 PM	0	15	0	0	1	0	1	0	1	37	1	0	2	2	0	0	60
05:45 PM	0	19	1	0	0	0	3	0	3	52	0	0	0	0	0	0	78
Total	4	70	5	0	3	2	6	0	7	177	2	0	4	2	1	0	283
Grand Total	6	130	7	0	5	2	8	0	11	298	3	0	7	2	4	0	483
Apprch %	4.2	90.9	4.9	0	33.3	13.3	53.3	0	3.5	95.5	1	0	53.8	15.4	30.8	0	
Total %	1.2	26.9	1.4	0	1	0.4	1.7	0	2.3	61.7	0.6	0	1.4	0.4	0.8	0	

Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 05:00 PM

	Necco Street From North					Necco Court From East					Necco Street From South					Necco Court From West					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
05:00 PM	1	17	1	0	19	1	0	1	0	2	1	51	0	0	52	2	0	1	0	3	76
05:15 PM	3	19	3	0	25	1	2	1	0	4	2	37	1	0	40	0	0	0	0	0	69
05:30 PM	0	15	0	0	15	1	0	1	0	2	1	37	1	0	39	2	2	0	0	4	60
05:45 PM	0	19	1	0	20	0	0	3	0	3	3	52	0	0	55	0	0	0	0	0	78
Total Volume	4	70	5	0	79	3	2	6	0	11	7	177	2	0	186	4	2	1	0	7	283
% App. Total	5.1	88.6	6.3	0		27.3	18.2	54.5	0		3.8	95.2	1.1	0		57.1	28.6	14.3	0		
PHF	.333	.921	.417	.000	.790	.750	.250	.500	.000	.688	.583	.851	.500	.000	.845	.500	.250	.250	.000	.438	.907

N/S: Necco Street
E/W: Necco Court
City, State: South Boston, MA
Client: VHB/ A. Santiago

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01752
Office: 508.875.0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

File Name : 165050 HH
Site Code : 13421
Start Date : 4/27/2016

Groups Printed- Heavy Vehicles

	Necco Street From North				Necco Court From East				Necco Street From South				Necco Court From West				
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Int. Total
04:00 PM	0	2	0	0	0	0	0	0	0	1	0	0	0	0	0	0	3
04:15 PM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
04:30 PM	0	2	0	0	0	0	0	0	0	1	0	0	0	0	0	0	3
04:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	5	0	0	0	0	0	0	0	2	0	0	0	0	0	0	7
05:00 PM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
05:15 PM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	2
05:30 PM	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
05:45 PM	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	2
Total	0	2	0	0	1	0	0	0	0	3	0	0	0	0	0	0	6
Grand Total	0	7	0	0	1	0	0	0	0	5	0	0	0	0	0	0	13
Apprch %	0	100	0	0	100	0	0	0	0	100	0	0	0	0	0	0	
Total %	0	53.8	0	0	7.7	0	0	0	0	38.5	0	0	0	0	0	0	

Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 04:00 PM

	Necco Street From North					Necco Court From East					Necco Street From South					Necco Court From West					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
04:00 PM	0	2	0	0	2	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	3
04:15 PM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
04:30 PM	0	2	0	0	2	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	3
04:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Volume	0	5	0	0	5	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	7
% App. Total	0	100	0	0		0	0	0	0		0	100	0	0		0	0	0	0		
PHF	.000	.625	.000	.000	.625	.000	.000	.000	.000	.000	.000	.500	.000	.000	.500	.000	.000	.000	.000	.000	.583

N/S: Necco Street
E/W: Necco Court
City, State: South Boston, MA
Client: VHB/ A. Santiago

PRECISION DATA INDUSTRIES, LLC
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File Name : 165050 HH
Site Code : 13421
Start Date : 4/27/2016

Groups Printed- Peds and Bikes

	Necco Street From North					Necco Court From East					Necco Street From South					Necco Court From West					
Start Time	Right	Thru	Left	Peds EB	Peds WB	Right	Thru	Left	Peds SB	Peds NB	Right	Thru	Left	Peds WB	Peds EB	Right	Thru	Left	Peds NB	Peds SB	Int. Total
04:00 PM	0	1	0	7	4	0	0	0	5	3	0	0	0	0	5	0	0	0	2	10	37
04:15 PM	0	2	0	5	5	0	0	0	6	3	0	0	0	1	1	0	0	1	2	9	35
04:30 PM	0	2	1	12	3	1	0	0	5	0	0	0	0	1	2	0	0	0	4	13	44
04:45 PM	2	2	2	5	8	1	0	0	3	0	0	1	0	2	0	0	0	0	2	9	37
Total	2	7	3	29	20	2	0	0	19	6	0	1	0	4	8	0	0	1	10	41	153
05:00 PM	1	0	0	15	13	1	0	0	5	2	0	1	0	2	1	0	0	0	5	17	63
05:15 PM	0	4	0	10	3	1	0	1	2	1	0	2	0	8	4	0	0	0	7	14	57
05:30 PM	1	8	0	10	2	0	0	0	2	0	0	3	0	2	1	0	0	0	0	14	43
05:45 PM	1	6	0	12	2	1	0	0	4	4	0	0	0	3	3	0	0	0	4	8	48
Total	3	18	0	47	20	3	0	1	13	7	0	6	0	15	9	0	0	0	16	53	211
Grand Total	5	25	3	76	40	5	0	1	32	13	0	7	0	19	17	0	0	1	26	94	364
Apprch %	3.4	16.8	2	51	26.8	9.8	0	2	62.7	25.5	0	16.3	0	44.2	39.5	0	0	0.8	21.5	77.7	
Total %	1.4	6.9	0.8	20.9	11	1.4	0	0.3	8.8	3.6	0	1.9	0	5.2	4.7	0	0	0.3	7.1	25.8	

Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 05:00 PM

	Necco Street From North						Necco Court From East						Necco Street From South						Necco Court From West						
Start Time	Right	Thru	Left	Peds EB	Peds WB	App. Total	Right	Thru	Left	Peds SB	Peds NB	App. Total	Right	Thru	Left	Peds WB	Peds EB	App. Total	Right	Thru	Left	Peds NB	Peds SB	App. Total	Int. Total
05:00 PM	1	0	0	15	13	29	1	0	0	5	2	8	0	1	0	2	1	4	0	0	0	5	17	22	63
05:15 PM	0	4	0	10	3	17	1	0	1	2	1	5	0	2	0	8	4	14	0	0	0	7	14	21	57
05:30 PM	1	8	0	10	2	21	0	0	0	2	0	2	0	3	0	2	1	6	0	0	0	0	14	14	43
05:45 PM	1	6	0	12	2	21	1	0	0	4	4	9	0	0	0	3	3	6	0	0	0	4	8	12	48
Total Volume	3	18	0	47	20	88	3	0	1	13	7	24	0	6	0	15	9	30	0	0	0	16	53	69	211
% App. Total	3.4	20.5	0	53.4	22.7		12.5	0	4.2	54.2	29.2		0	20	0	50	30		0	0	0	23.2	76.8		
PHF	.750	.563	.000	.783	.385	.759	.750	.000	.250	.650	.438	.667	.000	.500	.000	.469	.563	.536	.000	.000	.000	.571	.779	.784	.837

N/S: Necco Street
E/W: Necco Court
City, State: South Boston, MA
Client: VHB/ A. Santiago

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01752
Office: 508.875.0100 Fax: 508-875-0118
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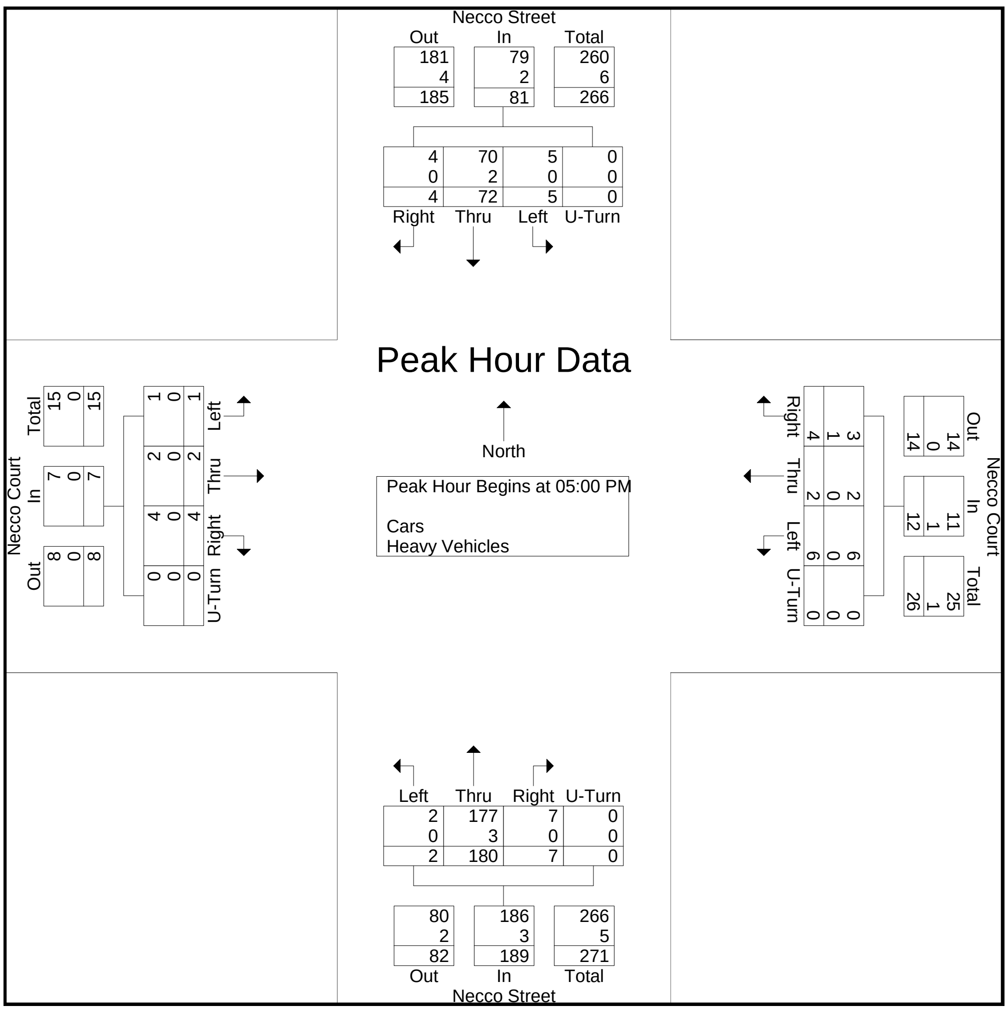
File Name : 165050 HH
Site Code : 13421
Start Date : 4/27/2016
Page No : 1

	Necco Street From North					Necco Court From East					Necco Street From South					Necco Court From West					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 05:00 PM																					
05:00 PM	1	18	1	0	20	1	0	1	0	2	1	51	0	0	52	2	0	1	0	3	77
05:15 PM	3	20	3	0	26	2	2	1	0	5	2	37	1	0	40	0	0	0	0	0	71
05:30 PM	0	15	0	0	15	1	0	1	0	2	1	38	1	0	40	2	2	0	0	4	61
05:45 PM	0	19	1	0	20	0	0	3	0	3	3	54	0	0	57	0	0	0	0	0	80
Total Volume	4	72	5	0	81	4	2	6	0	12	7	180	2	0	189	4	2	1	0	7	289
% App. Total	4.9	88.9	6.2	0		33.3	16.7	50	0		3.7	95.2	1.1	0		57.1	28.6	14.3	0		
PHF	.333	.900	.417	.000	.779	.500	.250	.500	.000	.600	.583	.833	.500	.000	.829	.500	.250	.250	.000	.438	.903
Cars	4	70	5	0	79	3	2	6	0	11	7	177	2	0	186	4	2	1	0	7	283
% Cars	100	97.2	100	0	97.5	75.0	100	100	0	91.7	100	98.3	100	0	98.4	100	100	100	0	100	97.9
Heavy Vehicles	0	2	0	0	2	1	0	0	0	1	0	3	0	0	3	0	0	0	0	0	6
% Heavy Vehicles	0	2.8	0	0	2.5	25.0	0	0	0	8.3	0	1.7	0	0	1.6	0	0	0	0	0	2.1



S: Necco Street
E/W: Melcher Street
City, State: South Boston, MA
Client: VHB/ A. Santiago

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01752
Office: 508.875.0100 Fax: 508-875-0118
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File Name : 165050 I
Site Code : 13421
Start Date : 4/27/2016

Groups Printed- Cars - Heavy Vehicles

	Melcher Street From East			Necco Street From South			Melcher Street From West			
Start Time	Thru	Left	U-Turn	Right	Left	U-Turn	Right	Thru	U-Turn	Int. Total
07:00 AM	15	11	2	2	5	0	30	28	0	93
07:15 AM	15	15	0	3	5	0	47	24	0	109
07:30 AM	18	16	1	2	10	0	39	31	0	117
07:45 AM	25	10	0	1	14	0	60	25	1	136
Total	73	52	3	8	34	0	176	108	1	455
08:00 AM	22	20	0	4	14	0	58	28	0	146
08:15 AM	31	21	0	0	5	0	48	34	0	139
08:30 AM	29	21	0	1	7	0	52	27	0	137
08:45 AM	24	17	0	2	8	0	59	31	0	141
Total	106	79	0	7	34	0	217	120	0	563
Grand Total	179	131	3	15	68	0	393	228	1	1018
Apprch %	57.2	41.9	1	18.1	81.9	0	63.2	36.7	0.2	
Total %	17.6	12.9	0.3	1.5	6.7	0	38.6	22.4	0.1	
Cars	160	130	3	14	49	0	371	195	1	923
% Cars	89.4	99.2	100	93.3	72.1	0	94.4	85.5	100	90.7
Heavy Vehicles	19	1	0	1	19	0	22	33	0	95
% Heavy Vehicles	10.6	0.8	0	6.7	27.9	0	5.6	14.5	0	9.3

	Melcher Street From East				Necco Street From South				Melcher Street From West				
Start Time	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Right	Thru	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 08:00 AM													
08:00 AM	22	20	0	42	4	14	0	18	58	28	0	86	146
08:15 AM	31	21	0	52	0	5	0	5	48	34	0	82	139
08:30 AM	29	21	0	50	1	7	0	8	52	27	0	79	137
08:45 AM	24	17	0	41	2	8	0	10	59	31	0	90	141
Total Volume	106	79	0	185	7	34	0	41	217	120	0	337	563
% App. Total	57.3	42.7	0		17.1	82.9	0		64.4	35.6	0		
PHF	.855	.940	.000	.889	.438	.607	.000	.569	.919	.882	.000	.936	.964
Cars	97	78	0	175	7	27	0	34	205	102	0	307	516
% Cars	91.5	98.7	0	94.6	100	79.4	0	82.9	94.5	85.0	0	91.1	91.7
Heavy Vehicles	9	1	0	10	0	7	0	7	12	18	0	30	47
% Heavy Vehicles	8.5	1.3	0	5.4	0	20.6	0	17.1	5.5	15.0	0	8.9	8.3

S: Necco Street
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PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01752
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File Name : 165050 I
Site Code : 13421
Start Date : 4/27/2016
Page No : 1

Groups Printed- Cars

	Melcher Street From East			Necco Street From South			Melcher Street From West			
Start Time	Thru	Left	U-Turn	Right	Left	U-Turn	Right	Thru	U-Turn	Int. Total
07:00 AM	14	11	2	2	3	0	27	22	0	81
07:15 AM	12	15	0	2	3	0	45	21	0	98
07:30 AM	15	16	1	2	7	0	37	27	0	105
07:45 AM	22	10	0	1	9	0	57	23	1	123
Total	63	52	3	7	22	0	166	93	1	407
08:00 AM	22	19	0	4	11	0	55	23	0	134
08:15 AM	30	21	0	0	4	0	44	31	0	130
08:30 AM	25	21	0	1	6	0	51	23	0	127
08:45 AM	20	17	0	2	6	0	55	25	0	125
Total	97	78	0	7	27	0	205	102	0	516
Grand Total	160	130	3	14	49	0	371	195	1	923
Apprch %	54.6	44.4	1	22.2	77.8	0	65.4	34.4	0.2	
Total %	17.3	14.1	0.3	1.5	5.3	0	40.2	21.1	0.1	

	Melcher Street From East				Necco Street From South				Melcher Street From West				
Start Time	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Right	Thru	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 08:00 AM													
08:00 AM	22	19	0	41	4	11	0	15	55	23	0	78	134
08:15 AM	30	21	0	51	0	4	0	4	44	31	0	75	130
08:30 AM	25	21	0	46	1	6	0	7	51	23	0	74	127
08:45 AM	20	17	0	37	2	6	0	8	55	25	0	80	125
Total Volume	97	78	0	175	7	27	0	34	205	102	0	307	516
% App. Total	55.4	44.6	0		20.6	79.4	0		66.8	33.2	0		
PHF	.808	.929	.000	.858	.438	.614	.000	.567	.932	.823	.000	.959	.963

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File Name : 165050 I
Site Code : 13421
Start Date : 4/27/2016

Groups Printed- Heavy Vehicles

	Melcher Street From East			Necco Street From South			Melcher Street From West			
Start Time	Thru	Left	U-Turn	Right	Left	U-Turn	Right	Thru	U-Turn	Int. Total
07:00 AM	1	0	0	0	2	0	3	6	0	12
07:15 AM	3	0	0	1	2	0	2	3	0	11
07:30 AM	3	0	0	0	3	0	2	4	0	12
07:45 AM	3	0	0	0	5	0	3	2	0	13
Total	10	0	0	1	12	0	10	15	0	48
08:00 AM	0	1	0	0	3	0	3	5	0	12
08:15 AM	1	0	0	0	1	0	4	3	0	9
08:30 AM	4	0	0	0	1	0	1	4	0	10
08:45 AM	4	0	0	0	2	0	4	6	0	16
Total	9	1	0	0	7	0	12	18	0	47
Grand Total	19	1	0	1	19	0	22	33	0	95
Apprch %	95	5	0	5	95	0	40	60	0	
Total %	20	1.1	0	1.1	20	0	23.2	34.7	0	

	Melcher Street From East				Necco Street From South				Melcher Street From West				
Start Time	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Right	Thru	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 07:00 AM													
07:00 AM	1	0	0	1	0	2	0	2	3	6	0	9	12
07:15 AM	3	0	0	3	1	2	0	3	2	3	0	5	11
07:30 AM	3	0	0	3	0	3	0	3	2	4	0	6	12
07:45 AM	3	0	0	3	0	5	0	5	3	2	0	5	13
Total Volume	10	0	0	10	1	12	0	13	10	15	0	25	48
% App. Total	100	0	0		7.7	92.3	0		40	60	0		
PHF	.833	.000	.000	.833	.250	.600	.000	.650	.833	.625	.000	.694	.923

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Start Date : 4/27/2016

Groups Printed- Peds and Bikes

	Melcher Street From East				Necco Street From South				Melcher Street From West				
Start Time	Thru	Left	Peds SB	Peds NB	Right	Left	Peds WB	Peds EB	Right	Thru	Peds NB	Peds SB	Int. Total
07:00 AM	1	0	0	1	0	4	16	33	2	0	6	0	63
07:15 AM	3	0	0	5	0	5	16	15	0	1	1	0	46
07:30 AM	0	0	1	4	0	2	14	29	2	2	2	0	56
07:45 AM	2	0	0	5	0	1	16	40	0	2	4	0	70
Total	6	0	1	15	0	12	62	117	4	5	13	0	235
08:00 AM	1	0	0	3	0	5	17	33	2	3	3	2	69
08:15 AM	2	0	0	3	0	8	23	55	2	2	5	2	102
08:30 AM	4	0	0	7	0	3	28	53	3	1	3	0	102
08:45 AM	3	0	2	16	0	2	15	80	4	4	1	0	127
Total	10	0	2	29	0	18	83	221	11	10	12	4	400
Grand Total	16	0	3	44	0	30	145	338	15	15	25	4	635
Apprch %	25.4	0	4.8	69.8	0	5.8	28.3	65.9	25.4	25.4	42.4	6.8	
Total %	2.5	0	0.5	6.9	0	4.7	22.8	53.2	2.4	2.4	3.9	0.6	

	Melcher Street From East					Necco Street From South					Melcher Street From West					
Start Time	Thru	Left	Peds SB	Peds NB	App. Total	Right	Left	Peds WB	Peds EB	App. Total	Right	Thru	Peds NB	Peds SB	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																
Peak Hour for Entire Intersection Begins at 08:00 AM																
08:00 AM	1	0	0	3	4	0	5	17	33	55	2	3	3	2	10	69
08:15 AM	2	0	0	3	5	0	8	23	55	86	2	2	5	2	11	102
08:30 AM	4	0	0	7	11	0	3	28	53	84	3	1	3	0	7	102
08:45 AM	3	0	2	16	21	0	2	15	80	97	4	4	1	0	9	127
Total Volume	10	0	2	29	41	0	18	83	221	322	11	10	12	4	37	400
% App. Total	24.4	0	4.9	70.7		0	5.6	25.8	68.6		29.7	27	32.4	10.8		
PHF	.625	.000	.250	.453	.488	.000	.563	.741	.691	.830	.688	.625	.600	.500	.841	.787

S: Necco Street
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Site Code : 13421
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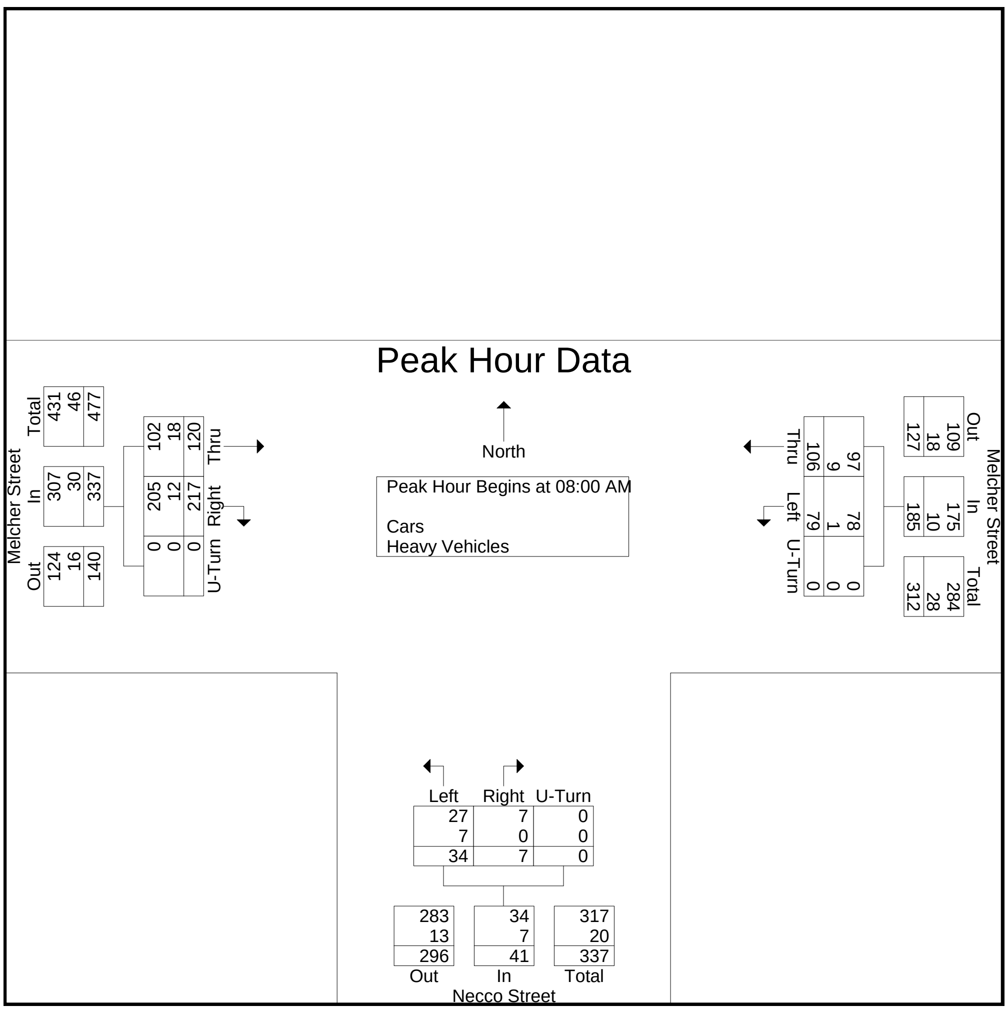
	Melcher Street From East				Necco Street From South				Melcher Street From West				
Start Time	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Right	Thru	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 08:00 AM													
08:00 AM	22	20	0	42	4	14	0	18	58	28	0	86	146
08:15 AM	31	21	0	52	0	5	0	5	48	34	0	82	139
08:30 AM	29	21	0	50	1	7	0	8	52	27	0	79	137
08:45 AM	24	17	0	41	2	8	0	10	59	31	0	90	141
Total Volume	106	79	0	185	7	34	0	41	217	120	0	337	563
% App. Total	57.3	42.7	0		17.1	82.9	0		64.4	35.6	0		
PHF	.855	.940	.000	.889	.438	.607	.000	.569	.919	.882	.000	.936	.964
Cars	97	78	0	175	7	27	0	34	205	102	0	307	516
% Cars	91.5	98.7	0	94.6	100	79.4	0	82.9	94.5	85.0	0	91.1	91.7
Heavy Vehicles	9	1	0	10	0	7	0	7	12	18	0	30	47
% Heavy Vehicles	8.5	1.3	0	5.4	0	20.6	0	17.1	5.5	15.0	0	8.9	8.3



S: Necco Street
E/W: Melcher Street
City, State: South Boston, MA
Client: VHB/ A. Santiago

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01752
Office: 508.875.0100 Fax: 508-875-0118
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File Name : 165050 II
Site Code : 13421
Start Date : 4/27/2016

Groups Printed- Cars - Heavy Vehicles

	Melcher Street From East			Necco Street From South			Melcher Street From West			
Start Time	Thru	Left	U-Turn	Right	Left	U-Turn	Right	Thru	U-Turn	Int. Total
04:00 PM	24	3	0	6	13	0	15	40	0	101
04:15 PM	24	3	1	8	26	0	10	42	1	115
04:30 PM	13	1	0	3	34	0	21	33	0	105
04:45 PM	37	1	0	8	30	0	16	32	0	124
Total	98	8	1	25	103	0	62	147	1	445
05:00 PM	45	4	0	14	39	0	16	26	0	144
05:15 PM	40	5	0	13	28	0	20	29	0	135
05:30 PM	34	3	0	7	33	0	12	35	0	124
05:45 PM	26	2	0	15	34	0	17	34	0	128
Total	145	14	0	49	134	0	65	124	0	531
Grand Total	243	22	1	74	237	0	127	271	1	976
Apprch %	91.4	8.3	0.4	23.8	76.2	0	31.8	67.9	0.3	
Total %	24.9	2.3	0.1	7.6	24.3	0	13	27.8	0.1	
Cars	219	22	1	74	231	0	119	235	1	902
% Cars	90.1	100	100	100	97.5	0	93.7	86.7	100	92.4
Heavy Vehicles	24	0	0	0	6	0	8	36	0	74
% Heavy Vehicles	9.9	0	0	0	2.5	0	6.3	13.3	0	7.6

	Melcher Street From East				Necco Street From South				Melcher Street From West				
Start Time	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Right	Thru	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 05:00 PM													
05:00 PM	45	4	0	49	14	39	0	53	16	26	0	42	144
05:15 PM	40	5	0	45	13	28	0	41	20	29	0	49	135
05:30 PM	34	3	0	37	7	33	0	40	12	35	0	47	124
05:45 PM	26	2	0	28	15	34	0	49	17	34	0	51	128
Total Volume	145	14	0	159	49	134	0	183	65	124	0	189	531
% App. Total	91.2	8.8	0		26.8	73.2	0		34.4	65.6	0		
PHF	.806	.700	.000	.811	.817	.859	.000	.863	.813	.886	.000	.926	.922
Cars	133	14	0	147	49	130	0	179	62	109	0	171	497
% Cars	91.7	100	0	92.5	100	97.0	0	97.8	95.4	87.9	0	90.5	93.6
Heavy Vehicles	12	0	0	12	0	4	0	4	3	15	0	18	34
% Heavy Vehicles	8.3	0	0	7.5	0	3.0	0	2.2	4.6	12.1	0	9.5	6.4

S: Necco Street
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File Name : 165050 II
Site Code : 13421
Start Date : 4/27/2016
Page No : 1

Groups Printed- Cars

	Melcher Street From East			Necco Street From South			Melcher Street From West			
Start Time	Thru	Left	U-Turn	Right	Left	U-Turn	Right	Thru	U-Turn	Int. Total
04:00 PM	19	3	0	6	12	0	13	32	0	85
04:15 PM	21	3	1	8	26	0	9	40	1	109
04:30 PM	11	1	0	3	33	0	19	25	0	92
04:45 PM	35	1	0	8	30	0	16	29	0	119
Total	86	8	1	25	101	0	57	126	1	405
05:00 PM	41	4	0	14	39	0	14	24	0	136
05:15 PM	37	5	0	13	27	0	19	25	0	126
05:30 PM	29	3	0	7	32	0	12	28	0	111
05:45 PM	26	2	0	15	32	0	17	32	0	124
Total	133	14	0	49	130	0	62	109	0	497
Grand Total	219	22	1	74	231	0	119	235	1	902
Apprch %	90.5	9.1	0.4	24.3	75.7	0	33.5	66.2	0.3	
Total %	24.3	2.4	0.1	8.2	25.6	0	13.2	26.1	0.1	

	Melcher Street From East				Necco Street From South				Melcher Street From West				
Start Time	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Right	Thru	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 05:00 PM													
05:00 PM	41	4	0	45	14	39	0	53	14	24	0	38	136
05:15 PM	37	5	0	42	13	27	0	40	19	25	0	44	126
05:30 PM	29	3	0	32	7	32	0	39	12	28	0	40	111
05:45 PM	26	2	0	28	15	32	0	47	17	32	0	49	124
Total Volume	133	14	0	147	49	130	0	179	62	109	0	171	497
% App. Total	90.5	9.5	0		27.4	72.6	0		36.3	63.7	0		
PHF	.811	.700	.000	.817	.817	.833	.000	.844	.816	.852	.000	.872	.914

S: Necco Street
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File Name : 165050 II
Site Code : 13421
Start Date : 4/27/2016
Page No : 1

Groups Printed- Heavy Vehicles

	Melcher Street From East			Necco Street From South			Melcher Street From West			
Start Time	Thru	Left	U-Turn	Right	Left	U-Turn	Right	Thru	U-Turn	Int. Total
04:00 PM	5	0	0	0	1	0	2	8	0	16
04:15 PM	3	0	0	0	0	0	1	2	0	6
04:30 PM	2	0	0	0	1	0	2	8	0	13
04:45 PM	2	0	0	0	0	0	0	3	0	5
Total	12	0	0	0	2	0	5	21	0	40
05:00 PM	4	0	0	0	0	0	2	2	0	8
05:15 PM	3	0	0	0	1	0	1	4	0	9
05:30 PM	5	0	0	0	1	0	0	7	0	13
05:45 PM	0	0	0	0	2	0	0	2	0	4
Total	12	0	0	0	4	0	3	15	0	34
Grand Total	24	0	0	0	6	0	8	36	0	74
Apprch %	100	0	0	0	100	0	18.2	81.8	0	
Total %	32.4	0	0	0	8.1	0	10.8	48.6	0	

	Melcher Street From East				Necco Street From South				Melcher Street From West				
Start Time	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Right	Thru	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 04:00 PM													
04:00 PM	5	0	0	5	0	1	0	1	2	8	0	10	16
04:15 PM	3	0	0	3	0	0	0	0	1	2	0	3	6
04:30 PM	2	0	0	2	0	1	0	1	2	8	0	10	13
04:45 PM	2	0	0	2	0	0	0	0	0	3	0	3	5
Total Volume	12	0	0	12	0	2	0	2	5	21	0	26	40
% App. Total	100	0	0		0	100	0		19.2	80.8	0		
PHF	.600	.000	.000	.600	.000	.500	.000	.500	.625	.656	.000	.650	.625

S: Necco Street
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File Name : 165050 II
Site Code : 13421
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Page No : 1

Groups Printed- Peds and Bikes

	Melcher Street From East				Necco Street From South				Melcher Street From West				
Start Time	Thru	Left	Peds SB	Peds NB	Right	Left	Peds WB	Peds EB	Right	Thru	Peds NB	Peds SB	Int. Total
04:00 PM	1	0	2	1	0	0	19	17	0	1	1	1	43
04:15 PM	1	0	3	3	0	2	14	21	2	1	0	0	47
04:30 PM	2	0	5	3	0	2	32	23	4	0	0	0	71
04:45 PM	5	0	3	2	0	2	35	26	6	3	0	0	82
Total	9	0	13	9	0	6	100	87	12	5	1	1	243
05:00 PM	2	0	11	1	0	2	57	32	2	1	1	2	111
05:15 PM	4	0	6	2	1	3	47	32	3	4	0	2	104
05:30 PM	1	0	3	3	0	3	45	46	9	5	0	2	117
05:45 PM	1	1	5	0	0	0	43	38	6	5	0	0	99
Total	8	1	25	6	1	8	192	148	20	15	1	6	431
Grand Total	17	1	38	15	1	14	292	235	32	20	2	7	674
Apprch %	23.9	1.4	53.5	21.1	0.2	2.6	53.9	43.4	52.5	32.8	3.3	11.5	
Total %	2.5	0.1	5.6	2.2	0.1	2.1	43.3	34.9	4.7	3	0.3	1	

	Melcher Street From East					Necco Street From South					Melcher Street From West					
Start Time	Thru	Left	Peds SB	Peds NB	App. Total	Right	Left	Peds WB	Peds EB	App. Total	Right	Thru	Peds NB	Peds SB	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																
Peak Hour for Entire Intersection Begins at 05:00 PM																
05:00 PM	2	0	11	1	14	0	2	57	32	91	2	1	1	2	6	111
05:15 PM	4	0	6	2	12	1	3	47	32	83	3	4	0	2	9	104
05:30 PM	1	0	3	3	7	0	3	45	46	94	9	5	0	2	16	117
05:45 PM	1	1	5	0	7	0	0	43	38	81	6	5	0	0	11	99
Total Volume	8	1	25	6	40	1	8	192	148	349	20	15	1	6	42	431
% App. Total	20	2.5	62.5	15		0.3	2.3	55	42.4		47.6	35.7	2.4	14.3		
PHF	.500	.250	.568	.500	.714	.250	.667	.842	.804	.928	.556	.750	.250	.750	.656	.921

S: Necco Street
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Client: VHB/ A. Santiago

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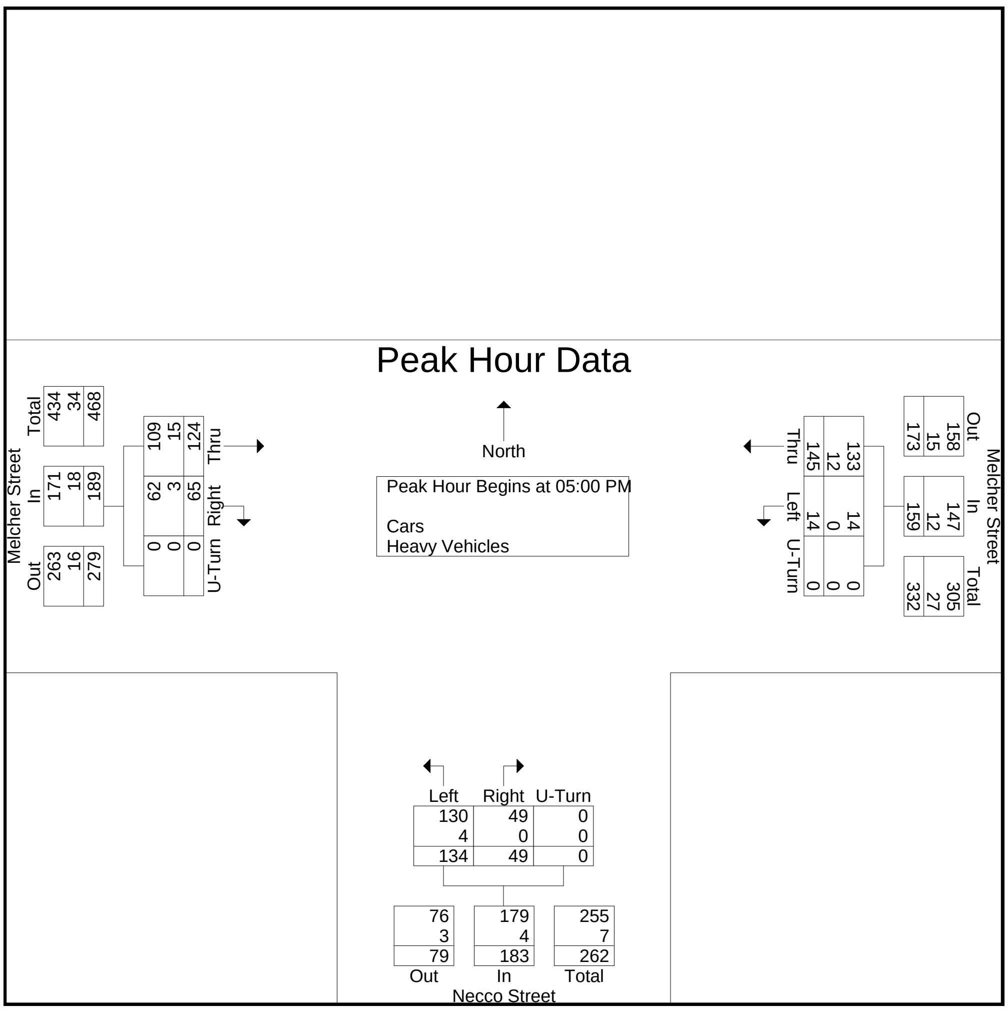
File Name : 165050 II
Site Code : 13421
Start Date : 4/27/2016

	Melcher Street From East				Necco Street From South				Melcher Street From West				
Start Time	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Right	Thru	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 05:00 PM													
05:00 PM	45	4	0	49	14	39	0	53	16	26	0	42	144
05:15 PM	40	5	0	45	13	28	0	41	20	29	0	49	135
05:30 PM	34	3	0	37	7	33	0	40	12	35	0	47	124
05:45 PM	26	2	0	28	15	34	0	49	17	34	0	51	128
Total Volume	145	14	0	159	49	134	0	183	65	124	0	189	531
% App. Total	91.2	8.8	0		26.8	73.2	0		34.4	65.6	0		
PHF	.806	.700	.000	.811	.817	.859	.000	.863	.813	.886	.000	.926	.922
Cars	133	14	0	147	49	130	0	179	62	109	0	171	497
% Cars	91.7	100	0	92.5	100	97.0	0	97.8	95.4	87.9	0	90.5	93.6
Heavy Vehicles	12	0	0	12	0	4	0	4	3	15	0	18	34
% Heavy Vehicles	8.3	0	0	7.5	0	3.0	0	2.2	4.6	12.1	0	9.5	6.4



S: Melcher Street
E/W: Summer Street
City, State: South Boston, MA
Client: VHB/ A. Santiago

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File Name : 165050 J
Site Code : 13421
Start Date : 4/27/2016

Groups Printed- Cars - Heavy Vehicles

	Summer Street From East			Melcher Street From South			Summer Street From West			
Start Time	Thru	Left	U-Turn	Right	Left	U-Turn	Right	Thru	U-Turn	Int. Total
07:00 AM	101	10	0	4	14	0	50	145	1	325
07:15 AM	116	4	0	3	20	0	68	115	0	326
07:30 AM	99	9	0	5	17	0	56	142	0	328
07:45 AM	106	10	0	15	24	0	75	117	0	347
Total	422	33	0	27	75	0	249	519	1	1326
08:00 AM	114	9	0	6	32	0	77	145	0	383
08:15 AM	129	13	0	8	28	0	76	146	0	400
08:30 AM	128	6	2	12	28	0	75	139	1	391
08:45 AM	133	16	1	11	19	0	80	142	2	404
Total	504	44	3	37	107	0	308	572	3	1578
Grand Total	926	77	3	64	182	0	557	1091	4	2904
Apprch %	92	7.7	0.3	26	74	0	33.7	66	0.2	
Total %	31.9	2.7	0.1	2.2	6.3	0	19.2	37.6	0.1	
Cars	813	70	3	61	146	0	511	972	4	2580
% Cars	87.8	90.9	100	95.3	80.2	0	91.7	89.1	100	88.8
Heavy Vehicles	113	7	0	3	36	0	46	119	0	324
% Heavy Vehicles	12.2	9.1	0	4.7	19.8	0	8.3	10.9	0	11.2

Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 08:00 AM

	Summer Street From East				Melcher Street From South				Summer Street From West				
Start Time	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Right	Thru	U-Turn	App. Total	Int. Total
08:00 AM	114	9	0	123	6	32	0	38	77	145	0	222	383
08:15 AM	129	13	0	142	8	28	0	36	76	146	0	222	400
08:30 AM	128	6	2	136	12	28	0	40	75	139	1	215	391
08:45 AM	133	16	1	150	11	19	0	30	80	142	2	224	404
Total Volume	504	44	3	551	37	107	0	144	308	572	3	883	1578
% App. Total	91.5	8	0.5		25.7	74.3	0		34.9	64.8	0.3		
PHF	.947	.688	.375	.918	.771	.836	.000	.900	.963	.979	.375	.985	.976
Cars	445	41	3	489	36	91	0	127	282	510	3	795	1411
% Cars	88.3	93.2	100	88.7	97.3	85.0	0	88.2	91.6	89.2	100	90.0	89.4
Heavy Vehicles	59	3	0	62	1	16	0	17	26	62	0	88	167
% Heavy Vehicles	11.7	6.8	0	11.3	2.7	15.0	0	11.8	8.4	10.8	0	10.0	10.6

S: Melcher Street
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File Name : 165050 J
Site Code : 13421
Start Date : 4/27/2016

Groups Printed- Cars

	Summer Street From East			Melcher Street From South			Summer Street From West			
Start Time	Thru	Left	U-Turn	Right	Left	U-Turn	Right	Thru	U-Turn	Int. Total
07:00 AM	89	9	0	4	11	0	42	136	1	292
07:15 AM	98	4	0	3	15	0	64	101	0	285
07:30 AM	88	6	0	5	11	0	52	123	0	285
07:45 AM	93	10	0	13	18	0	71	102	0	307
Total	368	29	0	25	55	0	229	462	1	1169
08:00 AM	105	8	0	6	29	0	70	126	0	344
08:15 AM	115	12	0	8	25	0	71	128	0	359
08:30 AM	114	6	2	11	24	0	71	124	1	353
08:45 AM	111	15	1	11	13	0	70	132	2	355
Total	445	41	3	36	91	0	282	510	3	1411
Grand Total	813	70	3	61	146	0	511	972	4	2580
Apprch %	91.8	7.9	0.3	29.5	70.5	0	34.4	65.4	0.3	
Total %	31.5	2.7	0.1	2.4	5.7	0	19.8	37.7	0.2	

	Summer Street From East				Melcher Street From South				Summer Street From West				
Start Time	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Right	Thru	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 08:00 AM													
08:00 AM	105	8	0	113	6	29	0	35	70	126	0	196	344
08:15 AM	115	12	0	127	8	25	0	33	71	128	0	199	359
08:30 AM	114	6	2	122	11	24	0	35	71	124	1	196	353
08:45 AM	111	15	1	127	11	13	0	24	70	132	2	204	355
Total Volume	445	41	3	489	36	91	0	127	282	510	3	795	1411
% App. Total	91	8.4	0.6		28.3	71.7	0		35.5	64.2	0.4		
PHF	.967	.683	.375	.963	.818	.784	.000	.907	.993	.966	.375	.974	.983

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Groups Printed- Heavy Vehicles

	Summer Street From East			Melcher Street From South			Summer Street From West			
Start Time	Thru	Left	U-Turn	Right	Left	U-Turn	Right	Thru	U-Turn	Int. Total
07:00 AM	12	1	0	0	3	0	8	9	0	33
07:15 AM	18	0	0	0	5	0	4	14	0	41
07:30 AM	11	3	0	0	6	0	4	19	0	43
07:45 AM	13	0	0	2	6	0	4	15	0	40
Total	54	4	0	2	20	0	20	57	0	157
08:00 AM	9	1	0	0	3	0	7	19	0	39
08:15 AM	14	1	0	0	3	0	5	18	0	41
08:30 AM	14	0	0	1	4	0	4	15	0	38
08:45 AM	22	1	0	0	6	0	10	10	0	49
Total	59	3	0	1	16	0	26	62	0	167
Grand Total	113	7	0	3	36	0	46	119	0	324
Apprch %	94.2	5.8	0	7.7	92.3	0	27.9	72.1	0	
Total %	34.9	2.2	0	0.9	11.1	0	14.2	36.7	0	

	Summer Street From East				Melcher Street From South				Summer Street From West				
Start Time	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Right	Thru	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 08:00 AM													
08:00 AM	9	1	0	10	0	3	0	3	7	19	0	26	39
08:15 AM	14	1	0	15	0	3	0	3	5	18	0	23	41
08:30 AM	14	0	0	14	1	4	0	5	4	15	0	19	38
08:45 AM	22	1	0	23	0	6	0	6	10	10	0	20	49
Total Volume	59	3	0	62	1	16	0	17	26	62	0	88	167
% App. Total	95.2	4.8	0		5.9	94.1	0		29.5	70.5	0		
PHF	.670	.750	.000	.674	.250	.667	.000	.708	.650	.816	.000	.846	.852

S: Melcher Street
E/W: Summer Street
City, State: South Boston, MA
Client: VHB/ A. Santiago

PRECISION
DATA
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File Name : 165050 J
Site Code : 13421
Start Date : 4/27/2016
Page No : 1

Groups Printed- Peds and Bikes

	Summer Street From East				Melcher Street From South				Summer Street From West				
Start Time	Thru	Left	Peds SB	Peds NB	Right	Left	Peds WB	Peds EB	Right	Thru	Peds NB	Peds SB	Int. Total
07:00 AM	1	0	0	0	0	5	5	20	2	2	24	5	64
07:15 AM	4	0	0	0	0	5	9	27	0	1	37	9	92
07:30 AM	0	0	0	0	0	4	14	48	3	3	43	13	128
07:45 AM	0	0	0	0	0	1	11	44	1	3	56	14	130
Total	5	0	0	0	0	15	39	139	6	9	160	41	414
08:00 AM	1	0	3	2	0	3	16	87	4	2	68	23	209
08:15 AM	1	0	0	1	0	9	22	123	7	5	89	39	296
08:30 AM	1	0	1	0	0	6	19	107	5	7	71	30	247
08:45 AM	1	0	2	2	0	6	13	102	8	10	66	23	233
Total	4	0	6	5	0	24	70	419	24	24	294	115	985
Grand Total	9	0	6	5	0	39	109	558	30	33	454	156	1399
Apprch %	45	0	30	25	0	5.5	15.4	79	4.5	4.9	67.5	23.2	
Total %	0.6	0	0.4	0.4	0	2.8	7.8	39.9	2.1	2.4	32.5	11.2	

	Summer Street From East					Melcher Street From South					Summer Street From West					
Start Time	Thru	Left	Peds SB	Peds NB	App. Total	Right	Left	Peds WB	Peds EB	App. Total	Right	Thru	Peds NB	Peds SB	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																
Peak Hour for Entire Intersection Begins at 08:00 AM																
08:00 AM	1	0	3	2	6	0	3	16	87	106	4	2	68	23	97	209
08:15 AM	1	0	0	1	2	0	9	22	123	154	7	5	89	39	140	296
08:30 AM	1	0	1	0	2	0	6	19	107	132	5	7	71	30	113	247
08:45 AM	1	0	2	2	5	0	6	13	102	121	8	10	66	23	107	233
Total Volume	4	0	6	5	15	0	24	70	419	513	24	24	294	115	457	985
% App. Total	26.7	0	40	33.3		0	4.7	13.6	81.7		5.3	5.3	64.3	25.2		
PHF	1.00	.000	.500	.625	.625	.000	.667	.795	.852	.833	.750	.600	.826	.737	.816	.832

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File Name : 165050 J
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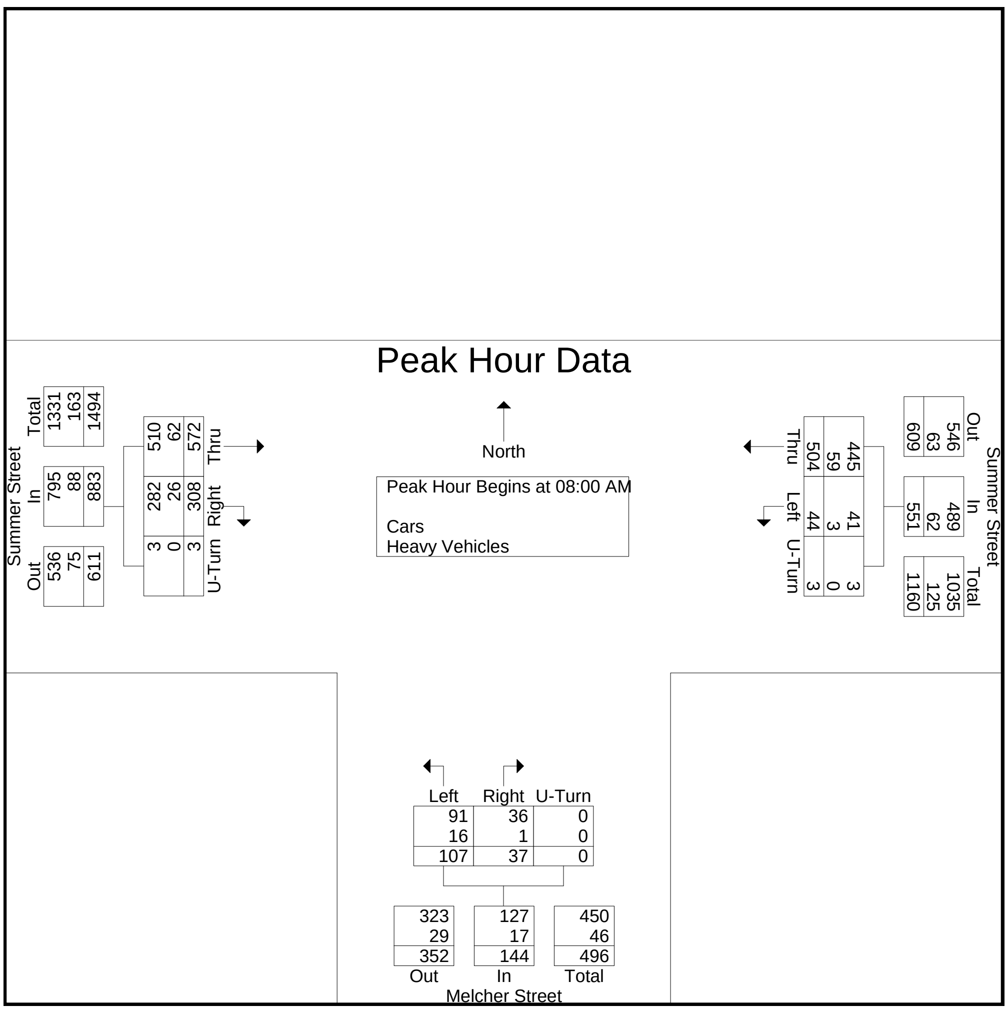
Start Date : 4/27/2016

	Summer Street From East				Melcher Street From South				Summer Street From West				
Start Time	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Right	Thru	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 08:00 AM													
08:00 AM	114	9	0	123	6	32	0	38	77	145	0	222	383
08:15 AM	129	13	0	142	8	28	0	36	76	146	0	222	400
08:30 AM	128	6	2	136	12	28	0	40	75	139	1	215	391
08:45 AM	133	16	1	150	11	19	0	30	80	142	2	224	404
Total Volume	504	44	3	551	37	107	0	144	308	572	3	883	1578
% App. Total	91.5	8	0.5		25.7	74.3	0		34.9	64.8	0.3		
PHF	.947	.688	.375	.918	.771	.836	.000	.900	.963	.979	.375	.985	.976
Cars	445	41	3	489	36	91	0	127	282	510	3	795	1411
% Cars	88.3	93.2	100	88.7	97.3	85.0	0	88.2	91.6	89.2	100	90.0	89.4
Heavy Vehicles	59	3	0	62	1	16	0	17	26	62	0	88	167
% Heavy Vehicles	11.7	6.8	0	11.3	2.7	15.0	0	11.8	8.4	10.8	0	10.0	10.6



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File Name : 165050 JJ
Site Code : 13421
Start Date : 4/27/2016

Groups Printed- Cars - Heavy Vehicles

	Summer Street From East			Melcher Street From South			Summer Street From West			
Start Time	Thru	Left	U-Turn	Right	Left	U-Turn	Right	Thru	U-Turn	Int. Total
04:00 PM	114	6	1	9	25	0	50	160	0	365
04:15 PM	119	8	0	13	35	0	43	164	1	383
04:30 PM	103	13	0	6	46	0	41	147	0	356
04:45 PM	91	2	0	23	47	0	49	144	0	356
Total	427	29	1	51	153	0	183	615	1	1460
05:00 PM	90	11	0	27	55	0	30	145	0	358
05:15 PM	118	8	2	17	48	0	39	164	0	396
05:30 PM	84	6	0	14	52	0	39	178	0	373
05:45 PM	90	10	0	21	37	0	41	175	0	374
Total	382	35	2	79	192	0	149	662	0	1501
Grand Total	809	64	3	130	345	0	332	1277	1	2961
Apprch %	92.4	7.3	0.3	27.4	72.6	0	20.6	79.3	0.1	
Total %	27.3	2.2	0.1	4.4	11.7	0	11.2	43.1	0	
Cars	754	62	3	129	317	0	291	1189	1	2746
% Cars	93.2	96.9	100	99.2	91.9	0	87.7	93.1	100	92.7
Heavy Vehicles	55	2	0	1	28	0	41	88	0	215
% Heavy Vehicles	6.8	3.1	0	0.8	8.1	0	12.3	6.9	0	7.3

	Summer Street From East				Melcher Street From South				Summer Street From West				
Start Time	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Right	Thru	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 05:00 PM													
05:00 PM	90	11	0	101	27	55	0	82	30	145	0	175	358
05:15 PM	118	8	2	128	17	48	0	65	39	164	0	203	396
05:30 PM	84	6	0	90	14	52	0	66	39	178	0	217	373
05:45 PM	90	10	0	100	21	37	0	58	41	175	0	216	374
Total Volume	382	35	2	419	79	192	0	271	149	662	0	811	1501
% App. Total	91.2	8.4	0.5		29.2	70.8	0		18.4	81.6	0		
PHF	.809	.795	.250	.818	.731	.873	.000	.826	.909	.930	.000	.934	.948
Cars	355	35	2	392	78	178	0	256	133	619	0	752	1400
% Cars	92.9	100	100	93.6	98.7	92.7	0	94.5	89.3	93.5	0	92.7	93.3
Heavy Vehicles	27	0	0	27	1	14	0	15	16	43	0	59	101
% Heavy Vehicles	7.1	0	0	6.4	1.3	7.3	0	5.5	10.7	6.5	0	7.3	6.7

S: Melcher Street
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File Name : 165050 JJ
Site Code : 13421
Start Date : 4/27/2016

Groups Printed- Cars

	Summer Street From East			Melcher Street From South			Summer Street From West			
Start Time	Thru	Left	U-Turn	Right	Left	U-Turn	Right	Thru	U-Turn	Int. Total
04:00 PM	109	4	1	9	19	0	41	147	0	330
04:15 PM	112	8	0	13	32	0	39	151	1	356
04:30 PM	97	13	0	6	43	0	32	141	0	332
04:45 PM	81	2	0	23	45	0	46	131	0	328
Total	399	27	1	51	139	0	158	570	1	1346
05:00 PM	84	11	0	27	52	0	27	134	0	335
05:15 PM	107	8	2	17	44	0	34	157	0	369
05:30 PM	78	6	0	14	46	0	34	165	0	343
05:45 PM	86	10	0	20	36	0	38	163	0	353
Total	355	35	2	78	178	0	133	619	0	1400
Grand Total	754	62	3	129	317	0	291	1189	1	2746
Apprch %	92.1	7.6	0.4	28.9	71.1	0	19.6	80.3	0.1	
Total %	27.5	2.3	0.1	4.7	11.5	0	10.6	43.3	0	

	Summer Street From East				Melcher Street From South				Summer Street From West				
Start Time	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Right	Thru	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 05:00 PM													
05:00 PM	84	11	0	95	27	52	0	79	27	134	0	161	335
05:15 PM	107	8	2	117	17	44	0	61	34	157	0	191	369
05:30 PM	78	6	0	84	14	46	0	60	34	165	0	199	343
05:45 PM	86	10	0	96	20	36	0	56	38	163	0	201	353
Total Volume	355	35	2	392	78	178	0	256	133	619	0	752	1400
% App. Total	90.6	8.9	0.5		30.5	69.5	0		17.7	82.3	0		
PHF	.829	.795	.250	.838	.722	.856	.000	.810	.875	.938	.000	.935	.949

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Start Date : 4/27/2016
Page No : 1

Groups Printed- Heavy Vehicles

	Summer Street From East			Melcher Street From South			Summer Street From West			
Start Time	Thru	Left	U-Turn	Right	Left	U-Turn	Right	Thru	U-Turn	Int. Total
04:00 PM	5	2	0	0	6	0	9	13	0	35
04:15 PM	7	0	0	0	3	0	4	13	0	27
04:30 PM	6	0	0	0	3	0	9	6	0	24
04:45 PM	10	0	0	0	2	0	3	13	0	28
Total	28	2	0	0	14	0	25	45	0	114
05:00 PM	6	0	0	0	3	0	3	11	0	23
05:15 PM	11	0	0	0	4	0	5	7	0	27
05:30 PM	6	0	0	0	6	0	5	13	0	30
05:45 PM	4	0	0	1	1	0	3	12	0	21
Total	27	0	0	1	14	0	16	43	0	101
Grand Total	55	2	0	1	28	0	41	88	0	215
Apprch %	96.5	3.5	0	3.4	96.6	0	31.8	68.2	0	
Total %	25.6	0.9	0	0.5	13	0	19.1	40.9	0	

	Summer Street From East				Melcher Street From South				Summer Street From West				
Start Time	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Right	Thru	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 04:00 PM													
04:00 PM	5	2	0	7	0	6	0	6	9	13	0	22	35
04:15 PM	7	0	0	7	0	3	0	3	4	13	0	17	27
04:30 PM	6	0	0	6	0	3	0	3	9	6	0	15	24
04:45 PM	10	0	0	10	0	2	0	2	3	13	0	16	28
Total Volume	28	2	0	30	0	14	0	14	25	45	0	70	114
% App. Total	93.3	6.7	0		0	100	0		35.7	64.3	0		
PHF	.700	.250	.000	.750	.000	.583	.000	.583	.694	.865	.000	.795	.814

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File Name : 165050 JJ
Site Code : 13421
Start Date : 4/27/2016

Groups Printed- Peds and Bikes

	Summer Street From East				Melcher Street From South				Summer Street From West				
Start Time	Thru	Left	Peds SB	Peds NB	Right	Left	Peds WB	Peds EB	Right	Thru	Peds NB	Peds SB	Int. Total
04:00 PM	3	0	0	0	0	1	105	20	2	5	25	29	190
04:15 PM	4	0	0	0	0	2	65	36	3	9	21	36	176
04:30 PM	4	0	3	0	0	3	79	30	3	2	16	51	191
04:45 PM	2	0	0	0	0	7	89	47	9	2	19	49	224
Total	13	0	3	0	0	13	338	133	17	18	81	165	781
05:00 PM	7	0	3	0	0	6	129	45	2	3	23	74	292
05:15 PM	5	1	1	1	0	10	127	36	8	4	22	41	256
05:30 PM	7	0	0	1	0	4	136	42	12	3	17	40	262
05:45 PM	7	0	0	0	0	5	78	40	7	2	36	54	229
Total	26	1	4	2	0	25	470	163	29	12	98	209	1039
Grand Total	39	1	7	2	0	38	808	296	46	30	179	374	1820
Apprch %	79.6	2	14.3	4.1	0	3.3	70.8	25.9	7.3	4.8	28.5	59.5	
Total %	2.1	0.1	0.4	0.1	0	2.1	44.4	16.3	2.5	1.6	9.8	20.5	

	Summer Street From East					Melcher Street From South					Summer Street From West					
Start Time	Thru	Left	Peds SB	Peds NB	App. Total	Right	Left	Peds WB	Peds EB	App. Total	Right	Thru	Peds NB	Peds SB	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																
Peak Hour for Entire Intersection Begins at 05:00 PM																
05:00 PM	7	0	3	0	10	0	6	129	45	180	2	3	23	74	102	292
05:15 PM	5	1	1	1	8	0	10	127	36	173	8	4	22	41	75	256
05:30 PM	7	0	0	1	8	0	4	136	42	182	12	3	17	40	72	262
05:45 PM	7	0	0	0	7	0	5	78	40	123	7	2	36	54	99	229
Total Volume	26	1	4	2	33	0	25	470	163	658	29	12	98	209	348	1039
% App. Total	78.8	3	12.1	6.1		0	3.8	71.4	24.8		8.3	3.4	28.2	60.1		
PHF	.929	.250	.333	.500	.825	.000	.625	.864	.906	.904	.604	.750	.681	.706	.853	.890

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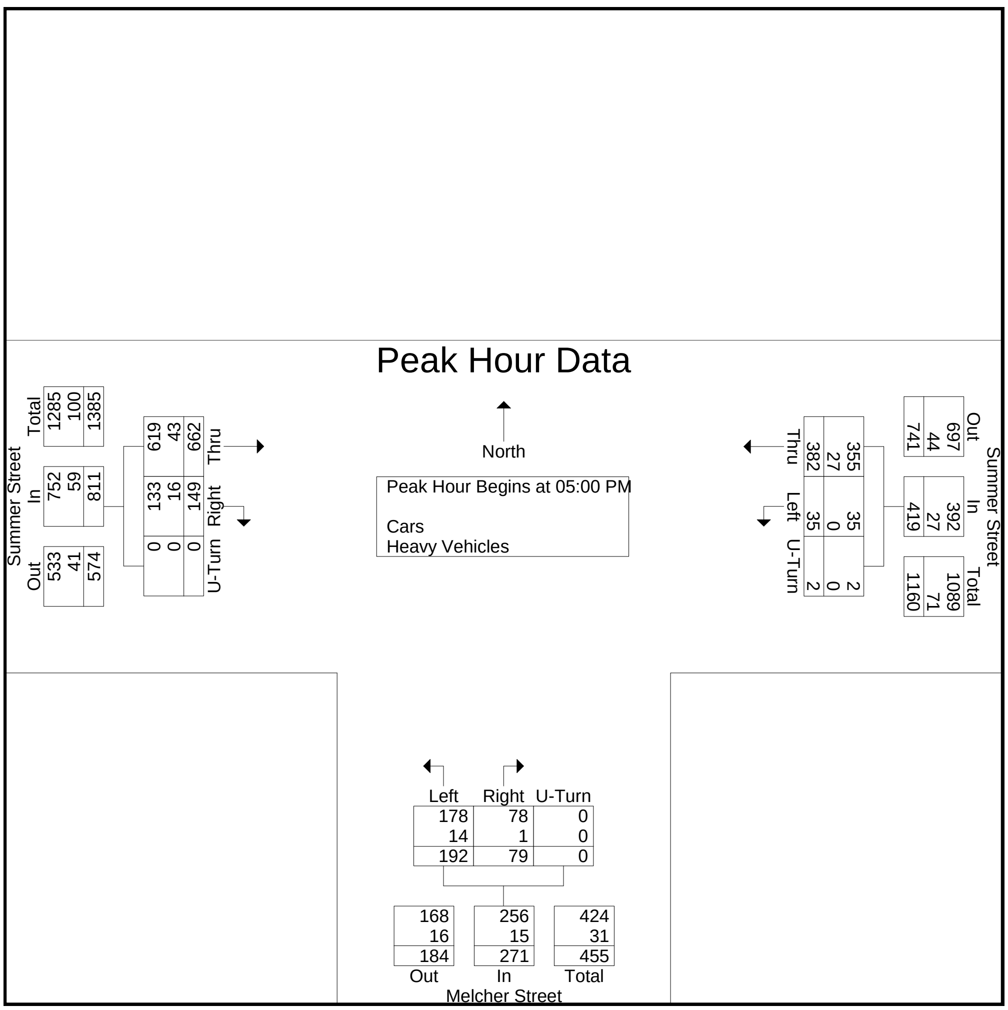
	Summer Street From East				Melcher Street From South				Summer Street From West				
Start Time	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Right	Thru	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 05:00 PM													
05:00 PM	90	11	0	101	27	55	0	82	30	145	0	175	358
05:15 PM	118	8	2	128	17	48	0	65	39	164	0	203	396
05:30 PM	84	6	0	90	14	52	0	66	39	178	0	217	373
05:45 PM	90	10	0	100	21	37	0	58	41	175	0	216	374
Total Volume	382	35	2	419	79	192	0	271	149	662	0	811	1501
% App. Total	91.2	8.4	0.5		29.2	70.8	0		18.4	81.6	0		
PHF	.809	.795	.250	.818	.731	.873	.000	.826	.909	.930	.000	.934	.948
Cars	355	35	2	392	78	178	0	256	133	619	0	752	1400
% Cars	92.9	100	100	93.6	98.7	92.7	0	94.5	89.3	93.5	0	92.7	93.3
Heavy Vehicles	27	0	0	27	1	14	0	15	16	43	0	59	101
% Heavy Vehicles	7.1	0	0	6.4	1.3	7.3	0	5.5	10.7	6.5	0	7.3	6.7



Intersection Capacity Analysis

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	SBT
Lane Group Flow (vph)	306	193	307	369	201	152	42
v/c Ratio	0.35	0.49	0.58	0.43	0.93	0.30	0.45
Control Delay	35.2	42.6	25.7	22.8	92.4	5.9	64.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	35.2	42.6	25.7	22.8	92.4	5.9	64.0
Queue Length 50th (ft)	105	134	154	198	142	0	29
Queue Length 95th (ft)	153	#271	#240	294	#284	45	50
Internal Link Dist (ft)	315			246			140
Turn Bay Length (ft)		60				180	
Base Capacity (vph)	868	390	560	840	217	535	113
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.35	0.49	0.55	0.44	0.93	0.28	0.37

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	10	260	170	270	315	10	185	0	140	10	10	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	11	11	12	12	11	11	12	12	13	12
Total Lost time (s)		8.5	8.5	6.5	8.5		4.5		6.5		5.5	
Lane Util. Factor		0.95	1.00	1.00	1.00		1.00		1.00		1.00	
Frpb, ped/bikes		1.00	1.00	1.00	1.00		1.00		1.00		1.00	
Flpb, ped/bikes		1.00	1.00	1.00	1.00		1.00		1.00		1.00	
Frt		1.00	0.85	1.00	1.00		1.00		0.85		0.95	
Flt Protected		1.00	1.00	0.95	1.00		0.95		1.00		0.98	
Satd. Flow (prot)		2704	1138	1540	1610		1540		1309		1319	
Flt Permitted		0.93	1.00	0.57	1.00		0.95		1.00		0.98	
Satd. Flow (perm)		2529	1138	916	1610		1540		1309		1319	
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.92	0.92	0.92	0.70	0.70	0.70
Adj. Flow (vph)	11	295	193	307	358	11	201	0	152	14	14	14
RTOR Reduction (vph)	0	0	0	0	1	0	0	0	105	0	0	0
Lane Group Flow (vph)	0	306	193	307	368	0	201	0	47	0	42	0
Confl. Bikes (#/hr)						2			3			
Heavy Vehicles (%)	0%	9%	8%	2%	4%	18%	2%	20%	11%	0%	29%	9%
Bus Blockages (#/hr)	0	0	0	0	3	3	0	0	0	0	0	0
Parking (#/hr)		5	5							0	1	0
Turn Type	Perm	NA	Perm	D.P+P	NA		Prot		pt+ov	Perm	NA	
Protected Phases		1		9	1 9		4		4 9		3	
Permitted Phases	1		1	1						3		
Actuated Green, G (s)		33.9	33.9	48.1	54.6		13.5		34.2		5.4	
Effective Green, g (s)		33.9	33.9	48.1	48.1		15.5		34.2		5.4	
Actuated g/C Ratio		0.31	0.31	0.44	0.44		0.14		0.31		0.05	
Clearance Time (s)		8.5	8.5	6.5			6.5				5.5	
Vehicle Extension (s)		2.0	2.0	2.0			2.0				2.0	
Lane Grp Cap (vph)		779	350	481	704		217		406		64	
v/s Ratio Prot				c0.08	0.23		c0.13		0.04			
v/s Ratio Perm		0.12	0.17	c0.20							0.03	
v/c Ratio		0.39	0.55	0.64	0.52		0.93		0.12		0.66	
Uniform Delay, d1		29.9	31.7	21.8	22.6		46.7		27.1		51.4	
Progression Factor		1.00	1.00	1.00	1.00		1.00		1.00		1.00	
Incremental Delay, d2		1.5	6.1	2.0	0.3		40.3		0.0		16.9	
Delay (s)		31.4	37.8	23.8	22.9		87.0		27.1		68.3	
Level of Service		C	D	C	C		F		C		E	
Approach Delay (s)		33.9			23.3			61.2			68.3	
Approach LOS		C			C			E			E	

Intersection Summary			
HCM 2000 Control Delay	36.4	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	31.0
Intersection Capacity Utilization	63.0%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	NBT	SBT	SBR
Lane Group Flow (vph)	147	423	416	127
v/c Ratio	0.58	0.54	0.41	0.19
Control Delay	25.4	10.2	8.7	3.4
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	25.4	10.2	8.7	3.4
Queue Length 50th (ft)	39	94	59	2
Queue Length 95th (ft)	71	190	133	22
Internal Link Dist (ft)	266	76	471	
Turn Bay Length (ft)				40
Base Capacity (vph)	375	788	1027	686
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.39	0.54	0.41	0.19

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	30	5	95	0	0	0	80	295	10	5	340	105
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	13	13	13	12	12	12	12	11	12	12	12	10
Total Lost time (s)		5.0						5.0			5.0	5.0
Lane Util. Factor		1.00						1.00			1.00	1.00
Frpb, ped/bikes		0.90						0.99			1.00	0.77
Flpb, ped/bikes		1.00						0.98			1.00	1.00
Frt		0.90						1.00			1.00	0.85
Flt Protected		0.99						0.99			1.00	1.00
Satd. Flow (prot)		1103						1428			1611	1012
Flt Permitted		0.99						0.85			0.99	1.00
Satd. Flow (perm)		1103						1228			1604	1012
Peak-hour factor, PHF	0.89	0.89	0.89	0.92	0.92	0.92	0.91	0.91	0.91	0.83	0.83	0.83
Adj. Flow (vph)	34	6	107	0	0	0	88	324	11	6	410	127
RTOR Reduction (vph)	0	0	0	0	0	0	0	2	0	0	0	42
Lane Group Flow (vph)	0	147	0	0	0	0	0	421	0	0	416	85
Confl. Peds. (#/hr)	35		83				173		138	138		173
Confl. Bikes (#/hr)									54			
Heavy Vehicles (%)	11%	40%	12%	2%	2%	2%	10%	11%	9%	0%	6%	3%
Parking (#/hr)	4	4	4									
Turn Type	Split	NA					Perm	NA		Perm	NA	Perm
Protected Phases	5	5						1			1	
Permitted Phases							1			1		1
Actuated Green, G (s)		10.0						30.0			30.0	30.0
Effective Green, g (s)		10.0						30.0			30.0	30.0
Actuated g/C Ratio		0.20						0.60			0.60	0.60
Clearance Time (s)		5.0						5.0			5.0	5.0
Vehicle Extension (s)		2.0						3.0			3.0	3.0
Lane Grp Cap (vph)		220						736			962	607
v/s Ratio Prot		c0.13										
v/s Ratio Perm								c0.34			0.26	0.08
v/c Ratio		0.67						0.57			0.43	0.14
Uniform Delay, d1		18.5						6.1			5.4	4.4
Progression Factor		1.00						0.95			1.00	1.00
Incremental Delay, d2		5.8						3.0			1.4	0.5
Delay (s)		24.3						8.8			6.8	4.8
Level of Service		C						A			A	A
Approach Delay (s)		24.3			0.0			8.8			6.4	
Approach LOS		C			A			A			A	

Intersection Summary			
HCM 2000 Control Delay	9.7	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	69.8%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	5	5	5	380	430	5
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.63	0.63	0.87	0.87	0.83	0.83
Hourly flow rate (vph)	8	8	6	437	518	6
Pedestrians	236			5	7	
Lane Width (ft)	12.0			11.0	11.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	20			0	1	
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)					156	
pX, platoon unblocked	0.87	0.87	0.87			
vC, conflicting volume	1212	762	760			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1169	652	649			
tC, single (s)	6.4	*3.9	4.3			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.4			
p0 queue free %	95	98	99			
cM capacity (veh/h)	148	498	607			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	16	443	524
Volume Left	8	6	0
Volume Right	8	0	6
cSH	228	607	1700
Volume to Capacity	0.07	0.01	0.31
Queue Length 95th (ft)	6	1	0
Control Delay (s)	21.9	0.3	0.0
Lane LOS	C	A	
Approach Delay (s)	21.9	0.3	0.0
Approach LOS	C		

Intersection Summary			
Average Delay	0.5		
Intersection Capacity Utilization	38.2%	ICU Level of Service	A
Analysis Period (min)	15		

* User Entered Value

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	15	75	105	370	350	85
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.81	0.81	0.91	0.91	0.84	0.84
Hourly flow rate (vph)	19	93	115	407	417	101
Pedestrians	165			3	77	
Lane Width (ft)	12.0			11.0	10.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	14			0	5	
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)					387	
pX, platoon unblocked	0.89	0.89	0.89			
vC, conflicting volume	1347	635	683			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1328	531	585			
tC, single (s)	*3.9	*3.9	4.2			
tC, 2 stage (s)						
tF (s)	3.5	3.4	2.3			
p0 queue free %	93	84	84			
cM capacity (veh/h)	267	576	740			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	111	522	518
Volume Left	19	115	0
Volume Right	93	0	101
cSH	483	740	1700
Volume to Capacity	0.23	0.16	0.30
Queue Length 95th (ft)	22	14	0
Control Delay (s)	14.7	4.1	0.0
Lane LOS	B	A	
Approach Delay (s)	14.7	4.1	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	3.3		
Intersection Capacity Utilization	72.7%	ICU Level of Service	C
Analysis Period (min)	15		

* User Entered Value

Lane Group	EBL	EBT	WBL	WBT	NBT	NBR	SBT
Lane Group Flow (vph)	9	18	103	92	565	65	469
v/c Ratio	0.05	0.09	0.69	0.41	0.48	0.19	0.46
Control Delay	32.0	22.9	61.1	31.9	5.6	4.0	8.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	32.0	22.9	61.1	31.9	5.6	4.0	8.1
Queue Length 50th (ft)	5	5	63	39	88	5	120
Queue Length 95th (ft)	11	12	105	76	143	m17	185
Internal Link Dist (ft)		142		206	568		1505
Turn Bay Length (ft)						25	
Base Capacity (vph)	535	530	427	595	1189	344	1011
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.02	0.03	0.24	0.15	0.48	0.19	0.46

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	5	5	5	90	0	80	10	470	55	50	320	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	13	12	12	10	12	12	12	12	10	12	12	12
Total Lost time (s)	5.0	5.0		5.0	5.0			5.0	5.0		5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00	1.00		1.00	
Frpb, ped/bikes	1.00	0.99		1.00	0.94			1.00	0.41		1.00	
Flpb, ped/bikes	0.97	1.00		0.99	1.00			1.00	1.00		0.97	
Frt	1.00	0.93		1.00	0.85			1.00	0.85		1.00	
Flt Protected	0.95	1.00		0.95	1.00			1.00	1.00		0.99	
Satd. Flow (prot)	1622	1167		1211	1293			1619	468		1527	
Flt Permitted	0.70	1.00		0.75	1.00			0.99	1.00		0.88	
Satd. Flow (perm)	1191	1167		951	1293			1603	468		1346	
Peak-hour factor, PHF	0.56	0.56	0.56	0.87	0.87	0.87	0.85	0.85	0.85	0.81	0.81	0.81
Adj. Flow (vph)	9	9	9	103	0	92	12	553	65	62	395	12
RTOR Reduction (vph)	0	8	0	0	20	0	0	0	6	0	1	0
Lane Group Flow (vph)	9	10	0	103	72	0	0	565	59	0	468	0
Confl. Peds. (#/hr)	16		4	4		16	70		356	356		70
Confl. Bikes (#/hr)									68			5
Heavy Vehicles (%)	0%	67%	0%	24%	0%	6%	22%	5%	18%	5%	7%	25%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		5			5			1			1	
Permitted Phases	5			5			1		1	1		
Actuated Green, G (s)	15.8	15.8		15.8	15.8			74.2	74.2		74.2	
Effective Green, g (s)	15.8	15.8		15.8	15.8			74.2	74.2		74.2	
Actuated g/C Ratio	0.16	0.16		0.16	0.16			0.74	0.74		0.74	
Clearance Time (s)	5.0	5.0		5.0	5.0			5.0	5.0		5.0	
Vehicle Extension (s)	2.0	2.0		2.0	2.0			3.0	3.0		3.0	
Lane Grp Cap (vph)	188	184		150	204			1189	347		998	
v/s Ratio Prot		0.01			0.06							
v/s Ratio Perm	0.01			c0.11				c0.35	0.13		0.35	
v/c Ratio	0.05	0.06		0.69	0.35			0.48	0.17		0.47	
Uniform Delay, d1	35.7	35.8		39.8	37.5			5.1	3.8		5.1	
Progression Factor	1.00	1.00		1.00	1.00			0.69	0.69		1.03	
Incremental Delay, d2	0.0	0.0		9.9	0.4			1.2	1.0		1.5	
Delay (s)	35.8	35.8		49.7	37.9			4.8	3.6		6.8	
Level of Service	D	D		D	D			A	A		A	
Approach Delay (s)		35.8			44.1			4.6			6.8	
Approach LOS		D			D			A			A	

Intersection Summary			
HCM 2000 Control Delay	11.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	77.6%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	89	122	250	528	489
v/c Ratio	0.84	0.55	0.77	0.45	0.48
Control Delay	85.5	45.3	52.0	7.6	10.1
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	85.5	45.3	52.0	7.6	10.1
Queue Length 50th (ft)	49	71	146	112	70
Queue Length 95th (ft)	#117	119	212	216	92
Internal Link Dist (ft)	126		152	275	568
Turn Bay Length (ft)					
Base Capacity (vph)	145	310	450	1182	1011
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.61	0.39	0.56	0.45	0.48

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	75	0	5	110	180	45	10	450	0	0	345	100
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	16	12	16	16	12	12	12	12	12	12	12
Total Lost time (s)		4.0		4.0	4.0			4.0			4.0	
Lane Util. Factor		1.00		1.00	1.00			1.00			1.00	
Frpb, ped/bikes		0.99		1.00	0.97			1.00			0.92	
Flpb, ped/bikes		0.94		0.91	1.00			1.00			1.00	
Frt		0.99		1.00	0.97			1.00			0.97	
Flt Protected		0.96		0.95	1.00			1.00			1.00	
Satd. Flow (prot)		1641		1516	1700			1624			1365	
Flt Permitted		0.31		0.75	1.00			0.99			1.00	
Satd. Flow (perm)		530		1197	1700			1609			1365	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.87	0.87	0.87	0.91	0.91	0.91
Adj. Flow (vph)	83	0	6	122	200	50	11	517	0	0	379	110
RTOR Reduction (vph)	0	9	0	0	10	0	0	0	0	0	8	0
Lane Group Flow (vph)	0	80	0	122	240	0	0	528	0	0	481	0
Confl. Peds. (#/hr)	39		41	41		39	109					109
Confl. Bikes (#/hr)						1						6
Heavy Vehicles (%)	5%	0%	0%	10%	9%	2%	0%	5%	0%	0%	7%	28%
Turn Type	Perm	NA		Perm	NA		Perm	NA			NA	
Protected Phases		2			2			1			1	
Permitted Phases	2			2			1					
Actuated Green, G (s)		18.5		18.5	18.5			73.5			73.5	
Effective Green, g (s)		18.5		18.5	18.5			73.5			73.5	
Actuated g/C Ratio		0.18		0.18	0.18			0.74			0.74	
Clearance Time (s)		4.0		4.0	4.0			4.0			4.0	
Vehicle Extension (s)		2.0		2.0	2.0			2.0			2.0	
Lane Grp Cap (vph)		98		221	314			1182			1003	
v/s Ratio Prot					0.14						c0.35	
v/s Ratio Perm		c0.15		0.10				0.33				
v/c Ratio		0.82		0.55	0.77			0.45			0.48	
Uniform Delay, d1		39.1		37.0	38.7			5.2			5.4	
Progression Factor		1.00		1.00	1.00			1.00			1.37	
Incremental Delay, d2		37.1		1.7	9.6			1.2			1.5	
Delay (s)		76.3		38.7	48.3			6.5			8.9	
Level of Service		E		D	D			A			A	
Approach Delay (s)		76.3			45.1			6.5			8.9	
Approach LOS		E			D			A			A	

Intersection Summary			
HCM 2000 Control Delay	21.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	71.7%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	0	0	0	10	5	35	5	5	290	5
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.50	0.50	0.50	0.68	0.68	0.68	0.94	0.94	0.94
Hourly flow rate (vph)	0	0	0	0	0	20	7	51	7	5	309	5
Pedestrians		103			39			9			93	
Lane Width (ft)		10.0			10.0			14.0			14.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		7			3			1			9	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	608	537	423	440	536	187	417			98		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	608	537	423	440	536	187	417			98		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.4	4.1			4.4		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.5	2.2			2.5		
p0 queue free %	100	100	100	100	100	97	99			100		
cM capacity (veh/h)	310	405	584	470	405	718	1071			1286		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	0	20	66	319
Volume Left	0	0	7	5
Volume Right	0	20	7	5
cSH	1700	718	1071	1286
Volume to Capacity	0.00	0.03	0.01	0.00
Queue Length 95th (ft)	0	2	1	0
Control Delay (s)	0.0	10.2	1.0	0.2
Lane LOS	A	B	A	A
Approach Delay (s)	0.0	10.2	1.0	0.2
Approach LOS	A	B		

Intersection Summary			
Average Delay	0.8		
Intersection Capacity Utilization	38.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	125	220	80	105	40	5
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.94	0.94	0.89	0.89	0.85	0.85
Hourly flow rate (vph)	133	234	90	118	47	6
Pedestrians	16			31	304	
Lane Width (ft)	13.0			16.0	12.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	1			3	25	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	371			346		
pX, platoon unblocked						
vC, conflicting volume			671		868	585
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			671		868	585
tC, single (s)			4.1		*3.9	*3.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			87		88	99
cM capacity (veh/h)			690		378	539

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	367	208	53
Volume Left	0	90	47
Volume Right	234	0	6
cSH	1700	690	391
Volume to Capacity	0.22	0.13	0.14
Queue Length 95th (ft)	0	11	12
Control Delay (s)	0.0	5.6	15.7
Lane LOS		A	C
Approach Delay (s)	0.0	5.6	15.7
Approach LOS			C

Intersection Summary			
Average Delay	3.2		
Intersection Capacity Utilization	58.7%	ICU Level of Service	B
Analysis Period (min)	15		

* User Entered Value

Lane Group	EBT	WBT	NBL	NBR
Lane Group Flow (vph)	889	597	122	39
v/c Ratio	0.56	0.42	0.73	0.19
Control Delay	17.9	18.0	70.5	15.2
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	17.9	18.0	70.5	15.2
Queue Length 50th (ft)	224	153	84	0
Queue Length 95th (ft)	317	219	144	31
Internal Link Dist (ft)	493	997	291	
Turn Bay Length (ft)				75
Base Capacity (vph)	1594	1433	211	243
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.56	0.42	0.58	0.16

Intersection Summary

Movement	EBU	EBT	EBR	WBU	WBL	WBT	NBL	NBR
Lane Configurations								
Volume (vph)	5	570	305	5	40	505	110	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	16	16	11	11
Total Lost time (s)		6.0				6.0	6.0	6.0
Lane Util. Factor		0.95				0.95	1.00	1.00
Frpb, ped/bikes		0.99				1.00	1.00	1.00
Flpb, ped/bikes		1.00				1.00	1.00	1.00
Frt		0.95				1.00	1.00	0.85
Flt Protected		1.00				1.00	0.95	1.00
Satd. Flow (prot)		2767				2998	1366	1364
Flt Permitted		0.95				0.81	0.95	1.00
Satd. Flow (perm)		2636				2434	1366	1364
Peak-hour factor, PHF	0.99	0.99	0.99	0.92	0.92	0.92	0.90	0.90
Adj. Flow (vph)	5	576	308	5	43	549	122	39
RTOR Reduction (vph)	0	48	0	0	0	0	0	34
Lane Group Flow (vph)	0	841	0	0	0	597	122	5
Confl. Bikes (#/hr)			24					
Heavy Vehicles (%)	0%	11%	8%	0%	7%	12%	15%	3%
Bus Blockages (#/hr)	0	0	0	0	0	15	0	0
Parking (#/hr)						4		
Turn Type	Perm	NA		Perm	Perm	NA	Prot	Prot
Protected Phases		1				1	5	5
Permitted Phases	1			1	1			
Actuated Green, G (s)		63.1				63.1	13.5	13.5
Effective Green, g (s)		63.1				63.1	13.5	13.5
Actuated g/C Ratio		0.57				0.57	0.12	0.12
Clearance Time (s)		6.0				6.0	6.0	6.0
Vehicle Extension (s)		2.0				2.0	2.0	2.0
Lane Grp Cap (vph)		1512				1396	167	167
v/s Ratio Prot							c0.09	0.00
v/s Ratio Perm		c0.32				0.25		
v/c Ratio		0.56				0.43	0.73	0.03
Uniform Delay, d1		14.7				13.2	46.5	42.5
Progression Factor		1.00				1.00	1.00	1.00
Incremental Delay, d2		1.5				1.0	13.2	0.0
Delay (s)		16.2				14.2	59.7	42.5
Level of Service		B				B	E	D
Approach Delay (s)		16.2				14.2	55.5	
Approach LOS		B				B	E	

Intersection Summary			
HCM 2000 Control Delay	19.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	67.3%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	SBT
Lane Group Flow (vph)	422	247	238	338	226	247	62
v/c Ratio	0.45	0.67	0.54	0.41	1.07	0.41	0.57
Control Delay	35.7	48.3	25.3	23.2	126.3	5.9	68.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	35.7	48.3	25.3	23.2	126.3	5.9	68.8
Queue Length 50th (ft)	146	~192	115	180	~176	0	43
Queue Length 95th (ft)	185	#315	173	256	#329	58	78
Internal Link Dist (ft)	315			246			140
Turn Bay Length (ft)		60				180	
Base Capacity (vph)	943	370	458	808	212	610	126
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.45	0.67	0.52	0.42	1.07	0.40	0.49

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	350	205	205	280	10	210	0	230	25	15	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	11	11	12	12	11	11	12	12	13	12
Total Lost time (s)		8.5	8.5	6.5	8.5		4.5		6.5		5.5	
Lane Util. Factor		0.95	1.00	1.00	1.00		1.00		1.00		1.00	
Frpb, ped/bikes		1.00	0.97	1.00	1.00		1.00		1.00		1.00	
Flpb, ped/bikes		1.00	1.00	1.00	1.00		1.00		1.00		1.00	
Frt		1.00	0.85	1.00	0.99		1.00		0.85		0.97	
Flt Protected		1.00	1.00	0.95	1.00		0.95		1.00		0.98	
Satd. Flow (prot)		2831	1118	1540	1616		1510		1439		1466	
Flt Permitted		1.00	1.00	0.47	1.00		0.95		1.00		0.98	
Satd. Flow (perm)		2831	1118	766	1616		1510		1439		1466	
Peak-hour factor, PHF	0.83	0.83	0.83	0.86	0.86	0.86	0.93	0.93	0.93	0.81	0.81	0.81
Adj. Flow (vph)	0	422	247	238	326	12	226	0	247	31	19	12
RTOR Reduction (vph)	0	0	0	0	1	0	0	0	174	0	0	0
Lane Group Flow (vph)	0	422	247	238	337	0	226	0	73	0	62	0
Confl. Bikes (#/hr)			6			20						
Heavy Vehicles (%)	0%	4%	7%	2%	4%	0%	4%	2%	1%	0%	0%	13%
Bus Blockages (#/hr)	0	0	0	0	3	3	0	0	0	0	0	0
Parking (#/hr)		5	5							0	1	0
Turn Type		NA	Perm	D.P+P	NA		Prot		pt+ov	Perm	NA	
Protected Phases		1		9	1 9		4		4 9		3	
Permitted Phases	1		1	1						3		
Actuated Green, G (s)		33.9	33.9	46.4	52.9		13.5		32.5		7.1	
Effective Green, g (s)		33.9	33.9	46.4	46.4		15.5		32.5		7.1	
Actuated g/C Ratio		0.31	0.31	0.42	0.42		0.14		0.30		0.06	
Clearance Time (s)		8.5	8.5	6.5			6.5				5.5	
Vehicle Extension (s)		2.0	2.0	2.0			2.0				2.0	
Lane Grp Cap (vph)		872	344	411	681		212		425		94	
v/s Ratio Prot		0.15		c0.07	0.21		c0.15		0.05			
v/s Ratio Perm			c0.22	0.18							0.04	
v/c Ratio		0.48	0.72	0.58	0.49		1.07		0.17		0.66	
Uniform Delay, d1		30.9	33.8	21.8	23.2		47.2		28.8		50.3	
Progression Factor		1.00	1.00	1.00	1.00		1.00		1.00		1.00	
Incremental Delay, d2		1.9	12.2	1.2	0.2		80.4		0.1		12.0	
Delay (s)		32.9	46.0	23.0	23.4		127.6		28.8		62.3	
Level of Service		C	D	C	C		F		C		E	
Approach Delay (s)		37.7			23.3			76.0			62.3	
Approach LOS		D			C			E			E	

Intersection Summary			
HCM 2000 Control Delay	44.1	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	31.0
Intersection Capacity Utilization	64.9%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	NBT	SBT	SBR
Lane Group Flow (vph)	192	546	409	74
v/c Ratio	0.80	0.64	0.37	0.16
Control Delay	59.0	16.1	9.3	5.4
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	59.0	16.1	9.3	5.4
Queue Length 50th (ft)	116	148	99	7
Queue Length 95th (ft)	174	286	197	30
Internal Link Dist (ft)	266	76	471	
Turn Bay Length (ft)				40
Base Capacity (vph)	371	854	1108	475
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.52	0.64	0.37	0.16

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	70	5	95	0	0	0	95	370	5	5	355	65
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	13	13	13	12	12	12	12	11	12	12	12	10
Total Lost time (s)		5.0						5.0			5.0	5.0
Lane Util. Factor		1.00						1.00			1.00	1.00
Frpb, ped/bikes		0.84						1.00			1.00	0.52
Flpb, ped/bikes		1.00						0.95			1.00	1.00
Frt		0.92						1.00			1.00	0.85
Flt Protected		0.98						0.99			1.00	1.00
Satd. Flow (prot)		1093						1480			1640	685
Flt Permitted		0.98						0.84			0.99	1.00
Satd. Flow (perm)		1093						1252			1631	685
Peak-hour factor, PHF	0.89	0.89	0.89	0.92	0.92	0.92	0.86	0.86	0.86	0.88	0.88	0.88
Adj. Flow (vph)	79	6	107	0	0	0	110	430	6	6	403	74
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	12
Lane Group Flow (vph)	0	192	0	0	0	0	0	546	0	0	409	62
Confl. Peds. (#/hr)	65		93				183		160	160		183
Confl. Bikes (#/hr)									8			38
Heavy Vehicles (%)	0%	83%	10%	2%	2%	2%	12%	3%	0%	0%	4%	3%
Parking (#/hr)	4	4	4									
Turn Type	Split	NA					Perm	NA		Perm	NA	Perm
Protected Phases	5	5						1			1	
Permitted Phases							1			1		1
Actuated Green, G (s)		22.1						67.9			67.9	67.9
Effective Green, g (s)		22.1						67.9			67.9	67.9
Actuated g/C Ratio		0.22						0.68			0.68	0.68
Clearance Time (s)		5.0						5.0			5.0	5.0
Vehicle Extension (s)		2.0						3.0			3.0	3.0
Lane Grp Cap (vph)		241						850			1107	465
v/s Ratio Prot		c0.18										
v/s Ratio Perm								c0.44			0.25	0.09
v/c Ratio		0.80						0.64			0.37	0.13
Uniform Delay, d1		36.8						9.1			6.9	5.7
Progression Factor		1.00						1.07			1.00	1.00
Incremental Delay, d2		15.5						3.6			0.9	0.6
Delay (s)		52.3						13.4			7.8	6.3
Level of Service		D						B			A	A
Approach Delay (s)		52.3			0.0			13.4			7.6	
Approach LOS		D			A			B			A	

Intersection Summary			
HCM 2000 Control Delay	17.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	75.8%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	10	5	10	460	445	5
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.60	0.60	0.91	0.91	0.95	0.95
Hourly flow rate (vph)	17	8	11	505	468	5
Pedestrians	211			1	3	
Lane Width (ft)	12.0			11.0	11.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	18			0	0	
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)					156	
pX, platoon unblocked	0.90	0.90	0.90			
vC, conflicting volume	1213	683	685			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1181	593	595			
tC, single (s)	*3.9	*3.9	4.2			
tC, 2 stage (s)						
tF (s)	3.5	3.5	2.3			
p0 queue free %	95	98	98			
cM capacity (veh/h)	351	530	690			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	25	516	474
Volume Left	17	11	0
Volume Right	8	0	5
cSH	395	690	1700
Volume to Capacity	0.06	0.02	0.28
Queue Length 95th (ft)	5	1	0
Control Delay (s)	14.7	0.4	0.0
Lane LOS	B	A	
Approach Delay (s)	14.7	0.4	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	0.6		
Intersection Capacity Utilization	46.1%	ICU Level of Service	A
Analysis Period (min)	15		

* User Entered Value

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	70	125	35	400	435	15
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.91	0.91	0.90	0.90	0.96	0.96
Hourly flow rate (vph)	77	137	39	444	453	16
Pedestrians	206			2	62	
Lane Width (ft)	12.0			11.0	10.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	17			0	4	
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)					387	
pX, platoon unblocked	0.91	0.91	0.91			
vC, conflicting volume	1251	669	675			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1227	589	596			
tC, single (s)	*3.9	*3.9	4.2			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.3			
p0 queue free %	76	75	95			
cM capacity (veh/h)	319	561	709			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	214	483	469
Volume Left	77	39	0
Volume Right	137	0	16
cSH	441	709	1700
Volume to Capacity	0.49	0.05	0.28
Queue Length 95th (ft)	65	4	0
Control Delay (s)	20.7	1.5	0.0
Lane LOS	C	A	
Approach Delay (s)	20.7	1.5	0.0
Approach LOS	C		

Intersection Summary			
Average Delay	4.4		
Intersection Capacity Utilization	75.3%	ICU Level of Service	D
Analysis Period (min)	15		

* User Entered Value

Lane Group	EBL	EBT	WBL	WBT	NBT	NBR	SBT
Lane Group Flow (vph)	6	11	173	67	422	122	616
v/c Ratio	0.03	0.03	0.76	0.21	0.38	0.28	0.57
Control Delay	26.8	0.2	56.6	10.3	6.8	5.4	12.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Total Delay	26.8	0.2	56.6	10.3	6.8	5.4	12.2
Queue Length 50th (ft)	3	0	104	4	71	11	136
Queue Length 95th (ft)	12	0	126	23	153	40	380
Internal Link Dist (ft)		142		206	568		1505
Turn Bay Length (ft)						25	
Base Capacity (vph)	437	670	489	608	1116	440	1090
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	2	0	0	0	0	40
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.01	0.02	0.35	0.11	0.38	0.28	0.59

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	5	0	10	130	5	45	20	360	110	35	540	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	13	12	12	10	12	12	12	12	10	12	12	12
Total Lost time (s)	5.0	5.0		5.0	5.0			5.0	5.0		5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00	1.00		1.00	
Frpb, ped/bikes	1.00	0.94		1.00	0.95			1.00	0.48		1.00	
Flpb, ped/bikes	0.97	1.00		0.96	1.00			0.99	1.00		0.98	
Frt	1.00	0.85		1.00	0.87			1.00	0.85		1.00	
Flt Protected	0.95	1.00		0.95	1.00			1.00	1.00		1.00	
Satd. Flow (prot)	1296	1370		1377	1278			1681	622		1639	
Flt Permitted	0.71	1.00		0.75	1.00			0.96	1.00		0.96	
Satd. Flow (perm)	973	1370		1087	1278			1616	622		1576	
Peak-hour factor, PHF	0.88	0.88	0.88	0.75	0.75	0.75	0.90	0.90	0.90	0.94	0.94	0.94
Adj. Flow (vph)	6	0	11	173	7	60	22	400	122	37	574	5
RTOR Reduction (vph)	0	9	0	0	47	0	0	0	12	0	0	0
Lane Group Flow (vph)	6	2	0	173	20	0	0	422	110	0	616	0
Confl. Peds. (#/hr)	16		16	16		16	121		226	226		121
Confl. Bikes (#/hr)									5			69
Heavy Vehicles (%)	25%	0%	0%	6%	0%	11%	0%	1%	5%	3%	2%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		5			5			1			1	
Permitted Phases	5			5			1		1	1		
Actuated Green, G (s)	21.0	21.0		21.0	21.0			69.0	69.0		69.0	
Effective Green, g (s)	21.0	21.0		21.0	21.0			69.0	69.0		69.0	
Actuated g/C Ratio	0.21	0.21		0.21	0.21			0.69	0.69		0.69	
Clearance Time (s)	5.0	5.0		5.0	5.0			5.0	5.0		5.0	
Vehicle Extension (s)	2.0	2.0		2.0	2.0			3.0	3.0		3.0	
Lane Grp Cap (vph)	204	287		228	268			1115	429		1087	
v/s Ratio Prot		0.00			0.02							
v/s Ratio Perm	0.01			c0.16				0.26	0.18		c0.39	
v/c Ratio	0.03	0.01		0.76	0.07			0.38	0.26		0.57	
Uniform Delay, d1	31.4	31.3		37.1	31.7			6.5	5.8		7.9	
Progression Factor	1.00	1.00		1.00	1.00			0.74	0.67		1.02	
Incremental Delay, d2	0.0	0.0		12.1	0.0			0.9	1.4		2.1	
Delay (s)	31.4	31.3		49.2	31.7			5.7	5.3		10.1	
Level of Service	C	C		D	C			A	A		B	
Approach Delay (s)		31.3			44.3			5.6			10.1	
Approach LOS		C			D			A			B	

Intersection Summary			
HCM 2000 Control Delay	14.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	84.7%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	94	145	169	473	807
v/c Ratio	0.76	0.68	0.57	0.38	0.71
Control Delay	69.9	54.6	42.7	5.7	10.0
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	69.9	54.6	42.7	5.7	10.0
Queue Length 50th (ft)	51	88	93	81	292
Queue Length 95th (ft)	95	134	138	175	183
Internal Link Dist (ft)	126		152	275	568
Turn Bay Length (ft)					
Base Capacity (vph)	197	353	477	1256	1135
Starvation Cap Reductn	0	0	0	0	4
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.48	0.41	0.35	0.38	0.71

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	75	0	5	125	115	30	10	420	0	0	585	125
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	16	12	16	16	12	12	12	12	12	12	12
Total Lost time (s)		4.0		4.0	4.0			4.0			4.0	
Lane Util. Factor		1.00		1.00	1.00			1.00			1.00	
Frpb, ped/bikes		1.00		1.00	0.97			1.00			0.91	
Flpb, ped/bikes		0.93		0.96	1.00			1.00			1.00	
Frt		0.99		1.00	0.97			1.00			0.98	
Flt Protected		0.96		0.95	1.00			1.00			1.00	
Satd. Flow (prot)		1600		1691	1800			1672			1483	
Flt Permitted		0.44		0.77	1.00			0.98			1.00	
Satd. Flow (perm)		729		1364	1800			1644			1483	
Peak-hour factor, PHF	0.85	0.85	0.85	0.86	0.86	0.86	0.91	0.91	0.91	0.88	0.88	0.88
Adj. Flow (vph)	88	0	6	145	134	35	11	462	0	0	665	142
RTOR Reduction (vph)	0	9	0	0	11	0	0	0	0	0	5	0
Lane Group Flow (vph)	0	85	0	145	158	0	0	473	0	0	802	0
Confl. Peds. (#/hr)	36		16	16		36	170					170
Confl. Bikes (#/hr)						1						64
Heavy Vehicles (%)	7%	0%	0%	5%	2%	0%	0%	2%	0%	0%	1%	7%
Turn Type	Perm	NA		Perm	NA		Perm	NA			NA	
Protected Phases		2			2			1			1	
Permitted Phases	2			2			1					
Actuated Green, G (s)		15.7		15.7	15.7			76.3			76.3	
Effective Green, g (s)		15.7		15.7	15.7			76.3			76.3	
Actuated g/C Ratio		0.16		0.16	0.16			0.76			0.76	
Clearance Time (s)		4.0		4.0	4.0			4.0			4.0	
Vehicle Extension (s)		2.0		2.0	2.0			2.0			2.0	
Lane Grp Cap (vph)		114		214	282			1254			1131	
v/s Ratio Prot					0.09						c0.54	
v/s Ratio Perm		c0.12		0.11				0.29				
v/c Ratio		0.74		0.68	0.56			0.38			0.71	
Uniform Delay, d1		40.2		39.8	39.0			3.9			6.1	
Progression Factor		1.00		1.00	1.00			1.00			0.82	
Incremental Delay, d2		20.2		6.5	1.5			0.9			3.4	
Delay (s)		60.5		46.3	40.5			4.8			8.4	
Level of Service		E		D	D			A			A	
Approach Delay (s)		60.5			43.2			4.8			8.4	
Approach LOS		E			D			A			A	

Intersection Summary			
HCM 2000 Control Delay	16.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	76.4%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	5	5	5	5	5	5	180	5	5	70	5
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.44	0.44	0.44	0.60	0.60	0.60	0.83	0.83	0.83	0.86	0.86	0.86
Hourly flow rate (vph)	0	11	11	8	8	8	6	217	6	6	81	6
Pedestrians		69			20			24			67	
Lane Width (ft)		10.0			10.0			14.0			14.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		5			1			2			7	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	476	420	177	389	420	307	156			243		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	476	420	177	389	420	307	156			243		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.5	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.5	2.2			2.2		
p0 queue free %	100	98	99	98	98	99	100			100		
cM capacity (veh/h)	412	491	810	507	491	629	1367			1317		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	23	25	229	93
Volume Left	0	8	6	6
Volume Right	11	8	6	6
cSH	611	536	1367	1317
Volume to Capacity	0.04	0.05	0.00	0.00
Queue Length 95th (ft)	3	4	0	0
Control Delay (s)	11.1	12.0	0.2	0.5
Lane LOS	B	B	A	A
Approach Delay (s)	11.1	12.0	0.2	0.5
Approach LOS	B	B		

Intersection Summary			
Average Delay	1.8		
Intersection Capacity Utilization	32.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	120	65	15	145	135	50
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.93	0.93	0.88	0.88	0.90	0.90
Hourly flow rate (vph)	129	70	17	165	150	56
Pedestrians	7			31	340	
Lane Width (ft)	13.0			16.0	12.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	1			3	28	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	371			346		
pX, platoon unblocked						
vC, conflicting volume			539		710	535
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			539		710	535
tC, single (s)			4.1		*3.9	*3.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			98		67	90
cM capacity (veh/h)			745		457	535

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	199	182	206
Volume Left	0	17	150
Volume Right	70	0	56
cSH	1700	745	476
Volume to Capacity	0.12	0.02	0.43
Queue Length 95th (ft)	0	2	54
Control Delay (s)	0.0	1.2	18.2
Lane LOS		A	C
Approach Delay (s)	0.0	1.2	18.2
Approach LOS			C

Intersection Summary			
Average Delay	6.7		
Intersection Capacity Utilization	42.0%	ICU Level of Service	A
Analysis Period (min)	15		

* User Entered Value

Lane Group	EBT	WBT	NBL	NBR
Lane Group Flow (vph)	871	472	219	96
v/c Ratio	0.56	0.35	0.79	0.29
Control Delay	24.7	21.7	61.8	12.9
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	24.7	21.7	61.8	12.9
Queue Length 50th (ft)	262	126	149	10
Queue Length 95th (ft)	#413	191	213	49
Internal Link Dist (ft)	493	997	291	
Turn Bay Length (ft)				75
Base Capacity (vph)	1543	1345	400	436
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.56	0.35	0.55	0.22

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	660	150	35	380	195	85
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	12	12	16	16	11	11
Total Lost time (s)	6.0			6.0	6.0	6.0
Lane Util. Factor	0.95			0.95	1.00	1.00
Frpb, ped/bikes	0.99			1.00	1.00	1.00
Flpb, ped/bikes	1.00			1.00	1.00	1.00
Frt	0.97			1.00	1.00	0.85
Flt Protected	1.00			1.00	0.95	1.00
Satd. Flow (prot)	2939			3142	1468	1391
Flt Permitted	1.00			0.82	0.95	1.00
Satd. Flow (perm)	2939			2578	1468	1391
Peak-hour factor, PHF	0.93	0.93	0.88	0.88	0.89	0.89
Adj. Flow (vph)	710	161	40	432	219	96
RTOR Reduction (vph)	13	0	0	0	0	64
Lane Group Flow (vph)	858	0	0	472	219	32
Confl. Bikes (#/hr)		12				
Heavy Vehicles (%)	6%	11%	0%	7%	7%	1%
Bus Blockages (#/hr)	0	0	0	15	0	0
Parking (#/hr)				4		
Turn Type	NA		Perm	NA	Prot	Prot
Protected Phases	1			1	5	5
Permitted Phases			1			
Actuated Green, G (s)	55.8			55.8	20.8	20.8
Effective Green, g (s)	55.8			55.8	20.8	20.8
Actuated g/C Ratio	0.51			0.51	0.19	0.19
Clearance Time (s)	6.0			6.0	6.0	6.0
Vehicle Extension (s)	2.0			2.0	2.0	2.0
Lane Grp Cap (vph)	1490			1307	277	263
v/s Ratio Prot	c0.29				c0.15	0.02
v/s Ratio Perm				0.18		
v/c Ratio	0.58			0.36	0.79	0.12
Uniform Delay, d1	18.9			16.3	42.5	37.0
Progression Factor	1.00			1.00	1.00	1.00
Incremental Delay, d2	1.6			0.8	13.3	0.1
Delay (s)	20.5			17.1	55.9	37.1
Level of Service	C			B	E	D
Approach Delay (s)	20.5			17.1	50.1	
Approach LOS	C			B	D	

Intersection Summary			
HCM 2000 Control Delay	25.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	63.7%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	SBT
Lane Group Flow (vph)	322	200	352	403	205	186	51
v/c Ratio	0.42	0.57	0.69	0.50	0.94	0.34	0.53
Control Delay	37.9	46.8	31.2	24.9	96.3	5.7	68.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	37.9	46.8	31.2	24.9	96.3	5.7	68.9
Queue Length 50th (ft)	113	141	186	226	145	0	35
Queue Length 95th (ft)	161	#283	#253	328	#291	49	58
Internal Link Dist (ft)	315			246			140
Turn Bay Length (ft)		60				180	
Base Capacity (vph)	768	349	524	804	217	558	112
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.42	0.57	0.67	0.50	0.94	0.33	0.46

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	12	271	176	310	341	13	189	0	171	10	15	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	11	11	12	12	11	11	12	12	13	12
Total Lost time (s)		8.5	8.5	6.5	8.5		4.5		6.5		5.5	
Lane Util. Factor		0.95	1.00	1.00	1.00		1.00		1.00		1.00	
Frpb, ped/bikes		1.00	1.00	1.00	1.00		1.00		1.00		1.00	
Flpb, ped/bikes		1.00	1.00	1.00	1.00		1.00		1.00		1.00	
Frt		1.00	0.85	1.00	0.99		1.00		0.85		0.96	
Flt Protected		1.00	1.00	0.95	1.00		0.95		1.00		0.99	
Satd. Flow (prot)		2705	1138	1540	1606		1540		1309		1302	
Flt Permitted		0.92	1.00	0.56	1.00		0.95		1.00		0.99	
Satd. Flow (perm)		2503	1138	902	1606		1540		1309		1302	
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.92	0.92	0.92	0.70	0.70	0.70
Adj. Flow (vph)	14	308	200	352	388	15	205	0	186	14	21	16
RTOR Reduction (vph)	0	0	0	0	1	0	0	0	126	0	0	0
Lane Group Flow (vph)	0	322	200	352	402	0	205	0	60	0	51	0
Confl. Bikes (#/hr)						2			3			
Heavy Vehicles (%)	0%	9%	8%	2%	4%	18%	2%	20%	11%	0%	29%	9%
Bus Blockages (#/hr)	0	0	0	0	3	3	0	0	0	0	0	0
Parking (#/hr)		5	5							0	1	0
Turn Type	Perm	NA	Perm	D.P+P	NA		Prot		pt+ov	Perm	NA	
Protected Phases		1		9	1 9		4		4 9		3	
Permitted Phases	1		1	1						3		
Actuated Green, G (s)		31.1	31.1	46.6	53.1		13.5		35.5		6.9	
Effective Green, g (s)		31.1	31.1	46.6	46.6		15.5		35.5		6.9	
Actuated g/C Ratio		0.28	0.28	0.42	0.42		0.14		0.32		0.06	
Clearance Time (s)		8.5	8.5	6.5			6.5				5.5	
Vehicle Extension (s)		2.0	2.0	2.0			2.0				2.0	
Lane Grp Cap (vph)		707	321	472	680		217		422		81	
v/s Ratio Prot				c0.11	0.25		c0.13		0.05			
v/s Ratio Perm		0.13	0.18	c0.21							0.04	
v/c Ratio		0.46	0.62	0.75	0.59		0.94		0.14		0.63	
Uniform Delay, d1		32.5	34.3	23.9	24.4		46.8		26.4		50.3	
Progression Factor		1.00	1.00	1.00	1.00		1.00		1.00		1.00	
Incremental Delay, d2		2.1	8.8	5.5	0.9		45.0		0.1		10.5	
Delay (s)		34.6	43.2	29.4	25.3		91.8		26.5		60.8	
Level of Service		C	D	C	C		F		C		E	
Approach Delay (s)		37.9			27.2			60.8			60.8	
Approach LOS		D			C			E			E	

Intersection Summary			
HCM 2000 Control Delay	39.1	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	31.0
Intersection Capacity Utilization	65.3%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	NBT	SBT	SBR
Lane Group Flow (vph)	163	459	464	140
v/c Ratio	0.61	0.60	0.46	0.21
Control Delay	26.3	12.7	9.6	3.8
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	26.3	12.7	9.6	3.8
Queue Length 50th (ft)	43	113	71	4
Queue Length 95th (ft)	78	#256	153	25
Internal Link Dist (ft)	266	76	471	
Turn Bay Length (ft)				40
Base Capacity (vph)	377	771	1014	678
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.43	0.60	0.46	0.21

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	37	5	102	0	0	0	85	323	10	5	380	116
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	13	13	13	12	12	12	12	11	12	12	12	10
Total Lost time (s)		5.0						5.0			5.0	5.0
Lane Util. Factor		1.00						1.00			1.00	1.00
Frpb, ped/bikes		0.90						0.99			1.00	0.77
Flpb, ped/bikes		1.00						0.98			1.00	1.00
Frt		0.90						1.00			1.00	0.85
Flt Protected		0.99						0.99			1.00	1.00
Satd. Flow (prot)		1110						1433			1612	1012
Flt Permitted		0.99						0.84			0.99	1.00
Satd. Flow (perm)		1110						1217			1604	1012
Peak-hour factor, PHF	0.89	0.89	0.89	0.92	0.92	0.92	0.91	0.91	0.91	0.83	0.83	0.83
Adj. Flow (vph)	42	6	115	0	0	0	93	355	11	6	458	140
RTOR Reduction (vph)	0	0	0	0	0	0	0	1	0	0	0	43
Lane Group Flow (vph)	0	163	0	0	0	0	0	458	0	0	464	97
Confl. Peds. (#/hr)	35		83				173		138	138		173
Confl. Bikes (#/hr)									54			
Heavy Vehicles (%)	11%	40%	12%	2%	2%	2%	10%	11%	9%	0%	6%	3%
Parking (#/hr)	4	4	4									
Turn Type	Split	NA					Perm	NA		Perm	NA	Perm
Protected Phases	5	5						1			1	
Permitted Phases							1			1		1
Actuated Green, G (s)		10.4						29.6			29.6	29.6
Effective Green, g (s)		10.4						29.6			29.6	29.6
Actuated g/C Ratio		0.21						0.59			0.59	0.59
Clearance Time (s)		5.0						5.0			5.0	5.0
Vehicle Extension (s)		2.0						3.0			3.0	3.0
Lane Grp Cap (vph)		230						720			949	599
v/s Ratio Prot		c0.15										
v/s Ratio Perm								c0.38			0.29	0.10
v/c Ratio		0.71						0.64			0.49	0.16
Uniform Delay, d1		18.4						6.7			5.9	4.6
Progression Factor		1.00						1.00			1.00	1.00
Incremental Delay, d2		7.9						4.0			1.8	0.6
Delay (s)		26.3						10.6			7.7	5.2
Level of Service		C						B			A	A
Approach Delay (s)		26.3			0.0			10.6			7.1	
Approach LOS		C			A			B			A	

Intersection Summary			
HCM 2000 Control Delay	11.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	74.1%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	5	5	5	413	477	5
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.63	0.63	0.87	0.87	0.83	0.83
Hourly flow rate (vph)	8	8	6	475	575	6
Pedestrians	236			5	7	
Lane Width (ft)	12.0			11.0	11.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	20			0	1	
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)					156	
pX, platoon unblocked	0.84	0.84	0.84			
vC, conflicting volume	1307	819	817			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1271	691	689			
tC, single (s)	6.4	*3.9	4.3			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.4			
p0 queue free %	94	98	99			
cM capacity (veh/h)	125	470	568			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	16	480	581
Volume Left	8	6	0
Volume Right	8	0	6
cSH	197	568	1700
Volume to Capacity	0.08	0.01	0.34
Queue Length 95th (ft)	6	1	0
Control Delay (s)	24.9	0.3	0.0
Lane LOS	C	A	
Approach Delay (s)	24.9	0.3	0.0
Approach LOS	C		

Intersection Summary			
Average Delay	0.5		
Intersection Capacity Utilization	40.1%	ICU Level of Service	A
Analysis Period (min)	15		

* User Entered Value

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	15	77	108	403	395	87
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.81	0.81	0.91	0.91	0.84	0.84
Hourly flow rate (vph)	19	95	119	443	470	104
Pedestrians	165			3	77	
Lane Width (ft)	12.0			11.0	10.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	14			0	5	
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)					387	
pX, platoon unblocked	0.86	0.86	0.86			
vC, conflicting volume	1444	690	739			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1435	560	616			
tC, single (s)	*3.9	*3.9	4.2			
tC, 2 stage (s)						
tF (s)	3.5	3.4	2.3			
p0 queue free %	92	83	83			
cM capacity (veh/h)	235	546	695			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	114	562	574
Volume Left	19	119	0
Volume Right	95	0	104
cSH	449	695	1700
Volume to Capacity	0.25	0.17	0.34
Queue Length 95th (ft)	25	15	0
Control Delay (s)	15.7	4.4	0.0
Lane LOS	C	A	
Approach Delay (s)	15.7	4.4	0.0
Approach LOS	C		

Intersection Summary			
Average Delay	3.4		
Intersection Capacity Utilization	77.6%	ICU Level of Service	D
Analysis Period (min)	15		

* User Entered Value

Lane Group	EBL	EBT	WBL	WBT	NBT	NBR	SBT
Lane Group Flow (vph)	9	18	107	95	605	66	524
v/c Ratio	0.05	0.09	0.69	0.42	0.51	0.19	0.52
Control Delay	31.6	22.5	61.1	32.4	6.0	4.0	8.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	31.6	22.5	61.1	32.4	6.0	4.0	8.9
Queue Length 50th (ft)	5	5	65	42	97	5	145
Queue Length 95th (ft)	11	12	108	78	159	m16	217
Internal Link Dist (ft)		142		206	568		1505
Turn Bay Length (ft)						25	
Base Capacity (vph)	534	530	427	593	1183	342	1011
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.02	0.03	0.25	0.16	0.51	0.19	0.52

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	5	5	5	93	0	83	10	504	56	56	359	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	13	12	12	10	12	12	12	12	10	12	12	12
Total Lost time (s)	5.0	5.0		5.0	5.0			5.0	5.0		5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00	1.00		1.00	
Frpb, ped/bikes	1.00	0.99		1.00	0.94			1.00	0.41		1.00	
Flpb, ped/bikes	0.97	1.00		0.99	1.00			1.00	1.00		0.97	
Frt	1.00	0.93		1.00	0.85			1.00	0.85		1.00	
Flt Protected	0.95	1.00		0.95	1.00			1.00	1.00		0.99	
Satd. Flow (prot)	1623	1167		1211	1293			1619	468		1533	
Flt Permitted	0.70	1.00		0.75	1.00			0.99	1.00		0.87	
Satd. Flow (perm)	1188	1167		951	1293			1603	468		1335	
Peak-hour factor, PHF	0.56	0.56	0.56	0.87	0.87	0.87	0.85	0.85	0.85	0.81	0.81	0.81
Adj. Flow (vph)	9	9	9	107	0	95	12	593	66	69	443	12
RTOR Reduction (vph)	0	8	0	0	18	0	0	0	6	0	1	0
Lane Group Flow (vph)	9	10	0	107	77	0	0	605	60	0	523	0
Confl. Peds. (#/hr)	16		4	4		16	70		356	356		70
Confl. Bikes (#/hr)									68			5
Heavy Vehicles (%)	0%	67%	0%	24%	0%	6%	22%	5%	18%	5%	7%	25%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		5			5			1			1	
Permitted Phases	5			5			1		1	1		
Actuated Green, G (s)	16.2	16.2		16.2	16.2			73.8	73.8		73.8	
Effective Green, g (s)	16.2	16.2		16.2	16.2			73.8	73.8		73.8	
Actuated g/C Ratio	0.16	0.16		0.16	0.16			0.74	0.74		0.74	
Clearance Time (s)	5.0	5.0		5.0	5.0			5.0	5.0		5.0	
Vehicle Extension (s)	2.0	2.0		2.0	2.0			3.0	3.0		3.0	
Lane Grp Cap (vph)	192	189		154	209			1183	345		985	
v/s Ratio Prot		0.01			0.06							
v/s Ratio Perm	0.01			c0.11				0.38	0.13		c0.39	
v/c Ratio	0.05	0.06		0.69	0.37			0.51	0.17		0.53	
Uniform Delay, d1	35.4	35.4		39.6	37.3			5.5	3.9		5.6	
Progression Factor	1.00	1.00		1.00	1.00			0.66	0.68		1.00	
Incremental Delay, d2	0.0	0.0		10.4	0.4			1.4	0.9		1.9	
Delay (s)	35.4	35.5		50.0	37.7			5.0	3.6		7.6	
Level of Service	D	D		D	D			A	A		A	
Approach Delay (s)		35.5			44.2			4.9			7.6	
Approach LOS		D			D			A			A	

Intersection Summary			
HCM 2000 Control Delay	12.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	82.3%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	104	130	266	560	536
v/c Ratio	1.04	0.56	0.78	0.48	0.53
Control Delay	138.1	44.6	52.2	8.3	10.6
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	138.1	44.6	52.2	8.3	10.6
Queue Length 50th (ft)	~66	76	155	128	72
Queue Length 95th (ft)	#156	127	226	235	94
Internal Link Dist (ft)	126		152	275	568
Turn Bay Length (ft)					
Base Capacity (vph)	130	313	451	1169	1006
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.80	0.42	0.59	0.48	0.53

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	88	0	5	117	193	47	10	478	0	0	383	105
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	16	12	16	16	12	12	12	12	12	12	12
Total Lost time (s)		4.0		4.0	4.0			4.0			4.0	
Lane Util. Factor		1.00		1.00	1.00			1.00			1.00	
Frpb, ped/bikes		0.99		1.00	0.97			1.00			0.92	
Flpb, ped/bikes		0.95		0.91	1.00			1.00			1.00	
Frt		0.99		1.00	0.97			1.00			0.97	
Flt Protected		0.96		0.95	1.00			1.00			1.00	
Satd. Flow (prot)		1648		1524	1702			1625			1375	
Flt Permitted		0.27		0.75	1.00			0.99			1.00	
Satd. Flow (perm)		473		1208	1702			1609			1375	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.87	0.87	0.87	0.91	0.91	0.91
Adj. Flow (vph)	98	0	6	130	214	52	11	549	0	0	421	115
RTOR Reduction (vph)	0	9	0	0	10	0	0	0	0	0	8	0
Lane Group Flow (vph)	0	95	0	130	256	0	0	560	0	0	528	0
Confl. Peds. (#/hr)	39		41	41		39	109					109
Confl. Bikes (#/hr)						1						6
Heavy Vehicles (%)	5%	0%	0%	10%	9%	2%	0%	5%	0%	0%	7%	28%
Turn Type	Perm	NA		Perm	NA		Perm	NA			NA	
Protected Phases		2			2			1			1	
Permitted Phases	2			2			1					
Actuated Green, G (s)		19.4		19.4	19.4			72.6			72.6	
Effective Green, g (s)		19.4		19.4	19.4			72.6			72.6	
Actuated g/C Ratio		0.19		0.19	0.19			0.73			0.73	
Clearance Time (s)		4.0		4.0	4.0			4.0			4.0	
Vehicle Extension (s)		2.0		2.0	2.0			2.0			2.0	
Lane Grp Cap (vph)		91		234	330			1168			998	
v/s Ratio Prot					0.15						c0.38	
v/s Ratio Perm		c0.20		0.11				0.35				
v/c Ratio		1.05		0.56	0.78			0.48			0.53	
Uniform Delay, d1		40.3		36.4	38.2			5.8			6.1	
Progression Factor		1.00		1.00	1.00			1.00			1.24	
Incremental Delay, d2		107.2		1.6	10.0			1.4			1.8	
Delay (s)		147.5		38.0	48.3			7.2			9.4	
Level of Service		F		D	D			A			A	
Approach Delay (s)		147.5			44.9			7.2			9.4	
Approach LOS		F			D			A			A	

Intersection Summary			
HCM 2000 Control Delay	26.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	74.2%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	0	0	0	10	5	36	5	5	298	5
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.50	0.50	0.50	0.68	0.68	0.68	0.94	0.94	0.94
Hourly flow rate (vph)	0	0	0	0	0	20	7	53	7	5	317	5
Pedestrians		103			39			9			93	
Lane Width (ft)		10.0			10.0			14.0			14.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		7			3			1			9	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	618	547	432	450	546	189	425			99		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	618	547	432	450	546	189	425			99		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.4	4.1			4.4		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.5	2.2			2.5		
p0 queue free %	100	100	100	100	100	97	99			100		
cM capacity (veh/h)	305	399	578	463	400	716	1063			1285		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	0	20	68	328
Volume Left	0	0	7	5
Volume Right	0	20	7	5
cSH	1700	716	1063	1285
Volume to Capacity	0.00	0.03	0.01	0.00
Queue Length 95th (ft)	0	2	1	0
Control Delay (s)	0.0	10.2	1.0	0.2
Lane LOS	A	B	A	A
Approach Delay (s)	0.0	10.2	1.0	0.2
Approach LOS	A	B		

Intersection Summary			
Average Delay	0.8		
Intersection Capacity Utilization	38.6%	ICU Level of Service	A
Analysis Period (min)	15		

General Electric Headquarters | 2021 No-Build Morning Peak Hour

8: Necco Street & Melcher Street | 8:00 AM - 9:00 AM

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	139	226	82	119	41	5
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.94	0.94	0.89	0.89	0.85	0.85
Hourly flow rate (vph)	148	240	92	134	48	6
Pedestrians	16			31	304	
Lane Width (ft)	13.0			16.0	12.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	1			3	25	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	371			346		
pX, platoon unblocked						
vC, conflicting volume			692		906	603
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			692		906	603
tC, single (s)			4.1		*3.9	*3.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			86		87	99
cM capacity (veh/h)			678		366	533

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	388	226	54
Volume Left	0	92	48
Volume Right	240	0	6
cSH	1700	678	379
Volume to Capacity	0.23	0.14	0.14
Queue Length 95th (ft)	0	12	12
Control Delay (s)	0.0	5.5	16.1
Lane LOS		A	C
Approach Delay (s)	0.0	5.5	16.1
Approach LOS			C

Intersection Summary			
Average Delay	3.2		
Intersection Capacity Utilization	60.7%	ICU Level of Service	B
Analysis Period (min)	15		

* User Entered Value

Lane Group	EBT	WBT	NBL	NBR
Lane Group Flow (vph)	923	615	138	40
v/c Ratio	0.59	0.44	0.78	0.19
Control Delay	18.7	18.8	74.4	14.8
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	18.7	18.8	74.4	14.8
Queue Length 50th (ft)	243	165	94	0
Queue Length 95th (ft)	334	228	#174	31
Internal Link Dist (ft)	493	997	291	
Turn Bay Length (ft)				75
Base Capacity (vph)	1577	1392	211	244
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.59	0.44	0.65	0.16

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBU	EBT	EBR	WBU	WBL	WBT	NBL	NBR
Lane Configurations								
Volume (vph)	5	586	323	5	42	519	124	36
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	16	16	11	11
Total Lost time (s)		6.0				6.0	6.0	6.0
Lane Util. Factor		0.95				0.95	1.00	1.00
Frpb, ped/bikes		0.99				1.00	1.00	1.00
Flpb, ped/bikes		1.00				1.00	1.00	1.00
Frt		0.95				1.00	1.00	0.85
Flt Protected		1.00				1.00	0.95	1.00
Satd. Flow (prot)		2764				2998	1366	1364
Flt Permitted		0.95				0.80	0.95	1.00
Satd. Flow (perm)		2633				2395	1366	1364
Peak-hour factor, PHF	0.99	0.99	0.99	0.92	0.92	0.92	0.90	0.90
Adj. Flow (vph)	5	592	326	5	46	564	138	40
RTOR Reduction (vph)	0	51	0	0	0	0	0	35
Lane Group Flow (vph)	0	872	0	0	0	615	138	5
Confl. Bikes (#/hr)			24					
Heavy Vehicles (%)	0%	11%	8%	0%	7%	12%	15%	3%
Bus Blockages (#/hr)	0	0	0	0	0	15	0	0
Parking (#/hr)						4		
Turn Type	Perm	NA		Perm	Perm	NA	Prot	Prot
Protected Phases		1				1	5	5
Permitted Phases	1			1	1			
Actuated Green, G (s)		62.3				62.3	14.3	14.3
Effective Green, g (s)		62.3				62.3	14.3	14.3
Actuated g/C Ratio		0.57				0.57	0.13	0.13
Clearance Time (s)		6.0				6.0	6.0	6.0
Vehicle Extension (s)		2.0				2.0	2.0	2.0
Lane Grp Cap (vph)		1491				1356	177	177
v/s Ratio Prot							c0.10	0.00
v/s Ratio Perm		c0.33				0.26		
v/c Ratio		0.58				0.45	0.78	0.03
Uniform Delay, d1		15.5				13.9	46.3	41.8
Progression Factor		1.00				1.00	1.00	1.00
Incremental Delay, d2		1.7				1.1	17.7	0.0
Delay (s)		17.1				15.0	64.0	41.8
Level of Service		B				B	E	D
Approach Delay (s)		17.1				15.0	59.0	
Approach LOS		B				B	E	

Intersection Summary			
HCM 2000 Control Delay	20.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	69.7%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	SBT
Lane Group Flow (vph)	456	259	280	371	237	298	69
v/c Ratio	0.51	0.71	0.66	0.46	1.12	0.47	0.62
Control Delay	37.3	50.7	30.5	24.2	141.2	6.0	72.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	37.3	50.7	30.5	24.2	141.2	6.0	72.6
Queue Length 50th (ft)	163	~214	141	205	~192	0	48
Queue Length 95th (ft)	203	#333	#231	286	#350	62	85
Internal Link Dist (ft)	315			246			140
Turn Bay Length (ft)		60				180	
Base Capacity (vph)	888	366	437	800	212	645	125
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.51	0.71	0.64	0.46	1.12	0.46	0.55

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	2	377	215	241	306	13	220	0	277	26	17	13
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	11	11	12	12	11	11	12	12	13	12
Total Lost time (s)		8.5	8.5	6.5	8.5		4.5		6.5		5.5	
Lane Util. Factor		0.95	1.00	1.00	1.00		1.00		1.00		1.00	
Frpb, ped/bikes		1.00	0.97	1.00	1.00		1.00		1.00		1.00	
Flpb, ped/bikes		1.00	1.00	1.00	1.00		1.00		1.00		1.00	
Frt		1.00	0.85	1.00	0.99		1.00		0.85		0.97	
Flt Protected		1.00	1.00	0.95	1.00		0.95		1.00		0.98	
Satd. Flow (prot)		2831	1118	1540	1615		1510		1439		1453	
Flt Permitted		0.95	1.00	0.44	1.00		0.95		1.00		0.98	
Satd. Flow (perm)		2699	1118	715	1615		1510		1439		1453	
Peak-hour factor, PHF	0.83	0.83	0.83	0.86	0.86	0.86	0.93	0.93	0.93	0.81	0.81	0.81
Adj. Flow (vph)	2	454	259	280	356	15	237	0	298	32	21	16
RTOR Reduction (vph)	0	0	0	0	1	0	0	0	209	0	0	0
Lane Group Flow (vph)	0	456	259	280	370	0	237	0	89	0	69	0
Confl. Bikes (#/hr)			6			20						
Heavy Vehicles (%)	0%	4%	7%	2%	4%	0%	4%	2%	1%	0%	0%	13%
Bus Blockages (#/hr)	0	0	0	0	3	3	0	0	0	0	0	0
Parking (#/hr)		5	5							0	1	0
Turn Type	Perm	NA	Perm	D.P+P	NA		Prot		pt+ov	Perm	NA	
Protected Phases		1		9	1 9		4		4 9		3	
Permitted Phases	1		1	1						3		
Actuated Green, G (s)		33.5	33.5	46.2	52.7		13.5		32.7		7.3	
Effective Green, g (s)		33.5	33.5	46.2	46.2		15.5		32.7		7.3	
Actuated g/C Ratio		0.30	0.30	0.42	0.42		0.14		0.30		0.07	
Clearance Time (s)		8.5	8.5	6.5			6.5				5.5	
Vehicle Extension (s)		2.0	2.0	2.0			2.0				2.0	
Lane Grp Cap (vph)		821	340	395	678		212		427		96	
v/s Ratio Prot				c0.08	0.23		c0.16		0.06			
v/s Ratio Perm		0.17	c0.23	0.22							0.05	
v/c Ratio		0.56	0.76	0.71	0.55		1.12		0.21		0.72	
Uniform Delay, d1		32.0	34.6	23.1	24.0		47.2		28.9		50.3	
Progression Factor		1.00	1.00	1.00	1.00		1.00		1.00		1.00	
Incremental Delay, d2		2.7	14.9	4.7	0.5		97.1		0.1		19.1	
Delay (s)		34.7	49.5	27.8	24.5		144.3		29.0		69.5	
Level of Service		C	D	C	C		F		C		E	
Approach Delay (s)		40.1			25.9			80.1			69.5	
Approach LOS		D			C			F			E	

Intersection Summary			
HCM 2000 Control Delay	47.3	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	31.0
Intersection Capacity Utilization	68.1%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	NBT	SBT	SBR
Lane Group Flow (vph)	212	607	459	78
v/c Ratio	0.81	0.74	0.42	0.17
Control Delay	58.2	20.9	10.8	6.2
Queue Delay	0.0	0.0	0.5	0.0
Total Delay	58.2	20.9	11.3	6.2
Queue Length 50th (ft)	128	180	124	9
Queue Length 95th (ft)	187	#342	239	34
Internal Link Dist (ft)	266	76	471	
Turn Bay Length (ft)				40
Base Capacity (vph)	375	825	1083	464
Starvation Cap Reductn	0	0	263	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.57	0.74	0.56	0.17

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	81	5	102	0	0	0	101	416	5	5	399	69
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	13	13	13	12	12	12	12	11	12	12	12	10
Total Lost time (s)		5.0						5.0			5.0	5.0
Lane Util. Factor		1.00						1.00			1.00	1.00
Frpb, ped/bikes		0.84						1.00			1.00	0.52
Flpb, ped/bikes		1.00						0.96			1.00	1.00
Frt		0.93						1.00			1.00	0.85
Flt Protected		0.98						0.99			1.00	1.00
Satd. Flow (prot)		1104						1495			1641	685
Flt Permitted		0.98						0.82			0.99	1.00
Satd. Flow (perm)		1104						1238			1632	685
Peak-hour factor, PHF	0.89	0.89	0.89	0.92	0.92	0.92	0.86	0.86	0.86	0.88	0.88	0.88
Adj. Flow (vph)	91	6	115	0	0	0	117	484	6	6	453	78
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	12
Lane Group Flow (vph)	0	212	0	0	0	0	0	607	0	0	459	66
Confl. Peds. (#/hr)	65		93				183		160	160		183
Confl. Bikes (#/hr)									8			38
Heavy Vehicles (%)	0%	83%	10%	2%	2%	2%	12%	3%	0%	0%	4%	3%
Parking (#/hr)	4	4	4									
Turn Type	Split	NA					Perm	NA		Perm	NA	Perm
Protected Phases	5	5						1			1	
Permitted Phases							1			1		1
Actuated Green, G (s)		23.7						66.3			66.3	66.3
Effective Green, g (s)		23.7						66.3			66.3	66.3
Actuated g/C Ratio		0.24						0.66			0.66	0.66
Clearance Time (s)		5.0						5.0			5.0	5.0
Vehicle Extension (s)		2.0						3.0			3.0	3.0
Lane Grp Cap (vph)		261						820			1082	454
v/s Ratio Prot		c0.19										
v/s Ratio Perm								c0.49			0.28	0.10
v/c Ratio		0.81						0.74			0.42	0.15
Uniform Delay, d1		36.0						11.1			7.9	6.3
Progression Factor		1.00						1.06			1.00	1.00
Incremental Delay, d2		16.4						5.8			1.2	0.7
Delay (s)		52.5						17.5			9.1	7.0
Level of Service		D						B			A	A
Approach Delay (s)		52.5			0.0			17.5			8.8	
Approach LOS		D			A			B			A	

Intersection Summary			
HCM 2000 Control Delay	19.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	82.4%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	10	5	10	512	496	5
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.60	0.60	0.91	0.91	0.95	0.95
Hourly flow rate (vph)	17	8	11	563	522	5
Pedestrians	211			1	3	
Lane Width (ft)	12.0			11.0	11.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	18			0	0	
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)					156	
pX, platoon unblocked	0.88	0.88	0.88			
vC, conflicting volume	1323	737	738			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1298	629	631			
tC, single (s)	*3.9	*3.9	4.2			
tC, 2 stage (s)						
tF (s)	3.5	3.5	2.3			
p0 queue free %	95	98	98			
cM capacity (veh/h)	314	504	651			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	25	574	527
Volume Left	17	11	0
Volume Right	8	0	5
cSH	359	651	1700
Volume to Capacity	0.07	0.02	0.31
Queue Length 95th (ft)	6	1	0
Control Delay (s)	15.8	0.5	0.0
Lane LOS	C	A	
Approach Delay (s)	15.8	0.5	0.0
Approach LOS	C		

Intersection Summary			
Average Delay	0.6		
Intersection Capacity Utilization	49.2%	ICU Level of Service	A
Analysis Period (min)	15		

* User Entered Value

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	72	128	36	450	486	15
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.91	0.91	0.90	0.90	0.96	0.96
Hourly flow rate (vph)	79	141	40	500	506	16
Pedestrians	206			2	62	
Lane Width (ft)	12.0			11.0	10.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	17			0	4	
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)					387	
pX, platoon unblocked	0.89	0.89	0.89			
vC, conflicting volume	1362	722	728			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1344	623	629			
tC, single (s)	*3.9	*3.9	4.2			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.3			
p0 queue free %	72	74	94			
cM capacity (veh/h)	284	533	669			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	220	540	522
Volume Left	79	40	0
Volume Right	141	0	16
cSH	405	669	1700
Volume to Capacity	0.54	0.06	0.31
Queue Length 95th (ft)	78	5	0
Control Delay (s)	24.0	1.6	0.0
Lane LOS	C	A	
Approach Delay (s)	24.0	1.6	0.0
Approach LOS	C		

Intersection Summary			
Average Delay	4.8		
Intersection Capacity Utilization	79.3%	ICU Level of Service	D
Analysis Period (min)	15		

* User Entered Value

Lane Group	EBL	EBT	WBL	WBT	NBT	NBR	SBT
Lane Group Flow (vph)	6	11	185	72	474	126	675
v/c Ratio	0.03	0.03	0.77	0.22	0.43	0.29	0.63
Control Delay	25.8	0.2	55.8	9.5	7.5	5.9	15.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.2
Total Delay	25.8	0.2	55.8	9.5	7.5	5.9	15.8
Queue Length 50th (ft)	3	0	111	4	78	12	165
Queue Length 95th (ft)	11	0	131	23	173	m43	478
Internal Link Dist (ft)		142		206	568		1505
Turn Bay Length (ft)						25	
Base Capacity (vph)	436	662	489	609	1096	432	1069
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	2	0	0	0	0	50
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.01	0.02	0.38	0.12	0.43	0.29	0.66

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	5	0	10	139	5	49	21	406	113	38	592	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	13	12	12	10	12	12	12	12	10	12	12	12
Total Lost time (s)	5.0	5.0		5.0	5.0			5.0	5.0		5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00	1.00		1.00	
Frpb, ped/bikes	1.00	0.94		1.00	0.95			1.00	0.48		1.00	
Flpb, ped/bikes	0.97	1.00		0.96	1.00			1.00	1.00		0.99	
Frt	1.00	0.85		1.00	0.86			1.00	0.85		1.00	
Flt Protected	0.95	1.00		0.95	1.00			1.00	1.00		1.00	
Satd. Flow (prot)	1297	1370		1377	1275			1682	622		1643	
Flt Permitted	0.71	1.00		0.75	1.00			0.96	1.00		0.95	
Satd. Flow (perm)	969	1370		1087	1275			1615	622		1572	
Peak-hour factor, PHF	0.88	0.88	0.88	0.75	0.75	0.75	0.90	0.90	0.90	0.94	0.94	0.94
Adj. Flow (vph)	6	0	11	185	7	65	23	451	126	40	630	5
RTOR Reduction (vph)	0	9	0	0	51	0	0	0	11	0	0	0
Lane Group Flow (vph)	6	2	0	185	21	0	0	474	115	0	675	0
Confl. Peds. (#/hr)	16		16	16		16	121		226	226		121
Confl. Bikes (#/hr)									5			69
Heavy Vehicles (%)	25%	0%	0%	6%	0%	11%	0%	1%	5%	3%	2%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		5			5			1			1	
Permitted Phases	5			5			1		1	1		
Actuated Green, G (s)	22.2	22.2		22.2	22.2			67.8	67.8		67.8	
Effective Green, g (s)	22.2	22.2		22.2	22.2			67.8	67.8		67.8	
Actuated g/C Ratio	0.22	0.22		0.22	0.22			0.68	0.68		0.68	
Clearance Time (s)	5.0	5.0		5.0	5.0			5.0	5.0		5.0	
Vehicle Extension (s)	2.0	2.0		2.0	2.0			3.0	3.0		3.0	
Lane Grp Cap (vph)	215	304		241	283			1094	421		1065	
v/s Ratio Prot		0.00			0.02							
v/s Ratio Perm	0.01			c0.17				0.29	0.18		c0.43	
v/c Ratio	0.03	0.01		0.77	0.08			0.43	0.27		0.63	
Uniform Delay, d1	30.5	30.3		36.5	30.8			7.3	6.4		9.1	
Progression Factor	1.00	1.00		1.00	1.00			0.70	0.65		1.12	
Incremental Delay, d2	0.0	0.0		12.4	0.0			1.1	1.5		2.8	
Delay (s)	30.5	30.3		48.8	30.8			6.3	5.6		12.9	
Level of Service	C	C		D	C			A	A		B	
Approach Delay (s)		30.4			43.8			6.1			12.9	
Approach LOS		C			D			A			B	

Intersection Summary			
HCM 2000 Control Delay	15.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	91.0%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	114	152	182	510	883
v/c Ratio	0.91	0.66	0.59	0.41	0.78
Control Delay	95.8	51.5	42.3	6.6	12.9
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	95.8	51.5	42.3	6.6	12.9
Queue Length 50th (ft)	66	92	102	93	336
Queue Length 95th (ft)	113	135	144	212	#707
Internal Link Dist (ft)	126		152	275	568
Turn Bay Length (ft)					
Base Capacity (vph)	189	359	477	1238	1127
Starvation Cap Reductn	0	0	0	0	4
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.60	0.42	0.38	0.41	0.79

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	92	0	5	131	125	32	10	454	0	0	647	130
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	16	12	16	16	12	12	12	12	12	12	12
Total Lost time (s)		4.0		4.0	4.0			4.0			4.0	
Lane Util. Factor		1.00		1.00	1.00			1.00			1.00	
Frpb, ped/bikes		1.00		1.00	0.97			1.00			0.91	
Flpb, ped/bikes		0.93		0.97	1.00			1.00			1.00	
Frt		0.99		1.00	0.97			1.00			0.98	
Flt Protected		0.95		0.95	1.00			1.00			1.00	
Satd. Flow (prot)		1604		1695	1802			1675			1492	
Flt Permitted		0.42		0.78	1.00			0.98			1.00	
Satd. Flow (perm)		699		1383	1802			1646			1492	
Peak-hour factor, PHF	0.85	0.85	0.85	0.86	0.86	0.86	0.91	0.91	0.91	0.88	0.88	0.88
Adj. Flow (vph)	108	0	6	152	145	37	11	499	0	0	735	148
RTOR Reduction (vph)	0	9	0	0	10	0	0	0	0	0	5	0
Lane Group Flow (vph)	0	105	0	152	172	0	0	510	0	0	878	0
Confl. Peds. (#/hr)	36		16	16		36	170					170
Confl. Bikes (#/hr)						1						64
Heavy Vehicles (%)	7%	0%	0%	5%	2%	0%	0%	2%	0%	0%	1%	7%
Turn Type	Perm	NA		Perm	NA		Perm	NA			NA	
Protected Phases		2			2			1			1	
Permitted Phases	2			2			1					
Actuated Green, G (s)		16.7		16.7	16.7			75.3			75.3	
Effective Green, g (s)		16.7		16.7	16.7			75.3			75.3	
Actuated g/C Ratio		0.17		0.17	0.17			0.75			0.75	
Clearance Time (s)		4.0		4.0	4.0			4.0			4.0	
Vehicle Extension (s)		2.0		2.0	2.0			2.0			2.0	
Lane Grp Cap (vph)		116		230	300			1239			1123	
v/s Ratio Prot					0.10						c0.59	
v/s Ratio Perm		c0.15		0.11				0.31				
v/c Ratio		0.90		0.66	0.57			0.41			0.78	
Uniform Delay, d1		40.9		39.0	38.4			4.4			7.4	
Progression Factor		1.00		1.00	1.00			1.00			0.76	
Incremental Delay, d2		53.5		5.4	1.6			1.0			4.7	
Delay (s)		94.3		44.4	40.0			5.4			10.3	
Level of Service		F		D	D			A			B	
Approach Delay (s)		94.3			42.0			5.4			10.3	
Approach LOS		F			D			A			B	

Intersection Summary			
HCM 2000 Control Delay	19.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	80.6%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	5	5	5	5	5	5	184	5	5	72	5
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.44	0.44	0.44	0.60	0.60	0.60	0.83	0.83	0.83	0.86	0.86	0.86
Hourly flow rate (vph)	0	11	11	8	8	8	6	222	6	6	84	6
Pedestrians		69			20			24			67	
Lane Width (ft)		10.0			10.0			14.0			14.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		5			1			2			7	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	484	427	180	396	427	312	159			248		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	484	427	180	396	427	312	159			248		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.5	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.5	2.2			2.2		
p0 queue free %	100	98	99	98	98	99	100			100		
cM capacity (veh/h)	408	487	807	501	487	625	1365			1311		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	23	25	234	95
Volume Left	0	8	6	6
Volume Right	11	8	6	6
cSH	607	531	1365	1311
Volume to Capacity	0.04	0.05	0.00	0.00
Queue Length 95th (ft)	3	4	0	0
Control Delay (s)	11.2	12.1	0.2	0.5
Lane LOS	B	B	A	A
Approach Delay (s)	11.2	12.1	0.2	0.5
Approach LOS	B	B		

Intersection Summary			
Average Delay	1.8		
Intersection Capacity Utilization	32.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	137	67	15	155	138	51
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.93	0.93	0.88	0.88	0.90	0.90
Hourly flow rate (vph)	147	72	17	176	153	57
Pedestrians	7			31	340	
Lane Width (ft)	13.0			16.0	12.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	1			3	28	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	371			346		
pX, platoon unblocked						
vC, conflicting volume			559		741	554
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			559		741	554
tC, single (s)			4.1		*3.9	*3.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			98		66	89
cM capacity (veh/h)			732		448	528

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	219	193	210
Volume Left	0	17	153
Volume Right	72	0	57
cSH	1700	732	467
Volume to Capacity	0.13	0.02	0.45
Queue Length 95th (ft)	0	2	57
Control Delay (s)	0.0	1.1	18.9
Lane LOS		A	C
Approach Delay (s)	0.0	1.1	18.9
Approach LOS			C

Intersection Summary			
Average Delay	6.7		
Intersection Capacity Utilization	42.7%	ICU Level of Service	A
Analysis Period (min)	15		

* User Entered Value

Lane Group	EBT	WBT	NBL	NBR
Lane Group Flow (vph)	910	486	231	98
v/c Ratio	0.60	0.37	0.80	0.29
Control Delay	26.0	22.7	61.7	13.6
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	26.0	22.7	61.7	13.6
Queue Length 50th (ft)	282	133	157	13
Queue Length 95th (ft)	#455	201	222	52
Internal Link Dist (ft)	493	997	291	
Turn Bay Length (ft)				75
Base Capacity (vph)	1518	1309	400	434
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.60	0.37	0.58	0.23

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	678	168	36	392	206	87
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	12	12	16	16	11	11
Total Lost time (s)	6.0			6.0	6.0	6.0
Lane Util. Factor	0.95			0.95	1.00	1.00
Frpb, ped/bikes	0.99			1.00	1.00	1.00
Flpb, ped/bikes	1.00			1.00	1.00	1.00
Frt	0.97			1.00	1.00	0.85
Flt Protected	1.00			1.00	0.95	1.00
Satd. Flow (prot)	2929			3142	1468	1391
Flt Permitted	1.00			0.81	0.95	1.00
Satd. Flow (perm)	2929			2546	1468	1391
Peak-hour factor, PHF	0.93	0.93	0.88	0.88	0.89	0.89
Adj. Flow (vph)	729	181	41	445	231	98
RTOR Reduction (vph)	15	0	0	0	0	61
Lane Group Flow (vph)	896	0	0	486	231	37
Confl. Bikes (#/hr)		12				
Heavy Vehicles (%)	6%	11%	0%	7%	7%	1%
Bus Blockages (#/hr)	0	0	0	15	0	0
Parking (#/hr)				4		
Turn Type	NA		Perm	NA	Prot	Prot
Protected Phases	1			1	5	5
Permitted Phases			1			
Actuated Green, G (s)	55.0			55.0	21.6	21.6
Effective Green, g (s)	55.0			55.0	21.6	21.6
Actuated g/C Ratio	0.50			0.50	0.20	0.20
Clearance Time (s)	6.0			6.0	6.0	6.0
Vehicle Extension (s)	2.0			2.0	2.0	2.0
Lane Grp Cap (vph)	1464			1273	288	273
v/s Ratio Prot	c0.31				c0.16	0.03
v/s Ratio Perm				0.19		
v/c Ratio	0.61			0.38	0.80	0.14
Uniform Delay, d1	19.8			17.0	42.2	36.5
Progression Factor	1.00			1.00	1.00	1.00
Incremental Delay, d2	1.9			0.9	14.0	0.1
Delay (s)	21.7			17.9	56.2	36.6
Level of Service	C			B	E	D
Approach Delay (s)	21.7			17.9	50.3	
Approach LOS	C			B	D	

Intersection Summary			
HCM 2000 Control Delay	26.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	65.5%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	SBT
Lane Group Flow (vph)	322	200	465	403	205	193	51
v/c Ratio	0.43	0.59	0.90	0.50	0.94	0.34	0.53
Control Delay	38.3	47.7	49.4	24.9	96.3	5.6	68.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	38.3	47.7	49.4	24.9	96.3	5.6	68.9
Queue Length 50th (ft)	113	141	~322	226	145	0	35
Queue Length 95th (ft)	161	#283	#430	328	#291	50	58
Internal Link Dist (ft)	315			246			140
Turn Bay Length (ft)		60				180	
Base Capacity (vph)	745	339	516	814	217	563	112
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.43	0.59	0.90	0.50	0.94	0.34	0.46

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	12	271	176	409	341	13	189	0	178	10	15	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	11	11	12	12	11	11	12	12	13	12
Total Lost time (s)		8.5	8.5	6.5	8.5		4.5		6.5		5.5	
Lane Util. Factor		0.95	1.00	1.00	1.00		1.00		1.00		1.00	
Frpb, ped/bikes		1.00	1.00	1.00	1.00		1.00		1.00		1.00	
Flpb, ped/bikes		1.00	1.00	1.00	1.00		1.00		1.00		1.00	
Frt		1.00	0.85	1.00	0.99		1.00		0.85		0.96	
Flt Protected		1.00	1.00	0.95	1.00		0.95		1.00		0.99	
Satd. Flow (prot)		2705	1138	1540	1606		1540		1309		1302	
Flt Permitted		0.92	1.00	0.56	1.00		0.95		1.00		0.99	
Satd. Flow (perm)		2502	1138	902	1606		1540		1309		1302	
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.92	0.92	0.92	0.70	0.70	0.70
Adj. Flow (vph)	14	308	200	465	388	15	205	0	193	14	21	16
RTOR Reduction (vph)	0	0	0	0	1	0	0	0	129	0	0	0
Lane Group Flow (vph)	0	322	200	465	402	0	205	0	64	0	51	0
Confl. Bikes (#/hr)						2			3			
Heavy Vehicles (%)	0%	9%	8%	2%	4%	18%	2%	20%	11%	0%	29%	9%
Bus Blockages (#/hr)	0	0	0	0	3	3	0	0	0	0	0	0
Parking (#/hr)		5	5							0	1	0
Turn Type	Perm	NA	Perm	D.P+P	NA		Prot		pt+ov	Perm	NA	
Protected Phases		1		9	1 9		4		4 9		3	
Permitted Phases	1		1	1						3		
Actuated Green, G (s)		30.1	30.1	46.6	53.1		13.5		36.5		6.9	
Effective Green, g (s)		30.1	30.1	46.6	46.6		15.5		36.5		6.9	
Actuated g/C Ratio		0.27	0.27	0.42	0.42		0.14		0.33		0.06	
Clearance Time (s)		8.5	8.5	6.5			6.5				5.5	
Vehicle Extension (s)		2.0	2.0	2.0			2.0				2.0	
Lane Grp Cap (vph)		684	311	477	680		217		434		81	
v/s Ratio Prot				c0.15	0.25		c0.13		0.05			
v/s Ratio Perm		0.13	0.18	c0.27							0.04	
v/c Ratio		0.47	0.64	0.97	0.59		0.94		0.15		0.63	
Uniform Delay, d1		33.3	35.2	28.0	24.4		46.8		25.8		50.3	
Progression Factor		1.00	1.00	1.00	1.00		1.00		1.00		1.00	
Incremental Delay, d2		2.3	9.8	34.3	0.9		45.0		0.1		10.5	
Delay (s)		35.6	45.0	62.3	25.3		91.8		25.9		60.8	
Level of Service		D	D	E	C		F		C		E	
Approach Delay (s)		39.2			45.1			59.8			60.8	
Approach LOS		D			D			E			E	

Intersection Summary			
HCM 2000 Control Delay	47.1	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	31.0
Intersection Capacity Utilization	69.7%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	NBT	SBT	SBR
Lane Group Flow (vph)	167	462	522	201
v/c Ratio	0.62	0.61	0.52	0.29
Control Delay	26.6	13.4	11.0	4.5
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	26.6	13.4	11.0	4.5
Queue Length 50th (ft)	44	119	85	8
Queue Length 95th (ft)	80	#307	181	36
Internal Link Dist (ft)	266	76	471	
Turn Bay Length (ft)				40
Base Capacity (vph)	379	760	1012	687
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.44	0.61	0.52	0.29

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	41	5	102	0	0	0	85	326	10	5	428	167
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	13	13	13	12	12	12	12	11	12	12	12	10
Total Lost time (s)		5.0						5.0			5.0	5.0
Lane Util. Factor		1.00						1.00			1.00	1.00
Frpb, ped/bikes		0.90						0.99			1.00	0.77
Flpb, ped/bikes		1.00						0.98			1.00	1.00
Frt		0.91						1.00			1.00	0.85
Flt Protected		0.99						0.99			1.00	1.00
Satd. Flow (prot)		1115						1437			1612	1012
Flt Permitted		0.99						0.83			1.00	1.00
Satd. Flow (perm)		1115						1202			1605	1012
Peak-hour factor, PHF	0.89	0.89	0.89	0.92	0.92	0.92	0.91	0.91	0.91	0.83	0.83	0.83
Adj. Flow (vph)	46	6	115	0	0	0	93	358	11	6	516	201
RTOR Reduction (vph)	0	0	0	0	0	0	0	1	0	0	0	55
Lane Group Flow (vph)	0	167	0	0	0	0	0	461	0	0	522	146
Confl. Peds. (#/hr)	35		83				173		138	138		173
Confl. Bikes (#/hr)									54			
Heavy Vehicles (%)	11%	40%	12%	2%	2%	2%	10%	11%	9%	0%	6%	3%
Parking (#/hr)	4	4	4									
Turn Type	Split	NA					Perm	NA		Perm	NA	Perm
Protected Phases	5	5						1			1	
Permitted Phases							1			1		1
Actuated Green, G (s)		10.5						29.5			29.5	29.5
Effective Green, g (s)		10.5						29.5			29.5	29.5
Actuated g/C Ratio		0.21						0.59			0.59	0.59
Clearance Time (s)		5.0						5.0			5.0	5.0
Vehicle Extension (s)		2.0						3.0			3.0	3.0
Lane Grp Cap (vph)		234						709			946	597
v/s Ratio Prot		c0.15										
v/s Ratio Perm								c0.38			0.33	0.14
v/c Ratio		0.71						0.65			0.55	0.25
Uniform Delay, d1		18.4						6.8			6.2	4.9
Progression Factor		1.00						1.02			1.00	1.00
Incremental Delay, d2		8.3						4.1			2.3	1.0
Delay (s)		26.6						11.1			8.5	5.9
Level of Service		C						B			A	A
Approach Delay (s)		26.6			0.0			11.1			7.8	
Approach LOS		C			A			B			A	

Intersection Summary			
HCM 2000 Control Delay	11.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	77.1%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	5	5	5	416	515	15
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.63	0.63	0.87	0.87	0.83	0.83
Hourly flow rate (vph)	8	8	6	478	620	18
Pedestrians	236			5	7	
Lane Width (ft)	12.0			11.0	11.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	20			0	1	
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)					156	
pX, platoon unblocked	0.81	0.81	0.81			
vC, conflicting volume	1362	871	875			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1330	722	727			
tC, single (s)	6.4	*3.9	4.3			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.4			
p0 queue free %	93	98	99			
cM capacity (veh/h)	110	442	527			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	16	484	639
Volume Left	8	6	0
Volume Right	8	0	18
cSH	176	527	1700
Volume to Capacity	0.09	0.01	0.38
Queue Length 95th (ft)	7	1	0
Control Delay (s)	27.4	0.3	0.0
Lane LOS	D	A	
Approach Delay (s)	27.4	0.3	0.0
Approach LOS	D		

Intersection Summary			
Average Delay	0.5		
Intersection Capacity Utilization	42.9%	ICU Level of Service	A
Analysis Period (min)	15		

* User Entered Value

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	18	81	169	403	395	125
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.81	0.81	0.91	0.91	0.84	0.84
Hourly flow rate (vph)	22	100	186	443	470	149
Pedestrians	165			3	77	
Lane Width (ft)	12.0			11.0	10.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	14			0	5	
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)					387	
pX, platoon unblocked	0.83	0.83	0.83			
vC, conflicting volume	1601	713	784			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1622	549	635			
tC, single (s)	*3.9	*3.9	4.2			
tC, 2 stage (s)						
tF (s)	3.5	3.4	2.3			
p0 queue free %	87	81	72			
cM capacity (veh/h)	171	528	657			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	122	629	619
Volume Left	22	186	0
Volume Right	100	0	149
cSH	383	657	1700
Volume to Capacity	0.32	0.28	0.36
Queue Length 95th (ft)	34	29	0
Control Delay (s)	18.8	7.1	0.0
Lane LOS	C	A	
Approach Delay (s)	18.8	7.1	0.0
Approach LOS	C		

Intersection Summary			
Average Delay	4.9		
Intersection Capacity Utilization	84.8%	ICU Level of Service	E
Analysis Period (min)	15		

* User Entered Value

Lane Group	EBL	EBT	WBL	WBT	NBT	NBR	SBT
Lane Group Flow (vph)	9	18	107	95	677	66	529
v/c Ratio	0.05	0.09	0.69	0.42	0.57	0.19	0.53
Control Delay	31.6	22.5	61.1	32.4	6.8	4.4	8.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	31.6	22.5	61.1	32.4	6.8	4.4	8.9
Queue Length 50th (ft)	5	5	65	42	119	5	149
Queue Length 95th (ft)	11	12	108	78	201	m18	220
Internal Link Dist (ft)		142		206	568		1505
Turn Bay Length (ft)						25	
Base Capacity (vph)	534	530	427	593	1185	342	997
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.02	0.03	0.25	0.16	0.57	0.19	0.53

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	5	5	5	93	0	83	10	565	56	56	363	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	13	12	12	10	12	12	12	12	10	12	12	12
Total Lost time (s)	5.0	5.0		5.0	5.0			5.0	5.0		5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00	1.00		1.00	
Frpb, ped/bikes	1.00	0.99		1.00	0.94			1.00	0.41		1.00	
Flpb, ped/bikes	0.97	1.00		0.99	1.00			1.00	1.00		0.98	
Frt	1.00	0.93		1.00	0.85			1.00	0.85		1.00	
Flt Protected	0.95	1.00		0.95	1.00			1.00	1.00		0.99	
Satd. Flow (prot)	1623	1167		1211	1293			1620	468		1540	
Flt Permitted	0.70	1.00		0.75	1.00			0.99	1.00		0.85	
Satd. Flow (perm)	1188	1167		951	1293			1606	468		1323	
Peak-hour factor, PHF	0.56	0.56	0.56	0.87	0.87	0.87	0.85	0.85	0.85	0.81	0.81	0.81
Adj. Flow (vph)	9	9	9	107	0	95	12	665	66	69	448	12
RTOR Reduction (vph)	0	8	0	0	18	0	0	0	6	0	1	0
Lane Group Flow (vph)	9	10	0	107	77	0	0	677	60	0	528	0
Confl. Peds. (#/hr)	16		4	4		16	70		356	356		70
Confl. Bikes (#/hr)									68			5
Heavy Vehicles (%)	0%	67%	0%	24%	0%	6%	22%	5%	18%	5%	7%	25%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		5			5			1			1	
Permitted Phases	5			5			1		1	1		
Actuated Green, G (s)	16.2	16.2		16.2	16.2			73.8	73.8		73.8	
Effective Green, g (s)	16.2	16.2		16.2	16.2			73.8	73.8		73.8	
Actuated g/C Ratio	0.16	0.16		0.16	0.16			0.74	0.74		0.74	
Clearance Time (s)	5.0	5.0		5.0	5.0			5.0	5.0		5.0	
Vehicle Extension (s)	2.0	2.0		2.0	2.0			3.0	3.0		3.0	
Lane Grp Cap (vph)	192	189		154	209			1185	345		976	
v/s Ratio Prot		0.01			0.06							
v/s Ratio Perm	0.01			c0.11				c0.42	0.13		0.40	
v/c Ratio	0.05	0.06		0.69	0.37			0.57	0.17		0.54	
Uniform Delay, d1	35.4	35.4		39.6	37.3			5.9	3.9		5.7	
Progression Factor	1.00	1.00		1.00	1.00			0.69	0.77		0.96	
Incremental Delay, d2	0.0	0.0		10.4	0.4			1.7	0.9		2.0	
Delay (s)	35.4	35.5		50.0	37.7			5.7	3.9		7.5	
Level of Service	D	D		D	D			A	A		A	
Approach Delay (s)		35.5			44.2			5.6			7.5	
Approach LOS		D			D			A			A	

Intersection Summary			
HCM 2000 Control Delay	12.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	86.1%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	104	130	266	631	540
v/c Ratio	1.04	0.56	0.78	0.54	0.54
Control Delay	138.1	44.6	52.2	9.2	10.4
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	138.1	44.6	52.2	9.2	10.4
Queue Length 50th (ft)	~66	76	155	154	72
Queue Length 95th (ft)	#156	127	226	283	94
Internal Link Dist (ft)	126		152	275	568
Turn Bay Length (ft)					
Base Capacity (vph)	130	313	451	1170	1007
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.80	0.42	0.59	0.54	0.54

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	88	0	5	117	193	47	10	539	0	0	387	105
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	16	12	16	16	12	12	12	12	12	12	12
Total Lost time (s)		4.0		4.0	4.0			4.0			4.0	
Lane Util. Factor		1.00		1.00	1.00			1.00			1.00	
Frpb, ped/bikes		0.99		1.00	0.97			1.00			0.92	
Flpb, ped/bikes		0.95		0.91	1.00			1.00			1.00	
Frt		0.99		1.00	0.97			1.00			0.97	
Flt Protected		0.96		0.95	1.00			1.00			1.00	
Satd. Flow (prot)		1648		1524	1702			1625			1377	
Flt Permitted		0.27		0.75	1.00			0.99			1.00	
Satd. Flow (perm)		473		1208	1702			1611			1377	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.87	0.87	0.87	0.91	0.91	0.91
Adj. Flow (vph)	98	0	6	130	214	52	11	620	0	0	425	115
RTOR Reduction (vph)	0	9	0	0	10	0	0	0	0	0	8	0
Lane Group Flow (vph)	0	95	0	130	256	0	0	631	0	0	532	0
Confl. Peds. (#/hr)	39		41	41		39	109					109
Confl. Bikes (#/hr)						1						6
Heavy Vehicles (%)	5%	0%	0%	10%	9%	2%	0%	5%	0%	0%	7%	28%
Turn Type	Perm	NA		Perm	NA		Perm	NA			NA	
Protected Phases		2			2			1			1	
Permitted Phases	2			2			1					
Actuated Green, G (s)		19.4		19.4	19.4			72.6			72.6	
Effective Green, g (s)		19.4		19.4	19.4			72.6			72.6	
Actuated g/C Ratio		0.19		0.19	0.19			0.73			0.73	
Clearance Time (s)		4.0		4.0	4.0			4.0			4.0	
Vehicle Extension (s)		2.0		2.0	2.0			2.0			2.0	
Lane Grp Cap (vph)		91		234	330			1169			999	
v/s Ratio Prot					0.15						0.39	
v/s Ratio Perm		c0.20		0.11				c0.39				
v/c Ratio		1.05		0.56	0.78			0.54			0.53	
Uniform Delay, d1		40.3		36.4	38.2			6.2			6.1	
Progression Factor		1.00		1.00	1.00			1.00			1.22	
Incremental Delay, d2		107.2		1.6	10.0			1.8			1.8	
Delay (s)		147.5		38.0	48.3			8.0			9.3	
Level of Service		F		D	D			A			A	
Approach Delay (s)		147.5			44.9			8.0			9.3	
Approach LOS		F			D			A			A	

Intersection Summary			
HCM 2000 Control Delay	25.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	77.8%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	0	10	0	10	5	43	5	5	391	5
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.50	0.50	0.50	0.68	0.68	0.68	0.94	0.94	0.94
Hourly flow rate (vph)	0	0	0	20	0	20	7	63	7	5	416	5
Pedestrians		103			39			9			93	
Lane Width (ft)		10.0			10.0			14.0			14.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		7			3			1			9	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	727	657	531	559	656	199	524			110		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	727	657	531	559	656	199	524			110		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.4	4.1			4.4		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.5	2.2			2.5		
p0 queue free %	100	100	100	95	100	97	99			100		
cM capacity (veh/h)	258	346	508	392	346	707	977			1273		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	0	40	78	427
Volume Left	0	20	7	5
Volume Right	0	20	7	5
cSH	1700	504	977	1273
Volume to Capacity	0.00	0.08	0.01	0.00
Queue Length 95th (ft)	0	6	1	0
Control Delay (s)	0.0	12.8	0.9	0.1
Lane LOS	A	B	A	A
Approach Delay (s)	0.0	12.8	0.9	0.1
Approach LOS	A	B		

Intersection Summary			
Average Delay	1.2		
Intersection Capacity Utilization	44.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	139	268	133	119	44	9
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.94	0.94	0.89	0.89	0.85	0.85
Hourly flow rate (vph)	148	285	149	134	52	11
Pedestrians	16			31	304	
Lane Width (ft)	13.0			16.0	12.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	1			3	25	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	371			346		
pX, platoon unblocked						
vC, conflicting volume			737		1043	625
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			737		1043	625
tC, single (s)			4.1		*3.9	*3.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			77		83	98
cM capacity (veh/h)			652		298	525

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	433	283	62
Volume Left	0	149	52
Volume Right	285	0	11
cSH	1700	652	321
Volume to Capacity	0.25	0.23	0.19
Queue Length 95th (ft)	0	22	18
Control Delay (s)	0.0	7.8	18.9
Lane LOS		A	C
Approach Delay (s)	0.0	7.8	18.9
Approach LOS			C

Intersection Summary			
Average Delay	4.4		
Intersection Capacity Utilization	67.2%	ICU Level of Service	C
Analysis Period (min)	15		

* User Entered Value

Lane Group	EBT	WBT	NBL	NBR
Lane Group Flow (vph)	966	615	141	40
v/c Ratio	0.61	0.45	0.79	0.19
Control Delay	18.6	19.0	74.9	14.7
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	18.6	19.0	74.9	14.7
Queue Length 50th (ft)	253	166	96	0
Queue Length 95th (ft)	347	230	#180	31
Internal Link Dist (ft)	493	997	291	
Turn Bay Length (ft)				75
Base Capacity (vph)	1581	1373	211	244
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.61	0.45	0.67	0.16

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBU	EBT	EBR	WBU	WBL	WBT	NBL	NBR
Lane Configurations								
Volume (vph)	5	586	365	5	42	519	127	36
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	16	16	11	11
Total Lost time (s)		6.0				6.0	6.0	6.0
Lane Util. Factor		0.95				0.95	1.00	1.00
Frpb, ped/bikes		0.99				1.00	1.00	1.00
Flpb, ped/bikes		1.00				1.00	1.00	1.00
Frt		0.94				1.00	1.00	0.85
Flt Protected		1.00				1.00	0.95	1.00
Satd. Flow (prot)		2751				2998	1366	1364
Flt Permitted		0.95				0.79	0.95	1.00
Satd. Flow (perm)		2620				2369	1366	1364
Peak-hour factor, PHF	0.99	0.99	0.99	0.92	0.92	0.92	0.90	0.90
Adj. Flow (vph)	5	592	369	5	46	564	141	40
RTOR Reduction (vph)	0	67	0	0	0	0	0	35
Lane Group Flow (vph)	0	899	0	0	0	615	141	5
Confl. Bikes (#/hr)			24					
Heavy Vehicles (%)	0%	11%	8%	0%	7%	12%	15%	3%
Bus Blockages (#/hr)	0	0	0	0	0	15	0	0
Parking (#/hr)						4		
Turn Type	Perm	NA		Perm	Perm	NA	Prot	Prot
Protected Phases		1				1	5	5
Permitted Phases	1			1	1			
Actuated Green, G (s)		62.2				62.2	14.4	14.4
Effective Green, g (s)		62.2				62.2	14.4	14.4
Actuated g/C Ratio		0.57				0.57	0.13	0.13
Clearance Time (s)		6.0				6.0	6.0	6.0
Vehicle Extension (s)		2.0				2.0	2.0	2.0
Lane Grp Cap (vph)		1481				1339	178	178
v/s Ratio Prot							c0.10	0.00
v/s Ratio Perm		c0.34				0.26		
v/c Ratio		0.61				0.46	0.79	0.03
Uniform Delay, d1		15.8				14.0	46.3	41.7
Progression Factor		1.00				1.00	1.00	1.00
Incremental Delay, d2		1.9				1.1	19.7	0.0
Delay (s)		17.7				15.2	66.1	41.7
Level of Service		B				B	E	D
Approach Delay (s)		17.7				15.2	60.7	
Approach LOS		B				B	E	

Intersection Summary			
HCM 2000 Control Delay	21.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	71.4%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	SBT
Lane Group Flow (vph)	456	259	292	371	237	390	69
v/c Ratio	0.52	0.72	0.68	0.46	1.12	0.55	0.62
Control Delay	37.5	51.3	31.9	24.2	141.2	6.3	72.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	37.5	51.3	31.9	24.2	141.2	6.3	72.6
Queue Length 50th (ft)	163	~214	149	205	~192	0	48
Queue Length 95th (ft)	203	#333	#255	286	#350	73	85
Internal Link Dist (ft)	315			246			140
Turn Bay Length (ft)		60				180	
Base Capacity (vph)	879	362	433	794	212	709	125
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.52	0.72	0.67	0.47	1.12	0.55	0.55

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	2	377	215	251	306	13	220	0	363	26	17	13
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	11	11	12	12	11	11	12	12	13	12
Total Lost time (s)		8.5	8.5	6.5	8.5		4.5		6.5		5.5	
Lane Util. Factor		0.95	1.00	1.00	1.00		1.00		1.00		1.00	
Frpb, ped/bikes		1.00	0.97	1.00	1.00		1.00		1.00		1.00	
Flpb, ped/bikes		1.00	1.00	1.00	1.00		1.00		1.00		1.00	
Frt		1.00	0.85	1.00	0.99		1.00		0.85		0.97	
Flt Protected		1.00	1.00	0.95	1.00		0.95		1.00		0.98	
Satd. Flow (prot)		2831	1118	1540	1615		1510		1439		1453	
Flt Permitted		0.95	1.00	0.44	1.00		0.95		1.00		0.98	
Satd. Flow (perm)		2699	1118	713	1615		1510		1439		1453	
Peak-hour factor, PHF	0.83	0.83	0.83	0.86	0.86	0.86	0.93	0.93	0.93	0.81	0.81	0.81
Adj. Flow (vph)	2	454	259	292	356	15	237	0	390	32	21	16
RTOR Reduction (vph)	0	0	0	0	1	0	0	0	273	0	0	0
Lane Group Flow (vph)	0	456	259	292	370	0	237	0	117	0	69	0
Confl. Bikes (#/hr)			6			20						
Heavy Vehicles (%)	0%	4%	7%	2%	4%	0%	4%	2%	1%	0%	0%	13%
Bus Blockages (#/hr)	0	0	0	0	3	3	0	0	0	0	0	0
Parking (#/hr)		5	5							0	1	0
Turn Type	Perm	NA	Perm	D.P+P	NA		Prot		pt+ov	Perm	NA	
Protected Phases		1		9	1 9		4		4 9		3	
Permitted Phases	1		1	1						3		
Actuated Green, G (s)		33.1	33.1	46.2	52.7		13.5		33.1		7.3	
Effective Green, g (s)		33.1	33.1	46.2	46.2		15.5		33.1		7.3	
Actuated g/C Ratio		0.30	0.30	0.42	0.42		0.14		0.30		0.07	
Clearance Time (s)		8.5	8.5	6.5			6.5				5.5	
Vehicle Extension (s)		2.0	2.0	2.0			2.0				2.0	
Lane Grp Cap (vph)		812	336	397	678		212		433		96	
v/s Ratio Prot				c0.09	0.23		c0.16		0.08			
v/s Ratio Perm		0.17	c0.23	0.22							0.05	
v/c Ratio		0.56	0.77	0.74	0.55		1.12		0.27		0.72	
Uniform Delay, d1		32.3	35.0	23.4	24.0		47.2		29.3		50.3	
Progression Factor		1.00	1.00	1.00	1.00		1.00		1.00		1.00	
Incremental Delay, d2		2.8	15.6	6.0	0.5		97.1		0.1		19.1	
Delay (s)		35.1	50.6	29.4	24.5		144.3		29.4		69.5	
Level of Service		D	D	C	C		F		C		E	
Approach Delay (s)		40.8			26.6			72.8			69.5	
Approach LOS		D			C			E			E	

Intersection Summary			
HCM 2000 Control Delay	46.9	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	31.0
Intersection Capacity Utilization	68.1%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	NBT	SBT	SBR
Lane Group Flow (vph)	261	656	465	84
v/c Ratio	0.85	0.83	0.45	0.19
Control Delay	59.2	27.2	12.2	6.9
Queue Delay	0.0	0.0	0.5	0.0
Total Delay	59.2	27.2	12.7	6.9
Queue Length 50th (ft)	156	211	140	11
Queue Length 95th (ft)	229	#567	249	37
Internal Link Dist (ft)	266	76	471	
Turn Bay Length (ft)				40
Base Capacity (vph)	397	786	1041	448
Starvation Cap Reductn	0	0	235	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.66	0.83	0.58	0.19

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	125	5	102	0	0	0	101	458	5	5	404	74
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	13	13	13	12	12	12	12	11	12	12	12	10
Total Lost time (s)		5.0						5.0			5.0	5.0
Lane Util. Factor		1.00						1.00			1.00	1.00
Frpb, ped/bikes		0.87						1.00			1.00	0.52
Flpb, ped/bikes		1.00						0.97			1.00	1.00
Frt		0.94						1.00			1.00	0.85
Flt Protected		0.97						0.99			1.00	1.00
Satd. Flow (prot)		1170						1505			1641	684
Flt Permitted		0.97						0.81			0.99	1.00
Satd. Flow (perm)		1170						1229			1631	684
Peak-hour factor, PHF	0.89	0.89	0.89	0.92	0.92	0.92	0.86	0.86	0.86	0.88	0.88	0.88
Adj. Flow (vph)	140	6	115	0	0	0	117	533	6	6	459	84
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	14
Lane Group Flow (vph)	0	261	0	0	0	0	0	656	0	0	465	70
Confl. Peds. (#/hr)	65		93				183		160	160		183
Confl. Bikes (#/hr)									8			38
Heavy Vehicles (%)	0%	83%	10%	2%	2%	2%	12%	3%	0%	0%	4%	3%
Parking (#/hr)	4	4	4									
Turn Type	Split	NA					Perm	NA		Perm	NA	Perm
Protected Phases	5	5						1			1	
Permitted Phases							1			1		1
Actuated Green, G (s)		26.2						63.8			63.8	63.8
Effective Green, g (s)		26.2						63.8			63.8	63.8
Actuated g/C Ratio		0.26						0.64			0.64	0.64
Clearance Time (s)		5.0						5.0			5.0	5.0
Vehicle Extension (s)		2.0						3.0			3.0	3.0
Lane Grp Cap (vph)		306						784			1040	436
v/s Ratio Prot		c0.22										
v/s Ratio Perm								c0.53			0.29	0.10
v/c Ratio		0.85						0.84			0.45	0.16
Uniform Delay, d1		35.1						14.0			9.2	7.3
Progression Factor		1.00						0.97			1.00	1.00
Incremental Delay, d2		19.3						10.0			1.4	0.8
Delay (s)		54.4						23.6			10.6	8.1
Level of Service		D						C			B	A
Approach Delay (s)		54.4			0.0			23.6			10.2	
Approach LOS		D			A			C			B	

Intersection Summary			
HCM 2000 Control Delay	24.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	87.3%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	19	5	10	545	500	6
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.60	0.60	0.91	0.91	0.95	0.95
Hourly flow rate (vph)	32	8	11	599	526	6
Pedestrians	211			1	3	
Lane Width (ft)	12.0			11.0	11.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	18			0	0	
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)					156	
pX, platoon unblocked	0.86	0.86	0.86			
vC, conflicting volume	1364	741	744			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1343	622	624			
tC, single (s)	*3.9	*3.9	4.2			
tC, 2 stage (s)						
tF (s)	3.5	3.5	2.3			
p0 queue free %	89	98	98			
cM capacity (veh/h)	300	499	645			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	40	610	533
Volume Left	32	11	0
Volume Right	8	0	6
cSH	327	645	1700
Volume to Capacity	0.12	0.02	0.31
Queue Length 95th (ft)	10	1	0
Control Delay (s)	17.5	0.5	0.0
Lane LOS	C	A	
Approach Delay (s)	17.5	0.5	0.0
Approach LOS	C		

Intersection Summary			
Average Delay	0.8		
Intersection Capacity Utilization	51.1%	ICU Level of Service	A
Analysis Period (min)	15		

* User Entered Value

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	105	181	42	450	486	19
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.91	0.91	0.90	0.90	0.96	0.96
Hourly flow rate (vph)	115	199	47	500	506	20
Pedestrians	206			2	62	
Lane Width (ft)	12.0			11.0	10.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	17			0	4	
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)					387	
pX, platoon unblocked	0.87	0.87	0.87			
vC, conflicting volume	1377	724	732			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1360	613	622			
tC, single (s)	*3.9	*3.9	4.2			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.3			
p0 queue free %	58	62	93			
cM capacity (veh/h)	274	529	664			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	314	547	526
Volume Left	115	47	0
Volume Right	199	0	20
cSH	394	664	1700
Volume to Capacity	0.80	0.07	0.31
Queue Length 95th (ft)	174	6	0
Control Delay (s)	41.8	1.9	0.0
Lane LOS	E	A	
Approach Delay (s)	41.8	1.9	0.0
Approach LOS	E		

Intersection Summary			
Average Delay	10.2		
Intersection Capacity Utilization	87.9%	ICU Level of Service	E
Analysis Period (min)	15		

* User Entered Value

Lane Group	EBL	EBT	WBL	WBT	NBT	NBR	SBT
Lane Group Flow (vph)	6	11	185	72	481	126	731
v/c Ratio	0.03	0.03	0.77	0.22	0.44	0.29	0.68
Control Delay	25.8	0.2	55.8	9.5	7.6	5.9	18.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.3
Total Delay	25.8	0.2	55.8	9.5	7.6	5.9	18.3
Queue Length 50th (ft)	3	0	111	4	79	12	216
Queue Length 95th (ft)	11	0	131	23	175	m43	534
Internal Link Dist (ft)		142		206	568		1505
Turn Bay Length (ft)						25	
Base Capacity (vph)	436	654	489	609	1093	432	1074
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	2	0	0	0	0	56
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.01	0.02	0.38	0.12	0.44	0.29	0.72

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	5	0	10	139	5	49	21	412	113	38	645	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	13	12	12	10	12	12	12	12	10	12	12	12
Total Lost time (s)	5.0	5.0		5.0	5.0			5.0	5.0		5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00	1.00		1.00	
Frpb, ped/bikes	1.00	0.94		1.00	0.95			1.00	0.48		1.00	
Flpb, ped/bikes	0.97	1.00		0.96	1.00			1.00	1.00		0.99	
Frt	1.00	0.85		1.00	0.86			1.00	0.85		1.00	
Flt Protected	0.95	1.00		0.95	1.00			1.00	1.00		1.00	
Satd. Flow (prot)	1297	1370		1377	1275			1683	622		1646	
Flt Permitted	0.71	1.00		0.75	1.00			0.95	1.00		0.96	
Satd. Flow (perm)	969	1370		1087	1275			1611	622		1579	
Peak-hour factor, PHF	0.88	0.88	0.88	0.75	0.75	0.75	0.90	0.90	0.90	0.94	0.94	0.94
Adj. Flow (vph)	6	0	11	185	7	65	23	458	126	40	686	5
RTOR Reduction (vph)	0	9	0	0	51	0	0	0	11	0	0	0
Lane Group Flow (vph)	6	2	0	185	21	0	0	481	115	0	731	0
Confl. Peds. (#/hr)	16		16	16		16	121		226	226		121
Confl. Bikes (#/hr)									5			69
Heavy Vehicles (%)	25%	0%	0%	6%	0%	11%	0%	1%	5%	3%	2%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		5			5			1			1	
Permitted Phases	5			5			1		1	1		
Actuated Green, G (s)	22.2	22.2		22.2	22.2			67.8	67.8		67.8	
Effective Green, g (s)	22.2	22.2		22.2	22.2			67.8	67.8		67.8	
Actuated g/C Ratio	0.22	0.22		0.22	0.22			0.68	0.68		0.68	
Clearance Time (s)	5.0	5.0		5.0	5.0			5.0	5.0		5.0	
Vehicle Extension (s)	2.0	2.0		2.0	2.0			3.0	3.0		3.0	
Lane Grp Cap (vph)	215	304		241	283			1092	421		1070	
v/s Ratio Prot		0.00			0.02							
v/s Ratio Perm	0.01			c0.17				0.30	0.19		c0.46	
v/c Ratio	0.03	0.01		0.77	0.08			0.44	0.27		0.68	
Uniform Delay, d1	30.5	30.3		36.5	30.8			7.4	6.4		9.7	
Progression Factor	1.00	1.00		1.00	1.00			0.70	0.65		1.19	
Incremental Delay, d2	0.0	0.0		12.4	0.0			1.2	1.5		3.4	
Delay (s)	30.5	30.3		48.8	30.8			6.3	5.6		14.9	
Level of Service	C	C		D	C			A	A		B	
Approach Delay (s)		30.4			43.8			6.2			14.9	
Approach LOS		C			D			A			B	

Intersection Summary			
HCM 2000 Control Delay	16.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	94.5%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	114	152	182	516	943
v/c Ratio	0.91	0.66	0.59	0.42	0.83
Control Delay	95.8	51.5	42.3	6.6	14.5
Queue Delay	0.0	0.0	0.0	0.0	0.1
Total Delay	95.8	51.5	42.3	6.6	14.5
Queue Length 50th (ft)	66	92	102	95	383
Queue Length 95th (ft)	113	135	144	216	#785
Internal Link Dist (ft)	126		152	275	568
Turn Bay Length (ft)					
Base Capacity (vph)	189	359	477	1237	1138
Starvation Cap Reductn	0	0	0	0	4
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.60	0.42	0.38	0.42	0.83

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	92	0	5	131	125	32	10	460	0	0	700	130
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	16	12	16	16	12	12	12	12	12	12	12
Total Lost time (s)		4.0		4.0	4.0			4.0			4.0	
Lane Util. Factor		1.00		1.00	1.00			1.00			1.00	
Frpb, ped/bikes		1.00		1.00	0.97			1.00			0.92	
Flpb, ped/bikes		0.93		0.97	1.00			1.00			1.00	
Frt		0.99		1.00	0.97			1.00			0.98	
Flt Protected		0.95		0.95	1.00			1.00			1.00	
Satd. Flow (prot)		1604		1695	1802			1675			1505	
Flt Permitted		0.42		0.78	1.00			0.98			1.00	
Satd. Flow (perm)		699		1383	1802			1644			1505	
Peak-hour factor, PHF	0.85	0.85	0.85	0.86	0.86	0.86	0.91	0.91	0.91	0.88	0.88	0.88
Adj. Flow (vph)	108	0	6	152	145	37	11	505	0	0	795	148
RTOR Reduction (vph)	0	9	0	0	10	0	0	0	0	0	5	0
Lane Group Flow (vph)	0	105	0	152	172	0	0	516	0	0	938	0
Confl. Peds. (#/hr)	36		16	16		36	170					170
Confl. Bikes (#/hr)						1						64
Heavy Vehicles (%)	7%	0%	0%	5%	2%	0%	0%	2%	0%	0%	1%	7%
Turn Type	Perm	NA		Perm	NA		Perm	NA			NA	
Protected Phases		2			2			1			1	
Permitted Phases	2			2			1					
Actuated Green, G (s)		16.7		16.7	16.7			75.3			75.3	
Effective Green, g (s)		16.7		16.7	16.7			75.3			75.3	
Actuated g/C Ratio		0.17		0.17	0.17			0.75			0.75	
Clearance Time (s)		4.0		4.0	4.0			4.0			4.0	
Vehicle Extension (s)		2.0		2.0	2.0			2.0			2.0	
Lane Grp Cap (vph)		116		230	300			1237			1133	
v/s Ratio Prot					0.10						c0.62	
v/s Ratio Perm		c0.15		0.11				0.31				
v/c Ratio		0.90		0.66	0.57			0.42			0.83	
Uniform Delay, d1		40.9		39.0	38.4			4.4			8.1	
Progression Factor		1.00		1.00	1.00			1.00			0.71	
Incremental Delay, d2		53.5		5.4	1.6			1.0			5.9	
Delay (s)		94.3		44.4	40.0			5.5			11.6	
Level of Service		F		D	D			A			B	
Approach Delay (s)		94.3			42.0			5.5			11.6	
Approach LOS		F			D			A			B	

Intersection Summary			
HCM 2000 Control Delay	20.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	83.6%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	5	5	6	5	5	5	265	14	5	81	5
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.44	0.44	0.44	0.60	0.60	0.60	0.83	0.83	0.83	0.86	0.86	0.86
Hourly flow rate (vph)	0	11	11	10	8	8	6	319	17	6	94	6
Pedestrians		69			20			24			67	
Lane Width (ft)		10.0			10.0			14.0			14.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		5			1			2			7	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	597	546	190	510	540	415	169			356		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	597	546	190	510	540	415	169			356		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.5	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.5	2.2			2.2		
p0 queue free %	100	97	99	98	98	98	100			100		
cM capacity (veh/h)	341	417	797	420	420	545	1353			1197		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	23	27	342	106
Volume Left	0	10	6	6
Volume Right	11	8	17	6
cSH	547	452	1353	1197
Volume to Capacity	0.04	0.06	0.00	0.00
Queue Length 95th (ft)	3	5	0	0
Control Delay (s)	11.9	13.5	0.2	0.5
Lane LOS	B	B	A	A
Approach Delay (s)	11.9	13.5	0.2	0.5
Approach LOS	B	B		

Intersection Summary			
Average Delay	1.5		
Intersection Capacity Utilization	37.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	137	71	20	155	175	95
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.93	0.93	0.88	0.88	0.90	0.90
Hourly flow rate (vph)	147	76	23	176	194	106
Pedestrians	7			31	340	
Lane Width (ft)	13.0			16.0	12.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	1			3	28	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	371			346		
pX, platoon unblocked						
vC, conflicting volume			564		754	556
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			564		754	556
tC, single (s)			4.1		*3.9	*3.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			97		56	80
cM capacity (veh/h)			730		440	527

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	224	199	300
Volume Left	0	23	194
Volume Right	76	0	106
cSH	1700	730	467
Volume to Capacity	0.13	0.03	0.64
Queue Length 95th (ft)	0	2	111
Control Delay (s)	0.0	1.5	25.5
Lane LOS		A	D
Approach Delay (s)	0.0	1.5	25.5
Approach LOS			D

Intersection Summary			
Average Delay	11.0		
Intersection Capacity Utilization	52.6%	ICU Level of Service	A
Analysis Period (min)	15		

* User Entered Value

Lane Group	EBT	WBT	NBL	NBR
Lane Group Flow (vph)	914	486	273	98
v/c Ratio	0.63	0.39	0.85	0.28
Control Delay	27.9	24.4	64.6	15.3
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	27.9	24.4	64.6	15.3
Queue Length 50th (ft)	298	140	184	19
Queue Length 95th (ft)	#461	203	264	58
Internal Link Dist (ft)	493	997	291	
Turn Bay Length (ft)				75
Base Capacity (vph)	1455	1231	400	426
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.63	0.39	0.68	0.23

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	678	172	36	392	243	87
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	12	12	16	16	11	11
Total Lost time (s)	6.0			6.0	6.0	6.0
Lane Util. Factor	0.95			0.95	1.00	1.00
Frpb, ped/bikes	0.99			1.00	1.00	1.00
Flpb, ped/bikes	1.00			1.00	1.00	1.00
Frt	0.97			1.00	1.00	0.85
Flt Protected	1.00			1.00	0.95	1.00
Satd. Flow (prot)	2926			3142	1468	1391
Flt Permitted	1.00			0.79	0.95	1.00
Satd. Flow (perm)	2926			2504	1468	1391
Peak-hour factor, PHF	0.93	0.93	0.88	0.88	0.89	0.89
Adj. Flow (vph)	729	185	41	445	273	98
RTOR Reduction (vph)	16	0	0	0	0	51
Lane Group Flow (vph)	898	0	0	486	273	47
Confl. Bikes (#/hr)		12				
Heavy Vehicles (%)	6%	11%	0%	7%	7%	1%
Bus Blockages (#/hr)	0	0	0	15	0	0
Parking (#/hr)				4		
Turn Type	NA		Perm	NA	Prot	Prot
Protected Phases	1			1	5	5
Permitted Phases			1			
Actuated Green, G (s)	52.6			52.6	24.0	24.0
Effective Green, g (s)	52.6			52.6	24.0	24.0
Actuated g/C Ratio	0.48			0.48	0.22	0.22
Clearance Time (s)	6.0			6.0	6.0	6.0
Vehicle Extension (s)	2.0			2.0	2.0	2.0
Lane Grp Cap (vph)	1399			1197	320	303
v/s Ratio Prot	c0.31				c0.19	0.03
v/s Ratio Perm				0.19		
v/c Ratio	0.64			0.41	0.85	0.16
Uniform Delay, d1	21.6			18.6	41.3	34.8
Progression Factor	1.00			1.00	1.00	1.00
Incremental Delay, d2	2.3			1.0	18.6	0.1
Delay (s)	23.9			19.6	59.9	34.9
Level of Service	C			B	E	C
Approach Delay (s)	23.9			19.6	53.3	
Approach LOS	C			B	D	

Intersection Summary			
HCM 2000 Control Delay	28.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	67.8%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

APPENDIX I: Air Quality/Greenhouse Gas Emissions Assessment Supporting Documentation

Air Quality Supporting Documentation

Greenhouse Gas Emissions Assessment Supporting Documentation

Air Quality Supporting Documentation

Microscale Analysis

- **Background Concentrations**
- **MOVES Microscale Link Output**
- **Cal3QHC Input Files**
- **Cal3QHC Output Files**

Mesoscale Analysis

- **MOVES Mesoscale Link Output**
- **Mesoscale Analysis Model**

Stationary Source

- **Energy Modeling Report**
- **Stationary GHG Analysis**

Microscale Analysis

- Background Concentrations
- MOVES Microscale Link Output
- Cal3QHC Input Files
- Cal3QHC Output Files

Background Concentrations

Carbon Monoxide (CO) Background Concentrations

Data from Massachusetts Air Quality Reports, MassDEP

Year	1-Hour* (ppm)	8-Hour** (ppm)
2012	2.2	1.6
2013	1.9	1.1
2014	1.7	1.1

*** 1-Hour values represent 2nd highest**

**** 8-Hour values represent 2nd highest**

1- Hour Background Calculation

Harrison Ave, Boston MA

Pollutant	1-Hour* (ppm)	Molecular weight	Background Concentration (Micrograms/meter3)
Carbon Monoxide	**2.2**	28.0	2562.4

* Highest value of 2012, 2013 and 2014

8-Hour Background Calculation

Harrison Ave, Boston MA

Pollutant	8-Hour* (ppm)	Molecular weight	Background Concentration (Micrograms/meter3)
Carbon Monoxide	**1.6**	28.0	1863.6

* Highest value of 2012, 2013 and 2014

MOVES Microscale Link Output

MOVES CO Emission Factors for 2016 Suffolk County

Year[1]	Month[2]	Day[3]	Hour[4]	Link	Link Average Speed[5]	linkDescription	Pollutant	Grams/Veh-Mile	Grams/Veh-Hour
2016	1	5	9	1	0	Idle	CO	-	10.90
2016	1	5	9	2	5	5 mph	CO	4.99	-
2016	1	5	9	3	10	10 mph	CO	3.58	-
2016	1	5	9	4	15	15 mph	CO	3.11	-
2016	1	5	9	5	20	20 mph	CO	2.77	-
2016	1	5	9	6	25	25 mph	CO	2.31	-
2016	1	5	9	7	30	30 mph	CO	2.23	-
2016	1	5	9	8	35	35 mph	CO	2.07	-
2016	1	5	9	9	40	40 mph	CO	1.95	-
2016	1	5	9	10	45	45 mph	CO	1.88	-
2016	1	5	9	11	50	50 mph	CO	1.87	-
2016	1	5	9	12	55	55 mph	CO	1.91	-
2016	1	5	9	13	60	60 mph	CO	1.98	-
2016	1	5	9	14	65	65 mph	CO	2.11	-

Notes:

[1]Existing year of analysis

[2]Month of year analyzed, "1" represents January

[3]Day of week analyzed, "5" represents weekday

[4]Hour of day analyzed, "9" represents 8 AM-9AM

[5]Speeds in mph, "0" represents idling

MOVES CO Emission Factors for 2021 Suffolk County

Year[1]	Month[2]	Day[3]	Hour[4]	Link	Link Average Speed[5]	linkDescription	Pollutant	Grams/Veh-Mile	Grams/Veh-Hour
2021	1	5	9	1	0	Idle	CO	-	6.26
2021	1	5	9	2	5	5 mph	CO	3.57	-
2021	1	5	9	3	10	10 mph	CO	2.65	-
2021	1	5	9	4	15	15 mph	CO	2.36	-
2021	1	5	9	5	20	20 mph	CO	2.11	-
2021	1	5	9	6	25	25 mph	CO	1.74	-
2021	1	5	9	7	30	30 mph	CO	1.70	-
2021	1	5	9	8	35	35 mph	CO	1.59	-
2021	1	5	9	9	40	40 mph	CO	1.49	-
2021	1	5	9	10	45	45 mph	CO	1.44	-
2021	1	5	9	11	50	50 mph	CO	1.44	-
2021	1	5	9	12	55	55 mph	CO	1.48	-
2021	1	5	9	13	60	60 mph	CO	1.54	-
2021	1	5	9	14	65	65 mph	CO	1.66	-

Notes:

[1]No Build and Build year of analysis

[2]Month of year analyzed, "1" represents January

[3]Day of week analyzed, "5" represents weekday

[4]Hour of day analyzed, "9" represents 8 AM-9AM

[5]Speeds in mph, "0" represents idling

Cal3QHC Input Files

'1_CONGRESS A_EX' 60.0 100.0 0.0 0.0 49 1 0 0 'PPM'
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'NW2' 331347.9 4690753.5 1.8
'NW3' 331354.7 4690747.9 1.8
'NW4' 331361.8 4690742.4 1.8
'NW5' 331369.2 4690735.7 1.8
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'NW8' 331391.9 4690716.8 1.8
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'NW14' 331426.6 4690761.1 1.8
'NE1' 331434.9 4690754.2 1.8
'NE2' 331428.6 4690744.0 1.8
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'NE9' 331421.6 4690688.1 1.8
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'NE11' 331443.6 4690671.0 1.8
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'SE2' 331422.5 4690661.9 1.8
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'CONGRESS_WB2@ASTFF'  'AG'  331388.6  4690712.3  331338.1  4690755.1  500  2.23  0.0  10.06
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'AST_NB2@CONGRESSFF'  'AG'  331397.6  4690701.0  331431.9  4690756.1  20  2.23  0.0  6.4
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'CONGRESS_EBTHRU@ASTQ'  'AG'  331371.9  4690715.5  331344.1  4690739.8  0.0  6.71  2
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'CONGRESS_EBRT@ASTQ'  'AG'  331368.7  4690712.0  331341.3  4690735.3  0.0  3.35  1
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'CONGRESS_WBLT@ASTQ'  'AG'  331400.2  4690695.9  331430.1  4690671.0  0.0  3.35  1
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'AST_NBLT@CONGRESSQ'  'AG'  331370.4  4690702.4  331349.2  4690667.3  0.0  3.35  1
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'NW4' 331157.6 4690516.4 1.8
'NW5' 331167.1 4690510.0 1.8
'NW6' 331174.9 4690504.8 1.8
'NW7' 331184.5 4690498.8 1.8
'NW8' 331192.5 4690494.0 1.8
'NW9' 331201.8 4690487.6 1.8
'NW10' 331211.6 4690481.2 1.8
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'NW12' 331224.8 4690485.0 1.8
'NW13' 331231.1 4690494.1 1.8
'NW14' 331237.2 4690502.5 1.8
'NW15' 331241.1 4690508.9 1.8
'E1' 331254.4 4690501.0 1.8
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'E6' 331223.5 4690457.7 1.8
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'N3'  331072.7  4690810.0  1.8
'N4'  331088.1  4690800.6  1.8
'N5'  331103.0  4690790.4  1.8
'N6'  331120.9  4690779.8  1.8
'N7'  331138.8  4690768.3  1.8
'N8'  331158.4  4690756.7  1.8
'N9'  331174.2  4690745.7  1.8
'N10'  331190.8  4690735.4  1.8
'N11'  331208.7  4690723.9  1.8
'N12'  331225.7  4690712.0  1.8
'N13'  331242.4  4690703.5  1.8
'N14'  331254.7  4690695.4  1.8
'N15'  331270.6  4690684.0  1.8
'N16'  331288.4  4690673.6  1.8
'N17'  331303.3  4690663.8  1.8
'N18'  331324.7  4690649.1  1.8
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'SW3'  331060.8  4690795.1  1.8
'SW4'  331076.6  4690784.0  1.8
'SW5'  331092.3  4690773.8  1.8
'SW6'  331108.6  4690764.2  1.8
'SW7'  331125.2  4690753.5  1.8
'SW8'  331144.3  4690738.7  1.8
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'SW10'  331146.4  4690697.4  1.8
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'SW12'  331169.8  4690671.8  1.8
'SW13'  331181.4  4690660.3  1.8
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'SE8'  331174.2  4690722.1  1.8
'SE9'  331189.5  4690712.7  1.8
'SE10'  331204.5  4690702.5  1.8
'SE11'  331220.7  4690692.1  1.8
'SE12'  331234.4  4690683.3  1.8
'SE13'  331247.9  4690675.2  1.8
'SE14'  331260.3  4690666.6  1.8
'SE15'  331274.3  4690657.3  1.8
'SE16'  331288.4  4690647.5  1.8
'SE17'  331300.7  4690639.0  1.8
'SE18'  331316.8  4690629.7  1.8
'EXISTING CONDITION'  14  1  1  'C'
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'MELCHER_SB@SUMMERFF'  'AG'  331150.1  4690697.7  331199.2  4690647.6  185  2.23  0.0  6.4
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'SUMMER_EB@MELCHERQ'  'AG'  331137.4  4690753.1  331062.0  4690800.8  0.0  7.32  2
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'SUMMER_WB@MELCHERQ'  'AG'  331166.1  4690742.8  331237.5  4690697.1  0.0  9.75  2
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2  2
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2  2
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1.0  0  4  1000.0  2.2  'Y'  10  0  35
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** MAPLAYER "\\VHB\PROJ\WAT-TS\12361.07 ASSIGN7-SBBR-HOV PILOT\TECH\AIR QUALITY\AERIAL\1\19TCG285875_201304_0X3000M_4B_1.JPG" AERIAL1 3 UNKNOWN UNKNOWN 1 0 0 0 0 0 0 0 0 0 0 16777215 0 0 1 1 328463.307839283 330036.363977066 4687500.89771186 4688999.11755685
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'NW3'  331354.7  4690747.9  1.8
'NW4'  331361.8  4690742.4  1.8
'NW5'  331369.2  4690735.7  1.8
'NW6'  331377.6  4690728.5  1.8
'NW7'  331386.3  4690721.8  1.8
'NW8'  331391.9  4690716.8  1.8
'NW9'  331391.5  4690713.2  1.8
'NW10'  331397.1  4690721.3  1.8
'NW11'  331403.9  4690730.6  1.8
'NW12'  331410.2  4690738.9  1.8
'NW13'  331416.9  4690748.2  1.8
'NW14'  331426.6  4690761.1  1.8
'NE1'  331434.9  4690754.2  1.8
'NE2'  331428.6  4690744.0  1.8
'NE3'  331423.0  4690734.9  1.8
'NE4'  331418.2  4690726.7  1.8
'NE5'  331412.4  4690717.7  1.8
'NE6'  331407.7  4690709.9  1.8
'NE7'  331403.2  4690703.4  1.8
'NE8'  331411.5  4690696.2  1.8
'NE9'  331421.6  4690688.1  1.8
'NE10'  331431.1  4690681.3  1.8
'NE11'  331443.6  4690671.0  1.8
'SE1'  331431.8  4690654.2  1.8
'SE2'  331422.5  4690661.9  1.8
'SE3'  331413.9  4690668.9  1.8
'SE4'  331403.0  4690678.1  1.8
'SE5'  331391.3  4690687.4  1.8
'SE6'  331384.0  4690693.3  1.8
'SE7'  331377.5  4690698.5  1.8
'SE8'  331371.3  4690691.7  1.8
'SE9'  331364.7  4690681.3  1.8
'SE10'  331357.7  4690670.2  1.8
'SE11'  331351.4  4690659.7  1.8
'SE12'  331346.1  4690651.2  1.8
'SE13'  331339.3  4690641.5  1.8
'SW1'  331330.6  4690646.7  1.8
'SW2'  331332.2  4690654.6  1.8
'SW3'  331339.3  4690665.8  1.8
'SW4'  331346.3  4690678.6  1.8
'SW5'  331353.3  4690689.0  1.8
'SW6'  331359.4  4690699.3  1.8
'SW7'  331365.0  4690708.3  1.8
'SW8'  331357.1  4690716.1  1.8
'SW9'  331347.0  4690724.9  1.8
'SW10'  331336.7  4690734.5  1.8
'SW11'  331326.7  4690743.7  1.8
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'CONGRESS_EB1@ASTFF'  'AG'  331381.0  4690703.5  331331.1  4690748.9  604  1.7  0.0  13.11
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'CONGRESS_EB2@ASTFF' 'AG' 331380.5 4690702.9 331434.9 4690658.2 665 1.7 0.0 9.45
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'CONGRESS_WB1@ASTFF' 'AG' 331386.6 4690709.7 331441.0 4690666.3 564 1.7 0.0 10.06
1 1
'CONGRESS_WB2@ASTFF' 'AG' 331388.6 4690712.3 331338.1 4690755.1 538 1.7 0.0 10.06
1 1
'AST_NB1@CONGRESSFF' 'AG' 331375.6 4690708.4 331335.4 4690644.9 492 1.7 0.0 10.06
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'AST_NB2@CONGRESSFF' 'AG' 331397.6 4690701.0 331431.9 4690756.1 40 1.7 0.0 6.4
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'THOMSON_SB1@CONGRESSFF' 'AG' 331391.3 4690705.9 331429.6 4690758.3 56 1.7 0.0 8.23
1 1
'THOMSON_SB2@CONGRESSFF' 'AG' 331371.7 4690712.3 331334.1 4690650.1 473 1.7 0.0 7.01
2 1
'CONGRESS_EBTHRU@ASTQ' 'AG' 331371.9 4690715.5 331344.1 4690739.8 0.0 6.71 2
110 79 2 389 6.26 1600 2 3
2 1
'CONGRESS_EBRT@ASTQ' 'AG' 331368.7 4690712.0 331341.3 4690735.3 0.0 3.35 1
110 79 2 215 6.26 1600 2 3
2 1
'CONGRESS_WBLT@ASTQ' 'AG' 331400.2 4690695.9 331430.1 4690671.0 0.0 3.35 1
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2 1
'CONGRESS_WBTHRU@ASTQ' 'AG' 331402.5 4690698.6 331433.5 4690674.8 0.0 3.66 1
110 59 2 323 6.26 1600 2 3
2 1
'AST_NBLT@CONGRESSQ' 'AG' 331370.4 4690702.4 331349.2 4690667.3 0.0 3.35 1
110 90 2 215 6.26 1600 2 3
2 1
'AST_NBRT@CONGRESSQ' 'AG' 331373.5 4690700.4 331351.9 4690666.5 0.0 3.66 1
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2 1
'THOMSON_SB@CONGRESSQ' 'AG' 331394.2 4690709.2 331415.6 4690736.4 0.0 5.18 1
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1.0 0 4 1000.0 2.2 'Y' 10 0 35
** BREEZE
** PROJECTN 0 104 7 -177 0 0.9996 500000 0
** MAPLAYER "\\VHB\PROJ\WAT-TS\12361.07 ASSIGN7-SBBR-HOV PILOT\TECH\AIR QUALITY\AERIAL\9\19TCG315905_201304_0X3000M_4B_1.JPG" AERIAL9 3 UNKNOWN UNKNOWN 1 0 0 0 0 0 0 0 0 0 0 16777215 0 0 1 1 331604.948637252 333176.723288648 4690500.86824658 4691999.14677943
** MAPLAYER "\\VHB\PROJ\WAT-TS\12361.07 ASSIGN7-SBBR-HOV PILOT\TECH\AIR QUALITY\AERIAL\8\19TCG315890_201304_0X3000M_4B_1.JPG" AERIAL8 3 UNKNOWN UNKNOWN 1 0 0 0 0 0 0 0 0 0 0 16777215 0 0 1 1 331605.948637252 333176.723288648 4689000.86742626 4690499.14758512
** MAPLAYER "\\VHB\PROJ\WAT-TS\12361.07 ASSIGN7-SBBR-HOV PILOT\TECH\AIR QUALITY\AERIAL\6\19TCG300905_201304_0X3000M_4B_1.JPG" AERIAL6 3 UNKNOWN UNKNOWN 1 0 0 0 0 0 0 0 0 0 0 16777215 0 0 1 1 330033.59386022 331606.077694167 4690500.88376013 4691999.13140214
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'NW3'  331150.0  4690520.9  1.8
'NW4'  331157.6  4690516.4  1.8
'NW5'  331167.1  4690510.0  1.8
'NW6'  331174.9  4690504.8  1.8
'NW7'  331184.5  4690498.8  1.8
'NW8'  331192.5  4690494.0  1.8
'NW9'  331201.8  4690487.6  1.8
'NW10'  331211.6  4690481.2  1.8
'NW11'  331219.0  4690476.5  1.8
'NW12'  331224.8  4690485.0  1.8
'NW13'  331231.1  4690494.1  1.8
'NW14'  331237.2  4690502.5  1.8
'NW15'  331241.1  4690508.9  1.8
'E1'  331254.4  4690501.0  1.8
'E2'  331249.2  4690492.3  1.8
'E3'  331243.4  4690484.5  1.8
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'E7'  331217.2  4690448.8  1.8
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'E11'  331191.9  4690408.7  1.8
'E12'  331186.4  4690400.5  1.8
'E13'  331182.2  4690393.3  1.8
'SW1'  331168.7  4690401.0  1.8
'SW2'  331175.4  4690410.9  1.8
'SW3'  331181.9  4690420.9  1.8
'SW4'  331188.8  4690431.3  1.8
'SW5'  331194.2  4690439.0  1.8
'SW6'  331200.3  4690449.0  1.8
'SW7'  331206.8  4690458.1  1.8
'SW8'  331212.3  4690467.0  1.8
'SW9'  331202.2  4690473.3  1.8
'SW10'  331190.7  4690480.1  1.8
'SW11'  331178.4  4690487.9  1.8
'SW12'  331168.2  4690494.0  1.8
'SW13'  331157.5  4690500.8  1.8
'SW14'  331147.3  4690506.9  1.8
'SW15'  331136.2  4690514.0  1.8
'NO BUILD CONDITION'  7  1  1  'C'
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'NECCO_EB@ASTFF'  'AG'  331215.0  4690469.4  331137.1  4690517.5  200  1.7  0.0  6.4
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'NECCO_WB@ASTFF'  'AG'  331217.6  4690472.9  331140.8  4690522.5  51  1.7  0.0  6.71
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'AST_NB1@NECCOFF'  'AG'  331223.8  4690467.6  331177.9  4690395.3  486  1.7  0.0  8.23
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'AST_SB2@NECCOFF'  'AG'  331219.5  4690470.7  331172.3  4690399.2  614  1.7  0.0  7.32
2  1
'NECCO_EB@ASTQ'  'AG'  331208.6  4690473.3  331155.9  4690505.7  0.0  3.35  1
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1.0  0  4  1000.0  2.2  'Y'  10  0  35
** BREEZE
** PROJECTN  0 104 7 -177 0 0.9996 500000 0
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** MAPLAYER "\\VHB\PROJ\WAT-TS\12361.07 ASSIGN7-SBBR-HOV PILOT\TECH\AIR
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** MAPLAYER "\\VHB\PROJ\WAT-TS\12361.07 ASSIGN7-SBBR-HOV PILOT\TECH\AIR
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'N3' 331072.7 4690810.0 1.8
'N4' 331088.1 4690800.6 1.8
'N5' 331103.0 4690790.4 1.8
'N6' 331120.9 4690779.8 1.8
'N7' 331138.8 4690768.3 1.8
'N8' 331158.4 4690756.7 1.8
'N9' 331174.2 4690745.7 1.8
'N10' 331190.8 4690735.4 1.8
'N11' 331208.7 4690723.9 1.8
'N12' 331225.7 4690712.0 1.8
'N13' 331242.4 4690703.5 1.8
'N14' 331254.7 4690695.4 1.8
'N15' 331270.6 4690684.0 1.8
'N16' 331288.4 4690673.6 1.8
'N17' 331303.3 4690663.8 1.8
'N18' 331324.7 4690649.1 1.8
'SW1' 331022.4 4690819.4 1.8
'SW2' 331042.5 4690807.0 1.8
'SW3' 331060.8 4690795.1 1.8
'SW4' 331076.6 4690784.0 1.8
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'SE1' 331208.7 4690653.2 1.8
'SE2' 331195.1 4690668.5 1.8
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'SE15' 331274.3 4690657.3 1.8
'SE16' 331288.4 4690647.5 1.8
'SE17' 331300.7 4690639.0 1.8
'SE18' 331316.8 4690629.7 1.8
'NO BUILD CONDITION' 14 1 1 'C'
1 1

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'SUMMER_EB2@MELCHERFF'  'AG'  331153.4  4690743.2  331320.2  4690634.7  765  1.7  0.0  11.28
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'SUMMER_WB1@MELCHERFF'  'AG'  331157.8  4690747.4  331322.6  4690642.4  428  1.7  0.0  12.8
1  1
'SUMMER_WB2@MELCHERFF'  'AG'  331157.2  4690748.3  331033.6  4690825.2  598  1.7  0.0  12.19
1  2
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'MELCHER_NB@SUMMERFF'  'AG'  331157.0  4690701.0  331204.7  4690650.5  293  1.7  0.0  9.75
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'MELCHER_SB@SUMMERFF'  'AG'  331148.1  4690741.0  331150.1  4690697.7  204  1.7  0.0  6.4
1
'MELCHER_SB@SUMMERFF'  'AG'  331150.1  4690697.7  331199.2  4690647.6  204  1.7  0.0  6.4
2  1
'SUMMER_EB@MELCHERQ'  'AG'  331137.4  4690753.1  331062.0  4690800.8  0.0  7.32  2
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2  1
'SUMMER_WB@MELCHERQ'  'AG'  331166.1  4690742.8  331237.5  4690697.1  0.0  9.75  2
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2  2
'MELCHER_NBLT@SUMMERQ'  'AG'  331154.3  4690732.9  331154.9  4690700.6  0.0  3.35  1
110  74  2  206  6.26  1600  2  3
2
'MELCHER_NBLT@SUMMERQ'  'AG'  331154.9  4690700.6  331164.9  4690690.0  0.0  3.35  1
110  74  2  206  6.26  1600  2  3
2  2
'MELCHER_NBRT@SUMMERQ'  'AG'  331156.3  4690733.2  331158.0  4690700.3  0.0  3.35  1
110  74  2  87  6.26  1600  2  3
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'MELCHER_NBRT@SUMMERQ'  'AG'  331158.0  4690700.3  331166.6  4690691.3  0.0  3.35  1
110  74  2  87  6.26  1600  2  3
1.0  0  4  1000.0  2.2  'Y'  10  0  35
** BREEZE
** PROJECTN  0 104 7 -177 0 0.9996 500000 0
** MAPLAYER "\\VHB\PROJ\WAT-TS\12361.07 ASSIGN7-SBBR-HOV PILOT\TECH\AIR
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QUALITY\AERIAL\8\19TCG315890_201304_0X3000M_4B_1.JPG" AERIAL8 3 UNKNOWN UNKNOWN 1 0 0 0
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** MAPLAYER "\\VHB\PROJ\WAT-TS\12361.07 ASSIGN7-SBBR-HOV PILOT\TECH\AIR
QUALITY\AERIAL\7\19TCG315875_201304_0X3000M_4B_1.JPG" AERIAL7 3 UNKNOWN UNKNOWN 1 0 0 0
0 0 0 0 0 0 0 16777215 0 0 1 1 331604.948637252 333176.723288648 4687500.86660668 4688999.14839009
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QUALITY\AERIAL\6\19TCG300905_201304_0X3000M_4B_1.JPG" AERIAL6 3 UNKNOWN UNKNOWN 1 0 0 0
0 0 0 0 0 0 0 16777215 0 0 1 1 330033.59386022 331606.077694167 4690500.88376013 4691999.13140214
** MAPLAYER "\\VHB\PROJ\WAT-TS\12361.07 ASSIGN7-SBBR-HOV PILOT\TECH\AIR
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QUALITY\AERIAL\4\19TCG300875_201304_0X3000M_4B_1.JPG" "AERIAL 4" 3 UNKNOWN UNKNOWN 1 0 0
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** MAPLAYER "\\VHB\PROJ\WAT-TS\12361.07 ASSIGN7-SBBR-HOV PILOT\TECH\AIR QUALITY\AERIAL\3\19TCG285905_201304_0X3000M_4B_1.JPG" "AERIAL 3" 3 UNKNOWN UNKNOWN 1 0 0 0 0 0 0 0 0 0 0 16777215 0 0 1 1 328463.273166173 330036.398333405 4690500.89941058 4691999.11588791
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'NW3'  331354.7  4690747.9  1.8
'NW4'  331361.8  4690742.4  1.8
'NW5'  331369.2  4690735.7  1.8
'NW6'  331377.6  4690728.5  1.8
'NW7'  331386.3  4690721.8  1.8
'NW8'  331391.9  4690716.8  1.8
'NW9'  331391.5  4690713.2  1.8
'NW10'  331397.1  4690721.3  1.8
'NW11'  331403.9  4690730.6  1.8
'NW12'  331410.2  4690738.9  1.8
'NW13'  331416.9  4690748.2  1.8
'NW14'  331426.6  4690761.1  1.8
'NE1'  331434.9  4690754.2  1.8
'NE2'  331428.6  4690744.0  1.8
'NE3'  331423.0  4690734.9  1.8
'NE4'  331418.2  4690726.7  1.8
'NE5'  331412.4  4690717.7  1.8
'NE6'  331407.7  4690709.9  1.8
'NE7'  331403.2  4690703.4  1.8
'NE8'  331411.5  4690696.2  1.8
'NE9'  331421.6  4690688.1  1.8
'NE10'  331431.1  4690681.3  1.8
'NE11'  331443.6  4690671.0  1.8
'SE1'  331431.8  4690654.2  1.8
'SE2'  331422.5  4690661.9  1.8
'SE3'  331413.9  4690668.9  1.8
'SE4'  331403.0  4690678.1  1.8
'SE5'  331391.3  4690687.4  1.8
'SE6'  331384.0  4690693.3  1.8
'SE7'  331377.5  4690698.5  1.8
'SE8'  331371.3  4690691.7  1.8
'SE9'  331364.7  4690681.3  1.8
'SE10'  331357.7  4690670.2  1.8
'SE11'  331351.4  4690659.7  1.8
'SE12'  331346.1  4690651.2  1.8
'SE13'  331339.3  4690641.5  1.8
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'SW2'  331332.2  4690654.6  1.8
'SW3'  331339.3  4690665.8  1.8
'SW4'  331346.3  4690678.6  1.8
'SW5'  331353.3  4690689.0  1.8
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'SW7'  331365.0  4690708.3  1.8
'SW8'  331357.1  4690716.1  1.8
'SW9'  331347.0  4690724.9  1.8
'SW10'  331336.7  4690734.5  1.8
'SW11'  331326.7  4690743.7  1.8
'Build Condition'  15  1  1  'C'
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'CONGRESS_WB1@ASTFF'  'AG'  331386.6  4690709.7  331441.0  4690666.3  570  1.7  0.0  10.06
1  1
'CONGRESS_WB2@ASTFF'  'AG'  331388.6  4690712.3  331338.1  4690755.1  539  1.7  0.0  10.06
1  1
'AST_NB1@CONGRESSFF'  'AG'  331375.6  4690708.4  331335.4  4690644.9  583  1.7  0.0  10.06
1  1
'AST_NB2@CONGRESSFF'  'AG'  331397.6  4690701.0  331431.9  4690756.1  40  1.7  0.0  6.4
1  1
'THOMSON_SB1@CONGRESSFF'  'AG'  331391.3  4690705.9  331429.6  4690758.3  56  1.7  0.0  8.23
1  1
'THOMSON_SB2@CONGRESSFF'  'AG'  331371.7  4690712.3  331334.1  4690650.1  483  1.7  0.0  7.01
2  1
'CONGRESS_EBTHRU@ASTQ'  'AG'  331371.9  4690715.5  331344.1  4690739.8  0.0  6.71  2
110  79  2  379  6.26  1600  2  3
2  1
'CONGRESS_EBRT@ASTQ'  'AG'  331368.7  4690712.0  331341.3  4690735.3  0.0  3.35  1
110  79  2  215  6.26  1600  2  3
2  1
'CONGRESS_WBLT@ASTQ'  'AG'  331400.2  4690695.9  331430.1  4690671.0  0.0  3.35  1
110  59  2  251  6.26  1600  2  3
2  1
'CONGRESS_WBTHRU@ASTQ'  'AG'  331402.5  4690698.6  331433.5  4690674.8  0.0  3.66  1
110  59  2  319  6.26  1600  2  3
2  1
'AST_NBLT@CONGRESSQ'  'AG'  331370.4  4690702.4  331349.2  4690667.3  0.0  3.35  1
110  90  2  220  6.26  1600  2  3
2  1
'AST_NBRT@CONGRESSQ'  'AG'  331373.5  4690700.4  331351.9  4690666.5  0.0  3.66  1
110  70  2  363  6.26  1600  2  3
2  1
'THOMSON_SB@CONGRESSQ'  'AG'  331394.2  4690709.2  331415.6  4690736.4  0.0  5.18  1
110  95  2  56  6.26  1600  2  3
1.0  0  4  1000.0  2.2  'Y'  10  0  35
** BREEZE
** PROJECTN  0 104 7 -177 0 0.9996 500000 0
** MAPLAYER "\\VHB\PROJ\WAT-TS\12361.07 ASSIGN7-SBBR-HOV PILOT\TECH\AIR QUALITY\AERIAL\9\19TCG315905_201304_0X3000M_4B_1.JPG" AERIAL9 3 UNKNOWN UNKNOWN 1 0 0 0 0 0 0 0 0 0 0 16777215 0 0 1 1 331604.948637252 333176.723288648 4690500.86824658 4691999.14677943
** MAPLAYER "\\VHB\PROJ\WAT-TS\12361.07 ASSIGN7-SBBR-HOV PILOT\TECH\AIR QUALITY\AERIAL\8\19TCG315890_201304_0X3000M_4B_1.JPG" AERIAL8 3 UNKNOWN UNKNOWN 1 0 0 0 0 0 0 0 0 0 0 16777215 0 0 1 1 331605.948637252 333176.723288648 4689000.86742626 4690499.14758512
** MAPLAYER "\\VHB\PROJ\WAT-TS\12361.07 ASSIGN7-SBBR-HOV PILOT\TECH\AIR QUALITY\AERIAL\6\19TCG300905_201304_0X3000M_4B_1.JPG" AERIAL6 3 UNKNOWN UNKNOWN 1 0 0 0 0 0 0 0 0 0 0 16777215 0 0 1 1 330033.59386022 331606.077694167 4690500.88376013 4691999.13140214
** MAPLAYER "\\VHB\PROJ\WAT-TS\12361.07 ASSIGN7-SBBR-HOV PILOT\TECH\AIR QUALITY\AERIAL\5\19TCG300890_201304_0X3000M_4B_1.JPG" AERIAL5 3 Unknown Unknown 1 0 0 0 0 0 0 0 0 0 0 16777215 0 0 1 1 330033.611049404 331606.060663355 4689000.88292516 4690499.13222234
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'NW3' 331150.0 4690520.9 1.8
'NW4' 331157.6 4690516.4 1.8
'NW5' 331167.1 4690510.0 1.8
'NW6' 331174.9 4690504.8 1.8
'NW7' 331184.5 4690498.8 1.8
'NW8' 331192.5 4690494.0 1.8
'NW9' 331201.8 4690487.6 1.8
'NW10' 331211.6 4690481.2 1.8
'NW11' 331219.0 4690476.5 1.8
'NW12' 331224.8 4690485.0 1.8
'NW13' 331231.1 4690494.1 1.8
'NW14' 331237.2 4690502.5 1.8
'NW15' 331241.1 4690508.9 1.8
'E1' 331254.4 4690501.0 1.8
'E2' 331249.2 4690492.3 1.8
'E3' 331243.4 4690484.5 1.8
'E4' 331237.7 4690476.3 1.8
'E5' 331229.7 4690464.9 1.8
'E6' 331223.5 4690457.7 1.8
'E7' 331217.2 4690448.8 1.8
'E8' 331211.3 4690439.3 1.8
'E9' 331204.6 4690429.0 1.8
'E10' 331197.7 4690418.3 1.8
'E11' 331191.9 4690408.7 1.8
'E12' 331186.4 4690400.5 1.8
'E13' 331182.2 4690393.3 1.8
'SW1' 331168.7 4690401.0 1.8
'SW2' 331175.4 4690410.9 1.8
'SW3' 331181.9 4690420.9 1.8
'SW4' 331188.8 4690431.3 1.8
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'SW13' 331157.5 4690500.8 1.8
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'NECCO_WB@ASTFF' 'AG' 331217.6 4690472.9 331140.8 4690522.5 61 1.7 0.0 6.71
1 1
'AST_NB1@NECCOFF' 'AG' 331223.8 4690467.6 331177.9 4690395.3 492 1.7 0.0 8.23
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'AST_NB2@NECCOFF' 'AG' 331225.7 4690467.0 331250.4 4690502.3 555 1.7 0.0 7.92
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1  1
'AST_SB2@NECCOFF'  'AG'  331219.5  4690470.7  331172.3  4690399.2  667  1.7  0.0  7.32
2  1
'NECCO_EB@ASTQ'  'AG'  331208.6  4690473.3  331155.9  4690505.7  0.0  3.35  1
120  70  2  286  6.26  1600  1  3
1.0  0  4  1000.0  2.2  'Y'  10  0  35
** BREEZE
** PROJECTN  0 104 7 -177 0 0.9996 500000 0
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'N3' 331072.7 4690810.0 1.8
'N4' 331088.1 4690800.6 1.8
'N5' 331103.0 4690790.4 1.8
'N6' 331120.9 4690779.8 1.8
'N7' 331138.8 4690768.3 1.8
'N8' 331158.4 4690756.7 1.8
'N9' 331174.2 4690745.7 1.8
'N10' 331190.8 4690735.4 1.8
'N11' 331208.7 4690723.9 1.8
'N12' 331225.7 4690712.0 1.8
'N13' 331242.4 4690703.5 1.8
'N14' 331254.7 4690695.4 1.8
'N15' 331270.6 4690684.0 1.8
'N16' 331288.4 4690673.6 1.8
'N17' 331303.3 4690663.8 1.8
'N18' 331324.7 4690649.1 1.8
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'SW2' 331042.5 4690807.0 1.8
'SW3' 331060.8 4690795.1 1.8
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'SW12' 331169.8 4690671.8 1.8
'SW13' 331181.4 4690660.3 1.8
'SW14' 331196.3 4690644.9 1.8
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'BUILD CONDITION' 14 1 1 'C'
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'SUMMER_EB1@MELCHERFF' 'AG' 331153.4 4690743.2 331026.4 4690824.8 850 1.7 0.0 11.58
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'SUMMER_EB2@MELCHERFF' 'AG' 331153.4 4690743.2 331320.2 4690634.7 765 1.7 0.0 11.28
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'SUMMER_WB1@MELCHERFF' 'AG' 331157.8 4690747.4 331322.6 4690642.4 428 1.7 0.0 12.8
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1
'MELCHER_NB@SUMMERFF' 'AG' 331157.0 4690701.0 331204.7 4690650.5 330 1.7 0.0 9.75
1 2
'MELCHER_SB@SUMMERFF' 'AG' 331148.1 4690741.0 331150.1 4690697.7 208 1.7 0.0 6.4
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2 1
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2 1
'SUMMER_WB@MELCHERQ' 'AG' 331166.1 4690742.8 331237.5 4690697.1 0.0 9.75 2
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2 2
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2
'MELCHER_NBLT@SUMMERQ' 'AG' 331154.9 4690700.6 331164.9 4690690.0 0.0 3.35 1
110 74 2 243 6.26 1600 2 3
2 2
'MELCHER_NBRT@SUMMERQ' 'AG' 331156.3 4690733.2 331158.0 4690700.3 0.0 3.35 1
110 74 2 87 6.26 1600 2 3
2
'MELCHER_NBRT@SUMMERQ' 'AG' 331158.0 4690700.3 331166.6 4690691.3 0.0 3.35 1
110 74 2 87 6.26 1600 2 3
1.0 0 4 1000.0 2.2 'Y' 10 0 35
** BREEZE
** PROJECTN 0 104 7 -177 0 0.9996 500000 0
** MAPLAYER "\\VHB\PROJ\WAT-TS\12361.07 ASSIGN7-SBBR-HOV PILOT\TECH\AIR QUALITY\AERIAL\9\19TCG315905_201304_0X3000M_4B_1.JPG" AERIAL9 3 UNKNOWN UNKNOWN 1 0 0 0 0 0 0 0 0 0 0 16777215 0 0 1 1 331604.948637252 333176.723288648 4690500.86824658 4691999.14677943
** MAPLAYER "\\VHB\PROJ\WAT-TS\12361.07 ASSIGN7-SBBR-HOV PILOT\TECH\AIR QUALITY\AERIAL\8\19TCG315890_201304_0X3000M_4B_1.JPG" AERIAL8 3 UNKNOWN UNKNOWN 1 0 0 0 0 0 0 0 0 0 0 16777215 0 0 1 1 331605.948637252 333176.723288648 4689000.86742626 4690499.14758512
** MAPLAYER "\\VHB\PROJ\WAT-TS\12361.07 ASSIGN7-SBBR-HOV PILOT\TECH\AIR QUALITY\AERIAL\7\19TCG315875_201304_0X3000M_4B_1.JPG" AERIAL7 3 UNKNOWN UNKNOWN 1 0 0 0 0 0 0 0 0 0 0 16777215 0 0 1 1 331604.948637252 333176.723288648 4687500.86660668 4688999.14839009
** MAPLAYER "\\VHB\PROJ\WAT-TS\12361.07 ASSIGN7-SBBR-HOV PILOT\TECH\AIR QUALITY\AERIAL\6\19TCG300905_201304_0X3000M_4B_1.JPG" AERIAL6 3 UNKNOWN UNKNOWN 1 0 0 0 0 0 0 0 0 0 0 16777215 0 0 1 1 330033.59386022 331606.077694167 4690500.88376013 4691999.13140214
** MAPLAYER "\\VHB\PROJ\WAT-TS\12361.07 ASSIGN7-SBBR-HOV PILOT\TECH\AIR QUALITY\AERIAL\5\19TCG300890_201304_0X3000M_4B_1.JPG" AERIAL5 3 UNKNOWN UNKNOWN 1 0 0 0 0 0 0 0 0 0 0 16777215 0 0 1 1 330033.611049404 331606.060663355 4689000.88292516 4690499.13222234
** MAPLAYER "\\VHB\PROJ\WAT-TS\12361.07 ASSIGN7-SBBR-HOV PILOT\TECH\AIR QUALITY\AERIAL\4\19TCG300875_201304_0X3000M_4B_1.JPG" "AERIAL 4" 3 UNKNOWN UNKNOWN 1 0 0 0 0 0 0 0 0 0 0 0 16777215 0 0 1 1 330033.628231288 331606.043639774 4687500.88209094 4688999.13304181

```
** MAPLAYER "\\VHB\PROJ\WAT-TS\12361.07 ASSIGN7-SBBR-HOV PILOT\TECH\AIR
QUALITY\AERIAL\3\19TCG285905_201304_0X3000M_4B_1.JPG" "AERIAL 3" 3 UNKNOWN UNKNOWN 1 0 0
 0 0 0 0 0 0 0 0 16777215 0 0 1 1 328463.273166173 330036.398333405 4690500.89941058 4691999.11588791
** MAPLAYER "\\VHB\PROJ\WAT-TS\12361.07 ASSIGN7-SBBR-HOV PILOT\TECH\AIR
QUALITY\AERIAL\2\19TCG285890_201304_0X3000M_4B_1.JPG" AERIAL2 3 UNKNOWN UNKNOWN 1 0 0 0
0 0 0 0 0 0 0 16777215 0 0 1 1 328463.290506411 330036.38115159 4689000.89856084 4690499.11672276
** MAPLAYER "\\VHB\PROJ\WAT-TS\12361.07 ASSIGN7-SBBR-HOV PILOT\TECH\AIR
QUALITY\AERIAL\1\19TCG285875_201304_0X3000M_4B_1.JPG" AERIAL1 3 UNKNOWN UNKNOWN 1 0 0 0
0 0 0 0 0 0 0 16777215 0 0 1 1 328463.307839283 330036.363977066 4687500.89771186 4688999.11755685
** OUTFILE  "H:\RDS\GE HQ\9 MelcherSummer_BD.lst"
** RAWFILE
```

Cal3QHC Output Files

1 CAL3QHC - (DATED 95221)

CAL3QHC PC (32 BIT) VERSION 3.0.0
(C) COPYRIGHT 1993-2000, TRINITY CONSULTANTS

Run Began on 6/02/2016 at 14:24:06

JOB: 1_CONGRESS A_EX RUN: EXISTING CONDITION

DATE : 06/02/ 0
TIME : 14:24:06

The MODE flag has been set to C for calculating CO averages.

SITE & METEOROLOGICAL VARIABLES

VS = 0.0 CM/S VD = 0.0 CM/S Z0 = 100. CM
U = 1.0 M/S CLAS = 4 (D) ATIM = 60. MINUTES MIXH = 1000. M AMB = 2.2 PPM

LINK VARIABLES

LINK DESCRIPTION * LINK COORDINATES (M) * LENGTH BRG TYPE VPH EF H W V/C QUEUE
* X1 Y1 X2 Y2 * (M) (DEG) (G/MI) (M) (M) (VEH)
------------------------*--*--
1. CONGRESS_EB1@ASTFF * 331381.0 ******** 331331.1 ******** * 68. 312. AG 555. 2.2 0.0 13.1
2. CONGRESS_EB2@ASTFF * 331380.5 ******** 331434.9 ******** * 71. 130. AG 595. 2.2 0.0 9.4
3. CONGRESS_WB1@ASTFF * 331386.6 ******** 331441.0 ******** * 69. 128. AG 495. 2.2 0.0 10.1
4. CONGRESS_WB2@ASTFF * 331388.6 ******** 331338.1 ******** * 66. 310. AG 500. 2.2 0.0 10.1
5. AST_NB1@CONGRESSFF * 331375.6 ******** 331335.4 ******** * 75. 212. AG 440. 2.2 0.0 10.1
6. AST_NB2@CONGRESSFF * 331397.6 ******** 331431.9 ******** * 65. 32. AG 20. 2.2 0.0 6.4
7. THOMSON_SB1@CONGRESS* 331391.3 ******** 331429.6 ******** * 65. 36. AG 50. 2.2 0.0 8.2
8. THOMSON_SB2@CONGRESS* 331371.7 ******** 331334.1 ******** * 73. 211. AG 425. 2.2 0.0 7.0
9. CONGRESS_EBTHRU@ASTQ* 331371.9 ******** 331354.6 ******** * 23. 311. AG 42. 100.0 0.0 6.7 0.45 3.8
10. CONGRESS_EBRT@ASTQ * 331368.7 ******** 331348.2 ******** * 27. 311. AG 21. 100.0 0.0 3.3 0.52 4.5
11. CONGRESS_WBLT@ASTQ * 331400.2 ******** 331415.7 ******** * 20. 130. AG 16. 100.0 0.0 3.3 0.30 3.4
12. CONGRESS_WBTHRU@ASTQ* 331402.5 ******** 331425.2 ******** * 29. 127. AG 16. 100.0 0.0 3.7 0.42 4.8
13. AST_NBLT@CONGRESSQ * 331370.4 ******** 331350.6 ******** * 38. 211. AG 24. 100.0 0.0 3.3 0.91 6.4
14. AST_NBRT@CONGRESSQ * 331373.5 ******** 331359.1 ******** * 27. 212. AG 19. 100.0 0.0 3.7 0.44 4.5
15. THOMSON_SB@CONGRESSQ* 331394.2 ******** 331399.1 ******** * 8. 38. AG 25. 100.0

0.0 5.2 0.31 1.3

JOB: 1_CONGRESS A_EX RUN: EXISTING CONDITION

DATE : 06/02/ 0
TIME : 14:24:06

ADDITIONAL QUEUE LINK PARAMETERS

LINK DESCRIPTION	CYCLE LENGTH (SEC)	RED TIME (SEC)	CLEARANCE LOST TIME (SEC)	APPROACH VOL (VPH)	SATURATION FLOW RATE (VPH)	IDLE EM FAC (gm/hr)	SIGNAL TYPE	ARRIVAL RATE
9. CONGRESS_EBTHRU@ASTQ	110	79	2.0	350	1600	10.90	2	3
10. CONGRESS_EBRT@ASTQ	110	79	2.0	205	1600	10.90	2	3
11. CONGRESS_WBLT@ASTQ	110	59	2.0	205	1600	10.90	2	3
12. CONGRESS_WBTHRU@ASTQ	110	59	2.0	290	1600	10.90	2	3
13. AST_NBLT@CONGRESSQ	110	90	2.0	210	1600	10.90	2	3
14. AST_NBRT@CONGRESSQ	110	70	2.0	230	1600	10.90	2	3
15. THOMSON_SB@CONGRESSQ	110	95	2.0	50	1600	10.90	2	3

RECEPTOR LOCATIONS

RECEPTOR	COORDINATES (M) X	Y	Z
1. NW1	331341.1	********	1.8
2. NW2	331347.9	********	1.8
3. NW3	331354.7	********	1.8
4. NW4	331361.8	********	1.8
5. NW5	331369.2	********	1.8
6. NW6	331377.6	********	1.8
7. NW7	331386.3	********	1.8
8. NW8	331391.9	********	1.8
9. NW9	331391.5	********	1.8
10. NW10	331397.1	********	1.8
11. NW11	331403.9	********	1.8
12. NW12	331410.2	********	1.8
13. NW13	331416.9	********	1.8
14. NW14	331426.6	********	1.8
15. NE1	331434.9	********	1.8
16. NE2	331428.6	********	1.8
17. NE3	331423.0	********	1.8
18. NE4	331418.2	********	1.8
19. NE5	331412.4	********	1.8
20. NE6	331407.7	********	1.8
21. NE7	331403.2	********	1.8
22. NE8	331411.5	********	1.8
23. NE9	331421.6	********	1.8
24. NE10	331431.1	********	1.8
25. NE11	331443.6	********	1.8
26. SE1	331431.8	********	1.8
27. SE2	331422.5	********	1.8

```
 28. SE3              *   331413.9  ********     1.8  *
 29. SE4              *   331403.0  ********     1.8  *
 30. SE5              *   331391.3  ********     1.8  *
 31. SE6              *   331384.0  ********     1.8  *
 32. SE7              *   331377.5  ********     1.8  *
 33. SE8              *   331371.3  ********     1.8  *
 34. SE9              *   331364.7  ********     1.8  *
 35. SE10             *   331357.7  ********     1.8  *
 36. SE11             *   331351.4  ********     1.8  *
 37. SE12             *   331346.1  ********     1.8  *
 38. SE13             *   331339.3  ********     1.8  *
```


DATE : 06/02/   0
TIME : 14:24:06

RECEPTOR LOCATIONS

```
                      *        COORDINATES (M)        *
   RECEPTOR           *      X         Y        Z     *
 -------------------------*----------------------------------*
 39. SW1              *   331330.6  ********     1.8  *
 40. SW2              *   331332.2  ********     1.8  *
 41. SW3              *   331339.3  ********     1.8  *
 42. SW4              *   331346.3  ********     1.8  *
 43. SW5              *   331353.3  ********     1.8  *
 44. SW6              *   331359.4  ********     1.8  *
 45. SW7              *   331365.0  ********     1.8  *
 46. SW8              *   331357.1  ********     1.8  *
 47. SW9              *   331347.0  ********     1.8  *
 48. SW10             *   331336.7  ********     1.8  *
 49. SW11             *   331326.7  ********     1.8  *
```


MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: 0.-350.

```
WIND  * CONCENTRATION
ANGLE *      (PPM)
(DEGR)* REC1  REC2  REC3  REC4  REC5  REC6  REC7  REC8  REC9  REC10 REC11 REC12 REC13 REC14
REC15 REC16 REC17 REC18 REC19 REC20
------*---------------------------------------------------------------------------------------------------------------
  0.  *   2.2   2.2   2.2   2.2   2.2   2.2   2.2   2.2   2.2   2.2   2.2   2.2   2.2   2.2   2.2   2.2   2.2   2.2   2.2   2.2
 10.  *   2.2   2.2   2.2   2.2   2.2   2.2   2.2   2.2   2.2   2.2   2.2   2.2   2.2   2.2   2.2   2.2   2.2   2.2   2.2   2.2
```

20. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
30. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
40. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
50. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
60. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
70. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
80. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
90. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
100. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
110. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
120. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
130. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
140. *	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.3	2.4	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
150. *	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
160. *	2.3	2.3	2.4	2.4	2.3	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
170. *	2.2	2.2	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
180. *	2.2	2.2	2.2	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
190. *	2.2	2.2	2.2	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
200. *	2.2	2.2	2.2	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
210. *	2.2	2.2	2.2	2.2	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
220. *	2.2	2.2	2.2	2.2	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
230. *	2.2	2.2	2.2	2.2	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
240. *	2.2	2.2	2.2	2.2	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
250. *	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
260. *	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
270. *	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
280. *	2.2	2.2	2.2	2.2	2.3	2.3	2.4	2.4	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
290. *	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.4	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
300. *	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
310. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
320. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
330. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
340. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
350. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
MAX *	2.3	2.3	2.4	2.4	2.3	2.3	2.4	2.4	2.4	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
DEGR. *	160	160	160	160	300	300	280	280	140	0	0	0	0	0	0	0	0	0	0	0

JOB: 1_CONGRESS A_EX RUN: EXISTING CONDITION

MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: 0.-350.

WIND * CONCENTRATION
ANGLE * (PPM)
(DEGR)* REC21 REC22 REC23 REC24 REC25 REC26 REC27 REC28 REC29 REC30 REC31 REC32 REC33

REC34 REC35 REC36 REC37 REC38 REC39 REC40

0.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.2	2.2	2.3	2.4	2.3	2.2	2.2	2.2	2.2	2.2
10.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.4	2.3	2.3	2.2	2.2	2.2	2.2
20.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.4	2.3	2.3	2.3	2.2	2.2
30.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.3	2.2
40.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3
50.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3
60.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
70.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
80.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
90.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
100.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
110.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
120.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
130.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
140.	*	2.3	2.4	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
150.	*	2.4	2.4	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
160.	*	2.3	2.4	2.4	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
170.	*	2.2	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
180.	*	2.2	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
190.	*	2.2	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
200.	*	2.2	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
210.	*	2.2	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
220.	*	2.2	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2
230.	*	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.5	2.3	2.2	2.2	2.2	2.2	2.2	2.2
240.	*	2.2	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.4	2.4	2.4	2.2	2.2	2.2	2.2	2.2	2.2
250.	*	2.2	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.4	2.4	2.4	2.2	2.2	2.2	2.2	2.2	2.2
260.	*	2.2	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.4	2.4	2.4	2.2	2.2	2.2	2.2	2.2	2.2
270.	*	2.2	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.4	2.4	2.2	2.2	2.2	2.2	2.2	2.2
280.	*	2.2	2.4	2.4	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.4	2.4	2.2	2.2	2.2	2.2	2.2	2.2
290.	*	2.2	2.3	2.4	2.4	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.4	2.4	2.2	2.2	2.2	2.2	2.2	2.2
300.	*	2.2	2.2	2.4	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.4	2.4	2.3	2.2	2.2	2.2	2.2	2.2
310.	*	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.4	2.4	2.3	2.2	2.2	2.2	2.2	2.2
320.	*	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.2	2.2	2.3	2.4	2.4	2.3	2.2	2.2	2.2	2.2	2.2
330.	*	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.2	2.4	2.4	2.4	2.3	2.2	2.2	2.2	2.2	2.2
340.	*	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.2	2.4	2.3	2.4	2.3	2.2	2.2	2.2	2.2	2.2
350.	*	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.3	2.4	2.3	2.2	2.2	2.2	2.2	2.2
MAX	*	2.4	2.4	2.4	2.4	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.4	2.5	2.4	2.4	2.3	2.3	2.3	2.3	2.3
DEGR.	*	150	140	160	290	300	350	350	350	350	350	130	240	230	0	20	20	20	20	50	50

MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: 0.-350.

WIND * CONCENTRATION
ANGLE * (PPM)

(DEGR)*	REC41	REC42	REC43	REC44	REC45	REC46	REC47	REC48	REC49
0. *	2.2	2.2	2.2	2.2	2.4	2.4	2.2	2.2	2.2
10. *	2.2	2.2	2.2	2.3	2.4	2.4	2.2	2.2	2.2
20. *	2.2	2.2	2.2	2.3	2.4	2.4	2.2	2.2	2.2
30. *	2.2	2.2	2.2	2.2	2.3	2.4	2.2	2.2	2.2
40. *	2.3	2.2	2.2	2.2	2.3	2.4	2.3	2.2	2.2
50. *	2.4	2.3	2.3	2.2	2.2	2.4	2.3	2.2	2.2
60. *	2.2	2.3	2.2	2.2	2.2	2.4	2.4	2.2	2.2
70. *	2.2	2.3	2.3	2.2	2.2	2.4	2.4	2.2	2.2
80. *	2.2	2.3	2.3	2.2	2.2	2.4	2.4	2.2	2.2
90. *	2.2	2.2	2.3	2.2	2.2	2.4	2.4	2.2	2.2
100. *	2.2	2.2	2.2	2.2	2.2	2.3	2.5	2.3	2.3
110. *	2.2	2.2	2.2	2.2	2.2	2.2	2.5	2.4	2.3
120. *	2.2	2.2	2.2	2.2	2.2	2.2	2.4	2.4	2.3
130. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
140. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
150. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
160. *	2.2	2.2	2.3	2.3	2.2	2.2	2.2	2.2	2.2
170. *	2.2	2.2	2.3	2.3	2.3	2.2	2.2	2.2	2.2
180. *	2.2	2.2	2.2	2.3	2.3	2.2	2.2	2.2	2.2
190. *	2.2	2.2	2.3	2.3	2.4	2.2	2.2	2.2	2.2
200. *	2.2	2.2	2.3	2.3	2.3	2.2	2.2	2.2	2.2
210. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
220. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
230. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
240. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
250. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
260. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
270. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
280. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
290. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
300. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
310. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
320. *	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2
330. *	2.2	2.2	2.2	2.2	2.5	2.4	2.2	2.2	2.2
340. *	2.2	2.2	2.2	2.2	2.5	2.4	2.2	2.2	2.2
350. *	2.2	2.2	2.2	2.2	2.5	2.5	2.2	2.2	2.2
MAX *	2.4	2.3	2.3	2.3	2.5	2.5	2.5	2.4	2.3
DEGR. *	50	80	200	200	350	350	110	110	120

THE HIGHEST CONCENTRATION OF 2.50 PPM OCCURRED AT RECEPTOR REC46.

JOB: 1_CONGRESS A_EX RUN: EXISTING CONDITION

DATE : 06/02/ 0
TIME : 14:24:06

RECEPTOR - LINK MATRIX FOR THE ANGLE PRODUCING

THE MAXIMUM CONCENTRATION FOR EACH RECEPTOR

* CO/LINK (PPM)
* ANGLE (DEGREES)

LINK # *	REC1	REC2	REC3	REC4	REC5	REC6	REC7	REC8	REC9	REC10	REC11	REC12	REC13	REC14	REC15	REC16	REC17	REC18	REC19	REC20
ANGLE *	160	160	160	160	300	300	280	280	140	0	0	0	0	0	0	0	0	0	0	0
1 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4 *	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9 *	0.0	0.0	0.1	0.1	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

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JOB: 1_CONGRESS A_EX RUN: EXISTING CONDITION

DATE : 06/02/ 0
TIME : 14:24:06

RECEPTOR - LINK MATRIX FOR THE ANGLE PRODUCING
THE MAXIMUM CONCENTRATION FOR EACH RECEPTOR

* CO/LINK (PPM)
* ANGLE (DEGREES)

LINK # *	REC21	REC22	REC23	REC24	REC25	REC26	REC27	REC28	REC29	REC30	REC31	REC32	REC33	REC34	REC35	REC36	REC37	REC38	REC39	REC40
ANGLE *	150	140	160	290	300	350	350	350	350	350	130	240	230	0	20	20	20	20	50	50
1 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2 *	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3 *	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.1	0.1	0.0
6 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
9 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12 *	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0
14 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0
15 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

JOB: 1_CONGRESS A_EX RUN: EXISTING CONDITION

DATE : 06/02/ 0
TIME : 14:24:06

RECEPTOR - LINK MATRIX FOR THE ANGLE PRODUCING
THE MAXIMUM CONCENTRATION FOR EACH RECEPTOR

* CO/LINK (PPM)
* ANGLE (DEGREES)

*	REC41	REC42	REC43	REC44	REC45	REC46	REC47	REC48	REC49
LINK # *	50	80	200	200	350	350	110	110	120
1 *	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1
2 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8 *	0.1	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0
9 *	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.0
10 *	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.0	0.0
11 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13 *	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

1 CAL3QHC - (DATED 95221)

CAL3QHC PC (32 BIT) VERSION 3.0.0

Run Began on 6/02/2016 at 14:41:01

JOB: 4_NECCO A_EX RUN: EXISTING CONDITION

DATE : 06/02/ 0
TIME : 14:41:01

The MODE flag has been set to C for calculating CO averages.

SITE & METEOROLOGICAL VARIABLES

VS = 0.0 CM/S VD = 0.0 CM/S Z0 = 100. CM
U = 1.0 M/S CLAS = 4 (D) ATIM = 60. MINUTES MIXH = 1000. M AMB = 2.2 PPM

LINK VARIABLES

LINK DESCRIPTION	X1	Y1	X2	Y2	LENGTH (M)	BRG (DEG)	TYPE	VPH	EF (G/MI)	H (M)	W (M)	V/C	QUEUE (VEH)
1. NECCO_EB@ASTFF	331215.0	********	331137.1	********	92.	302.	AG	195.	2.2	0.0	6.4		
2. NECCO_WB@ASTFF	331217.6	********	331140.8	********	91.	303.	AG	50.	2.2	0.0	6.7		
3. AST_NB1@NECCOFF	331223.8	********	331177.9	********	85.	213.	AG	435.	2.2	0.0	8.2		
4. AST_NB2@NECCOFF	331225.7	********	331250.4	********	43.	35.	AG	470.	2.2	0.0	7.9		
5. AST_SB1@NECCOFF	331219.8	********	331244.5	********	43.	35.	AG	450.	2.2	0.0	7.0		
6. AST_SB2@NECCOFF	331219.5	********	331172.3	********	86.	213.	AG	560.	2.2	0.0	7.3		
7. NECCO_EB@ASTQ	331208.6	********	331189.2	********	23.	301.	AG	17.	100.0	0.0	3.3	0.32	3.8

JOB: 4_NECCO A_EX RUN: EXISTING CONDITION

DATE : 06/02/ 0
TIME : 14:41:01

ADDITIONAL QUEUE LINK PARAMETERS

LINK DESCRIPTION	CYCLE LENGTH (SEC)	RED TIME (SEC)	CLEARANCE LOST TIME (SEC)	APPROACH VOL (VPH)	SATURATION FLOW RATE (VPH)	IDLE EM FAC (gm/hr)	SIGNAL TYPE	ARRIVAL RATE
7. NECCO_EB@ASTQ	120	70	2.0	195	1600	10.90	1	3

RECEPTOR LOCATIONS

RECEPTOR	X	Y	Z

1. NW2	*	331143.8	********	1.8	*
2. NW3	*	331150.0	********	1.8	*
3. NW4	*	331157.6	********	1.8	*
4. NW5	*	331167.1	********	1.8	*
5. NW6	*	331174.9	********	1.8	*
6. NW7	*	331184.5	********	1.8	*
7. NW8	*	331192.5	********	1.8	*
8. NW9	*	331201.8	********	1.8	*
9. NW10	*	331211.6	********	1.8	*
10. NW11	*	331219.0	********	1.8	*
11. NW12	*	331224.8	********	1.8	*
12. NW13	*	331231.1	********	1.8	*
13. NW14	*	331237.2	********	1.8	*
14. NW15	*	331241.1	********	1.8	*
15. E1	*	331254.4	********	1.8	*
16. E2	*	331249.2	********	1.8	*
17. E3	*	331243.4	********	1.8	*
18. E4	*	331237.7	********	1.8	*
19. E5	*	331229.7	********	1.8	*
20. E6	*	331223.5	********	1.8	*
21. E7	*	331217.2	********	1.8	*
22. E8	*	331211.3	********	1.8	*
23. E9	*	331204.6	********	1.8	*
24. E10	*	331197.7	********	1.8	*
25. E11	*	331191.9	********	1.8	*
26. E12	*	331186.4	********	1.8	*
27. E13	*	331182.2	********	1.8	*
28. SW1	*	331168.7	********	1.8	*
29. SW2	*	331175.4	********	1.8	*
30. SW3	*	331181.9	********	1.8	*
31. SW4	*	331188.8	********	1.8	*
32. SW5	*	331194.2	********	1.8	*
33. SW6	*	331200.3	********	1.8	*
34. SW7	*	331206.8	********	1.8	*
35. SW8	*	331212.3	********	1.8	*
36. SW9	*	331202.2	********	1.8	*
37. SW10	*	331190.7	********	1.8	*
38. SW11	*	331178.4	********	1.8	*
39. SW12	*	331168.2	********	1.8	*
40. SW13	*	331157.5	********	1.8	*
41. SW14	*	331147.3	********	1.8	*
42. SW15	*	331136.2	********	1.8	*

MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: 0.-350.

WIND * CONCENTRATION
ANGLE * (PPM)

(DEGR)*	REC1	REC2	REC3	REC4	REC5	REC6	REC7	REC8	REC9	REC10	REC11	REC12	REC13	REC14	REC15	REC16	REC17	REC18	REC19	REC20
0. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
10. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.2
20. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.2
30. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
40. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
50. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
60. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
70. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
80. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
90. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
100. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
110. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
120. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
130. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
140. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
150. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
160. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
170. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
180. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
190. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2
200. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2
210. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
220. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
230. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.2	2.2	2.2	2.3
240. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.2	2.2	2.2	2.2
250. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
260. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
270. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
280. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
290. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
300. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
310. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
320. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
330. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
340. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
350. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
MAX *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.2	2.3	2.3	2.3	2.3	2.2	2.3	2.3	2.3
DEGR. *	0	0	0	0	0	0	0	0	0	210	60	0	200	200	240	240	0	20	20	230

JOB: 4_NECCO A_EX RUN: EXISTING CONDITION

MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first

angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: 0.-350.

WIND * CONCENTRATION
ANGLE * (PPM)

(DEGR)*	REC21	REC22	REC23	REC24	REC25	REC26	REC27	REC28	REC29	REC30	REC31	REC32	REC33	REC34	REC35	REC36	REC37	REC38	REC39	REC40
0. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2
10. *	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2
20. *	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2
30. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2
40. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.3	2.2	2.2	2.2	2.2
50. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.3	2.2	2.2	2.2	2.2
60. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.3	2.3	2.2	2.2	2.2
70. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.3	2.2	2.2	2.2
80. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.3	2.2	2.2	2.2
90. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2
100. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2
110. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
120. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
130. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
140. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
150. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
160. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
170. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2
180. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2
190. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2
200. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2
210. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2
220. *	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
230. *	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
240. *	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
250. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
260. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
270. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
280. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
290. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
300. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
310. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
320. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2
330. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2
340. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2
350. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2
MAX *	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.2
DEGR. *	240	230	230	20	20	20	20	70	180	200	210	210	210	210	210	350	100	0	0	0

JOB: 4_NECCO A_EX RUN: EXISTING CONDITION

MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: 0.-350.

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WIND  * CONCENTRATION
ANGLE *      (PPM)
(DEGR)* REC41 REC42
------*------------
  0.  *   2.2   2.2
 10.  *   2.2   2.2
 20.  *   2.2   2.2
 30.  *   2.2   2.2
 40.  *   2.2   2.2
 50.  *   2.2   2.2
 60.  *   2.2   2.2
 70.  *   2.2   2.2
 80.  *   2.2   2.2
 90.  *   2.2   2.2
100.  *   2.2   2.2
110.  *   2.2   2.2
120.  *   2.2   2.2
130.  *   2.2   2.2
140.  *   2.2   2.2
150.  *   2.2   2.2
160.  *   2.2   2.2
170.  *   2.2   2.2
180.  *   2.2   2.2
190.  *   2.2   2.2
200.  *   2.2   2.2
210.  *   2.2   2.2
220.  *   2.2   2.2
230.  *   2.2   2.2
240.  *   2.2   2.2
250.  *   2.2   2.2
260.  *   2.2   2.2
270.  *   2.2   2.2
280.  *   2.2   2.2
290.  *   2.2   2.2
300.  *   2.2   2.2
310.  *   2.2   2.2
320.  *   2.2   2.2
330.  *   2.2   2.2
340.  *   2.2   2.2
350.  *   2.2   2.2
------*------------
MAX   *   2.2   2.2
DEGR. *    0     0
```

THE HIGHEST CONCENTRATION OF 2.30 PPM OCCURRED AT RECEPTOR REC36.

JOB: 4_NECCO A_EX RUN: EXISTING CONDITION

DATE : 06/02/ 0
TIME : 14:41:01

RECEPTOR - LINK MATRIX FOR THE ANGLE PRODUCING
THE MAXIMUM CONCENTRATION FOR EACH RECEPTOR

* CO/LINK (PPM)
* ANGLE (DEGREES)

LINK #	REC1	REC2	REC3	REC4	REC5	REC6	REC7	REC8	REC9	REC10	REC11	REC12	REC13	REC14	REC15	REC16	REC17	REC18	REC19	REC20
LINK #	0	0	0	0	0	0	0	0	0	210	60	0	200	200	240	240	0	20	20	230
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.1	0.1	0.0
5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0
6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

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JOB: 4_NECCO A_EX RUN: EXISTING CONDITION

DATE : 06/02/ 0
TIME : 14:41:01

RECEPTOR - LINK MATRIX FOR THE ANGLE PRODUCING
THE MAXIMUM CONCENTRATION FOR EACH RECEPTOR

* CO/LINK (PPM)
* ANGLE (DEGREES)

LINK #	REC21	REC22	REC23	REC24	REC25	REC26	REC27	REC28	REC29	REC30	REC31	REC32	REC33	REC34	REC35	REC36	REC37	REC38	REC39	REC40
LINK #	240	230	230	20	20	20	20	70	180	200	210	210	210	210	210	350	100	0	0	0
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0
7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0

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JOB: 4_NECCO A_EX RUN: EXISTING CONDITION

DATE : 06/02/ 0
TIME : 14:41:01

RECEPTOR - LINK MATRIX FOR THE ANGLE PRODUCING

THE MAXIMUM CONCENTRATION FOR EACH RECEPTOR

```
      *    CO/LINK  (PPM)
      *    ANGLE (DEGREES)
      *  REC41 REC42
LINK # *     0     0
-------*------------
    1  *   0.0   0.0
    2  *   0.0   0.0
    3  *   0.0   0.0
    4  *   0.0   0.0
    5  *   0.0   0.0
    6  *   0.0   0.0
    7  *   0.0   0.0
```

1 CAL3QHC - (DATED 95221)

CAL3QHC PC (32 BIT) VERSION 3.0.0

Run Began on 6/02/2016 at 14:50:57

JOB: 9_MELCHER SUMMER_EX RUN: EXISTING CONDITION

DATE : 06/02/ 0
TIME : 14:50:57

The MODE flag has been set to C for calculating CO averages.

SITE & METEOROLOGICAL VARIABLES

VS = 0.0 CM/S VD = 0.0 CM/S Z0 = 100. CM
U = 1.0 M/S CLAS = 4 (D) ATIM = 60. MINUTES MIXH = 1000. M AMB = 2.2 PPM

LINK VARIABLES

```
  LINK DESCRIPTION    *      LINK COORDINATES (M)        *   LENGTH  BRG TYPE   VPH    EF     H
W   V/C QUEUE
                    *   X1      Y1      X2      Y2    *    (M)  (DEG)        (G/MI)  (M) (M)     (VEH)
------------------------*--------------------------------------*--------------------------------------------------------
 1. SUMMER_EB1@MELCHERFF* 331153.4  ********  331026.4  ******** *    151.   303. AG    810.   2.2
0.0 11.6
 2. SUMMER_EB2@MELCHERFF* 331153.4  ********  331320.2  ******** *    199.   123. AG    745.   2.2
0.0 11.3
 3. SUMMER_WB1@MELCHERFF* 331157.8  ********  331322.6  ******** *    195.   123. AG    415.   2.2
0.0 12.8
 4. SUMMER_WB2@MELCHERFF* 331157.2  ********  331033.6  ******** *    145.   302. AG    575.   2.2
0.0 12.2
 5. MELCHER_NB@SUMMERFF * 331156.0  ********  331157.0  ******** *     41.   179. AG    280.   2.2   0.0
 9.8
 6. MELCHER_NB@SUMMERFF * 331157.0  ********  331204.7  ******** *     69.   137. AG    280.   2.2   0.0
 9.8
 7. MELCHER_SB@SUMMERFF * 331148.1  ********  331150.1  ******** *     44.   177. AG    185.   2.2   0.0
 6.4
 8. MELCHER_SB@SUMMERFF * 331150.1  ********  331199.2  ******** *     70.   136. AG    185.   2.2   0.0
 6.4
 9. SUMMER_EB@MELCHERQ  * 331137.4  ********  331098.1  ******** *     47.   302. AG     37. 100.0   0.0
 7.3 0.75   7.8
10. SUMMER_WB@MELCHERQ  * 331166.1  ********  331186.1  ******** *     24.   123. AG     37. 100.0
0.0  9.8 0.38   4.0
11. MELCHER_NBLT@SUMMERQ* 331154.3  ********  331154.8  ******** *     24.   179. AG     20. 100.0
0.0  3.3 0.42   4.0
12. MELCHER_NBLT@SUMMERQ* 331154.9  ********  331171.5  ******** *     24.   136. AG     20. 100.0
0.0  3.3 0.42   4.0
13. MELCHER_NBRT@SUMMERQ* 331156.3  ********  331156.8  ******** *     10.   177. AG     20. 100.0
0.0  3.3 0.18   1.7
14. MELCHER_NBRT@SUMMERQ* 331158.0  ********  331165.2  ******** *     10.   136. AG     20. 100.0
0.0  3.3 0.18   1.7
```

JOB: 9_MELCHER SUMMER_EX RUN: EXISTING CONDITION

DATE : 06/02/ 0
TIME : 14:50:57

ADDITIONAL QUEUE LINK PARAMETERS

LINK DESCRIPTION	CYCLE LENGTH (SEC)	RED TIME (SEC)	CLEARANCE LOST TIME (SEC)	APPROACH VOL (VPH)	SATURATION FLOW RATE (VPH)	IDLE EM FAC (gm/hr)	SIGNAL TYPE	ARRIVAL RATE
9. SUMMER_EB@MELCHERQ	110	69	2.0	810	1600	10.90	2	3
10. SUMMER_WB@MELCHERQ	110	69	2.0	415	1600	10.90	2	3
11. MELCHER_NBLT@SUMMERQ	110	74	2.0	195	1600	10.90	2	3
12. MELCHER_NBLT@SUMMERQ	110	74	2.0	195	1600	10.90	2	3
13. MELCHER_NBRT@SUMMERQ	110	74	2.0	85	1600	10.90	2	3
14. MELCHER_NBRT@SUMMERQ	110	74	2.0	85	1600	10.90	2	3

RECEPTOR LOCATIONS

RECEPTOR	COORDINATES (M) X	Y	Z
1. N1	331035.7	********	1.8
2. N2	331056.1	********	1.8
3. N3	331072.7	********	1.8
4. N4	331088.1	********	1.8
5. N5	331103.0	********	1.8
6. N6	331120.9	********	1.8
7. N7	331138.8	********	1.8
8. N8	331158.4	********	1.8
9. N9	331174.2	********	1.8
10. N10	331190.8	********	1.8
11. N11	331208.7	********	1.8
12. N12	331225.7	********	1.8
13. N13	331242.4	********	1.8
14. N14	331254.7	********	1.8
15. N15	331270.6	********	1.8
16. N16	331288.4	********	1.8
17. N17	331303.3	********	1.8
18. N18	331324.7	********	1.8
19. SW1	331022.4	********	1.8
20. SW2	331042.5	********	1.8
21. SW3	331060.8	********	1.8
22. SW4	331076.6	********	1.8
23. SW5	331092.3	********	1.8
24. SW6	331108.6	********	1.8
25. SW7	331125.2	********	1.8
26. SW8	331144.3	********	1.8
27. SW9	331144.7	********	1.8
28. SW10	331146.4	********	1.8
29. SW11	331157.9	********	1.8

30. SW12	*	331169.8	********	1.8 *
31. SW13	*	331181.4	********	1.8 *
32. SW14	*	331196.3	********	1.8 *
33. SE1	*	331208.7	********	1.8 *
34. SE2	*	331195.1	********	1.8 *
35. SE3	*	331183.6	********	1.8 *
36. SE4	*	331171.6	********	1.8 *
37. SE5	*	331162.7	********	1.8 *
38. SE6	*	331162.2	********	1.8 *
39. SE7	*	331162.7	********	1.8 *

DATE : 06/02/ 0
TIME : 14:50:57

RECEPTOR LOCATIONS

RECEPTOR	*	COORDINATES (M) X	Y	Z *
40. SE8	*	331174.2	********	1.8 *
41. SE9	*	331189.5	********	1.8 *
42. SE10	*	331204.5	********	1.8 *
43. SE11	*	331220.7	********	1.8 *
44. SE12	*	331234.4	********	1.8 *
45. SE13	*	331247.9	********	1.8 *
46. SE14	*	331260.3	********	1.8 *
47. SE15	*	331274.3	********	1.8 *
48. SE16	*	331288.4	********	1.8 *
49. SE17	*	331300.7	********	1.8 *
50. SE18	*	331316.8	********	1.8 *

MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: 0.-350.

WIND * CONCENTRATION
ANGLE * (PPM)

(DEGR)*	REC1	REC2	REC3	REC4	REC5	REC6	REC7	REC8	REC9	REC10	REC11	REC12	REC13	REC14	REC15	REC16	REC17	REC18	REC19	REC20
0. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3
10. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3
20. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3

30. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3
40. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3
50. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3
60. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3
70. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3
80. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3
90. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3
100. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3
110. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3
120. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3
130. *	2.4	2.3	2.3	2.3	2.3	2.2	2.2	2.3	2.4	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3
140. *	2.4	2.4	2.4	2.4	2.4	2.3	2.2	2.4	2.5	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
150. *	2.4	2.4	2.4	2.5	2.5	2.3	2.2	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
160. *	2.3	2.3	2.3	2.3	2.5	2.3	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
170. *	2.3	2.2	2.2	2.2	2.3	2.3	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
180. *	2.2	2.2	2.2	2.2	2.3	2.3	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
190. *	2.2	2.2	2.2	2.2	2.3	2.3	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
200. *	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
210. *	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
220. *	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.2	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
230. *	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.2	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
240. *	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.2	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
250. *	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.2	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
260. *	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.2	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
270. *	2.2	2.2	2.3	2.4	2.4	2.4	2.5	2.4	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
280. *	2.2	2.2	2.3	2.3	2.4	2.4	2.5	2.5	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
290. *	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.4	2.2	2.3	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.3	2.2	2.2
300. *	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2
310. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3
320. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3
330. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3
340. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3
350. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3
MAX *	2.4	2.4	2.4	2.5	2.5	2.4	2.5	2.5	2.5	2.3	2.2	2.3	2.2	2.2	2.3	2.2	2.2	2.3	2.3	2.3
DEGR. *	130	140	140	150	160	270	280	280	140	300	0	140	0	0	290	0	0	300	120	350

JOB: 9_MELCHER SUMMER_EX RUN: EXISTING CONDITION

MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: 0.-350.

WIND * CONCENTRATION
ANGLE * (PPM)
(DEGR)* REC21 REC22 REC23 REC24 REC25 REC26 REC27 REC28 REC29 REC30 REC31 REC32 REC33
REC34 REC35 REC36 REC37 REC38 REC39 REC40

0.	*	2.3	2.3	2.3	2.4	2.4	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.4
10.	*	2.3	2.3	2.3	2.4	2.4	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.4
20.	*	2.3	2.3	2.3	2.4	2.4	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.4	2.4
30.	*	2.3	2.3	2.3	2.4	2.4	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.4	2.4
40.	*	2.3	2.3	2.3	2.4	2.4	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.4	2.4
50.	*	2.3	2.3	2.3	2.4	2.4	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.4	2.4
60.	*	2.3	2.3	2.4	2.4	2.4	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.4	2.3
70.	*	2.3	2.3	2.4	2.4	2.4	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.4	2.3
80.	*	2.3	2.3	2.4	2.4	2.4	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.4	2.3
90.	*	2.3	2.3	2.4	2.4	2.4	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3
100.	*	2.3	2.3	2.4	2.4	2.4	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3
110.	*	2.3	2.4	2.4	2.4	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3
120.	*	2.3	2.4	2.4	2.4	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3
130.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3
140.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
150.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
160.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
170.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
180.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
190.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
200.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
210.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
220.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
230.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
240.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
250.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
260.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
270.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
280.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
290.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
300.	*	2.2	2.2	2.2	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
310.	*	2.3	2.3	2.3	2.3	2.4	2.4	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3
320.	*	2.3	2.3	2.3	2.4	2.4	2.4	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3
330.	*	2.3	2.3	2.3	2.4	2.4	2.4	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3
340.	*	2.3	2.3	2.3	2.4	2.4	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.4
350.	*	2.3	2.3	2.3	2.4	2.4	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.4
MAX	*	2.3	2.4	2.4	2.4	2.4	2.4	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.4	2.4
DEGR.	*	350	110	60	0	0	310	0	0	0	0	0	0	0	0	0	0	0	320	20	0

JOB: 9_MELCHER SUMMER_EX RUN: EXISTING CONDITION

MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: 0.-350.

WIND ANGLE (DEGR)	*	CONCENTRATION (PPM) REC41	REC42	REC43	REC44	REC45	REC46	REC47	REC48	REC49	REC50
0.	*	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
10.	*	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.2
20.	*	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.2
30.	*	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.2
40.	*	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.2
50.	*	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.2
60.	*	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.2
70.	*	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.2
80.	*	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.2
90.	*	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.2
100.	*	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.2
110.	*	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.2
120.	*	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.2
130.	*	2.3	2.3	2.2	2.3	2.3	2.2	2.2	2.2	2.2	2.2
140.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
150.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
160.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
170.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
180.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
190.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
200.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
210.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
220.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
230.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
240.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
250.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
260.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
270.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
280.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
290.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
300.	*	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
310.	*	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
320.	*	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
330.	*	2.4	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
340.	*	2.4	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
350.	*	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
MAX	*	2.4	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
DEGR.	*	330	350	350	350	350	350	350	350	350	350

THE HIGHEST CONCENTRATION OF 2.50 PPM OCCURRED AT RECEPTOR REC8 .

JOB: 9_MELCHER SUMMER_EX RUN: EXISTING CONDITION

DATE : 06/02/ 0
TIME : 14:50:57

RECEPTOR - LINK MATRIX FOR THE ANGLE PRODUCING
THE MAXIMUM CONCENTRATION FOR EACH RECEPTOR

* CO/LINK (PPM)
* ANGLE (DEGREES)

LINK #	REC1	REC2	REC3	REC4	REC5	REC6	REC7	REC8	REC9	REC10	REC11	REC12	REC13	REC14	REC15	REC16	REC17	REC18	REC19	REC20
	130	140	140	150	160	270	280	280	140	300	0	140	0	0	290	0	0	300	120	350
1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.0
4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	0.0	0.0	0.0	0.1	0.1	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

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JOB: 9_MELCHER SUMMER_EX RUN: EXISTING CONDITION

DATE : 06/02/ 0
TIME : 14:50:57

RECEPTOR - LINK MATRIX FOR THE ANGLE PRODUCING
THE MAXIMUM CONCENTRATION FOR EACH RECEPTOR

* CO/LINK (PPM)
* ANGLE (DEGREES)

LINK #	REC21	REC22	REC23	REC24	REC25	REC26	REC27	REC28	REC29	REC30	REC31	REC32	REC33	REC34	REC35	REC36	REC37	REC38	REC39	REC40
	350	110	60	0	0	310	0	0	0	0	0	0	0	0	0	0	0	320	20	0
1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1
3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	0.0	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1
11	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

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JOB: 9_MELCHER SUMMER_EX RUN: EXISTING CONDITION

DATE : 06/02/ 0
TIME : 14:50:57

RECEPTOR - LINK MATRIX FOR THE ANGLE PRODUCING
THE MAXIMUM CONCENTRATION FOR EACH RECEPTOR

		REC41	REC42	REC43	REC44	REC45	REC46	REC47	REC48	REC49	REC50
	*	CO/LINK (PPM)									
	*	ANGLE (DEGREES)									
LINK #	*	330	350	350	350	350	350	350	350	350	350
1	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
3	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	*	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

1 CAL3QHC - (DATED 95221)

CAL3QHC PC (32 BIT) VERSION 3.0.0
(C) COPYRIGHT 1993-2000, TRINITY CONSULTANTS

Run Began on 6/02/2016 at 14:23:48

JOB: 1_CONGRESS A_NB RUN: No Build Condition

DATE : 06/02/ 0
TIME : 14:23:48

The MODE flag has been set to C for calculating CO averages.

SITE & METEOROLOGICAL VARIABLES

VS = 0.0 CM/S VD = 0.0 CM/S Z0 = 100. CM
U = 1.0 M/S CLAS = 4 (D) ATIM = 60. MINUTES MIXH = 1000. M AMB = 2.2 PPM

LINK VARIABLES

LINK DESCRIPTION * LINK COORDINATES (M) * LENGTH BRG TYPE VPH EF H
W V/C QUEUE
* X1 Y1 X2 Y2 * (M) (DEG) (G/MI) (M) (M) (VEH)
------------------------*--*---
1. CONGRESS_EB1@ASTFF * 331381.0 ******** 331331.1 ******** * 68. 312. AG 604. 1.7 0.0
13.1
2. CONGRESS_EB2@ASTFF * 331380.5 ******** 331434.9 ******** * 71. 130. AG 665. 1.7 0.0
9.4
3. CONGRESS_WB1@ASTFF * 331386.6 ******** 331441.0 ******** * 69. 128. AG 564. 1.7 0.0
10.1
4. CONGRESS_WB2@ASTFF * 331388.6 ******** 331338.1 ******** * 66. 310. AG 538. 1.7 0.0
10.1
5. AST_NB1@CONGRESSFF * 331375.6 ******** 331335.4 ******** * 75. 212. AG 492. 1.7 0.0
10.1
6. AST_NB2@CONGRESSFF * 331397.6 ******** 331431.9 ******** * 65. 32. AG 40. 1.7 0.0 6.4
7. THOMSON_SB1@CONGRESS* 331391.3 ******** 331429.6 ******** * 65. 36. AG 56. 1.7 0.0
8.2
8. THOMSON_SB2@CONGRESS* 331371.7 ******** 331334.1 ******** * 73. 211. AG 473. 1.7 0.0
7.0
9. CONGRESS_EBTHRU@ASTQ* 331371.9 ******** 331352.8 ******** * 26. 311. AG 24. 100.0
0.0 6.7 0.49 4.3
10. CONGRESS_EBRT@ASTQ * 331368.7 ******** 331347.2 ******** * 28. 311. AG 12. 100.0 0.0
3.3 0.55 4.7
11. CONGRESS_WBLT@ASTQ * 331400.2 ******** 331418.4 ******** * 24. 130. AG 9. 100.0 0.0
3.3 0.35 3.9
12. CONGRESS_WBTHRU@ASTQ* 331402.5 ******** 331427.8 ******** * 32. 127. AG 9. 100.0
0.0 3.7 0.47 5.3
13. AST_NBLT@CONGRESSQ * 331370.4 ******** 331349.3 ******** * 41. 211. AG 14. 100.0 0.0
3.3 0.93 6.8
14. AST_NBRT@CONGRESSQ * 331373.5 ******** 331356.2 ******** * 32. 212. AG 11. 100.0 0.0
3.7 0.53 5.4
15. THOMSON_SB@CONGRESSQ* 331394.2 ******** 331399.6 ******** * 9. 38. AG 15. 100.0

0.0 5.2 0.35 1.5

JOB: 1_CONGRESS A_NB RUN: No Build Condition

DATE : 06/02/ 0
TIME : 14:23:48

ADDITIONAL QUEUE LINK PARAMETERS

LINK DESCRIPTION	CYCLE LENGTH (SEC)	RED TIME (SEC)	CLEARANCE LOST TIME (SEC)	APPROACH VOL (VPH)	SATURATION FLOW RATE (VPH)	IDLE EM FAC (gm/hr)	SIGNAL TYPE	ARRIVAL RATE
9. CONGRESS_EBTHRU@ASTQ	110	79	2.0	389	1600	6.26	2	3
10. CONGRESS_EBRT@ASTQ	110	79	2.0	215	1600	6.26	2	3
11. CONGRESS_WBLT@ASTQ	110	59	2.0	241	1600	6.26	2	3
12. CONGRESS_WBTHRU@ASTQ	110	59	2.0	323	1600	6.26	2	3
13. AST_NBLT@CONGRESSQ	110	90	2.0	215	1600	6.26	2	3
14. AST_NBRT@CONGRESSQ	110	70	2.0	277	1600	6.26	2	3
15. THOMSON_SB@CONGRESSQ	110	95	2.0	56	1600	6.26	2	3

RECEPTOR LOCATIONS

RECEPTOR	COORDINATES (M) X	Y	Z
1. NW1	331341.1	********	1.8
2. NW2	331347.9	********	1.8
3. NW3	331354.7	********	1.8
4. NW4	331361.8	********	1.8
5. NW5	331369.2	********	1.8
6. NW6	331377.6	********	1.8
7. NW7	331386.3	********	1.8
8. NW8	331391.9	********	1.8
9. NW9	331391.5	********	1.8
10. NW10	331397.1	********	1.8
11. NW11	331403.9	********	1.8
12. NW12	331410.2	********	1.8
13. NW13	331416.9	********	1.8
14. NW14	331426.6	********	1.8
15. NE1	331434.9	********	1.8
16. NE2	331428.6	********	1.8
17. NE3	331423.0	********	1.8
18. NE4	331418.2	********	1.8
19. NE5	331412.4	********	1.8
20. NE6	331407.7	********	1.8
21. NE7	331403.2	********	1.8
22. NE8	331411.5	********	1.8
23. NE9	331421.6	********	1.8
24. NE10	331431.1	********	1.8
25. NE11	331443.6	********	1.8
26. SE1	331431.8	********	1.8
27. SE2	331422.5	********	1.8

28. SE3	*	331413.9	********	1.8 *
29. SE4	*	331403.0	********	1.8 *
30. SE5	*	331391.3	********	1.8 *
31. SE6	*	331384.0	********	1.8 *
32. SE7	*	331377.5	********	1.8 *
33. SE8	*	331371.3	********	1.8 *
34. SE9	*	331364.7	********	1.8 *
35. SE10	*	331357.7	********	1.8 *
36. SE11	*	331351.4	********	1.8 *
37. SE12	*	331346.1	********	1.8 *
38. SE13	*	331339.3	********	1.8 *

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JOB: 1_CONGRESS A_NB RUN: No Build Condition

DATE : 06/02/ 0
TIME : 14:23:48

RECEPTOR LOCATIONS

RECEPTOR	*	COORDINATES (M) X	Y	Z *
39. SW1	*	331330.6	********	1.8 *
40. SW2	*	331332.2	********	1.8 *
41. SW3	*	331339.3	********	1.8 *
42. SW4	*	331346.3	********	1.8 *
43. SW5	*	331353.3	********	1.8 *
44. SW6	*	331359.4	********	1.8 *
45. SW7	*	331365.0	********	1.8 *
46. SW8	*	331357.1	********	1.8 *
47. SW9	*	331347.0	********	1.8 *
48. SW10	*	331336.7	********	1.8 *
49. SW11	*	331326.7	********	1.8 *

PAGE 4

JOB: 1_CONGRESS A_NB RUN: No Build Condition

MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: 0.-350.

WIND ANGLE (DEGR)*	REC1	REC2	REC3	REC4	REC5	REC6	REC7	REC8	REC9	REC10	REC11	REC12	REC13	REC14	REC15	REC16	REC17	REC18	REC19	REC20
	CONCENTRATION (PPM)																			
0. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
10. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2

20. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
30. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
40. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
50. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
60. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
70. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
80. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
90. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
100. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
110. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
120. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
130. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
140. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
150. *	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
160. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
170. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
180. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
190. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
200. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
210. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
220. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
230. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
240. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
250. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
260. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
270. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
280. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
290. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
300. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
310. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
320. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
330. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
340. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
350. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
MAX *	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
DEGR. *	0	150	0	0	0	0	0	0	310	0	0	0	0	0	0	0	0	0	0	0

JOB: 1_CONGRESS A_NB RUN: No Build Condition

MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: 0.-350.

WIND * CONCENTRATION
ANGLE * (PPM)
(DEGR)* REC21 REC22 REC23 REC24 REC25 REC26 REC27 REC28 REC29 REC30 REC31 REC32 REC33

REC34 REC35 REC36 REC37 REC38 REC39 REC40

0. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
10. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
20. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
30. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
40. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
50. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
60. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
70. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
80. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
90. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
100. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
110. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
120. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
130. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
140. *	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
150. *	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
160. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
170. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
180. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
190. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
200. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
210. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
220. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
230. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
240. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
250. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
260. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
270. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
280. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
290. *	2.2	2.2	2.3	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
300. *	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
310. *	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
320. *	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
330. *	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
340. *	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
350. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
MAX *	2.2	2.3	2.3	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
DEGR. *	0	150	290	0	300	340	340	340	340	120	120	330	0	0	0	0	0	0	0	0

JOB: 1_CONGRESS A_NB RUN: No Build Condition

MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: 0.-350.

WIND * CONCENTRATION
ANGLE * (PPM)

(DEGR)*	REC41	REC42	REC43	REC44	REC45	REC46	REC47	REC48	REC49
0. *	2.2	2.2	2.2	2.2	2.3	2.3	2.2	2.2	2.2
10. *	2.2	2.2	2.2	2.2	2.3	2.3	2.2	2.2	2.2
20. *	2.2	2.2	2.2	2.2	2.3	2.3	2.2	2.2	2.2
30. *	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2
40. *	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2
50. *	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2
60. *	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.2	2.2
70. *	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.2	2.2
80. *	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2
90. *	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2
100. *	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2
110. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
120. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3
130. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
140. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
150. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
160. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
170. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
180. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
190. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
200. *	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2
210. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
220. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
230. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
240. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
250. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
260. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
270. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
280. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
290. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
300. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
310. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
320. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
330. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
340. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
350. *	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2
MAX *	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.2	2.3
DEGR. *	0	0	0	0	350	70	100	0	120

THE HIGHEST CONCENTRATION OF 2.30 PPM OCCURRED AT RECEPTOR REC45.

PAGE 7

JOB: 1_CONGRESS A_NB RUN: No Build Condition

DATE : 06/02/ 0
TIME : 14:23:48

RECEPTOR - LINK MATRIX FOR THE ANGLE PRODUCING

THE MAXIMUM CONCENTRATION FOR EACH RECEPTOR

* CO/LINK (PPM)
* ANGLE (DEGREES)

LINK # *	REC1	REC2	REC3	REC4	REC5	REC6	REC7	REC8	REC9	REC10	REC11	REC12	REC13	REC14	REC15	REC16	REC17	REC18	REC19	REC20
LINK # *	0	150	0	0	0	0	0	0	310	0	0	0	0	0	0	0	0	0	0	0
1 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4 *	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DATE : 06/02/ 0
TIME : 14:23:48

RECEPTOR - LINK MATRIX FOR THE ANGLE PRODUCING
THE MAXIMUM CONCENTRATION FOR EACH RECEPTOR

* CO/LINK (PPM)
* ANGLE (DEGREES)

LINK # *	REC21	REC22	REC23	REC24	REC25	REC26	REC27	REC28	REC29	REC30	REC31	REC32	REC33	REC34	REC35	REC36	REC37	REC38	REC39	REC40
LINK # *	0	150	290	0	300	340	340	340	340	120	120	330	0	0	0	0	0	0	0	0
1 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2 *	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3 *	0.0	0.1	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

JOB: 1_CONGRESS A_NB RUN: No Build Condition

DATE : 06/02/ 0
TIME : 14:23:48

RECEPTOR - LINK MATRIX FOR THE ANGLE PRODUCING
THE MAXIMUM CONCENTRATION FOR EACH RECEPTOR

* CO/LINK (PPM)
* ANGLE (DEGREES)

LINK #	REC41	REC42	REC43	REC44	REC45	REC46	REC47	REC48	REC49
	0	0	0	0	350	70	100	0	120
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.0	0.0
10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

1 CAL3QHC - (DATED 95221)

CAL3QHC PC (32 BIT) VERSION 3.0.0
(C) COPYRIGHT 1993-2000, TRINITY CONSULTANTS

Run Began on 6/02/2016 at 14:42:11

JOB: 4_NECCO A_NB RUN: NO BUILD CONDITION

DATE : 06/02/ 0
TIME : 14:42:11

The MODE flag has been set to C for calculating CO averages.

SITE & METEOROLOGICAL VARIABLES

VS = 0.0 CM/S VD = 0.0 CM/S Z0 = 100. CM
U = 1.0 M/S CLAS = 4 (D) ATIM = 60. MINUTES MIXH = 1000. M AMB = 2.2 PPM

LINK VARIABLES

LINK DESCRIPTION * LINK COORDINATES (M) * LENGTH BRG TYPE VPH EF H
W V/C QUEUE
* X1 Y1 X2 Y2 * (M) (DEG) (G/MI) (M) (M) (VEH)
------------------------*---------------------------------------*---
1. NECCO_EB@ASTFF * 331215.0 ******** 331137.1 ******** * 92. 302. AG 200. 1.7 0.0 6.4
2. NECCO_WB@ASTFF * 331217.6 ******** 331140.8 ******** * 91. 303. AG 51. 1.7 0.0 6.7
3. AST_NB1@NECCOFF * 331223.8 ******** 331177.9 ******** * 85. 213. AG 486. 1.7 0.0 8.2
4. AST_NB2@NECCOFF * 331225.7 ******** 331250.4 ******** * 43. 35. AG 522. 1.7 0.0 7.9
5. AST_SB1@NECCOFF * 331219.8 ******** 331244.5 ******** * 43. 35. AG 501. 1.7 0.0 7.0
6. AST_SB2@NECCOFF * 331219.5 ******** 331172.3 ******** * 86. 213. AG 614. 1.7 0.0 7.3
7. NECCO_EB@ASTQ * 331208.6 ******** 331188.7 ******** * 23. 301. AG 10. 100.0 0.0 3.3
0.33 3.9

JOB: 4_NECCO A_NB RUN: NO BUILD CONDITION

DATE : 06/02/ 0
TIME : 14:42:11

ADDITIONAL QUEUE LINK PARAMETERS

LINK DESCRIPTION * CYCLE RED CLEARANCE APPROACH SATURATION IDLE SIGNAL
ARRIVAL
* LENGTH TIME LOST TIME VOL FLOW RATE EM FAC TYPE RATE
* (SEC) (SEC) (SEC) (VPH) (VPH) (gm/hr)
------------------------*--
7. NECCO_EB@ASTQ * 120 70 2.0 200 1600 6.26 1 3

RECEPTOR LOCATIONS
----
* COORDINATES (M) *
RECEPTOR * X Y Z *
-------------------------*------------------------------------*

1. NW2	*	331143.8	********	1.8	*
2. NW3	*	331150.0	********	1.8	*
3. NW4	*	331157.6	********	1.8	*
4. NW5	*	331167.1	********	1.8	*
5. NW6	*	331174.9	********	1.8	*
6. NW7	*	331184.5	********	1.8	*
7. NW8	*	331192.5	********	1.8	*
8. NW9	*	331201.8	********	1.8	*
9. NW10	*	331211.6	********	1.8	*
10. NW11	*	331219.0	********	1.8	*
11. NW12	*	331224.8	********	1.8	*
12. NW13	*	331231.1	********	1.8	*
13. NW14	*	331237.2	********	1.8	*
14. NW15	*	331241.1	********	1.8	*
15. E1	*	331254.4	********	1.8	*
16. E2	*	331249.2	********	1.8	*
17. E3	*	331243.4	********	1.8	*
18. E4	*	331237.7	********	1.8	*
19. E5	*	331229.7	********	1.8	*
20. E6	*	331223.5	********	1.8	*
21. E7	*	331217.2	********	1.8	*
22. E8	*	331211.3	********	1.8	*
23. E9	*	331204.6	********	1.8	*
24. E10	*	331197.7	********	1.8	*
25. E11	*	331191.9	********	1.8	*
26. E12	*	331186.4	********	1.8	*
27. E13	*	331182.2	********	1.8	*
28. SW1	*	331168.7	********	1.8	*
29. SW2	*	331175.4	********	1.8	*
30. SW3	*	331181.9	********	1.8	*
31. SW4	*	331188.8	********	1.8	*
32. SW5	*	331194.2	********	1.8	*
33. SW6	*	331200.3	********	1.8	*
34. SW7	*	331206.8	********	1.8	*
35. SW8	*	331212.3	********	1.8	*
36. SW9	*	331202.2	********	1.8	*
37. SW10	*	331190.7	********	1.8	*
38. SW11	*	331178.4	********	1.8	*
39. SW12	*	331168.2	********	1.8	*
40. SW13	*	331157.5	********	1.8	*
41. SW14	*	331147.3	********	1.8	*
42. SW15	*	331136.2	********	1.8	*

MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: 0.-350.

WIND * CONCENTRATION
ANGLE * (PPM)

(DEGR)*	REC1	REC2	REC3	REC4	REC5	REC6	REC7	REC8	REC9	REC10	REC11	REC12	REC13	REC14	REC15	REC16	REC17	REC18	REC19	REC20
0. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
10. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
20. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
30. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
40. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
50. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
60. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
70. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
80. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
90. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
100. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
110. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
120. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
130. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
140. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
150. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
160. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
170. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
180. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
190. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
200. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
210. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
220. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
230. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
240. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
250. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
260. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
270. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
280. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
290. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
300. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
310. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
320. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
330. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
340. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
350. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
MAX *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
DEGR. *	0	0	0	0	0	0	0	0	0	200	0	0	0	0	0	0	0	0	0	0

PAGE 4

JOB: 4_NECCO A_NB RUN: NO BUILD CONDITION

MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first

angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: 0.-350.

WIND * CONCENTRATION
ANGLE * (PPM)

(DEGR)*	REC21	REC22	REC23	REC24	REC25	REC26	REC27	REC28	REC29	REC30	REC31	REC32	REC33	REC34	REC35	REC36	REC37	REC38	REC39	REC40
0. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
10. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
20. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
30. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
40. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
50. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2
60. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2
70. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
80. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
90. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
100. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
110. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
120. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
130. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
140. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
150. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
160. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
170. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
180. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2
190. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2
200. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2
210. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2
220. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
230. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
240. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
250. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
260. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
270. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
280. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
290. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
300. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
310. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
320. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
330. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
340. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
350. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
MAX *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2
DEGR. *	0	0	0	0	0	0	0	60	60	60	200	210	210	210	210	0	0	0	0	0

JOB: 4_NECCO A_NB RUN: NO BUILD CONDITION

MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: 0.-350.

WIND ANGLE (DEGR)	*	CONCENTRATION (PPM) REC41	REC42
0.	*	2.2	2.2
10.	*	2.2	2.2
20.	*	2.2	2.2
30.	*	2.2	2.2
40.	*	2.2	2.2
50.	*	2.2	2.2
60.	*	2.2	2.2
70.	*	2.2	2.2
80.	*	2.2	2.2
90.	*	2.2	2.2
100.	*	2.2	2.2
110.	*	2.2	2.2
120.	*	2.2	2.2
130.	*	2.2	2.2
140.	*	2.2	2.2
150.	*	2.2	2.2
160.	*	2.2	2.2
170.	*	2.2	2.2
180.	*	2.2	2.2
190.	*	2.2	2.2
200.	*	2.2	2.2
210.	*	2.2	2.2
220.	*	2.2	2.2
230.	*	2.2	2.2
240.	*	2.2	2.2
250.	*	2.2	2.2
260.	*	2.2	2.2
270.	*	2.2	2.2
280.	*	2.2	2.2
290.	*	2.2	2.2
300.	*	2.2	2.2
310.	*	2.2	2.2
320.	*	2.2	2.2
330.	*	2.2	2.2
340.	*	2.2	2.2
350.	*	2.2	2.2
MAX	*	2.2	2.2
DEGR.	*	0	0

THE HIGHEST CONCENTRATION OF 2.30 PPM OCCURRED AT RECEPTOR REC35.

JOB: 4_NECCO A_NB RUN: NO BUILD CONDITION

DATE : 06/02/ 0
TIME : 14:42:11

RECEPTOR - LINK MATRIX FOR THE ANGLE PRODUCING
THE MAXIMUM CONCENTRATION FOR EACH RECEPTOR

* CO/LINK (PPM)
* ANGLE (DEGREES)

*	REC1	REC2	REC3	REC4	REC5	REC6	REC7	REC8	REC9	REC10	REC11	REC12	REC13	REC14	REC15	REC16	REC17	REC18	REC19	REC20
LINK # *	0	0	0	0	0	0	0	0	0	200	0	0	0	0	0	0	0	0	0	0
1 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

PAGE 7

JOB: 4_NECCO A_NB RUN: NO BUILD CONDITION

DATE : 06/02/ 0
TIME : 14:42:11

RECEPTOR - LINK MATRIX FOR THE ANGLE PRODUCING
THE MAXIMUM CONCENTRATION FOR EACH RECEPTOR

* CO/LINK (PPM)
* ANGLE (DEGREES)

*	REC21	REC22	REC23	REC24	REC25	REC26	REC27	REC28	REC29	REC30	REC31	REC32	REC33	REC34	REC35	REC36	REC37	REC38	REC39	REC40
LINK # *	0	0	0	0	0	0	0	60	60	60	200	210	210	210	210	0	0	0	0	0
1 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0
7 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

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JOB: 4_NECCO A_NB RUN: NO BUILD CONDITION

DATE : 06/02/ 0
TIME : 14:42:11

RECEPTOR - LINK MATRIX FOR THE ANGLE PRODUCING

THE MAXIMUM CONCENTRATION FOR EACH RECEPTOR

```
     *    CO/LINK  (PPM)
     *    ANGLE (DEGREES)
     *  REC41 REC42
LINK # *     0     0
-------*------------
   1  *   0.0   0.0
   2  *   0.0   0.0
   3  *   0.0   0.0
   4  *   0.0   0.0
   5  *   0.0   0.0
   6  *   0.0   0.0
   7  *   0.0   0.0
```

1 CAL3QHC - (DATED 95221)

CAL3QHC PC (32 BIT) VERSION 3.0.0

Run Began on 6/02/2016 at 14:52:35

JOB: 9_MELCHER SUMMER_NB RUN: NO BUILD CONDITION

DATE : 06/02/ 0
TIME : 14:52:35

The MODE flag has been set to C for calculating CO averages.

SITE & METEOROLOGICAL VARIABLES

VS = 0.0 CM/S VD = 0.0 CM/S Z0 = 100. CM
U = 1.0 M/S CLAS = 4 (D) ATIM = 60. MINUTES MIXH = 1000. M AMB = 2.2 PPM

LINK VARIABLES

LINK DESCRIPTION * LINK COORDINATES (M) * LENGTH BRG TYPE VPH EF H
W V/C QUEUE
* X1 Y1 X2 Y2 * (M) (DEG) (G/MI) (M) (M) (VEH)
------------------------*--*--
1. SUMMER_EB1@MELCHERFF* 331153.4 ******** 331026.4 ******** * 151. 303. AG 846. 1.7
0.0 11.6
2. SUMMER_EB2@MELCHERFF* 331153.4 ******** 331320.2 ******** * 199. 123. AG 765. 1.7
0.0 11.3
3. SUMMER_WB1@MELCHERFF* 331157.8 ******** 331322.6 ******** * 195. 123. AG 428. 1.7
0.0 12.8
4. SUMMER_WB2@MELCHERFF* 331157.2 ******** 331033.6 ******** * 145. 302. AG 598. 1.7
0.0 12.2
5. MELCHER_NB@SUMMERFF * 331156.0 ******** 331157.0 ******** * 41. 179. AG 293. 1.7 0.0
9.8
6. MELCHER_NB@SUMMERFF * 331157.0 ******** 331204.7 ******** * 69. 137. AG 293. 1.7 0.0
9.8
7. MELCHER_SB@SUMMERFF * 331148.1 ******** 331150.1 ******** * 44. 177. AG 204. 1.7 0.0
6.4
8. MELCHER_SB@SUMMERFF * 331150.1 ******** 331199.2 ******** * 70. 136. AG 204. 1.7 0.0
6.4
9. SUMMER_EB@MELCHERQ * 331137.4 ******** 331096.4 ******** * 49. 302. AG 21. 100.0 0.0
7.3 0.79 8.1
10. SUMMER_WB@MELCHERQ * 331166.1 ******** 331186.8 ******** * 25. 123. AG 21. 100.0
0.0 9.8 0.40 4.1
11. MELCHER_NBLT@SUMMERQ* 331154.3 ******** 331154.8 ******** * 25. 179. AG 11. 100.0
0.0 3.3 0.44 4.2
12. MELCHER_NBLT@SUMMERQ* 331154.9 ******** 331172.4 ******** * 25. 136. AG 11. 100.0
0.0 3.3 0.44 4.2
13. MELCHER_NBRT@SUMMERQ* 331156.3 ******** 331156.9 ******** * 11. 177. AG 11. 100.0
0.0 3.3 0.19 1.8
14. MELCHER_NBRT@SUMMERQ* 331158.0 ******** 331165.4 ******** * 11. 136. AG 11. 100.0
0.0 3.3 0.19 1.8

JOB: 9_MELCHER SUMMER_NB RUN: NO BUILD CONDITION

DATE : 06/02/ 0
TIME : 14:52:35

ADDITIONAL QUEUE LINK PARAMETERS

LINK DESCRIPTION	*	CYCLE LENGTH (SEC)	RED TIME (SEC)	CLEARANCE LOST TIME (SEC)	APPROACH VOL (VPH)	SATURATION FLOW RATE (VPH)	IDLE EM FAC (gm/hr)	SIGNAL TYPE	ARRIVAL RATE
9. SUMMER_EB@MELCHERQ	*	110	69	2.0	846	1600	6.26	2	3
10. SUMMER_WB@MELCHERQ	*	110	69	2.0	428	1600	6.26	2	3
11. MELCHER_NBLT@SUMMERQ	*	110	74	2.0	206	1600	6.26	2	3
12. MELCHER_NBLT@SUMMERQ	*	110	74	2.0	206	1600	6.26	2	3
13. MELCHER_NBRT@SUMMERQ	*	110	74	2.0	87	1600	6.26	2	3
14. MELCHER_NBRT@SUMMERQ	*	110	74	2.0	87	1600	6.26	2	3

RECEPTOR LOCATIONS

RECEPTOR	*	COORDINATES (M) X	Y	Z	*
1. N1	*	331035.7	********	1.8	*
2. N2	*	331056.1	********	1.8	*
3. N3	*	331072.7	********	1.8	*
4. N4	*	331088.1	********	1.8	*
5. N5	*	331103.0	********	1.8	*
6. N6	*	331120.9	********	1.8	*
7. N7	*	331138.8	********	1.8	*
8. N8	*	331158.4	********	1.8	*
9. N9	*	331174.2	********	1.8	*
10. N10	*	331190.8	********	1.8	*
11. N11	*	331208.7	********	1.8	*
12. N12	*	331225.7	********	1.8	*
13. N13	*	331242.4	********	1.8	*
14. N14	*	331254.7	********	1.8	*
15. N15	*	331270.6	********	1.8	*
16. N16	*	331288.4	********	1.8	*
17. N17	*	331303.3	********	1.8	*
18. N18	*	331324.7	********	1.8	*
19. SW1	*	331022.4	********	1.8	*
20. SW2	*	331042.5	********	1.8	*
21. SW3	*	331060.8	********	1.8	*
22. SW4	*	331076.6	********	1.8	*
23. SW5	*	331092.3	********	1.8	*
24. SW6	*	331108.6	********	1.8	*
25. SW7	*	331125.2	********	1.8	*
26. SW8	*	331144.3	********	1.8	*
27. SW9	*	331144.7	********	1.8	*
28. SW10	*	331146.4	********	1.8	*
29. SW11	*	331157.9	********	1.8	*

30. SW12	* 331169.8	********	1.8	*
31. SW13	* 331181.4	********	1.8	*
32. SW14	* 331196.3	********	1.8	*
33. SE1	* 331208.7	********	1.8	*
34. SE2	* 331195.1	********	1.8	*
35. SE3	* 331183.6	********	1.8	*
36. SE4	* 331171.6	********	1.8	*
37. SE5	* 331162.7	********	1.8	*
38. SE6	* 331162.2	********	1.8	*
39. SE7	* 331162.7	********	1.8	*

DATE : 06/02/ 0
TIME : 14:52:35

RECEPTOR LOCATIONS

RECEPTOR	* COORDINATES (M) X	Y	Z	*
40. SE8	* 331174.2	********	1.8	*
41. SE9	* 331189.5	********	1.8	*
42. SE10	* 331204.5	********	1.8	*
43. SE11	* 331220.7	********	1.8	*
44. SE12	* 331234.4	********	1.8	*
45. SE13	* 331247.9	********	1.8	*
46. SE14	* 331260.3	********	1.8	*
47. SE15	* 331274.3	********	1.8	*
48. SE16	* 331288.4	********	1.8	*
49. SE17	* 331300.7	********	1.8	*
50. SE18	* 331316.8	********	1.8	*

MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: 0.-350.

WIND * CONCENTRATION
ANGLE * (PPM)

(DEGR)*	REC1	REC2	REC3	REC4	REC5	REC6	REC7	REC8	REC9	REC10	REC11	REC12	REC13	REC14	REC15	REC16	REC17	REC18	REC19	REC20
0. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
10. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
20. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2

30.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
40.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
50.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
60.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
70.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3
80.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3
90.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3
100.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3
110.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3
120.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3
130.	*	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
140.	*	2.4	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
150.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
160.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
170.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
180.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
190.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
200.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
210.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
220.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
230.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
240.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
250.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
260.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
270.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
280.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
290.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
300.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
310.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
320.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3
330.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3
340.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3
350.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3
MAX	*	2.4	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3
DEGR.	*	140	0	0	0	0	0	290	290	240	290	0	0	0	0	0	0	0	0	120	350

JOB: 9_MELCHER SUMMER_NB RUN: NO BUILD CONDITION

MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: 0.-350.

WIND * CONCENTRATION
ANGLE * (PPM)
(DEGR)* REC21 REC22 REC23 REC24 REC25 REC26 REC27 REC28 REC29 REC30 REC31 REC32 REC33
REC34 REC35 REC36 REC37 REC38 REC39 REC40

0.	*	2.2	2.2	2.2	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
10.	*	2.2	2.2	2.2	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
20.	*	2.2	2.2	2.2	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
30.	*	2.2	2.2	2.2	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
40.	*	2.2	2.2	2.2	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
50.	*	2.2	2.2	2.2	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
60.	*	2.2	2.2	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
70.	*	2.3	2.2	2.3	2.4	2.4	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
80.	*	2.3	2.3	2.4	2.4	2.4	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3
90.	*	2.3	2.3	2.4	2.4	2.4	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3
100.	*	2.3	2.3	2.4	2.4	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3
110.	*	2.3	2.3	2.4	2.4	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3
120.	*	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3
130.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
140.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
150.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
160.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
170.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
180.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
190.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
200.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
210.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
220.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
230.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
240.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
250.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
260.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
270.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
280.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
290.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
300.	*	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
310.	*	2.3	2.3	2.3	2.3	2.4	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2
320.	*	2.3	2.3	2.3	2.4	2.4	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3
330.	*	2.3	2.3	2.3	2.4	2.4	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3
340.	*	2.3	2.3	2.3	2.4	2.4	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3
350.	*	2.3	2.3	2.3	2.4	2.4	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
MAX	*	2.3	2.3	2.4	2.4	2.4	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3
DEGR.	*	350	350	80	70	70	340	0	0	0	0	0	0	0	0	0	0	0	0	310	340

JOB: 9_MELCHER SUMMER_NB RUN: NO BUILD CONDITION

MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: 0.-350.

WIND * CONCENTRATION
ANGLE * (PPM)

(DEGR)*	REC41	REC42	REC43	REC44	REC45	REC46	REC47	REC48	REC49	REC50
0. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
10. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
20. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
30. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
40. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
50. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
60. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
70. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
80. *	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.2
90. *	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.2
100. *	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.2
110. *	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.2
120. *	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.2
130. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
140. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
150. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
160. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
170. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
180. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
190. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
200. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
210. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
220. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
230. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
240. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
250. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
260. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
270. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
280. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
290. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
300. *	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.2	2.2	2.3
310. *	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
320. *	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
330. *	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
340. *	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
350. *	2.3	2.2	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.2
MAX *	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
DEGR. *	350	340	350	350	350	350	350	340	340	340

THE HIGHEST CONCENTRATION OF 2.40 PPM OCCURRED AT RECEPTOR REC24.

JOB: 9_MELCHER SUMMER_NB RUN: NO BUILD CONDITION

DATE : 06/02/ 0
TIME : 14:52:35

RECEPTOR - LINK MATRIX FOR THE ANGLE PRODUCING
THE MAXIMUM CONCENTRATION FOR EACH RECEPTOR

* CO/LINK (PPM)
* ANGLE (DEGREES)
* REC1 REC2 REC3 REC4 REC5 REC6 REC7 REC8 REC9 REC10 REC11 REC12 REC13 REC14 REC15 REC16 REC17 REC18 REC19 REC20

LINK # *	140	0	0	0	0	0	290	290	240	290	0	0	0	0	0	0	0	0	120	350
1 *	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1
2 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4 *	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

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JOB: 9_MELCHER SUMMER_NB RUN: NO BUILD CONDITION

DATE : 06/02/ 0
TIME : 14:52:35

RECEPTOR - LINK MATRIX FOR THE ANGLE PRODUCING
THE MAXIMUM CONCENTRATION FOR EACH RECEPTOR

* CO/LINK (PPM)
* ANGLE (DEGREES)
* REC21 REC22 REC23 REC24 REC25 REC26 REC27 REC28 REC29 REC30 REC31 REC32 REC33 REC34 REC35 REC36 REC37 REC38 REC39 REC40

LINK # *	350	350	80	70	70	340	0	0	0	0	0	0	0	0	0	0	0	0	310	340
1 *	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0
2 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
3 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9 *	0.0	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

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JOB: 9_MELCHER SUMMER_NB RUN: NO BUILD CONDITION

DATE : 06/02/ 0
TIME : 14:52:35

RECEPTOR - LINK MATRIX FOR THE ANGLE PRODUCING
THE MAXIMUM CONCENTRATION FOR EACH RECEPTOR

*	CO/LINK (PPM)									
*	ANGLE (DEGREES)									
*	REC41	REC42	REC43	REC44	REC45	REC46	REC47	REC48	REC49	REC50
LINK # *	350	340	350	350	350	350	350	340	340	340
1 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2 *	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
3 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

1 CAL3QHC - (DATED 95221)

CAL3QHC PC (32 BIT) VERSION 3.0.0

Run Began on 6/02/2016 at 14:22:44

JOB: 1_CONGRESS A_BD RUN: Build Condition

DATE : 06/02/ 0
TIME : 14:22:44

The MODE flag has been set to C for calculating CO averages.

SITE & METEOROLOGICAL VARIABLES

VS = 0.0 CM/S VD = 0.0 CM/S Z0 = 100. CM
U = 1.0 M/S CLAS = 4 (D) ATIM = 60. MINUTES MIXH = 1000. M AMB = 2.2 PPM

LINK VARIABLES

LINK DESCRIPTION	*	X1	Y1	X2	Y2	*	LENGTH (M)	BRG (DEG)	TYPE	VPH	EF (G/MI)	H (M)	W (M)	V/C	QUEUE (VEH)
1. CONGRESS_EB1@ASTFF	*	331381.0	********	331331.1	********	*	68.	312.	AG	594.	1.7	0.0	13.1		
2. CONGRESS_EB2@ASTFF	*	331380.5	********	331434.9	********	*	71.	130.	AG	741.	1.7	0.0	9.4		
3. CONGRESS_WB1@ASTFF	*	331386.6	********	331441.0	********	*	69.	128.	AG	570.	1.7	0.0	10.1		
4. CONGRESS_WB2@ASTFF	*	331388.6	********	331338.1	********	*	66.	310.	AG	539.	1.7	0.0	10.1		
5. AST_NB1@CONGRESSFF	*	331375.6	********	331335.4	********	*	75.	212.	AG	583.	1.7	0.0	10.1		
6. AST_NB2@CONGRESSFF	*	331397.6	********	331431.9	********	*	65.	32.	AG	40.	1.7	0.0	6.4		
7. THOMSON_SB1@CONGRESS	*	331391.3	********	331429.6	********	*	65.	36.	AG	56.	1.7	0.0	8.2		
8. THOMSON_SB2@CONGRESS	*	331371.7	********	331334.1	********	*	73.	211.	AG	483.	1.7	0.0	7.0		
9. CONGRESS_EBTHRU@ASTQ	*	331371.9	********	331353.2	********	*	25.	311.	AG	24.	100.0	0.0	6.7	0.48	4.1
10. CONGRESS_EBRT@ASTQ	*	331368.7	********	331347.2	********	*	28.	311.	AG	12.	100.0	0.0	3.3	0.55	4.7
11. CONGRESS_WBLT@ASTQ	*	331400.2	********	331419.1	********	*	25.	130.	AG	9.	100.0	0.0	3.3	0.37	4.1
12. CONGRESS_WBTHRU@ASTQ	*	331402.5	********	331427.5	********	*	31.	127.	AG	9.	100.0	0.0	3.7	0.47	5.2
13. AST_NBLT@CONGRESSQ	*	331370.4	********	331347.9	********	*	43.	211.	AG	14.	100.0	0.0	3.3	0.95	7.2
14. AST_NBRT@CONGRESSQ	*	331373.5	********	331350.8	********	*	42.	212.	AG	11.	100.0	0.0	3.7	0.69	7.1
15. THOMSON_SB@CONGRESSQ	*	331394.2	********	331399.6	********	*	9.	38.	AG	15.	100.0				

0.0 5.2 0.35 1.5

JOB: 1_CONGRESS A_BD RUN: Build Condition

DATE : 06/02/ 0
TIME : 14:22:44

ADDITIONAL QUEUE LINK PARAMETERS

LINK DESCRIPTION	CYCLE LENGTH (SEC)	RED TIME (SEC)	CLEARANCE LOST TIME (SEC)	APPROACH VOL (VPH)	SATURATION FLOW RATE (VPH)	IDLE EM FAC (gm/hr)	SIGNAL TYPE	ARRIVAL RATE
9. CONGRESS_EBTHRU@ASTQ	110	79	2.0	379	1600	6.26	2	3
10. CONGRESS_EBRT@ASTQ	110	79	2.0	215	1600	6.26	2	3
11. CONGRESS_WBLT@ASTQ	110	59	2.0	251	1600	6.26	2	3
12. CONGRESS_WBTHRU@ASTQ	110	59	2.0	319	1600	6.26	2	3
13. AST_NBLT@CONGRESSQ	110	90	2.0	220	1600	6.26	2	3
14. AST_NBRT@CONGRESSQ	110	70	2.0	363	1600	6.26	2	3
15. THOMSON_SB@CONGRESSQ	110	95	2.0	56	1600	6.26	2	3

RECEPTOR LOCATIONS

RECEPTOR	X (M)	Y (M)	Z (M)
1. NW1	331341.1	********	1.8
2. NW2	331347.9	********	1.8
3. NW3	331354.7	********	1.8
4. NW4	331361.8	********	1.8
5. NW5	331369.2	********	1.8
6. NW6	331377.6	********	1.8
7. NW7	331386.3	********	1.8
8. NW8	331391.9	********	1.8
9. NW9	331391.5	********	1.8
10. NW10	331397.1	********	1.8
11. NW11	331403.9	********	1.8
12. NW12	331410.2	********	1.8
13. NW13	331416.9	********	1.8
14. NW14	331426.6	********	1.8
15. NE1	331434.9	********	1.8
16. NE2	331428.6	********	1.8
17. NE3	331423.0	********	1.8
18. NE4	331418.2	********	1.8
19. NE5	331412.4	********	1.8
20. NE6	331407.7	********	1.8
21. NE7	331403.2	********	1.8
22. NE8	331411.5	********	1.8
23. NE9	331421.6	********	1.8
24. NE10	331431.1	********	1.8
25. NE11	331443.6	********	1.8
26. SE1	331431.8	********	1.8
27. SE2	331422.5	********	1.8

28. SE3 * 331413.9 ******** 1.8 *
29. SE4 * 331403.0 ******** 1.8 *
30. SE5 * 331391.3 ******** 1.8 *
31. SE6 * 331384.0 ******** 1.8 *
32. SE7 * 331377.5 ******** 1.8 *
33. SE8 * 331371.3 ******** 1.8 *
34. SE9 * 331364.7 ******** 1.8 *
35. SE10 * 331357.7 ******** 1.8 *
36. SE11 * 331351.4 ******** 1.8 *
37. SE12 * 331346.1 ******** 1.8 *
38. SE13 * 331339.3 ******** 1.8 *

DATE : 06/02/ 0
TIME : 14:22:44

RECEPTOR LOCATIONS

RECEPTOR	X	Y	Z
39. SW1	331330.6	********	1.8
40. SW2	331332.2	********	1.8
41. SW3	331339.3	********	1.8
42. SW4	331346.3	********	1.8
43. SW5	331353.3	********	1.8
44. SW6	331359.4	********	1.8
45. SW7	331365.0	********	1.8
46. SW8	331357.1	********	1.8
47. SW9	331347.0	********	1.8
48. SW10	331336.7	********	1.8
49. SW11	331326.7	********	1.8

(COORDINATES (M))

MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: 0.-350.

WIND * CONCENTRATION
ANGLE * (PPM)

(DEGR)	REC1	REC2	REC3	REC4	REC5	REC6	REC7	REC8	REC9	REC10	REC11	REC12	REC13	REC14	REC15	REC16	REC17	REC18	REC19	REC20
0.	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
10.	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2

20.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
30.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
40.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
50.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
60.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
70.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
80.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
90.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
100.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
110.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
120.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
130.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
140.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
150.	*	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
160.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
170.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
180.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
190.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
200.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
210.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
220.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
230.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
240.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
250.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
260.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
270.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
280.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
290.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
300.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
310.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
320.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
330.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
340.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
350.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
------	*	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
MAX	*	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
DEGR.	*	0	150	0	0	0	0	0	0	310	0	0	0	0	0	0	0	0	0	0	0

PAGE 5

JOB: 1_CONGRESS A_BD RUN: Build Condition

MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: 0.-350.

WIND * CONCENTRATION
ANGLE * (PPM)
(DEGR)* REC21 REC22 REC23 REC24 REC25 REC26 REC27 REC28 REC29 REC30 REC31 REC32 REC33

REC34 REC35 REC36 REC37 REC38 REC39 REC40

0.	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.2	2.2	2.2	2.2	2.2
10.	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.2	2.2	2.3	2.2	2.2
20.	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.2	2.3	2.3	2.2	2.2
30.	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2
40.	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2
50.	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2
60.	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
70.	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
80.	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
90.	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
100.	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
110.	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
120.	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
130.	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
140.	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
150.	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
160.	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
170.	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
180.	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
190.	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
200.	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
210.	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
220.	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2
230.	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.4	2.4	2.2	2.2	2.2	2.2	2.2	2.2
240.	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2
250.	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2
260.	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
270.	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
280.	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
290.	2.2	2.2	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
300.	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
310.	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
320.	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
330.	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
340.	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
350.	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2
MAX	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.4	2.4	2.3	2.2	2.3	2.3	2.3	2.2
DEGR.	0	150	290	290	300	350	350	350	350	350	130	330	230	230	20	0	20	20	50	0

MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: 0.-350.

WIND * CONCENTRATION
ANGLE * (PPM)

(DEGR)*	REC41	REC42	REC43	REC44	REC45	REC46	REC47	REC48	REC49
0. *	2.2	2.2	2.2	2.2	2.3	2.3	2.2	2.2	2.2
10. *	2.2	2.2	2.2	2.2	2.3	2.3	2.2	2.2	2.2
20. *	2.2	2.2	2.2	2.2	2.3	2.3	2.2	2.2	2.2
30. *	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2
40. *	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2
50. *	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2
60. *	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2
70. *	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.2	2.2
80. *	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2
90. *	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2
100. *	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2
110. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
120. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3
130. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
140. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
150. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
160. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
170. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
180. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
190. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
200. *	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2
210. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
220. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
230. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
240. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
250. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
260. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
270. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
280. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
290. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
300. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
310. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
320. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
330. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
340. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
350. *	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2
MAX *	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.2	2.3
DEGR. *	0	0	0	0	350	70	100	0	120

THE HIGHEST CONCENTRATION OF 2.40 PPM OCCURRED AT RECEPTOR REC33.

JOB: 1_CONGRESS A_BD RUN: Build Condition

DATE : 06/02/ 0
TIME : 14:22:44

RECEPTOR - LINK MATRIX FOR THE ANGLE PRODUCING

THE MAXIMUM CONCENTRATION FOR EACH RECEPTOR

* CO/LINK (PPM)
* ANGLE (DEGREES)

LINK #	REC1	REC2	REC3	REC4	REC5	REC6	REC7	REC8	REC9	REC10	REC11	REC12	REC13	REC14	REC15	REC16	REC17	REC18	REC19	REC20
LINK # *	0	150	0	0	0	0	0	0	310	0	0	0	0	0	0	0	0	0	0	0
1 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4 *	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

PAGE 8

JOB: 1_CONGRESS A_BD RUN: Build Condition

DATE : 06/02/ 0
TIME : 14:22:44

RECEPTOR - LINK MATRIX FOR THE ANGLE PRODUCING
THE MAXIMUM CONCENTRATION FOR EACH RECEPTOR

* CO/LINK (PPM)
* ANGLE (DEGREES)

LINK #	REC21	REC22	REC23	REC24	REC25	REC26	REC27	REC28	REC29	REC30	REC31	REC32	REC33	REC34	REC35	REC36	REC37	REC38	REC39	REC40
LINK # *	0	150	290	290	300	350	350	350	350	350	130	330	230	230	20	0	20	20	50	0
1 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2 *	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3 *	0.0	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.1	0.1	0.1	0.0
6 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0
15 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DATE : 06/02/ 0
TIME : 14:22:44

RECEPTOR - LINK MATRIX FOR THE ANGLE PRODUCING
THE MAXIMUM CONCENTRATION FOR EACH RECEPTOR

* CO/LINK (PPM)									
* ANGLE (DEGREES)									
*	REC41	REC42	REC43	REC44	REC45	REC46	REC47	REC48	REC49
LINK # *	0	0	0	0	350	70	100	0	120
1 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
2 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9 *	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.0	0.0
10 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

```
1                   CAL3QHC - (DATED 95221)

            CAL3QHC  PC (32 BIT) VERSION 3.0.0
           (C) COPYRIGHT 1993-2000, TRINITY CONSULTANTS

 Run Began on  6/02/2016 at 14:43:01

    JOB: 4_NECCO A_BD                          RUN: BUILD CONDITION

    DATE : 06/02/   0
    TIME : 14:43:01

      The MODE flag has been set to C for calculating CO averages.

     SITE & METEOROLOGICAL VARIABLES
     -------------------------------
     VS =   0.0 CM/S      VD =   0.0 CM/S      Z0 = 100. CM
      U =  1.0 M/S        CLAS =   4  (D)     ATIM =  60. MINUTES     MIXH =  1000. M   AMB =  2.2 PPM

     LINK VARIABLES
     --------------
      LINK DESCRIPTION     *        LINK COORDINATES (M)          *    LENGTH  BRG TYPE   VPH    EF     H
 W    V/C QUEUE
                        *   X1       Y1       X2       Y2    *     (M)   (DEG)          (G/MI)   (M) (M)      (VEH)
    ------------------------*--------------------------------------*-------------------------------------------------------
     1. NECCO_EB@ASTFF      * 331215.0  ********  331137.1  ******** *     92.   302. AG    286.   1.7   0.0  6.4
     2. NECCO_WB@ASTFF      * 331217.6  ********  331140.8  ******** *     91.   303. AG     61.   1.7   0.0  6.7
     3. AST_NB1@NECCOFF     * 331223.8  ********  331177.9  ******** *     85.   213. AG    492.   1.7   0.0  8.2
     4. AST_NB2@NECCOFF     * 331225.7  ********  331250.4  ******** *     43.    35. AG    555.   1.7   0.0  7.9
     5. AST_SB1@NECCOFF     * 331219.8  ********  331244.5  ******** *     43.    35. AG    505.   1.7   0.0  7.0
     6. AST_SB2@NECCOFF     * 331219.5  ********  331172.3  ******** *     86.   213. AG    667.   1.7   0.0  7.3
     7. NECCO_EB@ASTQ       * 331208.6  ********  331180.1  ******** *     33.   301. AG     10. 100.0   0.0  3.3
0.47   5.6
                                                                      PAGE  2
    JOB: 4_NECCO A_BD                          RUN: BUILD CONDITION

    DATE : 06/02/   0
    TIME : 14:43:01

     ADDITIONAL QUEUE LINK PARAMETERS
     --------------------------------
      LINK DESCRIPTION     *    CYCLE    RED     CLEARANCE  APPROACH  SATURATION   IDLE   SIGNAL
  ARRIVAL
                        *    LENGTH   TIME    LOST TIME    VOL     FLOW RATE   EM FAC   TYPE     RATE
                        *     (SEC)   (SEC)    (SEC)      (VPH)      (VPH)    (gm/hr)
    ------------------------*--------------------------------------------------------------------------------
     7. NECCO_EB@ASTQ       *     120       70       2.0       286       1600       6.26      1       3

     RECEPTOR LOCATIONS
     ------------------
                        *         COORDINATES (M)          *
      RECEPTOR             *      X          Y          Z        *
    -------------------------*-------------------------------------*
```

1.	NW2	*	331143.8	********	1.8	*
2.	NW3	*	331150.0	********	1.8	*
3.	NW4	*	331157.6	********	1.8	*
4.	NW5	*	331167.1	********	1.8	*
5.	NW6	*	331174.9	********	1.8	*
6.	NW7	*	331184.5	********	1.8	*
7.	NW8	*	331192.5	********	1.8	*
8.	NW9	*	331201.8	********	1.8	*
9.	NW10	*	331211.6	********	1.8	*
10.	NW11	*	331219.0	********	1.8	*
11.	NW12	*	331224.8	********	1.8	*
12.	NW13	*	331231.1	********	1.8	*
13.	NW14	*	331237.2	********	1.8	*
14.	NW15	*	331241.1	********	1.8	*
15.	E1	*	331254.4	********	1.8	*
16.	E2	*	331249.2	********	1.8	*
17.	E3	*	331243.4	********	1.8	*
18.	E4	*	331237.7	********	1.8	*
19.	E5	*	331229.7	********	1.8	*
20.	E6	*	331223.5	********	1.8	*
21.	E7	*	331217.2	********	1.8	*
22.	E8	*	331211.3	********	1.8	*
23.	E9	*	331204.6	********	1.8	*
24.	E10	*	331197.7	********	1.8	*
25.	E11	*	331191.9	********	1.8	*
26.	E12	*	331186.4	********	1.8	*
27.	E13	*	331182.2	********	1.8	*
28.	SW1	*	331168.7	********	1.8	*
29.	SW2	*	331175.4	********	1.8	*
30.	SW3	*	331181.9	********	1.8	*
31.	SW4	*	331188.8	********	1.8	*
32.	SW5	*	331194.2	********	1.8	*
33.	SW6	*	331200.3	********	1.8	*
34.	SW7	*	331206.8	********	1.8	*
35.	SW8	*	331212.3	********	1.8	*
36.	SW9	*	331202.2	********	1.8	*
37.	SW10	*	331190.7	********	1.8	*
38.	SW11	*	331178.4	********	1.8	*
39.	SW12	*	331168.2	********	1.8	*
40.	SW13	*	331157.5	********	1.8	*
41.	SW14	*	331147.3	********	1.8	*
42.	SW15	*	331136.2	********	1.8	*

MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: 0.-350.

WIND * CONCENTRATION
ANGLE * (PPM)

(DEGR)*	REC1	REC2	REC3	REC4	REC5	REC6	REC7	REC8	REC9	REC10	REC11	REC12	REC13	REC14	REC15	REC16	REC17	REC18	REC19	REC20
0. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
10. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
20. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2
30. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
40. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
50. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
60. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
70. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
80. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
90. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
100. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
110. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
120. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
130. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
140. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
150. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
160. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
170. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
180. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
190. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
200. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
210. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
220. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
230. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2
240. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
250. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
260. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
270. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
280. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
290. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
300. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
310. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
320. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
330. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
340. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
350. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
MAX *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.3	2.2
DEGR. *	0	0	0	0	0	0	0	0	0	210	0	0	0	0	230	0	0	0	20	0

PAGE 4

JOB: 4_NECCO A_BD RUN: BUILD CONDITION

MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first

angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: 0.-350.

WIND * CONCENTRATION
ANGLE * (PPM)

(DEGR)*	REC21	REC22	REC23	REC24	REC25	REC26	REC27	REC28	REC29	REC30	REC31	REC32	REC33	REC34	REC35	REC36	REC37	REC38	REC39	REC40
0. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
10. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
20. *	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
30. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
40. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
50. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2
60. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2
70. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2
80. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
90. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
100. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
110. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
120. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
130. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
140. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
150. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
160. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
170. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
180. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2
190. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2
200. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2
210. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2
220. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
230. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
240. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
250. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
260. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
270. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
280. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
290. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
300. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
310. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
320. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
330. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
340. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
350. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
MAX *	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2
DEGR. *	0	0	0	0	0	20	0	60	70	200	200	210	210	210	210	0	0	0	0	0

MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: 0.-350.

WIND ANGLE (DEGR)	CONCENTRATION (PPM) REC41	REC42
0.	2.2	2.2
10.	2.2	2.2
20.	2.2	2.2
30.	2.2	2.2
40.	2.2	2.2
50.	2.2	2.2
60.	2.2	2.2
70.	2.2	2.2
80.	2.2	2.2
90.	2.2	2.2
100.	2.2	2.2
110.	2.2	2.2
120.	2.2	2.2
130.	2.2	2.2
140.	2.2	2.2
150.	2.2	2.2
160.	2.2	2.2
170.	2.2	2.2
180.	2.2	2.2
190.	2.2	2.2
200.	2.2	2.2
210.	2.2	2.2
220.	2.2	2.2
230.	2.2	2.2
240.	2.2	2.2
250.	2.2	2.2
260.	2.2	2.2
270.	2.2	2.2
280.	2.2	2.2
290.	2.2	2.2
300.	2.2	2.2
310.	2.2	2.2
320.	2.2	2.2
330.	2.2	2.2
340.	2.2	2.2
350.	2.2	2.2
MAX	2.2	2.2
DEGR.	0	0

THE HIGHEST CONCENTRATION OF 2.30 PPM OCCURRED AT RECEPTOR REC15.

DATE : 06/02/ 0
TIME : 14:43:01

RECEPTOR - LINK MATRIX FOR THE ANGLE PRODUCING
THE MAXIMUM CONCENTRATION FOR EACH RECEPTOR

* CO/LINK (PPM)
* ANGLE (DEGREES)

*	REC1	REC2	REC3	REC4	REC5	REC6	REC7	REC8	REC9	REC10	REC11	REC12	REC13	REC14	REC15	REC16	REC17	REC18	REC19	REC20
LINK # *	0	0	0	0	0	0	0	0	0	210	0	0	0	0	230	0	0	0	20	0
1 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.0
5 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DATE : 06/02/ 0
TIME : 14:43:01

RECEPTOR - LINK MATRIX FOR THE ANGLE PRODUCING
THE MAXIMUM CONCENTRATION FOR EACH RECEPTOR

* CO/LINK (PPM)
* ANGLE (DEGREES)

*	REC21	REC22	REC23	REC24	REC25	REC26	REC27	REC28	REC29	REC30	REC31	REC32	REC33	REC34	REC35	REC36	REC37	REC38	REC39	REC40
LINK # *	0	0	0	0	0	20	0	60	70	200	200	210	210	210	210	0	0	0	0	0
1 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3 *	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0
7 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DATE : 06/02/ 0
TIME : 14:43:01

RECEPTOR - LINK MATRIX FOR THE ANGLE PRODUCING

THE MAXIMUM CONCENTRATION FOR EACH RECEPTOR

*	CO/LINK (PPM)
*	ANGLE (DEGREES)

	*	REC41	REC42
LINK #	*	0	0
1	*	0.0	0.0
2	*	0.0	0.0
3	*	0.0	0.0
4	*	0.0	0.0
5	*	0.0	0.0
6	*	0.0	0.0
7	*	0.0	0.0

1 CAL3QHC - (DATED 95221)

CAL3QHC PC (32 BIT) VERSION 3.0.0

Run Began on 6/02/2016 at 14:53:48

JOB: 9_MELCHER SUMMER_BD RUN: BUILD CONDITION

DATE : 06/02/ 0
TIME : 14:53:48

The MODE flag has been set to C for calculating CO averages.

SITE & METEOROLOGICAL VARIABLES

VS = 0.0 CM/S VD = 0.0 CM/S Z0 = 100. CM
U = 1.0 M/S CLAS = 4 (D) ATIM = 60. MINUTES MIXH = 1000. M AMB = 2.2 PPM

LINK VARIABLES

LINK DESCRIPTION * LINK COORDINATES (M) * LENGTH BRG TYPE VPH EF H
W V/C QUEUE
* X1 Y1 X2 Y2 * (M) (DEG) (G/MI) (M) (M) (VEH)
------------------------*--*--
1. SUMMER_EB1@MELCHERFF* 331153.4 ******** 331026.4 ******** * 151. 303. AG 850. 1.7
0.0 11.6
2. SUMMER_EB2@MELCHERFF* 331153.4 ******** 331320.2 ******** * 199. 123. AG 765. 1.7
0.0 11.3
3. SUMMER_WB1@MELCHERFF* 331157.8 ******** 331322.6 ******** * 195. 123. AG 428. 1.7
0.0 12.8
4. SUMMER_WB2@MELCHERFF* 331157.2 ******** 331033.6 ******** * 145. 302. AG 635. 1.7
0.0 12.2
5. MELCHER_NB@SUMMERFF * 331156.0 ******** 331157.0 ******** * 41. 179. AG 330. 1.7 0.0
9.8
6. MELCHER_NB@SUMMERFF * 331157.0 ******** 331204.7 ******** * 69. 137. AG 330. 1.7 0.0
9.8
7. MELCHER_SB@SUMMERFF * 331148.1 ******** 331150.1 ******** * 44. 177. AG 208. 1.7 0.0
6.4
8. MELCHER_SB@SUMMERFF * 331150.1 ******** 331199.2 ******** * 70. 136. AG 208. 1.7 0.0
6.4
9. SUMMER_EB@MELCHERQ * 331137.4 ******** 331096.2 ******** * 49. 303. AG 21. 100.0 0.0
7.3 0.79 8.1
10. SUMMER_WB@MELCHERQ * 331166.1 ******** 331186.8 ******** * 25. 123. AG 21. 100.0
0.0 9.8 0.40 4.1
11. MELCHER_NBLT@SUMMERQ* 331154.3 ******** 331154.9 ******** * 30. 179. AG 11. 100.0
0.0 3.3 0.52 5.0
12. MELCHER_NBLT@SUMMERQ* 331154.9 ******** 331175.6 ******** * 30. 136. AG 11. 100.0
0.0 3.3 0.52 5.0
13. MELCHER_NBRT@SUMMERQ* 331156.3 ******** 331156.9 ******** * 11. 177. AG 11. 100.0
0.0 3.3 0.19 1.8
14. MELCHER_NBRT@SUMMERQ* 331158.0 ******** 331165.4 ******** * 11. 136. AG 11. 100.0
0.0 3.3 0.19 1.8

JOB: 9_MELCHER SUMMER_BD RUN: BUILD CONDITION

DATE : 06/02/ 0
TIME : 14:53:48

ADDITIONAL QUEUE LINK PARAMETERS

LINK DESCRIPTION	CYCLE LENGTH (SEC)	RED TIME (SEC)	CLEARANCE LOST TIME (SEC)	APPROACH VOL (VPH)	SATURATION FLOW RATE (VPH)	IDLE EM FAC (gm/hr)	SIGNAL TYPE	ARRIVAL RATE
9. SUMMER_EB@MELCHERQ	110	69	2.0	850	1600	6.26	2	3
10. SUMMER_WB@MELCHERQ	110	69	2.0	428	1600	6.26	2	3
11. MELCHER_NBLT@SUMMERQ	110	74	2.0	243	1600	6.26	2	3
12. MELCHER_NBLT@SUMMERQ	110	74	2.0	243	1600	6.26	2	3
13. MELCHER_NBRT@SUMMERQ	110	74	2.0	87	1600	6.26	2	3
14. MELCHER_NBRT@SUMMERQ	110	74	2.0	87	1600	6.26	2	3

RECEPTOR LOCATIONS

RECEPTOR	X (M)	Y (M)	Z (M)
1. N1	331035.7	********	1.8
2. N2	331056.1	********	1.8
3. N3	331072.7	********	1.8
4. N4	331088.1	********	1.8
5. N5	331103.0	********	1.8
6. N6	331120.9	********	1.8
7. N7	331138.8	********	1.8
8. N8	331158.4	********	1.8
9. N9	331174.2	********	1.8
10. N10	331190.8	********	1.8
11. N11	331208.7	********	1.8
12. N12	331225.7	********	1.8
13. N13	331242.4	********	1.8
14. N14	331254.7	********	1.8
15. N15	331270.6	********	1.8
16. N16	331288.4	********	1.8
17. N17	331303.3	********	1.8
18. N18	331324.7	********	1.8
19. SW1	331022.4	********	1.8
20. SW2	331042.5	********	1.8
21. SW3	331060.8	********	1.8
22. SW4	331076.6	********	1.8
23. SW5	331092.3	********	1.8
24. SW6	331108.6	********	1.8
25. SW7	331125.2	********	1.8
26. SW8	331144.3	********	1.8
27. SW9	331144.7	********	1.8
28. SW10	331146.4	********	1.8
29. SW11	331157.9	********	1.8

```
 30. SW12              *    331169.8   ********      1.8   *
 31. SW13              *    331181.4   ********      1.8   *
 32. SW14              *    331196.3   ********      1.8   *
 33. SE1              *    331208.7   ********      1.8   *
 34. SE2              *    331195.1   ********      1.8   *
 35. SE3              *    331183.6   ********      1.8   *
 36. SE4              *    331171.6   ********      1.8   *
 37. SE5              *    331162.7   ********      1.8   *
 38. SE6              *    331162.2   ********      1.8   *
 39. SE7              *    331162.7   ********      1.8   *
```

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JOB: 9_MELCHER SUMMER_BD   RUN: BUILD CONDITION

DATE : 06/02/   0
TIME : 14:53:48

RECEPTOR LOCATIONS

```
                   *         COORDINATES (M)         *
   RECEPTOR          *      X          Y         Z       *
 -------------------------*------------------------------------*
 40. SE8              *    331174.2   ********      1.8   *
 41. SE9              *    331189.5   ********      1.8   *
 42. SE10              *    331204.5   ********      1.8   *
 43. SE11              *    331220.7   ********      1.8   *
 44. SE12              *    331234.4   ********      1.8   *
 45. SE13              *    331247.9   ********      1.8   *
 46. SE14              *    331260.3   ********      1.8   *
 47. SE15              *    331274.3   ********      1.8   *
 48. SE16              *    331288.4   ********      1.8   *
 49. SE17              *    331300.7   ********      1.8   *
 50. SE18              *    331316.8   ********      1.8   *
```

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JOB: 9_MELCHER SUMMER_BD   RUN: BUILD CONDITION

MODEL RESULTS

REMARKS : In search of the angle corresponding to
          the maximum concentration, only the first
          angle, of the angles with same maximum
          concentrations, is indicated as maximum.

WIND ANGLE RANGE: 0.-350.

```
WIND  * CONCENTRATION
ANGLE *      (PPM)
(DEGR)* REC1  REC2  REC3  REC4  REC5  REC6  REC7  REC8  REC9  REC10 REC11 REC12 REC13 REC14
REC15 REC16 REC17 REC18 REC19 REC20
------*--------------------------------------------------------------------------------------------------------------------------
   0.  *   2.2   2.2   2.2   2.2   2.2   2.2   2.2   2.2   2.2   2.2   2.2   2.2   2.2   2.2   2.2   2.2   2.2   2.2   2.2   2.2
  10.  *   2.2   2.2   2.2   2.2   2.2   2.2   2.2   2.2   2.2   2.2   2.2   2.2   2.2   2.2   2.2   2.2   2.2   2.2   2.2   2.2
  20.  *   2.2   2.2   2.2   2.2   2.2   2.2   2.2   2.2   2.2   2.2   2.2   2.2   2.2   2.2   2.2   2.2   2.2   2.2   2.2   2.2
```

30.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
40.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
50.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
60.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
70.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3
80.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3
90.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3
100.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3
110.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3
120.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3
130.	*	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
140.	*	2.4	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
150.	*	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
160.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
170.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
180.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
190.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
200.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
210.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
220.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
230.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
240.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
250.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
260.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
270.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
280.	*	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
290.	*	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
300.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
310.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
320.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3
330.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3
340.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3
350.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3
MAX	*	2.4	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3
DEGR.	*	140	140	140	140	290	290	290	290	240	290	0	0	0	0	0	0	0	0	120	350

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JOB: 9_MELCHER SUMMER_BD RUN: BUILD CONDITION

MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: 0.-350.

WIND * CONCENTRATION
ANGLE * (PPM)
(DEGR)* REC21 REC22 REC23 REC24 REC25 REC26 REC27 REC28 REC29 REC30 REC31 REC32 REC33 REC34 REC35 REC36 REC37 REC38 REC39 REC40

0. *	2.2	2.2	2.2	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
10. *	2.2	2.2	2.2	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
20. *	2.2	2.2	2.2	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
30. *	2.2	2.2	2.2	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
40. *	2.2	2.2	2.2	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
50. *	2.2	2.2	2.2	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
60. *	2.2	2.2	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
70. *	2.3	2.2	2.3	2.4	2.4	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
80. *	2.3	2.3	2.4	2.4	2.4	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3
90. *	2.3	2.3	2.4	2.4	2.4	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3
100. *	2.3	2.3	2.4	2.4	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3
110. *	2.3	2.3	2.4	2.4	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3
120. *	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3
130. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
140. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
150. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
160. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
170. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
180. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
190. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
200. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
210. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
220. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
230. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
240. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
250. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
260. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
270. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
280. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
290. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
300. *	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
310. *	2.3	2.3	2.3	2.3	2.4	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2
320. *	2.3	2.3	2.3	2.4	2.4	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3
330. *	2.3	2.3	2.3	2.4	2.4	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3
340. *	2.3	2.3	2.3	2.4	2.4	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3
350. *	2.3	2.3	2.3	2.4	2.4	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
MAX *	2.3	2.3	2.4	2.4	2.4	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3
DEGR. *	350	350	80	70	70	340	0	0	0	0	0	0	0	0	0	0	0	0	310	340

JOB: 9_MELCHER SUMMER_BD RUN: BUILD CONDITION

MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: 0.-350.

WIND * CONCENTRATION
ANGLE * (PPM)

(DEGR)*	REC41	REC42	REC43	REC44	REC45	REC46	REC47	REC48	REC49	REC50
0. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
10. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
20. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
30. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
40. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
50. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
60. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
70. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
80. *	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.2
90. *	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.2
100. *	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.2
110. *	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.2
120. *	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.2
130. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
140. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
150. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
160. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
170. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
180. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
190. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
200. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
210. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
220. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
230. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
240. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
250. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
260. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
270. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
280. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
290. *	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
300. *	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.2	2.2	2.3
310. *	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
320. *	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
330. *	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
340. *	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
350. *	2.3	2.2	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.2
MAX *	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
DEGR. *	350	340	350	350	350	350	350	340	340	340

THE HIGHEST CONCENTRATION OF 2.40 PPM OCCURRED AT RECEPTOR REC24.

DATE : 06/02/ 0
TIME : 14:53:48

RECEPTOR - LINK MATRIX FOR THE ANGLE PRODUCING
THE MAXIMUM CONCENTRATION FOR EACH RECEPTOR

LINK #	REC1	REC2	REC3	REC4	REC5	REC6	REC7	REC8	REC9	REC10	REC11	REC12	REC13	REC14	REC15	REC16	REC17	REC18	REC19	REC20
CO/LINK (PPM) ANGLE (DEGREES)	140	140	140	140	290	290	290	290	240	290	0	0	0	0	0	0	0	0	120	350
1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

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JOB: 9_MELCHER SUMMER_BD RUN: BUILD CONDITION

DATE : 06/02/ 0
TIME : 14:53:48

RECEPTOR - LINK MATRIX FOR THE ANGLE PRODUCING
THE MAXIMUM CONCENTRATION FOR EACH RECEPTOR

LINK #	REC21	REC22	REC23	REC24	REC25	REC26	REC27	REC28	REC29	REC30	REC31	REC32	REC33	REC34	REC35	REC36	REC37	REC38	REC39	REC40
CO/LINK (PPM) ANGLE (DEGREES)	350	350	80	70	70	340	0	0	0	0	0	0	0	0	0	0	0	0	310	340
1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	0.0	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

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JOB: 9_MELCHER SUMMER_BD RUN: BUILD CONDITION

DATE : 06/02/ 0
TIME : 14:53:48

RECEPTOR - LINK MATRIX FOR THE ANGLE PRODUCING
THE MAXIMUM CONCENTRATION FOR EACH RECEPTOR

* CO/LINK (PPM)
* ANGLE (DEGREES)

LINK #	REC41	REC42	REC43	REC44	REC45	REC46	REC47	REC48	REC49	REC50
	350	340	350	350	350	350	350	340	340	340
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Mesoscale Analysis

- MOVES Mesoscale Link Output
- Mesoscale Analysis Model

MOVES Mesocale Link Output

GE HQ Mesoscale Emission Factors from MOVES2014a (g/mi)										
		2016 Existing			2021 No Build			2021 Build		
#	Link	NOx	VOC	CO2	NOx	VOC	CO2	NOx	VOC	CO2
1	A St (W Broadway/W 2nd)	0.4	1.2	481.3	0.2	0.7	427.4	0.2	0.7	427.4
2	W 2nd St (Dorchester/A St)	0.4	0.8	448.6	0.2	0.5	398.3	0.2	0.5	398.3
3	W 2nd St (A St/D St)	0.3	0.4	443.8	0.2	0.3	394.1	0.2	0.3	394.1
4	A St (W 2nd/Richards)	0.4	1.0	492.6	0.2	0.6	437.5	0.2	0.6	437.5
5	Sobin Park (A St/End)	0.4	1.9	533.4	0.2	1.1	473.2	0.2	1.1	473.2
6	Richards St (A St/SBBR)	0.3	1.2	425.4	0.1	0.7	377.7	0.1	0.7	377.7
7	A St (Richards/Necco St)	0.3	0.5	429.6	0.1	0.3	381.4	0.1	0.3	381.4
8	A St (Necco St/Necco Ct)	0.3	2.3	425.4	0.1	1.3	377.7	0.1	1.3	377.7
9	Necco St (A St/ GE Dwy)	0.3	1.9	425.4	0.1	1.1	377.7	0.1	1.1	377.7
10	Necco St (GE Dwy/ Necco Ct)	0.3	1.9	430.9	0.1	1.1	382.6	0.1	1.1	382.6
11	Necco Ct (Harborwalk/Necco St)	0.4	1.9	464.2	0.2	1.1	412.2	0.2	1.1	412.2
12	Necco Ct (Necco St/A St)	0.3	1.9	436.7	0.1	1.1	387.8	0.1	1.1	387.8
13	A St (Necco Ct/ Melcher St)	0.4	3.7	449.9	0.2	2.2	399.6	0.2	2.2	399.6
14	Necco St (Necco Ct/Melcher St)	0.4	3.7	477.7	0.2	2.2	424.2	0.2	2.2	424.2
15	Melcher St (Summer St/Necco St)	0.4	1.7	482.5	0.2	1.0	428.5	0.2	1.0	428.5
16	Melcher St (Necco St/ A St)	0.4	1.6	469.5	0.2	1.0	417.0	0.2	1.0	417.0
17	Summer St (Melcher St/Purchase St)	0.4	0.4	450.7	0.2	0.3	400.2	0.2	0.3	400.2
18	Summer St (Melcher St/D St)	0.3	0.3	444.3	0.2	0.2	394.6	0.2	0.2	394.6
19	A St (Melcher St/ Congress St)	0.3	1.2	425.4	0.1	0.7	377.7	0.1	0.7	377.7
20	Congress St (A St/ Purchase St)	0.3	0.4	441.6	0.2	0.2	392.2	0.2	0.2	392.2
21	Congress St (A St/ B St)	0.3	0.5	438.0	0.1	0.3	388.9	0.1	0.3	388.9
22	Thomson Pl (Congress St/ Seaport Ave)	0.3	0.7	433.7	0.1	0.4	385.2	0.1	0.4	385.2
23	GE Site Driveway (Build Only)	0.4	2.3	533.4	0.2	1.4	473.2	0.2	1.4	473.2
24	Idle Link [g/hr]	2.4	1.7	4090.1	0.9	0.9	3621.3	0.9	0.9	3621.3

2016 Link MOVES Output

yearID	monthID	dayID	hourID	stateID	countyID	zoneID	linkID	pollutantID	processID	emissionQuant	emissionRate	massUnits	distanceUnits	Link	1
2016	7	5	16	25	25025	250250	1	90	1	48.12519836	481.2519765	g	mi	CO2	481.2519765 g/mi
2016	7	5	16	25	25025	250250	1	87	15	0.000107214	0.00107214	g	mi	VOC	1.189185439 g/mi
2016	7	5	16	25	25025	250250	1	87	13	0.030339601	0.303396001	g	mi	Nox	0.392635398 g/mi
2016	7	5	16	25	25025	250250	1	87	11	0.052251302	0.522513009	g	mi		
2016	7	5	16	25	25025	250250	1	87	1	0.00844793	0.084479301	g	mi		
2016	7	5	16	25	25025	250250	1	3	15	8.84148E-06	8.84148E-05	g	mi		
2016	7	5	16	25	25025	250250	1	3	1	0.039254699	0.392546983	g	mi	Link	2
2016	7	5	16	25	25025	250250	2	90	1	71.771698	448.5731225	g	mi	CO2	448.5731225 g/mi
2016	7	5	16	25	25025	250250	2	87	15	0.00015901	0.000993813	g	mi	VOC	0.779644462 g/mi
2016	7	5	16	25	25025	250250	2	87	13	0.031216299	0.195101874	g	mi	Nox	0.350776066 g/mi
2016	7	5	16	25	25025	250250	2	87	11	0.052282002	0.326762519	g	mi		
2016	7	5	16	25	25025	250250	2	87	1	0.0125107	0.078191878	g	mi		
2016	7	5	16	25	25025	250250	2	3	15	1.27702E-05	7.98137E-05	g	mi		
2016	7	5	16	25	25025	250250	2	3	1	0.056111399	0.350696252	g	mi	Link	3
2016	7	5	16	25	25025	250250	3	90	1	142.0200043	443.8125233	g	mi	CO2	443.8125233 g/mi
2016	7	5	16	25	25025	250250	3	87	15	0.000314089	0.000981528	g	mi	VOC	0.44268248 g/mi
2016	7	5	16	25	25025	250250	3	87	13	0.0335541	0.104856563	g	mi	Nox	0.344281626 g/mi
2016	7	5	16	25	25025	250250	3	87	11	0.052363802	0.163636884	g	mi		
2016	7	5	16	25	25025	250250	3	87	1	0.0247113	0.077222813	g	mi		
2016	7	5	16	25	25025	250250	3	3	15	2.51152E-05	7.8485E-05	g	mi		
2016	7	5	16	25	25025	250250	3	3	1	0.110145003	0.344203141	g	mi	Link	4
2016	7	5	16	25	25025	250250	4	90	1	59.11780167	492.6483582	g	mi	CO2	492.6483582 g/mi
2016	7	5	16	25	25025	250250	4	87	15	0.000131686	0.001097383	g	mi	VOC	1.011991553 g/mi
2016	7	5	16	25	25025	250250	4	87	13	0.030631799	0.255264999	g	mi	Nox	0.40703049 g/mi
2016	7	5	16	25	25025	250250	4	87	11	0.052261598	0.43551333	g	mi		
2016	7	5	16	25	25025	250250	4	87	1	0.0103738	0.086448336	g	mi		
2016	7	5	16	25	25025	250250	4	3	15	1.09581E-05	9.13175E-05	g	mi		
2016	7	5	16	25	25025	250250	4	3	1	0.0488327	0.406939173	g	mi	Link	5
2016	7	5	16	25	25025	250250	5	90	1	32.00249863	533.374989	g	mi	CO2	533.374989 g/mi
2016	7	5	16	25	25025	250250	5	87	15	7.35545E-05	0.001225908	g	mi	VOC	1.931268323 g/mi
2016	7	5	16	25	25025	250250	5	87	13	0.0301935	0.503225015	g	mi	Nox	0.370869481 g/mi
2016	7	5	16	25	25025	250250	5	87	11	0.052246202	0.870770049	g	mi		
2016	7	5	16	25	25025	250250	5	87	1	0.00572404	0.095400666	g	mi		
2016	7	5	16	25	25025	250250	5	3	15	5.1687E-06	8.6145E-05	g	mi		
2016	7	5	16	25	25025	250250	5	3	1	0.022247	0.370783336	g	mi	Link	6
2016	7	5	16	25	25025	250250	6	90	1	42.53900146	425.3900083	g	mi	CO2	425.3900083 g/mi
2016	7	5	16	25	25025	250250	6	87	15	9.43193E-05	0.000943193	g	mi	VOC	1.178653992 g/mi
2016	7	5	16	25	25025	250250	6	87	13	0.030339601	0.303396001	g	mi	Nox	0.321471457 g/mi
2016	7	5	16	25	25025	250250	6	87	11	0.052251302	0.522513009	g	mi		
2016	7	5	16	25	25025	250250	6	87	1	0.00740768	0.0740768	g	mi		
2016	7	5	16	25	25025	250250	6	3	15	7.34574E-06	7.34574E-05	g	mi		
2016	7	5	16	25	25025	250250	6	3	1	0.0321398	0.321398	g	mi	Link	7
2016	7	5	16	25	25025	250250	7	90	1	128.8670044	429.5566642	g	mi	CO2	429.5566642 g/mi
2016	7	5	16	25	25025	250250	7	87	15	0.000285909	0.00095303	g	mi	VOC	0.46271767 g/mi
2016	7	5	16	25	25025	250250	7	87	13	0.033261899	0.110872992	g	mi	Nox	0.326746608 g/mi
2016	7	5	16	25	25025	250250	7	87	11	0.052353598	0.174511987	g	mi		
2016	7	5	16	25	25025	250250	7	87	1	0.0224663	0.074887664	g	mi		
2016	7	5	16	25	25025	250250	7	3	15	2.2387E-05	7.46233E-05	g	mi		
2016	7	5	16	25	25025	250250	7	3	1	0.098001599	0.326671985	g	mi	Link	8
2016	7	5	16	25	25025	250250	8	90	1	21.26950073	425.3900083	g	mi	CO2	425.3900083 g/mi
2016	7	5	16	25	25025	250250	8	87	15	4.71596E-05	0.000943192	g	mi	VOC	2.253790003 g/mi
2016	7	5	16	25	25025	250250	8	87	13	0.029609	0.592179997	g	mi	Nox	0.321471457 g/mi
2016	7	5	16	25	25025	250250	8	87	11	0.052225702	1.044514015	g	mi		
2016	7	5	16	25	25025	250250	8	87	1	0.00370384	0.0740768	g	mi		
2016	7	5	16	25	25025	250250	8	3	15	3.67287E-06	7.34574E-05	g	mi		
2016	7	5	16	25	25025	250250	8	3	1	0.0160699	0.321398	g	mi	Link	9
2016	7	5	16	25	25025	250250	9	90	1	25.52339935	425.3899987	g	mi	CO2	425.3899987 g/mi
2016	7	5	16	25	25025	250250	9	87	15	5.65916E-05	0.000943193	g	mi	VOC	1.895411538 g/mi
2016	7	5	16	25	25025	250250	9	87	13	0.029755101	0.495918355	g	mi	Nox	0.321471798 g/mi
2016	7	5	16	25	25025	250250	9	87	11	0.052230898	0.870514991	g	mi		
2016	7	5	16	25	25025	250250	9	87	1	0.0044446	0.07407667	g	mi		
2016	7	5	16	25	25025	250250	9	3	15	4.40744E-06	7.34573E-05	g	mi		
2016	7	5	16	25	25025	250250	9	3	1	0.0192839	0.321398341	g	mi	Link	10
2016	7	5	16	25	25025	250250	10	90	1	25.85320091	430.8866915	g	mi	CO2	430.8866915 g/mi
2016	7	5	16	25	25025	250250	10	87	15	5.73369E-05	0.000955615	g	mi	VOC	1.896446792 g/mi
2016	7	5	16	25	25025	250250	10	87	13	0.029755101	0.495918355	g	mi	Nox	0.328383281 g/mi

2016	7	5	16	25	25025	250250	10	87	11	0.052230898	0.870514991 g	mi		
2016	7	5	16	25	25025	250250	10	87	1	0.00450597	0.075099503 g	mi		
2016	7	5	16	25	25025	250250	10	3	15	4.4958E-06	7.493E-05 g	mi		
2016	7	5	16	25	25025	250250	10	3	1	0.019698501	0.328308351 g	mi	Link	11
2016	7	5	16	25	25025	250250	11	90	1	27.85070038	464.17835 g	mi	CO2	464.17835 g/mi
2016	7	5	16	25	25025	250250	11	87	15	6.17789E-05	0.001029648 g	mi	VOC	1.902484325 g/mi
2016	7	5	16	25	25025	250250	11	87	13	0.029755101	0.495918355 g	mi	Nox	0.370615673 g/mi
2016	7	5	16	25	25025	250250	11	87	11	0.052230898	0.870514991 g	mi		
2016	7	5	16	25	25025	250250	11	87	1	0.00486378	0.081063002 g	mi		
2016	7	5	16	25	25025	250250	11	3	15	5.04067E-06	8.40112E-05 g	mi		
2016	7	5	16	25	25025	250250	11	3	1	0.022231899	0.370531662 g	mi	Link	12
2016	7	5	16	25	25025	250250	12	90	1	26.20289993	436.7150086 g	mi	CO2	436.7150086 g/mi
2016	7	5	16	25	25025	250250	12	87	15	5.80761E-05	0.000967935 g	mi	VOC	1.897471444 g/mi
2016	7	5	16	25	25025	250250	12	87	13	0.029755101	0.495918355 g	mi	Nox	0.335940204 g/mi
2016	7	5	16	25	25025	250250	12	87	11	0.052230898	0.870514991 g	mi		
2016	7	5	16	25	25025	250250	12	87	1	0.00456671	0.076111835 g	mi		
2016	7	5	16	25	25025	250250	12	3	15	4.61225E-06	7.68708E-05 g	mi		
2016	7	5	16	25	25025	250250	12	3	1	0.0201518	0.335863333 g	mi	Link	13
2016	7	5	16	25	25025	250250	13	90	1	13.4982996	449.94333 g	mi	CO2	449.94333 g/mi
2016	7	5	16	25	25025	250250	13	87	15	2.98847E-05	0.000996157 g	mi	VOC	3.691668626 g/mi
2016	7	5	16	25	25025	250250	13	87	13	0.0293168	0.977226679 g	mi	Nox	0.352413572 g/mi
2016	7	5	16	25	25025	250250	13	87	11	0.052215502	1.740516761 g	mi		
2016	7	5	16	25	25025	250250	13	87	1	0.00235157	0.078385667 g	mi		
2016	7	5	16	25	25025	250250	13	3	15	2.407E-06	8.02333E-05 g	mi		
2016	7	5	16	25	25025	250250	13	3	1	0.01057	0.352333339 g	mi	Link	14
2016	7	5	16	25	25025	250250	14	90	1	14.32999992	477.6666748 g	mi	CO2	477.6666748 g/mi
2016	7	5	16	25	25025	250250	14	87	15	3.18338E-05	0.001061127 g	mi	VOC	3.696972929 g/mi
2016	7	5	16	25	25025	250250	14	87	13	0.0293168	0.977226679 g	mi	Nox	0.387724112 g/mi
2016	7	5	16	25	25025	250250	14	87	11	0.052215502	1.740516761 g	mi		
2016	7	5	16	25	25025	250250	14	87	1	0.00250875	0.083625 g	mi		
2016	7	5	16	25	25025	250250	14	3	15	2.62314E-06	8.7438E-05 g	mi		
2016	7	5	16	25	25025	250250	14	3	1	0.0116291	0.387636674 g	mi	Link	15
2016	7	5	16	25	25025	250250	15	90	1	33.77610016	482.5157145 g	mi	CO2	482.5157145 g/mi
2016	7	5	16	25	25025	250250	15	87	15	7.51801E-05	0.001074001 g	mi	VOC	1.650123537 g/mi
2016	7	5	16	25	25025	250250	15	87	13	0.0299013	0.427161421 g	mi	Nox	0.394125962 g/mi
2016	7	5	16	25	25025	250250	15	87	11	0.052235998	0.746228543 g	mi		
2016	7	5	16	25	25025	250250	15	87	1	0.00592487	0.084640997 g	mi		
2016	7	5	16	25	25025	250250	15	3	15	6.21676E-06	8.88109E-05 g	mi		
2016	7	5	16	25	25025	250250	15	3	1	0.027582601	0.394037151 g	mi	Link	16
2016	7	5	16	25	25025	250250	16	90	1	32.86809921	469.5442725 g	mi	CO2	469.5442725 g/mi
2016	7	5	16	25	25025	250250	16	87	15	7.32129E-05	0.001045899 g	mi	VOC	1.647813867 g/mi
2016	7	5	16	25	25025	250250	16	87	13	0.0299013	0.427161421 g	mi	Nox	0.37826841 g/mi
2016	7	5	16	25	25025	250250	16	87	11	0.052235998	0.746228543 g	mi		
2016	7	5	16	25	25025	250250	16	87	1	0.00576516	0.082359429 g	mi		
2016	7	5	16	25	25025	250250	16	3	15	5.98936E-06	8.55623E-05 g	mi		
2016	7	5	16	25	25025	250250	16	3	1	0.026472799	0.378182848 g	mi	Link	17
2016	7	5	16	25	25025	250250	17	90	1	144.2290039	450.7156473 g	mi	CO2	450.7156473 g/mi
2016	7	5	16	25	25025	250250	17	87	15	0.000319114	0.000997231 g	mi	VOC	0.443965998 g/mi
2016	7	5	16	25	25025	250250	17	87	13	0.0335541	0.104856563 g	mi	Nox	0.353199125 g/mi
2016	7	5	16	25	25025	250250	17	87	11	0.052363802	0.163636884 g	mi		
2016	7	5	16	25	25025	250250	17	87	1	0.025117001	0.078490629 g	mi		
2016	7	5	16	25	25025	250250	17	3	15	2.57163E-05	8.03634E-05 g	mi		
2016	7	5	16	25	25025	250250	17	3	1	0.112998001	0.353118762 g	mi	Link	18
2016	7	5	16	25	25025	250250	18	90	1	239.9320068	444.3185135 g	mi	CO2	444.3185135 g/mi
2016	7	5	16	25	25025	250250	18	87	15	0.000530391	0.000982206 g	mi	VOC	0.3058709 g/mi
2016	7	5	16	25	25025	250250	18	87	13	0.036768701	0.068090184 g	mi	Nox	0.34483788 g/mi
2016	7	5	16	25	25025	250250	18	87	11	0.052476302	0.097178333 g	mi		
2016	7	5	16	25	25025	250250	18	87	1	0.041737299	0.077291292 g	mi		
2016	7	5	16	25	25025	250250	18	3	15	4.24659E-05	7.86406E-05 g	mi		
2016	7	5	16	25	25025	250250	18	3	1	0.186169997	0.34475924 g	mi	Link	19
2016	7	5	16	25	25025	250250	19	90	1	42.53900146	425.3900083 g	mi	CO2	425.3900083 g/mi
2016	7	5	16	25	25025	250250	19	87	15	9.43193E-05	0.000943193 g	mi	VOC	1.178653992 g/mi
2016	7	5	16	25	25025	250250	19	87	13	0.030339601	0.303396001 g	mi	Nox	0.321471457 g/mi
2016	7	5	16	25	25025	250250	19	87	11	0.052251302	0.522513009 g	mi		
2016	7	5	16	25	25025	250250	19	87	1	0.00740768	0.0740768 g	mi		
2016	7	5	16	25	25025	250250	19	3	15	7.34574E-06	7.34574E-05 g	mi		
2016	7	5	16	25	25025	250250	19	3	1	0.0321398	0.321398 g	mi	Link	20
2016	7	5	16	25	25025	250250	20	90	1	176.6499939	441.6249782 g	mi	CO2	441.6249782 g/mi

2016	7	5	16	25	25025	250250	20	87	15	0.00039124	0.0009781 g	mi	VOC	0.375233848 g/mi
2016	7	5	16	25	25025	250250	20	87	13	0.034722999	0.086807496 g	mi	Nox	0.342005542 g/mi
2016	7	5	16	25	25025	250250	20	87	11	0.052404702	0.131011752 g	mi		
2016	7	5	16	25	25025	250250	20	87	1	0.0307895	0.076973749 g	mi		
2016	7	5	16	25	25025	250250	20	3	15	3.12253E-05	7.80632E-05 g	mi		
2016	7	5	16	25	25025	250250	20	3	1	0.136770993	0.341927479 g	mi	Link	21
2016	7	5	16	25	25025	250250	21	90	1	118.2570038	437.9888855 g	mi	CO2	437.9888855 g/mi
2016	7	5	16	25	25025	250250	21	87	15	0.000262197	0.0009711 g	mi	VOC	0.504036634 g/mi
2016	7	5	16	25	25025	250250	21	87	13	0.0328236	0.121568884 g	mi	Nox	0.33779095 g/mi
2016	7	5	16	25	25025	250250	21	87	11	0.052338202	0.193845183 g	mi		
2016	7	5	16	25	25025	250250	21	87	1	0.020619599	0.076368883 g	mi		
2016	7	5	16	25	25025	250250	21	3	15	2.08587E-05	7.72544E-05 g	mi		
2016	7	5	16	25	25025	250250	21	3	1	0.091182701	0.337713695 g	mi	Link	22
2016	7	5	16	25	25025	250250	22	90	1	73.73519897	433.73646 g	mi	CO2	433.73646 g/mi
2016	7	5	16	25	25025	250250	22	87	15	0.000163559	0.000962112 g	mi	VOC	0.737513293 g/mi
2016	7	5	16	25	25025	250250	22	87	13	0.031362399	0.184484701 g	mi	Nox	0.33223403 g/mi
2016	7	5	16	25	25025	250250	22	87	11	0.052287102	0.307571184 g	mi		
2016	7	5	16	25	25025	250250	22	87	1	0.0128554	0.075620001 g	mi		
2016	7	5	16	25	25025	250250	22	3	15	1.28858E-05	7.57988E-05 g	mi		
2016	7	5	16	25	25025	250250	22	3	1	0.0564669	0.332158231 g	mi	Link	23
2016	7	5	16	25	25025	250250	23	90	1	26.66880035	533.3759991 g	mi	CO2	533.3759991 g/mi
2016	7	5	16	25	25025	250250	23	87	15	6.12954E-05	0.001225908 g	mi	VOC	2.289646493 g/mi
2016	7	5	16	25	25025	250250	23	87	13	0.0299743	0.599485999 g	mi	Nox	0.370870132 g/mi
2016	7	5	16	25	25025	250250	23	87	11	0.052238502	1.044770017 g	mi		
2016	7	5	16	25	25025	250250	23	87	1	0.00477003	0.095400595 g	mi		
2016	7	5	16	25	25025	250250	23	3	15	4.30725E-06	8.6145E-05 g	mi		
2016	7	5	16	25	25025	250250	23	3	1	0.0185392	0.370783987 g	mi	Link	24
2016	7	5	16	25	25025	250250	24	90	1	4090.080078	g	mi	CO2	4090.080078 g/hr
2016	7	5	16	25	25025	250250	24	87	15	0.00986653	g	mi	VOC	1.743074926 g/hr
2016	7	5	16	25	25025	250250	24	87	13	0.467222989	g	mi	Nox	2.372486854 g/hr
2016	7	5	16	25	25025	250250	24	87	11	0.067539401	g	mi		
2016	7	5	16	25	25025	250250	24	87	1	0.77075702	g	mi		
2016	7	5	16	25	25025	250250	24	3	15	0.000666881	g	mi		
2016	7	5	16	25	25025	250250	24	3	1	2.371819973	g	mi		

2021 Link MOVES Output

yearID	monthID	dayID	hourID	stateID	countyID	zoneID	linkID	pollutantID	processID	emissionQuant	emissionRate	massUnits	distanceUnits	Link	1
2021	7	5	16	25	25025	250250	1	90	1	42.73949814	427.394975	g	mi	CO2	427.395 g/mi
2021	7	5	16	25	25025	250250	1	87	15	4.5436E-05	0.00045436	g	mi	VOC	0.698867 g/mi
2021	7	5	16	25	25025	250250	1	87	13	0.029880401	0.298804003	g	mi	Nox	0.17485 g/mi
2021	7	5	16	25	25025	250250	1	87	11	0.0357439	0.357438991	g	mi		
2021	7	5	16	25	25025	250250	1	87	1	0.00421695	0.042169499	g	mi		
2021	7	5	16	25	25025	250250	1	3	15	3.88605E-06	3.88605E-05	g	mi		
2021	7	5	16	25	25025	250250	1	3	1	0.0174811	0.174810996	g	mi	Link	2
2021	7	5	16	25	25025	250250	2	90	1	63.73410034	398.338136	g	mi	CO2	398.3381 g/mi
2021	7	5	16	25	25025	250250	2	87	15	6.63647E-05	0.000414779	g	mi	VOC	0.454912 g/mi
2021	7	5	16	25	25025	250250	2	87	13	0.030744599	0.192153749	g	mi	Nox	0.155772 g/mi
2021	7	5	16	25	25025	250250	2	87	11	0.035764001	0.223525013	g	mi		
2021	7	5	16	25	25025	250250	2	87	1	0.00621098	0.038818626	g	mi		
2021	7	5	16	25	25025	250250	2	3	15	5.59099E-06	3.49437E-05	g	mi		
2021	7	5	16	25	25025	250250	2	3	1	0.024917999	0.155737499	g	mi	Link	3
2021	7	5	16	25	25025	250250	3	90	1	126.112999	394.1031306	g	mi	CO2	394.1031 g/mi
2021	7	5	16	25	25025	250250	3	87	15	0.000130728	0.000408525	g	mi	VOC	0.253923 g/mi
2021	7	5	16	25	25025	250250	3	87	13	0.0330492	0.103278751	g	mi	Nox	0.152768 g/mi
2021	7	5	16	25	25025	250250	3	87	11	0.0358175	0.111929691	g	mi		
2021	7	5	16	25	25025	250250	3	87	1	0.0122579	0.038305939	g	mi		
2021	7	5	16	25	25025	250250	3	3	15	1.09838E-05	3.43244E-05	g	mi		
2021	7	5	16	25	25025	250250	3	3	1	0.048874699	0.152733436	g	mi	Link	4
2021	7	5	16	25	25025	250250	4	90	1	52.5041008	437.5341831	g	mi	CO2	437.5342 g/mi
2021	7	5	16	25	25025	250250	4	87	15	5.60354E-05	0.000466962	g	mi	VOC	0.593003 g/mi
2021	7	5	16	25	25025	250250	4	87	13	0.030168399	0.251403332	g	mi	Nox	0.181327 g/mi
2021	7	5	16	25	25025	250250	4	87	11	0.035750601	0.297921685	g	mi		
2021	7	5	16	25	25025	250250	4	87	1	0.00518532	0.043211001	g	mi		
2021	7	5	16	25	25025	250250	4	3	15	4.82143E-06	4.01786E-05	g	mi		
2021	7	5	16	25	25025	250250	4	3	1	0.021754401	0.181286677	g	mi	Link	5
2021	7	5	16	25	25025	250250	5	90	1	28.3932991	473.2216623	g	mi	CO2	473.2217 g/mi
2021	7	5	16	25	25025	250250	5	87	15	3.00898E-05	0.000501497	g	mi	VOC	1.138436 g/mi
2021	7	5	16	25	25025	250250	5	87	13	0.029736301	0.495605027	g	mi	Nox	0.163246 g/mi
2021	7	5	16	25	25025	250250	5	87	11	0.035740498	0.595674988	g	mi		
2021	7	5	16	25	25025	250250	5	87	1	0.00279925	0.046654167	g	mi		
2021	7	5	16	25	25025	250250	5	3	15	2.27144E-06	3.78573E-05	g	mi		
2021	7	5	16	25	25025	250250	5	3	1	0.00979246	0.163207672	g	mi	Link	6
2021	7	5	16	25	25025	250250	6	90	1	37.77270126	377.727007	g	mi	CO2	377.727 g/mi
2021	7	5	16	25	25025	250250	6	87	15	3.89858E-05	0.000389858	g	mi	VOC	0.693287 g/mi
2021	7	5	16	25	25025	250250	6	87	13	0.029880401	0.298804003	g	mi	Nox	0.142497 g/mi
2021	7	5	16	25	25025	250250	6	87	11	0.0357439	0.357438991	g	mi		
2021	7	5	16	25	25025	250250	6	87	1	0.00366541	0.036654099	g	mi		
2021	7	5	16	25	25025	250250	6	3	15	3.20617E-06	3.20617E-05	g	mi		
2021	7	5	16	25	25025	250250	6	3	1	0.0142465	0.142464999	g	mi	Link	7
2021	7	5	16	25	25025	250250	7	90	1	114.4290009	381.4299877	g	mi	CO2	381.43 g/mi
2021	7	5	16	25	25025	250250	7	87	15	0.000118382	0.000394607	g	mi	VOC	0.266048 g/mi
2021	7	5	16	25	25025	250250	7	87	13	0.032761101	0.109203665	g	mi	Nox	0.144891 g/mi
2021	7	5	16	25	25025	250250	7	87	11	0.035810798	0.119369323	g	mi		
2021	7	5	16	25	25025	250250	7	87	1	0.0111242	0.037080666	g	mi		
2021	7	5	16	25	25025	250250	7	3	15	9.77171E-06	3.25724E-05	g	mi		
2021	7	5	16	25	25025	250250	7	3	1	0.0434574	0.144857994	g	mi	Link	8
2021	7	5	16	25	25025	250250	8	90	1	18.88629913	377.725977	g	mi	CO2	377.726 g/mi
2021	7	5	16	25	25025	250250	8	87	15	1.94929E-05	0.000389858	g	mi	VOC	1.334788 g/mi
2021	7	5	16	25	25025	250250	8	87	13	0.029160099	0.583201973	g	mi	Nox	0.142497 g/mi
2021	7	5	16	25	25025	250250	8	87	11	0.035727099	0.714541961	g	mi		
2021	7	5	16	25	25025	250250	8	87	1	0.00183271	0.036654199	g	mi		
2021	7	5	16	25	25025	250250	8	3	15	1.60309E-06	3.20618E-05	g	mi		
2021	7	5	16	25	25025	250250	8	3	1	0.00712326	0.142465194	g	mi	Link	9
2021	7	5	16	25	25025	250250	9	90	1	22.66360092	377.7266905	g	mi	CO2	377.7267 g/mi
2021	7	5	16	25	25025	250250	9	87	15	2.33915E-05	0.000389858	g	mi	VOC	1.120956 g/mi
2021	7	5	16	25	25025	250250	9	87	13	0.029304201	0.488403357	g	mi	Nox	0.142497 g/mi
2021	7	5	16	25	25025	250250	9	87	11	0.0357305	0.595508343	g	mi		
2021	7	5	16	25	25025	250250	9	87	1	0.00219925	0.036654168	g	mi		
2021	7	5	16	25	25025	250250	9	3	15	1.9237E-06	3.20617E-05	g	mi		
2021	7	5	16	25	25025	250250	9	3	1	0.00854792	0.142465333	g	mi	Link	10

2021	7	5	16	25	25025	250250	10	90	1	22.95660019	382.6100117	g	mi	CO2	382.61 g/mi
2021	7	5	16	25	25025	250250	10	87	15	2.37531E-05	0.000395885	g	mi	VOC	1.121499 g/mi
2021	7	5	16	25	25025	250250	10	87	13	0.029304201	0.488403357	g	mi	Nox	0.145626 g/mi
2021	7	5	16	25	25025	250250	10	87	11	0.0357305	0.595508343	g	mi		
2021	7	5	16	25	25025	250250	10	87	1	0.00223149	0.037191502	g	mi		
2021	7	5	16	25	25025	250250	10	3	15	1.96313E-06	3.27188E-05	g	mi		
2021	7	5	16	25	25025	250250	10	3	1	0.00873558	0.145593009	g	mi	Link	11
2021	7	5	16	25	25025	250250	11	90	1	24.73290062	412.2150195	g	mi	CO2	412.215 g/mi
2021	7	5	16	25	25025	250250	11	87	15	2.59518E-05	0.00043253	g	mi	VOC	1.124673 g/mi
2021	7	5	16	25	25025	250250	11	87	13	0.029304201	0.488403357	g	mi	Nox	0.164713 g/mi
2021	7	5	16	25	25025	250250	11	87	11	0.0357305	0.595508343	g	mi		
2021	7	5	16	25	25025	250250	11	87	1	0.0024197	0.040328333	g	mi		
2021	7	5	16	25	25025	250250	11	3	15	2.20981E-06	3.68302E-05	g	mi		
2021	7	5	16	25	25025	250250	11	3	1	0.00988059	0.164676508	g	mi	Link	12
2021	7	5	16	25	25025	250250	12	90	1	23.26819992	387.8033407	g	mi	CO2	387.8033 g/mi
2021	7	5	16	25	25025	250250	12	87	15	2.41249E-05	0.000402082	g	mi	VOC	1.122046 g/mi
2021	7	5	16	25	25025	250250	12	87	13	0.029304201	0.488403357	g	mi	Nox	0.149064 g/mi
2021	7	5	16	25	25025	250250	12	87	11	0.0357305	0.595508343	g	mi		
2021	7	5	16	25	25025	250250	12	87	1	0.00226395	0.0377325	g	mi		
2021	7	5	16	25	25025	250250	12	3	15	2.01461E-06	3.35768E-05	g	mi		
2021	7	5	16	25	25025	250250	12	3	1	0.00894181	0.149030164	g	mi	Link	13
2021	7	5	16	25	25025	250250	13	90	1	11.98649979	399.5500018	g	mi	CO2	399.55 g/mi
2021	7	5	16	25	25025	250250	13	87	15	1.24769E-05	0.000415897	g	mi	VOC	2.192421 g/mi
2021	7	5	16	25	25025	250250	13	87	13	0.028872101	0.962403376	g	mi	Nox	0.156501 g/mi
2021	7	5	16	25	25025	250250	13	87	11	0.035720501	1.190683396	g	mi		
2021	7	5	16	25	25025	250250	13	87	1	0.00116754	0.038918	g	mi		
2021	7	5	16	25	25025	250250	13	3	15	1.05395E-06	3.51317E-05	g	mi		
2021	7	5	16	25	25025	250250	13	3	1	0.00469399	0.15646634	g	mi	Link	14
2021	7	5	16	25	25025	250250	14	90	1	12.72599983	424.2000039	g	mi	CO2	424.2 g/mi
2021	7	5	16	25	25025	250250	14	87	15	1.34554E-05	0.000448513	g	mi	VOC	2.195239 g/mi
2021	7	5	16	25	25025	250250	14	87	13	0.028872101	0.962403376	g	mi	Nox	0.172538 g/mi
2021	7	5	16	25	25025	250250	14	87	11	0.035720501	1.190683396	g	mi		
2021	7	5	16	25	25025	250250	14	87	1	0.00125111	0.041703667	g	mi		
2021	7	5	16	25	25025	250250	14	3	15	1.15201E-06	3.84003E-05	g	mi		
2021	7	5	16	25	25025	250250	14	3	1	0.005175	0.172500006	g	mi	Link	15
2021	7	5	16	25	25025	250250	15	90	1	29.9965992	428.5228439	g	mi	CO2	428.5228 g/mi
2021	7	5	16	25	25025	250250	15	87	15	3.18648E-05	0.000455211	g	mi	VOC	0.973884 g/mi
2021	7	5	16	25	25025	250250	15	87	13	0.0294482	0.42068857	g	mi	Nox	0.17552 g/mi
2021	7	5	16	25	25025	250250	15	87	11	0.035733901	0.510484297	g	mi		
2021	7	5	16	25	25025	250250	15	87	1	0.00295788	0.042255429	g	mi		
2021	7	5	16	25	25025	250250	15	3	15	2.73261E-06	3.90373E-05	g	mi		
2021	7	5	16	25	25025	250250	15	3	1	0.0122837	0.175481422	g	mi	Link	16
2021	7	5	16	25	25025	250250	16	90	1	29.18910027	416.9871449	g	mi	CO2	416.9871 g/mi
2021	7	5	16	25	25025	250250	16	87	15	3.08648E-05	0.000440926	g	mi	VOC	0.972642 g/mi
2021	7	5	16	25	25025	250250	16	87	13	0.0294482	0.42068857	g	mi	Nox	0.168325 g/mi
2021	7	5	16	25	25025	250250	16	87	11	0.035733901	0.510484297	g	mi		
2021	7	5	16	25	25025	250250	16	87	1	0.00287197	0.041028142	g	mi		
2021	7	5	16	25	25025	250250	16	3	15	2.62733E-06	3.75333E-05	g	mi		
2021	7	5	16	25	25025	250250	16	3	1	0.0117801	0.168287141	g	mi	Link	17
2021	7	5	16	25	25025	250250	17	90	1	128.0769958	400.240621	g	mi	CO2	400.2406 g/mi
2021	7	5	16	25	25025	250250	17	87	15	0.000133263	0.000416447	g	mi	VOC	0.254604 g/mi
2021	7	5	16	25	25025	250250	17	87	13	0.0330492	0.103278751	g	mi	Nox	0.156836 g/mi
2021	7	5	16	25	25025	250250	17	87	11	0.0358175	0.111929691	g	mi		
2021	7	5	16	25	25025	250250	17	87	1	0.0124733	0.038979064	g	mi		
2021	7	5	16	25	25025	250250	17	3	15	1.12613E-05	3.51916E-05	g	mi		
2021	7	5	16	25	25025	250250	17	3	1	0.0501763	0.156800941	g	mi	Link	18
2021	7	5	16	25	25025	250250	18	90	1	213.0579987	394.5518337	g	mi	CO2	394.5518 g/mi
2021	7	5	16	25	25025	250250	18	87	15	0.000220765	0.000408824	g	mi	VOC	0.172287 g/mi
2021	7	5	16	25	25025	250250	18	87	13	0.036218099	0.067070552	g	mi	Nox	0.15301 g/mi
2021	7	5	16	25	25025	250250	18	87	11	0.035891101	0.066464999	g	mi		
2021	7	5	16	25	25025	250250	18	87	1	0.020705	0.03834259	g	mi		
2021	7	5	16	25	25025	250250	18	3	15	1.85691E-05	3.43872E-05	g	mi		
2021	7	5	16	25	25025	250250	18	3	1	0.082607001	0.152975922	g	mi	Link	19
2021	7	5	16	25	25025	250250	19	90	1	37.77270126	377.727007	g	mi	CO2	377.727 g/mi
2021	7	5	16	25	25025	250250	19	87	15	3.89858E-05	0.000389858	g	mi	VOC	0.693287 g/mi

2021	7	5	16	25	25025	250250	19	87	13	0.029880401	0.298804003	g	mi	Nox	0.142497	g/mi
2021	7	5	16	25	25025	250250	19	87	11	0.0357439	0.357438991	g	mi			
2021	7	5	16	25	25025	250250	19	87	1	0.00366541	0.036654099	g	mi			
2021	7	5	16	25	25025	250250	19	3	15	3.20617E-06	3.20617E-05	g	mi			
2021	7	5	16	25	25025	250250	19	3	1	0.0142465	0.142464999	g	mi	Link	20	
2021	7	5	16	25	25025	250250	20	90	1	156.8679962	392.1699847	g	mi	CO2	392.17	g/mi
2021	7	5	16	25	25025	250250	20	87	15	0.000162818	0.000407045	g	mi	VOC	0.21371	g/mi
2021	7	5	16	25	25025	250250	20	87	13	0.034201499	0.085503746	g	mi	Nox	0.151851	g/mi
2021	7	5	16	25	25025	250250	20	87	11	0.035844199	0.089610497	g	mi			
2021	7	5	16	25	25025	250250	20	87	1	0.0152753	0.038188248	g	mi			
2021	7	5	16	25	25025	250250	20	3	15	1.36534E-05	3.41335E-05	g	mi			
2021	7	5	16	25	25025	250250	20	3	1	0.060726799	0.151816995	g	mi	Link	21	
2021	7	5	16	25	25025	250250	21	90	1	105.012001	388.9333217	g	mi	CO2	388.9333	g/mi
2021	7	5	16	25	25025	250250	21	87	15	0.000108985	0.000403648	g	mi	VOC	0.290604	g/mi
2021	7	5	16	25	25025	250250	21	87	13	0.032329001	0.119737034	g	mi	Nox	0.149918	g/mi
2021	7	5	16	25	25025	250250	21	87	11	0.0358008	0.132595549	g	mi			
2021	7	5	16	25	25025	250250	21	87	1	0.0102242	0.037867405	g	mi			
2021	7	5	16	25	25025	250250	21	3	15	9.11406E-06	3.37558E-05	g	mi			
2021	7	5	16	25	25025	250250	21	3	1	0.0404687	0.149884069	g	mi	Link	22	
2021	7	5	16	25	25025	250250	22	90	1	65.47599792	385.1529249	g	mi	CO2	385.1529	g/mi
2021	7	5	16	25	25025	250250	22	87	15	6.78529E-05	0.000399135	g	mi	VOC	0.429957	g/mi
2021	7	5	16	25	25025	250250	22	87	13	0.0308886	0.181697647	g	mi	Nox	0.147371	g/mi
2021	7	5	16	25	25025	250250	22	87	11	0.035767298	0.21039587	g	mi			
2021	7	5	16	25	25025	250250	22	87	1	0.00636892	0.037464236	g	mi			
2021	7	5	16	25	25025	250250	22	3	15	5.62865E-06	3.31097E-05	g	mi			
2021	7	5	16	25	25025	250250	22	3	1	0.025047399	0.14733764	g	mi	Link	23	
2021	7	5	16	25	25025	250250	23	90	1	23.66110039	473.2220007	g	mi	CO2	473.222	g/mi
2021	7	5	16	25	25025	250250	23	87	15	2.50748E-05	0.000501496	g	mi	VOC	1.352272	g/mi
2021	7	5	16	25	25025	250250	23	87	13	0.029520299	0.590405977	g	mi	Nox	0.163246	g/mi
2021	7	5	16	25	25025	250250	23	87	11	0.035735499	0.714709972	g	mi			
2021	7	5	16	25	25025	250250	23	87	1	0.00233271	0.046654199	g	mi			
2021	7	5	16	25	25025	250250	23	3	15	1.89287E-06	3.78574E-05	g	mi			
2021	7	5	16	25	25025	250250	23	3	1	0.00816039	0.163207797	g	mi	Link	24	
2021	7	5	16	25	25025	250250	24	90	1	3621.330078		g	mi	CO2	3621.33	g/hr
2021	7	5	16	25	25025	250250	24	87	15	0.00346434		g	mi	VOC	0.865683	g/hr
2021	7	5	16	25	25025	250250	24	87	13	0.460556		g	mi	Nox	0.9365	g/hr
2021	7	5	16	25	25025	250250	24	87	11	0.045747198		g	mi			
2021	7	5	16	25	25025	250250	24	87	1	0.35591501		g	mi			
2021	7	5	16	25	25025	250250	24	3	15	0.00025001		g	mi			
2021	7	5	16	25	25025	250250	24	3	1	0.936249971		g	mi			

Mesoscale Analysis Model

General Electric HQ
Mesoscale Analysis

	2016 Existing	2021 No-Build	2021 Build
OXIDES OF NITROGEN (NOx)			
Emissions (kg/d)	13.6	6.5	6.8
Project Contribution (kg/d)			0.3
VOLATILE ORGANIC COMPOUNDS (VOC)			
Emissions (kg/d)	23.2	14.5	15.7
Project Contribution (kg/d)			1.2
GREENHOUSE GAS (CO_2)			
Emissions (short tons per year)	7,275.1	7,021.4	7,397.1
Project Contribution (short tons per year)			375.7

General Electric HQ

2021 Build

Link No.	Description	Roadway Speed	Link Length (miles)	Emission Factor (g/mi) NO_x	Emission Factor (g/mi) VOC	AADT (veh/day)	Seasonally Adjusted ADT (veh/day)	VMT Peak (veh-miles)	VMT Off-Peak (veh-miles)	Peak Period Factor	Peak Traffic Data: Period Volume (vehicles)	Peak Traffic Data: Average Delay (sec)	Peak Traffic Data: Adjusted Delay (veh-sec)	Off-Peak Traffic Data: Period Volume (vehicles)	Off-Peak Traffic Data: Average Delay (sec)	Off-Peak Traffic Data: Adjusted Delay (veh-sec)	Link Emissions: NO_x (grams)	Link Emissions: VOC (grams)
1	A St (W Broadway/W 2nd)	30	0.1	0.2	0.7	16,325	16,325	886	746	0.54	8,864	3	29,253	7,461	3	22,158	285	1,141
2	W 2nd St (Dorchester/A St)	30	0.16	0.2	0.5	4,525	4,525	393	331	0.54	2,457	48	117,694	2,068	43	89,148	113	329
3	W 2nd St (A St/D St)	30	0.32	0.2	0.3	3,600	3,600	626	526	0.54	1,955	23	45,449	1,645	21	34,426	176	293
4	A St (W 2nd/Richards)	30	0.12	0.2	0.6	17,200	17,200	1,121	943	0.54	9,340	11	101,335	7,860	10	76,757	374	1,224
5	Sobin Park (A St/End)	20	0.06	0.2	1.1	575	575	19	16	0.54	312	5	1,436	263	4	1,088	6	39
6	Richards St (A St/SBBR)	30	0.1	0.1	0.7	4,300	4,300	233	197	0.54	2,335	21	49,967	1,965	19	37,848	61	298
7	A St (Richards/Necco St)	30	0.3	0.1	0.3	14,750	14,750	2,403	2,022	0.54	8,009	10	80,893	6,741	9	61,273	641	1,177
8	A St (Necco St/Necco Ct)	30	0.05	0.1	1.3	13,250	13,250	360	303	0.54	7,195	0	1,799	6,055	0	1,362	94	884
9	Necco St (A St/ GE Dwy)	30	0.06	0.1	1.1	7,125	7,125	232	195	0.54	3,869	21	80,859	3,256	19	61,248	61	479
10	Necco St (GE Dwy/ Necco Ct)	30	0.06	0.1	1.1	7,125	7,125	232	195	0.54	3,869	0	387	3,256	0	293	62	479
11	Necco Ct (Harborwalk/Necco St)	30	0.06	0.2	1.1	313	313	10	9	0.54	170	6	1,010	143	5	765	3	21
12	Necco Ct (Necco St/A St)	30	0.06	0.1	1.1	500	500	16	14	0.54	272	16	4,208	229	14	3,188	4	34
13	A St (Necco Ct/ Melcher St)	30	0.03	0.2	2.2	13,375	13,375	218	183	0.54	7,263	14	98,772	6,112	12	74,815	63	880
14	Necco St (Necco Ct/Melcher St)	30	0.03	0.2	2.2	4,513	4,513	74	62	0.54	2,450	13	31,854	2,062	12	24,128	23	297
15	Melcher St (Summer St/Necco St)	30	0.07	0.2	1.0	6,725	6,725	256	215	0.54	3,652	26	94,213	3,073	23	71,363	83	458
16	Melcher St (Necco St/ A St)	30	0.07	0.2	1.0	5,088	5,088	193	163	0.54	2,763	30	83,842	2,325	27	63,507	60	346
17	Summer St (Melcher St/Purchase St)	30	0.32	0.2	0.3	18,563	18,563	3,225	2,715	0.54	10,079	14	140,608	8,483	13	106,505	932	1,512
18	Summer St (Melcher St/D St)	30	0.54	0.2	0.2	14,913	14,913	4,373	3,680	0.54	8,097	12	98,789	6,815	11	74,829	1,232	1,387
19	A St (Melcher St/ Congress St)	30	0.1	0.1	0.7	13,325	13,325	724	609	0.54	7,235	35	249,624	6,090	31	189,080	190	924
20	Congress St (A St/ Purchase St)	30	0.4	0.2	0.2	14,163	14,163	3,076	2,589	0.54	7,690	21	163,418	6,472	19	123,782	860	1,211
21	Congress St (A St/ B St)	30	0.27	0.1	0.3	16,700	16,700	2,448	2,061	0.54	9,068	14	125,140	7,632	12	94,788	676	1,310
22	Thomson Pl (Congress St/ Seaport Ave)	30	0.17	0.1	0.4	888	888	82	69	0.54	482	36	17,493	406	33	13,251	22	65
23	GE Site Driveway (Build Only)	20	0.05	0.2	1.4	2,788	2,788	76	64	0.54	1,514	0	0	1,274	0	0	23	188
							VMT (per day)	21,275	17,906								6.0	15.0
							VMT (per year)	7,765,528	6,535,628.4			Arterial	1,618,043			1,225,600	Daily Total (kg)	
																	NO_X	VOC

VMT Total (per year)	**14,301,156.25**

	NOx EF (g/s)	NOx Idle (g/day)	NOx Idle (kg/day)	VOC EF (g/s)	VOC Idle (g/day)	VOC Idle (kg/day)
Freeway						
Peak Period	0.0003	0	**0.00**	0.0002	0	**0.00**
Off-Peak Period	0.0003	0	**0.00**	0.0002	0	**0.00**
Arterial						
Peak Period	0.0003	421	**0.42**	0.0002	389	**0.39**
Off-Peak Period	0.0003	319	**0.32**	0.0002	295	**0.29**
Total (Including Link)			**6.78**			**15.66**

General Electric HQ

2021 No Build

Link No.	Description	Roadway Speed	Link Length (miles)	Emission Factor (g/mi) NOx	Emission Factor (g/mi) VOC	AADT (veh/day)	Seasonally Adjusted ADT (veh/day)	VMT Peak (veh-miles)	VMT Off-Peak (veh-miles)	Peak Period Factor	Peak Traffic Data: Period Volume (vehicles)	Peak Traffic Data: Average Delay (sec)	Peak Traffic Data: Adjusted Delay (veh-sec)	Off-Peak Traffic Data: Period Volume (vehicles)	Off-Peak Traffic Data: Average Delay (sec)	Off-Peak Traffic Data: Adjusted Delay (veh-sec)	Link Emissions: NO_x (grams)	Link Emissions: VOC (grams)
1	A St (W Broadway/W 2nd)	30	0.1	0.2	0.7	15,588	15,588	846	712	0.54	8,464	3	27,931	7,123	3	21,157	273	1,089
2	W 2nd St (Dorchester/A St)	30	0.16	0.2	0.5	4,525	4,525	393	331	0.54	2,457	48	117,694	2,068	43	89,148	113	329
3	W 2nd St (A St/D St)	30	0.32	0.2	0.3	3,600	3,600	626	526	0.54	1,955	23	45,449	1,645	21	34,426	176	293
4	A St (W 2nd/Richards)	30	0.12	0.2	0.6	16,463	16,463	1,073	903	0.54	8,939	10	89,838	7,523	9	68,049	358	1,171
5	Sobin Park (A St/End)	20	0.06	0.2	1.1	575	575	19	16	0.54	312	5	1,436	263	4	1,088	6	39
6	Richards St (A St/SBBR)	30	0.1	0.1	0.7	4,300	4,300	233	197	0.54	2,335	21	49,967	1,965	19	37,848	61	298
7	A St (Richards/Necco St)	30	0.3	0.1	0.3	14,013	14,013	2,283	1,921	0.54	7,609	9	66,196	6,404	8	50,141	609	1,118
8	A St (Necco St/Necco Ct)	30	0.05	0.1	1.3	12,788	12,788	347	292	0.54	6,944	0	1,736	5,844	0	1,315	91	853
9	Necco St (A St/ GE Dwy)	30	0.06	0.1	1.1	4,925	4,925	160	135	0.54	2,674	12	32,091	2,251	11	24,308	42	331
10	Necco St (GE Dwy/ Necco Ct)	30	0.06	0.1	1.1	4,925	4,925	160	135	0.54	2,674	0	267	2,251	0	203	43	331
11	Necco Ct (Harborwalk/Necco St)	30	0.06	0.2	1.1	313	313	10	9	0.54	170	6	950	143	5	720	3	21
12	Necco Ct (Necco St/A St)	30	0.06	0.1	1.1	375	375	12	10	0.54	204	14	2,841	171	13	2,152	3	25
13	A St (Necco Ct/ Melcher St)	30	0.03	0.2	2.2	12,788	12,788	208	175	0.54	6,944	10	72,561	5,844	9	54,962	60	841
14	Necco St (Necco Ct/Melcher St)	30	0.03	0.2	2.2	3,388	3,388	55	46	0.54	1,839	10	17,842	1,548	9	13,515	18	223
15	Melcher St (Summer St/Necco St)	30	0.07	0.2	1.0	6,213	6,213	236	199	0.54	3,373	24	79,949	2,839	21	60,558	76	424
16	Melcher St (Necco St/ A St)	30	0.07	0.2	1.0	4,475	4,475	170	143	0.54	2,430	30	72,047	2,045	27	54,573	53	305
17	Summer St (Melcher St/Purchase St)	30	0.32	0.2	0.3	18,050	18,050	3,136	2,640	0.54	9,801	13	127,415	8,249	12	96,512	906	1,471
18	Summer St (Melcher St/D St)	30	0.54	0.2	0.2	14,913	14,913	4,373	3,680	0.54	8,097	11	91,906	6,815	10	69,615	1,232	1,387
19	A St (Melcher St/ Congress St)	30	0.1	0.1	0.7	12,125	12,125	658	554	0.54	6,584	38	251,504	5,541	34	190,504	173	841
20	Congress St (A St/ Purchase St)	30	0.4	0.2	0.2	14,163	14,163	3,076	2,589	0.54	7,690	21	162,264	6,472	19	122,908	860	1,211
21	Congress St (A St/ B St)	30	0.27	0.1	0.3	15,500	15,500	2,272	1,913	0.54	8,417	13	113,202	7,084	12	85,746	627	1,216
22	Thomson Pl (Congress St/ Seaport Ave)	30	0.17	0.1	0.4	888	888	82	69	0.54	482	36	17,493	406	33	13,251	22	65
23	GE Site Driveway (Build Only)	20	0.05	0.2	1.4	0	0	0	0	0.54	0	0	0	0	0	0	0	0
							VMT (per day)	20,431	17,195								5.8	13.9
							VMT (per year)	7,457,211	6,276,142.4			Arterial	1,442,582			1,092,696	Daily Total (kg)	
																	NO_X	VOC

VMT Total (per year)	**13,733,353.13**

	NOx EF (g/s)	NOx Idle (g/day)	NOx Idle (kg/day)	VOC EF (g/s)	VOC Idle (g/day)	VOC Idle (kg/day)
Freeway						
Peak Period	0.0003	0	**0.00**	0.0002	0	**0.00**
Off-Peak Period	0.0003	0	**0.00**	0.0002	0	**0.00**
Arterial						
Peak Period	0.0003	375	**0.38**	0.0002	347	**0.35**
Off-Peak Period	0.0003	284	**0.28**	0.0002	263	**0.26**
Total (Including Link)			**6.47**			**14.49**

General Electric HQ

2016 Existing

Link No.	Description	Roadway Type	Link Length (miles)	Emission Factor (g/mi) NO_x	Emission Factor (g/mi) VOC	AADT (veh/day)	Seasonally Adjusted ADT (veh/day)	VMT Peak (veh-miles)	VMT Off-Peak (veh-miles)	Peak Period Factor	Peak Traffic Data: Period Volume (vehicles)	Peak Traffic Data: Average Delay (sec)	Peak Traffic Data: Adjusted Delay (veh-sec)	Off-Peak Traffic Data: Period Volume (vehicles)	Off-Peak Traffic Data: Average Delay (sec)	Off-Peak Traffic Data: Adjusted Delay (veh-sec)	Link Emissions NO_x (grams)	Link Emissions VOC (grams)
1	A St (W Broadway/W 2nd)	30	0.1	0.4	1.2	14,313	14,313	777	654	0.54	7,772	3	22,149	6,541	3	16,777	562	1,702
2	W 2nd St (Dorchester/A St)	30	0.16	0.4	0.8	4,125	4,125	358	302	0.54	2,240	35	78,284	1,885	31	59,297	232	515
3	W 2nd St (A St/D St)	30	0.32	0.3	0.4	3,375	3,375	586	494	0.54	1,833	24	44,166	1,542	22	33,454	372	478
4	A St (W 2nd/Richards)	30	0.12	0.4	1.0	15,000	15,000	977	823	0.54	8,145	8	67,196	6,855	7	50,898	733	1,822
5	Sobin Park (A St/End)	20	0.06	0.4	1.9	563	563	18	15	0.54	305	5	1,466	257	4	1,111	13	65
6	Richards St (A St/SBBR)	30	0.1	0.3	1.2	4,063	4,063	221	186	0.54	2,206	22	48,200	1,857	20	36,509	131	479
7	A St (Richards/Necco St)	30	0.3	0.3	0.5	12,688	12,688	2,067	1,739	0.54	6,889	7	47,192	5,798	6	35,746	1,244	1,761
8	A St (Necco St/Necco Ct)	30	0.05	0.3	2.3	11,500	11,500	312	263	0.54	6,245	0	1,249	5,256	0	946	185	1,296
9	Necco St (A St/ GE Dwy)	30	0.06	0.3	1.9	4,813	4,813	157	132	0.54	2,613	10	27,046	2,199	9	20,487	93	547
10	Necco St (GE Dwy/ Necco Ct)	30	0.06	0.3	1.9	4,813	4,813	157	132	0.54	2,613	0	261	2,199	0	198	95	548
11	Necco Ct (Harborwalk/Necco St)	30	0.06	0.4	1.9	313	313	10	9	0.54	170	6	942	143	5	713	7	36
12	Necco Ct (Necco St/A St)	30	0.06	0.3	1.9	375	375	12	10	0.54	204	13	2,718	171	12	2,059	8	43
13	A St (Necco Ct/ Melcher St)	30	0.03	0.4	3.7	11,500	11,500	187	158	0.54	6,245	8	50,268	5,256	7	38,076	122	1,274
14	Necco St (Necco Ct/Melcher St)	30	0.03	0.4	3.7	3,313	3,313	54	45	0.54	1,799	9	16,818	1,514	8	12,739	39	367
15	Melcher St (Summer St/Necco St)	30	0.07	0.4	1.7	5,813	5,813	221	186	0.54	3,156	23	74,013	2,656	21	56,061	160	671
16	Melcher St (Necco St/ A St)	30	0.07	0.4	1.6	4,125	4,125	157	132	0.54	2,240	30	67,420	1,885	27	51,068	109	476
17	Summer St (Melcher St/Purchase St)	30	0.32	0.4	0.4	17,313	17,313	3,008	2,532	0.54	9,401	12	116,098	7,912	11	87,940	1,957	2,460
18	Summer St (Melcher St/D St)	30	0.54	0.3	0.3	14,500	14,500	4,252	3,578	0.54	7,874	11	85,427	6,627	10	64,708	2,700	2,395
19	A St (Melcher St/ Congress St)	30	0.1	0.3	1.2	10,813	10,813	587	494	0.54	5,871	36	211,656	4,941	32	160,321	348	1,274
20	Congress St (A St/ Purchase St)	30	0.4	0.3	0.4	13,188	13,188	2,864	2,411	0.54	7,161	20	144,290	6,027	18	109,294	1,804	1,979
21	Congress St (A St/ B St)	30	0.27	0.3	0.5	13,750	13,750	2,016	1,697	0.54	7,466	12	89,968	6,284	11	68,147	1,254	1,871
22	Thomson Pl (Congress St/ Seaport Ave)	30	0.17	0.3	0.7	750	750	69	58	0.54	407	34	14,009	343	31	10,612	42	94
23	GE Site Driveway (Build Only)	20	0.05	0.4	2.3	0	0	0	0	0.54	0	0	0	0	0	0	0	0
							VMT (per day)	19,069	16,049			Freeway	0			0	12.2	22.2
							VMT (per year)	6,960,113	5,857,774.6			Arterial	1,210,839			917,160	Daily Total (kg)	
																	NO_X	VOC

VMT Total (per year)	**12,817,887.50**

	NOx (g/s)	NOx (g/day)	NOx (kg/day)	VOC (g/s)	VOC (g/day)	VOC (kg/day)
Freeway						
Peak Period	0.0007	0	**0.00**	0.0005	0	**0.00**
Off-Peak Period	0.0007	0	**0.00**	0.0005	0	**0.00**
Arterial						
Peak Period	0.0007	798	**0.80**	0.0005	586	**0.59**
Off-Peak Period	0.0007	604	**0.60**	0.0005	444	**0.44**
Total (Including Link)			**13.61**			**23.18**

General Electric HQ

Build

Link No.	Description	Speed	Roadway Link Length (miles)	Emission Factor (g/mi) CO_2	Weekday AADT (veh/day)	Weekday Seasonally Adjusted ADT (veh/day)	Weekday VMT Peak (veh-miles)	Weekday VMT Off-Peak (veh-miles)	Weekend AADT (veh/day)	Weekend Seasonally Adjusted ADT (veh/day)	Weekend VMT Peak (veh-miles)	Weekend VMT Off-Peak (veh-miles)	Annual Weekday Trips (veh/day)	Annual Weekend Trips (veh/day)	Peak Period Factor	Peak Period Factor
1	A St (W Broadway/W 2nd)	30	0.1	427.4	16,325	16,325	230,476	193,974	16,325	16,325	83,135	88,277	4,244,500	1,714,125	0.54	0.49
2	W 2nd St (Dorchester/A St)	30	0.16	398.3	4,525	4,525	102,214	86,026	4,525	4,525	36,870	39,150	1,176,500	475,125	0.54	0.49
3	W 2nd St (A St/D St)	30	0.32	394.1	3,600	3,600	162,639	136,881	3,600	3,600	58,666	62,294	936,000	378,000	0.54	0.49
4	A St (W 2nd/Richards)	30	0.12	437.5	17,200	17,200	291,396	245,244	17,200	17,200	105,109	111,611	4,472,000	1,806,000	0.54	0.49
5	Sobin Park (A St/End)	20	0.06	473.2	575	575	4,871	4,099	575	575	1,757	1,866	149,500	60,375	0.54	0.49
6	Richards St (A St/SBBR)	30	0.1	377.7	4,300	4,300	60,707	51,093	4,300	4,300	21,898	23,252	1,118,000	451,500	0.54	0.49
7	A St (Richards/Necco St)	30	0.3	381.4	14,750	14,750	624,722	525,779	14,750	14,750	225,343	239,282	3,835,000	1,548,750	0.54	0.49
8	A St (Necco St/Necco Ct)	30	0.05	377.7	13,250	13,250	93,532	78,718	13,250	13,250	33,738	35,825	3,445,000	1,391,250	0.54	0.49
9	Necco St (A St/ GE Dwy)	30	0.06	377.7	7,125	7,125	60,354	50,796	7,125	7,125	21,770	23,117	1,852,500	748,125	0.54	0.49
10	Necco St (GE Dwy/ Necco Ct)	30	0.06	382.6	7,125	7,125	60,354	50,796	7,125	7,125	21,770	23,117	1,852,500	748,125	0.54	0.49
11	Necco Ct (Harborwalk/Necco St)	30	0.06	412.2	313	313	2,647	2,228	313	313	955	1,014	81,250	32,813	0.54	0.49
12	Necco Ct (Necco St/A St)	30	0.06	387.8	500	500	4,235	3,565	500	500	1,528	1,622	130,000	52,500	0.54	0.49
13	A St (Necco Ct/ Melcher St)	30	0.03	399.6	13,375	13,375	56,648	47,677	13,375	13,375	20,434	21,698	3,477,500	1,404,375	0.54	0.49
14	Necco St (Necco Ct/Melcher St)	30	0.03	424.2	4,513	4,513	19,112	16,085	4,513	4,513	6,894	7,320	1,173,250	473,813	0.54	0.49
15	Melcher St (Summer St/Necco St)	30	0.07	428.5	6,725	6,725	66,460	55,935	6,725	6,725	23,973	25,456	1,748,500	706,125	0.54	0.49
16	Melcher St (Necco St/ A St)	30	0.07	417.0	5,088	5,088	50,278	42,315	5,088	5,088	18,136	19,257	1,322,750	534,188	0.54	0.49
17	Summer St (Melcher St/Purchase St)	30	0.32	400.2	18,563	18,563	838,609	705,791	18,563	18,563	302,495	321,206	4,826,250	1,949,063	0.54	0.49
18	Summer St (Melcher St/D St)	30	0.54	394.6	14,913	14,913	1,136,887	956,828	14,913	14,913	410,086	435,452	3,877,250	1,565,813	0.54	0.49
19	A St (Melcher St/ Congress St)	30	0.1	377.7	13,325	13,325	188,122	158,328	13,325	13,325	67,858	72,055	3,464,500	1,399,125	0.54	0.49
20	Congress St (A St/ Purchase St)	30	0.4	392.2	14,163	14,163	799,785	673,115	14,163	14,163	288,490	306,335	3,682,250	1,487,063	0.54	0.49
21	Congress St (A St/ B St)	30	0.27	388.9	16,700	16,700	636,581	535,759	16,700	16,700	229,621	243,824	4,342,000	1,753,500	0.54	0.49
22	Thomson Pl (Congress St/ Seaport Ave)	30	0.17	385.2	888	888	21,301	17,927	888	888	7,683	8,159	230,750	93,188	0.54	0.49
23	GE Site Driveway (Build Only)	20	0.05	473.2	2,788	2,788	19,677	16,561	2,788	2,788	7,098	7,537	724,750	292,688	0.54	0.49
						VMT (per year)	5,531,609	4,655,516		VMT (per year)	1,995,305	2,118,726				

Link No.	Weekday Peak Traffic Data Period Volume (vehicles)	Weekday Peak Traffic Data Average Delay (sec)	Weekday Peak Traffic Data Adjusted Delay (veh-sec)	Weekday Off-Peak Traffic Data Period Volume (vehicles)	Weekday Off-Peak Traffic Data Average Delay (sec)	Weekday Off-Peak Traffic Data Adjusted Delay (veh-sec)	Weekend Peak Traffic Data Period Volume (vehicles)	Weekend Peak Traffic Data Average Delay (sec)	Weekend Peak Traffic Data Adjusted Delay (veh-sec)	Weekend Off-Peak Traffic Data Period Volume (vehicles)	Weekend Off-Peak Traffic Data Average Delay (sec)	Weekend Off-Peak Traffic Data Adjusted Delay (veh-sec)	Link Emissions CO_2 (grams)
1	2,304,764	3	7,605,720	1,939,737	3	5,761,017	831,351	3	2,743,457	882,774	3	2,621,840	254,668,638
2	638,840	48	30,600,412	537,661	43	23,178,544	230,436	48	11,037,866	244,689	43	10,548,559	105,264,836
3	508,248	23	11,816,766	427,752	21	8,950,711	183,330	23	4,262,423	194,670	21	4,073,470	165,712,484
4	2,428,296	11	26,347,012	2,043,704	10	19,956,770	875,910	11	9,503,624	930,090	10	9,082,329	329,620,752
5	81,179	5	373,421	68,322	4	282,851	29,282	5	134,697	31,093	4	128,726	5,959,044
6	607,074	21	12,991,384	510,926	19	9,840,435	218,978	21	4,686,119	232,523	19	4,478,383	59,284,254
7	2,082,405	10	21,032,291	1,752,595	9	15,931,089	751,144	10	7,586,552	797,606	9	7,250,241	616,057,109
8	1,870,635	0	467,659	1,574,365	0	354,232	674,756	0	168,689	716,494	0	161,211	91,338,863
9	1,005,908	21	21,023,467	846,593	19	15,924,405	362,841	21	7,583,369	385,284	19	7,247,199	58,939,528
10	1,005,908	0	100,591	846,593	0	76,193	362,841	0	36,284	385,284	0	34,676	59,701,510
11	44,119	6	262,507	37,131	5	198,838	15,914	6	94,689	16,898	5	90,491	2,821,097
12	70,590	16	1,094,145	59,410	14	828,770	25,463	16	394,669	27,038	14	377,173	4,246,447
13	1,888,283	14	25,680,642	1,589,218	12	19,452,022	681,122	14	9,263,258	723,253	12	8,852,618	58,516,595
14	637,075	13	8,281,972	536,175	12	6,273,250	229,799	13	2,987,388	244,013	12	2,854,957	20,960,518
15	949,436	26	24,495,436	799,065	23	18,554,278	342,471	26	8,835,742	363,654	23	8,444,055	73,630,402
16	718,253	30	21,798,986	604,497	27	16,511,829	259,081	30	7,863,106	275,107	27	7,514,536	54,202,335
17	2,620,654	14	36,558,120	2,205,596	13	27,691,261	945,295	14	13,186,870	1,003,767	13	12,602,297	867,761,690
18	2,105,347	12	25,685,230	1,771,903	11	19,455,498	759,419	12	9,264,913	806,393	11	8,854,200	1,159,687,957
19	1,881,224	35	64,902,211	1,583,277	31	49,160,735	678,576	35	23,410,859	720,549	31	22,373,058	183,712,251
20	1,999,462	21	42,488,562	1,682,788	19	32,183,325	721,225	21	15,326,038	765,837	19	14,646,636	810,899,682
21	2,357,706	14	32,536,343	1,984,294	12	24,644,931	850,448	14	11,736,176	903,053	12	11,215,912	640,100,627
22	125,297	36	4,548,290	105,453	33	3,445,141	45,196	36	1,640,613	47,992	33	1,567,884	21,210,131
23	393,539	0	0	331,211	0	0	141,953	0	0	150,734	0	0	24,073,690
		Arterial	420,691,164			318,656,125		Arterial	151,747,397			145,020,451	6,248.20 Total (tons/year)

	Weekday	**Weekend**	**Total**
VMT per year	**10,187,125.00**	**4,114,031.25**	**14,301,156.25**

	Weekday Idle (g/s)	Weekday Idle (g/year)	Weekday Idle (tons/year)	Weekend Idle (g/s)	Weekend Idle (g/year)	Weekend Idle (tons/year)	Total Idle (g/s)	Total Idle (g/year)	Total Idle (tons/year)	
Freeway										
Peak Period	1.0059	0	**0.00**	1.0059	0	**0.00**			**0.00**	
Off-Peak Period	1.0059	0	**0.00**	1.0059	0	**0.00**			**0.00**	
Arterial										
Peak Period	1.0059	423,183,768	**466.47**	1.0059	152,646,504	**168.26**			**634.73**	
Off-Peak Period	1.0059	320,544,169	**353.33**	1.0059	145,879,700	**160.80**			**514.14**	
Total			**819.81**			**329.06**		Total (Including Link)	**7,397.07**	Includes Link Emissions

General Electric HQ

No Build

Link No.	Description	Speed	Roadway Link Length (miles)	Emission Factor (g/mi) CO_2	Weekday AADT (veh/day)	Weekday Seasonally Adjusted ADT (veh/day)	Weekday VMT Peak (veh-miles)	Weekday VMT Off-Peak (veh-miles)	Weekend AADT (veh/day)	Weekend Seasonally Adjusted ADT (veh/day)	Weekend VMT Peak (veh-miles)	Weekend VMT Off-Peak (veh-miles)	Annual Weekday Trips (veh/day)	Annual Weekend Trips (veh/day)	Peak Period Factor	Peak Period Factor
1	A St (W Broadway/W 2nd)	30	0.1	427.4	15,588	15,588	220,064	185,211	15,588	15,588	79,379	84,289	4,052,750	1,636,688	0.54	0.49
2	W 2nd St (Dorchester/A St)	30	0.16	398.3	4,525	4,525	102,214	86,026	4,525	4,525	36,870	39,150	1,176,500	475,125	0.54	0.49
3	W 2nd St (A St/D St)	30	0.32	394.1	3,600	3,600	162,639	136,881	3,600	3,600	58,666	62,294	936,000	378,000	0.54	0.49
4	A St (W 2nd/Richards)	30	0.12	437.5	16,463	16,463	278,901	234,729	16,463	16,463	100,602	106,825	4,280,250	1,728,563	0.54	0.49
5	Sobin Park (A St/End)	20	0.06	473.2	575	575	4,871	4,099	575	575	1,757	1,866	149,500	60,375	0.54	0.49
6	Richards St (A St/SBBR)	30	0.1	377.7	4,300	4,300	60,707	51,093	4,300	4,300	21,898	23,252	1,118,000	451,500	0.54	0.49
7	A St (Richards/Necco St)	30	0.3	381.4	14,013	14,013	593,485	499,490	14,013	14,013	214,076	227,318	3,643,250	1,471,313	0.54	0.49
8	A St (Necco St/Necco Ct)	30	0.05	377.7	12,788	12,788	90,267	75,971	12,788	12,788	32,560	34,574	3,324,750	1,342,688	0.54	0.49
9	Necco St (A St/ GE Dwy)	30	0.06	377.7	4,925	4,925	41,719	35,111	4,925	4,925	15,048	15,979	1,280,500	517,125	0.54	0.49
10	Necco St (GE Dwy/ Necco Ct)	30	0.06	382.6	4,925	4,925	41,719	35,111	4,925	4,925	15,048	15,979	1,280,500	517,125	0.54	0.49
11	Necco Ct (Harborwalk/Necco St)	30	0.06	412.2	313	313	2,647	2,228	313	313	955	1,014	81,250	32,813	0.54	0.49
12	Necco Ct (Necco St/A St)	30	0.06	387.8	375	375	3,177	2,673	375	375	1,146	1,217	97,500	39,375	0.54	0.49
13	A St (Necco Ct/ Melcher St)	30	0.03	399.6	12,788	12,788	54,160	45,582	12,788	12,788	19,536	20,745	3,324,750	1,342,688	0.54	0.49
14	Necco St (Necco Ct/Melcher St)	30	0.03	424.2	3,388	3,388	14,347	12,075	3,388	3,388	5,175	5,495	880,750	355,688	0.54	0.49
15	Melcher St (Summer St/Necco St)	30	0.07	428.5	6,213	6,213	61,396	51,672	6,213	6,213	22,146	23,516	1,615,250	652,313	0.54	0.49
16	Melcher St (Necco St/ A St)	30	0.07	417.0	4,475	4,475	44,225	37,220	4,475	4,475	15,952	16,939	1,163,500	469,875	0.54	0.49
17	Summer St (Melcher St/Purchase St)	30	0.32	400.2	18,050	18,050	815,456	686,304	18,050	18,050	294,143	312,337	4,693,000	1,895,250	0.54	0.49
18	Summer St (Melcher St/D St)	30	0.54	394.6	14,913	14,913	1,136,887	956,828	14,913	14,913	410,086	435,452	3,877,250	1,565,813	0.54	0.49
19	A St (Melcher St/ Congress St)	30	0.1	377.7	12,125	12,125	171,181	144,069	12,125	12,125	61,747	65,566	3,152,500	1,273,125	0.54	0.49
20	Congress St (A St/ Purchase St)	30	0.4	392.2	14,163	14,163	799,785	673,115	14,163	14,163	288,490	306,335	3,682,250	1,487,063	0.54	0.49
21	Congress St (A St/ B St)	30	0.27	388.9	15,500	15,500	590,838	497,262	15,500	15,500	213,121	226,304	4,030,000	1,627,500	0.54	0.49
22	Thomson Pl (Congress St/ Seaport Ave)	30	0.17	385.2	888	888	21,301	17,927	888	888	7,683	8,159	230,750	93,188	0.54	0.49
23	GE Site Driveway (Build Only)	20	0.05	473.2	0	0	0	0	0	0	0	0	0	0	0.54	0.49
						VMT (per year)	5,311,986	4,470,677		VMT (per year)	1,916,085	2,034,606				

Link No.	Weekday Peak Traffic Data: Period Volume (vehicles)	Weekday Peak: Average Delay (sec)	Weekday Peak: Adjusted Delay (veh-sec)	Weekday Off-Peak Traffic Data: Period Volume (vehicles)	Weekday Off-Peak: Average Delay (sec)	Weekday Off-Peak: Adjusted Delay (veh-sec)	Weekend Peak Traffic Data: Period Volume (vehicles)	Weekend Peak: Average Delay (sec)	Weekend Peak: Adjusted Delay (veh-sec)	Weekend Off-Peak Traffic Data: Period Volume (vehicles)	Weekend Off-Peak: Average Delay (sec)	Weekend Off-Peak: Adjusted Delay (veh-sec)	Link Emissions CO_2 (grams)
1	2,200,643	3	7,262,123	1,852,107	3	5,500,757	793,793	3	2,619,518	842,894	3	2,503,395	243,163,700
2	638,840	48	30,600,412	537,661	43	23,178,544	230,436	48	11,037,866	244,689	43	10,548,559	105,264,836
3	508,248	23	11,816,766	427,752	21	8,950,711	183,330	23	4,262,423	194,670	21	4,073,470	165,712,484
4	2,324,176	10	23,357,966	1,956,074	9	17,692,692	838,353	10	8,425,446	890,210	9	8,051,947	315,487,304
5	81,179	5	373,421	68,322	4	282,851	29,282	5	134,697	31,093	4	128,726	5,959,044
6	607,074	21	12,991,384	510,926	19	9,840,435	218,978	21	4,686,119	232,523	19	4,478,383	59,284,254
7	1,978,285	9	17,211,077	1,664,965	8	13,036,678	713,587	9	6,208,203	757,726	8	5,932,994	585,254,253
8	1,805,339	0	451,335	1,519,411	0	341,867	651,203	0	162,801	691,484	0	155,584	88,150,619
9	695,312	12	8,343,738	585,189	11	6,320,036	250,806	12	3,009,668	266,319	11	2,876,249	40,740,657
10	695,312	0	69,531	585,189	0	52,667	250,806	0	25,081	266,319	0	23,969	41,267,359
11	44,119	6	247,065	37,131	5	187,142	15,914	6	89,119	16,898	5	85,168	2,821,097
12	52,943	14	738,548	44,558	13	559,419	19,097	14	266,401	20,278	13	254,592	3,184,835
13	1,805,339	10	18,865,795	1,519,411	9	14,290,058	651,203	10	6,805,076	691,484	9	6,503,408	55,946,240
14	478,247	10	4,638,998	402,503	9	3,513,849	172,508	10	1,673,332	183,179	9	1,599,153	15,734,904
15	877,081	24	20,786,814	738,169	21	15,745,150	316,372	24	7,498,006	335,941	21	7,165,620	68,019,163
16	631,781	30	18,732,292	531,720	27	14,188,935	227,889	30	6,756,920	241,986	27	6,457,386	47,676,746
17	2,548,299	13	33,127,887	2,144,701	12	25,093,002	919,196	13	11,949,551	976,054	12	11,419,829	843,803,287
18	2,105,347	11	23,895,686	1,771,903	10	18,099,992	759,419	11	8,619,406	806,393	10	8,237,309	1,159,687,957
19	1,711,808	38	65,391,047	1,440,693	34	49,531,008	617,466	38	23,587,187	655,659	34	22,541,569	167,167,809
20	1,999,462	21	42,188,643	1,682,788	19	31,956,149	721,225	21	15,217,854	765,837	19	14,543,248	810,899,682
21	2,188,290	13	29,432,501	1,841,710	12	22,293,900	789,338	13	10,616,589	838,163	12	10,145,957	594,105,372
22	125,297	36	4,548,290	105,453	33	3,445,141	45,196	36	1,640,613	47,992	33	1,567,884	21,210,131
23	0	0	0	0	0	0	0	0	0	0	0	0	0
		Arterial	375,071,318			284,100,982		Arterial	135,291,875			129,294,400	5,997.07 Total (tons/year)

	Weekday	Weekend	Total
VMT per year	**9,782,662.50**	**3,950,690.63**	**13,733,353.13**

	Weekday Idle (g/s)	Weekday Idle (g/year)	Weekday Idle (tons/year)	Weekend Idle (g/s)	Weekend Idle (g/year)	Weekend Idle (tons/year)	Total Idle (g/s)	Total Idle (g/year)	Total Idle (tons/year)
Freeway									
Peak Period	1.0059	0	**0.00**	1.0059	0	**0.00**			**0.00**
Off-Peak Period	1.0059	0	**0.00**	1.0059	0	**0.00**			**0.00**
Arterial									
Peak Period	1.0059	377,293,623	**415.89**	1.0059	136,093,482	**150.01**			**565.90**
Off-Peak Period	1.0059	285,784,286	**315.02**	1.0059	130,060,472	**143.36**			**458.38**
Total			**730.91**			**293.38**		Total (Including Link)	**7,021.36**

Includes Link Emissions

General Electric HQ

Link No.	Existing: Description	Roadway Type	Link Length (miles)	Emission Factor (g/mi) CO_2	Weekday: AADT (veh/day)	Weekday: Seasonally Adjusted ADT (veh/day)	Weekday: VMT Peak (veh-miles)	Weekday: VMT Off-Peak (veh-miles)	Weekend: AADT (veh/day)	Weekend: Seasonally Adjusted ADT (veh/day)	Weekend: VMT Peak (veh-miles)	Weekend: VMT Off-Peak (veh-miles)	Annual Weekday Trips (veh/day) (veh/day)	Annual Weekend Trips (veh/day)	Peak Period Factor	Peak Period Factor
1	A St (W Broadway/W 2nd)	30	0.1	481.3	14,313	14,313	202,064	170,061	14,313	14,313	72,886	77,395	3,721,250	1,502,813	0.54	0.49
2	W 2nd St (Dorchester/A St)	30	0.16	448.6	4,125	4,125	93,179	78,421	4,125	4,125	33,611	35,690	1,072,500	433,125	0.54	0.49
3	W 2nd St (A St/D St)	30	0.32	443.8	3,375	3,375	152,474	128,326	3,375	3,375	54,999	58,401	877,500	354,375	0.54	0.49
4	A St (W 2nd/Richards)	30	0.12	492.6	15,000	15,000	254,124	213,876	15,000	15,000	91,665	97,335	3,900,000	1,575,000	0.54	0.49
5	Sobin Park (A St/End)	20	0.06	533.4	563	563	4,765	4,010	563	563	1,719	1,825	146,250	59,063	0.54	0.49
6	Richards St (A St/SBBR)	30	0.1	425.4	4,063	4,063	57,354	48,271	4,063	4,063	20,688	21,968	1,056,250	426,563	0.54	0.49
7	A St (Richards/Necco St)	30	0.3	429.6	12,688	12,688	537,366	452,259	12,688	12,688	193,833	205,823	3,298,750	1,332,188	0.54	0.49
8	A St (Necco St/Necco Ct)	30	0.05	425.4	11,500	11,500	81,179	68,322	11,500	11,500	29,282	31,093	2,990,000	1,207,500	0.54	0.49
9	Necco St (A St/ GE Dwy)	30	0.06	425.4	4,813	4,813	40,766	34,309	4,813	4,813	14,705	15,614	1,251,250	505,313	0.54	0.49
10	Necco St (GE Dwy/ Necco Ct)	30	0.06	430.9	4,813	4,813	40,766	34,309	4,813	4,813	14,705	15,614	1,251,250	505,313	0.54	0.49
11	Necco Ct (Harborwalk/Necco St)	30	0.06	464.2	313	313	2,647	2,228	313	313	955	1,014	81,250	32,813	0.54	0.49
12	Necco Ct (Necco St/A St)	30	0.06	436.7	375	375	3,177	2,673	375	375	1,146	1,217	97,500	39,375	0.54	0.49
13	A St (Necco Ct/ Melcher St)	30	0.03	449.9	11,500	11,500	48,707	40,993	11,500	11,500	17,569	18,656	2,990,000	1,207,500	0.54	0.49
14	Necco St (Necco Ct/Melcher St)	30	0.03	477.7	3,313	3,313	14,030	11,808	3,313	3,313	5,061	5,374	861,250	347,813	0.54	0.49
15	Melcher St (Summer St/Necco St)	30	0.07	482.5	5,813	5,813	57,443	48,345	5,813	5,813	20,720	22,002	1,511,250	610,313	0.54	0.49
16	Melcher St (Necco St/ A St)	30	0.07	469.5	4,125	4,125	40,766	34,309	4,125	4,125	14,705	15,614	1,072,500	433,125	0.54	0.49
17	Summer St (Melcher St/Purchase St)	30	0.32	450.7	17,313	17,313	782,137	658,263	17,313	17,313	282,125	299,576	4,501,250	1,817,813	0.54	0.49
18	Summer St (Melcher St/D St)	30	0.54	444.3	14,500	14,500	1,105,439	930,361	14,500	14,500	398,743	423,407	3,770,000	1,522,500	0.54	0.49
19	A St (Melcher St/ Congress St)	30	0.1	425.4	10,813	10,813	152,651	128,474	10,813	10,813	55,063	58,469	2,811,250	1,135,313	0.54	0.49
20	Congress St (A St/ Purchase St)	30	0.4	441.6	13,188	13,188	744,725	626,776	13,188	13,188	268,629	285,246	3,428,750	1,384,688	0.54	0.49
21	Congress St (A St/ B St)	30	0.27	438.0	13,750	13,750	524,131	441,119	13,750	13,750	189,059	200,753	3,575,000	1,443,750	0.54	0.49
22	Thomson Pl (Congress St/ Seaport Ave)	30	0.17	433.7	750	750	18,000	15,150	750	750	6,493	6,895	195,000	78,750	0.54	0.49
23	GE Site Driveway (Build Only)	20	0.05	533.4	0	0	0	0	0	0	0	0	0	0	0.54	0.49
						VMT (per year)	4,957,889	4,172,661		VMT (per year)	1,788,359	1,898,979				

Link No.	Weekday Peak Traffic Data: Period Volume (vehicles)	Weekday Peak: Average Delay (sec)	Weekday Peak: Adjusted Delay (veh-sec)	Weekday Off-Peak Traffic Data: Period Volume (vehicles)	Weekday Off-Peak: Average Delay (sec)	Weekday Off-Peak: Adjusted Delay (veh-sec)	Weeknd Peak Traffic Data: Period Volume (vehicles)	Weeknd Peak: Average Delay (sec)	Weeknd Peak: Adjusted Delay (veh-sec)	Weeknd Off-Peak Traffic Data: Period Volume (vehicles)	Weeknd Off-Peak: Average Delay (sec)	Weeknd Off-Peak: Adjusted Delay (veh-sec)	Link Emissions: CO_2 (grams)
1	2,020,639	3	5,758,820	1,700,611	3	4,362,068	728,864	3	2,077,263	773,948	3	1,985,178	251,409,040
2	582,368	35	20,353,744	490,133	31	15,417,118	210,066	35	7,341,794	223,059	31	7,016,333	108,061,265
3	476,483	24	11,483,228	401,018	22	8,698,070	171,872	24	4,142,112	182,503	22	3,958,493	174,950,897
4	2,117,700	8	17,471,025	1,782,300	7	13,233,578	763,875	8	6,301,969	811,125	7	6,022,603	323,669,971
5	79,414	5	381,186	66,836	4	288,733	28,645	5	137,498	30,417	4	131,402	6,570,513
6	573,544	22	12,531,931	482,706	20	9,492,418	206,883	22	4,520,389	219,680	20	4,320,001	63,077,362
7	1,791,221	7	12,269,866	1,507,529	6	9,293,915	646,111	7	4,425,860	686,077	6	4,229,662	596,775,019
8	1,623,570	0	324,714	1,366,430	0	245,957	585,638	0	117,128	621,863	0	111,935	89,278,728
9	679,429	10	7,032,088	571,821	9	5,326,515	245,077	10	2,536,542	260,236	9	2,424,098	44,833,447
10	679,429	0	67,943	571,821	0	51,464	245,077	0	24,508	260,236	0	23,421	45,412,764
11	44,119	6	244,859	37,131	5	185,471	15,914	6	88,323	16,898	5	84,408	3,176,721
12	52,943	13	706,782	44,558	12	535,358	19,097	13	254,943	20,278	12	243,642	3,586,522
13	1,623,570	8	13,069,739	1,366,430	7	9,899,785	585,638	8	4,714,382	621,863	7	4,505,394	56,659,114
14	467,659	9	4,372,609	393,591	8	3,312,070	168,689	9	1,577,243	179,123	8	1,507,324	17,325,866
15	820,609	23	19,243,275	690,641	21	14,575,984	296,002	23	6,941,237	314,311	21	6,633,532	71,658,107
16	582,368	30	17,529,262	490,133	27	13,277,689	210,066	30	6,322,975	223,059	27	6,042,678	49,487,032
17	2,444,179	12	30,185,608	2,057,071	11	22,864,347	881,639	12	10,888,242	936,173	11	10,405,568	911,392,110
18	2,047,110	11	22,211,144	1,722,890	10	16,824,021	738,413	11	8,011,776	784,088	10	7,656,614	1,269,840,096
19	1,526,509	36	55,030,640	1,284,741	32	41,683,430	550,627	36	19,850,088	584,686	32	18,970,135	167,882,825
20	1,861,811	20	37,515,497	1,566,939	18	28,416,434	671,573	20	13,532,205	713,114	18	12,932,324	850,293,692
21	1,941,225	12	23,391,761	1,633,775	11	17,718,290	700,219	12	8,437,636	743,531	11	8,063,596	593,502,314
22	105,885	34	3,642,444	89,115	31	2,759,000	38,194	34	1,313,865	40,556	31	1,255,622	20,185,011
23	0	0	0	0	0	0	0	0	0	0	0	0	0
		Arterial	314,818,164			238,461,715		Arterial	113,557,976			108,523,962	6,304.04 **Total (tons/year)**

	Weekday	Weekend	Total
VMT per year	**9,130,550.00**	**3,687,337.50**	**12,817,887.50**

	Weekday (g/s)	Weekday (g/year)	Weekday (tons/year)	Weekend (g/s)	Weekend (g/year)	Weekend (tons/year)	Total (g/s)	Total (g/year)	Total (tons/year)	
Freeway										
Peak Period	1.1361	0	**0.00**	1.1361	0	**0.00**			**0.00**	
Off-Peak Period	1.1361	0	**0.00**	1.1361	0	**0.00**			**0.00**	
Arterial										
Peak Period	1.1361	357,675,417	**394.27**	1.1361	129,017,004	**142.22**			**536.49**	
Off-Peak Period	1.1361	270,924,308	**298.64**	1.1361	123,297,694	**135.91**			**434.56**	
Total			**692.91**			**278.13**			**7,275.09**	Includes Link Emissions

General Electric HQ

Weekend Traffic

Link No.	Roadway Description	Roadway S.A.F.	2016 Roadway ADT (veh/day)	2016 Seasonal ADT (veh/day)	2021 Roadway ADT (veh/day)	2021 Seasonal ADT (veh/day)	2021 Traffic Increase (existing)	2021 Roadway ADT (veh/day)	2021 Seasonal ADT (veh/day)	2021 Traffic Increase (existing)	2021 Traffic Increase (no-build)
1	A St (W Broadway/W 2nd)	100%	14,313	14,313	15,588	15,588	9%	16,325	16,325	14%	4.7%
2	W 2nd St (Dorchester/A St)	100%	4,125	4,125	4,525	4,525	10%	4,525	4,525	10%	0.0%
3	W 2nd St (A St/D St)	100%	3,375	3,375	3,600	3,600	7%	3,600	3,600	7%	0.0%
4	A St (W 2nd/Richards)	100%	15,000	15,000	16,463	16,463	10%	17,200	17,200	15%	4.5%
5	Sobin Park (A St/End)	100%	563	563	575	575	2%	575	575	2%	0.0%
6	Richards St (A St/SBBR)	100%	4,063	4,063	4,300	4,300	6%	4,300	4,300	6%	0.0%
7	A St (Richards/Necco St)	100%	12,688	12,688	14,013	14,013	10%	14,750	14,750	16%	5.3%
8	A St (Necco St/Necco Ct)	100%	11,500	11,500	12,788	12,788	11%	13,250	13,250	15%	3.6%
9	Necco St (A St/ GE Dwy)	100%	4,813	4,813	4,925	4,925	2%	7,125	7,125	48%	44.7%
10	Necco St (GE Dwy/ Necco Ct)	100%	4,813	4,813	4,925	4,925	2%	7,125	7,125	48%	44.7%
11	Necco Ct (Harborwalk/Necco St)	100%	313	313	313	313	0%	313	313	0%	0.0%
12	Necco Ct (Necco St/A St)	100%	375	375	375	375	0%	500	500	33%	33.3%
13	A St (Necco Ct/ Melcher St)	100%	11,500	11,500	12,788	12,788	11%	13,375	13,375	16%	4.6%
14	Necco St (Necco Ct/Melcher St)	100%	3,313	3,313	3,388	3,388	2%	4,513	4,513	36%	33.2%
15	Melcher St (Summer St/Necco St)	100%	5,813	5,813	6,213	6,213	7%	6,725	6,725	16%	8.2%
16	Melcher St (Necco St/ A St)	100%	4,125	4,125	4,475	4,475	8%	5,088	5,088	23%	13.7%
17	Summer St (Melcher St/Purchase St)	100%	17,313	17,313	18,050	18,050	4%	18,563	18,563	7%	2.8%
18	Summer St (Melcher St/D St)	100%	14,500	14,500	14,913	14,913	3%	14,913	14,913	3%	0.0%
19	A St (Melcher St/ Congress St)	100%	10,813	10,813	12,125	12,125	12%	13,325	13,325	23%	9.9%
20	Congress St (A St/ Purchase St)	100%	13,188	13,188	14,163	14,163	7%	14,163	14,163	7%	0.0%
21	Congress St (A St/ B St)	100%	13,750	13,750	15,500	15,500	13%	16,700	16,700	21%	7.7%
22	Thomson Pl (Congress St/ Seaport Ave)	100%	750	750	888	888	18%	888	888	18%	0.0%
23	GE Site Driveway (Build Only)	100%	0	0	0	0	#DIV/0!	2,788	2,788	#DIV/0!	#DIV/0!

General Electric HQ

Weekday Traffic

Link No.	Roadway Description	Roadway S.A.F.	2016 Roadway ADT (veh/day)	2016 Seasonal ADT (veh/day)	2021 Roadway ADT (veh/day)	2021 Seasonal ADT (veh/day)	2021 Traffic Increase (existing)	2021 Roadway ADT (veh/day)	2021 Seasonal ADT (veh/day)	2021 Traffic Increase (existing)	2021 Traffic Increase (no-build)
1	A St (W Broadway/W 2nd)	100%	14,313	14,313	15,588	15,588	9%	16,325	16,325	14%	4.7%
2	W 2nd St (Dorchester/A St)	100%	4,125	4,125	4,525	4,525	10%	4,525	4,525	10%	0.0%
3	W 2nd St (A St/D St)	100%	3,375	3,375	3,600	3,600	7%	3,600	3,600	7%	0.0%
4	A St (W 2nd/Richards)	100%	15,000	15,000	16,463	16,463	10%	17,200	17,200	15%	4.5%
5	Sobin Park (A St/End)	100%	563	563	575	575	2%	575	575	2%	0.0%
6	Richards St (A St/SBBR)	100%	4,063	4,063	4,300	4,300	6%	4,300	4,300	6%	0.0%
7	A St (Richards/Necco St)	100%	12,688	12,688	14,013	14,013	10%	14,750	14,750	16%	5.3%
8	A St (Necco St/Necco Ct)	100%	11,500	11,500	12,788	12,788	11%	13,250	13,250	15%	3.6%
9	Necco St (A St/ GE Dwy)	100%	4,813	4,813	4,925	4,925	2%	7,125	7,125	48%	44.7%
10	Necco St (GE Dwy/ Necco Ct)	100%	4,813	4,813	4,925	4,925	2%	7,125	7,125	48%	44.7%
11	Necco Ct (Harborwalk/Necco St)	100%	313	313	313	313	0%	313	313	0%	0.0%
12	Necco Ct (Necco St/A St)	100%	375	375	375	375	0%	500	500	33%	33.3%
13	A St (Necco Ct/ Melcher St)	100%	11,500	11,500	12,788	12,788	11%	13,375	13,375	16%	4.6%
14	Necco St (Necco Ct/Melcher St)	100%	3,313	3,313	3,388	3,388	2%	4,513	4,513	36%	33.2%
15	Melcher St (Summer St/Necco St)	100%	5,813	5,813	6,213	6,213	7%	6,725	6,725	16%	8.2%
16	Melcher St (Necco St/ A St)	100%	4,125	4,125	4,475	4,475	8%	5,088	5,088	23%	13.7%
17	Summer St (Melcher St/Purchase St)	100%	17,313	17,313	18,050	18,050	4%	18,563	18,563	7%	2.8%
18	Summer St (Melcher St/D St)	100%	14,500	14,500	14,913	14,913	3%	14,913	14,913	3%	0.0%
19	A St (Melcher St/ Congress St)	100%	10,813	10,813	12,125	12,125	12%	13,325	13,325	23%	9.9%
20	Congress St (A St/ Purchase St)	100%	13,188	13,188	14,163	14,163	7%	14,163	14,163	7%	0.0%
21	Congress St (A St/ B St)	100%	13,750	13,750	15,500	15,500	13%	16,700	16,700	21%	7.7%
22	Thomson Pl (Congress St/ Seaport Ave)	100%	750	750	888	888	18%	888	888	18%	0.0%
23	GE Site Driveway (Build Only)	100%	0	0	0	0	#DIV/0!	2,788	2,788	#DIV/0!	#DIV/0!

General Electric HQ
Weekend Vehicle Delay

Link No.	Description	2016 Delay By Approach NB or EB (sec)	2016 Delay By Approach SB or WB (sec)	2016 Adjusted Delay * NB or EB (sec)	2016 Adjusted Delay * SB or WB (sec)	2016 Combined Delay (sec)	2021 Delay By Approach NB or EB (sec)	2021 Delay By Approach SB or WB (sec)	2021 Adjusted Delay * NB or EB (sec)	2021 Adjusted Delay * SB or WB (sec)	2021 Combined Delay (sec)	2021 Delay By Approach NB or EB (sec)	2021 Delay By Approach SB or WB (sec)	2021 Adjusted Delay * NB or EB (sec)	2021 Adjusted Delay * SB or WB (sec)	2021 Combined Delay (sec)
1	A St (W Broadway/W 2nd)	5.7	0	5.7	0	2.85	6.6	0	6.6	0	3.3	6.6	0	6.6	0	3.3
2	W 2nd St (Dorchester/A St)	69.9	0	69.9	0	34.95	95.8	0	95.8	0	47.9	95.8	0	95.8	0	47.9
3	W 2nd St (A St/D St)	0	48.2	0	48.2	24.1	0	46.5	0	46.5	23.25	0	46.5	0	46.5	23.25
4	A St (W 2nd/Richards)	6.5	10	6.5	10	8.25	7.2	12.9	7.2	12.9	10.05	7.2	14.5	7.2	14.5	10.85
5	Sobin Park (A St/End)	9.6	0	9.6	0	4.8	9.2	0	9.2	0	4.6	9.2	0	9.2	0	4.6
6	Richards St (A St/SBBR)	0	43.7	0	43.7	21.85	0	42.8	0	42.8	21.4	0	42.8	0	42.8	21.4
7	A St (Richards/Necco St)	1.5	12.2	1.5	12.2	6.85	1.6	15.8	1.6	15.8	8.7	1.9	18.3	1.9	18.3	10.1
8	A St (Necco St/Necco Ct)	0.4	0	0.4	0	0.2	0.5	0	0.5	0	0.25	0.5	0	0.5	0	0.25
9	Necco St (A St/ GE Dwy)	0	20.7	0	20.7	10.35	0	24	0	24	12	0	41.8	0	41.8	20.9
10	Necco St (GE Dwy/ Necco Ct)	0.2	0	0.2	0	0.1	0.2	0	0.2	0	0.1	0.2	0	0.2	0	0.1
11	Necco Ct (Harborwalk/Necco St)	11.1	0	11.1	0	5.55	11.2	0	11.2	0	5.6	11.9	0	11.9	0	5.95
12	Necco Ct (Necco St/A St)	14.7	12	14.7	12	13.35	15.8	12.1	15.8	12.1	13.95	17.5	13.5	17.5	13.5	15.5
13	A St (Necco Ct/ Melcher St)	16.1	0	16.1	0	8.05	20.9	0	20.9	0	10.45	27.2	0	27.2	0	13.6
14	Necco St (Necco Ct/Melcher St)	18.2	0.5	18.2	0.5	9.35	18.9	0.5	18.9	0.5	9.7	25.5	0.5	25.5	0.5	13
15	Melcher St (Summer St/Necco St)	46.9	0	46.9	0	23.45	47.4	0	47.4	0	23.7	51.6	0	51.6	0	25.8
16	Melcher St (Necco St/ A St)	59	1.2	59	1.2	30.1	58.2	1.1	58.2	1.1	29.65	59.2	1.5	59.2	1.5	30.35
17	Summer St (Melcher St/Purchase St)	24.7	0	24.7	0	12.35	26	0	26	0	13	27.9	0	27.9	0	13.95
18	Summer St (Melcher St/D St)	0	21.7	0	21.7	10.85	0	22.7	0	22.7	11.35	0	24.4	0	24.4	12.2
19	A St (Melcher St/ Congress St)	63.4	8.7	63.4	8.7	36.05	65.9	10.5	65.9	10.5	38.2	57.2	11.8	57.2	11.8	34.5
20	Congress St (A St/ Purchase St)	40.3	0	40.3	0	20.15	42.2	0	42.2	0	21.1	42.5	0	42.5	0	21.25
21	Congress St (A St/ B St)	0	24.1	0	24.1	12.05	0	26.9	0	26.9	13.45	0	27.6	0	27.6	13.8
22	Thomson Pl (Congress St/ Seaport Ave)	0	68.8	0	68.8	34.4	0	72.6	0	72.6	36.3	0	72.6	0	72.6	36.3
23	GE Site Driveway (Build Only)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

MD PEAK CONDITION
DELAY BY APPROACH (seconds)

		2016 Existing EB	2016 Existing WB	2016 Existing NB	2016 Existing SB	2021 No Build EB	2021 No Build WB	2021 No Build NB	2021 No Build SB	2021 Build EB	2021 Build WB	2021 Build NB	2021 Build SB
Int 6	A St @ W 2nd St	69.9	48.2	5.7	10	95.8	46.5	6.6	12.9	95.8	46.5	6.6	14.5
Int 5	A St @ Sobin Park/Richards St	9.6	43.7	6.5	12.2	9.2	42.8	7.2	15.8	9.2	42.8	7.2	18.3
Int 4	A St @ Necco St	20.7	0	1.5	0	24	0	1.6	0	41.8	0	1.9	0
Int 3	A St @ Necco Ct	14.7	0	0.4	0	15.8	0	0.5	0	17.5	0	0.5	0
Int 7	Necco St @ Necco Ct	11.1	12	0.2	0.5	11.2	12.1	0.2	0.5	11.9	13.5	0.2	0.5
Int 2	A St @ Melcher St	59	0	16.1	8.7	58.2	0	20.9	10.5	59.2	0	27.2	11.8
Int 8	Necco St @ Melcher St	0	1.2	18.2	0	0	1.1	18.9	0	0	1.5	25.5	0
Int 9	Summer St @ Melcher St	24.7	21.7	46.9	0	26	22.7	47.4	0	27.9	24.4	51.6	0
Int 1	Congress St @ A St/Thomson Pl	40.3	24.1	63.4	68.8	42.2	26.9	65.9	72.6	42.5	27.6	57.2	72.6
Int10	Necco St @ GE Dwy (Build Only)	0	0	0	0	0	0	0	0	0	0	0	0

General Electric HQ

Weekend Average Daily Traffic (ADT) for Mesoscale Roadway Network

	Roadway Segments	Speed Limit (mph)	2016 Existing Volume (ADT)	2021 No-Build Volume (ADT)	2021 Build Volume (ADT)	K Factor	S.A.F.	Unadjusted PM Peak Hour 2016 Existing	2021 No Build	2021 Build
						8.0%	1.00			
1	A St (W Broadway/W 2nd)	30	14,313	15,588	16,325			1,145	1,247	1,306
2	W 2nd St (Dorchester/A St)	30	4,125	4,525	4,525			330	362	362
3	W 2nd St (A St/D St)	30	3,375	3,600	3,600			270	288	288
4	A St (W 2nd/Richards)	30	15,000	16,463	17,200			1,200	1,317	1,376
5	Sobin Park (A St/End)	20	563	575	575			45	46	46
6	Richards St (A St/SBBR)	30	4,063	4,300	4,300			325	344	344
7	A St (Richards/Necco St)	30	12,688	14,013	14,750			1,015	1,121	1,180
8	A St (Necco St/Necco Ct)	30	11,500	12,788	13,250			920	1,023	1,060
9	Necco St (A St/ GE Dwy)	30	4,813	4,925	7,125			385	394	570
10	Necco St (GE Dwy/ Necco Ct)	30	4,813	4,925	7,125			385	394	570
11	Necco Ct (Harborwalk/Necco St)	30	313	313	313			25	25	25
12	Necco Ct (Necco St/A St)	30	375	375	500			30	30	40
13	A St (Necco Ct/ Melcher St)	30	11,500	12,788	13,375			920	1,023	1,070
14	Necco St (Necco Ct/Melcher St)	30	3,313	3,388	4,513			265	271	361
15	Melcher St (Summer St/Necco St)	30	5,813	6,213	6,725			465	497	538
16	Melcher St (Necco St/ A St)	30	4,125	4,475	5,088			330	358	407
17	Summer St (Melcher St/Purchase St)	30	17,313	18,050	18,563			1,385	1,444	1,485
18	Summer St (Melcher St/D St)	30	14,500	14,913	14,913			1,160	1,193	1,193
19	A St (Melcher St/ Congress St)	30	10,813	12,125	13,325			865	970	1,066
20	Congress St (A St/ Purchase St)	30	13,188	14,163	14,163			1,055	1,133	1,133
21	Congress St (A St/ B St)	30	13,750	15,500	16,700			1,100	1,240	1,336
22	Thomson Pl (Congress St/ Seaport Ave)	30	750	888	888			60	71	71
23	GE Site Driveway (Build Only)	20	0	0	2,788			0	0	223

General Electric HQ
Weekday Vehicle Delay

Link No.	Description	2016 Delay By Approach NB or EB (sec)	2016 Delay By Approach SB or WB (sec)	2016 Adjusted Delay * NB or EB (sec)	2016 Adjusted Delay * SB or WB (sec)	2016 Combined Delay (sec)	2021 Delay By Approach NB or EB (sec)	2021 Delay By Approach SB or WB (sec)	2021 Adjusted Delay * NB or EB (sec)	2021 Adjusted Delay * SB or WB (sec)	2021 Combined Delay (sec)	2021 Delay By Approach NB or EB (sec)	2021 Delay By Approach SB or WB (sec)	2021 Adjusted Delay * NB or EB (sec)	2021 Adjusted Delay * SB or WB (sec)	2021 Combined Delay (sec)
1	A St (W Broadway/W 2nd)	5.7	0	5.7	0	2.85	6.6	0	6.6	0	3.3	6.6	0	6.6	0	3.3
2	W 2nd St (Dorchester/A St)	69.9	0	69.9	0	34.95	95.8	0	95.8	0	47.9	95.8	0	95.8	0	47.9
3	W 2nd St (A St/D St)	0	48.2	0	48.2	24.1	0	46.5	0	46.5	23.25	0	46.5	0	46.5	23.25
4	A St (W 2nd/Richards)	6.5	10	6.5	10	8.25	7.2	12.9	7.2	12.9	10.05	7.2	14.5	7.2	14.5	10.85
5	Sobin Park (A St/End)	9.6	0	9.6	0	4.8	9.2	0	9.2	0	4.6	9.2	0	9.2	0	4.6
6	Richards St (A St/SBBR)	0	43.7	0	43.7	21.85	0	42.8	0	42.8	21.4	0	42.8	0	42.8	21.4
7	A St (Richards/Necco St)	1.5	12.2	1.5	12.2	6.85	1.6	15.8	1.6	15.8	8.7	1.9	18.3	1.9	18.3	10.1
8	A St (Necco St/Necco Ct)	0.4	0	0.4	0	0.2	0.5	0	0.5	0	0.25	0.5	0	0.5	0	0.25
9	Necco St (A St/ GE Dwy)	0	20.7	0	20.7	10.35	0	24	0	24	12	0	41.8	0	41.8	20.9
10	Necco St (GE Dwy/ Necco Ct)	0.2	0	0.2	0	0.1	0.2	0	0.2	0	0.1	0.2	0	0.2	0	0.1
11	Necco Ct (Harborwalk/Necco St)	11.1	0	11.1	0	5.55	11.2	0	11.2	0	5.6	11.9	0	11.9	0	5.95
12	Necco Ct (Necco St/A St)	14.7	12	14.7	12	13.35	15.8	12.1	15.8	12.1	13.95	17.5	13.5	17.5	13.5	15.5
13	A St (Necco Ct/ Melcher St)	16.1	0	16.1	0	8.05	20.9	0	20.9	0	10.45	27.2	0	27.2	0	13.6
14	Necco St (Necco Ct/Melcher St)	18.2	0.5	18.2	0.5	9.35	18.9	0.5	18.9	0.5	9.7	25.5	0.5	25.5	0.5	13
15	Melcher St (Summer St/Necco St)	46.9	0	46.9	0	23.45	47.4	0	47.4	0	23.7	51.6	0	51.6	0	25.8
16	Melcher St (Necco St/ A St)	59	1.2	59	1.2	30.1	58.2	1.1	58.2	1.1	29.65	59.2	1.5	59.2	1.5	30.35
17	Summer St (Melcher St/Purchase St)	24.7	0	24.7	0	12.35	26	0	26	0	13	27.9	0	27.9	0	13.95
18	Summer St (Melcher St/D St)	0	21.7	0	21.7	10.85	0	22.7	0	22.7	11.35	0	24.4	0	24.4	12.2
19	A St (Melcher St/ Congress St)	63.4	8.7	63.4	8.7	36.05	65.9	10.5	65.9	10.5	38.2	57.2	11.8	57.2	11.8	34.5
20	Congress St (A St/ Purchase St)	40.3	0	40.3	0	20.15	42.2	0	42.2	0	21.1	42.5	0	42.5	0	21.25
21	Congress St (A St/ B St)	0	24.1	0	24.1	12.05	0	26.9	0	26.9	13.45	0	27.6	0	27.6	13.8
22	Thomson Pl (Congress St/ Seaport Ave)	0	68.8	0	68.8	34.4	0	72.6	0	72.6	36.3	0	72.6	0	72.6	36.3
23	GE Site Driveway (Build Only)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

PM PEAK CONDITION
DELAY BY APPROACH (seconds)

		2016 Existing					2021 No Build					2021 Build				
			EB	WB	NB	SB		EB	WB	NB	SB		EB	WB	NB	SB
Int 6	A St @ W 2nd St		69.9	48.2	5.7	10		95.8	46.5	6.6	12.9		95.8	46.5	6.6	14.5
Int 5	A St @ Sobin Park/Richards St		9.6	43.7	6.5	12.2		9.2	42.8	7.2	15.8		9.2	42.8	7.2	18.3
Int 4	A St @ Necco St		20.7		1.5	0		24		1.6	0		41.8		1.9	0
Int 3	A St @ Necco Ct		14.7		0.4	0		15.8		0.5	0		17.5		0.5	0
Int 7	Necco St @ Necco Ct		11.1	12	0.2	0.5		11.2	12.1	0.2	0.5		11.9	13.5	0.2	0.5
Int 2	A St @ Melcher St		59		16.1	8.7		58.2		20.9	10.5		59.2		27.2	11.8
Int 8	Necco St @ Melcher St		0	1.2	18.2			0	1.1	18.9			0	1.5	25.5	
Int 9	Summer St @ Melcher St		24.7	21.7	46.9	0		26	22.7	47.4			27.9	24.4	51.6	
Int 1	Congress St @ A St/Thomson Pl		40.3	24.1	63.4	68.8		42.2	26.9	65.9	72.6		42.5	27.6	57.2	72.6
Int10	Necco St @ GE Dwy (Build Only)		0		0	0		0		0	0		0	0	0	0

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Weekday Average Daily Traffic (ADT) for Mesoscale Roadway Network

	Roadway Segments	Speed Limit (mph)	2016 Existing Volume (ADT)	2021 No-Build Volume (ADT)	2021 Build Volume (ADT)	K Factor	S.A.F.	Unadjusted PM Peak Hour 2016 Existing	Unadjusted PM Peak Hour 2021 No-Build	Unadjusted PM Peak Hour 2021 Build
						8.0%	1.00			
1	A St (W Broadway/W 2nd)	30	14,313	15,588	16,325			1,145	1,247	1,306
2	W 2nd St (Dorchester/A St)	30	4,125	4,525	4,525			330	362	362
3	W 2nd St (A St/D St)	30	3,375	3,600	3,600			270	288	288
4	A St (W 2nd/Richards)	30	15,000	16,463	17,200			1,200	1,317	1,376
5	Sobin Park (A St/End)	20	563	575	575			45	46	46
6	Richards St (A St/SBBR)	30	4,063	4,300	4,300			325	344	344
7	A St (Richards/Necco St)	30	12,688	14,013	14,750			1,015	1,121	1,180
8	A St (Necco St/Necco Ct)	30	11,500	12,788	13,250			920	1,023	1,060
9	Necco St (A St/ GE Dwy)	30	4,813	4,925	7,125			385	394	570
10	Necco St (GE Dwy/ Necco Ct)	30	4,813	4,925	7,125			385	394	570
11	Necco Ct (Harborwalk/Necco St)	30	313	313	313			25	25	25
12	Necco Ct (Necco St/A St)	30	375	375	500			30	30	40
13	A St (Necco Ct/ Melcher St)	30	11,500	12,788	13,375			920	1,023	1,070
14	Necco St (Necco Ct/Melcher St)	30	3,313	3,388	4,513			265	271	361
15	Melcher St (Summer St/Necco St)	30	5,813	6,213	6,725			465	497	538
16	Melcher St (Necco St/ A St)	30	4,125	4,475	5,088			330	358	407
17	Summer St (Melcher St/Purchase St)	30	17,313	18,050	18,563			1,385	1,444	1,485
18	Summer St (Melcher St/D St)	30	14,500	14,913	14,913			1,160	1,193	1,193
19	A St (Melcher St/ Congress St)	30	10,813	12,125	13,325			865	970	1,066
20	Congress St (A St/ Purchase St)	30	13,188	14,163	14,163			1,055	1,133	1,133
21	Congress St (A St/ B St)	30	13,750	15,500	16,700			1,100	1,240	1,336
22	Thomson Pl (Congress St/ Seaport Ave)	30	750	888	888			60	71	71
23	GE Site Driveway (Build Only)	20	0	0	2,788			0	0	223

General Electric HQ

Emissions Factors By Link (g/mi)

	Roadway Segments	2016 Existing NO_x	2016 Existing VOC	2016 Existing CO_2	2021 No Build NO_x	2021 No Build VOC	2021 No Build CO_2	2021 Build NO_x	2021 Build VOC	2021 Build CO_2
		Emission Factors From MOVES2014a								
1	A St (W Broadway/W 2nd)	0.4	1.2	481.3	0.2	0.7	427.4	0.2	0.7	427.4
2	W 2nd St (Dorchester/A St)	0.4	0.8	448.6	0.2	0.5	398.3	0.2	0.5	398.3
3	W 2nd St (A St/D St)	0.3	0.4	443.8	0.2	0.3	394.1	0.2	0.3	394.1
4	A St (W 2nd/Richards)	0.4	1.0	492.6	0.2	0.6	437.5	0.2	0.6	437.5
5	Sobin Park (A St/End)	0.4	1.9	533.4	0.2	1.1	473.2	0.2	1.1	473.2
6	Richards St (A St/SBBR)	0.3	1.2	425.4	0.1	0.7	377.7	0.1	0.7	377.7
7	A St (Richards/Necco St)	0.3	0.5	429.6	0.1	0.3	381.4	0.1	0.3	381.4
8	A St (Necco St/Necco Ct)	0.3	2.3	425.4	0.1	1.3	377.7	0.1	1.3	377.7
9	Necco St (A St/ GE Dwy)	0.3	1.9	425.4	0.1	1.1	377.7	0.1	1.1	377.7
10	Necco St (GE Dwy/ Necco Ct)	0.3	1.9	430.9	0.1	1.1	382.6	0.1	1.1	382.6
11	Necco Ct (Harborwalk/Necco St)	0.4	1.9	464.2	0.2	1.1	412.2	0.2	1.1	412.2
12	Necco Ct (Necco St/A St)	0.3	1.9	436.7	0.1	1.1	387.8	0.1	1.1	387.8
13	A St (Necco Ct/ Melcher St)	0.4	3.7	449.9	0.2	2.2	399.6	0.2	2.2	399.6
14	Necco St (Necco Ct/Melcher St)	0.4	3.7	477.7	0.2	2.2	424.2	0.2	2.2	424.2
15	Melcher St (Summer St/Necco St)	0.4	1.7	482.5	0.2	1.0	428.5	0.2	1.0	428.5
16	Melcher St (Necco St/ A St)	0.4	1.6	469.5	0.2	1.0	417.0	0.2	1.0	417.0
17	Summer St (Melcher St/Purchase St)	0.4	0.4	450.7	0.2	0.3	400.2	0.2	0.3	400.2
18	Summer St (Melcher St/D St)	0.3	0.3	444.3	0.2	0.2	394.6	0.2	0.2	394.6
19	A St (Melcher St/ Congress St)	0.3	1.2	425.4	0.1	0.7	377.7	0.1	0.7	377.7
20	Congress St (A St/ Purchase St)	0.3	0.4	441.6	0.2	0.2	392.2	0.2	0.2	392.2
21	Congress St (A St/ B St)	0.3	0.5	438.0	0.1	0.3	388.9	0.1	0.3	388.9
22	Thomson Pl (Congress St/ Seaport Ave)	0.3	0.7	433.7	0.1	0.4	385.2	0.1	0.4	385.2
23	GE Site Driveway (Build Only)	0.4	2.3	533.4	0.2	1.4	473.2	0.2	1.4	473.2

General Electric HQ

Mesoscale Roadway Data

Link No.	Description	Speed Limit (mph)	Link Length (miles)	Grade (%)
1	A St (W Broadway/W 2nd)	30	0.10	1.3
2	W 2nd St (Dorchester/A St)	30	0.16	0.6
3	W 2nd St (A St/D St)	30	0.32	0.5
4	A St (W 2nd/Richards)	30	0.12	1.6
5	Sobin Park (A St/End)	20	0.06	0.0
6	Richards St (A St/SBBR)	30	0.10	0.0
7	A St (Richards/Necco St)	30	0.30	0.1
8	A St (Necco St/Necco Ct)	30	0.05	0.0
9	Necco St (A St/ GE Dwy)	30	0.06	0.0
10	Necco St (GE Dwy/ Necco Ct)	30	0.06	0.2
11	Necco Ct (Harborwalk/Necco St)	30	0.06	0.9
12	Necco Ct (Necco St/A St)	30	0.06	0.3
13	A St (Necco Ct/ Melcher St)	30	0.03	0.6
14	Necco St (Necco Ct/Melcher St)	30	0.03	1.3
15	Melcher St (Summer St/Necco St)	30	0.07	1.4
16	Melcher St (Necco St/ A St)	30	0.07	1.1
17	Summer St (Melcher St/Purchase St)	30	0.32	0.7
18	Summer St (Melcher St/D St)	30	0.54	0.5
19	A St (Melcher St/ Congress St)	30	0.10	0.0
20	Congress St (A St/ Purchase St)	30	0.40	0.4
21	Congress St (A St/ B St)	30	0.27	0.4
22	Thomson Pl (Congress St/ Seaport Ave)	30	0.17	0.2
23	GE Site Driveway (Build Only)	20	0.05	0

Project Data

TRAFFIC DATA	
Project Name	General Electric HQ
Existing Year	2016
No-Build Year	2021
Build Year	2021
Seasonal Adjustment Factor	1.00
K-Factor	8.0%

Idle Emission Factors

Year	NOx (g/hr)	VOC (g/hr)	CO2 (g/hr)
2016	2.37	1.74	4090.08
2021	0.9	0.9	3621.3

Greenhouse Gas Emissions Assessment Supporting Documentation

Stationary Source

- Energy Modeling Report
- Stationary GHG Analysis

Energy Modeling Report

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Energy Section

There are multiple energy compliance requirements that are applicable to the new GE Headquarters in Boston. These requirements are not intended to be design targets but should be carried as proven performance over known comparisons. The proposed case for this energy code compliance document is modeled conservatively – energy improvements are only included in the model if the design team is certain they will be incorporated into the final design. There are several energy improvements under consideration which have not bene included in this iteration of the model. It is assumed that the pending MA Stretch Code will be the applicable code for this project.

The current energy performance goals for the GE headquarters is to be at least 15% better than the pending Stretch Code in MA. This is based on IECC 2012, which has ASHRAE 90.1 – 2010 as its base code.

Energy modeling for this project will be performed utilizing DOE-2 based freeware Energy Plus. Energy Plus is an industry proven software package that actively being updated and has a large user base in the United States. It is a robust software package with capabilities of analyzing complex buildings and building systems. This is an approved software of the IRS and is therefore also approved for MEPA filing in Boston: http://www.energy.gov/eere/buildings/qualified-software-calculating-commercial-building-tax-deductions

New Building Key Model Assumptions

Modeling Parameter	Base Case	Design Case
General		
Conditioned Floor Area	310,925	310,925
Building Envelope		
External Walls	Steel Framed with R-13 cavity insulation and R-7.5 continuous insulation; Assembly U-value = 0.064	Minimum R-13 + R-10 continuous insulation; Assembly U-value = 0.055
Roof	R-20 continuous insulation above deck; Assembly U-value = 0.048	Minimum R-30 continuous insulation
Slab Insulation	F-0.86 minimum; I.E., R-15 for 24 inches or equivalent	F-0.86 minimum; I.E., R-15 for 24 inches or equivalent
Fenestration and Shading		
Assembly U-value	0.45	0.3
Assembly SHGC	0.40	0.25
Overall % Window to Wall Ratio	40%	70%
HVAC (Air-side)		

HVAC System	VAV with Reheat Air-side Economizers	Active Chilled Beam Dual Enthalpy Economizers
HVAC (Water-side)		
Boiler Efficiency	82%	90% (Actual Design TBD)
Chiller Efficiency	0.576 kW/ton	0.576 kW/ton
Lighting		
Lighting Power Density (LPD)	1.15 W/SF (80% Office @ 0.98 W/SF, 20% Lab @ 1.81 W/SF)	0.54 W/SF (80% Office @ 0.5 W/SF, 20% Lab @ 0.7 W/SF)
Daylighting Control	NONE	NONE
Plug Loads		
Equipment Power Density (EPD)	1.65 W/SF	10% Reduction Per Energy Star Equipment

Existing Building Key Model Assumptions

Modeling Parameter	Base Case	Design Case
General		
Conditioned Floor Area	89,320	89,320
Building Envelope		
External Walls	Existing Brick Masonry	Existing Brick Masonry
Roof	Existing Warehouse Roof (R-15)	Minimum R-30 continuous insulation
Slab Insulation	NONE	NONE
Fenestration and Shading		
Assembly U-value (Existing Construction)	0.62 (CBECS Pre-1980 CZ5a Window Construction)	0.3
Assembly U-value (New Construction)	0.45 (90.1-2010)	0.3
Assembly SHGC (Existing Construction)	0.41 (CBECS Pre-1980 CZ5a Window Construction)	0.25
Assembly SHGC (New Construction)	0.4 (90.1-2010)	0.25
Overall % Window to Wall Ratio	35%	35%
Overall % Skylight to Roof Ratio	3.5%	13.3%
HVAC (Air-side)		
HVAC System	Packaged VAV with Reheat Air-side Economizers	VAV with Reheat Dual Enthalpy Economizers
HVAC (Water-side)		
Boiler Efficiency	82%	90%
DX Efficiency/Chiller Efficiency	1.22 kW/ton (9.8 EER)	0.576 kW/ton
Lighting		
Lighting Power Density (LPD)	1.15 W/SF (80% Office @ 0.98 W/SF, 20% Lab @ 1.81 W/SF)	0.54 W/SF (80% Office @ 0.5 W/SF, 20% Lab @ 0.7 W/SF)
Daylighting Control	NONE	NONE

Plug Loads		
Equipment Power Density (EPD)	1.65 W/SF	10% Reduction Per Energy Star Equipment

Building Baseline Energy Usage and Thermal Loads

The baseline EUI for the new building and existing buildings is 56.3 and 76.3 kBTU/SF respectively. The tables and charts below detail the energy usage for the baseline scenarios for the new and existing buildings. Please note that in the charts and tables below, the unit "MBtu" refers to one million Btu, and "kBtu" is one thousand Btu.

Table 1: End Use Breakdown - New Building Baseline

End Use	Consumption (kBtu)
Heating	2,923,163
Cooling	1,016,003
Interior Lighting	3,921,243
Interior Equipment	8,291,504
Fans	1,166,279
Pumps	149,348
Heat Rejection	34,538
Total	**17,502,078**

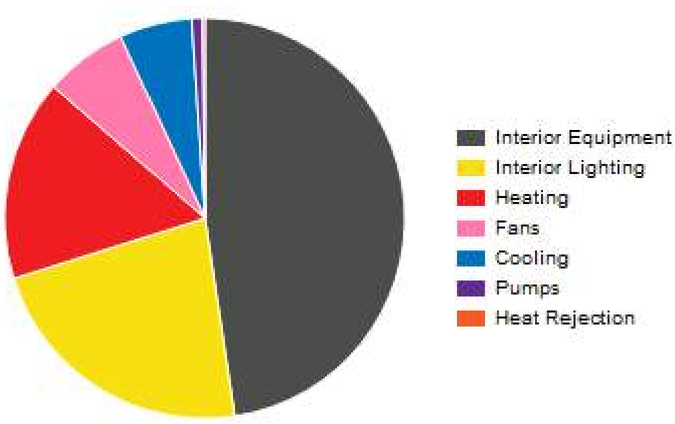

Figure 1: End Use Breakdown – New Building Baseline

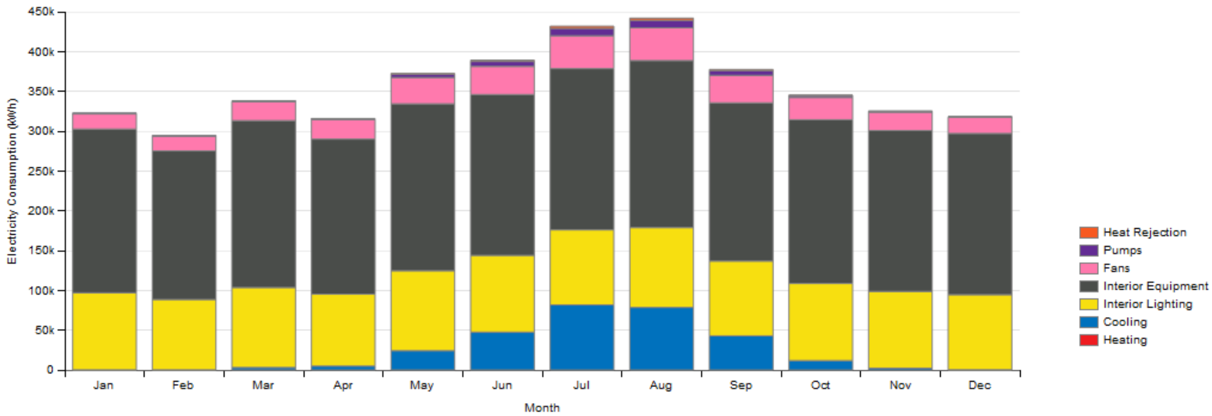

Figure 2: Electricity Monthly End-Use Breakdown – New Building Baseline

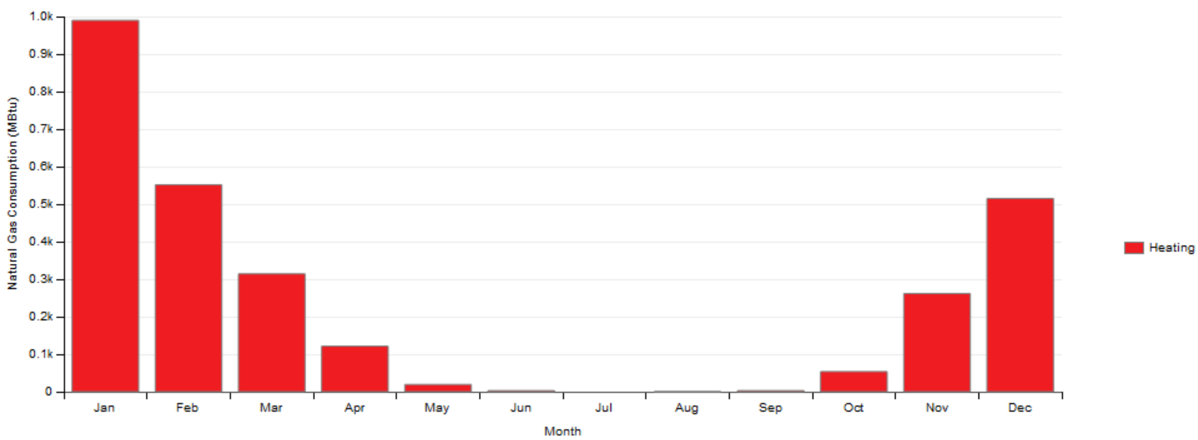

Figure 3: Monthly Gas Usage – New Building Baseline

Existing Building Baseline:

Table 2: End Use Breakdown - Existing Building Baseline

End Use	Consumption (kBtu)
Heating	2,440,828

End Use	Consumption (kBtu)
Cooling	628,687
Interior Lighting	1,130,395
Interior Equipment	2,381,912
Fans	205,335
Pumps	30,757
Total	**6,817,914**

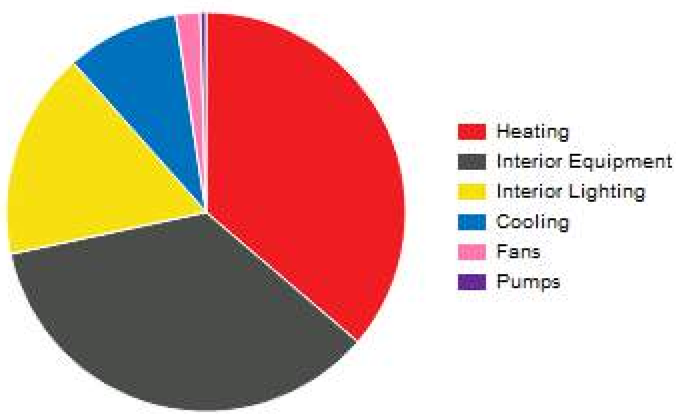

Figure 4: End Use Breakdown – Existing Building Baseline

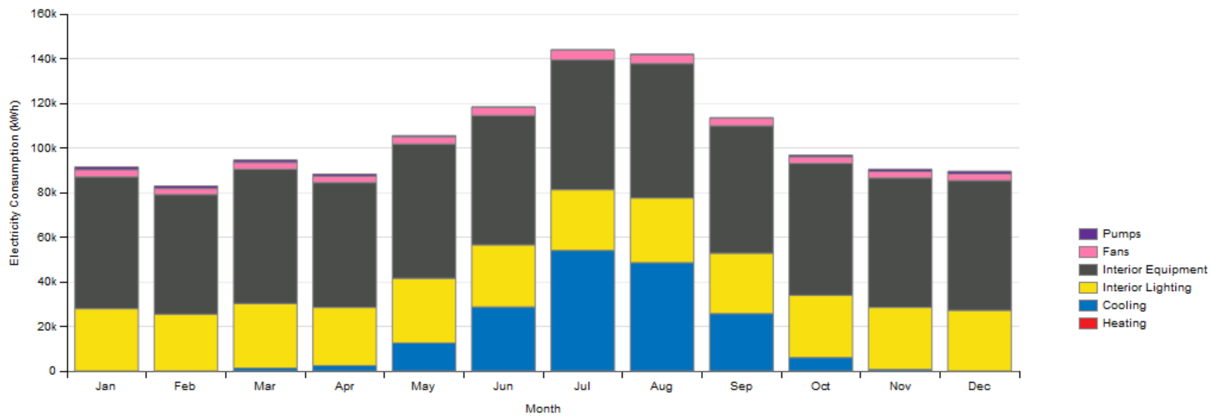

Figure 5: Electricity Monthly End-Use Breakdown – Existing Building Baseline

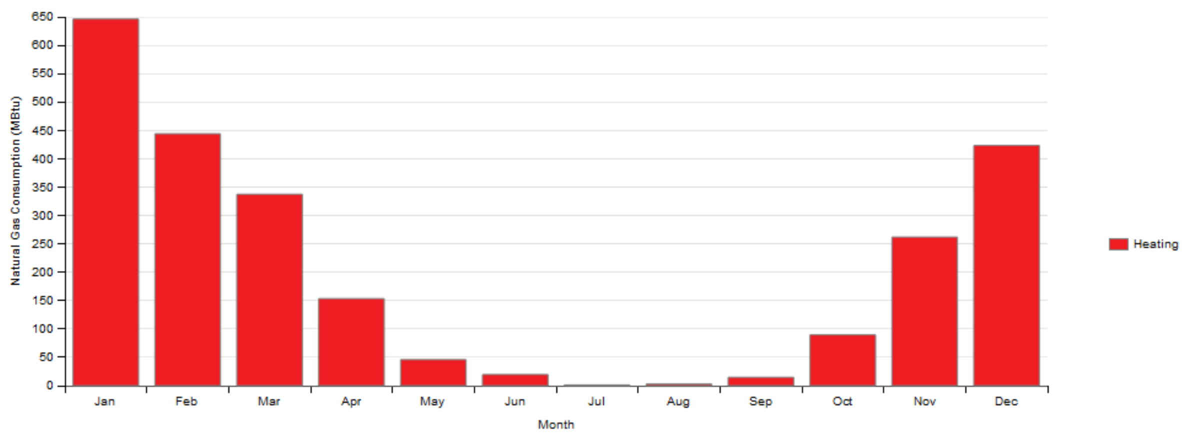

Figure 6: Monthly Gas Usage – Existing Building Baseline

Proposed Building Energy Usage

The proposed EUI for the new building and existing buildings is 39.5 and 61.2 kBTU/SF, respectively. Table 3 below compares baseline and proposed EUI and defines the percentage improvement over baseline. See below for monthly heating and cooling load profiles for the new building as well as the existing.

Table 3: Baseline vs. Proposed Performance

	Main Building	Existing Building
Baseline EUI (kBTU/SF/yr)	56.3	76.3
Proposed EUI (kBTU/SF/yr)	39.5	61.2
Percentage Improvement	**30%**	**20%**

Table 4: End Use Breakdown - New Building Proposed

End Use	Consumption (kBtu)
Heating	5,547,157

End Use	Consumption (kBtu)
Cooling	1,996,975
Interior Lighting	1,765,253
Interior Equipment	1,478,054
Fans	931,534
Pumps	479,330
Heat Rejection	71,750
Humidification	6,322
Total	**12,276,375**

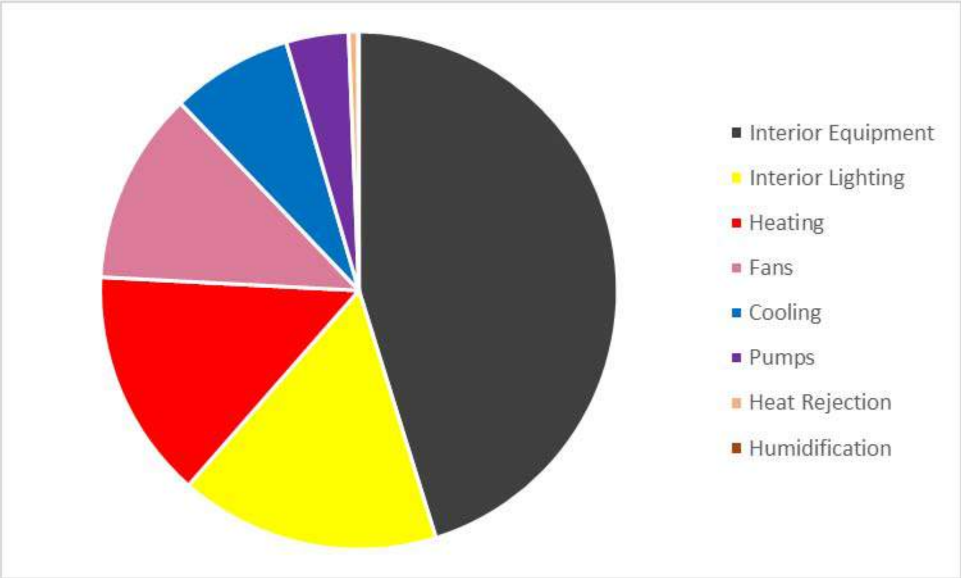

Figure 7: End Use Breakdown – New Building Proposed

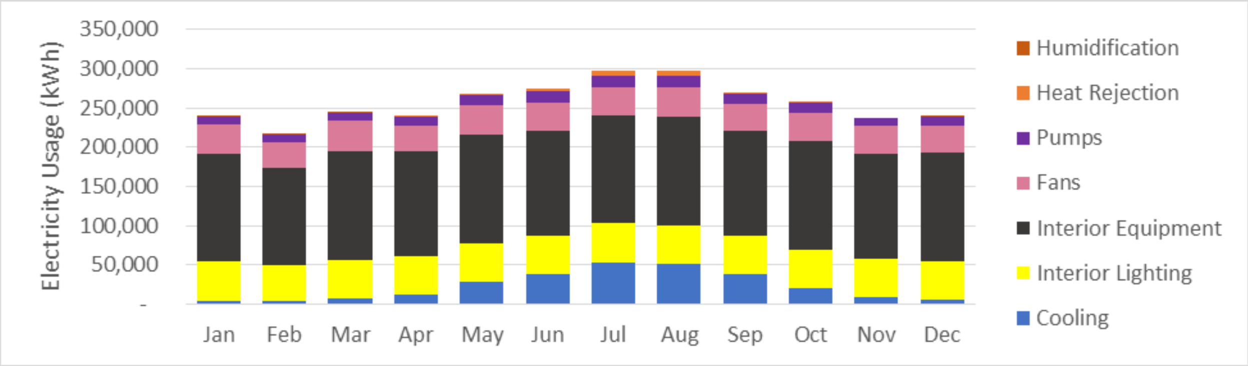

Figure 8: Electricity Monthly End-Use Breakdown – New Building Proposed

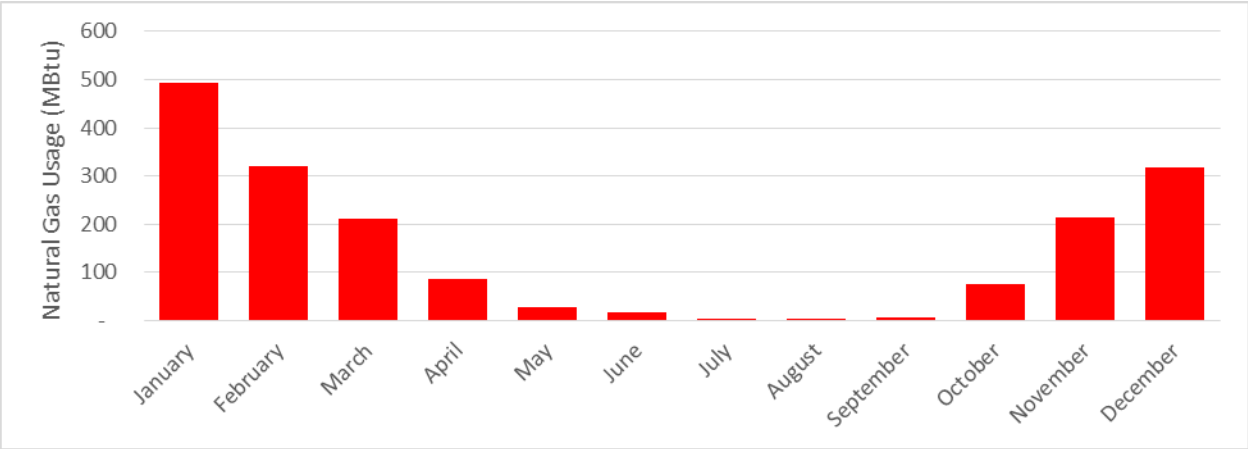

Figure 9: Monthly Gas Usage – New Building Proposed

Table 5: End Use Breakdown - Existing Building Proposed

End Use	Consumption (kBtu)
Heating	1,989,980
Cooling	306,562
Interior Lighting	530,797
Interior Equipment	2,165,374
Fans	105,359
Pumps	208,975
Heat Rejection	163,214
Total	**5,470,261**

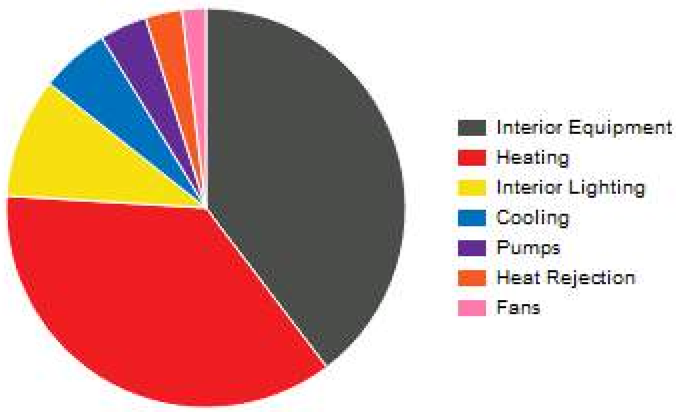

Figure 10: End Use Breakdown – Existing Building Proposed

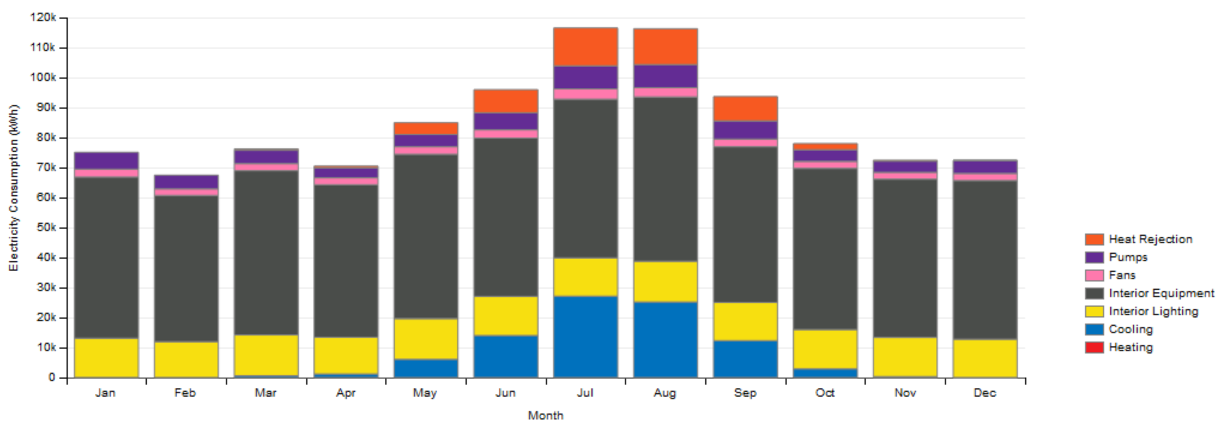

Figure 11: Electricity Monthly End-Use Breakdown – Existing Building Proposed

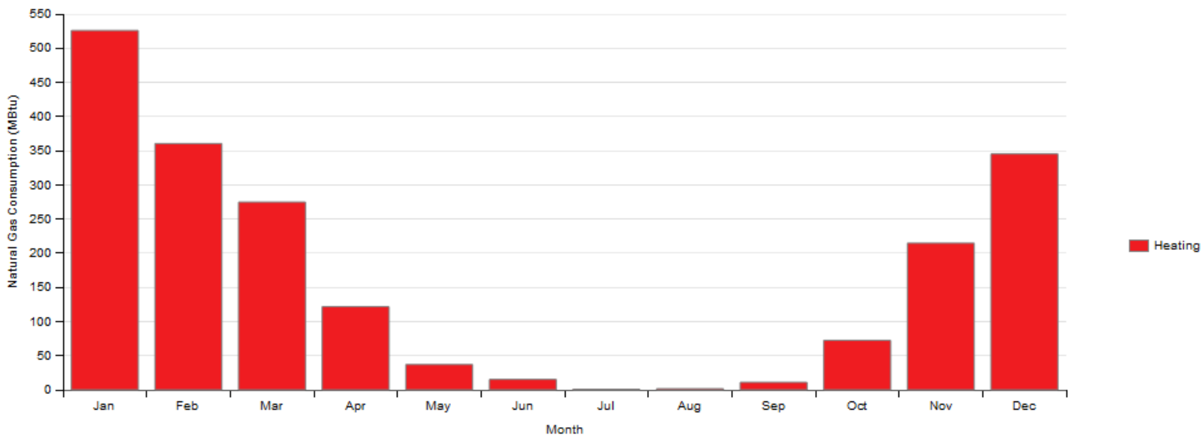

Figure 12: Monthly Gas Usage – Existing Building Proposed

The following Appendix sections from the Boston GHG Guidelines were incorporated into the current models:

BUILDING ENVELOPE

- Improve building envelope through higher R-value insulation in walls, roof, and if appropriate, basement walls and ceiling
- Install lower U-value windows to improve envelope performance
- Incorporate window glazing to balance and optimize daylighting, heat loss and solar heat gain performance
- Design roofs at a minimum to be solar-ready

BUILDING MECHANICAL SYSTEMS AND LIGHTING

- Install high-efficiency HVAC systems and premium efficiency motors
- Use energy efficient boilers, heaters, furnaces, incinerators, or generators
- Include heat recovery ventilation units (with regenerative desiccant beds)
- Install high efficiency lighting, including CFLs and LED technology as appropriate

ONGOING OPERATIONS

- Purchase and install Energy Star-rated appliances that are the lowest energy rating

The following Appendix sections from the Boston GHG Guidelines are under consideration for the design process but are not included in the current models:

BUILDING ENVELOPE

- Maximize the thermal mass of walls, roofs and floor to provide thermal damping
- Conduct inspection and comprehensive air sealing of building envelope to minimize air leakage
- Construct green roofs to reduce heat load on roof, further insulate, and retain/filter rainwater
- Maximize interior daylighting through floor plates, and use of skylights, celestories and light wells

BUILDING MECHANICAL SYSTEMS AND LIGHTING

- Prevent over-sizing of HVAC or other equipment by sizing only after efficiency measures have been incorporated to reduce HVAC, lighting and other electrical loads
- Eliminate or reduce use of refrigerants in HVAC systems
- Use demand control ventilation
- Use ground source heat pumps
- Seal and leak-check all supply air ductwork
- Incorporate motion sensors into lighting, daylighting, and climate controls
- Use efficient, directed exterior lighting, such as LED technology
- Install energy efficient elevators and escalators
- Provide automated energy management control system with the capacity to:
    - Adjust and maintain set points and schedules
    - Indicate alarms and problems
    - Provide information on trends and operating history
    - Operate mechanical and lighting systems to minimize overall energy usage

DISTRIBUTED GENERATION (ON-SITE)

- Incorporate appropriate on-site renewable energy systems into project including solar PV (both first and third-party ownership models should be evaluated), solar thermal, wind, low impact hydro, geothermal, biomass (including pellets), and bio-gas strategies
- Incorporate combined heat and power (CHP) technologies where sufficient year-round thermal demand exists

ENERGY INFORMATION (Data Acquisition)

- Track energy performance of building and develop strategy to maintain efficiency
- Install sub-meters on all floors and/or departments and/or for each specific tenant space
- Provide energy information systems to promote energy awareness to occupants
- Conduct 3rd party building commissioning to ensure energy performance

ONGOING OPERATIONS

- Reduce energy demand using peak shaving or load shifting strategies – if applicable, enroll in demand response program with ISO-New England
- Conduct or provide incentives for annual audits of energy consumption for tenants
- Create and implement a tenant manual identifying GHG-reducing operations and practices
- Purchase green power

HVAC Systems Section

The overall campus will require approximately 945 tons of cooling and 12,200 MBH of heating capacity. Final loads will be determined as the design progresses. The new building load will account for approximately 823 tons of cooling and 7,900 MBH of heating of this total load. The heating and cooling plant will either be a geothermal well system with heat recovery chiller or a chiller, cooling tower and boiler system. The location of the new GE site currently lies outside of Boston's "Green Steam" territory (in magenta below) and therefore is not eligible for that option. Installation of localized Cogeneration will be explored in more detail.

The main air handling units will be either constant volume dedicated outside air units or VAV units depending on the final distribution system. Units will have hot and chilled water coils, variable frequency drives, energy recovery (where applicable) and economizer (where applicable).

The distribution system on the floors will be a combination of active chilled beams and an overhead VAV system depending on specific space requirements throughout the building. Ventilation air will be provided by the air handling units, with thermal and latent exhaust heat recovery.
See below for baseline monthly heating and cooling load profiles for the new building as well as the existing in the baseline and proposed cases.

Table 6: Modeled Monthly Heating and Cooling Loads – New Building Baseline

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average Outdoor Air Dry Bulb (F)	27	31	39	47	59	66	74	71	65	54	43	36
Cooling Load (MBtu)	0	0	11	16	83	163	280	269	146	40	8	1
Heating Load (MBtu)	1,023	572	325	123	19	3	-	0	3	54	269	532

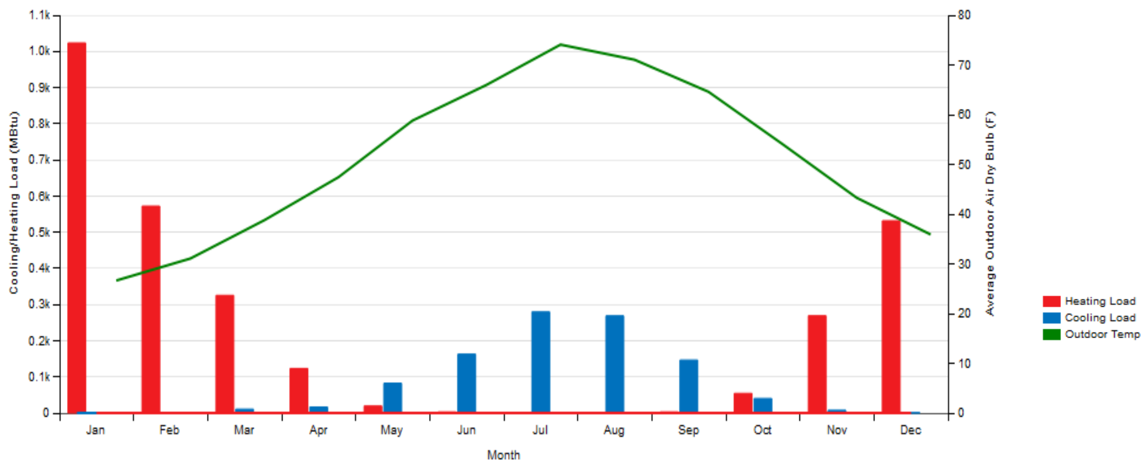

Figure 13: Modeled Monthly Heating and Cooling Load Profile – New Building Baseline

Table 7: Modeled Monthly Heating and Cooling Loads – Existing Building Baseline

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average Outdoor Air Dry Bulb (F)	27	31	39	47	59	66	74	71	65	54	43	36
Cooling Load (MBtu)	-	-	5	8	44	100	188	169	90	21	3	-
Heating Load (MBtu)	645	444	337	154	46	20	1	3	15	90	262	423

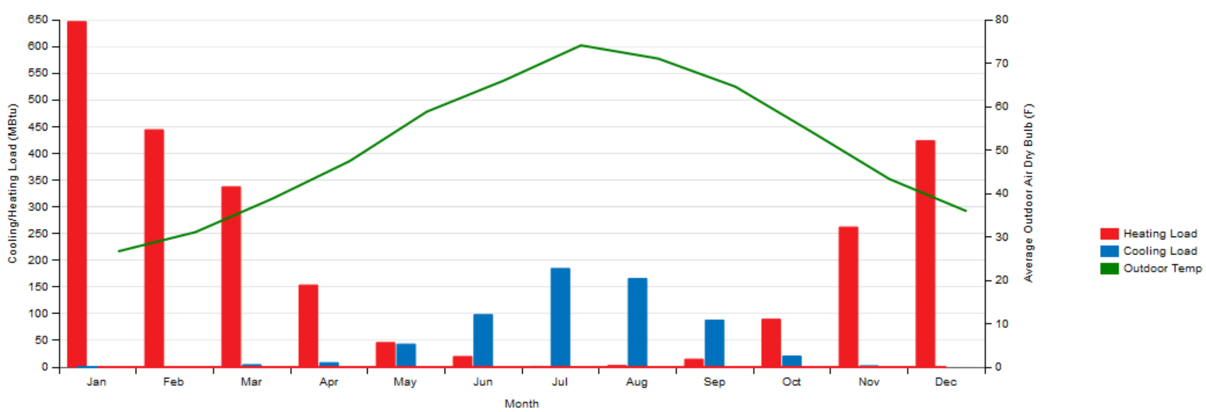

Figure 14: Modeled Monthly Heating and Cooling Load Profile – Existing Building Baseline

Table 8: Modeled Monthly Heating and Cooling Loads – New Building Proposed

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average Outdoor Air Dry Bulb (F)	27	31	39	47	59	66	74	71	65	54	43	36
Cooling Load (MBtu)	15	14	25	43	96	134	182	174	131	68	32	18
Heating Load (MBtu)	433	282	186	75	24	14	1	1	4	65	187	280

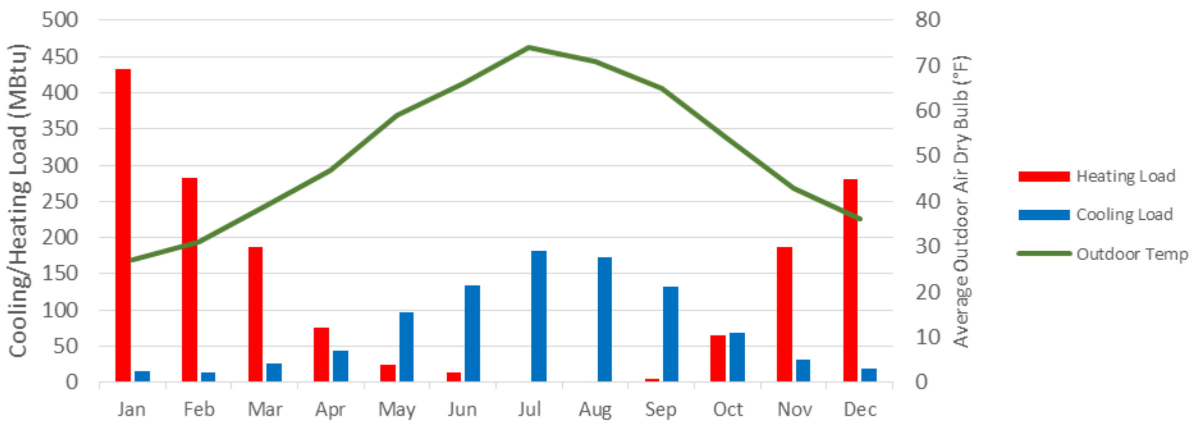

Figure 15: Modeled Monthly Heating and Cooling Load Profile – New Building Proposed

Table 9: Modeled Monthly Heating and Cooling Loads – Existing Building Proposed

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average Outdoor Air Dry Bulb (F)	27	31	39	47	59	66	74	71	65	54	43	36
Cooling Load (MBtu)	-	-	2	4	21	48	93	86	42	10	1	-
Heating Load (MBtu)	528	362	276	123	37	16	1	2	11	73	216	347

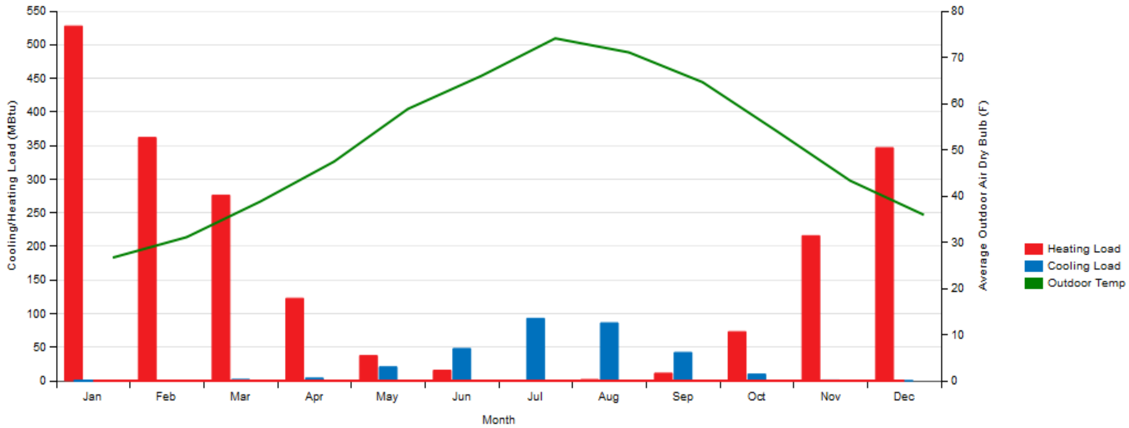

Figure 16: Modeled Monthly Heating and Cooling Load Profile – Existing Building Proposed

Solar/PV Systems Section

The building will feature a solar PV brise-soleil on the south façade, where PV modules will be arranged to simultaneously shade direct sunlight and to generate power from the sun. Based on preliminary modeling, the system could achieve up to 450 kW DC ratings and yield up to 567,000 kWh per year in alternative energy production. These calculations are high level in nature, based on today's available PV module technology, and are not included in the proposed system model at present. The system specifications will be further developed as the building design is refined.

Stationary GHG Analysis

Stationary Source Greenhouse Gas Emissions Estimate

Job number: 13421.00
Project: GE Headquarters

New Building

ENERGY CONSUMPTION

Scenario	Space Cool	Heat Rejection	Space Heating	Vent Fans	Pumps & Aux.	Humidification	Misc. Equip.[1]	Interior Lighting	Total Electricity	Total Gas	Total Energy	EUI
	(kBtu)	(kBtu)	(kBtu)	(kBtu)	(kBtu)	(kBtu)	(kBtu)	(kBtu)	(kBtu)	(kBtu)	(kBtu)	(kBtu/sf-yr)
BASELINE	1,016,003	34,538	2,923,163	1,166,279	149,348		8,291,504	3,921,243	14,578,915	2,923,163	17,502,078	56.3
DESIGN	1,996,975	71,750	5,547,157	931,534	479,330	6,322	1,478,054	1,765,253	6,729,218	5,547,157	12,276,375	39.5
END-USE SAVINGS	-980,972	-37,212	-2,623,994	234,745	-329,982	-6,322	6,813,450	2,155,990	7,849,697	-2,623,994	5,225,703	
PERCENT SAVINGS											29.9%	

GREENHOUSE GAS EMISSIONS

Scenario	Space Cool	Heat Rejection	Space Heating	Vent Fans	Pumps & Aux.	Humidification	Misc. Equip.	Interior Lighting	Total Electricity	Total Gas	Total Energy
	(tons/yr)	(tons/yr)	(tons/yr)	(tons/yr)	(tons/yr)	(tons/yr)	(tons/yr)	(tons/yr)	(tons/yr)	(tons/yr)	(tons/yr)
BASELINE	108.1	3.7	171.0	124.0	15.9	0.0	881.9	417.1	1,550.6	171.0	1,721.6
DESIGN	212.4	7.6	324.5	99.1	51.0	0.7	157.2	187.8	715.7	324.5	1,040.2
END-USE SAVINGS	-104.3	-4.0	-153.5	25.0	-35.1	-0.7	724.7	229.3	834.9	-153.5	681.4
PERCENT SAVINGS											39.6%

Existing Building

ENERGY CONSUMPTION

Scenario	Space Cool	Heat Rejection	Space Heating	Vent Fans	Pumps & Aux.		Misc. Equip.[1]	Interior Lighting	Total Electricity	Total Gas	Total Energy	EUI
	(kBtu)	(kBtu)	(kBtu)	(kBtu)	(kBtu)		(kBtu)	(kBtu)	(kBtu)	(kBtu)	(kBtu)	(kBtu/sf-yr)
BASELINE	628,687		2,440,828	205,335	30,757		2,381,912	1,130,395	4,377,086	2,440,828	6,817,914	76.3
DESIGN	306,562	163,214	1,989,980	105,359	208,975		2,165,374	530,797	3,480,281	1,989,980	5,470,261	61.2
END-USE SAVINGS	322,125	-163,214	450,848	99,976	-178,218		216,538	599,598	896,805	450,848	1,347,653	
PERCENT SAVINGS											19.8%	

GREENHOUSE GAS EMISSIONS

Scenario	Space Cool	Heat Rejection	Space Heating	Vent Fans	Pumps & Aux.		Misc. Equip.	Interior Lighting	Total Electricity	Total Gas	Total Energy
	(tons/yr)	(tons/yr)	(tons/yr)	(tons/yr)	(tons/yr)	(tons/yr)	(tons/yr)	(tons/yr)	(tons/yr)	(tons/yr)	(tons/yr)
BASELINE	66.9	0.0	142.8	21.8	3.3		253.3	120.2	465.5	142.8	608.3
DESIGN	32.6	17.4	116.4	11.2	22.2		230.3	56.5	370.2	116.4	486.6
END-USE SAVINGS	34.3	-17.4	26.4	10.6	-19.0		23.0	63.8	95.4	26.4	121.8
PERCENT SAVINGS											20.0%

PROJECT TOTAL

ENERGY CONSUMPTION

Scenario	Space Cool	Heat Rejection	Space Heating	Vent Fans	Pumps & Aux.	Humidification	Misc. Equip.[1]	Interior Lighting	Total Electricity	Total Gas	Total Energy
	(kBtu)	(kBtu)	(kBtu)	(kBtu)	(kBtu)	(kBtu)	(kBtu)	(kBtu)	(kBtu)	(kBtu)	(kBtu)
BASELINE	1,644,690	34,538	5,363,991	1,371,614	180,105	0	10,673,416	5,051,638	18,956,001	5,363,991	24,319,992
DESIGN	2,303,537	234,964	7,537,137	1,036,893	688,305	6,322	3,643,428	2,296,050	10,209,499	7,537,137	17,746,636
END-USE SAVINGS	-658,847	-200,426	-2,173,146	334,721	-508,200	-6,322	7,029,988	2,755,588	8,746,502	-2,173,146	6,573,356
PERCENT SAVINGS											27.0%

GREENHOUSE GAS EMISSIONS

Scenario	Space Cool	Heat Rejection	Space Heating	Vent Fans	Pumps & Aux.	Humidification	Misc. Equip.	Interior Lighting	Total Electricity	Total Gas	Total Energy
	(tons/yr)	(tons/yr)	(tons/yr)	(tons/yr)	(tons/yr)	(tons/yr)	(tons/yr)	(tons/yr)	(tons/yr)	(tons/yr)	(tons/yr)
BASELINE	174.9	3.7	313.8	145.9	19.2	0.0	1,135.2	537.3	2,016.1	313.8	2,329.9
DESIGN	245.0	25.0	440.9	110.3	73.2	0.7	387.5	244.2	1,085.9	440.9	1,526.8
END-USE SAVINGS	-70.1	-21.3	-127.1	35.6	-54.1	-0.7	747.7	293.1	930.3	-127.1	803.1
PERCENT SAVINGS											34.5%

CONVERSION TABLE

CONVERT	MULTIPLY BY
KWH TO MWH	0.0
MWH TO LBS[2]	726.0
THERMS TO MBTU	0.1
LBS TO SHORT TONS	0.0005
kBTU to KWH	0.293
MMBTU to LBS[3]	117.0

Energy Source

(red)	Natural Gas Use
(black)	Electricity Use

1 Plug-in loads accounted for by applying a 10% reduction (based on the discussions with MEPA/DOER).
2 mwh to lbs of CO2 conversion factor from 2014 ISO New England Electric Generator Air Emissions Report
3 https://www.eia.gov/environment/emissions/co2_vol_mass.cfm