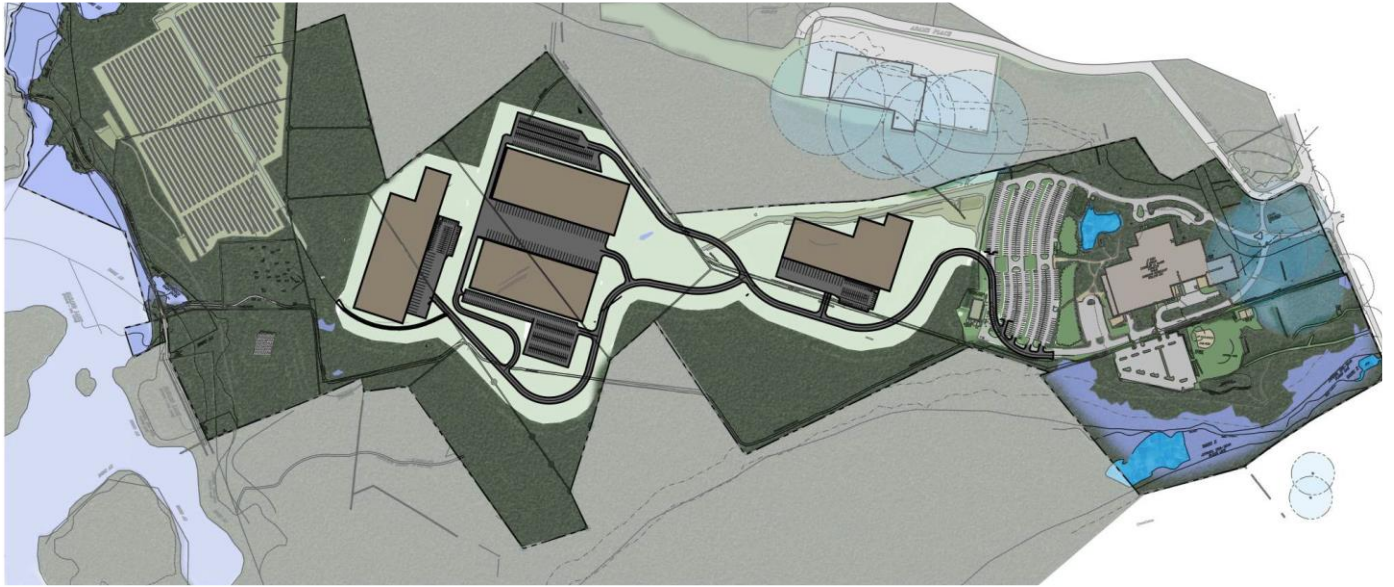




Environmental Notification Form

Submitted Pursuant to the Massachusetts Environmental Policy Act

Massachusetts Avenue Research Campus



Submitted to:
Executive Office of Energy and Environmental Affairs
MEPA Office
100 Cambridge Street, Suite 900
Boston, MA 02114

Submitted by:
Lincoln Property Company
53 State Street, 8th Floor
Boston, MA 02109

Prepared by:
Epsilon Associates, Inc.
3 Mill & Main Place, Suite 250
Maynard, MA 01754

In Association with:
Nitsch Engineering, Inc.
Beals and Thomas, inc.
Sanborn, Head & Associates
Onsite Engineering, Inc.



PRINCIPALS

- Theodore A Barten, PE
- Margaret B Briggs
- Dale T Raczynski, PE
- Cindy Schlessinger
- Lester B Smith, Jr
- Robert D O'Neal, CCM, INCE
- Michael D Howard, PWS, CWS
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- Dwight R Dunk, LPD
- David C Klinch, PWS, PMP
- Maria B Hartnett
- Richard M Lampeter, INCE
- Geoff Starsiak, LEED AP BD+C
- Marc Bergeron, PWS, CWS
- Alyssa Jacobs, PWS

July 15, 2021

Secretary, Bethany A. Card
 Executive Office of Energy and Environmental Affairs
 100 Cambridge Street, Suite 900
 Boston MA 02114

**Subject: Environmental Notification Form
 MARC Boxborough, MA**

Dear Secretary Card:

On behalf of the Lincoln Property Company, I am pleased to submit the enclosed Environmental Notification Form for Massachusetts Avenue Research Campus (MARC), a proposed light industrial park located at 1414 Massachusetts Avenue in Boxborough, MA.

The Project will include the maintenance of an existing 2-story office building and the construction of four single-story, light manufacturing buildings, and associated loading docks, access drives, and parking lots, which will provide a total of 1400 spaces. The Project will also include the installation of landscaping, stormwater management infrastructure, new on-site wells, and an on-site wastewater treatment plant and subsurface disposal.

We look forward to working with the MEPA Office on this project that will contribute to not only Boxborough's industrial and commercial needs, but also the continued positive growth of the Commonwealth.

If you have any questions about the project, please call me at (978) 461-6215.

Sincerely,

EPSILON ASSOCIATES, INC.

David E. Hewett
 Principal

3 Mill & Main Place, Suite 250
 Maynard, MA 01754
 www.epsilonassociates.com

978 897 7100
 FAX 978 897 0099

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Submitted to:

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JULY 15, 2022

Epsilon
ASSOCIATES INC.

Environmental Notification Form

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: Massachusetts Avenue Research Campus (MARC)		
Street Address: 1414 Massachusetts Avenue		
Municipality: Boxborough	Watershed: SuAsCo (Assabet)	
Universal Transverse Mercator Coordinates: 42°29'00.97"N 71°32'25.12"W	Latitude: 42.48362 Longitude: -71.54032	
Estimated commencement date: 2023	Estimated completion date: 2025	
Project Type: Light Manufacturing/ Commercial/R&D	Status of project design: 10 %complete	
Proponent: Lincoln Property Company		
Street Address: 53 State Street, 8th Floor		
Municipality: Boston	State: MA	Zip Code: 02109
Name of Contact Person: David Hewett		
Firm/Agency: Epsilon Associates, Inc.	Street Address: 3 Mill & Main Place, Suite 250	
Municipality: Maynard	State: MA	Zip Code: 01754
Phone: (978) 897-7100	Fax: (978) 897-0099	E-mail: dhewett@epsilonassociates.com
<p>Does this project meet or exceed a mandatory EIR threshold (see 301 CMR 11.03)? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>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: N/A</p> <p>a Single EIR? (see 301 CMR 11.06(8)) <input type="checkbox"/> Yes <input type="checkbox"/> No a Special Review Procedure? (see 301CMR 11.09) <input type="checkbox"/> Yes <input type="checkbox"/> No a Waiver of mandatory EIR? (see 301 CMR 11.11) <input type="checkbox"/> Yes <input type="checkbox"/> No a Phase I Waiver? (see 301 CMR 11.11) <input type="checkbox"/> Yes <input type="checkbox"/> No <i>(Note: Greenhouse Gas Emissions analysis must be included in the Expanded ENF.)</i></p> <p>Which MEPA review threshold(s) does the project meet or exceed (see 301 CMR 11.03)?</p> <ul style="list-style-type: none"> • 301 CMR 11.03 (1)(a)2 - Creation of ten or more acres of impervious area (also 11.03 (1)(b)2). • 301 CMR 11.03 (1)(b)1 - Direct alteration of 25 or more acres of land, unless the Project is consistent with an approved conservation farm plan or forest cutting plan or other similar generally accepted agricultural or forestry practices. • 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 (6)(b)14 - Generation of 1,000 or more New adt on roadways providing access to a single location and construction of 150 or more New parking spaces at a single location. • 301 CMR 11.03 (6)(b)15 - Construction of 300 or more New parking spaces at a single location. 		

Which State Agency Permits will the project require? [MassDOT State Highway Access Permit](#)

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: [None](#)

Summary of Project Size & Environmental Impacts	Existing	Change	Total
LAND			
Total site acreage	207.81		
New acres of land altered		43.71	
Acres of impervious area	23.12	26.3	49.4
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		0	
STRUCTURES			
Gross square footage	293,731	581,250	874,981
Number of housing units	0	0	0
Maximum height (feet)	35+	5	40
TRANSPORTATION			
Vehicle trips per day	1,457	2,346	3,803
Parking spaces	978	422 (NET)	1,400
WASTEWATER			
Water Use (Gallons per day)	24,300	30,520	54,820
Water withdrawal (GPD)	500	30,520	31,020
Wastewater generation/treatment (GPD)	25,000	7,550	32,550
Length of water mains (miles)	N/A	N/A	N/A
Length of sewer mains (miles)	N/A	N/A	N/A
Has this project been filed with MEPA before? <input type="checkbox"/> Yes (EEA # _____) <input checked="" type="checkbox"/> No			
Has any project on this site been filed with MEPA before? <input type="checkbox"/> Yes (EEA # _____) <input checked="" type="checkbox"/> No			

GENERAL PROJECT INFORMATION – all proponents must fill out this section

PROJECT DESCRIPTION:

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

The Project site comprises 13 contiguous parcels, totaling approximately 208.4 acres, southeast of the I-495/Route 111 interchange in Boxborough. The site is bordered by Massachusetts Avenue (Route 111) to the north; the Wolf Swamp Conservation Area, a large wetland complex, to the east; Elizabeth Brook, Eldridge Pond, and residences along Old Harvard Road and Eldridge Road to the south; and the Boxboro Regency Hotel and I-495 to the west. See Attachments 1 and 2, USGS Locus Map and Aerial Locus Map. The site is accessible only from Massachusetts Avenue via a shared entrance roadway (Adams Place) that serves the Project site as well as the adjacent hotel (Boxboro Regency). The Project site is zoned as “Office Park” and the proposed light manufacturing use is an allowed use within the zone.

The northern “front” portion of the site abutting Massachusetts Avenue is occupied by an approximately 286,500 square foot (sf) 2-story office building with associated parking lots to the east and south of the building. There are currently 978 parking spaces on site. As shown on Attachment 3 Existing Site Survey and Attachment 4 Environmental Constraints, there are several small wetlands in the northern portion of the site, in the area around the existing building.

The southwest corner of the site is occupied by the approximately 20-acre, 5-megawatt Boxborough Community Solar installation, which is accessed via a gravel access road that traverses the length of the Project site. As shown on Attachment 4, the very southern portion of the site is within the FEMA 100-year floodplain associated with Elizabeth Brook. However, the proposed new development is sited outside and well away from the floodplain.

The remainder of the site, where new development is being proposed, is undeveloped mixed deciduous forest. As shown on the Existing Site Survey in Attachment 3, elevations in this area of the Project site range from approximately 300 to 400 feet. There is a vernal pool located south of the Project site near the site’s highest point (see Attachment 4).

The closest Environmental Justice (EJ) Populations, per the MEPA Website’s EJ mapping tool, are Block Groups 2 and 3, Census Tract 3881, Middlesex County. The Project site is located within the EJ Population coverage area of Block Group 2 Census Tract 3881, and within a mile of Block Group 3 Census Tract 3881. These block groups meet the EJ criterion: minority population. An EJ assessment is presented on page 31 of this ENF.

Describe the proposed project and its programmatic and physical elements:

The Proponent proposes the development of a light industrial park that will include four single-story, light manufacturing buildings with associated loading docks, access drives, parking lots (1,400 total spaces), landscaping, and stormwater management infrastructure. The Project will also include new on-site wells as well as an on-site wastewater treatment plant and subsurface disposal. The proposed site layout is depicted on Attachment 5. The buildings will be located in the central portion of the site and will require substantial grading to accommodate their development.

The Table below presents a summary of the proposed buildout and its water/sewer demand.

Building Element	Area (GSF)	Estimated Number of Employees	Estimated Sanitary Flows (gpd)-WTHH Cafeteria (20 gal/employee)	Estimated Process Water Demand Allowance	Estimated Potable Demand (gpd)
Building 1 Light Manufacturing	142,500	129	2,580	5,000	7,580
Building 2 Light Manufacturing	162,500	147	2,940	5,000	7,940
Building 3 Light Manufacturing	143,750	130	2,600	5,000	7,600
Building 4 Light Manufacturing	132,500	120	2,400	5,000	7,400
Existing Office	293,731	-	22,500	-	24,300
Total	874,981	526	33,020	20,000	54,820

*Using Assessor's area for the existing building

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:

The Proponent considered various development schemes to achieve economic objectives, while protecting the environment. In addition to the preferred Alternative described in this ENF, the Proponent also considered the following: a No-build Alternative, an Office Park Development Alternative, and a single-building Distribution Center Alternative. The various alternatives are shown on Attachments 6A and 6B. The table below summarizes their potential environmental impacts.

Alternative	Total Building GSF	Land Alteration (ac)	Impervious Area (ac)	Parking	Trip Generation (vtpd)	Water Demand (gpd)
No-Build	293,731	N/A	23.12	978	1,457	24,300
Preferred Alternative	874,981	43.71	47.56	1400	3,803	24,300
Alternative 2 Office Park Development	600,000	38.06	17.63	2400	6,033	49,500
Alternative 3 Single Building Distribution Center	293,731	43.34	24.15	157	1,086	3,100

- **No-build Alternative:** No new development would occur. The No-build Alternative would leave the site in its current condition with just the existing office building. While this alternative would have no new environmental impacts, it would not meet any of the Proponent's objectives nor would it bring any new economic benefit to the area.
- **The Office Building Alternative:** A traditional office park would require significantly more parking such that it would require the construction of parking garages and would have significantly higher traffic impacts, particularly during the morning and evening peak hours.
- **The Distribution Center Alternative:** This alternative was determined to not be cost effective because it would require such a significant amount of excavation to make the layout for such a large building possible.

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.*

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

The Proponent will undertake practicable mitigation efforts to minimize the Project's anticipated impacts.

During construction

- Construction period impacts will be mitigated to the extent practicable. Construction is expected to occur between 7 AM to 5 PM Monday through Friday with potential overtime as allowed under the Town of Boxborough's by-laws. The number of workers required during the construction period will vary. The workforce will generally arrive prior to peak traffic periods, and these trips are not expected to significantly impact traffic conditions. Personal vehicles will be allowed to park within designated areas at the Project construction site at no cost, and no construction or personal vehicle parking will be allowed in any adjacent residential or commercial lots.

Structures

- LED Lighting, or more efficient technology, will be used throughout the entire Project.
- Energy Star, or other similarly recognized and equivalently efficient, rated appliances will be installed.
- User occupancy and vacancy sensors for lighting will be used in internal public areas. (Minimal lighting required by code for safety and/or egress is allowed to stay on).
- Low Flow fixtures, including low consumption water closets will be installed.

Site & Maintenance

- The Project avoids all wetland and State-regulated buffer zone impacts.
- The Project will include a comprehensive stormwater management system that incorporates Best Management Practices (BMP's) sufficient to meet or exceed MassDEP Stormwater standards.
- Low-salt de-icing/anti-icing strategy (acetates or calibrated salt spreader) will be used.
- Low nitrogen content, slow-release organic fertilizer will be used within wetland buffer zones.
- Herbicides and pesticides will be prohibited in within wetland buffer areas.

Transportation

- If deemed necessary from the result of the traffic analysis, the Proponent will explore traffic control modifications at the intersection of Route 111 at Paddock Lane and the site driveway.
- The Proponent will work with the Town of Boxborough to explore transit services to the Project site and surrounding facilities including Boxboro Regency Hotel and the business park on Swanson Road. The Proponent will provide bicycle racks for tenants and visitors near building entrances. The Proponent will also explore the feasibility of providing electric vehicle charging station in the parking lot.

Climate Adaptation and Resiliency

- The Project is sited well outside the 100-year floodplain.
- The Project will be designed to reduce the existing peak rates and volumes of stormwater runoff from the site and promote runoff recharge to the greatest extent practicable.
- To minimize the Project's susceptibility to drought conditions, the landscape design is anticipated to incorporate native and adaptive plant materials and high efficiency irrigation systems will be installed. Aeration fixtures and appliances will be chosen for water conservation qualities, conserving potable water supplies.

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

The Proponent intends to construct the overall site infrastructure and at least one of the buildings in a single first phase. Subsequent building development will be dependent on market demand, meaning that all buildings could potentially be built in a single phase or could be spaced out over a period of years.

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/nhosp/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:) No

If yes, does the project involve any demolition or destruction of any listed or inventoried historic or archaeological resources? Yes (Specify:) No

WATER RESOURCES:

Is there an Outstanding Resource Water (ORW) on or within a half-mile radius of the project site? X Yes ___ No; if yes, identify the ORW and its location. **Vernal Pool located within the southerly forested portion of the Project site**

(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? X Yes ___ No **Medium Stress-SuAsCo Basin**

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 is designed to minimize the creation of impervious surfaces by maintaining as much pre-developed vegetation as possible, minimizing the creation of steep slopes, and fitting the development to the existing terrain as much as practicable. However, as a greenfield site, the proposed development will inherently result in an increase in impervious area. The Project will utilize a stormwater conveyance system with subsurface storage chambers to capture untreated stormwater runoff on-site to comply with MassDEP's Stormwater Management Regulations. This will also ensure that the peak discharge rate post development will be lower than pre-development. In addition, a comprehensive erosion and sediment control plan will be in-place prior to any construction on-site.

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 ___ No X; 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:_____

A Phase I Environmental Site Assessment of the Project site was conducted on November 16, 2020. The assessment found no evidence of recognized environmental conditions (RECs), historical recognized environmental conditions (HRECs), controlled recognized environmental conditions (CRECs), de minimis conditions, or considerations outside the scope of ASTM Practice E 1527-13 in connection with Project site.

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 contractor will take an active role with regard to the reprocessing and recycling of construction waste. The excavation contracts will include specific requirements to ensure construction procedures allow for the necessary segregation, reprocessing, reuse, and recycling of materials. A Construction Waste Management Plan will be developed to ensure that a minimal amount of waste debris is disposed of in landfills and to pursue the goal of diverting at least 75 percent of project-generated construction waste from landfills. For materials that cannot be recycled, solid waste will be transported in covered trucks to an approved solid waste facility per the DEP Regulation for Solid Waste Facilities, 310 CMR 16.00. This requirement will be specified in the contract documents.

(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 ___ No X ;
if yes, please consult state asbestos requirements at <http://mass.gov/MassDEP/air/asbhom01.htm>

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

The construction contract will require contractors to use several measures to reduce potential emissions and minimize impacts from construction vehicles including:

- Encouraging contractors to use construction equipment EPA Tier 4 equipment or equipment retrofitted with diesel emission control devices to the greatest extent practicable.
- Using Ultra-Low Sulphur Diesel for all trucks and construction machinery.
- Maintaining an “idle free” work zone by providing supplemental electrical equipment along with “just-in-time” delivery methods. On-site idling will be limited to five minutes in accordance with the Massachusetts Anti Idling Law. “No Idling” signs will be posted at all appropriate locations.
- Minimizing exposed storage of debris on-site and using wetting agents where needed on a scheduled basis to minimize dust.
- Monitoring construction practices to reduce unnecessary transfers and mechanical disturbances of loose materials. Cleaning streets and sidewalks regularly to minimize dust accumulation.

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 ;
if yes, specify name of river and designation:

If yes, does the project have the potential to impact any of the “outstandingly remarkable” resources of a federally Wild and Scenic River or the stated purpose of a state designated Scenic River? Yes ___ No ___ ; if yes, specify name of river and designation: _____;
if yes, will the project will result in any impacts to any of the designated “outstandingly remarkable” resources of the Wild and Scenic River or the stated purposes of a Scenic River.
Yes ___ No ___ ; if yes, describe the potential impacts to one or more of the “outstandingly remarkable” resources or stated purposes and mitigation measures proposed.

ATTACHMENTS:

1. List of all attachments to this document. [See Table of Contents](#)
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. [Attachment 1](#)
3. Aerial Locus Map. [Attachment 2](#)
4. 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. [Attachment 3](#)
5. 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. [Attachment 4](#)
6. 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). [Attachment 5](#)
7. Plans showing Project alternatives considered. [Attachments 6A and 6B.](#)
8. Transportation Report. [Attachment 7](#)
9. List of all agencies and persons to whom the proponent circulated the ENF, in accordance with 301 CMR 11.16(2). [Attachment 8](#)
10. List of municipal and federal permits and reviews required by the project, as applicable. [Attachment 9](#)
11. Resilient MA Action Team (RMAT) Report. [Attachment 10](#)
12. EJ Screening Form. [Attachment 11](#)
13. MEPA EJ Distribution List. [Attachment 12](#)

LAND SECTION – all proponents must fill out this section

I. Thresholds / Permits

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

- 301 CMR 11.03 (1)(a)2 - Creation of ten or more acres of impervious area.
- 301 CMR 11.03 (1)(b)1 - Direct alteration of 25 or more acres of land unless the Project is consistent with an approved conservation farm plan or forest cutting plan or other similar generally accepted agricultural or forestry practices.
- 301 CMR 11.03 (1)(b)2 - Creation of five or more acres of impervious area.

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	3.74	14.9	17.93
Internal roadways	2.61	3.90	6.51
Parking and other paved areas	16.77	5.44	22.21
Other altered areas	18.55	(0.04)	18.52
Undeveloped areas	166.14	(23.50)	142.64
Total: Project Site Acreage	207.81	0	207.81

- 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?
According to MassGIS, the Project site contains both prime farmland soils and farmland of unique importance close to the south boundary.
- 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? X Yes No; if yes, does the project involve the release or modification of such restriction? Yes No; if yes, describe:

According to MassGIS, land south of the Project is part of the Wolf Swamp Conservation Area and the Delaney Flood Control Project, which both contain open space and MDAR Agricultural preservation restrictions. The Delaney Flood Control Project, also known as the Delaney Wildlife Management area, consists of 577 acres of conservation land originally designed as a flood control project and currently managed by the Massachusetts Department of Fisheries and Wildlife. The Project will not encroach or impact these areas.

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
Title: **Boxborough 2030** Date: **January 2016**

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

- 1) economic development

Boxborough has large commercial sector and areas that serve as significant regional employment centers. The Boxborough 2030 plan encourages economic development that will improve the quality of life for residents and that will develop within existing commercial areas, which are supported by the responsible use and management of water resources and adequate wastewater treatment facilities. The Project aligns with the plan as it provides new opportunities for commercial growth within an area zoned for commercial/industrial development. The Project will also contribute to the Town's tax base and increase employment opportunities.

- 2) adequacy of infrastructure

Interstate 495 and Route 2 are key highways that border Boxborough and connect it to Boston and the rest of the region. The Project will take advantage of its proximity to these major roadways, connecting more Boxborough residents to employment opportunities. Moreover, the Project plans to add the following improvements to the existing infrastructure:

- Possible installation of a new signalized intersection along Massachusetts Avenue (Route 111) at the Project site driveway and Paddock Lane to improve the site driveway northbound left-turn movement to LOS D from LOS F under unmitigated conditions, and the Paddock Lane southbound left-turn movement from LOS F to LOS D. All other movements would operate at B or better.
- The Project will also align with the plan's goals for long-term water resource management and protection through properly engineered on-site wells and subsurface wastewater disposal.

- 3) open space impacts

Although the proposed development will impact a portion of the Project site that is currently undeveloped, the site is not designated as open space and is zoned for commercial development. The Project will be carefully designed to protect nearby ecological resources through adequate buffers and a stormwater management system that is protective of water quality.

- 4) compatibility with adjacent land uses

Boxborough is primarily a residential community with approximately 40 percent of the town's land area devoted to residential use. Approximately 20 percent of the town's land area consists of office parks, where many high-technology and light manufacturing firms can be found. The Project will adhere to the Town's commercial zoning. Moreover, the proposed development will be clustered in the center of the site, creating a buffer from the residential areas to the south and east.

C. Identify the current Regional Policy Plan of the applicable Regional Planning Agency (RPA)
RPA: [Metropolitan Area Planning Council](#)
Title: [MetroCommon 2050](#) Date: [Fall 2021](#)

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

1) economic development

[MetroCommon 2050](#) envisions the growth of new jobs located near transit, other infrastructure, and existing services. The Project will contribute to the economy of Boxborough and the region by providing significant new construction and long-term job opportunities and generating taxes for town. The Project is located in proximity to Interstate 495 and Route 2, connecting residents of Boxborough and surrounding towns to employment opportunities.

2) adequacy of infrastructure.

One of [MetroCommon 2050's](#) goals is that vacant and underutilized commercial and industrial sites are revitalized, and they provide new jobs close to population centers and transit. The Project is proposed on already developed land, thus conserving land, energy, and previous investments in building and infrastructure. Moreover, the Project site is situated in an accessible area, with Interstate 495 and Route 2 connecting the Project site to the region and town residents to employment opportunities. Moreover, the Project plans to make improvements to the existing transportation infrastructure through the possible installation of a new signalized intersection along Massachusetts Avenue (Route 111) at the Project site driveway and Paddock Lane to improve levels of service. In addition, the Project will provide long-term water resource management and protection through properly engineered on-site wells and subsurface wastewater disposal.

3) Open space impacts

The regional plan envisions a future where natural areas are accessible to all and wetlands and natural resources are protected and enhanced. In line with this goal, the Project is proposed primarily on already developed land thus preserving surrounding undeveloped areas and vital wetland resources. Careful project design and appropriate mitigation measures will be adopted to prevent significant impacts in surrounding resource areas. Moreover, walking trails along the southeastern portion of the Project site will be provided to allow access to the natural areas around the site.

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 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 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 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.

II. Impacts and Permits

A. Does the project site fall within Priority or Estimated Habitat in the current Massachusetts Natural Heritage Atlas (attach relevant page)? ___ Yes ___ No. If yes,

1. Have you consulted with the Division of Fisheries and Wildlife Natural Heritage and Endangered Species Program (NHESP)? ___ Yes ___ No; if yes, have you received a determination as to whether the project will result in the "take" of a rare species? ___ Yes ___ No; if yes, attach the letter of determination to this submission.

2. Will the project "take" an endangered, threatened, and/or species of special concern in accordance with M.G.L. c.131A (see also 321 CMR 10.04)? ___ Yes ___ No; if yes, provide a summary of proposed measures to minimize and mitigate rare species impacts

3. Which rare species are known to occur within the Priority or Estimated Habitat?

4. Has the site been surveyed for rare species in accordance with the Massachusetts Endangered Species Act? ___ Yes ___ No

5. If your project is within Estimated Habitat, have you filed a Notice of Intent or received an Order of Conditions for this project? ___ Yes ___ No; if yes, did you send a copy of the Notice of Intent to the Natural Heritage and Endangered Species Program, in accordance with the Wetlands Protection Act regulations? ___ Yes ___ No

B. Will the project "take" an endangered, threatened, and/or species of special concern in accordance with M.G.L. c.131A (see also 321 CMR 10.04)? ___ Yes ___ No; if yes, provide a summary of proposed measures to minimize and mitigate impacts to significant habitat:

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))? ___ Yes X No; if yes, specify, in quantitative terms:

- B. Does the project require any state permits (or a local Order of Conditions) related to **wetlands, waterways, or tidelands**? ___ Yes X No; if yes, specify which permit. **The Proponent does not expect to need an Order of Conditions under the State Wetlands Protection Act and is studying whether one will be needed under the Local Wetlands Bylaw.**

- 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)? ___ Yes ___ No; if yes, has a Notice of Intent been filed? ___ Yes ___ 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 ___ No.

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

- 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:

<u>Coastal Wetlands</u>	<u>Area (square feet) or Length (linear feet)</u>	<u>Temporary or Permanent Impact?</u>
Land Under the Ocean	_____	_____
Designated Port Areas	_____	_____
Coastal Beaches	_____	_____
Coastal Dunes	_____	_____
Barrier Beaches	_____	_____
Coastal Banks	_____	_____
Rocky Intertidal Shores	_____	_____
Salt Marshes	_____	_____
Land Under Salt Ponds	_____	_____
Land Containing Shellfish	_____	_____
Fish Runs	_____	_____
Land Subject to Coastal Storm Flowage	_____	_____
<u>Inland Wetlands</u>		
Bank (If)	_____	_____
Bordering Vegetated Wetlands	_____	_____
Isolated Vegetated Wetlands	_____	_____
Land under Water	_____	_____
Isolated Land Subject to Flooding	_____	_____
Bordering Land Subject to Flooding	_____	_____
Riverfront Area	_____	_____

D. Is any part of the project:

1. proposed as a **limited project**? ___ Yes ___ No; if yes, what is the area (in sf)? _____
2. the construction or alteration of a **dam**? ___ Yes ___ No; if yes, describe:
3. fill or structure in a **velocity zone** or **regulatory floodway**? ___ Yes ___ No
4. dredging or disposal of dredged material? ___ Yes ___ 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 ___ No
6. subject to a wetlands restriction order? ___ Yes ___ No; if yes, identify the area (in sf):
7. located in buffer zones? ___ Yes ___ No; if yes, how much (in sf)

E. Will the project:

1. be subject to a local wetlands ordinance or bylaw? ___ Yes ___ No
2. alter any federally-protected wetlands not regulated under state law? ___ Yes ___ 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? ___ Yes ___ No; if yes, is there a current Chapter 91 License or Permit affecting the project site? ___ 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:
- B. Does the project require a new or modified license or permit under M.G.L.c.91? ___ 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 ___ Change ___ Total ___ If yes, how many square feet of solid fill or pile-supported structures (in sf)?
- C. For non-water-dependent use projects, indicate the following:
Area of filled tidelands on the site: _____
Area of filled tidelands covered by buildings: _____
For portions of site on filled tidelands, list ground floor uses and area of each use: ___
Does the project include new non-water-dependent uses located over flowed tidelands?
Yes ___ No ___
Height of building on filled tidelands _____

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.

- D. Is the project located on landlocked tidelands? ___ Yes ___ 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? ___ 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:
- 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? ___ Yes ___ No; (*NOTE: If yes, then the project will be subject to Public Benefit Review and Determination.*)
- G. Does the project include dredging? ___ Yes ___ 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? ___ Yes ___ No; if yes, describe these effects and the projects consistency with the policies of the Office of Coastal Zone Management:

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

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**? **X** Yes ___ No; if yes, specify which permit:
- **BRP WS 15 Permit - BRP WS Application for Drinking Water Program (Water Supply) Permits or Approvals**
 - **BRP WS 23A Permit - BRP WS 23 A, B, & C Approval to Construct a Facility to Treat less than One Million Gallons per Day**
- 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.

II. Impacts and Permits

- A. Describe, in gallons per day (gpd), the volume and source of water use for existing and proposed activities at the project site:

	<u>Existing</u>	<u>Change</u>	<u>Total</u>
Municipal or regional water supply	<u>0</u>	<u>0</u>	<u>0</u>
Withdrawal from groundwater	<u>24,300</u>	<u>30,520</u>	<u>54,820</u>
Withdrawal from surface water	<u>0</u>	<u>0</u>	<u>0</u>
Interbasin transfer	<u>0</u>	<u>0</u>	<u>0</u>

(NOTE: Interbasin Transfer approval will be required if the basin and community where the proposed water supply source is located is different from the basin and community where the wastewater from the source will be discharged.)

- B. If the source is a municipal or regional supply, has the municipality or region indicated that there is adequate capacity in the system to accommodate the project? ___ Yes ___ No **N/A**
- C. If the project involves a new or expanded withdrawal from a groundwater or surface water source, has a pumping test been conducted? ___ Yes **X** No; if yes, attach a map of the drilling sites and a summary of the alternatives considered and the results. _____
- D. What is the currently permitted withdrawal at the proposed water supply source (in gallons per day)? **32,000**. Will the project require an increase in that withdrawal? **X** Yes ___ No; if yes, then how much of an increase (gpd)? **30,520**
- E. Does the project site currently contain a water supply well, a drinking water treatment facility, water main, or other water supply facility, or will the project involve construction of a new facility? **X** Yes ___ No. If yes, describe existing and proposed water supply facilities at the project site: :

	<u>Permitted Flow</u>	<u>Existing Avg Daily Flow</u>	<u>Project Flow</u>	<u>Total</u>
Capacity of water supply well(s) (gpd)	<u>32,000</u>	<u>500*</u>	<u>30,520</u>	<u>31,020</u>
Capacity of water treatment plant (gpd)	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>

***Flows from the existing on-site well has been low the past several years because the existing on-site building was vacant. The Proponent plans to add a new well to serve the proposed new uses.**

F. If the project involves a new interbasin transfer of water, which basins are involved, what is the direction of the transfer, and is the interbasin transfer existing or proposed? **N/A**

G. Does the project involve:

1. new water service by the Massachusetts Water Resources Authority or other agency of the Commonwealth to a municipality or water district? ___ Yes **_X_** No
2. a Watershed Protection Act variance? ___ Yes **_X_** No; if yes, how many acres of alteration?
3. a non-bridged stream crossing 1,000 or less feet upstream of a public surface drinking water supply for purpose of forest harvesting activities? ___ Yes **_X_** No

III. Consistency

Describe the project's consistency with water conservation plans or other plans to enhance water resources, quality, facilities and services:

The Project will include water conservation measures within the construction and operation of its facilities. All facilities will employ low flush toilet fixture, low flow faucet aerators and shower heads and will reduce irrigation requirements using drought tolerant plantings and drip irrigation in planting beds. Demand and drought management controls will also be in place to reduce/restrict outdoor water uses.

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**? X Yes ___ No; if yes, specify which permit:
- **BRP WP 83 Application to Prepare a Hydrogeological Evaluation**
 - **BRP WP 11 Individual Permit Renewal/Modification with Plan Approval**
- 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.

II. Impacts and Permits

- A. Describe the volume (in gallons per day) and type of disposal of wastewater generation for existing and proposed activities at the project site (calculate according to 310 CMR 15.00 for septic systems or 314 CMR 7.00 for sewer systems):

	<u>Existing</u>	<u>Change</u>	<u>Total</u>
Discharge of sanitary wastewater	<u>25,000</u>	<u>7,550</u>	<u>32,550</u>
Discharge of industrial wastewater	_____	_____	_____
TOTAL	<u>25,000</u>	<u>7,550</u>	<u>32,550</u>

	<u>Existing</u>	<u>Change</u>	<u>Total</u>
Discharge to groundwater	<u>25,000</u>	<u>7,550</u>	<u>32,550</u>
Discharge to outstanding resource water	_____	_____	_____
Discharge to surface water	_____	_____	_____
Discharge to municipal or regional Wastewater facility	_____	_____	_____
TOTAL	<u>25,000</u>	<u>7,550</u>	<u>32,550</u>

- B. Is the existing collection system at or near its capacity? ___ Yes X No; if yes, then describe the measures to be undertaken to accommodate the project's wastewater flows:
- C. Is the existing wastewater disposal facility at or near its permitted capacity? X Yes ___ No; if yes, then describe the measures to be undertaken to accommodate the project's wastewater flows:

The existing wastewater treatment and effluent disposal system will be expanded as part of the Project to accommodate the increase in flow as part of the BRP WP 83 and BRP WP 11 approval process with MassDEP.

- D. Does the project site currently contain a wastewater treatment facility, sewer main, or other wastewater disposal facility, or will the project involve construction of a new facility? X Yes ___ No; if yes, describe as follows:

	<u>Permitted</u>	<u>Existing Avg Daily Flow</u>	<u>Project Flow</u>	<u>Total</u>
Wastewater treatment plant capacity (in gallons per day)	<u>25,000</u>	<u>22,030</u>	<u>10,520</u>	<u>32,550</u>

E. If the project requires an interbasin transfer of wastewater, which basins are involved, what is the direction of the transfer, and is the interbasin transfer existing or new? **N/A**

(NOTE: Interbasin Transfer approval may be needed if the basin and community where wastewater will be discharged is different from the basin and community where the source of water supply is located.)

F. Does the project involve new sewer service by the Massachusetts Water Resources Authority (MWRA) or other Agency of the Commonwealth to a municipality or sewer district? ___ Yes **X** No

G. Is there an existing facility, or is a new facility proposed at the project site for the storage, treatment, processing, combustion or disposal of sewage sludge, sludge ash, grit, screenings, wastewater reuse (gray water) or other sewage residual materials? ___ Yes **X** No; if yes, what is the capacity (tons per day):

	<u>Existing</u>	<u>Change</u>	<u>Total</u>
Storage	_____	_____	_____
Treatment	_____	_____	_____
Processing	_____	_____	_____
Combustion	_____	_____	_____
Disposal	_____	_____	_____

H. Describe the water conservation measures to be undertaken by the project, and other wastewater mitigation, such as infiltration and inflow removal.

Wastewater generated from the site will be treated and disposed of via the expanded on-site water resource recovery facility (WRRF) with subsurface land disposal.

The Project will utilize low flow plumbing fixtures resulting in reduced overall water consumption. All sewage flows will be collected in the existing solids/trash trap pretreatment tank system at the treatment facility headworks. The sewage collection system and water resource recovery facility tanks will be tested for water tightness prior to being placed into service in accordance with Project specifications.

The proposed water resource recovery facility will employ the existing aerobic biological process, expanded, to accomplish treatment and therefore will have the potential to produce an effluent far superior to that provided by a conventional subsurface sewage disposal system. Aerobic biological treatment processes are capable of removing substantially greater amounts of Biochemical Oxygen Demand (BOD) and Total Suspended Solid (TSS) than a conventional subsurface sewage disposal system. Additionally, the treatment process is also capable of nitrifying the ammonia-nitrogen present in the wastewater to nitrate-nitrogen, which can subsequently be removed through an anoxic denitrification process. Disinfection at such facilities provides significant reductions in the number of pathogenic organisms in the wastewater prior to discharge to the environment.

III. Consistency

A. Describe measures that the proponent will take to comply with applicable state, regional, and local plans and policies related to wastewater management:

The expanded resource facility will be designed, installed, operated and maintained, under the supervision of the Proponent, to meet all applicable standards and according to state, regional, and local regulations. The permitted treatment facility will be operated by a Certified Plant

Operator in accordance with the requirements in "Rules and Regulations for Certification of Operators of Wastewater Treatment Facilities" (257 CMR 2.00). The proponent will be required to meet all regulatory treatment, reporting and compliance standards set forth by MassDEP

- B. If the project requires a sewer extension permit, is that extension included in a comprehensive wastewater management plan? ___ Yes ___ No; if yes, indicate the EEA number for the plan and whether the project site is within a sewer service area recommended or approved in that plan: **N/A**

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:

The unadjusted vehicle trips per day generated by the Project is 2,346, which exceeds 301 CMR 11.03(6)(b)(13) – Generation of 2,000 or more new average daily trips on roadways providing access to a single location.

- B. Does the project require any state permits related to **state-controlled roadways**? X Yes ___ No; if yes, specify which permit: **MassDOT State Highway Access 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	978	422	1,400
Number of loading docks	3	118	121
Number of unadjusted vehicle trips per day	1,457	2,346	3,803
Number of adjusted vehicle trips per day	1,457	2,346	3,803
ITE Land Use Code(s):	110	130	130

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

Roadway	Existing	Change	Total
Massachusetts Avenue (Route 111) West of I-495	4,988	258	5,246
Massachusetts Avenue (Route 111) East of I-495	9,190	751	9,941
I-495 Northbound On-Ramp	3,397	317	3,714
I-495 Northbound Off-Ramp	2,065	352	2,417
I-495 Southbound On-Ramp	2,912	352	3,264
I-495 Southbound Off-Ramp	2,145	317	2,462

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

If deemed necessary, from the result of the traffic analysis, the Proponent will explore traffic control modifications at the intersection of Mass Ave (Route 111) at Paddock Lane and site driveway.

- E. 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 Proponent will work with the Town of Boxborough on exploring transit services to the Project site and surrounding facilities including Boxboro Regency Hotel and the business park on Swanson Road. The Proponent will provide bicycle racks for tenants and visitors near building entrances.

The Proponent will also explore the feasibility of providing electric vehicle charging station in the parking lot.

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

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

- H. 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)? **Not applicable**

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 Proponent is committed to conducting a Transportation Monitoring Program to confirm that the post-development impacts of the Project are consistent with the forecast estimates and to ensure that the mitigation measures are completed and/or maintained. The monitoring program is expected to include Employee Survey, Verification of Mitigation Measures, Traffic Data Collection, and Monitoring Program Schedule and Reporting. The program is explained in detail in the Transportation Demand Management (TDM) Section of the report (Attachment 7).

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 No; if yes, specify, in quantitative terms:

- B. Does the project require any state permits related to **roadways or other transportation facilities**? ___ Yes 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.

II. Transportation Facility Impacts

- A. Describe existing and proposed transportation facilities in the immediate vicinity of the project site:

- B. Will the project involve any
 - 1. Alteration of bank or terrain (in linear feet)? _____
 - 2. Cutting of living public shade trees (number)? _____
 - 3. Elimination of stone wall (in linear feet)? _____

III. Consistency –

Describe the project's consistency with other federal, state, regional, and local plans and policies related to traffic, transit, pedestrian and bicycle transportation facilities and services, including consistency with the applicable regional transportation plan and the Transportation Improvements Plan (TIP), the State Bicycle Plan, and the State Pedestrian Plan:

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 Section below.

II. Impacts and Permits

A. Describe existing and proposed energy generation and transmission facilities at the project site:

	<u>Existing</u>	<u>Change</u>	<u>Total</u>
Capacity of electric generating facility (megawatts)	_____	_____	_____
Length of fuel line (in miles)	_____	_____	_____
Length of transmission lines (in miles)	_____	_____	_____
Capacity of transmission lines (in kilovolts)	_____	_____	_____

- B. If the project involves construction or expansion of an electric generating facility, what are:
 - 1. the facility's current and proposed fuel source(s)?
 - 2. the facility's current and proposed cooling source(s)?

- C. If the project involves construction of an electrical transmission line, will it be located on a new, unused, or abandoned right of way? ___Yes ___No; if yes, please describe:

- D. Describe the project's other impacts on energy facilities and services:

III. Consistency

Describe the project's consistency with state, municipal, regional, and federal plans and policies for enhancing energy facilities and services:

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.

II. Impacts and Permits

- A. Does the project involve construction or modification of a major stationary source (see 310 CMR 7.00, Appendix A)? ___ Yes ___ No; if yes, describe existing and proposed emissions (in tons per day) of:

	<u>Existing</u>	<u>Change</u>	<u>Total</u>
Particulate matter	_____	_____	_____
Carbon monoxide	_____	_____	_____
Sulfur dioxide	_____	_____	_____
Volatile organic compounds	_____	_____	_____
Oxides of nitrogen	_____	_____	_____
Lead	_____	_____	_____
Any hazardous air pollutant	_____	_____	_____
Carbon dioxide	_____	_____	_____

- B. Describe the project's other impacts on air resources and air quality, including noise impacts:

III. Consistency

- A. Describe the project's consistency with the State Implementation Plan:

- B. Describe measures that the proponent will take to comply with other federal, state, regional, and local plans and policies related to air resources and air quality:

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 the remainder of the Solid and Hazardous Waste Section below.

II. Impacts and Permits

- A. Is there any current or proposed facility at the project site for the storage, treatment, processing, combustion or disposal of solid waste? ___ Yes ___ No; if yes, what is the volume (in tons per day) of the capacity:

	<u>Existing</u>	<u>Change</u>	<u>Total</u>
Storage	_____	_____	_____
Treatment, processing	_____	_____	_____
Combustion	_____	_____	_____
Disposal	_____	_____	_____

- B. Is there any current or proposed facility at the project site for the storage, recycling, treatment or disposal of hazardous waste? ___ Yes ___ No; if yes, what is the volume (in tons or gallons per day) of the capacity:

	<u>Existing</u>	<u>Change</u>	<u>Total</u>
Storage	_____	_____	_____
Recycling	_____	_____	_____
Treatment	_____	_____	_____
Disposal	_____	_____	_____

- C. If the project will generate solid waste (for example, during demolition or construction), describe alternatives considered for re-use, recycling, and disposal:
- D. If the project involves demolition, do any buildings to be demolished contain asbestos?
___ Yes ___ No
- E. Describe the project's other solid and hazardous waste impacts (including indirect impacts):

III. Consistency

Describe measures that the proponent will take to comply with the State Solid Waste Master Plan:

HISTORICAL AND ARCHAEOLOGICAL RESOURCES SECTION

I. Thresholds / Impacts

- A. Have you consulted with the Massachusetts Historical Commission? Yes 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
- 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? Yes No; if yes, does the project involve the demolition of all or any exterior part of such historic structure? Yes No; if yes, please describe:
- 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 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:

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:

CLIMATE CHANGE ADAPTATION AND RESILIENCY SECTION

This section of the Environmental Notification Form (ENF) solicits information and disclosures related to climate change adaptation and resiliency, in accordance with the MEPA Interim Protocol on Climate Change Adaptation and Resiliency (the "MEPA Interim Protocol"), effective October 1, 2021. The Interim Protocol builds on the analysis and recommendations of the 2018 Massachusetts Integrated State Hazard Mitigation and Climate Adaptation Plan (SHMCAP) and incorporates the efforts of the Resilient Massachusetts Action Team (RMAT), the inter-agency steering committee responsible for implementation, monitoring, and maintenance of the SHMCAP, including the "Climate Resilience Design Standards and Guidelines" project. The RMAT team recently released the RMAT Climate Resilience Design Standards Tool, which is available [here](#).

The MEPA Interim Protocol is intended to gather project-level data in a standardized manner that will both inform the MEPA review process and assist the RMAT team in evaluating the accuracy and effectiveness of the RMAT Climate Resilience Design Standards Tool. Once this testing process is completed, the MEPA Office anticipates developing a formal Climate Change Adaptation and Resiliency Policy through a public stakeholder process. Questions about the RMAT Climate Resilience Design Standards Tool can be directed to rmat@mass.gov.

All Proponents must complete the following section, referencing as appropriate the results of the output report generated by the RMAT Climate Resilience Design Standards Tool and attached to the ENF. In completing this section, Proponents are encouraged, but not required at this time, to utilize the recommended design standards and associated Tier 1/2/3 methodologies outlined in the RMAT Climate Resilience Design Standards Tool to analyze the project design. However, Proponents are requested to respond to a user feedback survey on the RMAT website or to provide feedback to rmat@mass.gov, which will be used by the RMAT team to further refine the tool. Proponents are also encouraged to consult general guidance and best practices as described in the RMAT Climate Resilience Design Guidelines.

Climate Change Adaptation and Resiliency Strategies

- I. Has the project taken measures to adapt to climate change for all of the climate parameters analyzed in the RMAT Climate Resilience Design Standards Tool (sea level rise/storm surge, extreme precipitation (urban or riverine flooding), extreme heat)? Yes No

[Refer to RMAT Report in Attachment 11](#)

Note: Climate adaptation and resiliency strategies include actions that seek to reduce vulnerability to anticipated climate risks and improve resiliency for future climate conditions. Examples of climate adaptation and resiliency strategies include flood barriers, increased stormwater infiltration, living shorelines, elevated infrastructure, increased tree canopy, etc. Projects should address any planning priorities identified by the affected municipality through the Municipal Vulnerability Preparedness (MVP) program or other planning efforts, and should consider a flexible adaptive pathways approach, an adaptation best practice that encourages design strategies that adapt over time to respond to changing climate conditions. General guidance and best practices for designing for climate risk are described in the [RMAT Climate Resilience Design Guidelines](#).

A. If no, explain why.

B. If yes, describe the measures the project will take, including identifying the planning horizon and climate data used in designing project components. If applicable, specify the return period and design storm used (e.g., 100-year, 24-hour storm).

The Project's buildings are assumed to have a useable life of approximately 60 years. The Project will use a planning horizon of 2070 and the NOAA Atlas 14 precipitation forecasts when designing the stormwater management system.

C. Is the project contributing to regional adaptation strategies? ___ Yes No; If yes, describe

II. Has the Proponent considered alternative locations for the project in light of climate change risks?
___ Yes No

A. If no, explain why.

The Project is not particularly susceptible to climate change. It is well away from the coast and all development is proposed in upland areas, outside of any floodplain. In addition, the Proponent owns the site, which is currently partially developed with an office building.

B. If yes, describe alternatives considered.

III. Is the project located in Land Subject to Coastal Storm Flowage (LSCSF) or Bordering Land Subject to Flooding (BLSF) as defined in the Wetlands Protection Act? ___ Yes No

If yes, describe how/whether proposed changes to the site's topography (including the addition of fill) will result in changes to floodwater flow paths and/or velocities that could impact adjacent properties or the functioning of the floodplain. General guidance on providing this analysis can be found in the CZM/MassDEP Coastal Wetlands Manual, available [here](#).

ENVIRONMENTAL JUSTICE SECTION

I. Identifying Characteristics of EJ Populations

- A. If an Environmental Justice (EJ) population has been identified as located in whole or in part within 5 miles of the project site, describe the characteristics of each EJ populations as identified in the EJ Maps Viewer (i.e., the census block group identification number and EJ characteristics of “Minority,” “Minority and Income,” etc.). Provide a breakdown of those EJ populations within 1 mile of the project site, and those within 5 miles of the site.

EJ Populations within a mile of the Project site:

Block Group	Census Tract	County	Town	Criteria	Total Minority Population	Median Household Income
2	3881	Middlesex	Boxborough	Minority	30.1 %	\$127,159 (148.1 % of the MA median)
3	3881	Middlesex	Boxborough	Minority	41.7 %	\$73,750 (85.9 % of the MA media)

EJ Populations within 5 miles of the Project site:

Block Group	Census Tract	County	Town	Criteria	Total Minority Population	Households with Language Isolation	Median Household Income
6	7614	Worcester	Harvard	Minority	49.2 %	0 %	\$134,417 (157 % of the MA median)
3	3631.04	Middlesex	Acton	Minority	48.2 %	7.1 %	\$135,710 (158 % of the MA median)
2	3632.02	Middlesex	Acton	Minority	40 %	0 %	\$134,625 (157 % of the MA median)
1	3632.02	Middlesex	Acton	Minority	41.2 %	0 %	\$146,125 (170 % of the MA median)
1	3631.03	Middlesex	Acton	Minority	42.1 %	4.7 %	\$144,306 (168 % of the MA median)
4	7131	Middlesex	Lancaster	Minority	29.6 %	0 %	\$95,278 (111 % of the MA median)

- B. Identify all languages identified in the “Languages Spoken in Massachusetts” tab of the EJ Maps Viewer as spoken by 5 percent or more of the EJ population who also identify as not speaking English “very well.” The languages should be identified for each census tract located in whole or in part within 1 mile and 5 miles of the project site, regardless of whether such census tract contains any designated EJ populations.

The Proponent did not identify any language isolation within one mile of the Project site. An area of language isolation for Chinese is located within five miles.

- C. If the list of languages identified under Section I.B. has been modified with approval of the EEA EJ Director, provide a list of approved languages that the project will use to provide public involvement opportunities during the course of MEPA review. If the list has been expanded by the Proponent (without input from the EEA EJ Director), provide a list of the additional languages that will be used to provide public involvement opportunities during the course of MEPA review as required by Part II of the MEPA Public Involvement Protocol for Environmental Justice Populations (“MEPA EJ Public Involvement Protocol”). If the project is exempt from Part II of the protocol, please specify.

The Proponent has decided to include Portuguese for public involvement as these EJ populations are located about 5.3 miles from the Project site.

II. Potential Effects on EJ Populations

- A. If an EJ population has been identified using the EJ Maps Viewer within 1 mile of the project site, describe the likely effects of the project (both adverse and beneficial) on the identified EJ population(s).

The Project is not anticipated to have significant impacts to EJ populations. Impacts will be minor and temporary primarily due to construction related activities. Impacts include:

- Increased vehicle emissions from project associated traffic
- Temporary impacts to air quality during construction
- Increased noise levels during construction and from ongoing operations at the site

All impacts will be reviewed through MEPA and the various permitting programs and will be appropriately mitigated in accordance with applicable regulations.

The Project will have the following benefits:

- Provide new opportunities for commercial growth within an area zoned for commercial/industrial development
- Connect more of Boxborough’s residents to employment opportunities through the Project’s proximity to Interstate 495 and Route 2
- Contribute to the economy of Boxborough and the region
- Provide significant new construction and long-term job opportunities

- B. If an EJ population has been identified using the EJ Maps Viewer within 5 miles of the project site, will the project: (i) meet or exceed MEPA review thresholds under 301 CMR 11.03(8)(a)-(b) ___ Yes No; or (ii) generate 150 or more new average daily trips (adt) of diesel vehicle traffic, excluding public transit trips, over a duration of 1 year or more. ___ Yes No
- C. If you answered “Yes” to either question in Section II.B., describe the likely effects of the project (both adverse and beneficial) on the identified EJ population(s).

III. Public Involvement Activities

- A. Provide a description of activities conducted prior to filing to promote public involvement by EJ populations, in accordance with Part II of the MEPA EJ Public Involvement Protocol. In particular:

1. If advance notification was provided under Part II.A., attach a copy of the Environmental Justice Screening Form and provide list of CBOs/tribes contacted (with dates). Copies of email correspondence can be attached in lieu of a separate list.

See Attachment 12 for the EJ Screening Form.

2. State how CBOs and tribes were informed of ways to request a community meeting, and if any meeting was requested. If public meetings were held, describe any issues of concern that were raised at such meetings, and any steps taken (including modifications to the project design) to address such concerns.

As part of encouraging public involvement, a separate notice to the EJ Screening form was sent to CBOs to notify them of a public information session. The notice briefly described the Project and ways the public can reach out to learn more about the Project. A public information session was also held on July 11, 2022, at 6pm.

3. If the project is exempt from Part II of the protocol, please specify.
- B. Provide below (or attach) a distribution list (if different from the list in Section III.A. above) of CBOs and tribes, or other individuals or entities the Proponent intends to maintain for the notice of the MEPA Site Visit and circulation of other materials and notices during the course of MEPA review.

See Attachment 13 for distribution list.

- C. Describe (or submit as a separate document) the Proponent's plan to maintain the same level of community engagement throughout the MEPA review process, as conducted prior to filing.

The Proponent intends to continue to reach out by way of e-mail to CBOs and others listed on the EJ Distribution List (see Attachment 13) as well others who express interest in the Project's development process. Listed parties will be notified in advance of any planned public meetings associated with the Project's review processes. Notices regarding public meetings related to the Project will also be published in the local newspaper.

All communication and ads will clearly indicate the Proponent's contact information to allow concerned citizens to be able to discuss the Project and ask questions.

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):

(Name) **The Lowell Sun** (Date) **7/15/21**

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

Signatures:

<u>7/15/22</u>	<i>James D Noonan</i>	<u>7/15/22</u>	<i>David E. Hewett</i>
Date	Signature of Responsible Officer or Proponent	Date	Signature of person preparing ENF (if different from above)

James D. Noonan

Name (print or type)

David Hewett

Name (print or type)

Lincoln Property Company

Firm/Agency

Epsilon Associates, Inc.

Firm/Agency

53 State Street, 8th Floor

Street

3 Mill and Main Place, Suite 250

Street

Boston, MA 02109

Municipality/State/Zip

Maynard, MA 01754

Municipality/State/Zip

(617) 951-4137

Phone

(978) 897-7100

Phone


ENF Attachments

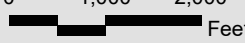

Attachment 1	USGS Locus Map
Attachment 2	Aerial Locus Map
Attachment 3	Existing Site Survey
Attachment 4	Environmental Site Constraints Map
Attachment 5	Proposed Site Plan
Attachment 6	Project Alternatives
Attachment 7	Transportation Report
Attachment 8	Circulation List
Attachment 9	List of Federal and Local Permits
Attachment 10	Resilient MA Action Team (RMAT) Report
Attachment 11	EJ Screening Form and Maps
Attachment 12	MEPA EJ Distribution List

Attachment 1

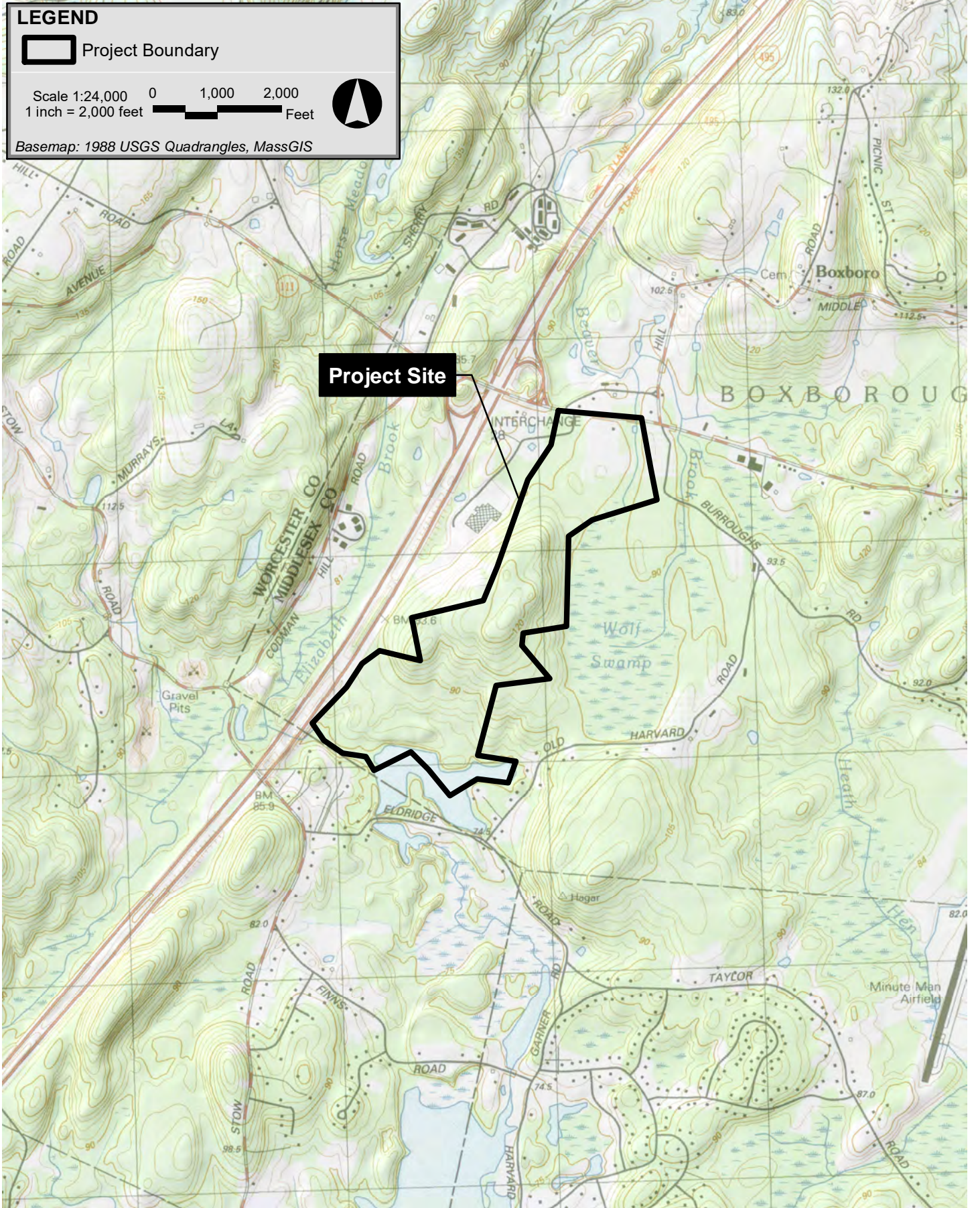
USGS Locus Map

LEGEND

 Project Boundary

Scale 1:24,000 0 1,000 2,000
1 inch = 2,000 feet  Feet 

Basemap: 1988 USGS Quadrangles, MassGIS





Massachusetts Avenue Research Campus Boxborough, Massachusetts

Attachment 2

Aerial Locus Map

LEGEND

-  Project Boundary
-  Project Buildings

Scale 1:9,600
1 inch = 800 feet

0 400 800 Feet

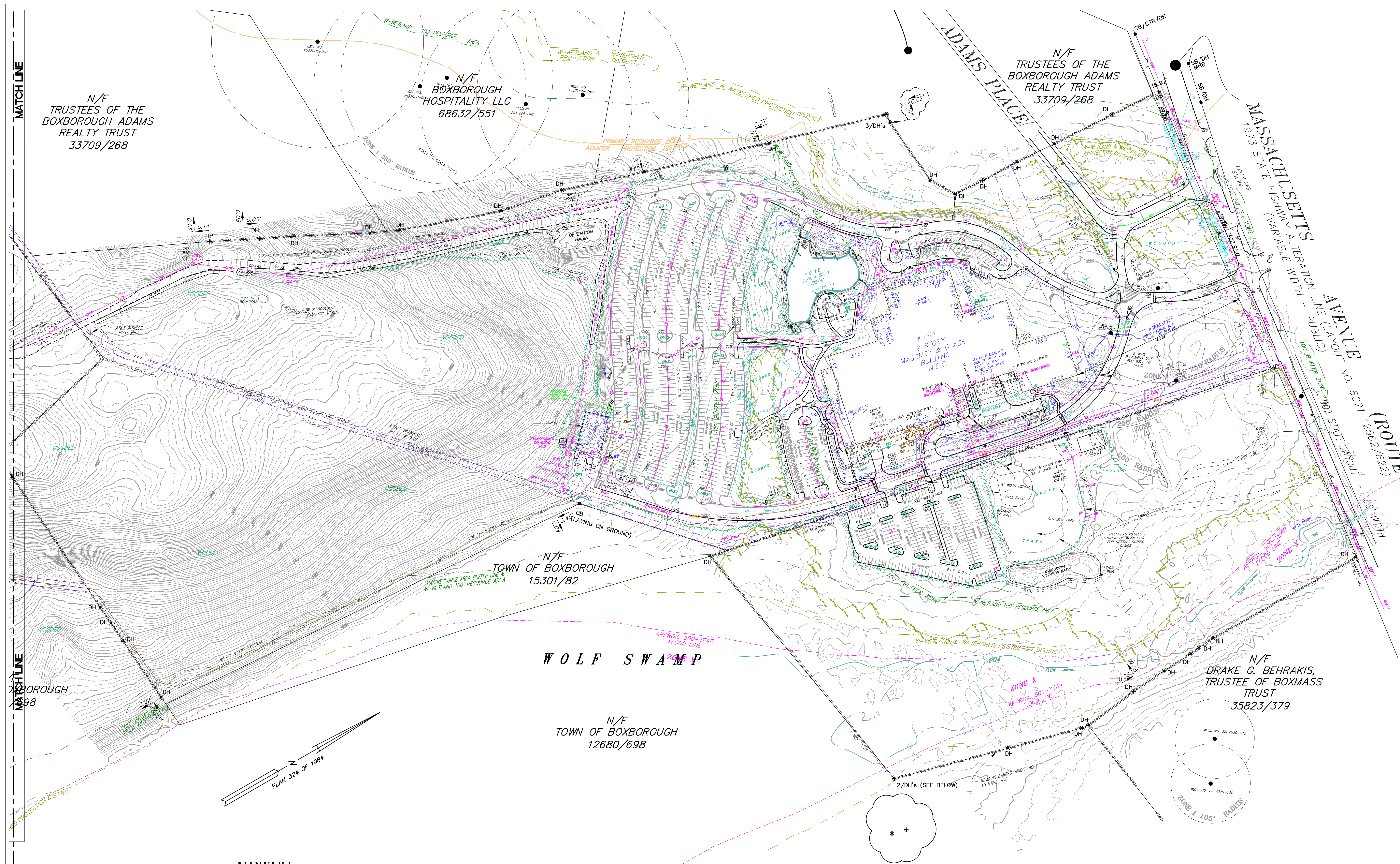
Basemap: 2019 Orthophotography, MassGIS



Massachusetts Avenue Research Campus Boxborough, Massachusetts

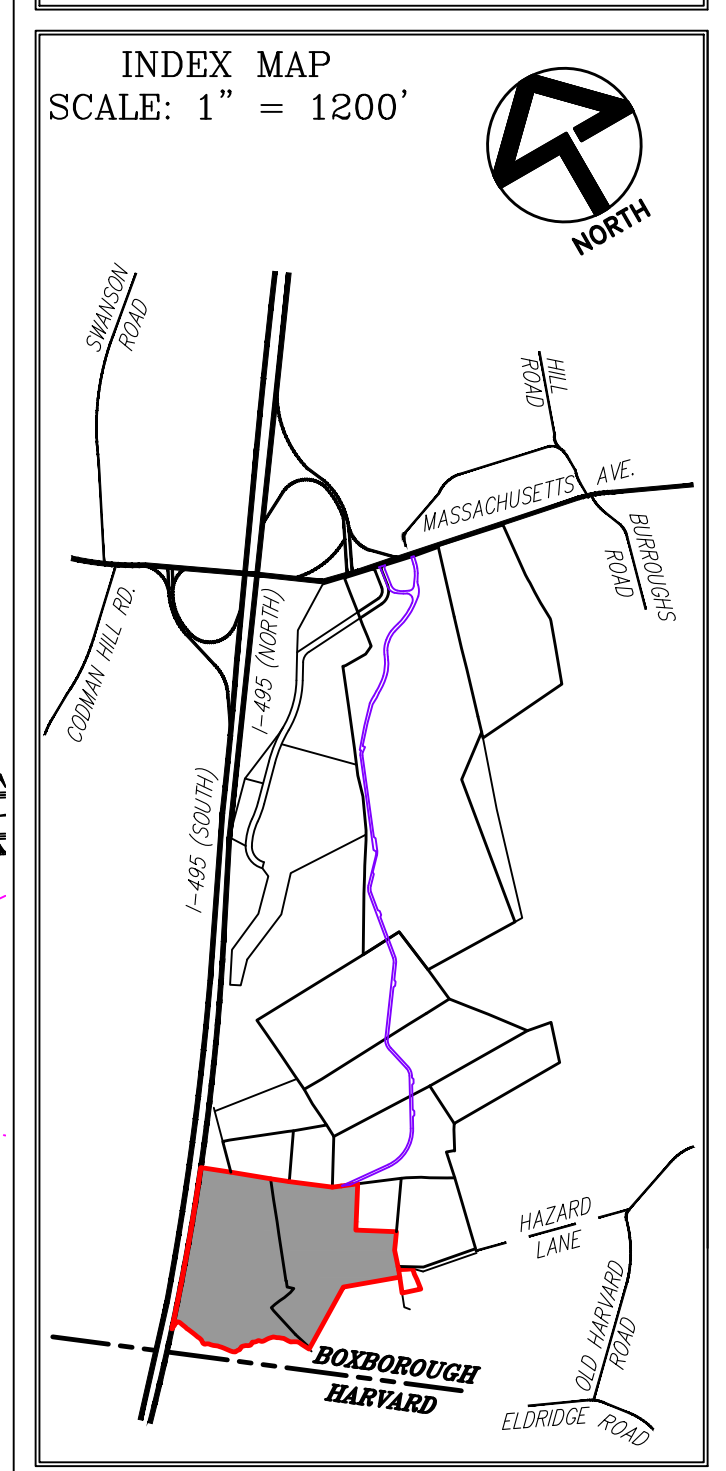
Attachment 3

Existing Site Survey

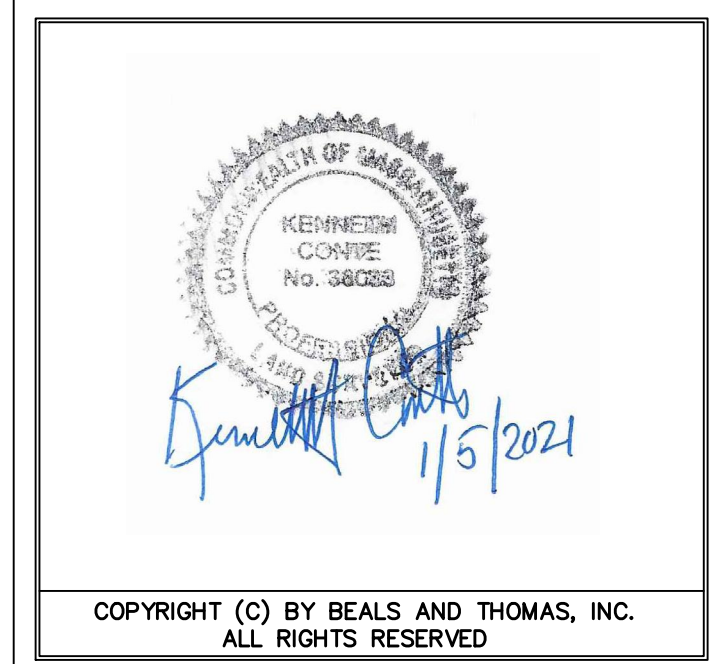


PREPARED FOR:
LINCOLN PROPERTY COMPANY
 53 STATE STREET, 8TH FL.
 BOSTON, MA 02109

RECORD OWNER:
LPCH BOXBOROUGH, L.P.
 69867/565
 (AUGUST 24, 2017)
 PARCEL DESIGNATION:
 1-2-113, 1-2-116.2, 1-2-117,
 1-2-124, 1-2-125, 2-2-134,
 2-2-209
 40195/74
 PARCEL DESIGNATION:
 1-2-208
 40195/76
 PARCEL DESIGNATION:
 1-2-114, 1-2-115, 1-2-116.1
 40195/82
 PARCEL DESIGNATION:
 1-2-110
 40195/85
 PARCEL DESIGNATION:
 1-2-207
 (JULY 28, 2003)
 (LEASE AREA PARCELS)



5	
4	
3	
2	
1	
0	01/05/2021 INITIAL ISSUE
	ISSUE DATE DESCRIPTION
SDR	BAL MPM KCC
FLD	CALC DWN CHR'D



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 ALL RIGHTS RESERVED

TOPOGRAPHIC PLAN OF LAND
CISCO NEDC SITE 1
 IN
BOXBOROUGH, MA
 (MIDDLESEX COUNTY)

PREPARED BY:
BEALS + THOMAS
 Civil Engineers + Landscape Architects +
 Land Surveyors + Planners +
 Environmental Specialists

BEALS AND THOMAS, INC.
 Reservoir Corporate Center
 144 Turnpike Road
 Southborough, Massachusetts 01772-2104
 T 508.366.0560 | www.bealsandthomas.com

DATE: JANUARY 5, 2021 METERS
 0 10 25 50 75 100
 0 50 100 200 300
 FEET
 SCALE: 1"=100'
 B+T JOB NO. 0322.29

B+T PLAN NO.
 032229P01A-001 **TP-1**

NOTES

- UNDERGROUND UTILITIES WERE COMPILED FROM AVAILABLE RECORD PLANS OF UTILITY COMPANIES AND PUBLIC AGENCIES AND ARE APPROXIMATE ONLY. BEFORE CONSTRUCTION CALL "DIG SAFE" 1-888-344-7233.
- THIS PLAN WAS PREPARED FROM AN ACTUAL SURVEY MADE ON THE GROUND USING TOTAL STATION METHODS ON OR BETWEEN MAY, 1987 AND OCTOBER 22, 2020.
- ZONE 1-RADIUS
 ZONE 1 MEANS THE PROTECTIVE RADIUS REQUIRED AROUND A PUBLIC WATER SYSTEM WELL OR WELLFIELD. (SEE THE COMMONWEALTH OF MASSACHUSETTS, DEPARTMENT OF ENVIRONMENTAL PROTECTION BUREAU OF RESOURCE PROTECTION, DRINKING WATER PROGRAM, CURRENT GUIDELINES AND POLICIES FOR PUBLIC WATER SYSTEMS.)
- ALL MONUMENTS SHOWN ARE FOUND UNLESS OTHERWISE NOTED ON THIS PLAN.
- THE AQUIFER PROTECTION DISTRICT TAKEN FROM A PLAN ENTITLED "SIGNIFICANT AQUIFER AREAS TOWN OF BOXBOROUGH PLANNING BASE MAP NORTH SECTION," PREPARED BY BOSTON SURVEY CONSULTANTS, AND DATED DECEMBER 1978.
- THE W-WETLAND AND WATERSHED PROTECTION DISTRICTS WERE TAKEN FROM A PLAN ENTITLED "ASSESSOR'S TAX MAP TOWN OF BOXBOROUGH (MIDDLESEX COUNTY), MASSACHUSETTS," PREPARED BY BOSTON SURVEY CONSULTANTS, AND LAST REVISED OCTOBER 1998.
- PORTIONS OF THE LEASE AREA ARE LOCATED IN THE FOLLOWING FLOOD ZONES:
 (100-YEAR FLOOD)
 ZONE AE (SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD; BASE FLOOD ELEVATIONS DETERMINED);
 (OUTSIDE FLOOD ZONE)
 ZONE X (AREAS DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE FLOODPLAIN)
 AS SHOWN ON "FLOOD INSURANCE RATE MAP, MIDDLESEX COUNTY, MASSACHUSETTS (ALL JURISDICTIONS) PANEL 331 OF 656", MAP NUMBER 2501700331F, MAP REVISED: JULY 7, 2014.
- SOLAR PANELS AND GRAVEL DRIVE LOCATED WITHIN THE FENCE WERE TAKEN FROM A PLAN ENTITLED "PHOTOVOLTAIC ARRAY SITE PLAN, LITTLETON SOLAR FIXED-TILT PV ARRAYS, 3.96 MWAC, MIDDLESEX COUNTY, MA, AS-BUILT, SHEET NUMBER G-100.1" PREPARED BY BLMYER ENGINEERS, LAST DATED DECEMBER 17, 2018.
- WETLAND RESOURCE AREAS HAVE BEEN DELINEATED BY BEALS AND THOMAS, INC ON OR BETWEEN OCTOBER 7, 2020 AND OCTOBER 19, 2020. (PENDING BOXBOROUGH CONSERVATION COMMISSION APPROVAL.)

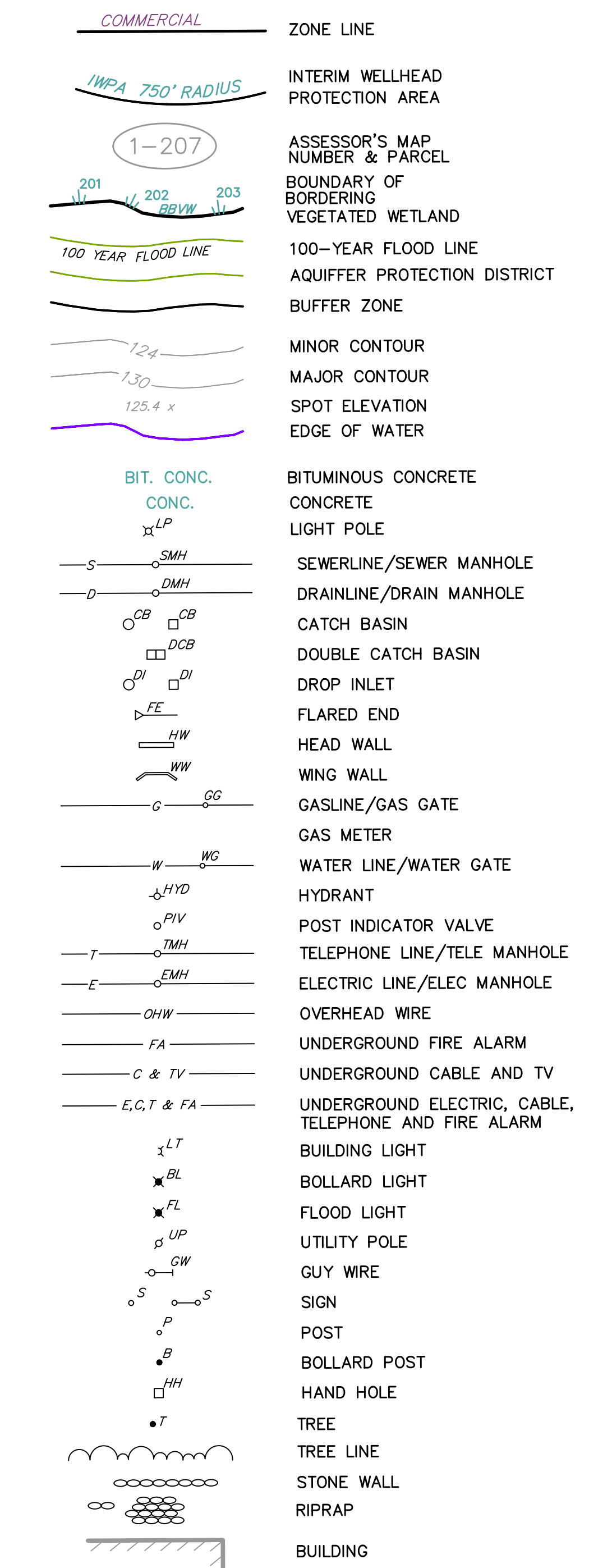
ZONING CLASSIFICATION

ZONING DISTRICT—OFFICE PARK
 ZONING OVERLAY DISTRICTS—
 AQUIFER PROTECTION OVERLAY
 FLOOD PLAIN OVERLAY
 WIRELESS COMMUNICATION FACILITIES OVERLAY

SEE SHEET TP-3 FOR NOTES, RIM AND INVERT SCHEDULE AND LEGEND.

Attachment 3
 Site Survey

LEGEND:



STRUCTURE	RIM/INV. ELEV.	INVERT/SUMP OR SHELF EL.	SIZE & MATERIAL	CONNECTION	REMARKS
CB-100	288.10	283.80	?	DMH-100	WATER
		282.10			SILT SUMP
CB-101	287.11	283.62	12" RCP	CB-102	WATER
		281.71			SILT SUMP
CB-102	286.91	283.56	12" RCP	CB-101	WATER
		283.47		DMH-100	WATER
		281.01			SILT SUMP
CB-103	287.47	283.91	12" RCP	DMH-100	WATER
		282.17			SILT SUMP
CB-104	295.87	292.42	12" RCP	DMH-101	WATER
		291.07			SILT SUMP
CB-105	291.72	287.98	12" RCP	DMH-102	WATER
		286.32			SILT SUMP
CB-106	292.33	288.73	12" CMP	DMH-104	WATER
		287.73			SILT SUMP
CB-107	291.99	287.17	12" CMP	DMH-105	WATER
		285.39			SILT SUMP
CB-108	289.83	287.18	12" CMP	CB-109	WATER
		285.13			
CB-109	290.10	287.13	12" CMP	DMH-105	WATER
		287.11		CB-108	WATER
		285.30			SUMP
CB-110	284.90	284.90			FULL OF SAND
					SUMP
					WATER
CB-111	282.01	275.88	12" RCP	FE-107	WATER
		276.05		CB-114	WATER
		279.18		Westerly	WATER
		274.61			SILT SUMP
CB-112	283.87	280.19		DMH-106	WATER
		283.87			WATER
		281.57			SILT SUMP
CB-113	283.89	280.69		EAST	WATER
					SILT SUMP
		280.99			WATER
CB-114	280.65	276.63	12" RCP	CB-114	WATER
		277.21		EAST	WATER
		277.26		Westerly	WATER
		275.95			SUMP
DMH-100	287.22	283.53		CB-100	WATER
		283.61		CB-102	WATER
		283.51		CB-103	WATER
		283.34		FE-100	WATER
		289.44		CB-A11	WATER
DMH-101	296.15	292.37	12" RCP	CB-104	WATER
		291.93		DMH-102	WATER
		291.92		DMH-104	WATER
		288.80		DMH-104	WATER
DMH-102	294.34	291.35	6" CIP	DMH-101	WATER
				DMH-103	WATER
				DMH-105	WATER
				DMH-102	WATER
				TRENCH	WATER
				?	WATER
DMH-104	292.50	285.84	15" RCP	DMH-101	WATER
		285.96		DMH-105	WATER
		288.71		CB-106	WATER
		285.72		FE-101	WATER
DMH-105				DMH-104	WATER
				CB-107	WATER
				CB-109	WATER
DMH-106	284.31	280.37		FE-104	WATER
				CB-112	WATER
				CB-110?	WATER
				FE	WATER
DROP WELL	N/A	287.84	8" CMP	FE	WATER
		287.97			WATER
FE		285.80	8" CMP	DROP WELL	WATER
GT-1	294.28	289.48	6" IRON		WATER
GT-2	294.24	289.48			WATER
SMH-1	294.32	289.63	8" IRON elbow	SEPTIC TANK	WATER
SMH-2	294.34	289.44		SEPTIC TANK	WATER
SMH-3	294.37	289.47		SEPTIC TANK	WATER
SMH-4	294.39	289.33	8" IRON elbow	SEPTIC TANK	WATER
SMH-5	294.65	289.51	8" CLAY	SMH-6	WATER
		289.51		BLDG.	WATER
		289.51		BLDG.	WATER
		290.13			SHELF
SMH-6	294.74	289.96	2" PVC	CB-A12	WATER
PUMP		287.14	4" PVC	BLDG.	WATER
		285.94		GRAVEL	SUMP
		287.14			WATER
SMH-7	294.62	288.64	8" PVC	BLDG.	WATER
AER. PUMP		279.71			SUMP
					HATCH
SMH-8	294.62				REMOVED
PUMP					FLOOR
CHAMBER					

STRUCTURE	RIM/INV. ELEV.	INVERT/SUMP OR SHELF EL.	SIZE & MATERIAL	CONNECTION	REMARKS	
CB-A11	297.34	292.74	12" RCP	CB-A12	WATER	
		292.69		DMH-101	WATER	
		290.44			SILT SUMP	
CB-A12	296.96	293.57	12" RCP	CB-A11	WATER	
		294.45		SMH-6	WATER	
		292.06			SILT SUMP	
CB-C2	291.35	287.55	?	DMH-C1	WATER	
		289.05		RD	WATER	
DCB-F16	294.24	290.35	15" RCP	DMH-F2	WATER	
		288.44			SUMP	
CB-E11	299.08	292.72	12" RCP	DMH E10	WATER	
CB-E12	303.13	295.10	12" RCP	DMH E10	WATER	
CB-F11	304.95	297.07	12" RCP	DMH F10	WATER	
CB-F14	306.16	298.12	12" RCP	CB F15	WATER	
CB-F15	300.56	297.06	12" RCP	CB F14	IN	
		293.38		DMH F9	OUT	
CB-J1	293.13	288.88	15" RCP	DMH J2	WATER	
DCB-E8	297.57	291.57	12" RCP	DMH E7	WATER	
DCB-E9	294.34	291.19	12" RCP	DMH E7	WATER	
DCB-E13	292.66					
DCB-F12		295.72	12" RCP	DMH F10	WATER	
DCB-F13		295.26	12" RCP	DMH F10	WATER	
DCB-F16		294.24	15" RCP	DMH F2	WATER	
CB-D1		290.03	285.95			
CB-D2		290.06	286.35		RECORD	
CB-E2		292.70				
CB-E4		290.42	FULL OF SAND			
CB-E5		291.36	287.55			
CB-E6		291.36	288.05		RECORD	
DMH-C1		292.59		CB-C2	RECORD FROM	
		285.95	18 RCP	FE-C1		
		288.27	18" RCP	DMH-C3		
		288.95	2" COPPER			
		285.95			TRENCH	
DMH-C4	292.04	288.34	18" RCP	DMH-C3	OUT	
		288.56	15" RCP	DMH-C5	IN	
		288.34				
DMH-C5	293.70	289.04	15" RCP	DMH-C4	WATER	
		289.52	15" STEEL	BLDG.	TRENCH	
		289.04				
FE-104		285.80	8" CMP	DROP WELL	WATER	
FE-100		282.86	12" RCP	DMH-100	WATER	
FE-101		283.69	15" RCP	DMH-104	WATER	
FE-102		283.41	12" RCP	FE-103	WATER	
FE-103		283.68	12" RCP	FE-102	WATER	
RD-1	289.55	287.59	4"	BLDG.	WATER	
RD-2	289.55	287.96	4"	BLDG.	WATER	
RD-3	289.55	287.98	4"	BLDG.	WATER	
TRENCH DRAIN		289.55	287.00	12" RCP	DMH-103	WATER
DMH-E7	296.73	291.03	12" RCP	DMH E10	IN	
		290.57		DCB E9	IN	
		290.86		DCB E8	IN	
		290.66		CB E2	OUT	
DMH-E10	299.24				OUT	
DMH-F2	293.65	289.26	15" RCP	DMH F1	OUT	
		289.28	15" RCP	DMH F2	IN	
DMH-F9	298.62	298.89	12" RCP	CB F15	IN	
		298.92	15" RCP	DMH F10	OUT	
DMH-F10	298.72	295.92	12" RCP	DCB F13	WATER	
		295.57	12" RCP	DCB F12	WATER	
		295.57		CB F11	WATER	
DMH-J2	293.41	287.51	15" RCP	CB J1	IN	
		287.35	15" RCP	FE J3	OUT	
FE-E2		285.50		CB F7	WATER	
FE-F2		282.03	18" RCP	CB F7	WATER	
FE-J3		285.78	15" RCP	DMH J2	WATER	
DMH-C1	292.59	286.25	18" RCP	DMH C3	WATER	

REFERENCES:

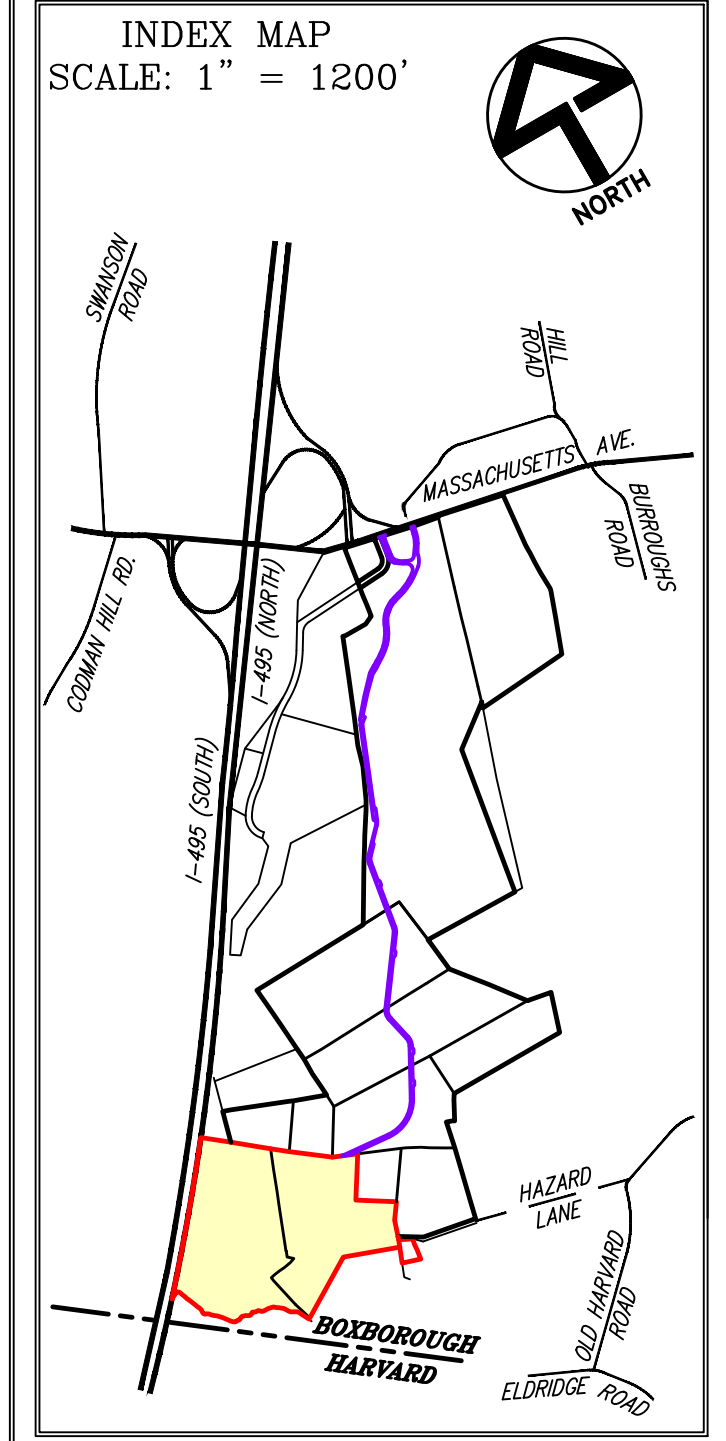
- SITE DETAIL AND WETLAND RESOURCE AREAS ARE BASED ON AN ONT THE GROUND SURVEY PERFORMED BY BEALS AND THOMAS, INC. BETWEEN NOVEMBER 1998 AND SEPTEMBER 2020.
- AQUIFER PROTECTION DISTRICT TAKEN FROM A PLAN ENTITLED "SIGNIFICANT AQUIFER AREAS TOWN OF BOXBOROUGH PLANNING BASE MAP, NORTH AND SOUTH SECTION." PREPARED BY BOSTON SURVEY CONSULTANTS, AND DATED DECEMBER 1978.
- THE ZONING DISTRICT LIMIT WAS TAKEN FROM A PLAN ENTITLED "ASSESSOR'S TAX MAP TOWN OF BOXBOROUGH (MIDDLESEX COUNTY) MASSACHUSETTS." PREPARED BY BOSTON SURVEY CONSULTANTS, AND LAST REVISED OCTOBER 1998.
- THE W-WETLAND AND WATERSHED PROTECTION DISTRICTS WERE TAKEN FROM A PLAN ENTITLED "ASSESSOR'S TAX MAP TOWN OF BOXBOROUGH (MIDDLESEX COUNTY) MASSACHUSETTS." PREPARED BY BOSTON SURVEY CONSULTANTS, AND LAST REVISED OCTOBER 1998.

NOTES:

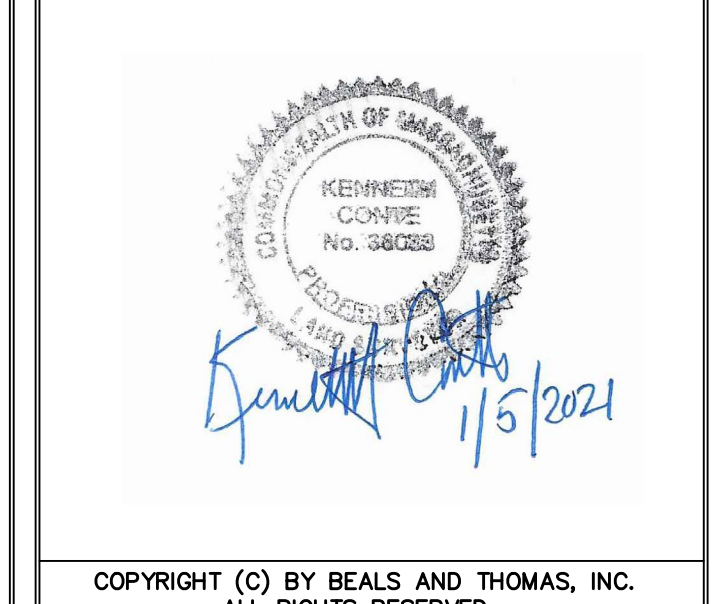
- UNDERGROUND UTILITIES WERE COMPILED FROM AVAILABLE RECORD PLANS OF UTILITY COMPANIES AND PUBLIC RECORDS AND ARE APPROXIMATE ONLY. BEFORE CONSTRUCTION CALL "DIG SAFE" 1-888-344-7233.
- ZONING CLASSIFICATION—OFFICE PARK DISTRICT-10
- ALL ELEVATIONS REFER TO THE NATIONAL GEODETIC VERTICAL DATUM OF 1988.
- TOPOGRAPHIC SURFACE DATA SHOWN ON THIS PLAN IS BASED ON AERIAL MAPPING PERFORMED SEPTEMBER 2020, BY BLUESKY, INC. AND SUPPLEMENTED BY FIELD SURVEY. (IN AREAS LABELLED DENSE TREES, CONTOURS AND SPOT ELEVATIONS MAY NOT MEET THE NATIONAL MAP STANDARDS FOR AERIAL MAPPING. THOSE AREAS LABELLED DENSE TREES SHOULD BE FIELD VERIFIED BEFORE PERFORMING ANY DESIGN WORK.

PREPARED FOR:
LINCOLN PROPERTY COMPANY
53 STATE STREET, 8TH FL.
BOSTON, MA 02109

RECORD OWNER:
LPCH BOXBOROUGH, L.P.
69867/565
(AUGUST 24, 2017)
PARCEL DESIGNATION:
1-2-113, 1-2-116.2, 1-2-117,
1-2-124, 1-2-125, 2-2-134,
2-2-209
40195/74
PARCEL DESIGNATION:
1-2-208
40195/76
PARCEL DESIGNATION:
1-2-114, 1-2-115, 1-2-116.1
40195/82
PARCEL DESIGNATION:
1-2-110
40195/85
PARCEL DESIGNATION:
1-2-207
(JULY 28, 2003)
(LEASE AREA PARCELS)



5				
4				
3				
2				
1				
0	01/05/2021	INITIAL ISSUE		
	ISSUE DATE	DESCRIPTION		
SDR	BAL	MPM	KCC	
FLD	CALC	DWN	CHK'D	



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TOPOGRAPHIC PLAN OF LAND
CISCO NEDC SITE 1
IN
BOXBOROUGH, MA
(MIDDLESEX COUNTY)

PREPARED BY:
BEALS + THOMAS
Civil Engineers + Landscape Architects +
Land Surveyors + Planners +
Environmental Specialists

BEALS AND THOMAS, INC.
Reservoir Corporate Center
144 Turnpike Road
Southborough, Massachusetts 01772-2104
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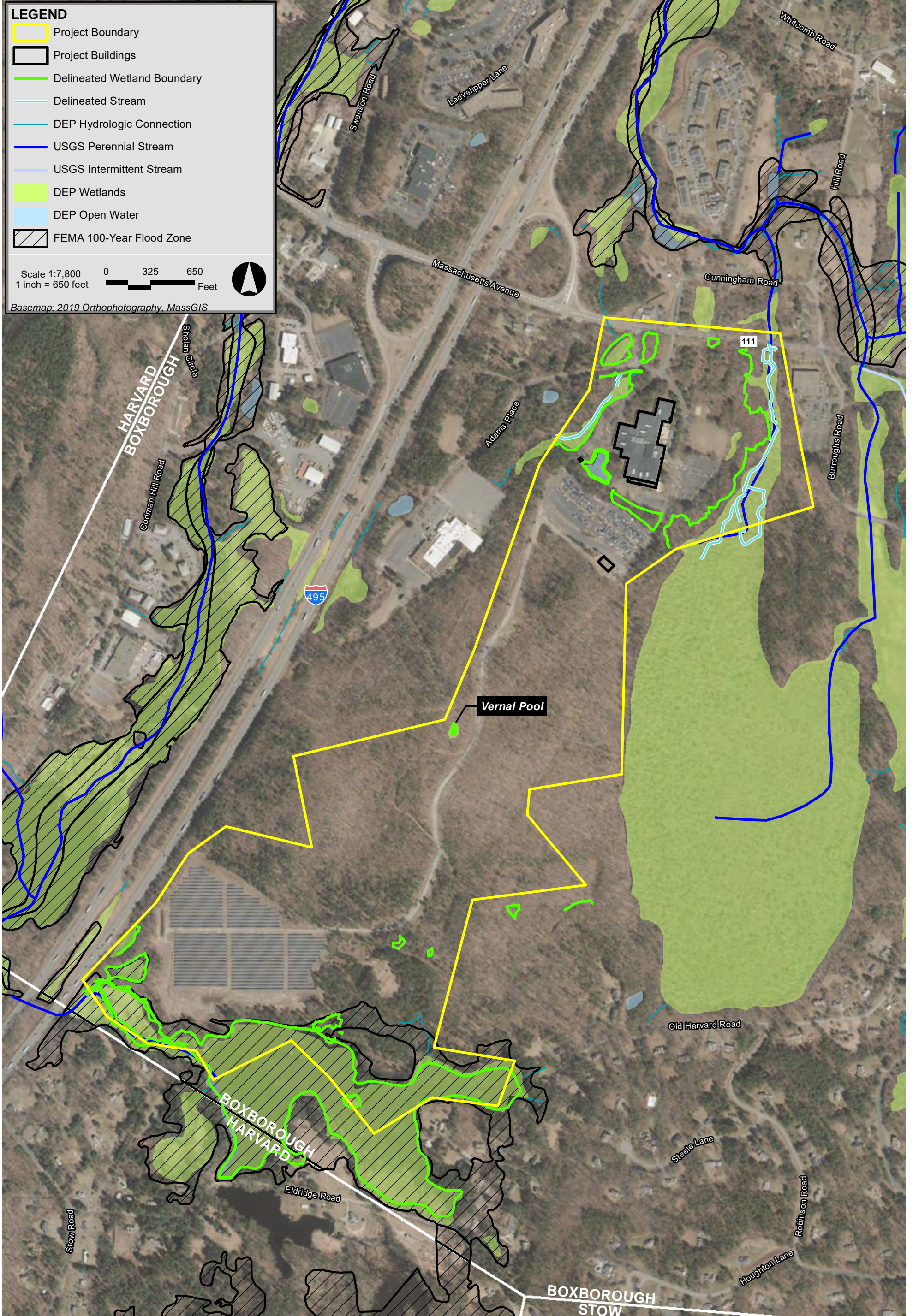
DATE: JANUARY 5, 2021

SCALE: N/A
B+T JOB NO. 0322.29
B+T PLAN NO. 032229P01A-003
SHEET No. 3 OF 3

TP-3

Attachment 4

Environmental Site Constraints Map



Lincoln Property Company 1414 Massachusetts Avenue Boxborough, Massachusetts

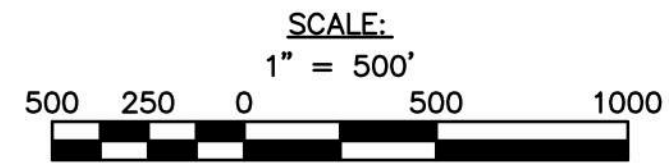
Attachment 5

Proposed Site Plan



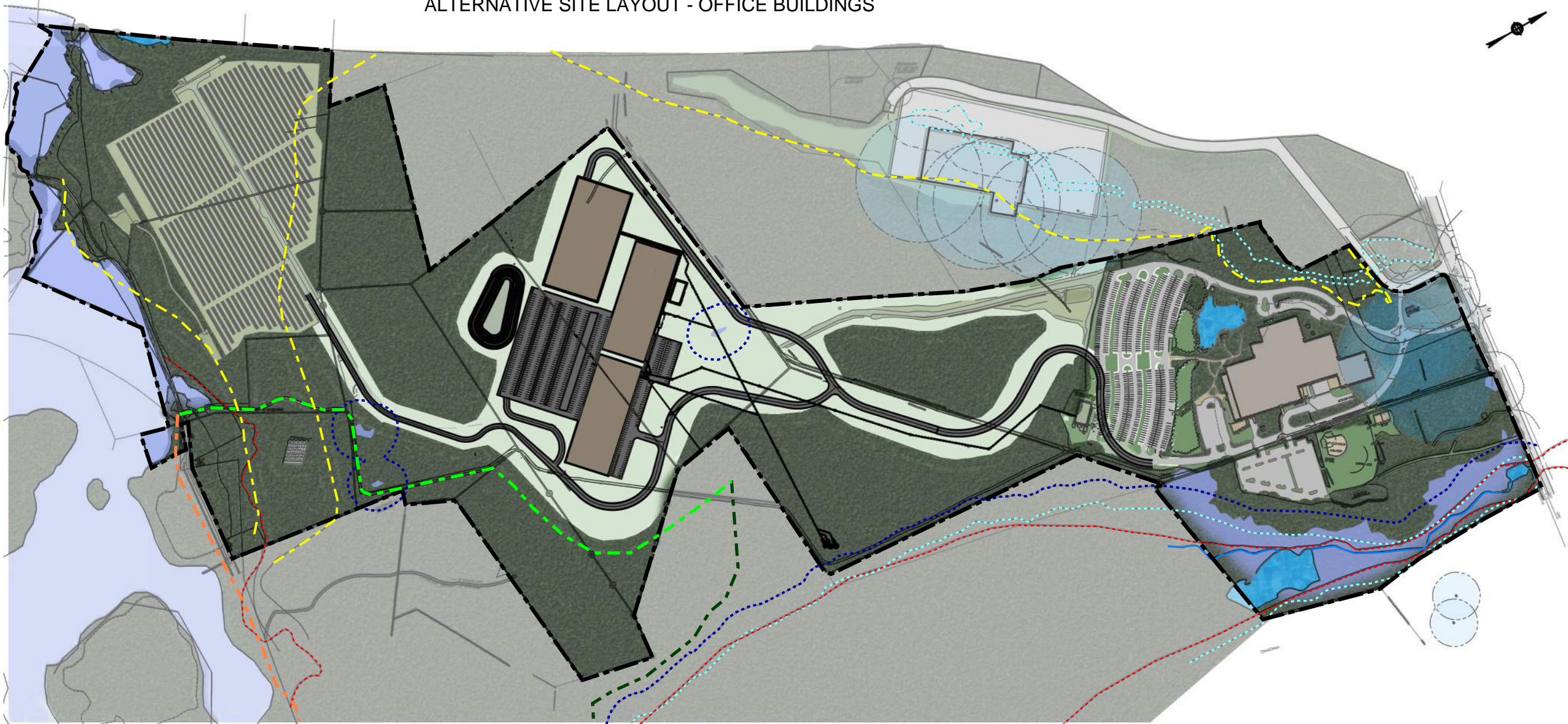
LEGEND

 Wetlands Resource Area	 Hazard Lane Access
 Watershed Protection District	 Town Trails
 Primary Recharge Area & Aquifer Protection District	 Proposed Trails
 Flood Zone	










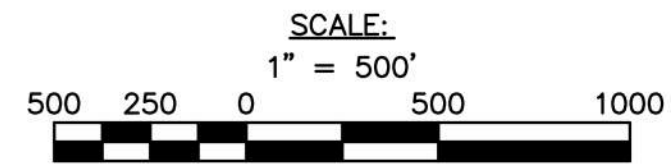
Attachment 6

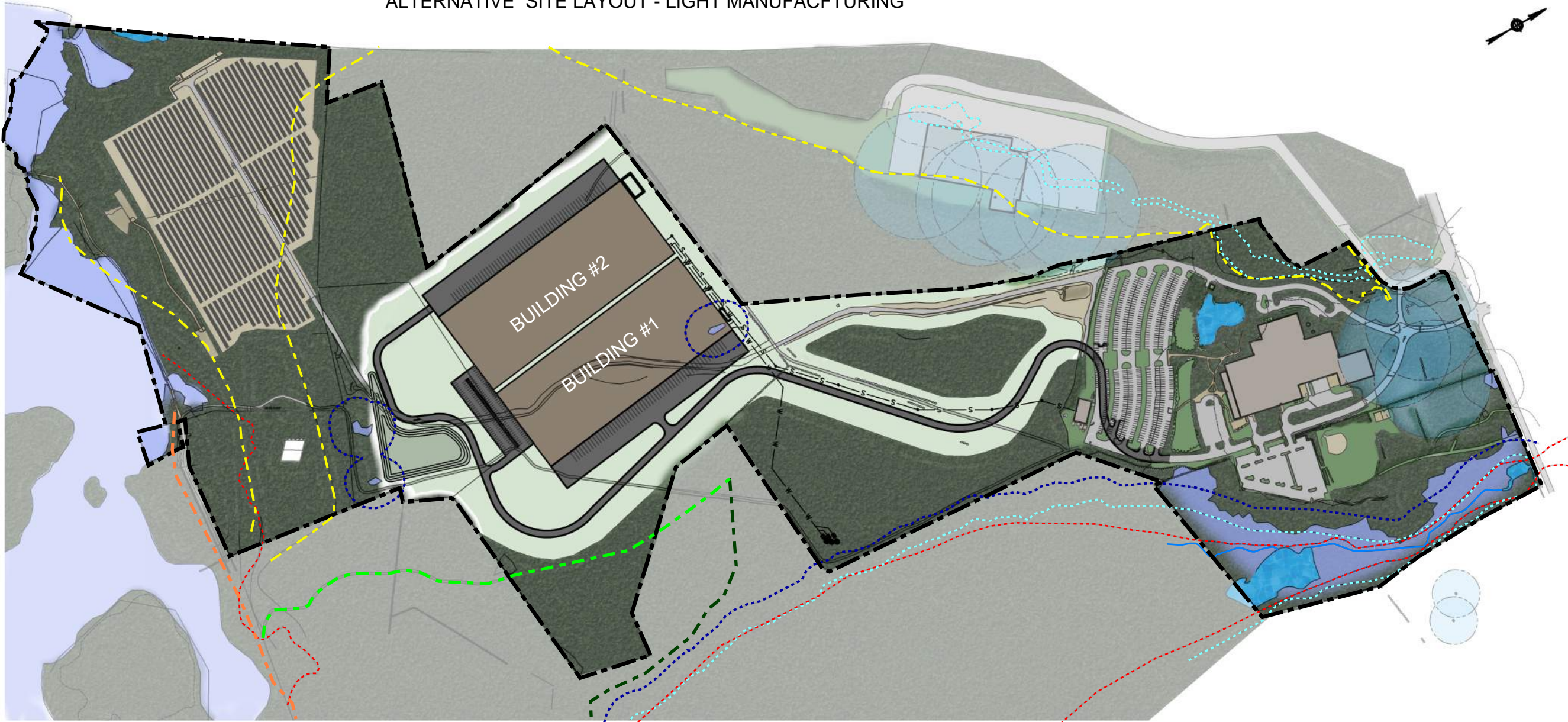
Project alternatives



LEGEND

 Wetlands Resource Area	 Hazard Lane
 Watershed Protection District	 Town Trails
 Primary Recharge Area & Aquifer Protection District	 Proposed Town Trails
 Flood Zone	

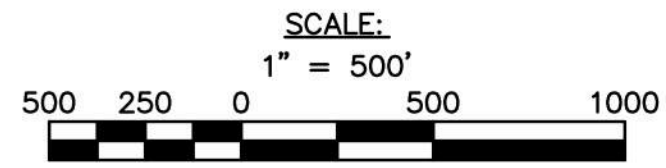




LEGEND

- Wetlands Resource Area
- Watershed Protection District
- Primary Recharge Area & Aquifer Protection District
- Flood Zone

- Hazard Lane
- Town Trails
- Proposed Town Trails



Attachment 7

Transportation Report



Nitsch Engineering

Traffic Impact Study

1414 Massachusetts Avenue
(Route 111)
Boxborough, MA

July 1, 2022

Prepared for:

Lincoln Property Company
Development & Construction

Submitted by:

Nitsch Engineering
2 Center Plaza, Suite 430
Boston, MA 02108

Nitsch Project #12995.3



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1 Introduction

The project team has prepared a qualitative assessment of traffic circulation, and transportation impacts associated with the proposed industrial park at 1414 Massachusetts Avenue (Route 111) in Boxborough, Massachusetts. The following sections describe the Project area, trip generation, public transportation, parking accommodations, bicycle and pedestrian facilities, safety analyses, signal warrant analyses, and capacity analyses.

1.1 Proposed Development

The existing site at 1414 Massachusetts Avenue is approximately 208 acres which is occupied mostly by an un-development wooded area with the north portion adjacent to Massachusetts Avenue (Route 111) occupied by an office and research development, formerly the Cisco System Headquarters. The proposed development will be built south of the existing parking lot. The site is bounded by a wetland (Wolf Swamp) to the east, the Regency Hotel and I-495 to the west, Massachusetts Avenue (Route 111) to the north, and a solar farm to the south. Figure 1 represents the Locus Map showing the site and its surrounding facilities. Figure 2 represents the study area and roadways.

The proposed development will include four single-story buildings with surface parking and loading docks. In addition, a new access road will be built south of the existing parking lot to access the new buildings.

1.2 Methodology

The traffic analysis herein is summarized in the following sections:

- 1 An inventory of existing transportation conditions, including roadway capacities, safety, parking, transit, pedestrian and bicycle accommodation, and site circulation.
- 2 Adjusted historical (2014) traffic data at all study intersections to year 2019 as the new 2020 existing conditions following MassDOT's Engineering Directive E-20-005 and site-specific adjustment.
- 3 An evaluation of future transportation conditions and an assessment of potential traffic impacts associated with the proposed development and other neighboring projects. Long-term impacts are evaluated for the year 2027, based on a seven-year horizon from the 2020 base year. Expected roadway, parking, and loading conditions and deficiencies are identified. This section includes the following scenarios:
 - a. The no-build scenario (2027) includes general background growth and additional vehicular traffic associated with specific proposed or planned developments and roadway changes in the vicinity of the site; and
 - b. The build scenario (2027) includes specific travel demand forecasts for the Project.
- 4 An identification of appropriate measures to mitigate Project-related impacts.
- 5 An evaluation of short-term traffic impacts associated with construction activities.

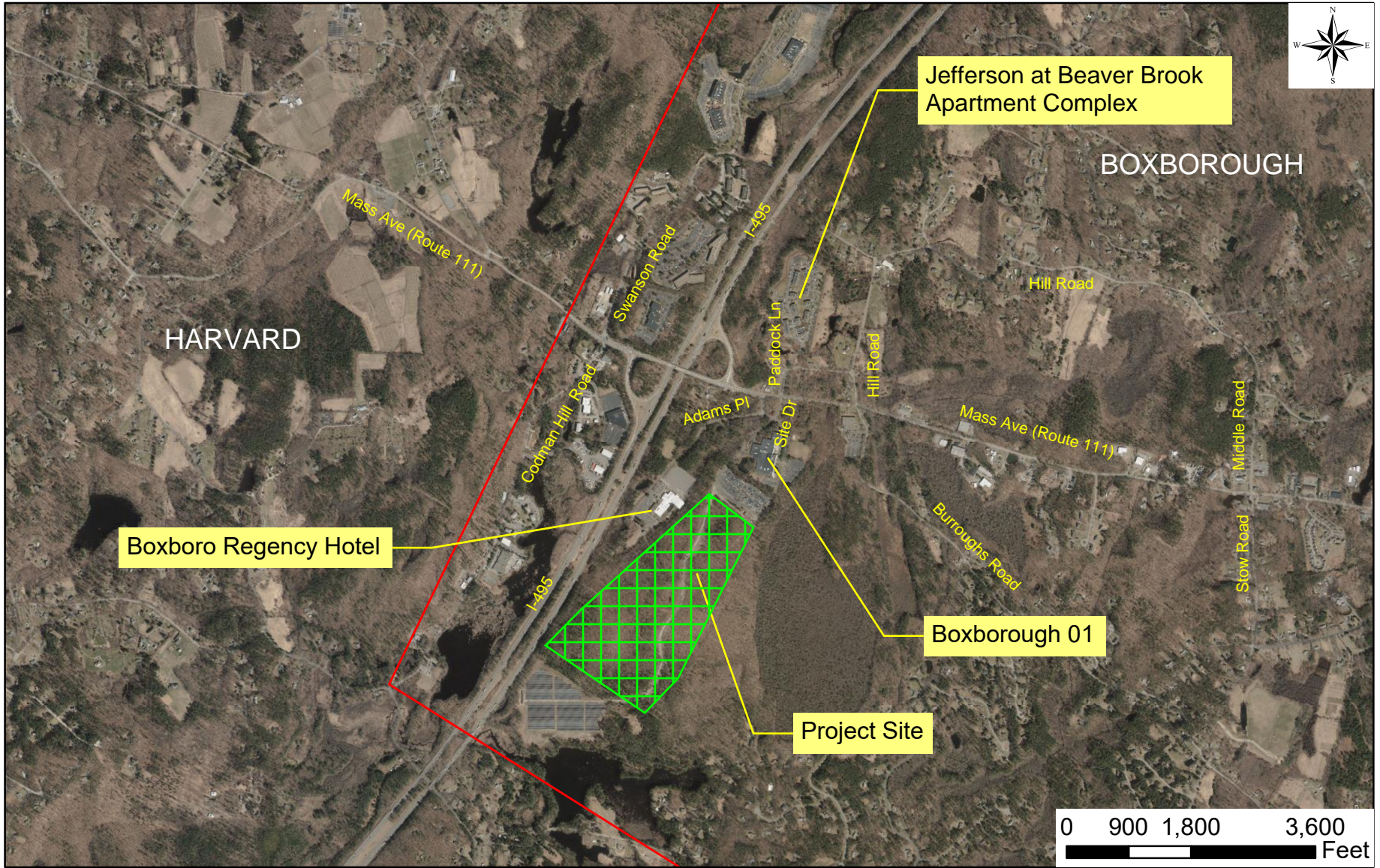


Figure 1: Locus Map

1414 Massachusetts Avenue (Route 111)
 Traffic Impact Study
 Boxborough, MA

Data Source: MassGIS
 Nitsch Project #12995.3



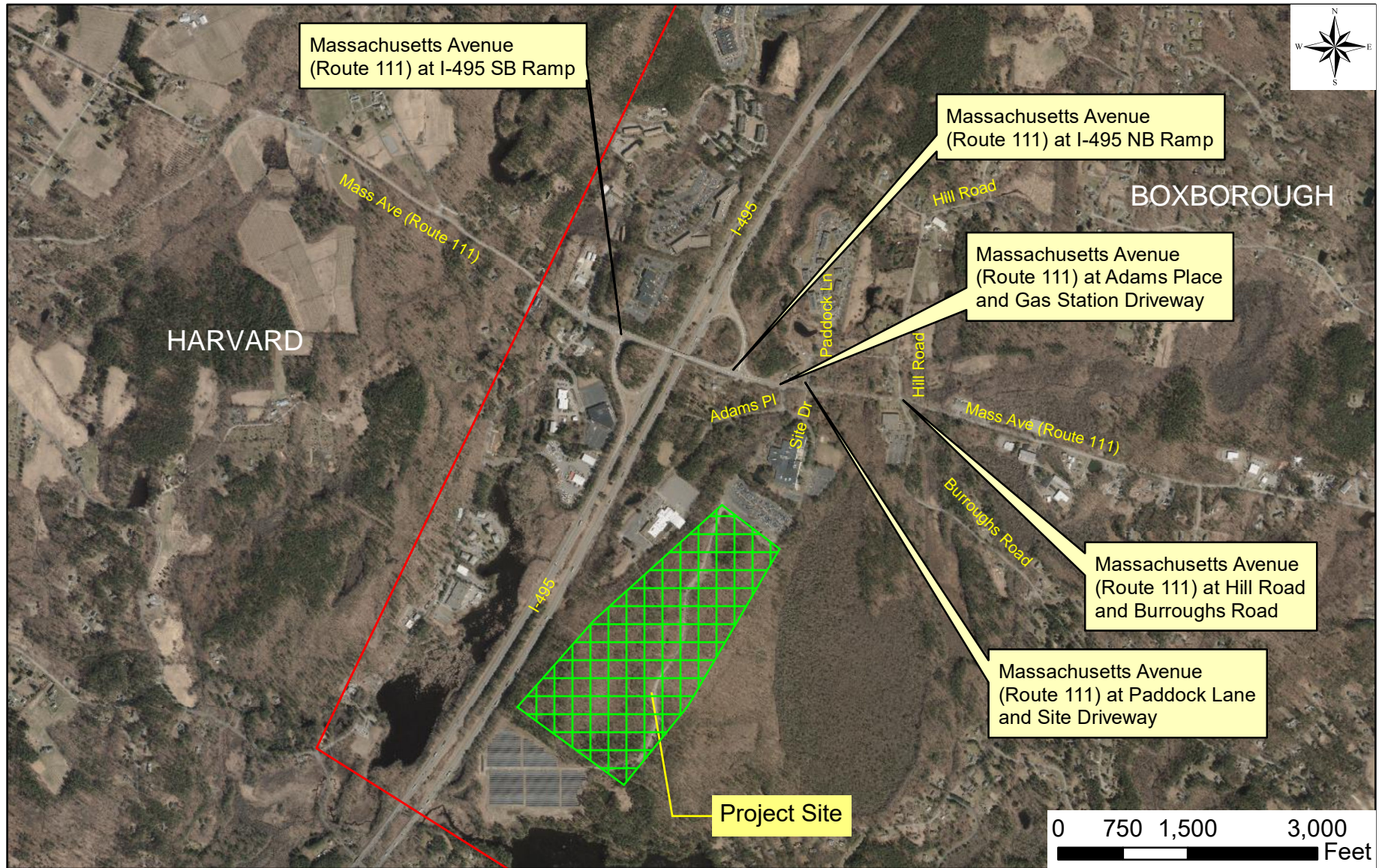


Figure 2: Study Area

1414 Massachusetts Avenue (Route 111)
 Traffic Impact Study
 Boxborough, MA



2 Existing Conditions

2.1 Field Reconnaissance

Field reconnaissance was conducted on Thursday, October 29, 2020 to observe traffic operations, geometric conditions, pedestrian accommodations, signing, pavement markings, local site access, and overall roadway and intersection conditions in the study area.

Project Site

The existing site at 1414 Massachusetts Avenue is approximately 208 acres which is occupied mostly by an un-development wooded area with the north portion adjacent to Massachusetts Avenue (Route 111) occupied by an office and research development, formerly the Cisco System Headquarters. The site is bounded by a wetland (Wolf Swamp) to the east, the Regency Hotel and I-495 to the west, Massachusetts Avenue (Route 111) to the north, and a solar farm to the south.

2.2 Study Area Roadways

The following roadways have been reviewed to examine the existing conditions.

Massachusetts Avenue (Route 111)

Massachusetts Avenue (Route 111) is classified by the Massachusetts Department of Transportation (MassDOT) as an Urban Minor Arterial and is under MassDOT jurisdiction. The roadway runs in the east-west direction from its eastern terminus at the Concord Rotary in Concord, MA to Route 110 in Harvard, MA where Route 111 turns north where it intersects with the New Hampshire state line. Within the project vicinity, Massachusetts Avenue (Route 111) is separated by a Double Yellow Center Line (DYCL); and to the east of Hill Road, the DYCL transitions to Broken Yellow Center Line (BYCL) where passing is allowed. The roadway has one lane in each direction with additional turn lane(s) at major intersections. The roadway widens to two lanes in each direction from the west of Swanson Road to the west of Adams Place for approximately 2,500 feet. The developments along Massachusetts Avenue (Route 111) are mixed in nature which include industrial, commercial, and residential land uses. Within the study area, there are no pedestrian or bicycle accommodations along Massachusetts Avenue (Route 111). The posted speed limit along Massachusetts Avenue (Route 111) westbound is 40 miles per hour (mph) east of Paddock Lane and 35 mph west of Paddock lane. The posted speed limit along Massachusetts Avenue (Route 111) eastbound is 45 mph west of Paddock lane and 40 mph east of Paddock Lane.

I-495 Northbound Ramp

The I-495 Northbound Ramp is classified by MassDOT as an Urban Minor Arterial and is under MassDOT jurisdiction; it provides main access between Boxborough and Boston, as well as the rest of the northern Massachusetts region. The I-495 ramp intersects with Massachusetts Avenue (Route 111) to form a four-leg signalized intersection. Pedestrian and bicycle access are prohibited on I-495.

I-495 Southbound Ramp

The I-495 Southbound Ramp is classified by MassDOT as an Urban Minor Arterial and is under MassDOT jurisdiction; it provides main access between Boxborough and the southern Massachusetts region. The I-495 Southbound Ramp intersects with Massachusetts Avenue (Route 111) to form a three-leg signalized intersection. Pedestrian and bicycle access are prohibited on I-495.



Hill Road

Hill Road is under Town of Boxborough jurisdiction and is classified by MassDOT as a local road. The roadway runs in the north-south direction from its southern terminus at Massachusetts Avenue (Route 111) to its northern terminus at Liberty Square Road. Hill Road is an unmarked two-way roadway with no pedestrian or bicycle accommodations. The main land use along Hill Road is residential and the posted speed limit is 30 mph.

Burroughs Road

Burroughs Road is under Town of Boxborough jurisdiction and is classified by MassDOT as a local road. The roadway runs in the general east-west direction, with both eastern and western terminus at Massachusetts Avenue (Route 111). In the project vicinity, Burroughs Road is oriented in the north-south direction. Within the study area, the land uses along Burroughs Road are commercial and wooded areas. Burroughs Road is an unmarked two-way roadway with no pedestrian or bicycle accommodations. The land use along Hill Road is residential and the posted speed limit is 30 mph.

Paddock Lane

Paddock Lane between Massachusetts Avenue (Route 111) and Cunningham Road is under Town of Boxborough jurisdiction and is classified by MassDOT as a local road. The remaining portion of Paddock Lane is a private road providing access to an apartment complex. South of Cunningham Road, Paddock Lane is separated by a planting median and is unmarked north of Cunningham Road. The land uses along Paddock Lane are residential. Sidewalk is present on the west side of the roadway south of Cunningham Road where it crosses over and continues along the east side of Paddock Lane. There is not a posted speed limit.

Adams Place

Adams Place is a private roadway classified by MassDOT as a local road. Adams Place is an unmarked two-way roadway providing access to the Boxboro Regency Hotel and serves as an ingress-only for 1414 Massachusetts Avenue (the project site). There is not a posted speed limit.

Site Driveway

The Site Driveway is a local private roadway providing one-way egress only, with the left lane for left turns only and the right lane for right turns only.


2.3 Study Intersections

To examine the existing conditions, following intersections were studied:

Massachusetts Avenue (Route 111) at I-495 Southbound Ramp

The I-495 Southbound Ramp intersects with Massachusetts Avenue (Route 111) to form a signalized T-intersection, with the I-495 Southbound Off-Ramp approaching from the south, and Massachusetts Avenue (Route 111) approaching from the east and west.

The I-495 Southbound Ramp permits two-way travel separated by a raised median. The I-495 Southbound Off-Ramp northbound approach consists of two left-turn lanes and one channelized right-turn lane. The I-495 Southbound On-Ramp has one southbound departure lane.



From the east, Massachusetts Avenue (Route 111) permits two-way travel separated by a DYCL. The Massachusetts Avenue (Route 111) westbound approach consists of one exclusive left-turn lane and two through lanes. Massachusetts Avenue (Route 111) has two eastbound departure lanes.

From the west, Massachusetts Avenue (Route 111) permits two-way travel separated by a DYCL. The Massachusetts Avenue (Route 111) eastbound approach consists of two through lanes and one exclusive right-turn lane. Massachusetts Avenue (Route 111) has two westbound departure lanes that widens to include an additional left-turn lane and a right-turn lane.

No pedestrian or bicycle accommodation are present at the intersection.

The traffic signal is the master intersection within the coordinated system along Massachusetts Avenue (Route 111). During the first phase, the Massachusetts Avenue (Route 111) eastbound and westbound movements operate concurrently, with the Massachusetts Avenue (Route 111) westbound left-turn movement prohibited. During the second phase, the Massachusetts Avenue (Route 111) westbound left-turn operates as a protected lag with concurrent westbound through movements. The I-495 Southbound Off-Ramp northbound left-turn operates as the third phase.

Massachusetts Avenue (Route 111) at I-495 Northbound Ramp

The I-495 Northbound Ramp intersects with Massachusetts Avenue (Route 111) and a private driveway to form a four-leg signalized intersection with I-495 Northbound Off-Ramp approaching from the north, the private driveway approaching from the south, and Massachusetts Avenue (Route 111) approaching from the east and west.

The I-495 Northbound Ramp permits two-way travel separated by a raised median. The I-495 Northbound Off-Ramp southbound approach consists of two left-turn lanes and one channelized right-turn lane. The I-495 Northbound On-Ramp has one northbound departure lane.

The private driveway is unmarked and permits two-way travel. The driveway northbound approach operates as a general lane and is controlled by the traffic signal.

From the east, Massachusetts Avenue (Route 111) permits two-way travel separated by a DYCL. The Massachusetts Avenue (Route 111) westbound approach consists of two through lanes and one exclusive right-turn lane. Massachusetts Avenue (Route 111) has two eastbound departure lanes that are reduced to one lane just west of Adams Place.

From the west, Massachusetts Avenue (Route 111) permits two-way travel separated by a DYCL. The Massachusetts Avenue (Route 111) eastbound approach consists of an exclusive left-turn lane and two through lanes. Massachusetts Avenue (Route 111) has two westbound departure lanes.

No pedestrian or bicycle accommodations are present at the intersection.

The traffic signal is coordinated with the intersection of Massachusetts Avenue (Route 111) at I-495 Southbound Ramp. During the first phase, the Massachusetts Avenue (Route 111) eastbound and westbound approaches operate concurrently, with the Massachusetts Avenue (Route 111) eastbound left-turn movement prohibited. During the second phase, the Massachusetts Avenue (Route 111) eastbound left-turn operates as a protected lag with concurrent westbound through movements. The I-495 Northbound Off-Ramp and the private driveway operate as split phasing. The driveway northbound phase would override the coordination when actuated.



Massachusetts Avenue (Route 111) at Adams Place and Gas Station Driveway

Massachusetts Avenue (Route 111) intersects with Adams Place and the Gas Station Driveway to form an unsignalized intersection with the Gas Station Driveway approaching from the north, Adams Place approaching from the south and Massachusetts Avenue (Route 111) approaching from the east and west.

From the north, the Gas Station Driveway permits two-way travel.

From the south, Adams Place is unmarked and permits two-way travel. The Adams Place northbound approach operates as a single lane for both left and right turns and is controlled by a stop sign.

From the east, Massachusetts Avenue (Route 111) is uncontrolled and permits two-way travel separated by a DYCL. Approaching and departing the intersection westbound, the roadway has one travel lane.

From the west, Massachusetts Avenue (Route 111) is uncontrolled and permits two-way travel separated by a DYCL. Eastbound approaching the intersection, the roadway narrows from two lanes to one. Massachusetts Avenue (Route 111) has two westbound departure lanes.

No pedestrian or bicycle accommodations are present at the intersection.

Massachusetts Avenue (Route 111) at Paddock Lane and Site Driveway

Massachusetts Avenue (Route 111) intersects with Paddock Lane and the Site Driveway to form a four-leg unsignalized intersection with Paddock Lane approaching from the north, Site Driveway approaching from the south, and Massachusetts Avenue (Route 111) approaching from the east and west.

From the north, Paddock Lane permits two-way travel separated by a planting median that transitions to gore lines as it approaches to the intersection. Southbound approaching the intersection, the roadway has one left-turn lane and one right-turn lane.

From the south, the Site Driveway provides one-way egress that consists of one left-turn lane and one right-turn lane.

From both the east and west, Massachusetts Avenue (Route 111) is uncontrolled and permits two-way travel with one lane in each direction separated by a DYCL.


No pedestrian or bicycle accommodations are present at the intersection.

Massachusetts Avenue (Route 111) at Hill Road and Burroughs Road

Massachusetts Avenue (Route 111) intersects with Hill Road and Burroughs Road to form a four-leg unsignalized intersection with Hill Road approaching from the north, Burroughs Road approaching from the south, and Massachusetts Avenue (Route 111) approaching from the east and west.

From the north, Hill Road is unmarked and permits two-way travel. The Hill Road southbound approach operates as one general lane and is controlled by a stop sign.

From the south, Burroughs Road is unmarked and permits two-way travel. The Burroughs Road northbound approach operates as one general lane and is controlled by a stop sign.



From both the east and west, Massachusetts Avenue (Route 111) is uncontrolled and permits two-way travel with one lane in each direction separated by a DYCL.

No pedestrian or bicycle accommodations are present at the intersection.

2.4 Public Transportation

Boxborough is a primary rural and residential community that lacks vast public transportation options. While there is no MBTA service within the project proximity, there is a Commuter Rail Fitchburg Line stop in Littleton located just off I-495 (via Exit 29B), approximately 4 miles north of the project site.

Boxborough is served by the Montachusett Regional Transit Authority (MART) that provides on-demand ride services for elderly, disabled, as well as the general public. The Town has stepped away from the CrossTown Connect Transportation Management Association (TMA) and rolled back to providing dispatch service for the elderly and disabled in house.



3 Existing Traffic Conditions

3.1 Traffic Count Data

Precision Data Industries, Inc. (PDI) of Framingham, Massachusetts was retained to collect traffic data within the study area, including both Automatic Traffic Recorder (ATR) counts and Turning Movement Counts (TMCs) on Wednesday, October 21, 2020.

Three ATR counts were collected for a continuous 48-hour period on Massachusetts Avenue (Route 111) from Tuesday, October 20, 2020 to Wednesday, October 21, 2020, and TMC counts were collected on Wednesday, October 21, 2020 for all study intersections, except for the intersection of Massachusetts Avenue (Route 111) at I-495 SB Ramp, which was collected on Thursday, October 22, 2020.

COVID-19 Traffic Data Adjustment

Since March 2020, the COVID-19 pandemic caused the State of Massachusetts to close most businesses, schools, retail stores, and restaurants, significantly altering daily traffic operations. Therefore, the traffic counts conducted by PDI in November 2014 for the same study location were obtained, and the average daily traffic volumes from various MassDOT count Stations (Station #4010 and #255181) were reviewed. As basis of comparison, the 2020 daily traffic volumes were found to be 7%-25% lower than Pre-COVID conditions, and the 2020 peak hour traffic volumes were 30%-50% lower than Pre-COVID conditions.

On May 2020, MassDOT published a new Engineering Directive E-20-005, to provide guidance on how to estimate existing and future traffic counts due to traffic counts taken after March 13, 2020 may undercount the baseline for which future year are based. As previously noted, the 2020 traffic volumes significantly underrepresent the normal traffic conditions. As such, the 2014 traffic volumes were utilized and adjusted to 2019 volumes following the procedures outlined in the MassDOT Guidance on Traffic Count Data (April 2020). **The adjusted 2019 traffic volumes will be referred to as the 2020 existing condition in this report.** The 2020 raw traffic counts are included in Appendix A and the 2014 raw traffic counts are included in Appendix B.

ATR Data

As described, the 48-hour ATR counts conducted by PDI were used on Massachusetts Avenue (Route 111) from Wednesday, November 19, 2014 to Thursday, November 20, 2014. According to the methodology presented on MassDOT guidance on traffic count data, the Weekly Seasonal Adjustment Factor (0.97) for November was applied to the 2014 volumes; then the Annual Growth Factor was applied to the volumes compounded for 5 years to obtain the 2019 volumes. The ATR counts are summarized in **Error! Reference source not found.** and the bi-directional average daily traffic (ADT) volumes are shown graphically in **Error! Reference source not found.** The MassDOT's 2014 Weekly Seasonal Factor and MassDOT Yearly Growth Rates 2014 – 2019 are included in Appendix C.

Table 1 – Automatic Traffic Recorder (ATR) Summary

ATR LOCATION	PERIOD	ADT ^a		PEAK HOUR TRAFFIC			K factor ^d
		VOLUMES (vpd) ^b	DIRECTIONAL DISTRIBUTION	PERIOD	VOLUMES (vph) ^c	DIRECTIONAL DISTRIBUTION	
Mass Avenue (Route 111) west of Hill Road	Weekday	9,190	48% EB/WB	Morning	830	51% EB	0.09
				Evening	905	51% WB	

^a Average Daily Traffic; ^b Vehicles per day; ^c Vehicles per hour; ^d Percent of daily traffic

TMC Data

PDI collected TMC data at all study intersections on Thursday November 20, 2014 which was recorded from 7:00 AM to 9:00 AM to capture the weekday morning peak hour volumes and from 4:00 PM to 6:00 PM to capture the weekday evening peak hour volumes. The counts include passenger vehicles, heavy vehicles, buses, single-unit trucks, bicycles, and pedestrians. According to the MassDOT guidance, the Annual Growth Factors for each year were applied to year 2019; however, no seasonal adjustment factor (0.97) was applied as the traffic volumes in November 2014 were 3% higher than annual average volumes.

Site Specific Traffic Volume Adjustments


Although the 2014 traffic volumes have been adjusted, further site-specific adjustments had to be applied as development has changed over the last six years. The following describes the development that has occurred since 2014:

Under the 2020 existing condition, the Jefferson at Beaver Brook apartment complex, currently known as Paddock Estates at Boxborough Apartments, was constructed and with full occupancy. As part of apartment project, Paddock Lane was constructed to align with the Site Driveway as it intersects Massachusetts Avenue (Route 111); and Cunningham Road was terminated and became a dead-end road and only allow pedestrian access to Paddock Lane. As such, the existing volumes from 2014 counts on Cunningham Road to and from Massachusetts Avenue (Route 111) have been detoured to Hill Road for the 2020 existing conditions. The Trip Generation and Distribution for Jefferson at Beaver Brook apartment complex is included in Appendix D.

Boxborough 01 - light industrial and office building, previously occupied by Cisco, was vacant under the 2020 existing conditions. However, as indicated in the 2014 Traffic Impact Study for the Jefferson at Beaver Brook conducted by VHB, at the time of the 2014 traffic counts, the Cisco office building was not at full occupancy. Therefore, the study included the Adams Place and Cisco Driveway 2007 peak hour counts collected by BSC Group at the time when Cisco's office has full occupancy, which are also shown in Appendix B.

As shown in Figure 3 - Site Access Diagram, Adams Place serves as both ingress and egress for Regency Hotel, but only as the ingress for Boxborough 01; the Boxborough 01 Site Driveway serves as egress. Therefore, it has been determined that the Adams Place northbound volumes represent volumes exiting the hotel, and the Site Driveway northbound volumes represent volumes exiting the Boxborough 01.

Given this background information, the following steps were performed to adjust volumes that would reflect 2020 existing traffic conditions:

- 
- Conduct trip generation for Boxboro Regency Hotel (143 rooms) using the *Institute of Transportation Engineers (ITE) Trip Generation Manual, 10th Edition*, only to estimate the number of vehicle trips entering the Hotel for both peak hours;
 - Deduct all trips from the 2014 volumes associated with Adams Place and the Site Driveway and add the ITE calculated trips associated to hotel back to the roadway network;
 - Adjust the resultant volumes from 2014 to 2019 with annual growth rates specified by MassDOT;
 - Add the trips associated to Paddock Lane Apartment complex to the roadway network to obtain the 2020 existing condition traffic volumes; and
 - Deduct the trips associated with the hotel from the 2007 Driveway counts to obtain the peak hour traffic volumes associated with Boxborough 01 office building, assuming the building will be fully occupied in the future. This assumption will also be reflected in the 2027 future no-build conditions.

The 2020 existing vehicular traffic volumes are shown in Figure 4, the 2020 existing pedestrians and bicycles volumes are shown in Figures 5.

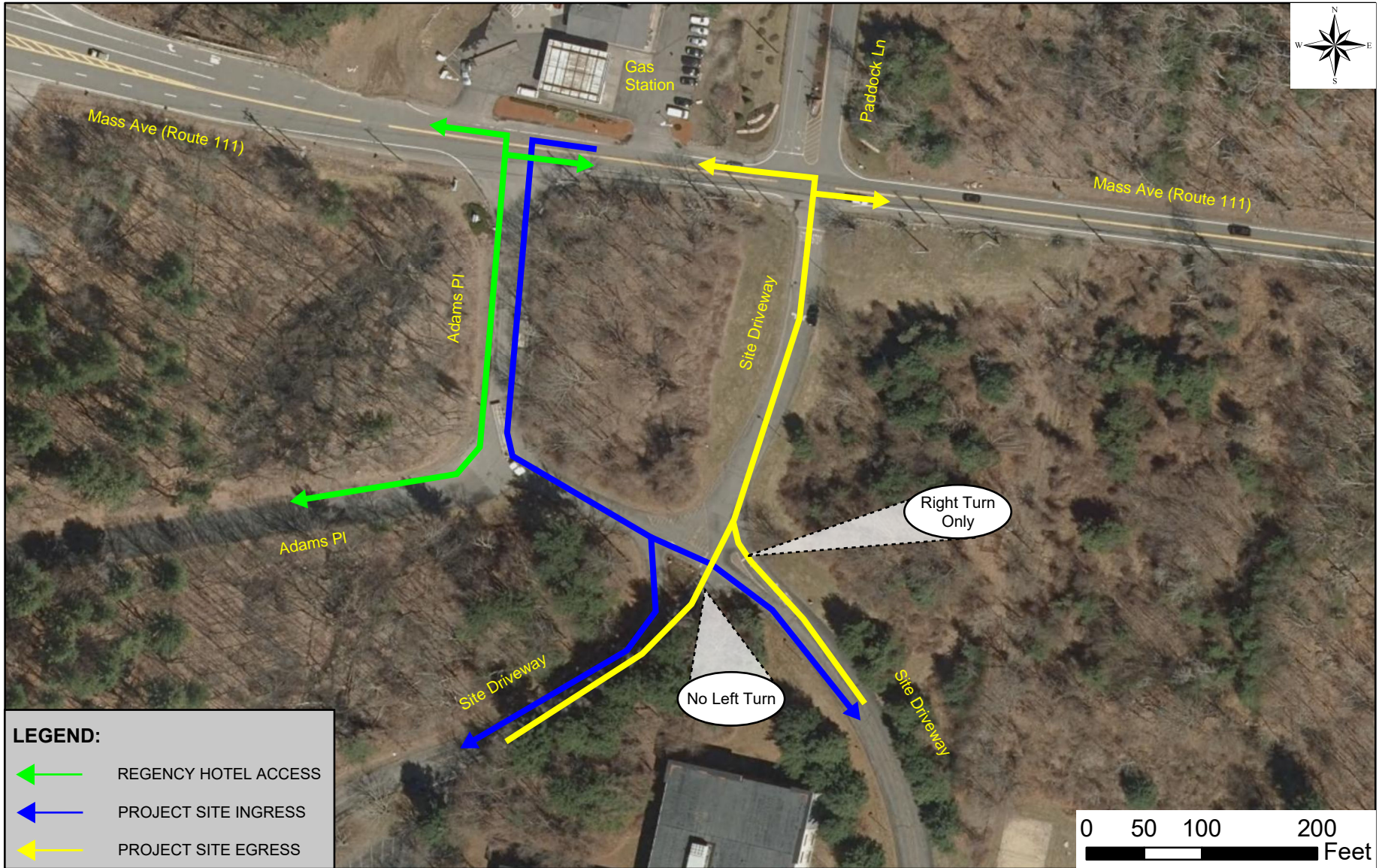


Figure 3: Site Access Diagram

1414 Massachusetts Avenue (Route 111)
 Traffic Impact Study
 Boxborough, MA

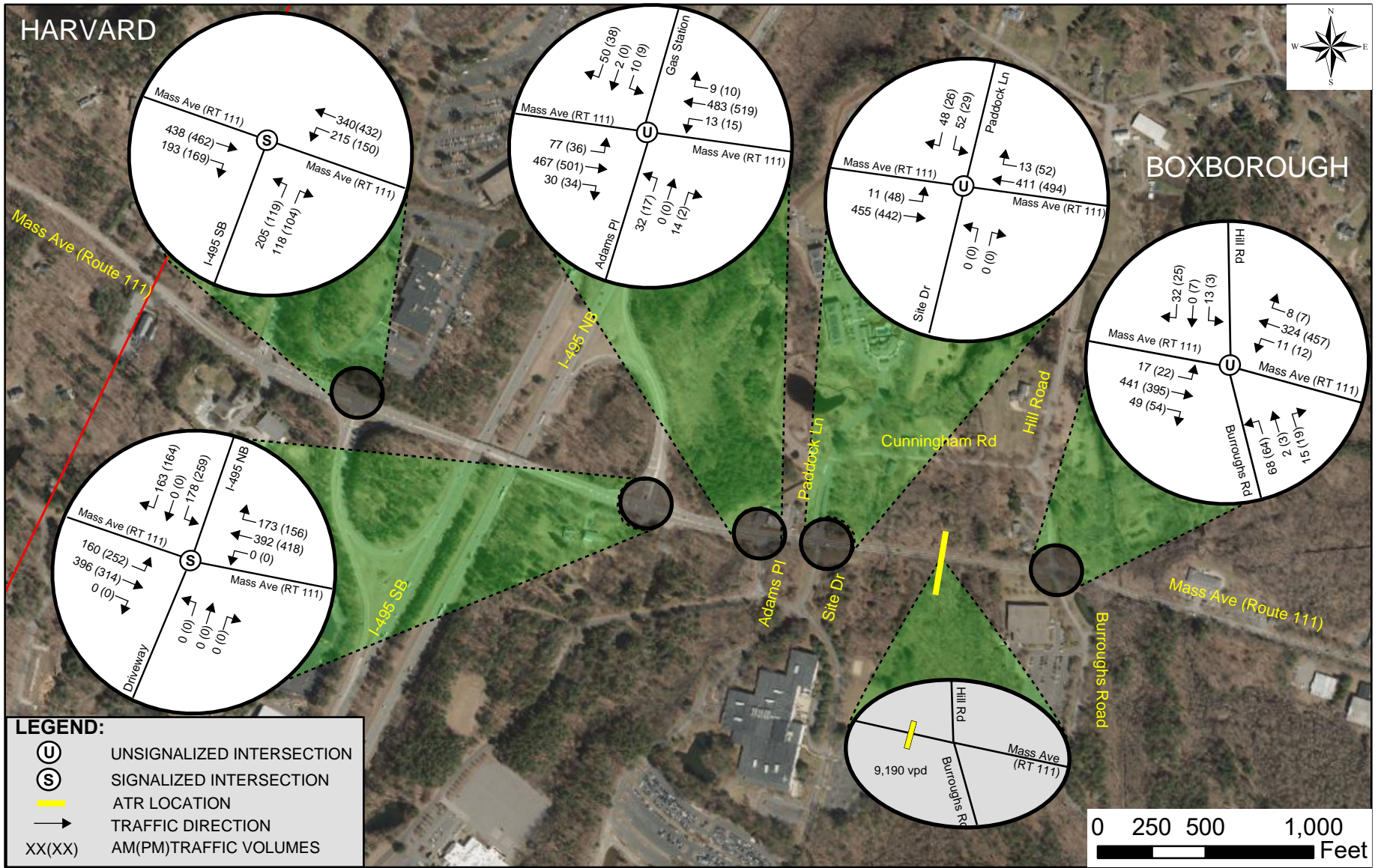


Figure 4: 2020 Existing Peak Hour Traffic Volumes
 1414 Massachusetts Avenue (Route 111)
 Traffic Impact Study
 Boxborough, MA

Data Source: MassGIS
 Nitsch Project #12995.3

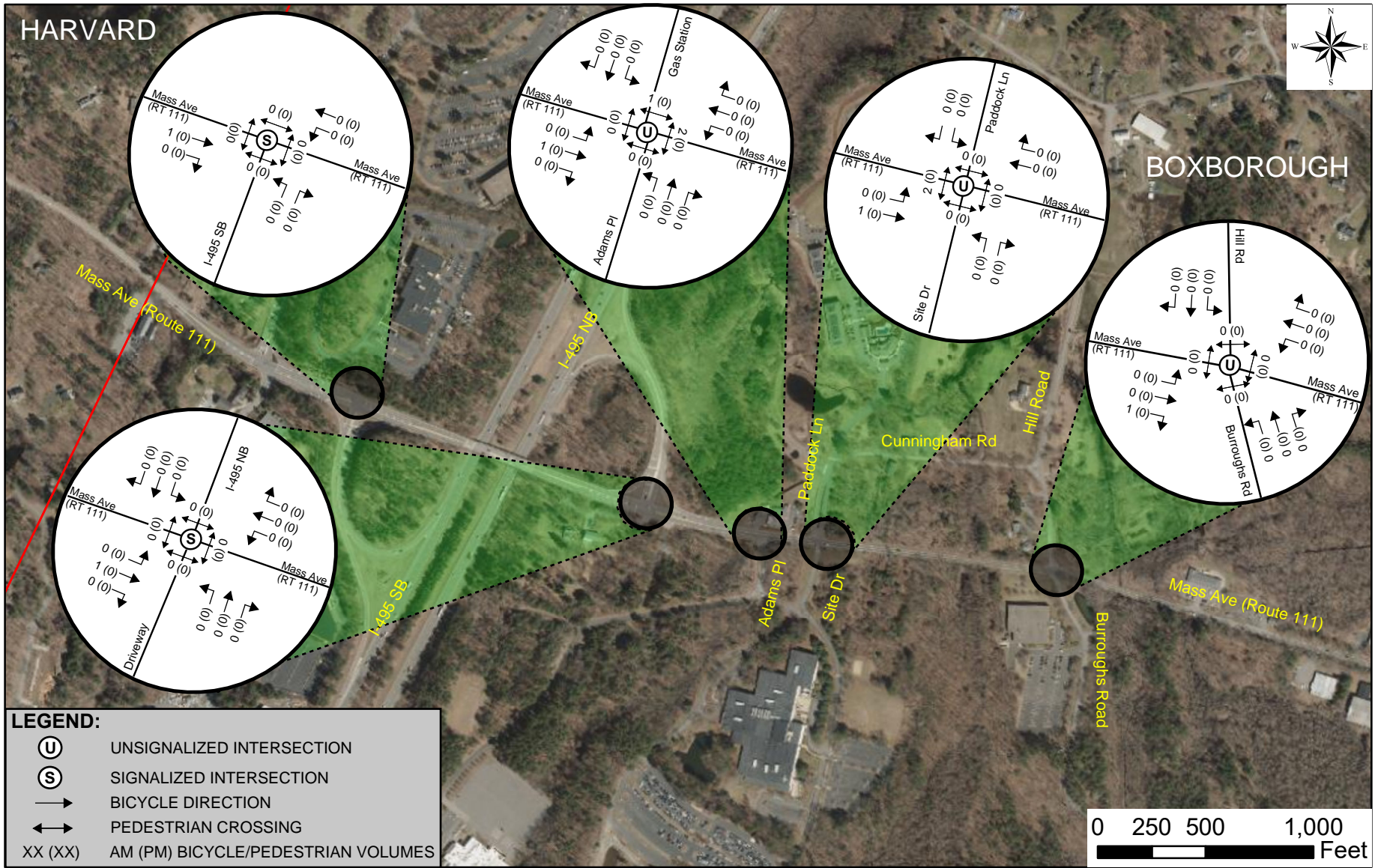


Figure 5: 2020 Existing Peak Hour Pedestrian and Bicycle Volumes

1414 Massachusetts Avenue (Route 111)

Traffic Impact Study

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Data Source: MassGIS
Nitsch Project #12995.3

3.2 Safety Analysis

Crash data from the MassDOT crash portal was reviewed for the five-year period from 2015 to 2019 for the study intersections and was analyzed to develop crash statistics and identify crash patterns. The crash rate worksheets for the analysis are provided in Appendix E. Table 2 summarizes crash statistics for the study intersections, including the severity and manner of collision.

Table 2 – Crash Statistics

Intersections	Mass Ave at I-495 Southbound Ramp	Mass Ave at I-495 Northbound Ramp	Mass Ave at Adams Place	Mass Ave at Paddock Lane and Site Driveway	Mass Ave at Hill Road and Burroughs Road
Total Crashes By Year					
2015	2	0	3	1	4
2016	2	0	5	0	1
2017	2	2	2	1	4
2018	1	0	2	0	2
2019	0	0	4	2	3
Total (5 Years)	7	2	16	4	14
Intersection Crash Rate					
Calculated ^a	0.23	0.06	0.67	0.12	0.65
Average, District 3 ^{a,c}	0.89	0.89	0.61	0.61	0.61
Average, Statewide ^{a,c}	0.78	0.78	0.57	0.57	0.57
Severity of Crash					
No Injury	5	1	13	2	14
Injury	2	1	3	2	0
Fatality	0	0	0	0	0
Manner of Collision					
Angle	2	0	2	1	0
Rear-End	4	2	4	1	5
Rear-Rear	0	0	3	0	0
Head-On	0	0	0	0	0
Sideswipe	0	0	2	0	1
Single Vehicle	1	0	5	2	8
Other	0	0	0	0	0
Involving Cyclists or Pedestrians					
Cyclist-Involved	0	0	0	0	0
Pedestrian-Involved	0	0	0	0	0
Percent Occurring During					
Peak Hours (7-9 AM, 4-6 PM)	71%	100%	19%	25%	43%
Adverse Weather/Roadway Conditions ^d	29%	50%	25%	75%	36%
^a Crashes per Million Entering Vehicles (MEV)					
^b MassDOT's average crash rates for intersections are based on the latest information available as of June 2018					
^c Rain, snow, sleet/hail/freezing rain/freezing drizzle, blowing sand/snow; Wet, icy, or snowy road surface					



Crash rates for an intersection are expressed by the number of crashes per million entering vehicles (MEV). Based on the full set of crash database entries as queried in June 2018, MassDOT reports the average Statewide crash rate is 0.78 per MEV for signalized intersections and 0.57 for unsignalized intersections. For District 3, which includes the Town of Boxborough, the crash rate is 0.89 and 0.61 per MEV for signalized and unsignalized intersections, respectively. The crash rates were calculated for each of the study intersections and it was identified that two unsignalized intersections have a crash rate above the Statewide and district average.

For the intersection of Massachusetts Avenue (Route 111) and Adams Place, a total of 16 crashes were reported from 2015 to 2019, equating to an average of 3.2 crashes per year. Three crashes resulted in injuries. 19% of the crashes occurred during peak hours, and 35% occurred under adverse weather or road surface conditions. It is noted that many crashes including rear-end, rear-rear, and sideswipes crashes may be related to vehicles queued and or parked illegally on the shoulder due to overflow traffic for the Dunkin's located within the Gulf gas station.

For the intersection of Massachusetts Avenue (Route 111) at Hill Road and Burroughs Road, a total of 14 crashes were reported with no injury. 43% of the crashes occurred during peak hours, and 36% occurred under adverse weather or road surface conditions. 57% of the crashes were single vehicle crashes, with either fixed roadway obstructions such as stone walls and utility poles or with wild animals.

3.3 Sight Distance

Stopping Sight Distance (SSD) is the length of the roadway ahead that is visible to the driver and should be long enough to enable a vehicle traveling at or near the design speed to stop before reaching a stationary object in its path. Stopping sight distance is the sum of the distance traversed by the vehicle from the instant the driver sights an object necessitating a stop to the instant the brakes are applied and the distance needed to stop the vehicle from the instant brake application begins.

Intersection Sight Distance (ISD) is the length of the leg of the departure sight triangle along the major road in both directions for a vehicle stopped on the minor road waiting to depart. The critical departure sight triangles for both the Adams Place and the Site Driveway are for traffic approaching from either the left or right for left turns from Adams Place and the Site Driveway onto Massachusetts Avenue (Route 111). The SSD and ISD values associated with a given design speed are shown in Table 3.

Table 3 – Sight Distance Criteria

DESIGN SPEED (MPH)	DESIGN STOPPING SIGHT DISTANCE VALUE ¹ (FT)	RECOMMENDED INTERSECTION SIGHT DISTANCE VALUE ² (FT)
15	80	170
20	115	225
25	155	280
30	200	335
35	250	390
40	305	445
45	360	500
50	425	555
55	495	610
60	570	665
65	645	720
70	730	775
75	820	830
80	910	885

Source: A Policy on Geometric Design of Highways and Streets, AASHTO, Washington DC (2011)


¹Design value based on a grade of less than 3%, a brake reaction distance predicted on a time of 2.5 seconds and a deceleration rate of 11.2 ft/s²

²Recommended value based on Case B1 - a stopped passenger car to turn left onto a two-lane highway with no median and grades 3% or less

The posted speed limit and the 85th percentile speed for Massachusetts Avenue (Route 111) approaching eastbound is 45 MPH and 42 MPH, respectively. The posted speed limit for Massachusetts Avenue (Route 111) approaching westbound is 40 MPH east of Paddock Lane and 35 MPH west of Paddock Lane; and the 85th percentile speed on Massachusetts Avenue (Route 111) approaching westbound is 41 MPH. To be conservative, 45 MPH was used to calculate the minimum sight distance for the eastbound and westbound approaches. For both streets, sight distance was measured at approximately 10 feet from the edge of pavement based on observed driving behavior. Table 4 summarizes the sight distance evaluation.

Table 4 – Sight Distance Evaluation

Intersecting Street	Stopping Sight Distance (SSD)			Intersection Sight Distance (ISD)		
	Traveling	Calculated	Measured	Looking	Calculated	Measured
Adams Pl at Mass Avenue (Route 111)	EB	360'	> 500'	Right	500'	500'
	WB	360'	> 500'	Left	500'	>500'
Site Driveway at Mass Avenue (Route 111)	EB	360	> 500'	Right	500'	500'
	WB	360'	> 500'	Left	500'	>500'



As shown in Table 4, SSD is adequate for both the eastbound and westbound traffic approaching the two intersections. However, the series of utility poles along the south side of Massachusetts Avenue (Route 111) have the potential to interfere the driver's view as they approach the Site Driveway, causing an unsafe condition.

Looking to the left on Massachusetts Avenue (Route 111) from Adams Place, the sightline extends beyond the Route 111 bridge over I-495, which is approximately 1,400 feet. Looking to the right from Adams Place, the sightline is limited to approximately 500 feet due to the vertical curvature on Massachusetts Avenue (Route 111) east of Adams Place . Looking to the left from the Site Driveway, the sightline extends for approximately 850 feet. Looking to the right from the Site Driveway, the clear sightline is limited to approximately 500 feet due to the obstruction from the utility poles and trees.

The potential sightline interference by utility poles to the Site Driveway was taken into consideration for future mitigation, which involves installing traffic signal at the intersection of Massachusetts Avenue (Route 111) at Paddock Lane and Site Driveway. This is further described in Section 7.2.

4 Future No-Build Traffic Conditions

To understand the potential impacts of the proposed site, the 2020 existing traffic volumes were used as the baseline for projecting traffic volumes to the 2027 future condition, representing a seven-year horizon. To determine the 2027 future traffic volumes, the following steps were taken:

- Project existing 2020 traffic volumes seven years into the future to 2027 using an annual background traffic growth rate;
- Add traffic volumes associated with any planned developments that may impact the study area; and
- Include any planned roadway improvements that may affect traffic volumes.

4.1 Background Growth

MassDOT records traffic volumes at various stations throughout the Commonwealth over multiple years to identify regional shifts in traffic. The count stations near the study area were used to determine a traffic volume trend. There is one station with 3 years of volume data available (from 2014 to 2017), located on I-495 Northbound just upstream of Exit 28. Table 5 depicts the traffic volumes and the calculated growth rate for a 3-year period.

Table 5 – Background Annual Traffic Growth Rate

COUNT LOCATION	AADT ¹ , YEAR		3-YEAR GROWTH RATE
	2014	2017	
MassDOT Count Station 4010	88,093	91,219	2011 - 2017 1.17%
<small>¹Annual Average Daily Traffic (AADT) is the average traffic volume for the entire given calendar year (Source: Massachusetts Department of Transportation (MassDOT) Data Management System)</small>			

Table 5 indicates a background traffic growth rate on I-495 of 1.17% per year between 2014 and 2017. As a basis of comparison, previous projects in the Town of Boxborough were researched and it was found that a 1.0% growth rate was adopted. Based on these results, a rate of 1.0% per year was used to represent the regional background traffic growth.

4.2 Additional Development

Nitsch Identified the following planned developments that would have traffic impact to the study intersections.

Enclave at Boxborough

The project is located on along the south side of Massachusetts Avenue (Route 111) west of the intersection of Stow Road and Middle Road in Boxborough, MA. The project proposes to construct 50 age-restricted townhouse units. The project is anticipated to generate 24 vehicle trips during the weekday morning peak hour, and 28 vehicle trips during the weekday evening peak hour. The Trip Generation and Distribution for the Enclave at Boxborough project are included in Appendix D.



Boxborough 01

As discussed in Section 3.1, The Boxborough 01, previously occupied by Cisco, located just north of the project site is currently vacant, and therefore will be included as part of the additional development assuming the office building will be occupied with similar a land use as Cisco. Based on the methodology described in Section 3.1, the project is expected to generate 162 vehicle trips in the weekday morning peak hour, and 171 vehicle trips in the weekday evening peak hour.

4.3 Planned Area Roadway Improvements

Boxborough - Bridge Replacement, B-18-002. Route 111 over I-495

The project proposes to replace the existing deficient bridge with an integral abutment two-span continuous structure with roadway widening to accommodate sidewalk and bicycles, and to increase the existing vertical clearance from 15 feet to 16.5 feet. The project is in its preliminary design phase and is expected to only have short-term traffic impact during construction.

4.4 2027 No-Build Traffic Volumes

As discussed in Section 4.1, a background traffic growth rate of 1.0% per year over the seven-year period was used to forecast future traffic. The 2027 future year traffic volumes were calculated by projecting the 2020 traffic volumes and applying the 1.0% annual traffic increase over the seven-year assessment period, then adding the trips generated by the Regency at Boxborough as well as Boxborough 01. The resulting 2027 future no-build peak hour traffic volumes are presented in Figure 6.

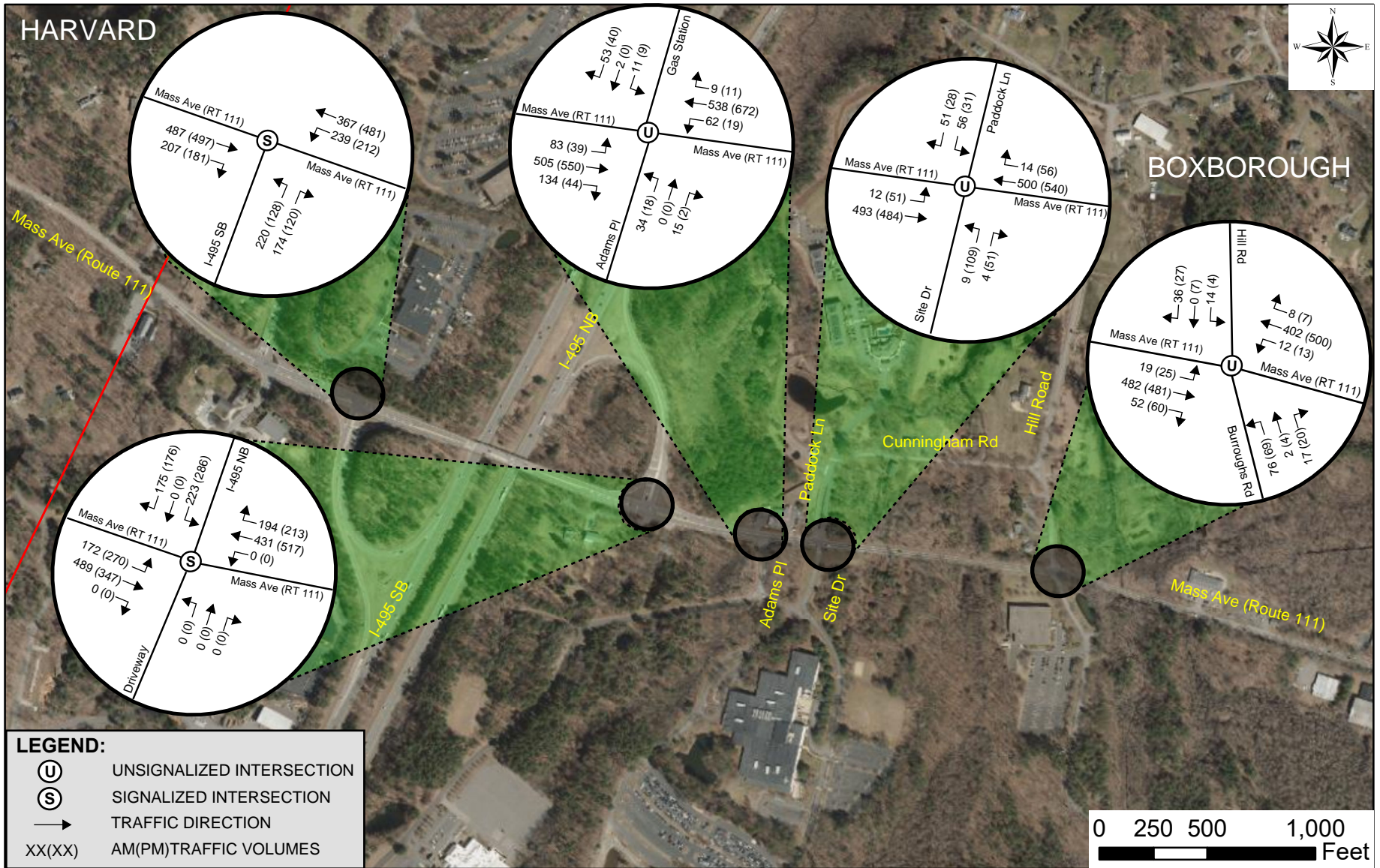


Figure 6: 2027 Future No-Build Peak Hour Traffic Volumes

1414 Massachusetts Avenue (Route 111)

Traffic Impact Study

Boxborough, MA



5 Future Build Conditions

5.1 Proposed Project

The project located at 1414 Massachusetts Avenue proposes to construct an industrial park consisting of four single-story light industrial buildings that would have the functional capacity to accommodate varies light industrial use such as business office, light manufacturing and distribution, and wholesale operation. The four proposed buildings will comprise a total of 581,250 square feet of gross floor area.

Vehicle Access, Egress, and Circulation

The project proposes to construct a new access driveway to connect the proposed industrial park to solar farms to the south, the existing surface parking, and the access driveway to the north. The site access will remain as existing shown in Figure 3; Adams Place will continue to serve as the ingress-only point to the site, and the existing site driveway will continue to serve as the egress-only to Massachusetts Avenue (Route 111).

Parking

The existing building at Boxborough 01 is facilitated by 978 striped parking spaces. As a result of the new access driveway connecting the proposed development to the existing surface parking lot, 90 parking spaces will be removed. The project proposes to construct an additional 512 parking spaces and 118 loading docks.

5.2 2027 Build Volumes

5.2.1 Proposed Trip Generation

The *Institute of Transportation Engineers Trip Generation Manual, 10th Edition*¹ was used to estimate the trips generated by the proposed development.

As the project proposes to develop diversified light industrial facilities that would accommodate varies use, Land Use Code (LUC) 130 – “Industrial Park” was used for the proposed project. ITE characterizes “Industrial Park” by a mix of manufacturing, service, and warehouse facilities with a wide variation in the proportion of each type of use. While the subject parcel is not zoned for warehouse uses, this LUC best represents the proposed development from current traffic engineering standards. “Thousand-square-foot” (KSF) was used for the independent variable to generate the number of vehicle trips. The project is expected to generate 233 vehicles trips (188 entering / 45 exiting) during the weekday morning peak hour and 233 vehicle trips (49 entering / 184 exiting) during the weekday evening peak hour.

¹ *Trip Generation*, Institute of Transportation Engineers, 10th Edition, 2016, Washington, D.C.

The project is expected to generate a relatively high number of truck trips related to manufacturing and distributing. Therefore, the *ITE Trip Generation 10th Edition Supplement*² was used to estimate the truck trips generated by the facility. It is expected that the project would generate a total of 332 weekday daily truck trips with 23 truck trips occurring during both the weekday morning and evening peak hours. Table 6 represents weekday and peak hour trip generation.

Table 6 – Vehicle Trip Generation

Period	Direction	Future Employee Vehicle Trips	Future Truck Trips	Total Generated Trips
Daily	Enter	1007	166	1173
	Exit	1007	166	1173
	Total	2014	332	2346
AM	Enter	178	10	188
	Exit	32	13	45
	Total	210	23	233
PM	Enter	40	9	49
	Exit	170	14	184
	Total	210	23	233

5.2.2 Transportation Mode Share

Although, there will be potential commuter rail users, as the study area lacks last mile public transportation options as well as bicycle and pedestrian accommodations, only vehicle trips are considered for this analysis.

5.2.3 Trip Distribution

Residence to Workplace data from the *2011 – 2015 5-Year American Community Survey (ACS) Commuting Flows*³, along with Google Map suggested routes were used to develop trip distribution patterns. Figure 6 illustrate the trip distribution percentage in the study area network. The detailed route distribution analysis is included in Appendix F.

² *Trip Generation*, Institute of Transportation Engineers, 10th Edition Supplement, 2020, Washington, DC

³ 2011-2015 5-Year ACS Commuting Flows, 2015, United States Census Bureau



5.2.4 Trip Assignment

To distribute the site generated vehicular trips throughout the roadway network, the vehicular trips in Table 5 were multiplied by the trip distribution percentages presented in Figure 7 to assign the additional intersection turning movement volumes. The resultant new trip assignment volumes are shown on Figure 8 for both the weekday morning and weekday evening peak hours.

The trip assignment volumes from Figure 8 were added to 2027 No-Build conditions traffic volumes from Figure 6 to yield the 2027 Build conditions peak-hour traffic volumes, which are shown on Figure 9.

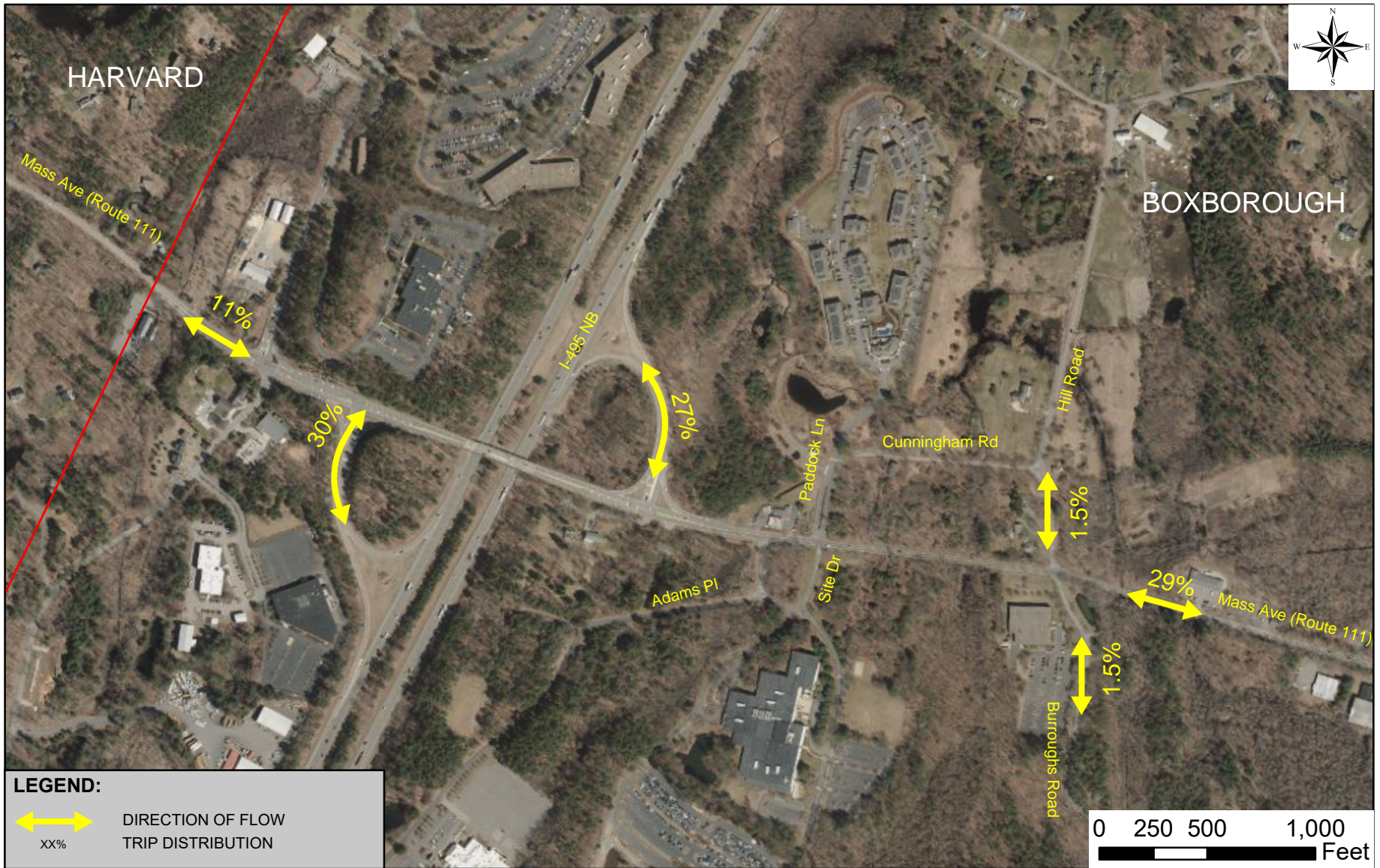


Figure 7: Trip Distribution

1414 Massachusetts Avenue (Route 111)
 Traffic Impact Study
 Boxborough, MA

Data Source: MassGIS
 Nitsch Project #12995.3



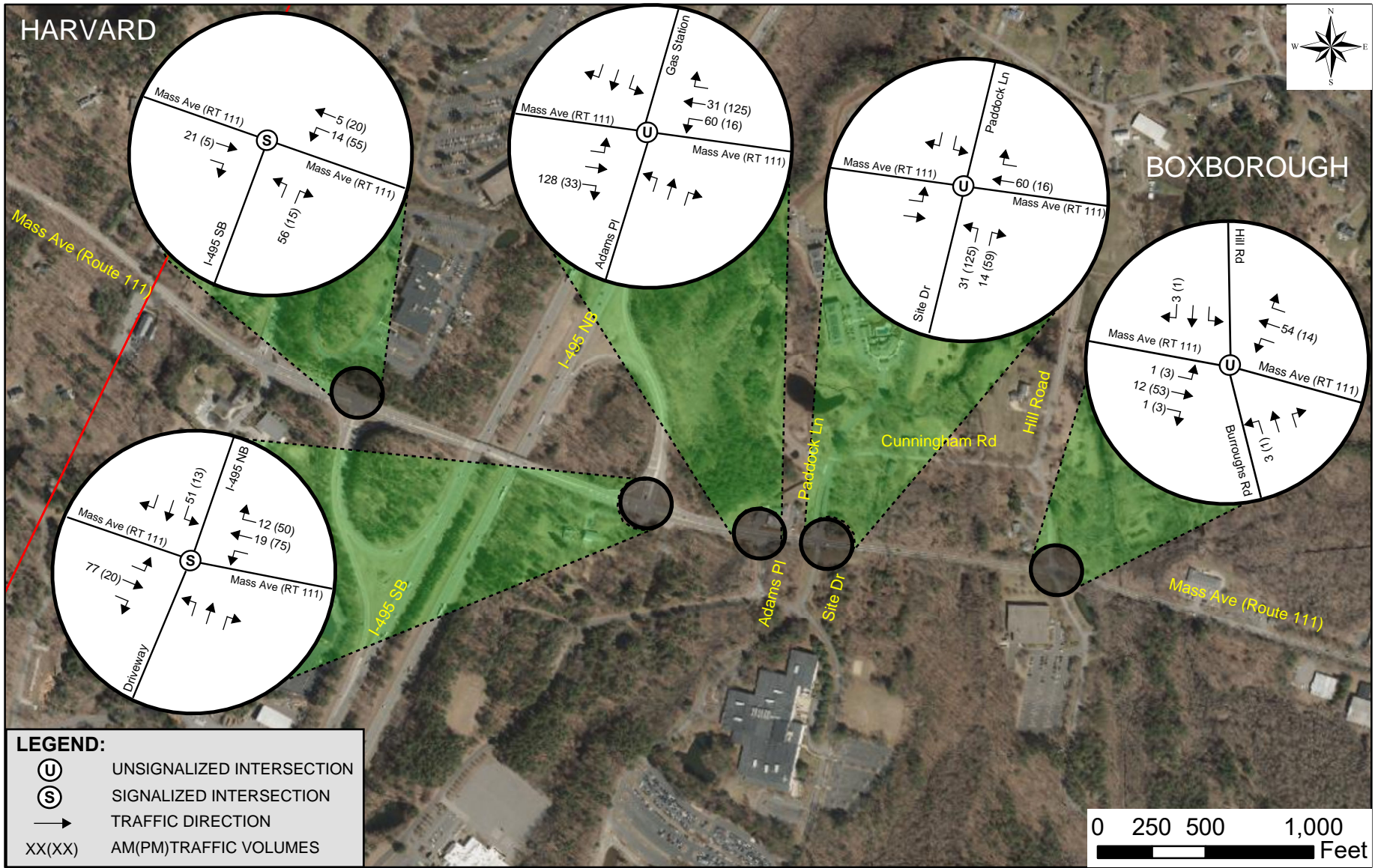


Figure 8: Trip Assignment
 1414 Massachusetts Avenue (Route 111)
 Traffic Impact Study
 Boxborough, MA

Data Source: MassGIS
 Nitsch Project #12995.3

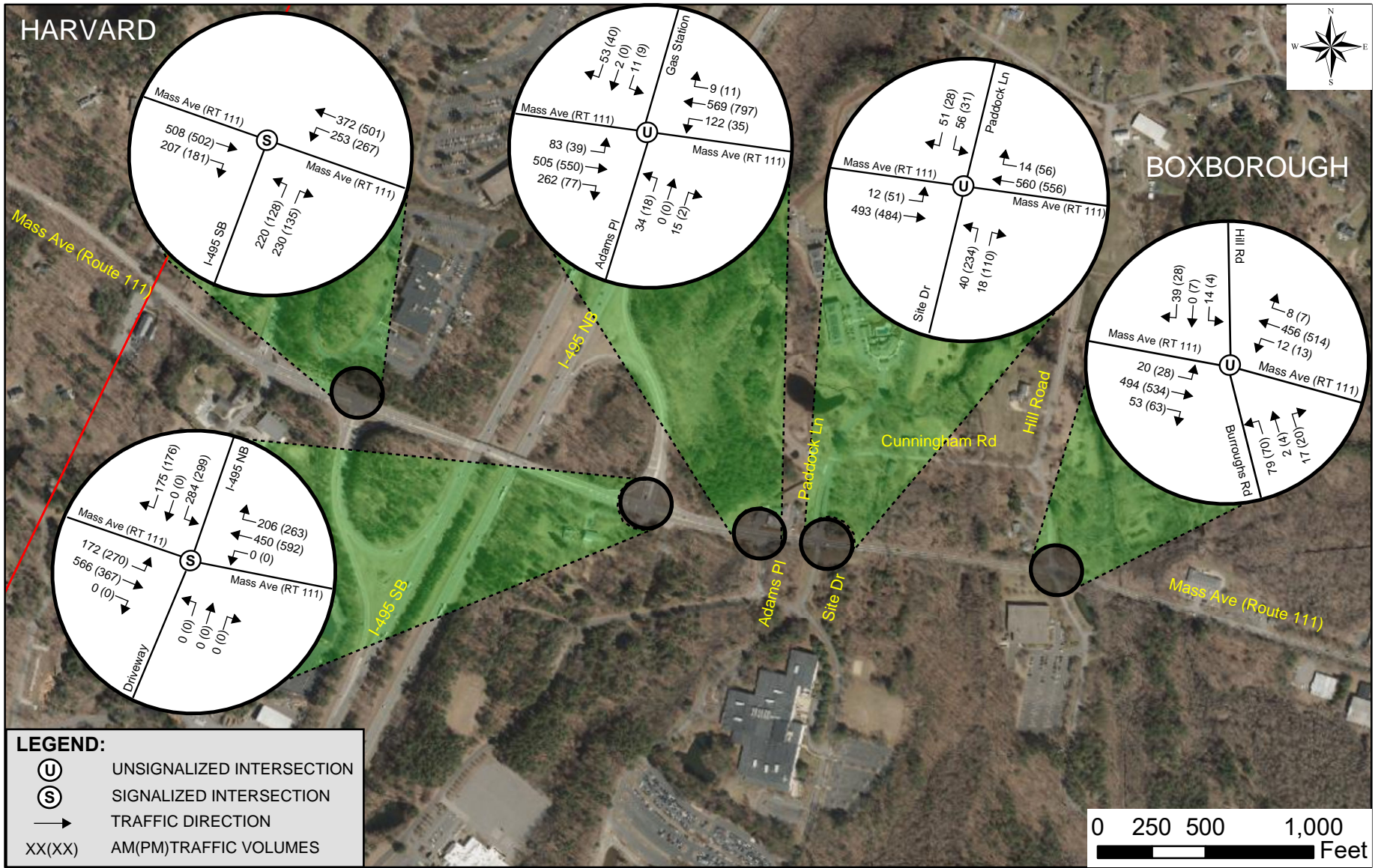


Figure 9: 2027 Future Build Traffic Volumes

1414 Massachusetts Avenue (Route 111)

Traffic Impact Study

Boxborough, MA

6 Traffic Analysis

6.1 Evaluation Criteria

Traffic operations at intersections are evaluated using the performance measures of average vehicular delay, level of service (LOS), volume-to-capacity (v/c) ratio, and average and 95th percentile queue lengths.

LOS is a qualitative measure that describes operating conditions through letter designations, from A to F. It is defined for intersections in terms of average control delay per vehicle. LOS A indicates the most favorable condition, with minimum traffic delay. LOS F represents the worst condition where there is significant traffic delay. LOS D or better is typically considered desirable for peak-hour operation in urban and suburban settings. The delay designations for each LOS level differ slightly between signalized and unsignalized intersections due to driver expectations and behavior. Table 7 summarizes the LOS criteria for intersections as used in this analysis.

Table 7 – Intersection Level of Service Criteria

Level of Service	Average Control Delay (sec/veh)	
	Signalized	Unsignalized
A	0-10	0-10
B	>10-20	>10-15
C	>20-35	>15-25
D	>35-55	>25-35
E	>55-80	>35-50
F	>80	>50

Source: HCM 2000

For signalized intersections, LOS is reported by lane group, by approach, and for the entire intersection. For unsignalized intersections, the analysis assumes that the traffic on the mainline is not affected by traffic on the side street. As such, an unsignalized intersection's LOS is generally reported for left-turns on the mainline and all side street movements, and an overall intersection LOS is not determined.

The v/c ratio is a measure of congestion at an intersection approach. The capacity of a facility is the maximum hourly rate at which persons or vehicles reasonably can be expected to traverse a point or a uniform section of a lane or roadway under prevailing roadway, traffic, and control conditions. A v/c ratio below one indicates that the intersection approach has adequate capacity to serve the arriving traffic demand. A v/c ratio that approaches or exceeds 1.0 indicates traffic congestion or poor operating conditions. In that situation, vehicles arrive faster than they can be served, so queue lengths can theoretically grow indefinitely, which is the unstable condition.

Since arrival volumes fluctuate throughout the peak hour, queue lengths vary. The average (50th percentile) queue length represents the maximum back of queue on a typical cycle for a signalized intersection. Average queue lengths are not reported for unsignalized intersections. The 95th percentile queue, reported for both signalized and unsignalized intersections, occurs with 95th percentile traffic volumes, and its length commonly denotes the farthest extent of the vehicle queue.



6.2 Capacity Analyses

Capacity analyses were performed for the study intersections under 2020 Existing conditions, 2027 No-Build conditions, and 2027 Build conditions during the weekday morning and evening peak hours using *Trafficware's Synchro 11 software*. Synchro uses, in part, the traffic operational analysis methodology of the Transportation Research Board's *Highway Capacity Manual (HCM)*⁴. The results of the capacity analyses were generated using Synchro's Percentile Delay Method for delay, v/c ratio, and queue lengths, supported by HCM 2000 methodology for unsignalized intersection analysis. The Synchro output sheets for the capacity analyses are included in Appendix I.

6.2.1 2020 Existing Conditions

The first analysis evaluated traffic operations with 2020 existing traffic volumes under existing geometric conditions and signal timing/phasing. The peak hour factors (PHFs) and heavy vehicle percentages were derived from the 2014 TMC data. The PHFs were applied on an approach-by-approach basis, and the heavy vehicle percentages were applied by lane group. Table 8 summarizes the capacity analysis results for the 2020 existing conditions.

Under the 2020 existing conditions, the intersection of Massachusetts Avenue (Route 111) and I-495 SB Ramp operates well below capacity with overall intersection LOS B in both the morning and evening peak hours.

The intersection of Massachusetts Avenue (Route 111) and I-495 NB Ramp operates at LOS B during the morning peak hour and LOS C during the evening peak hour.

At the unsignalized intersection of Massachusetts Avenue (Route 111) at Adams Place and the Gas Station Driveway, the stop-controlled Adams Place northbound approach operates at LOS E during both the morning and evening peak hours, and the Gas Station Driveway southbound approach operates at LOS C during both peak hours.

At the unsignalized intersection of Massachusetts Avenue (Route 111) at Paddock Lane and the Site Driveway, the stop-controlled Paddock Lane southbound approach operates at LOS C and LOS D during the morning peak hour and evening peak hour, respectively. Under the existing condition, the Boxborough 01 office is currently vacant, and therefore the operation for the Site Driveway is not reported.

At the unsignalized intersection of Massachusetts Avenue (Route 111) at Hill Road and Burroughs Road, the stop-controlled Burroughs Road northbound approach operates at LOS D and E during the morning and evening peak hours, respectively. The Hill Road southbound approach operates at LOS B and C during the weekday morning and evening peak hours, respectively.

⁴ *Highway Capacity Manual 2000 (HCM 2000)*, Transportation Research Board, Washington, D.C., 2000.

Table 8 – Level of Service Summary – 2020 Existing Conditions

LOCATION	DIRECTION / MOVEMENT ¹	WEEKDAY MORNING PEAK HOUR					WEEKDAY EVENING PEAK HOUR				
		V/C ²	DELAY ³	LOS ⁴	50th Q ⁵	95th Q ⁶	V/C ²	DELAY ³	LOS ⁴	50th Q ⁵	95th Q ⁶
Massachusetts Avenue (Route 111) at I-495 SB Off-Ramp (Signalized)	Mass Avenue EB-T	0.30	15.8	B	87	128	0.35	20.2	C	116	155
	Mass Avenue EB-R	0.25	3.0	A	0	36	0.25	3.6	A	0	37
	Mass Avenue WB-L	0.66	32.8	C	141	211	0.34	16.4	B	106	156
	Mass Avenue WB-T	0.16	1.1	A	9	10	0.19	0.8	A	9	7
	I-495 SB Off-Ramp NB-L	0.52	40.5	D	63	95	0.37	44.8	D	41	69
	I-495 SB Off-Ramp NB-R	0.42	10.9	B	0	48	0.43	13.2	B	0	49
	Overall	0.66	16.1	B	-	-	0.43	13.1	B	-	-
Massachusetts Avenue (Route 111) at I-495 NB Ramp (Signalized)	Mass Avenue EB-L	0.37	19.0	B	87	147	0.41	23.5	C	170	263
	Mass Avenue EB-T	0.18	0.7	A	6	5	0.13	0.6	A	4	3
	Mass Avenue WB-T	0.29	19.4	B	81	125	0.47	29.9	C	141	168
	Mass Avenue WB-R	0.25	4.1	A	0	41	0.31	5.4	A	0	34
	I-495 NB Off-Ramp SB-L	0.55	41.4	D	64	81	0.72	51.2	D	104	127
	I-495 NB Off-Ramp NB-R	0.55	11.1	B	0	34	0.54	11.1	B	0	38
	Overall	0.55	14.6	B	-	-	0.72	22.6	C	-	-
Massachusetts Avenue (Route 111) at Adams Place and Gas Station (Unsignalized)	Mass Avenue EB-LTR	0.08	2.0	A	-	6	0.04	1.1	A	-	3
	Mass Avenue WB-LTR	0.01	0.4	A	-	1	0.02	0.4	A	-	1
	Adams Pl NB-LTR	0.37	42.0	E	-	39	0.26	45.0	E	-	24
	Gas Station Dr SB-LTR	0.20	17.2	C	-	19	0.18	18.9	C	-	17
Massachusetts Avenue (Route 111) at Paddock Lane and Site Driveway (Unsignalized)	Mass Avenue EB-LT	0.01	0.3	A	-	1	0.05	1.4	A	-	4
	Mass Avenue WB-TR	0.26	0.0	A	-	0	0.35	0.0	A	-	0
	Site Dr NB-L	-	-	-	-	-	-	-	-	-	-
	Site Dr NB-R	-	-	-	-	-	-	-	-	-	-
	Paddock Ln SB-L	0.23	24.1	C	-	22	0.18	30.1	D	-	16
	Paddock Ln SB-R	0.08	11.3	B	-	7	0.05	12.2	B	-	4
Massachusetts Avenue (Route 111) at Hill Road and Burroughs Road (Unsignalized)	Mass Avenue EB-LTR	0.01	0.4	A	-	1	0.02	0.6	A	-	2
	Mass Avenue WB-LTR	0.01	0.4	A	-	1	0.01	0.4	A	-	1
	Burroughs Road NB-LTR	0.40	28.9	D	-	46	0.62	48.0	E	-	91
	Hill Road SB-LTR	0.15	14.8	B	-	13	0.12	16.4	C	-	11

¹NB = Northbound, SB = Southbound, EB = Eastbound, WB = Westbound; L = Left-turn, T=Through movement, R = Right-turn;

² Volume to Capacity Ratio;

³ Vehicle Delay, measured in seconds;

⁴ Level Of Service;

⁵ 50th Percentile Queue (in feet);

⁶ 95th Percentile Queue (in feet) based upon 25 feet per vehicle;

~ = 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;

m = Volume for 95th percentile queue is metered by upstream signal



6.2.2 2027 No-Build Conditions

Under future no-build conditions, the lane geometry, traffic control, and signal timing parameters were maintained from the existing conditions. For all intersections, the future volumes calculated and described in Section 4.4 (Figure 6) were used with the same heavy vehicle percentages as the existing condition. PHFs were set to the default future-condition value of 0.92. Table 9 summarizes the analysis results for 2027 no-build conditions.

Under the 2027 no-build conditions, the two signalized intersections are expected to operate at similar conditions as compared to the existing condition.

At the stop-controlled intersection of Massachusetts Avenue (Route 111) at Adams Place and the Gas Station Driveway, the Adams Place northbound approach is expected to degrade from LOS E to LOS F during both peak hours due to the traffic volume increase on main street approaches. The Gas Station Driveway southbound approach is expected to degrade from LOS C to LOS D during the morning peak hour and would remain at LOS C during the evening peak hour.

At the stop-controlled intersection of Massachusetts Avenue (Route 111) at Paddock Lane and the Site Driveway, the Site Driveway northbound left-turn movement and Paddock Lane southbound left-turn movement would both operate at LOS D during the morning peak hour and LOS F during the evening peak hour.

At the stop-controlled intersection of Massachusetts Avenue (Route 111) at Burroughs Road and Hill Road, the Burroughs Road northbound left-turn and Hill Road southbound left-turn would both degrade from LOS D to LOS E during the morning peak hour, and from LOS E to LOS F during the evening peak hour.

Table 9 – Level of Service Summary – 2027 No-Build Conditions

LOCATION	DIRECTION / MOVEMENT ¹	WEEKDAY MORNING PEAK HOUR					WEEKDAY EVENING PEAK HOUR				
		V/C ²	DELAY ³	LOS ⁴	50th Q ⁵	95th Q ⁶	V/C ²	DELAY ³	LOS ⁴	50th Q ⁵	95th Q ⁶
Massachusetts Avenue (Route 111) at I-495 SB Off-Ramp (Signalized)	Mass Avenue EB-T	0.32	16.2	B	95	142	0.36	20.4	C	118	165
	Mass Avenue EB-R	0.26	3.1	A	0	40	0.25	3.6	A	0	41
	Mass Avenue WB-L	0.67	31.4	C	144	236	0.42	16.8	B	132	218
	Mass Avenue WB-T	0.16	0.9	A	7	7	0.18	0.6	A	7	6
	I-495 SB Off-Ramp NB-L	0.53	40.5	D	66	99	0.38	44.9	D	43	72
	I-495 SB Off-Ramp NB-R	0.52	10.8	B	0	57	0.46	13.1	B	0	54
	<i>Overall</i>	0.67	16.0	B	-	-	0.46	13.6	B	-	-
Massachusetts Avenue (Route 111) at I-495 NB Ramp (Signalized)	Mass Avenue EB-L	0.38	19.4	B	88	155	0.42	23.7	C	174	276
	Mass Avenue EB-T	0.21	0.9	A	9	8	0.14	0.7	A	5	4
	Mass Avenue WB-T	0.34	20.3	C	95	143	0.51	30.5	C	155	209
	Mass Avenue WB-R	0.29	4.1	A	0	45	0.35	5.2	A	0	54
	I-495 NB Off-Ramp SB-L	0.57	41.3	D	70	104	0.69	49.9	D	97	142
	I-495 NB Off-Ramp NB-R	0.51	10.5	B	0	56	0.51	11.1	B	0	61
	<i>Overall</i>	0.57	14.6	B	-	-	0.69	21.9	C	-	-
Massachusetts Avenue (Route 111) at Adams Place and Gas Station (Unsignalized)	Mass Avenue EB-LTR	0.09	2.3	A	-	8	0.05	1.3	A	-	4
	Mass Avenue WB-LTR	0.08	1.9	A	-	6	0.02	0.6	A	-	2
	Adams Pl NB-LTR	0.68	117.2	F	-	79	0.26	61.8	F	-	23
	Gas Station Dr SB-LTR	0.31	26.9	D	-	31	0.22	23.9	C	-	20
Massachusetts Avenue (Route 111) at Paddock Lane and Site Driveway (Unsignalized)	Mass Avenue EB-LT	0.01	0.4	A	-	1	0.06	1.5	A	-	5
	Mass Avenue WB-TR	0.33	0.0	A	-	0	0.38	0.0	A	-	0
	Site Dr NB-L	0.07	31.2	D	-	5	0.94	132.6	F	-	156
	Site Dr NB-R	0.01	11.6	B	-	1	0.10	12.1	B	-	8
	Paddock Ln SB-L	0.34	35.0	D	-	35	0.29	48.3	E	-	28
	Paddock Ln SB-R	0.10	12.5	B	-	9	0.06	12.8	B	-	5
Massachusetts Avenue (Route 111) at Hill Road and Burroughs Road (Unsignalized)	Mass Avenue EB-LTR	0.02	0.5	A	-	1	0.03	0.7	A	-	2
	Mass Avenue WB-LTR	0.01	0.4	A	-	1	0.01	0.4	A	-	1
	Burroughs Road NB-LTR	0.52	42.0	E	-	67	0.60	54.3	F	-	81
	Hill Road SB-LTR	0.15	16.9	C	-	13	0.13	17.7	C	-	11

¹NB = Northbound, SB = Southbound, EB = Eastbound, WB = Westbound; L = Left-turn, T=Through movement, R = Right-turn;

² Volume to Capacity Ratio;

³ Vehicle Delay, measured in seconds;

⁴ Level Of Service;

⁵ 50th Percentile Queue (in feet);

⁶ 95th Percentile Queue (in feet) based upon 25 feet per vehicle;

~ = 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;

m = Volume for 95th percentile queue is metered by upstream signal



6.2.3 2027 Build Conditions

Under future build conditions, the lane geometry, traffic control, and signal timing parameters were maintained from the existing conditions. The project generated trips determined in Section 5 (Figure 8) were applied to the no-build traffic volumes with the updated heavy vehicle percentage representative of the additional truck trips generated by the project. PHFs were set to the default future-condition value of 0.92. Table 10 summarizes the analysis results for 2027 build conditions.

Under the 2027 build conditions, the two signalized intersections are expected to continue operate well below capacity with slight increase in delay.

At the intersection of Massachusetts Avenue (Route 111) at Adams Place and the Gas Station Driveway, the operational deficiency occurred during the morning peak hour at the Adams Place northbound approach. The approach delay is expected to increase from 117.2 seconds to 328.1 seconds with the v/c ratio increased from 0.68 to 1.16

The critical movement at the intersection of Massachusetts Avenue (Route 111) at Paddock Lane and the Site Driveway is the Site Driveway northbound left-turn. During the evening peak hour, the Site Driveway northbound left-turn is expected to exceed its capacity and operate at LOS F with delay over 600 seconds.

The intersection of Massachusetts Avenue (Route 111) at Burroughs Road and Hill Road is expected to continue to operate below capacity. However, some degradation on the stop-controlled side streets is expected due to volume increase on the main road.

Table 10 – Level of Service Summary – 2027 Build Conditions

LOCATION	DIRECTION / MOVEMENT ¹	WEEKDAY MORNING PEAK HOUR					WEEKDAY EVENING PEAK HOUR				
		V/C ²	DELAY ³	LOS ⁴	50th Q ⁵	95th Q ⁶	V/C ²	DELAY ³	LOS ⁴	50th Q ⁵	95th Q ⁶
Massachusetts Avenue (Route 111) at I-495 SB Off-Ramp (Signalized)	Mass Avenue EB-T	0.34	16.5	B	100	151	0.36	20.4	C	120	167
	Mass Avenue EB-R	0.26	3.1	A	0	41	0.25	3.6	A	0	41
	Mass Avenue WB-L	0.72	33.7	C	155	#264	0.53	18.2	B	175	275
	Mass Avenue WB-T	0.16	0.9	A	7	7	0.19	0.6	A	7	6
	I-495 SB Off-Ramp NB-L	0.53	40.0	D	66	97	0.38	44.9	D	43	72
	I-495 SB Off-Ramp NB-R	0.59	10.8	B	0	63	0.50	13.2	B	0	56
	<i>Overall</i>	0.72	16.3	B	-	-	0.53	13.8	B	-	-
Massachusetts Avenue (Route 111) at I-495 NB Ramp (Signalized)	Mass Avenue EB-L	0.38	19.7	B	88	155	0.42	23.7	C	173	275
	Mass Avenue EB-T	0.24	1.2	A	14	13	0.15	0.7	A	6	4
	Mass Avenue WB-T	0.37	21.4	C	103	151	0.59	32.1	C	183	243
	Mass Avenue WB-R	0.31	4.2	A	0	46	0.42	5.3	A	0	59
	I-495 NB Off-Ramp SB-L	0.63	41.9	D	86	124	0.72	51.3	D	102	149
	I-495 NB Off-Ramp NB-R	0.49	9.8	A	0	56	0.51	11.0	B	0	61
	<i>Overall</i>	0.63	15.2	B	-	-	0.72	22.5	C	-	-
Massachusetts Avenue (Route 111) at Adams Place and Gas Station (Unsignalized)	Mass Avenue EB-LTR	0.10	2.5	A	-	8	0.05	1.4	A	-	4
	Mass Avenue WB-LTR	0.17	4.3	A	-	16	0.04	1.2	A	-	3
	Adams Pl NB-LTR	1.16	328.1	F	-	124	0.37	98.9	F	-	34
	Gas Station Dr SB-LTR	0.45	44.7	E	-	52	0.29	32.1	D	-	28
Massachusetts Avenue (Route 111) at Paddock Lane and Site Driveway (Unsignalized)	Mass Avenue EB-LT	0.01	0.4	A	-	1	0.06	1.6	A	-	5
	Mass Avenue WB-TR	0.37	0.0	A	-	0	0.39	0.0	A	-	0
	Site Dr NB-L	0.37	53.6	F	-	38	2.15	603.1	F	-	535
	Site Dr NB-R	0.04	12.3	B	-	3	0.22	13.3	B	-	20
	Paddock Ln SB-L	0.40	43.8	E	-	44	0.39	69.9	F	-	39
	Paddock Ln SB-R	0.11	13.3	B	-	9	0.06	13.0	B	-	5
Massachusetts Avenue (Route 111) at Hill Road and Burroughs Road (Unsignalized)	Mass Avenue EB-LTR	0.02	0.6	A	-	2	0.03	0.8	A	-	2
	Mass Avenue WB-LTR	0.01	0.4	A	-	1	0.01	0.4	A	-	1
	Burroughs Road NB-LTR	0.62	54.7	F	-	85	0.70	72.3	F	-	100
	Hill Road SB-LTR	0.17	18.2	C	-	15	0.14	18.8	C	-	12

¹NB = Northbound, SB = Southbound, EB = Eastbound, WB = Westbound; L = Left-turn, T=Through movement, R = Right-turn;

² Volume to Capacity Ratio;

³ Vehicle Delay, measured in seconds;

⁴ Level Of Service;

⁵ 50th Percentile Queue (in feet);

⁶ 95th Percentile Queue (in feet) based upon 25 feet per vehicle;

~ = 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;

m = Volume for 95th percentile queue is metered by upstream signal



7 Proposed Mitigation

7.1 Signal Warrant Analysis

To determine the appropriate means of mitigation, traffic signal warrant analyses were conducted for the two unsignalized study intersections to determine whether signalization would be justified.

The current MUTCD contains nine traffic signal warrants, at least one of which should be satisfied to justify the installation of a traffic signal at a particular location. Satisfying one or more warrants, however, does not necessarily require the installation of a traffic signal. The traffic signal warrants are:

- Warrant 1: Eight-Hour Vehicular Volume;
- Warrant 2: Four-Hour Vehicular Volume;
- Warrant 3: Peak Hour;
- Warrant 4: Pedestrian Volume;
- Warrant 5: School Crossing;
- Warrant 6: Coordinated Signal System;
- Warrant 7: Crash Experience;
- Warrant 8: Roadway Network; and
- Warrant 9: Intersection Near a Grade Crossing.


The signal warrant analysis was conducted using the procedures contained in the MUTCD. Not all warrants are applicable to all intersections, and data availability may limit which warrants can be evaluated. For this analysis, due to unique circumstances with the proposed light industrial complex that will generate large numbers of vehicles over a short period of time, only Warrant 3: Peak Hour was evaluated for the intersection of Massachusetts Avenue (Route 111) at Adams Place and the Gas Station Driveway, as well as the intersection of Massachusetts Avenue (Route 111) at Paddock Lane and the Site Driveway.

The analyses indicated only the intersection of Massachusetts Avenue (Route 111) Paddock Lane and the Site Driveway met the Peak Hour Warrant under the future 2020 build condition based on the criteria for delay and volume on the minor approach (Site Driveway and Paddock Lane) as well as total entering volume in the evening peak hour. Appendix G includes the signal warrant analysis worksheets.

7.2 Mitigation Capacity Analysis

Installing a traffic signal at the intersection of Massachusetts Avenue (Route 111) and Site Driveway/Paddock Lane is recommended to mitigate the effects of the additional trips generated by the project, and to resolve the potential sight line interference by the utility poles at the Site Driveway. The Yellow/All Red Clearance Calculation sheet for the proposed signal is provided in Appendix H.

Under the mitigation, the new signalized the intersection of Massachusetts Avenue (Route 111) at the Site Driveway and Paddock Lane would operate with three phases, and in the same coordinated system with other traffic signals along Massachusetts Avenue (Route 111). During the first phase, the Massachusetts Avenue (Route 111) eastbound and westbound movements would operate concurrently; and the Site Driveway northbound and Paddock Lane southbound movements would operate as split phasing. Table 11 summarizes the analysis results for 2027 build with mitigation condition.



During the evening peak hour, the signalization at the intersection of Massachusetts Avenue (Route 111) at the Site Driveway and Paddock Lane would improve the Site Driveway northbound left-turn movement to LOS D from LOS F under unmitigated conditions, and the delay would decrease from 603.1 seconds to 54.3 seconds. The Paddock Lane southbound left-turn movement would also improve from LOS F to LOS D. All other movements would operate at B or better.

With the optimized splits and offsets within the coordinated system, a slight delay reduction is expected at the two previously signalized intersections during the morning peak hour. During the evening peak hour, an increase in delay is expected on the Massachusetts Avenue (Route 111) westbound left-turn movement at intersection of Massachusetts Avenue (Route 111) and I-495 SB Ramp. This is a result of the optimization for the evening peak hour emphasized on eastbound progression to minimize the queuing on the Massachusetts Avenue (Route 111) eastbound approach at the intersection of Massachusetts Avenue (Route 111) and the Site Driveway/Paddock Lane to avoid blocking the intersection at Adams Place.

By signalizing the intersection of Massachusetts Avenue (Route 111) at the Site Driveway and Paddock Lane, there are more predicable gaps for vehicles making left-turns from Adams Place and the Gas Station Driveway. During the morning peak hour, the delay for the Adams Place northbound left-turn movement would reduce from 328.1 seconds to 147.5 seconds, with the v/c ratio reduced from 1.16 to 0.76.

Slight increases in delay are expected for the side streets at the intersection of Massachusetts Avenue (Route 111) at Burroughs Road and Hill Road, as eastbound traffic would arrive in platoons due to signalization at the upstream intersection. However, the increase in queue is less than one vehicle for both side street approaches which is deemed insignificant.

Table 11 – Level of Service Summary – 2027 Build with Mitigation Conditions

LOCATION	DIRECTION / MOVEMENT ¹	WEEKDAY MORNING PEAK HOUR					WEEKDAY EVENING PEAK HOUR				
		V/C ²	DELAY ³	LOS ⁴	50th Q ⁵	95th Q ⁶	V/C ²	DELAY ³	LOS ⁴	50th Q ⁵	95th Q ⁶
Massachusetts Avenue (Route 111) at I-495 SB Off-Ramp (Signalized)	Mass Avenue EB-T	0.42	22.5	C	118	177	0.38	21.9	C	124	174
	Mass Avenue EB-R	0.30	4.3	A	0	48	0.26	3.8	A	0	43
	Mass Avenue WB-L	0.51	14.9	B	108	173	0.50	44.9	D	190	267
	Mass Avenue WB-T	0.16	1.4	A	9	14	0.19	2.0	A	7	20
	I-495 SB Off-Ramp NB-L	0.53	40.2	D	66	98	0.38	44.9	D	43	72
	I-495 SB Off-Ramp NB-R	0.59	10.9	B	0	63	0.50	13.2	B	0	56
	<i>Overall</i>	0.59	15.6	B	-	-	0.50	18.8	B	-	-
Massachusetts Avenue (Route 111) at I-495 NB Ramp (Signalized)	Mass Avenue EB-L	0.41	26.8	C	104	179	0.54	17.9	B	59	92
	Mass Avenue EB-T	0.25	1.4	A	14	20	0.15	3.4	A	27	35
	Mass Avenue WB-T	0.35	15.9	B	64	91	0.47	25.2	C	182	230
	Mass Avenue WB-R	0.31	2.1	A	0	15	0.37	5.2	A	23	44
	I-495 NB Off-Ramp SB-L	0.61	40.5	D	86	120	0.64	45.8	D	101	139
	I-495 NB Off-Ramp NB-R	0.48	9.3	A	0	54	0.48	9.7	A	0	57
	<i>Overall</i>	0.61	14.1	B	-	-	0.64	19.2	B	-	-
Massachusetts Avenue (Route 111) at Adams Place and Gas Station (Unsignalized)	Mass Avenue EB-LTR	0.10	2.6	A	-	8	0.06	1.6	A	-	5
	Mass Avenue WB-LTR	0.17	4.3	A	-	16	0.04	1.2	A	-	3
	Adams Pl NB-LTR	0.76	147.5	F	-	89	0.36	95.0	F	-	33
	Gas Station Dr SB-LTR	0.33	29.8	D	-	35	0.28	31.4	D	-	28
Massachusetts Avenue (Route 111) at Paddock Lane and Site Driveway (Signalized)	Mass Avenue EB-LT	0.42	4.7	A	54	74	0.59	7.2	A	70	221
	Mass Avenue WB-TR	0.47	8.9	A	168	286	0.59	15.9	B	258	403
	Site Dr NB-L	0.34	45.4	D	23	55	0.77	54.3	D	153	233
	Site Dr NB-R	0.10	1.1	A	0	0	0.31	8.2	A	0	44
	Paddock Ln SB-L	0.37	44.5	D	33	71	0.28	50.1	D	21	53
	Paddock Ln SB-R	0.25	6.5	A	0	18	0.17	2.0	A	0	0
	<i>Overall</i>	0.47	9.8	A	-	-	0.77	18.6	B	-	-
Massachusetts Avenue (Route 111) at Hill Road and Burroughs Road (Unsignalized)	Mass Avenue EB-LTR	0.02	0.6	A	-	2	0.03	0.8	A	-	2
	Mass Avenue WB-LTR	0.01	0.4	A	-	1	0.02	0.4	A	-	1
	Burroughs Road NB-LTR	0.65	61.3	F	-	92	0.78	94.1	F	-	117
	Hill Road SB-LTR	0.18	18.8	C	-	16	0.15	20.2	C	-	13

¹NB = Northbound, SB = Southbound, EB = Eastbound, WB = Westbound; L = Left-turn, T=Through movement, R = Right-turn;
² Volume to Capacity Ratio;
³ Vehicle Delay, measured in seconds;
⁴ Level Of Service;
⁵ 50th Percentile Queue (in feet);
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= 95th percentile volume exceeds capacity, queue may be longer, queue shown is maximum after two cycles;
m = Volume for 95th percentile queue is metered by upstream signal



8 Transportation Demand Management

The Proponent is committed to implement Transportation Demand Management (TDM) measures to minimize automobile usage and Project related traffic impacts. TDM will be facilitated by the nature of the Project (which does not generate significant peak hour trips) and its proximity to the Commuter Rail Station in Acton.

On-site management will keep a supply of transit information (schedules, maps, and fare information) to be made available to the tenants of the site. The Proponent will work with the Town to develop a TDM program appropriate to the Project and consistent with its level of impact.

The TDM measures for the Project may include but are not limited to the following:

8.1 Alternative Transportation

The Proponent will work with the Town of Boxborough on exploring services to the project site and surrounding facilities including Boxboro Regency Hotel and the business park on Swanson Road.

8.2 Bicycle Accommodation

The Proponent will provide bicycle racks for tenants and visitors near building entrances.

8.3 Electric Vehicle Charging

The Proponent will explore the feasibility of providing electric vehicle charging stations in the parking lot.

8.4 Transportation Monitoring Program

The Proponent is committed to conducting a Transportation Monitoring Program. The intent of the monitoring program is to confirm that the post-development impacts of the Project are consistent with the forecast estimates and to ensure that the mitigation measures are completed and/or maintained. The monitoring program is expected to include the following elements:

- **Employee Survey** – A survey will be distributed to determine commuting modes to/from the Project Site, transit ridership, bicycle parking utilization, occupancy of car-sharing parking spaces, occupancy of alternative fueled vehicle parking spaces, electric vehicle charging station demand and usage, and overall parking demands.
- **Verification of Mitigation Measures** – The implementation of the proposed mitigation measures, TDM measures, and parking accommodations will be verified.
- **Traffic Data Collection** – Traffic data (i.e., turning movement counts for vehicles, pedestrians, bicycles) will be collected during the weekday morning peak period (7:00 AM – 9:00 AM) and evening peak period (4:00 PM – 6:00 PM) and operations analysis performed at “mitigated” intersections, including both Adams Place and the signalized Site Driveway
- **Monitoring Program Schedule and Reporting** – This monitoring will be performed annually commencing six months after full completion and occupancy of the first building will continue for a period of five years after occupancy of the full build-out of the Project. Should subsequent phases extend beyond five years, the traffic monitoring program will cease until the next phase of the Project is completed. Results of the monitoring program will be summarized in a technical memorandum, including an update on TDM effectiveness.



9 Construction Management Outline

The detail of construction impact from the development will be provided as the project progresses. To the extent possible, arrival and departure of construction vehicles should occur outside of the vehicle peak periods (9:00 AM to 3:30 PM and 7:00 PM to 5:00AM). The developer should coordinate a construction entrance that is of enough width and meets the necessary sight distance requirements set forth by the American Association of State Highway and Transportation Officials (AASHTO).

During construction, pedestrian accessibility should be maintained. If necessary, temporary crosswalks and ramps should be provided. All pedestrian accommodations should adhere to Massachusetts Architectural Access Board (MAAB) and Americans with Disabilities Act (ADA) guidelines.

10 Conclusions and Recommendations

Nitsch Engineering has prepared this Traffic Impact Study (TIS) for the proposed light industrial park at 1414 Massachusetts Avenue in Town of Boxborough, MA.

The study includes five intersections, two signalized and three unsignalized, to establish the impact the proposed development would have on intersection traffic operations.


As traffic counts conducted during COVID-19 pandemic were under-representing the traffic condition, 2014 traffic counts were obtained for all study intersections and adjusted based on MassDOT guidelines. Site specific volume adjustments were also done to incorporate other alteration in traffic volumes due to projects constructed after 2014, and the temporary occupancy change in office building.

The crash data over the last five years available from MassDOT indicated that two unsignalized intersections have crash rates above District 3 and statewide averages. The traffic signal warrant analysis indicates that a traffic signal may be justified under future build traffic conditions for the unsignalized intersection of Massachusetts Avenue (Route 111) at Paddock Lane and the Site Driveway, based on the Peak Hour Warrant.

For future conditions, the existing traffic volumes within the study area were projected over a seven-year period to the build year 2027 using an annual growth rate of 1.0%, based on expected regional growth. These volumes were added to the vehicle trips expected to be generated by other planned development projects.

The quantity of vehicle trips generated by the proposed industrial park was estimated based on *Institute of Transportation Engineers (ITE) Trip Generation Manual, 10th Edition* criteria. The additional vehicle trips were distributed to the roadway network using the developed traffic pattern based on American Community Survey for work trips to Town of Boxborough. It was assumed that all project-generated trips will be made by private automobiles to present a conservative analysis.

A capacity analysis was performed to compare the weekday morning and evening peak hours of the 2020 existing conditions, 2027 no-build conditions, 2027 build conditions. Under existing conditions, the analysis indicates all study intersections operate efficiently. Under the 2027 no-build conditions, the expected growth in traffic volumes on Massachusetts Avenue (Route 111) would increase the delay on side streets for all stop-controlled intersections. Under the 2027 build conditions, the Site Driveway would operate with severe delay during the evening peak hour when a significant number of vehicles from the Site Driveway are seeking to turn left onto Massachusetts Avenue (Route 111).



To mitigate the traffic impact, installing a traffic signal at the intersection of Massachusetts Avenue (Route 111) at the Site Driveway and Paddock Lane is recommended. With the addition of the traffic signal, the analysis indicated that all study intersections would operate at an acceptable level of service, with only minor increases in queue length on some stop-controlled side street approaches.

APPENDIX CONTENTS

Section	Description
A	2020 Raw Traffic Counts
B	2014 Raw Traffic Counts & 2007 Manual Traffic Counts
C	MassDOT Guidance on Traffic Count Data
D	Background Project Trip Distribution
E	Crash Rate Calculation Sheet
F	Trip Distribution Analysis
G	Signal Warrant Analysis
H	Yellow and All Red Clearance Calculation
I	Synchro Analysis

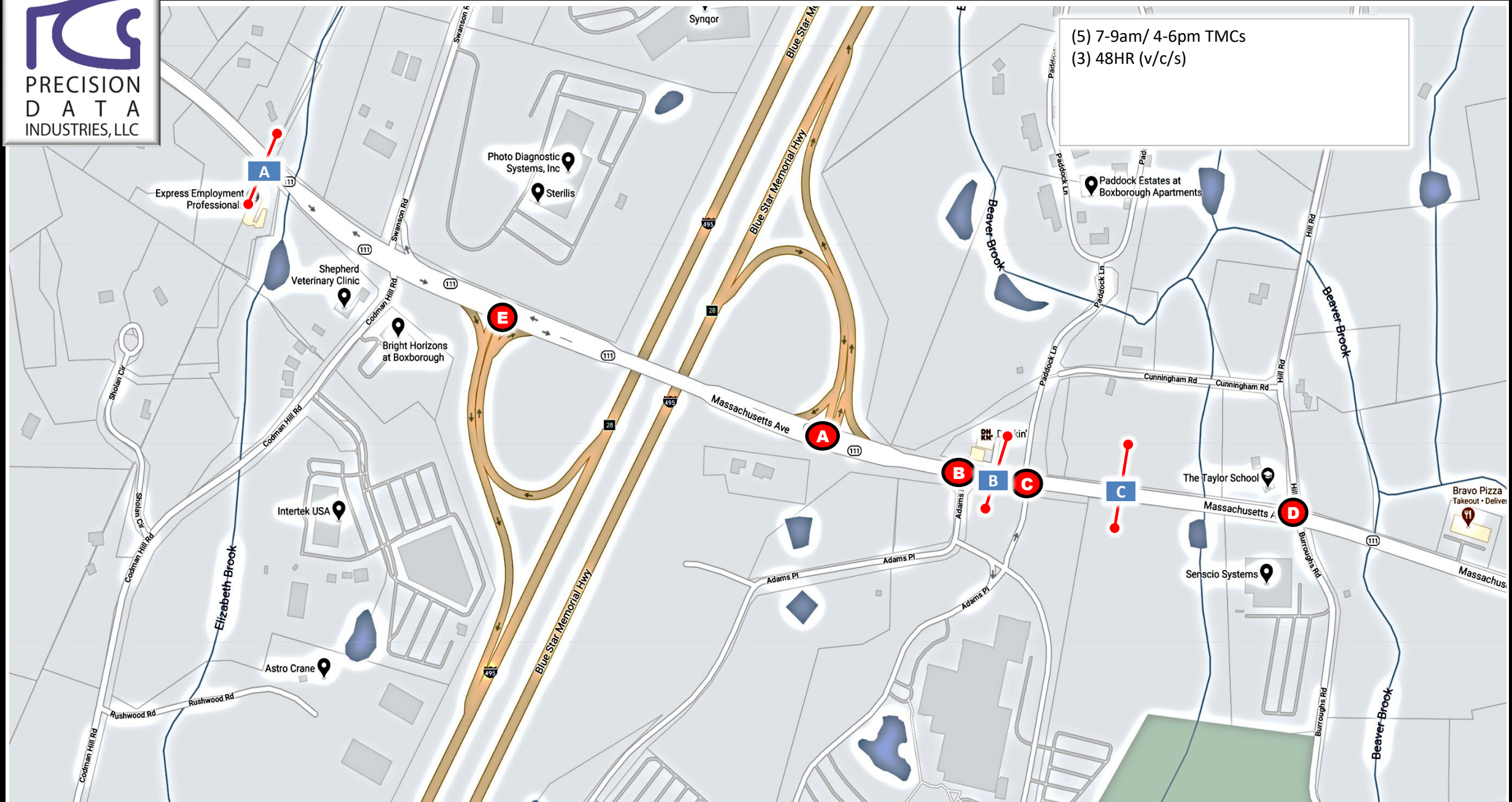
Appendix A

2020 Raw Traffic Counts



Location Map: 207662 Boxborough, MA

Precision Data Industries, LLC 46 Morton Street, Framingham, MA 01702 ph: 508-875-0100 email: datarequests@pdillc.com



Client:
Nitsch

Engineer:
B. Zimolka

Site Code:

Date:
Tues 10/20 thru Wed 10/21/2020

PDI Job #
207662

City, State:
Boxborough, MA



PRECISION
DATA
INDUSTRIES, LLC

46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Mass Ave (Route 111)
west of Swanson Road
City, State: Boxborough, MA
Client: Nitsch/ B. Zimolka
Site Code: TBA

PDI File #: 207662 ATR-A

Count Date:
Tuesday, October 20, 2020

Volume

EB					WB					Combined							
Start Time:	15 min	60 min	15 min	60 min	Start Time:	15 min	60 min	15 min	60 min	Start Time:	15 min	60 min	15 min	60 min			
12:00 AM	1		12:00 PM	37	12:00 AM	2		12:00 PM	52	12:00 AM	3		12:00 PM	89			
12:15 AM	0		12:15 PM	47	12:15 AM	2		12:15 PM	50	12:15 AM	2		12:15 PM	97			
12:30 AM	1		12:30 PM	36	12:30 AM	2		12:30 PM	54	12:30 AM	3		12:30 PM	90			
12:45 AM	0	2	12:45 PM	43	163	12:45 AM	0	6	12:45 PM	56	212	12:45 AM	0	8	12:45 PM	99	375
1:00 AM	0		1:00 PM	41		1:00 AM	0		1:00 PM	56		1:00 AM	0		1:00 PM	97	
1:15 AM	0		1:15 PM	40		1:15 AM	1		1:15 PM	48		1:15 AM	1		1:15 PM	88	
1:30 AM	0		1:30 PM	35		1:30 AM	0		1:30 PM	39		1:30 AM	0		1:30 PM	74	
1:45 AM	1	1	1:45 PM	34	150	1:45 AM	1	2	1:45 PM	46	189	1:45 AM	2	3	1:45 PM	80	339
2:00 AM	3		2:00 PM	36		2:00 AM	0		2:00 PM	52		2:00 AM	3		2:00 PM	88	
2:15 AM	0		2:15 PM	34		2:15 AM	0		2:15 PM	59		2:15 AM	0		2:15 PM	93	
2:30 AM	2		2:30 PM	45		2:30 AM	0		2:30 PM	59		2:30 AM	2		2:30 PM	104	
2:45 AM	0	5	2:45 PM	50	165	2:45 AM	0	0	2:45 PM	64	234	2:45 AM	0	5	2:45 PM	114	399
3:00 AM	3		3:00 PM	54		3:00 AM	0		3:00 PM	94		3:00 AM	3		3:00 PM	148	
3:15 AM	0		3:15 PM	53		3:15 AM	0		3:15 PM	104		3:15 AM	0		3:15 PM	157	
3:30 AM	0		3:30 PM	36		3:30 AM	0		3:30 PM	69		3:30 AM	0		3:30 PM	105	
3:45 AM	0	3	3:45 PM	37	180	3:45 AM	4	4	3:45 PM	72	339	3:45 AM	4	7	3:45 PM	109	519
4:00 AM	0		4:00 PM	46		4:00 AM	2		4:00 PM	84		4:00 AM	2		4:00 PM	130	
4:15 AM	2		4:15 PM	41		4:15 AM	0		4:15 PM	60		4:15 AM	2		4:15 PM	101	
4:30 AM	1		4:30 PM	42		4:30 AM	2		4:30 PM	82		4:30 AM	3		4:30 PM	124	
4:45 AM	7	10	4:45 PM	53	182	4:45 AM	6	10	4:45 PM	94	320	4:45 AM	13	20	4:45 PM	147	502
5:00 AM	9		5:00 PM	40		5:00 AM	7		5:00 PM	86		5:00 AM	16		5:00 PM	126	
5:15 AM	10		5:15 PM	41		5:15 AM	11		5:15 PM	90		5:15 AM	21		5:15 PM	131	
5:30 AM	15		5:30 PM	32		5:30 AM	17		5:30 PM	70		5:30 AM	32		5:30 PM	102	
5:45 AM	18	52	5:45 PM	44	157	5:45 AM	27	62	5:45 PM	68	314	5:45 AM	45	114	5:45 PM	112	471
6:00 AM	19		6:00 PM	29		6:00 AM	31		6:00 PM	69		6:00 AM	50		6:00 PM	98	
6:15 AM	23		6:15 PM	24		6:15 AM	26		6:15 PM	37		6:15 AM	49		6:15 PM	61	
6:30 AM	40		6:30 PM	21		6:30 AM	49		6:30 PM	33		6:30 AM	89		6:30 PM	54	
6:45 AM	54	136	6:45 PM	11	85	6:45 AM	67	173	6:45 PM	30	169	6:45 AM	121	309	6:45 PM	41	254
7:00 AM	53		7:00 PM	13		7:00 AM	67		7:00 PM	27		7:00 AM	120		7:00 PM	40	
7:15 AM	53		7:15 PM	14		7:15 AM	73		7:15 PM	27		7:15 AM	126		7:15 PM	41	
7:30 AM	54		7:30 PM	15		7:30 AM	65		7:30 PM	28		7:30 AM	119		7:30 PM	43	
7:45 AM	75	235	7:45 PM	20	62	7:45 AM	73	278	7:45 PM	22	104	7:45 AM	148	513	7:45 PM	42	166
8:00 AM	37		8:00 PM	7		8:00 AM	38		8:00 PM	16		8:00 AM	75		8:00 PM	23	
8:15 AM	53		8:15 PM	11		8:15 AM	48		8:15 PM	11		8:15 AM	101		8:15 PM	22	
8:30 AM	43		8:30 PM	6		8:30 AM	51		8:30 PM	12		8:30 AM	94		8:30 PM	18	
8:45 AM	46	179	8:45 PM	4	28	8:45 AM	59	196	8:45 PM	10	49	8:45 AM	105	375	8:45 PM	14	77
9:00 AM	47		9:00 PM	6		9:00 AM	41		9:00 PM	14		9:00 AM	88		9:00 PM	20	
9:15 AM	36		9:15 PM	6		9:15 AM	46		9:15 PM	13		9:15 AM	82		9:15 PM	19	
9:30 AM	34		9:30 PM	4		9:30 AM	40		9:30 PM	18		9:30 AM	74		9:30 PM	22	
9:45 AM	24	141	9:45 PM	4	20	9:45 AM	43	170	9:45 PM	5	50	9:45 AM	67	311	9:45 PM	9	70
10:00 AM	27		10:00 PM	3		10:00 AM	44		10:00 PM	9		10:00 AM	71		10:00 PM	12	
10:15 AM	25		10:15 PM	4		10:15 AM	36		10:15 PM	7		10:15 AM	61		10:15 PM	11	
10:30 AM	31		10:30 PM	0		10:30 AM	57		10:30 PM	4		10:30 AM	88		10:30 PM	4	
10:45 AM	39	122	10:45 PM	2	9	10:45 AM	59	196	10:45 PM	2	22	10:45 AM	98	318	10:45 PM	4	31
11:00 AM	32		11:00 PM	6		11:00 AM	49		11:00 PM	7		11:00 AM	81		11:00 PM	13	
11:15 AM	30		11:15 PM	1		11:15 AM	41		11:15 PM	3		11:15 AM	71		11:15 PM	4	
11:30 AM	36		11:30 PM	0		11:30 AM	51		11:30 PM	2		11:30 AM	87		11:30 PM	2	
11:45 AM	38	136	11:45 PM	2	9	11:45 AM	57	198	11:45 PM	3	15	11:45 AM	95	334	11:45 PM	5	24
Total	1022		1210			Total	1295		2017			Total	2317		3227		
Percent	45.79%		54.21%			Percent	39.10%		60.90%			Percent	41.79%		58.21%		
Day Total			2232			Day Total			3312			Day Total			5544		
Peak Hour	7:00 AM		2:30 PM			Peak Hour	7:00 AM		4:30 PM			Peak Hour	7:00 AM		4:30 PM		
Volume	235		202			Volume	278		352			Volume	513		528		
P.H.F.	0.783		0.935			P.H.F.	0.952		0.936			P.H.F.	0.867		0.898		



PRECISION
DATA
INDUSTRIES, LLC

46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Mass Ave (Route 111)

west of Swanson Road

City, State: Boxborough, MA

Client: Nitsch/ B. Zimolka

Site Code: TBA

PDI File #: 207662 ATR-A

Count Date:

Wednesday, October 21, 2020

Volume

EB					WB					Combined							
Start Time:	15 min	60 min	15 min	60 min	Start Time:	15 min	60 min	15 min	60 min	Start Time:	15 min	60 min	15 min	60 min			
12:00 AM	0		12:00 PM	23	12:00 AM	3		12:00 PM	50	12:00 AM	3		12:00 PM	73			
12:15 AM	1		12:15 PM	49	12:15 AM	2		12:15 PM	67	12:15 AM	3		12:15 PM	116			
12:30 AM	0		12:30 PM	27	12:30 AM	3		12:30 PM	62	12:30 AM	3		12:30 PM	89			
12:45 AM	0	1	12:45 PM	43	142	12:45 AM	2	10	12:45 PM	43	222	12:45 AM	2	11	12:45 PM	86	364
1:00 AM	3		1:00 PM	31		1:00 AM	1		1:00 PM	50		1:00 AM	4		1:00 PM	81	
1:15 AM	1		1:15 PM	33		1:15 AM	0		1:15 PM	69		1:15 AM	1		1:15 PM	102	
1:30 AM	0		1:30 PM	31		1:30 AM	1		1:30 PM	52		1:30 AM	1		1:30 PM	83	
1:45 AM	0	4	1:45 PM	39	134	1:45 AM	0	2	1:45 PM	67	238	1:45 AM	0	6	1:45 PM	106	372
2:00 AM	0		2:00 PM	48		2:00 AM	0		2:00 PM	45		2:00 AM	0		2:00 PM	93	
2:15 AM	2		2:15 PM	38		2:15 AM	1		2:15 PM	57		2:15 AM	3		2:15 PM	95	
2:30 AM	0		2:30 PM	31		2:30 AM	0		2:30 PM	61		2:30 AM	0		2:30 PM	92	
2:45 AM	1	3	2:45 PM	51	168	2:45 AM	0	1	2:45 PM	72	235	2:45 AM	1	4	2:45 PM	123	403
3:00 AM	1		3:00 PM	42		3:00 AM	0		3:00 PM	84		3:00 AM	1		3:00 PM	126	
3:15 AM	0		3:15 PM	51		3:15 AM	0		3:15 PM	92		3:15 AM	0		3:15 PM	143	
3:30 AM	0		3:30 PM	50		3:30 AM	2		3:30 PM	69		3:30 AM	2		3:30 PM	119	
3:45 AM	1	2	3:45 PM	43	186	3:45 AM	1	3	3:45 PM	81	326	3:45 AM	2	5	3:45 PM	124	512
4:00 AM	4		4:00 PM	31		4:00 AM	1		4:00 PM	83		4:00 AM	5		4:00 PM	114	
4:15 AM	0		4:15 PM	32		4:15 AM	0		4:15 PM	76		4:15 AM	0		4:15 PM	108	
4:30 AM	2		4:30 PM	46		4:30 AM	2		4:30 PM	87		4:30 AM	4		4:30 PM	133	
4:45 AM	5	11	4:45 PM	44	153	4:45 AM	2	5	4:45 PM	79	325	4:45 AM	7	16	4:45 PM	123	478
5:00 AM	10		5:00 PM	46		5:00 AM	7		5:00 PM	101		5:00 AM	17		5:00 PM	147	
5:15 AM	11		5:15 PM	39		5:15 AM	13		5:15 PM	106		5:15 AM	24		5:15 PM	145	
5:30 AM	13		5:30 PM	47		5:30 AM	11		5:30 PM	68		5:30 AM	24		5:30 PM	115	
5:45 AM	13	47	5:45 PM	28	160	5:45 AM	16	47	5:45 PM	66	341	5:45 AM	29	94	5:45 PM	94	501
6:00 AM	14		6:00 PM	40		6:00 AM	12		6:00 PM	56		6:00 AM	26		6:00 PM	96	
6:15 AM	33		6:15 PM	25		6:15 AM	21		6:15 PM	32		6:15 AM	54		6:15 PM	57	
6:30 AM	39		6:30 PM	29		6:30 AM	33		6:30 PM	42		6:30 AM	72		6:30 PM	71	
6:45 AM	40	126	6:45 PM	19	113	6:45 AM	38	104	6:45 PM	42	172	6:45 AM	78	230	6:45 PM	61	285
7:00 AM	53		7:00 PM	13		7:00 AM	55		7:00 PM	30		7:00 AM	108		7:00 PM	43	
7:15 AM	50		7:15 PM	14		7:15 AM	50		7:15 PM	32		7:15 AM	100		7:15 PM	46	
7:30 AM	54		7:30 PM	12		7:30 AM	46		7:30 PM	21		7:30 AM	100		7:30 PM	33	
7:45 AM	58	215	7:45 PM	11	50	7:45 AM	57	208	7:45 PM	22	105	7:45 AM	115	423	7:45 PM	33	155
8:00 AM	56		8:00 PM	8		8:00 AM	60		8:00 PM	16		8:00 AM	116		8:00 PM	24	
8:15 AM	52		8:15 PM	5		8:15 AM	64		8:15 PM	18		8:15 AM	116		8:15 PM	23	
8:30 AM	36		8:30 PM	6		8:30 AM	48		8:30 PM	12		8:30 AM	84		8:30 PM	18	
8:45 AM	51	195	8:45 PM	3	22	8:45 AM	48	220	8:45 PM	12	58	8:45 AM	99	415	8:45 PM	15	80
9:00 AM	32		9:00 PM	3		9:00 AM	40		9:00 PM	13		9:00 AM	72		9:00 PM	16	
9:15 AM	37		9:15 PM	7		9:15 AM	43		9:15 PM	10		9:15 AM	80		9:15 PM	17	
9:30 AM	33		9:30 PM	4		9:30 AM	52		9:30 PM	8		9:30 AM	85		9:30 PM	12	
9:45 AM	36	138	9:45 PM	0	14	9:45 AM	58	193	9:45 PM	11	42	9:45 AM	94	331	9:45 PM	11	56
10:00 AM	26		10:00 PM	6		10:00 AM	43		10:00 PM	6		10:00 AM	69		10:00 PM	12	
10:15 AM	29		10:15 PM	3		10:15 AM	32		10:15 PM	4		10:15 AM	61		10:15 PM	7	
10:30 AM	32		10:30 PM	1		10:30 AM	29		10:30 PM	5		10:30 AM	61		10:30 PM	6	
10:45 AM	32	119	10:45 PM	4	14	10:45 AM	49	153	10:45 PM	8	23	10:45 AM	81	272	10:45 PM	12	37
11:00 AM	26		11:00 PM	1		11:00 AM	46		11:00 PM	3		11:00 AM	72		11:00 PM	4	
11:15 AM	36		11:15 PM	0		11:15 AM	47		11:15 PM	3		11:15 AM	83		11:15 PM	3	
11:30 AM	38		11:30 PM	0		11:30 AM	49		11:30 PM	1		11:30 AM	87		11:30 PM	1	
11:45 AM	29	129	11:45 PM	0	1	11:45 AM	46	188	11:45 PM	4	11	11:45 AM	75	317	11:45 PM	4	12
Total	990		1157			Total	1134		2098			Total	2124		3255		
Percent	46.11%		53.89%			Percent	35.09%		64.91%			Percent	39.49%		60.51%		
Day Total			2147			Day Total			3232			Day Total			5379		
Peak Hour	7:30 AM		2:45 PM			Peak Hour	7:45 AM		4:30 PM			Peak Hour	7:30 AM		4:30 PM		
Volume	220		194			Volume	229		373			Volume	447		548		
P.H.F.	0.948		0.951			P.H.F.	0.895		0.880			P.H.F.	0.963		0.932		

Mass Ave (Route 111)
 west of Swanson Road
 City, State: Boxborough, MA
 Client: Nitsch/ B. Zimolka
 Site Code: TBA



PDI File #: 207662 ATR-A

Count Date
 Tuesday, October 20, 2020

Classification (60-minute)

EB														
Start Time:	Cycles	Cars and Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	Total
12:00 AM	0	2	0	0	0	0	0	0	0	0	0	0	0	2
1:00 AM	0	1	0	0	0	0	0	0	0	0	0	0	0	1
2:00 AM	0	3	1	0	0	0	0	0	1	0	0	0	0	5
3:00 AM	0	2	0	0	0	1	0	0	0	0	0	0	0	3
4:00 AM	0	9	0	1	0	0	0	0	0	0	0	0	0	10
5:00 AM	3	35	13	0	0	1	0	0	0	0	0	0	0	52
6:00 AM	3	113	16	0	4	0	0	0	0	0	0	0	0	136
7:00 AM	13	188	21	1	10	1	0	1	0	0	0	0	0	235
8:00 AM	6	142	22	0	4	3	0	2	0	0	0	0	0	179
9:00 AM	7	99	25	1	7	2	0	0	0	0	0	0	0	141
10:00 AM	1	100	14	1	4	2	0	0	0	0	0	0	0	122
11:00 AM	6	100	24	0	5	1	0	0	0	0	0	0	0	136
12:00 PM	2	134	24	0	2	1	0	0	0	0	0	0	0	163
1:00 PM	8	114	16	3	7	0	0	2	0	0	0	0	0	150
2:00 PM	5	116	34	0	6	3	0	1	0	0	0	0	0	165
3:00 PM	4	141	20	1	10	1	0	2	0	1	0	0	0	180
4:00 PM	5	135	32	1	7	1	0	0	1	0	0	0	0	182
5:00 PM	6	126	22	0	0	1	0	0	1	0	0	0	1	157
6:00 PM	4	64	12	0	4	0	0	0	1	0	0	0	0	85
7:00 PM	0	53	8	0	1	0	0	0	0	0	0	0	0	62
8:00 PM	0	23	5	0	0	0	0	0	0	0	0	0	0	28
9:00 PM	0	16	3	0	1	0	0	0	0	0	0	0	0	20
10:00 PM	0	8	1	0	0	0	0	0	0	0	0	0	0	9
11:00 PM	1	7	0	0	0	1	0	0	0	0	0	0	0	9
Total	74	1731	313	9	72	19	0	8	4	1	0	0	1	2232
Percent	3.32%	77.55%	14.02%	0.40%	3.23%	0.85%	0.00%	0.36%	0.18%	0.04%	0.00%	0.00%	0.04%	

AM Peak	7:00 AM	7:00 AM	9:00 AM	4:00 AM	7:00 AM	8:00 AM		8:00 AM	2:00 AM					7:00 AM
Volume	13	188	25	1	10	3	0	2	1	0	0	0	0	235
PM Peak	1:00 PM	3:00 PM	2:00 PM	1:00 PM	3:00 PM	2:00 PM		1:00 PM	4:00 PM	3:00 PM			5:00 PM	4:00 PM
Volume	8	141	34	3	10	3	0	2	1	1	0	0	1	182

Cycles:	74	3.3%
Cars and Light Trucks:	2044	91.6%
Heavy Vehicles:	114	5.1%

Mass Ave (Route 111)
 west of Swanson Road
 City, State: Boxborough, MA
 Client: Nitsch/ B. Zimolka
 Site Code: TBA



PDI File #: 207662 ATR-A

Count Date
 Tuesday, October 20, 2020

Classification (60-minute)

WB														
Start Time:	Cycles	Cars and Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	Total
12:00 AM	0	5	0	0	1	0	0	0	0	0	0	0	0	6
1:00 AM	0	0	2	0	0	0	0	0	0	0	0	0	0	2
2:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:00 AM	0	2	0	1	1	0	0	0	0	0	0	0	0	4
4:00 AM	0	8	0	1	1	0	0	0	0	0	0	0	0	10
5:00 AM	1	46	15	0	0	0	0	0	0	0	0	0	0	62
6:00 AM	0	140	22	0	9	1	1	0	0	0	0	0	0	173
7:00 AM	1	242	20	0	8	4	0	1	2	0	0	0	0	278
8:00 AM	1	165	18	0	8	0	0	3	1	0	0	0	0	196
9:00 AM	1	139	24	1	3	2	0	0	0	0	0	0	0	170
10:00 AM	0	161	28	1	6	0	0	0	0	0	0	0	0	196
11:00 AM	0	164	23	1	9	1	0	0	0	0	0	0	0	198
12:00 PM	1	175	27	0	9	0	0	0	0	0	0	0	0	212
1:00 PM	0	146	33	3	3	2	0	1	1	0	0	0	0	189
2:00 PM	1	199	25	0	7	1	0	1	0	0	0	0	0	234
3:00 PM	4	285	38	1	11	0	0	0	0	0	0	0	0	339
4:00 PM	3	268	41	0	4	1	0	2	1	0	0	0	0	320
5:00 PM	2	270	34	0	7	0	0	1	0	0	0	0	0	314
6:00 PM	1	144	19	0	3	0	0	2	0	0	0	0	0	169
7:00 PM	0	93	9	0	1	1	0	0	0	0	0	0	0	104
8:00 PM	0	45	4	0	0	0	0	0	0	0	0	0	0	49
9:00 PM	0	45	4	0	1	0	0	0	0	0	0	0	0	50
10:00 PM	0	20	0	0	1	0	0	0	1	0	0	0	0	22
11:00 PM	0	13	1	0	1	0	0	0	0	0	0	0	0	15
PM Total	16	2775	387	9	94	13	1	11	6	0	0	0	0	3312
Percent	0.48%	83.79%	11.68%	0.27%	2.84%	0.39%	0.03%	0.33%	0.18%	0.00%	0.00%	0.00%	0.00%	

AM Peak	5:00 AM	7:00 AM	10:00 AM	3:00 AM	6:00 AM	7:00 AM	6:00 AM	8:00 AM	7:00 AM					7:00 AM
Volume	1	242	28	1	9	4	1	3	2	0	0	0	0	278
PM Peak	3:00 PM	3:00 PM	4:00 PM	1:00 PM	3:00 PM	1:00 PM		4:00 PM	1:00 PM					3:00 PM
Volume	4	285	41	3	11	2	0	2	1	0	0	0	0	339

Cycles:	16	0.5%
Cars and Light Trucks:	3162	95.5%
Heavy Vehicles:	134	4.0%

Mass Ave (Route 111)
 west of Swanson Road
 City, State: Boxborough, MA
 Client: Nitsch/ B. Zimolka
 Site Code: TBA



PDI File #: 207662 ATR-A

Count Date
 Tuesday, October 20, 2020

Classification (60-minute)

Combined														
Start Time:	Cycles	Cars and Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	Total
12:00 AM	0	7	0	0	1	0	0	0	0	0	0	0	0	8
1:00 AM	0	1	2	0	0	0	0	0	0	0	0	0	0	3
2:00 AM	0	3	1	0	0	0	0	0	1	0	0	0	0	5
3:00 AM	0	4	0	1	1	1	0	0	0	0	0	0	0	7
4:00 AM	0	17	0	2	1	0	0	0	0	0	0	0	0	20
5:00 AM	4	81	28	0	0	1	0	0	0	0	0	0	0	114
6:00 AM	3	253	38	0	13	1	1	0	0	0	0	0	0	309
7:00 AM	14	430	41	1	18	5	0	2	2	0	0	0	0	513
8:00 AM	7	307	40	0	12	3	0	5	1	0	0	0	0	375
9:00 AM	8	238	49	2	10	4	0	0	0	0	0	0	0	311
10:00 AM	1	261	42	2	10	2	0	0	0	0	0	0	0	318
11:00 AM	6	264	47	1	14	2	0	0	0	0	0	0	0	334
12:00 PM	3	309	51	0	11	1	0	0	0	0	0	0	0	375
1:00 PM	8	260	49	6	10	2	0	3	1	0	0	0	0	339
2:00 PM	6	315	59	0	13	4	0	2	0	0	0	0	0	399
3:00 PM	8	426	58	2	21	1	0	2	0	1	0	0	0	519
4:00 PM	8	403	73	1	11	2	0	2	2	0	0	0	0	502
5:00 PM	8	396	56	0	7	1	0	1	1	0	0	0	1	471
6:00 PM	5	208	31	0	7	0	0	2	1	0	0	0	0	254
7:00 PM	0	146	17	0	2	1	0	0	0	0	0	0	0	166
8:00 PM	0	68	9	0	0	0	0	0	0	0	0	0	0	77
9:00 PM	0	61	7	0	2	0	0	0	0	0	0	0	0	70
10:00 PM	0	28	1	0	1	0	0	0	1	0	0	0	0	31
11:00 PM	1	20	1	0	1	1	0	0	0	0	0	0	0	24
PM Total	90	4506	700	18	166	32	1	19	10	1	0	0	1	5544
Percent	1.62%	81.28%	12.63%	0.32%	2.99%	0.58%	0.02%	0.34%	0.18%	0.02%	0.00%	0.00%	0.02%	

AM Peak	7:00 AM	7:00 AM	9:00 AM	4:00 AM	7:00 AM	7:00 AM	6:00 AM	8:00 AM	7:00 AM					7:00 AM
Volume	14	430	49	2	18	5	1	5	2	0	0	0	0	513
PM Peak	1:00 PM	3:00 PM	4:00 PM	1:00 PM	3:00 PM	2:00 PM		1:00 PM	4:00 PM	3:00 PM			5:00 PM	3:00 PM
Volume	8	426	73	6	21	4	0	3	2	1	0	0	1	519

Cycles:	90	1.6%
Cars and Light Trucks:	5206	93.9%
Heavy Vehicles:	248	4.5%

Mass Ave (Route 111)
 west of Swanson Road
 City, State: Boxborough, MA
 Client: Nitsch/ B. Zimolka
 Site Code: TBA



PRECISION
 DATA
 INDUSTRIES, LLC
 46 Morton Street, Framingham, MA 01702
 Office: 508-875-0100 Fax: 508-875-0118
 Email: datarequests@pdillc.com

PDI File #: 207662 ATR-A

Count Date
 Wednesday, October 21, 2020

Classification (60-minute)

EB														
Start Time:	Cycles	Cars and Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	Total
12:00 AM	0	1	0	0	0	0	0	0	0	0	0	0	0	1
1:00 AM	0	4	0	0	0	0	0	0	0	0	0	0	0	4
2:00 AM	0	1	1	0	1	0	0	0	0	0	0	0	0	3
3:00 AM	0	2	0	0	0	0	0	0	0	0	0	0	0	2
4:00 AM	1	9	0	0	0	0	1	0	0	0	0	0	0	11
5:00 AM	0	35	12	0	0	0	0	0	0	0	0	0	0	47
6:00 AM	6	78	36	0	5	0	0	1	0	0	0	0	0	126
7:00 AM	4	179	21	2	6	2	0	0	0	1	0	0	0	215
8:00 AM	15	149	25	0	4	1	1	0	0	0	0	0	0	195
9:00 AM	8	102	14	1	11	2	0	0	0	0	0	0	0	138
10:00 AM	3	82	28	0	4	1	1	0	0	0	0	0	0	119
11:00 AM	3	98	20	2	4	1	0	1	0	0	0	0	0	129
12:00 PM	4	106	26	0	4	1	0	1	0	0	0	0	0	142
1:00 PM	2	110	16	1	3	1	0	1	0	0	0	0	0	134
2:00 PM	10	124	20	1	7	3	0	2	1	0	0	0	0	168
3:00 PM	6	143	21	2	12	1	1	0	0	0	0	0	0	186
4:00 PM	5	119	18	1	10	0	0	0	0	0	0	0	0	153
5:00 PM	0	133	21	1	3	2	0	0	0	0	0	0	0	160
6:00 PM	7	87	15	0	4	0	0	0	0	0	0	0	0	113
7:00 PM	2	43	3	0	2	0	0	0	0	0	0	0	0	50
8:00 PM	0	19	2	1	0	0	0	0	0	0	0	0	0	22
9:00 PM	0	12	2	0	0	0	0	0	0	0	0	0	0	14
10:00 PM	0	13	1	0	0	0	0	0	0	0	0	0	0	14
11:00 PM	0	1	0	0	0	0	0	0	0	0	0	0	0	1
Total	76	1650	302	12	80	15	4	6	1	1	0	0	0	2147
Percent	3.54%	76.85%	14.07%	0.56%	3.73%	0.70%	0.19%	0.28%	0.05%	0.05%	0.00%	0.00%	0.00%	

AM Peak	8:00 AM	7:00 AM	6:00 AM	7:00 AM	9:00 AM	7:00 AM	4:00 AM	6:00 AM		7:00 AM				7:00 AM
Volume	15	179	36	2	11	2	1	1	0	1	0	0	0	215
PM Peak	2:00 PM	3:00 PM	12:00 PM	3:00 PM	3:00 PM	2:00 PM	3:00 PM	2:00 PM	2:00 PM					3:00 PM
Volume	10	143	26	2	12	3	1	2	1	0	0	0	0	186

Cycles:	76	3.5%
Cars and Light Trucks:	1952	90.9%
Heavy Vehicles:	119	5.5%

Mass Ave (Route 111)
 west of Swanson Road
 City, State: Boxborough, MA
 Client: Nitsch/ B. Zimolka
 Site Code: TBA



PDI File #: 207662 ATR-A

Count Date
 Wednesday, October 21, 2020

Classification (60-minute)

WB														
Start Time:	Cycles	Cars and Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	Total
12:00 AM	0	8	2	0	0	0	0	0	0	0	0	0	0	10
1:00 AM	0	1	1	0	0	0	0	0	0	0	0	0	0	2
2:00 AM	1	0	0	0	0	0	0	0	0	0	0	0	0	1
3:00 AM	0	3	0	0	0	0	0	0	0	0	0	0	0	3
4:00 AM	0	3	1	1	0	0	0	0	0	0	0	0	0	5
5:00 AM	0	29	15	0	3	0	0	0	0	0	0	0	0	47
6:00 AM	0	80	20	0	4	0	0	0	0	0	0	0	0	104
7:00 AM	1	180	18	0	4	1	1	2	0	1	0	0	0	208
8:00 AM	0	194	18	2	5	1	0	0	0	0	0	0	0	220
9:00 AM	2	160	23	1	6	1	0	0	0	0	0	0	0	193
10:00 AM	0	117	24	3	7	1	0	0	1	0	0	0	0	153
11:00 AM	1	158	20	0	5	1	0	1	2	0	0	0	0	188
12:00 PM	0	189	24	1	6	0	0	2	0	0	0	0	0	222
1:00 PM	0	206	26	1	4	0	0	1	0	0	0	0	0	238
2:00 PM	1	197	25	1	8	1	0	1	1	0	0	0	0	235
3:00 PM	1	282	31	1	7	2	0	2	0	0	0	0	0	326
4:00 PM	1	269	46	0	6	1	0	2	0	0	0	0	0	325
5:00 PM	2	305	26	0	7	0	0	1	0	0	0	0	0	341
6:00 PM	3	145	20	0	3	1	0	0	0	0	0	0	0	172
7:00 PM	0	93	10	0	0	1	0	1	0	0	0	0	0	105
8:00 PM	0	50	6	1	1	0	0	0	0	0	0	0	0	58
9:00 PM	0	35	4	0	3	0	0	0	0	0	0	0	0	42
10:00 PM	0	18	4	0	0	0	0	1	0	0	0	0	0	23
11:00 PM	0	11	0	0	0	0	0	0	0	0	0	0	0	11
PM Total	13	2733	364	12	79	11	1	14	4	1	0	0	0	3232
Percent	0.40%	84.56%	11.26%	0.37%	2.44%	0.34%	0.03%	0.43%	0.12%	0.03%	0.00%	0.00%	0.00%	

AM Peak	9:00 AM	8:00 AM	10:00 AM	10:00 AM	10:00 AM	7:00 AM	7:00 AM	7:00 AM	11:00 AM	7:00 AM				8:00 AM
Volume	2	194	24	3	7	1	1	2	2	1	0	0	0	220
PM Peak	6:00 PM	5:00 PM	4:00 PM	12:00 PM	2:00 PM	3:00 PM		12:00 PM	2:00 PM					5:00 PM
Volume	3	305	46	1	8	2	0	2	1	0	0	0	0	341

Cycles:	13	0.4%
Cars and Light Trucks:	3097	95.8%
Heavy Vehicles:	122	3.8%

Mass Ave (Route 111)
 west of Swanson Road
 City, State: Boxborough, MA
 Client: Nitsch/ B. Zimolka
 Site Code: TBA



PDI File #: 207662 ATR-A

Count Date
 Wednesday, October 21, 2020

Classification (60-minute)

Combined														
Start Time:	Cycles	Cars and Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	Total
12:00 AM	0	9	2	0	0	0	0	0	0	0	0	0	0	11
1:00 AM	0	5	1	0	0	0	0	0	0	0	0	0	0	6
2:00 AM	1	1	1	0	1	0	0	0	0	0	0	0	0	4
3:00 AM	0	5	0	0	0	0	0	0	0	0	0	0	0	5
4:00 AM	1	12	1	1	0	0	1	0	0	0	0	0	0	16
5:00 AM	0	64	27	0	3	0	0	0	0	0	0	0	0	94
6:00 AM	6	158	56	0	9	0	0	1	0	0	0	0	0	230
7:00 AM	5	359	39	2	10	3	1	2	0	2	0	0	0	423
8:00 AM	15	343	43	2	9	2	1	0	0	0	0	0	0	415
9:00 AM	10	262	37	2	17	3	0	0	0	0	0	0	0	331
10:00 AM	3	199	52	3	11	2	1	0	1	0	0	0	0	272
11:00 AM	4	256	40	2	9	2	0	2	2	0	0	0	0	317
12:00 PM	4	295	50	1	10	1	0	3	0	0	0	0	0	364
1:00 PM	2	316	42	2	7	1	0	2	0	0	0	0	0	372
2:00 PM	11	321	45	2	15	4	0	3	2	0	0	0	0	403
3:00 PM	7	425	52	3	19	3	1	2	0	0	0	0	0	512
4:00 PM	6	388	64	1	16	1	0	2	0	0	0	0	0	478
5:00 PM	2	438	47	1	10	2	0	1	0	0	0	0	0	501
6:00 PM	10	232	35	0	7	1	0	0	0	0	0	0	0	285
7:00 PM	2	136	13	0	2	1	0	1	0	0	0	0	0	155
8:00 PM	0	69	8	2	1	0	0	0	0	0	0	0	0	80
9:00 PM	0	47	6	0	3	0	0	0	0	0	0	0	0	56
10:00 PM	0	31	5	0	0	0	0	1	0	0	0	0	0	37
11:00 PM	0	12	0	0	0	0	0	0	0	0	0	0	0	12
PM Total	89	4383	666	24	159	26	5	20	5	2	0	0	0	5379
Percent	1.65%	81.48%	12.38%	0.45%	2.96%	0.48%	0.09%	0.37%	0.09%	0.04%	0.00%	0.00%	0.00%	

AM Peak	8:00 AM	7:00 AM	6:00 AM	10:00 AM	9:00 AM	7:00 AM	4:00 AM	7:00 AM	11:00 AM	7:00 AM				7:00 AM
Volume	15	359	56	3	17	3	1	2	2	2	0	0	0	423
PM Peak	2:00 PM	5:00 PM	4:00 PM	3:00 PM	3:00 PM	2:00 PM	3:00 PM	12:00 PM	2:00 PM					3:00 PM
Volume	11	438	64	3	19	4	1	3	2	0	0	0	0	512

Cycles:	89	1.7%
Cars and Light Trucks:	5049	93.9%
Heavy Vehicles:	241	4.5%

Mass Ave (Route 111)
 west of Swanson Road
 City, State: Boxborough, MA
 Client: Nitsch/ B. Zimolka
 Site Code: TBA



PDI File #: 207662 ATR-A

Count Date
 Tuesday, October 20, 2020

Speed (60-minute)

EB																
Start Time:	1 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 to 69	70+	Total	85th %ile	Ave Speed
12:00 AM	0	0	0	0	0	1	1	0	0	0	0	0	0	2	40.3	38.5
1:00 AM	0	0	0	0	0	0	0	0	1	0	0	0	0	1	52.0	52.0
2:00 AM	0	0	0	0	0	0	0	2	3	0	0	0	0	5	51.8	49.6
3:00 AM	0	0	0	0	1	0	0	1	0	1	0	0	0	3	52.0	44.3
4:00 AM	0	0	0	0	1	0	1	5	2	1	0	0	0	10	51.7	46.5
5:00 AM	0	0	0	0	1	5	29	12	5	0	0	0	0	52	47.4	43.8
6:00 AM	0	0	1	0	0	3	78	42	11	1	0	0	0	136	47.8	44.1
7:00 AM	0	0	2	1	4	39	133	38	15	3	0	0	0	235	46.0	42.2
8:00 AM	0	0	1	2	4	18	87	50	16	1	0	0	0	179	48.0	43.2
9:00 AM	0	1	1	3	0	24	63	37	10	2	0	0	0	141	47.0	42.7
10:00 AM	0	0	0	0	1	23	69	21	6	2	0	0	0	122	46.0	42.7
11:00 AM	0	0	1	5	5	26	69	24	5	1	0	0	0	136	46.0	41.2
12:00 PM	0	0	1	1	0	27	81	46	6	1	0	0	0	163	47.0	42.7
1:00 PM	0	0	1	1	6	29	76	31	6	0	0	0	0	150	46.0	42.0
2:00 PM	0	0	1	2	4	24	81	41	11	1	0	0	0	165	47.0	42.9
3:00 PM	0	0	0	0	0	34	88	42	10	6	0	0	0	180	47.0	43.3
4:00 PM	0	1	3	3	9	45	74	38	8	1	0	0	0	182	46.0	41.2
5:00 PM	0	0	2	1	12	34	66	32	10	0	0	0	0	157	47.0	41.6
6:00 PM	0	0	0	0	3	8	48	21	5	0	0	0	0	85	47.0	42.9
7:00 PM	0	0	0	0	4	16	24	15	3	0	0	0	0	62	47.0	41.9
8:00 PM	0	0	1	0	0	2	16	5	4	0	0	0	0	28	48.0	43.3
9:00 PM	0	0	0	0	1	5	9	2	2	1	0	0	0	20	47.5	42.1
10:00 PM	0	0	0	0	0	1	4	3	1	0	0	0	0	9	48.4	45.0
11:00 PM	0	0	0	0	2	0	3	3	1	0	0	0	0	9	47.4	42.6
Total	0	2	15	19	58	364	1100	511	141	22	0	0	0	2232	47.0	42.6
Percent	0.00%	0.09%	0.67%	0.85%	2.60%	16.31%	49.28%	22.89%	6.32%	0.99%	0.00%	0.00%	0.00%			

AM Peak	9:00 AM	7:00 AM	11:00 AM	11:00 AM	7:00 AM	7:00 AM	8:00 AM	8:00 AM	7:00 AM					7:00 AM
Volume	0	1	2	5	5	39	133	50	16	3	0	0	0	235
PM Peak	4:00 PM	4:00 PM	4:00 PM	5:00 PM	4:00 PM	3:00 PM	12:00 PM	2:00 PM	3:00 PM					4:00 PM
Volume	0	1	3	3	12	45	88	46	11	6	0	0	0	182

15th Percentile:	39.0 MPH	Average Speed:	42.6 MPH	Posted Speed Limit:	40 MPH
50th Percentile:	42.0 MPH	10 MPH Pace:	38 to 47 MPH	Number of Vehicles > 40 MPH:	1583
85th Percentile:	47.0 MPH	Number in Pace:	1711	Percent of Vehicles > 40 MPH:	70.9%
95th Percentile:	51.0 MPH	Percent in Pace:	76.7%		

Mass Ave (Route 111)
 west of Swanson Road
 City, State: Boxborough, MA
 Client: Nitsch/ B. Zimolka
 Site Code: TBA



PDI File #: 207662 ATR-A

Count Date
 Tuesday, October 20, 2020

Speed (60-minute)

WB																
Start Time:	1 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 to 69	70+	Total	85th %ile	Ave Speed
12:00 AM	0	0	0	0	0	2	3	1	0	0	0	0	0	6	44.3	41.0
1:00 AM	0	0	0	0	0	0	2	0	0	0	0	0	0	2	41.0	41.0
2:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	#####	#####
3:00 AM	0	0	0	0	0	1	3	0	0	0	0	0	0	4	41.0	40.3
4:00 AM	0	0	0	0	1	2	3	3	0	0	1	0	0	10	46.7	43.7
5:00 AM	0	0	0	0	0	5	38	17	2	0	0	0	0	62	46.0	43.4
6:00 AM	0	0	0	1	7	10	97	55	1	2	0	0	0	173	46.0	42.7
7:00 AM	0	2	0	3	7	66	172	27	1	0	0	0	0	278	44.0	40.6
8:00 AM	0	0	1	2	16	44	105	26	2	0	0	0	0	196	44.0	40.6
9:00 AM	0	1	2	0	7	55	83	16	6	0	0	0	0	170	44.0	40.3
10:00 AM	0	1	2	3	7	54	112	13	3	0	0	1	0	196	44.0	40.4
11:00 AM	0	2	5	8	13	55	95	16	4	0	0	0	0	198	44.0	39.1
12:00 PM	0	1	0	3	8	60	117	19	4	0	0	0	0	212	44.0	40.5
1:00 PM	0	0	2	1	11	47	94	29	4	1	0	0	0	189	45.0	41.0
2:00 PM	0	1	0	0	10	48	130	35	10	0	0	0	0	234	45.0	41.6
3:00 PM	0	1	2	1	18	75	177	55	8	1	0	1	0	339	45.0	41.3
4:00 PM	1	2	8	7	18	99	126	48	9	2	0	0	0	320	45.0	39.8
5:00 PM	0	1	3	3	27	118	120	36	4	2	0	0	0	314	44.0	39.6
6:00 PM	0	2	0	3	10	49	82	15	7	1	0	0	0	169	44.0	40.4
7:00 PM	0	0	0	0	7	14	57	23	3	0	0	0	0	104	46.0	42.1
8:00 PM	0	0	1	0	1	11	28	6	2	0	0	0	0	49	45.6	41.3
9:00 PM	0	0	0	0	3	13	25	6	2	1	0	0	0	50	45.7	41.3
10:00 PM	0	0	0	0	0	5	13	3	1	0	0	0	0	22	44.9	42.3
11:00 PM	0	0	0	0	0	2	5	4	3	1	0	0	0	15	50.9	45.4
Total	1	14	26	35	171	835	1687	453	76	11	1	2	0	3312	45.0	40.7
Percent	0.03%	0.42%	0.79%	1.06%	5.16%	25.21%	50.94%	13.68%	2.29%	0.33%	0.03%	0.06%	0.00%			

AM Peak		7:00 AM	11:00 AM	11:00 AM	8:00 AM	7:00 AM	7:00 AM	6:00 AM	9:00 AM	6:00 AM	4:00 AM	10:00 AM		7:00 AM
Volume	0	2	5	8	16	66	172	55	6	2	1	1	0	278
PM Peak	4:00 PM	4:00 PM	4:00 PM	4:00 PM	5:00 PM	5:00 PM	3:00 PM	3:00 PM	2:00 PM	4:00 PM		3:00 PM		3:00 PM
Volume	1	2	8	7	27	118	177	55	10	2	0	1	0	339

15th Percentile:	37.0 MPH	Average Speed:	40.7 MPH	Posted Speed Limit:	40 MPH
50th Percentile:	41.0 MPH	10 MPH Pace:	37 to 46 MPH	Number of Vehicles > 40 MPH:	1852
85th Percentile:	45.0 MPH	Number in Pace:	2609	Percent of Vehicles > 40 MPH:	55.9%
95th Percentile:	48.0 MPH	Percent in Pace:	78.8%		

Mass Ave (Route 111)
 west of Swanson Road
 City, State: Boxborough, MA
 Client: Nitsch/ B. Zimolka
 Site Code: TBA



PRECISION
 DATA
 INDUSTRIES, LLC
 46 Morton Street, Framingham, MA 01702
 Office: 508-875-0100 Fax: 508-875-0118
 Email: datarequests@pdillc.com

PDI File #: 207662 ATR-A

Count Date
 Tuesday, October 20, 2020

Speed (60-minute)

Combined EB and WB

Start Time:	1 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 to 69	70+	Total	85th %ile	Ave Speed
12:00 AM	0	0	0	0	0	3	4	1	0	0	0	0	0	8	43.9	40.4
1:00 AM	0	0	0	0	0	0	2	0	1	0	0	0	0	3	48.7	44.7
2:00 AM	0	0	0	0	0	0	0	2	3	0	0	0	0	5	51.8	49.6
3:00 AM	0	0	0	0	1	1	3	1	0	1	0	0	0	7	46.0	42.0
4:00 AM	0	0	0	0	2	2	4	8	2	1	1	0	0	20	51.2	45.1
5:00 AM	0	0	0	0	1	10	67	29	7	0	0	0	0	114	46.0	43.6
6:00 AM	0	0	1	1	7	13	175	97	12	3	0	0	0	309	46.0	43.3
7:00 AM	0	2	2	4	11	105	305	65	16	3	0	0	0	513	45.0	41.4
8:00 AM	0	0	2	4	20	62	192	76	18	1	0	0	0	375	46.0	41.8
9:00 AM	0	2	3	3	7	79	146	53	16	2	0	0	0	311	46.0	41.4
10:00 AM	0	1	2	3	8	77	181	34	9	2	0	1	0	318	44.0	41.3
11:00 AM	0	2	6	13	18	81	164	40	9	1	0	0	0	334	44.1	40.0
12:00 PM	0	1	1	4	8	87	198	65	10	1	0	0	0	375	45.0	41.5
1:00 PM	0	0	3	2	17	76	170	60	10	1	0	0	0	339	45.0	41.5
2:00 PM	0	1	1	2	14	72	211	76	21	1	0	0	0	399	46.0	42.1
3:00 PM	0	1	2	1	18	109	265	97	18	7	0	1	0	519	46.0	42.0
4:00 PM	1	3	11	10	27	144	200	86	17	3	0	0	0	502	45.0	40.3
5:00 PM	0	1	5	4	39	152	186	68	14	2	0	0	0	471	45.0	40.3
6:00 PM	0	2	0	3	13	57	130	36	12	1	0	0	0	254	45.0	41.2
7:00 PM	0	0	0	0	11	30	81	38	6	0	0	0	0	166	47.0	42.0
8:00 PM	0	0	2	0	1	13	44	11	6	0	0	0	0	77	46.6	42.0
9:00 PM	0	0	0	0	4	18	34	8	4	2	0	0	0	70	46.0	41.5
10:00 PM	0	0	0	0	0	6	17	6	2	0	0	0	0	31	46.0	43.1
11:00 PM	0	0	0	0	2	2	8	7	4	1	0	0	0	24	50.6	44.3
Total	1	16	41	54	229	1199	2787	964	217	33	1	2	0	5544	46.0	41.5
Percent	0.02%	0.29%	0.74%	0.97%	4.13%	21.63%	50.27%	17.39%	3.91%	0.60%	0.02%	0.04%	0.00%			

AM Peak		7:00 AM	11:00 AM	11:00 AM	8:00 AM	7:00 AM	7:00 AM	6:00 AM	8:00 AM	6:00 AM	4:00 AM	10:00 AM		7:00 AM
Volume	0	2	6	13	20	105	305	97	18	3	1	1	0	513
PM Peak	4:00 PM	4:00 PM	4:00 PM	4:00 PM	5:00 PM	5:00 PM	3:00 PM	3:00 PM	2:00 PM	3:00 PM		3:00 PM		3:00 PM
Volume	1	3	11	10	39	152	265	97	21	7	0	1	0	519

15th Percentile:	37.0 MPH	Average Speed:	41.5 MPH	Posted Speed Limit:	40 MPH
50th Percentile:	42.0 MPH	10 MPH Pace:	37 to 46 MPH	Number of Vehicles > 40 MPH:	3435
85th Percentile:	46.0 MPH	Number in Pace:	4278	Percent of Vehicles > 40 MPH:	62.0%
95th Percentile:	49.0 MPH	Percent in Pace:	77.2%		

Mass Ave (Route 111)
 west of Swanson Road
 City, State: Boxborough, MA
 Client: Nitsch/ B. Zimolka
 Site Code: TBA



PRECISION
 DATA
 INDUSTRIES, LLC
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 Office: 508-875-0100 Fax: 508-875-0118
 Email: datarequests@pdillc.com

PDI File #: 207662 ATR-A

Count Date
 Wednesday, October 21, 2020

Speed (60-minute)

EB																
Start Time:	1 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 to 69	70+	Total	85th %ile	Ave Speed
12:00 AM	0	0	0	0	0	0	0	1	0	0	0	0	0	1	45.0	45.0
1:00 AM	0	0	0	0	0	0	0	1	2	0	1	0	0	4	56.9	53.3
2:00 AM	0	0	0	0	0	1	0	1	0	1	0	0	0	3	54.1	47.0
3:00 AM	0	0	0	0	0	1	0	0	0	1	0	0	0	2	52.2	45.5
4:00 AM	0	0	0	2	0	0	3	3	2	1	0	0	0	11	52.5	43.6
5:00 AM	0	0	1	0	2	3	20	17	3	1	0	0	0	47	47.0	43.7
6:00 AM	0	3	1	0	9	26	55	25	5	2	0	0	0	126	46.0	41.2
7:00 AM	0	0	3	0	5	26	119	47	15	0	0	0	0	215	47.0	42.7
8:00 AM	0	0	4	7	9	37	96	35	6	1	0	0	0	195	45.0	40.7
9:00 AM	0	0	1	6	11	25	62	23	10	0	0	0	0	138	47.5	41.1
10:00 AM	0	0	1	0	3	27	65	16	7	0	0	0	0	119	45.3	41.9
11:00 AM	0	0	0	1	4	25	66	23	7	2	1	0	0	129	46.0	42.5
12:00 PM	0	1	0	0	6	21	70	39	5	0	0	0	0	142	46.9	42.3
1:00 PM	0	0	0	0	1	16	79	29	5	4	0	0	0	134	47.0	43.6
2:00 PM	0	0	0	2	16	28	89	27	6	0	0	0	0	168	45.0	41.2
3:00 PM	0	0	1	0	1	18	114	45	7	0	0	0	0	186	47.0	42.9
4:00 PM	0	0	0	4	5	34	60	39	10	1	0	0	0	153	47.2	42.1
5:00 PM	0	0	0	0	3	35	75	39	7	1	0	0	0	160	47.0	42.5
6:00 PM	0	0	0	0	7	32	52	17	4	1	0	0	0	113	46.0	41.1
7:00 PM	0	0	1	1	1	12	20	13	2	0	0	0	0	50	47.0	41.7
8:00 PM	0	0	0	0	0	5	11	3	2	1	0	0	0	22	47.7	43.1
9:00 PM	0	0	0	0	0	3	6	4	1	0	0	0	0	14	49.0	43.4
10:00 PM	0	0	0	0	0	0	7	3	3	1	0	0	0	14	53.1	46.8
11:00 PM	0	0	0	0	0	0	1	0	0	0	0	0	0	1	42.0	42.0
Total	0	4	13	23	83	375	1070	450	109	18	2	0	0	2147	47.0	42.1
Percent	0.00%	0.19%	0.61%	1.07%	3.87%	17.47%	49.84%	20.96%	5.08%	0.84%	0.09%	0.00%	0.00%			

AM Peak		6:00 AM	8:00 AM	8:00 AM	9:00 AM	8:00 AM	7:00 AM	7:00 AM	7:00 AM	6:00 AM	1:00 AM			7:00 AM
Volume	0	3	4	7	11	37	119	47	15	2	1	0	0	215
PM Peak		12:00 PM	3:00 PM	4:00 PM	2:00 PM	5:00 PM	3:00 PM	3:00 PM	4:00 PM	1:00 PM				3:00 PM
Volume	0	1	1	4	16	35	114	45	10	4	0	0	0	186

15th Percentile:	38.0 MPH	Average Speed:	42.1 MPH	Posted Speed Limit:	40 MPH
50th Percentile:	42.0 MPH	10 MPH Pace:	37 to 46 MPH	Number of Vehicles > 40 MPH:	1469
85th Percentile:	47.0 MPH	Number in Pace:	1613	Percent of Vehicles > 40 MPH:	68.4%
95th Percentile:	50.0 MPH	Percent in Pace:	75.1%		

Mass Ave (Route 111)
 west of Swanson Road
 City, State: Boxborough, MA
 Client: Nitsch/ B. Zimolka
 Site Code: TBA



PDI File #: 207662 ATR-A

Count Date
 Wednesday, October 21, 2020

Speed (60-minute)

WB																
Start Time:	1 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 to 69	70+	Total	85th %ile	Ave Speed
12:00 AM	0	0	0	0	1	1	3	3	2	0	0	0	0	10	50.3	43.6
1:00 AM	0	0	0	0	0	2	0	0	0	0	0	0	0	2	38.7	38.0
2:00 AM	0	0	0	0	0	1	0	0	0	0	0	0	0	1	35.0	35.0
3:00 AM	0	0	0	0	0	2	0	1	0	0	0	0	0	3	45.3	41.3
4:00 AM	0	0	0	0	0	1	3	1	0	0	0	0	0	5	44.2	41.4
5:00 AM	0	0	0	0	1	7	22	14	1	2	0	0	0	47	47.0	43.6
6:00 AM	0	0	0	0	8	24	59	11	2	0	0	0	0	104	44.0	40.8
7:00 AM	0	1	2	2	6	52	121	21	2	1	0	0	0	208	44.0	40.8
8:00 AM	0	0	1	0	21	67	107	19	4	1	0	0	0	220	43.2	39.9
9:00 AM	0	1	1	0	11	67	94	16	2	1	0	0	0	193	43.2	40.1
10:00 AM	0	0	1	1	12	42	78	18	1	0	0	0	0	153	44.0	40.1
11:00 AM	0	1	0	0	11	46	109	20	0	1	0	0	0	188	44.0	40.7
12:00 PM	0	0	1	2	15	64	105	30	4	1	0	0	0	222	45.0	40.5
1:00 PM	0	1	1	2	6	42	137	39	9	1	0	0	0	238	45.0	42.0
2:00 PM	0	0	0	0	9	48	144	30	4	0	0	0	0	235	44.0	41.3
3:00 PM	0	0	3	2	7	82	180	40	11	1	0	0	0	326	45.0	41.2
4:00 PM	0	1	0	2	18	93	161	45	4	1	0	0	0	325	45.0	40.8
5:00 PM	0	2	2	2	27	82	173	45	5	2	1	0	0	341	45.0	40.6
6:00 PM	0	0	2	1	11	45	76	32	4	1	0	0	0	172	46.0	40.9
7:00 PM	0	0	1	0	4	26	45	23	6	0	0	0	0	105	47.0	41.8
8:00 PM	0	0	0	0	7	10	26	13	2	0	0	0	0	58	46.0	41.0
9:00 PM	0	0	0	1	3	12	20	4	2	0	0	0	0	42	44.0	40.8
10:00 PM	0	0	0	1	1	3	11	6	1	0	0	0	0	23	46.0	41.9
11:00 PM	0	0	0	0	2	1	4	2	0	1	1	0	0	11	52.5	44.0
Total	0	7	15	16	181	820	1678	433	66	14	2	0	0	3232	45.0	40.9
Percent	0.00%	0.22%	0.46%	0.50%	5.60%	25.37%	51.92%	13.40%	2.04%	0.43%	0.06%	0.00%	0.00%			

AM Peak		7:00 AM	7:00 AM	7:00 AM	8:00 AM	8:00 AM	7:00 AM	7:00 AM	8:00 AM	5:00 AM					8:00 AM
Volume	0	1	2	2	21	67	121	21	4	2	0	0	0	220	

PM Peak		5:00 PM	3:00 PM	12:00 PM	5:00 PM	4:00 PM	3:00 PM	4:00 PM	3:00 PM	5:00 PM	5:00 PM				5:00 PM
Volume	0	2	3	2	27	93	180	45	11	2	1	0	0	341	

15th Percentile:	37.0 MPH	Average Speed:	40.9 MPH	Posted Speed Limit:	40 MPH
50th Percentile:	41.0 MPH	10 MPH Pace:	36 to 45 MPH	Number of Vehicles > 40 MPH:	1855
85th Percentile:	45.0 MPH	Number in Pace:	2561	Percent of Vehicles > 40 MPH:	57.4%
95th Percentile:	48.0 MPH	Percent in Pace:	79.2%		

Mass Ave (Route 111)
 west of Swanson Road
 City, State: Boxborough, MA
 Client: Nitsch/ B. Zimolka
 Site Code: TBA



PRECISION
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 Office: 508-875-0100 Fax: 508-875-0118
 Email: datarequests@pdillc.com

PDI File #: 207662 ATR-A

Count Date
 Wednesday, October 21, 2020

Speed (60-minute)

Combined EB and WB

Start Time:	1 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 to 69	70+	Total	85th %ile	Ave Speed
12:00 AM	0	0	0	0	1	1	3	4	2	0	0	0	0	11	49.5	43.7
1:00 AM	0	0	0	0	0	2	0	1	2	0	1	0	0	6	54.8	48.2
2:00 AM	0	0	0	0	0	2	0	1	0	1	0	0	0	4	52.2	44.0
3:00 AM	0	0	0	0	0	3	0	1	0	1	0	0	0	5	50.8	43.0
4:00 AM	0	0	0	2	0	1	6	4	2	1	0	0	0	16	50.3	42.9
5:00 AM	0	0	1	0	3	10	42	31	4	3	0	0	0	94	47.0	43.6
6:00 AM	0	3	1	0	17	50	114	36	7	2	0	0	0	230	45.0	41.0
7:00 AM	0	1	5	2	11	78	240	68	17	1	0	0	0	423	45.0	41.8
8:00 AM	0	0	5	7	30	104	203	54	10	2	0	0	0	415	45.0	40.3
9:00 AM	0	1	2	6	22	92	156	39	12	1	0	0	0	331	45.0	40.5
10:00 AM	0	0	2	1	15	69	143	34	8	0	0	0	0	272	45.0	40.8
11:00 AM	0	1	0	1	15	71	175	43	7	3	1	0	0	317	45.0	41.4
12:00 PM	0	1	1	2	21	85	175	69	9	1	0	0	0	364	46.0	41.2
1:00 PM	0	1	1	2	7	58	216	68	14	5	0	0	0	372	46.0	42.6
2:00 PM	0	0	0	2	25	76	233	57	10	0	0	0	0	403	45.0	41.3
3:00 PM	0	0	4	2	8	100	294	85	18	1	0	0	0	512	45.0	41.8
4:00 PM	0	1	0	6	23	127	221	84	14	2	0	0	0	478	46.0	41.2
5:00 PM	0	2	2	2	30	117	248	84	12	3	1	0	0	501	46.0	41.2
6:00 PM	0	0	2	1	18	77	128	49	8	2	0	0	0	285	46.0	41.0
7:00 PM	0	0	2	1	5	38	65	36	8	0	0	0	0	155	47.0	41.8
8:00 PM	0	0	0	0	7	15	37	16	4	1	0	0	0	80	46.0	41.6
9:00 PM	0	0	0	1	3	15	26	8	3	0	0	0	0	56	46.8	41.4
10:00 PM	0	0	0	1	1	3	18	9	4	1	0	0	0	37	48.2	43.8
11:00 PM	0	0	0	0	2	1	5	2	0	1	1	0	0	12	50.6	43.8
Total	0	11	28	39	264	1195	2748	883	175	32	4	0	0	5379	46.0	41.4
Percent	0.00%	0.20%	0.52%	0.73%	4.91%	22.22%	51.09%	16.42%	3.25%	0.59%	0.07%	0.00%	0.00%			

AM Peak
 Volume 0 3 5 7 30 104 240 68 17 3 1 0 0 423

PM Peak
 Volume 0 2 4 6 30 127 294 85 18 5 1 0 0 512

15th Percentile:	37.0 MPH	Average Speed:	41.4 MPH	Posted Speed Limit:	40 MPH
50th Percentile:	42.0 MPH	10 MPH Pace:	37 to 46 MPH	Number of Vehicles > 40 MPH:	3324
85th Percentile:	46.0 MPH	Number in Pace:	4166	Percent of Vehicles > 40 MPH:	61.8%
95th Percentile:	49.0 MPH	Percent in Pace:	77.4%		



PRECISION
DATA
INDUSTRIES, LLC

46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Mass Ave (Route 111) between
Adams Place and Paddock Lane
City, State: Boxborough, MA
Client: Nitsch/ B. Zimolka
Site Code: TBA

PDI File #: 207662 ATR-B

Count Date:
Tuesday, October 20, 2020

Volume

EB					WB					Combined							
Start Time:	15 min	60 min	15 min	60 min	Start Time:	15 min	60 min	15 min	60 min	Start Time:	15 min	60 min	15 min	60 min			
12:00 AM	4		12:00 PM	67	12:00 AM	0		12:00 PM	50	12:00 AM	4		12:00 PM	117			
12:15 AM	0		12:15 PM	54	12:15 AM	2		12:15 PM	74	12:15 AM	2		12:15 PM	128			
12:30 AM	0		12:30 PM	68	12:30 AM	1		12:30 PM	69	12:30 AM	1		12:30 PM	137			
12:45 AM	1	5	12:45 PM	55	244	12:45 AM	0	3	12:45 PM	68	261	12:45 AM	1	8	12:45 PM	123	505
1:00 AM	0		1:00 PM	39		1:00 AM	3		1:00 PM	51		1:00 AM	3		1:00 PM	90	
1:15 AM	1		1:15 PM	45		1:15 AM	0		1:15 PM	66		1:15 AM	1		1:15 PM	111	
1:30 AM	1		1:30 PM	56		1:30 AM	0		1:30 PM	65		1:30 AM	1		1:30 PM	121	
1:45 AM	1	3	1:45 PM	62	202	1:45 AM	1	4	1:45 PM	48	230	1:45 AM	2	7	1:45 PM	110	432
2:00 AM	0		2:00 PM	37		2:00 AM	0		2:00 PM	69		2:00 AM	0		2:00 PM	106	
2:15 AM	0		2:15 PM	57		2:15 AM	0		2:15 PM	75		2:15 AM	0		2:15 PM	132	
2:30 AM	1		2:30 PM	44		2:30 AM	1		2:30 PM	67		2:30 AM	2		2:30 PM	111	
2:45 AM	0	1	2:45 PM	82	220	2:45 AM	0	1	2:45 PM	61	272	2:45 AM	0	2	2:45 PM	143	492
3:00 AM	0		3:00 PM	64		3:00 AM	1		3:00 PM	105		3:00 AM	1		3:00 PM	169	
3:15 AM	1		3:15 PM	66		3:15 AM	2		3:15 PM	109		3:15 AM	3		3:15 PM	175	
3:30 AM	2		3:30 PM	56		3:30 AM	1		3:30 PM	76		3:30 AM	3		3:30 PM	132	
3:45 AM	2	5	3:45 PM	63	249	3:45 AM	6	10	3:45 PM	78	368	3:45 AM	8	15	3:45 PM	141	617
4:00 AM	2		4:00 PM	44		4:00 AM	1		4:00 PM	92		4:00 AM	3		4:00 PM	136	
4:15 AM	1		4:15 PM	54		4:15 AM	0		4:15 PM	80		4:15 AM	1		4:15 PM	134	
4:30 AM	1		4:30 PM	65		4:30 AM	2		4:30 PM	88		4:30 AM	3		4:30 PM	153	
4:45 AM	7	11	4:45 PM	55	218	4:45 AM	8	11	4:45 PM	93	353	4:45 AM	15	22	4:45 PM	148	571
5:00 AM	5		5:00 PM	66		5:00 AM	5		5:00 PM	91		5:00 AM	10		5:00 PM	157	
5:15 AM	6		5:15 PM	75		5:15 AM	9		5:15 PM	104		5:15 AM	15		5:15 PM	179	
5:30 AM	10		5:30 PM	69		5:30 AM	9		5:30 PM	89		5:30 AM	19		5:30 PM	158	
5:45 AM	28	49	5:45 PM	59	269	5:45 AM	9	32	5:45 PM	88	372	5:45 AM	37	81	5:45 PM	147	641
6:00 AM	27		6:00 PM	62		6:00 AM	11		6:00 PM	86		6:00 AM	38		6:00 PM	148	
6:15 AM	35		6:15 PM	50		6:15 AM	25		6:15 PM	52		6:15 AM	60		6:15 PM	102	
6:30 AM	48		6:30 PM	40		6:30 AM	40		6:30 PM	37		6:30 AM	88		6:30 PM	77	
6:45 AM	68	178	6:45 PM	48	200	6:45 AM	33	109	6:45 PM	42	217	6:45 AM	101	287	6:45 PM	90	417
7:00 AM	72		7:00 PM	38		7:00 AM	40		7:00 PM	28		7:00 AM	112		7:00 PM	66	
7:15 AM	79		7:15 PM	28		7:15 AM	58		7:15 PM	40		7:15 AM	137		7:15 PM	68	
7:30 AM	66		7:30 PM	32		7:30 AM	55		7:30 PM	28		7:30 AM	121		7:30 PM	60	
7:45 AM	73	290	7:45 PM	23	121	7:45 AM	50	203	7:45 PM	21	117	7:45 AM	123	493	7:45 PM	44	238
8:00 AM	56		8:00 PM	36		8:00 AM	51		8:00 PM	21		8:00 AM	107		8:00 PM	57	
8:15 AM	66		8:15 PM	21		8:15 AM	40		8:15 PM	22		8:15 AM	106		8:15 PM	43	
8:30 AM	56		8:30 PM	16		8:30 AM	59		8:30 PM	14		8:30 AM	115		8:30 PM	30	
8:45 AM	62	240	8:45 PM	12	85	8:45 AM	62	212	8:45 PM	9	66	8:45 AM	124	452	8:45 PM	21	151
9:00 AM	52		9:00 PM	15		9:00 AM	49		9:00 PM	12		9:00 AM	101		9:00 PM	27	
9:15 AM	36		9:15 PM	20		9:15 AM	42		9:15 PM	17		9:15 AM	78		9:15 PM	37	
9:30 AM	59		9:30 PM	12		9:30 AM	35		9:30 PM	18		9:30 AM	94		9:30 PM	30	
9:45 AM	55	202	9:45 PM	6	53	9:45 AM	47	173	9:45 PM	8	55	9:45 AM	102	375	9:45 PM	14	108
10:00 AM	49		10:00 PM	7		10:00 AM	52		10:00 PM	15		10:00 AM	101		10:00 PM	22	
10:15 AM	33		10:15 PM	5		10:15 AM	44		10:15 PM	7		10:15 AM	77		10:15 PM	12	
10:30 AM	39		10:30 PM	4		10:30 AM	49		10:30 PM	3		10:30 AM	88		10:30 PM	7	
10:45 AM	59	180	10:45 PM	5	21	10:45 AM	53	198	10:45 PM	6	31	10:45 AM	112	378	10:45 PM	11	52
11:00 AM	57		11:00 PM	8		11:00 AM	59		11:00 PM	5		11:00 AM	116		11:00 PM	13	
11:15 AM	41		11:15 PM	5		11:15 AM	55		11:15 PM	3		11:15 AM	96		11:15 PM	8	
11:30 AM	46		11:30 PM	2		11:30 AM	47		11:30 PM	1		11:30 AM	93		11:30 PM	3	
11:45 AM	79	223	11:45 PM	1	16	11:45 AM	63	224	11:45 PM	3	12	11:45 AM	142	447	11:45 PM	4	28
Total	1387		1898			Total	1180		2354			Total	2567		4252		
Percent	42.22%		57.78%			Percent	33.39%		66.61%			Percent	37.64%		62.36%		
Day Total			3285			Day Total			3534			Day Total			6819		
Peak Hour	7:00 AM		5:00 PM			Peak Hour	11:45 AM		4:45 PM			Peak Hour	11:45 AM		4:45 PM		
Volume	290		269			Volume	256		377			Volume	524		642		
P.H.F.	0.918		0.897			P.H.F.	0.865		0.906			P.H.F.	0.923		0.897		



PRECISION
DATA
INDUSTRIES, LLC

46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Mass Ave (Route 111) between
Adams Place and Paddock Lane
City, State: Boxborough, MA
Client: Nitsch/ B. Zimolka
Site Code: TBA

PDI File #: 207662 ATR-B

Count Date:
Wednesday, October 21, 2020

Volume

EB					WB					Combined							
Start Time:	15 min	60 min	15 min	60 min	Start Time:	15 min	60 min	15 min	60 min	Start Time:	15 min	60 min	15 min	60 min			
12:00 AM	3		12:00 PM	51	12:00 AM	5		12:00 PM	64	12:00 AM	8		12:00 PM	115			
12:15 AM	2		12:15 PM	69	12:15 AM	6		12:15 PM	74	12:15 AM	8		12:15 PM	143			
12:30 AM	4		12:30 PM	64	12:30 AM	2		12:30 PM	71	12:30 AM	6		12:30 PM	135			
12:45 AM	1	10	12:45 PM	66	250	12:45 AM	2	15	12:45 PM	76	285	12:45 AM	3	25	12:45 PM	142	535
1:00 AM	0		1:00 PM	72		1:00 AM	0		1:00 PM	63		1:00 AM	0		1:00 PM	135	
1:15 AM	1		1:15 PM	60		1:15 AM	1		1:15 PM	78		1:15 AM	2		1:15 PM	138	
1:30 AM	3		1:30 PM	55		1:30 AM	2		1:30 PM	63		1:30 AM	5		1:30 PM	118	
1:45 AM	0	4	1:45 PM	50	237	1:45 AM	1	4	1:45 PM	53	257	1:45 AM	1	8	1:45 PM	103	494
2:00 AM	1		2:00 PM	47		2:00 AM	1		2:00 PM	68		2:00 AM	2		2:00 PM	115	
2:15 AM	0		2:15 PM	58		2:15 AM	0		2:15 PM	65		2:15 AM	0		2:15 PM	123	
2:30 AM	0		2:30 PM	54		2:30 AM	0		2:30 PM	86		2:30 AM	0		2:30 PM	140	
2:45 AM	1	2	2:45 PM	64	223	2:45 AM	0	1	2:45 PM	88	307	2:45 AM	1	3	2:45 PM	152	530
3:00 AM	1		3:00 PM	71		3:00 AM	0		3:00 PM	98		3:00 AM	1		3:00 PM	169	
3:15 AM	2		3:15 PM	74		3:15 AM	0		3:15 PM	100		3:15 AM	2		3:15 PM	174	
3:30 AM	0		3:30 PM	60		3:30 AM	3		3:30 PM	70		3:30 AM	3		3:30 PM	130	
3:45 AM	0	3	3:45 PM	77	282	3:45 AM	2	5	3:45 PM	78	346	3:45 AM	2	8	3:45 PM	155	628
4:00 AM	1		4:00 PM	60		4:00 AM	0		4:00 PM	110		4:00 AM	1		4:00 PM	170	
4:15 AM	2		4:15 PM	64		4:15 AM	1		4:15 PM	88		4:15 AM	3		4:15 PM	152	
4:30 AM	1		4:30 PM	83		4:30 AM	4		4:30 PM	84		4:30 AM	5		4:30 PM	167	
4:45 AM	4	8	4:45 PM	77	284	4:45 AM	6	11	4:45 PM	77	359	4:45 AM	10	19	4:45 PM	154	643
5:00 AM	6		5:00 PM	68		5:00 AM	8		5:00 PM	128		5:00 AM	14		5:00 PM	196	
5:15 AM	8		5:15 PM	93		5:15 AM	12		5:15 PM	104		5:15 AM	20		5:15 PM	197	
5:30 AM	9		5:30 PM	111		5:30 AM	13		5:30 PM	88		5:30 AM	22		5:30 PM	199	
5:45 AM	20	43	5:45 PM	77	349	5:45 AM	12	45	5:45 PM	105	425	5:45 AM	32	88	5:45 PM	182	774
6:00 AM	20		6:00 PM	73		6:00 AM	19		6:00 PM	70		6:00 AM	39		6:00 PM	143	
6:15 AM	29		6:15 PM	72		6:15 AM	29		6:15 PM	79		6:15 AM	58		6:15 PM	151	
6:30 AM	47		6:30 PM	61		6:30 AM	23		6:30 PM	55		6:30 AM	70		6:30 PM	116	
6:45 AM	70	166	6:45 PM	51	257	6:45 AM	35	106	6:45 PM	60	264	6:45 AM	105	272	6:45 PM	111	521
7:00 AM	47		7:00 PM	47		7:00 AM	47		7:00 PM	46		7:00 AM	94		7:00 PM	93	
7:15 AM	70		7:15 PM	40		7:15 AM	51		7:15 PM	34		7:15 AM	121		7:15 PM	74	
7:30 AM	78		7:30 PM	24		7:30 AM	50		7:30 PM	32		7:30 AM	128		7:30 PM	56	
7:45 AM	79	274	7:45 PM	22	133	7:45 AM	56	204	7:45 PM	29	141	7:45 AM	135	478	7:45 PM	51	274
8:00 AM	68		8:00 PM	15		8:00 AM	53		8:00 PM	28		8:00 AM	121		8:00 PM	43	
8:15 AM	51		8:15 PM	27		8:15 AM	43		8:15 PM	20		8:15 AM	94		8:15 PM	47	
8:30 AM	45		8:30 PM	16		8:30 AM	61		8:30 PM	17		8:30 AM	106		8:30 PM	33	
8:45 AM	62	226	8:45 PM	16	74	8:45 AM	63	220	8:45 PM	13	78	8:45 AM	125	446	8:45 PM	29	152
9:00 AM	61		9:00 PM	19		9:00 AM	49		9:00 PM	23		9:00 AM	110		9:00 PM	42	
9:15 AM	52		9:15 PM	14		9:15 AM	48		9:15 PM	9		9:15 AM	100		9:15 PM	23	
9:30 AM	51		9:30 PM	16		9:30 AM	36		9:30 PM	10		9:30 AM	87		9:30 PM	26	
9:45 AM	39	203	9:45 PM	6	55	9:45 AM	54	187	9:45 PM	6	48	9:45 AM	93	390	9:45 PM	12	103
10:00 AM	52		10:00 PM	15		10:00 AM	48		10:00 PM	14		10:00 AM	100		10:00 PM	29	
10:15 AM	51		10:15 PM	7		10:15 AM	39		10:15 PM	8		10:15 AM	90		10:15 PM	15	
10:30 AM	44		10:30 PM	9		10:30 AM	47		10:30 PM	4		10:30 AM	91		10:30 PM	13	
10:45 AM	63	210	10:45 PM	6	37	10:45 AM	56	190	10:45 PM	3	29	10:45 AM	119	400	10:45 PM	9	66
11:00 AM	49		11:00 PM	3		11:00 AM	46		11:00 PM	9		11:00 AM	95		11:00 PM	12	
11:15 AM	51		11:15 PM	2		11:15 AM	55		11:15 PM	8		11:15 AM	106		11:15 PM	10	
11:30 AM	62		11:30 PM	6		11:30 AM	63		11:30 PM	2		11:30 AM	125		11:30 PM	8	
11:45 AM	76	238	11:45 PM	0	11	11:45 AM	65	229	11:45 PM	8	27	11:45 AM	141	467	11:45 PM	8	38
Total	1387			2192		Total	1217			2566		Total	2604			4758	
Percent	38.75%			61.25%		Percent	32.17%			67.83%		Percent	35.37%			64.63%	
Day Total				3579		Day Total				3783		Day Total				7362	
Peak Hour	7:15 AM			5:15 PM		Peak Hour	11:45 AM			5:00 PM		Peak Hour	11:45 AM			5:00 PM	
Volume	295			354		Volume	274			425		Volume	534			774	
P.H.F.	0.934			0.797		P.H.F.	0.926			0.830		P.H.F.	0.934			0.972	

Mass Ave (Route 111) between
 Adams Place and Paddock Lane
 City, State: Boxborough, MA
 Client: Nitsch/ B. Zimolka
 Site Code: TBA



PDI File #: 207662 ATR-B

Count Date
 Tuesday, October 20, 2020

Classification (60-minute)

EB														
Start Time:	Cycles	Cars and Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	Total
12:00 AM	0	5	0	0	0	0	0	0	0	0	0	0	0	5
1:00 AM	0	3	0	0	0	0	0	0	0	0	0	0	0	3
2:00 AM	0	0	1	0	0	0	0	0	0	0	0	0	0	1
3:00 AM	0	5	0	0	0	0	0	0	0	0	0	0	0	5
4:00 AM	0	8	2	0	0	1	0	0	0	0	0	0	0	11
5:00 AM	1	27	14	0	6	1	0	0	0	0	0	0	0	49
6:00 AM	1	119	46	0	9	0	0	1	2	0	0	0	0	178
7:00 AM	6	227	38	3	11	3	0	1	1	0	0	0	0	290
8:00 AM	2	186	29	5	14	0	1	2	0	1	0	0	0	240
9:00 AM	1	150	39	0	10	2	0	0	0	0	0	0	0	202
10:00 AM	0	129	32	4	12	0	0	1	2	0	0	0	0	180
11:00 AM	0	166	45	1	9	1	0	1	0	0	0	0	0	223
12:00 PM	0	186	40	2	13	1	0	1	1	0	0	0	0	244
1:00 PM	7	151	26	0	13	0	0	3	2	0	0	0	0	202
2:00 PM	5	160	44	1	7	2	0	0	1	0	0	0	0	220
3:00 PM	2	188	35	3	14	4	0	2	1	0	0	0	0	249
4:00 PM	0	184	25	1	4	2	0	0	2	0	0	0	0	218
5:00 PM	0	241	21	1	3	2	0	0	1	0	0	0	0	269
6:00 PM	0	173	16	0	4	3	0	3	1	0	0	0	0	200
7:00 PM	0	103	15	0	1	2	0	0	0	0	0	0	0	121
8:00 PM	0	73	9	0	3	0	0	0	0	0	0	0	0	85
9:00 PM	0	45	6	0	1	1	0	0	0	0	0	0	0	53
10:00 PM	0	18	2	0	1	0	0	0	0	0	0	0	0	21
11:00 PM	0	14	2	0	0	0	0	0	0	0	0	0	0	16
Total	25	2561	487	21	135	25	1	15	14	1	0	0	0	3285
Percent	0.76%	77.96%	14.82%	0.64%	4.11%	0.76%	0.03%	0.46%	0.43%	0.03%	0.00%	0.00%	0.00%	

AM Peak	7:00 AM	7:00 AM	6:00 AM	8:00 AM	8:00 AM	7:00 AM	8:00 AM	8:00 AM	6:00 AM	8:00 AM				7:00 AM
Volume	6	227	46	5	14	3	1	2	2	1	0	0	0	290
PM Peak	1:00 PM	5:00 PM	2:00 PM	3:00 PM	3:00 PM	3:00 PM		1:00 PM	1:00 PM					5:00 PM
Volume	7	241	44	3	14	4	0	3	2	0	0	0	0	269

Cycles:	25	0.8%
Cars and Light Trucks:	3048	92.8%
Heavy Vehicles:	212	6.5%

Mass Ave (Route 111) between
 Adams Place and Paddock Lane
 City, State: Boxborough, MA
 Client: Nitsch/ B. Zimolka
 Site Code: TBA



PDI File #: 207662 ATR-B

Count Date
 Tuesday, October 20, 2020

Classification (60-minute)

WB														
Start Time:	Cycles	Cars and Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	Total
12:00 AM	0	3	0	0	0	0	0	0	0	0	0	0	0	3
1:00 AM	0	3	1	0	0	0	0	0	0	0	0	0	0	4
2:00 AM	0	0	0	0	1	0	0	0	0	0	0	0	0	1
3:00 AM	0	8	1	0	0	0	0	1	0	0	0	0	0	10
4:00 AM	0	7	3	0	1	0	0	0	0	0	0	0	0	11
5:00 AM	0	24	6	0	2	0	0	0	0	0	0	0	0	32
6:00 AM	1	74	19	1	3	4	2	3	2	0	0	0	0	109
7:00 AM	1	152	35	2	6	2	0	4	1	0	0	0	0	203
8:00 AM	1	151	42	4	12	0	0	1	0	1	0	0	0	212
9:00 AM	2	135	18	2	12	2	0	0	1	1	0	0	0	173
10:00 AM	0	147	35	3	11	1	0	0	1	0	0	0	0	198
11:00 AM	4	162	39	3	14	0	0	2	0	0	0	0	0	224
12:00 PM	3	184	51	1	15	2	0	4	0	1	0	0	0	261
1:00 PM	1	164	43	3	14	1	0	2	2	0	0	0	0	230
2:00 PM	2	191	51	3	23	1	0	1	0	0	0	0	0	272
3:00 PM	7	277	59	1	18	1	0	2	3	0	0	0	0	368
4:00 PM	1	288	42	0	18	1	0	1	2	0	0	0	0	353
5:00 PM	3	302	47	0	19	0	0	0	1	0	0	0	0	372
6:00 PM	1	174	35	0	6	0	0	1	0	0	0	0	0	217
7:00 PM	0	93	19	0	4	0	0	1	0	0	0	0	0	117
8:00 PM	0	59	6	0	1	0	0	0	0	0	0	0	0	66
9:00 PM	0	45	7	1	2	0	0	0	0	0	0	0	0	55
10:00 PM	0	29	2	0	0	0	0	0	0	0	0	0	0	31
11:00 PM	0	10	0	0	2	0	0	0	0	0	0	0	0	12
PM Total	27	2682	561	24	184	15	2	23	13	3	0	0	0	3534
Percent	0.76%	75.89%	15.87%	0.68%	5.21%	0.42%	0.06%	0.65%	0.37%	0.08%	0.00%	0.00%	0.00%	

AM Peak	11:00 AM	11:00 AM	8:00 AM	8:00 AM	11:00 AM	6:00 AM	6:00 AM	7:00 AM	6:00 AM	8:00 AM				11:00 AM
Volume	4	162	42	4	14	4	2	4	2	1	0	0	0	224
PM Peak	3:00 PM	5:00 PM	3:00 PM	1:00 PM	2:00 PM	12:00 PM		12:00 PM	3:00 PM	12:00 PM				5:00 PM
Volume	7	302	59	3	23	2	0	4	3	1	0	0	0	372

Cycles:	27	0.8%
Cars and Light Trucks:	3243	91.8%
Heavy Vehicles:	264	7.5%

Mass Ave (Route 111) between
 Adams Place and Paddock Lane
 City, State: Boxborough, MA
 Client: Nitsch/ B. Zimolka
 Site Code: TBA



PDI File #: 207662 ATR-B

Count Date
 Tuesday, October 20, 2020

Classification (60-minute)

Combined														
Start Time:	Cycles	Cars and Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	Total
12:00 AM	0	8	0	0	0	0	0	0	0	0	0	0	0	8
1:00 AM	0	6	1	0	0	0	0	0	0	0	0	0	0	7
2:00 AM	0	0	1	0	1	0	0	0	0	0	0	0	0	2
3:00 AM	0	13	1	0	0	0	0	1	0	0	0	0	0	15
4:00 AM	0	15	5	0	1	1	0	0	0	0	0	0	0	22
5:00 AM	1	51	20	0	8	1	0	0	0	0	0	0	0	81
6:00 AM	2	193	65	1	12	4	2	4	4	0	0	0	0	287
7:00 AM	7	379	73	5	17	5	0	5	2	0	0	0	0	493
8:00 AM	3	337	71	9	26	0	1	3	0	2	0	0	0	452
9:00 AM	3	285	57	2	22	4	0	0	1	1	0	0	0	375
10:00 AM	0	276	67	7	23	1	0	1	3	0	0	0	0	378
11:00 AM	4	328	84	4	23	1	0	3	0	0	0	0	0	447
12:00 PM	3	370	91	3	28	3	0	5	1	1	0	0	0	505
1:00 PM	8	315	69	3	27	1	0	5	4	0	0	0	0	432
2:00 PM	7	351	95	4	30	3	0	1	1	0	0	0	0	492
3:00 PM	9	465	94	4	32	5	0	4	4	0	0	0	0	617
4:00 PM	1	472	67	1	22	3	0	1	4	0	0	0	0	571
5:00 PM	3	543	68	1	22	2	0	0	2	0	0	0	0	641
6:00 PM	1	347	51	0	10	3	0	4	1	0	0	0	0	417
7:00 PM	0	196	34	0	5	2	0	1	0	0	0	0	0	238
8:00 PM	0	132	15	0	4	0	0	0	0	0	0	0	0	151
9:00 PM	0	90	13	1	3	1	0	0	0	0	0	0	0	108
10:00 PM	0	47	4	0	1	0	0	0	0	0	0	0	0	52
11:00 PM	0	24	2	0	2	0	0	0	0	0	0	0	0	28
PM Total	52	5243	1048	45	319	40	3	38	27	4	0	0	0	6819
Percent	0.76%	76.89%	15.37%	0.66%	4.68%	0.59%	0.04%	0.56%	0.40%	0.06%	0.00%	0.00%	0.00%	

AM Peak	7:00 AM	7:00 AM	11:00 AM	8:00 AM	8:00 AM	7:00 AM	6:00 AM	7:00 AM	6:00 AM	8:00 AM				7:00 AM
Volume	7	379	84	9	26	5	2	5	4	2	0	0	0	493
PM Peak	3:00 PM	5:00 PM	2:00 PM	2:00 PM	3:00 PM	3:00 PM		12:00 PM	1:00 PM	12:00 PM				5:00 PM
Volume	9	543	95	4	32	5	0	5	4	1	0	0	0	641

Cycles:	52	0.8%
Cars and Light Trucks:	6291	92.3%
Heavy Vehicles:	476	7.0%

Mass Ave (Route 111) between
 Adams Place and Paddock Lane
 City, State: Boxborough, MA
 Client: Nitsch/ B. Zimolka
 Site Code: TBA



PDI File #: 207662 ATR-B

Count Date
 Wednesday, October 21, 2020

Classification (60-minute)

EB														
Start Time:	Cycles	Cars and Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	Total
12:00 AM	0	10	0	0	0	0	0	0	0	0	0	0	0	10
1:00 AM	0	3	0	0	0	1	0	0	0	0	0	0	0	4
2:00 AM	0	1	1	0	0	0	0	0	0	0	0	0	0	2
3:00 AM	0	3	0	0	0	0	0	0	0	0	0	0	0	3
4:00 AM	0	3	3	0	1	1	0	0	0	0	0	0	0	8
5:00 AM	0	31	6	0	5	0	0	0	1	0	0	0	0	43
6:00 AM	0	108	43	1	9	1	0	2	2	0	0	0	0	166
7:00 AM	1	203	39	3	20	2	0	4	1	1	0	0	0	274
8:00 AM	2	173	36	2	12	1	0	0	0	0	0	0	0	226
9:00 AM	0	154	28	1	13	3	0	4	0	0	0	0	0	203
10:00 AM	1	137	43	3	22	3	0	1	0	0	0	0	0	210
11:00 AM	0	190	28	1	11	3	0	3	2	0	0	0	0	238
12:00 PM	1	193	43	1	10	2	0	0	0	0	0	0	0	250
1:00 PM	1	179	42	0	8	2	0	2	2	1	0	0	0	237
2:00 PM	2	160	47	2	10	1	0	0	1	0	0	0	0	223
3:00 PM	1	233	36	0	9	0	0	2	1	0	0	0	0	282
4:00 PM	3	229	41	2	4	5	0	0	0	0	0	0	0	284
5:00 PM	6	298	31	1	7	1	0	3	2	0	0	0	0	349
6:00 PM	3	218	29	0	4	1	0	0	2	0	0	0	0	257
7:00 PM	0	116	14	0	0	1	0	2	0	0	0	0	0	133
8:00 PM	0	64	6	0	3	0	0	0	1	0	0	0	0	74
9:00 PM	0	45	7	1	2	0	0	0	0	0	0	0	0	55
10:00 PM	0	35	1	0	1	0	0	0	0	0	0	0	0	37
11:00 PM	0	10	1	0	0	0	0	0	0	0	0	0	0	11
Total	21	2796	525	18	151	28	0	23	15	2	0	0	0	3579
Percent	0.59%	78.12%	14.67%	0.50%	4.22%	0.78%	0.00%	0.64%	0.42%	0.06%	0.00%	0.00%	0.00%	

AM Peak	8:00 AM	7:00 AM	6:00 AM	7:00 AM	10:00 AM	9:00 AM		7:00 AM	6:00 AM	7:00 AM				7:00 AM
Volume	2	203	43	3	22	3	0	4	2	1	0	0	0	274
PM Peak	5:00 PM	5:00 PM	2:00 PM	2:00 PM	12:00 PM	4:00 PM		5:00 PM	1:00 PM	1:00 PM				5:00 PM
Volume	6	298	47	2	10	5	0	3	2	1	0	0	0	349

Cycles:	21	0.6%
Cars and Light Trucks:	3321	92.8%
Heavy Vehicles:	237	6.6%

Mass Ave (Route 111) between
 Adams Place and Paddock Lane
 City, State: Boxborough, MA
 Client: Nitsch/ B. Zimolka
 Site Code: TBA



PDI File #: 207662 ATR-B

Count Date
 Wednesday, October 21, 2020

Classification (60-minute)

WB														
Start Time:	Cycles	Cars and Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	Total
12:00 AM	0	12	2	0	1	0	0	0	0	0	0	0	0	15
1:00 AM	0	2	1	0	0	1	0	0	0	0	0	0	0	4
2:00 AM	0	1	0	0	0	0	0	0	0	0	0	0	0	1
3:00 AM	0	4	1	0	0	0	0	0	0	0	0	0	0	5
4:00 AM	0	7	4	0	0	0	0	0	0	0	0	0	0	11
5:00 AM	2	33	5	0	4	0	0	0	1	0	0	0	0	45
6:00 AM	1	81	15	0	3	4	0	1	1	0	0	0	0	106
7:00 AM	3	153	31	2	8	2	0	3	2	0	0	0	0	204
8:00 AM	4	179	29	2	4	1	0	1	0	0	0	0	0	220
9:00 AM	0	134	32	0	12	5	0	2	2	0	0	0	0	187
10:00 AM	2	137	23	5	21	0	0	0	2	0	0	0	0	190
11:00 AM	1	177	31	1	16	0	0	3	0	0	0	0	0	229
12:00 PM	2	210	51	2	14	2	0	2	2	0	0	0	0	285
1:00 PM	0	199	38	3	13	2	0	1	1	0	0	0	0	257
2:00 PM	3	211	72	0	18	0	0	1	2	0	0	0	0	307
3:00 PM	1	269	56	2	15	1	0	1	1	0	0	0	0	346
4:00 PM	5	267	62	1	19	1	0	4	0	0	0	0	0	359
5:00 PM	1	356	46	0	19	0	0	3	0	0	0	0	0	425
6:00 PM	3	206	43	0	10	1	0	1	0	0	0	0	0	264
7:00 PM	1	116	19	0	3	0	0	1	1	0	0	0	0	141
8:00 PM	0	64	12	0	2	0	0	0	0	0	0	0	0	78
9:00 PM	0	42	5	0	1	0	0	0	0	0	0	0	0	48
10:00 PM	0	24	4	0	1	0	0	0	0	0	0	0	0	29
11:00 PM	0	23	2	0	2	0	0	0	0	0	0	0	0	27
PM Total	29	2907	584	18	186	20	0	24	15	0	0	0	0	3783
Percent	0.77%	76.84%	15.44%	0.48%	4.92%	0.53%	0.00%	0.63%	0.40%	0.00%	0.00%	0.00%	0.00%	

AM Peak	8:00 AM	8:00 AM	9:00 AM	10:00 AM	10:00 AM	9:00 AM		7:00 AM	7:00 AM					11:00 AM
Volume	4	179	32	5	21	5	0	3	2	0	0	0	0	229
PM Peak	4:00 PM	5:00 PM	2:00 PM	1:00 PM	4:00 PM	12:00 PM		4:00 PM	12:00 PM					5:00 PM
Volume	5	356	72	3	19	2	0	4	2	0	0	0	0	425

Cycles:	29	0.8%
Cars and Light Trucks:	3491	92.3%
Heavy Vehicles:	263	7.0%

Mass Ave (Route 111) between
 Adams Place and Paddock Lane
 City, State: Boxborough, MA
 Client: Nitsch/ B. Zimolka
 Site Code: TBA



PDI File #: 207662 ATR-B

Count Date
 Wednesday, October 21, 2020

Classification (60-minute)

Combined														
Start Time:	Cycles	Cars and Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	Total
12:00 AM	0	22	2	0	1	0	0	0	0	0	0	0	0	25
1:00 AM	0	5	1	0	0	2	0	0	0	0	0	0	0	8
2:00 AM	0	2	1	0	0	0	0	0	0	0	0	0	0	3
3:00 AM	0	7	1	0	0	0	0	0	0	0	0	0	0	8
4:00 AM	0	10	7	0	1	1	0	0	0	0	0	0	0	19
5:00 AM	2	64	11	0	9	0	0	0	2	0	0	0	0	88
6:00 AM	1	189	58	1	12	5	0	3	3	0	0	0	0	272
7:00 AM	4	356	70	5	28	4	0	7	3	1	0	0	0	478
8:00 AM	6	352	65	4	16	2	0	1	0	0	0	0	0	446
9:00 AM	0	288	60	1	25	8	0	6	2	0	0	0	0	390
10:00 AM	3	274	66	8	43	3	0	1	2	0	0	0	0	400
11:00 AM	1	367	59	2	27	3	0	6	2	0	0	0	0	467
12:00 PM	3	403	94	3	24	4	0	2	2	0	0	0	0	535
1:00 PM	1	378	80	3	21	4	0	3	3	1	0	0	0	494
2:00 PM	5	371	119	2	28	1	0	1	3	0	0	0	0	530
3:00 PM	2	502	92	2	24	1	0	3	2	0	0	0	0	628
4:00 PM	8	496	103	3	23	6	0	4	0	0	0	0	0	643
5:00 PM	7	654	77	1	26	1	0	6	2	0	0	0	0	774
6:00 PM	6	424	72	0	14	2	0	1	2	0	0	0	0	521
7:00 PM	1	232	33	0	3	1	0	3	1	0	0	0	0	274
8:00 PM	0	128	18	0	5	0	0	0	1	0	0	0	0	152
9:00 PM	0	87	12	1	3	0	0	0	0	0	0	0	0	103
10:00 PM	0	59	5	0	2	0	0	0	0	0	0	0	0	66
11:00 PM	0	33	3	0	2	0	0	0	0	0	0	0	0	38
PM Total	50	5703	1109	36	337	48	0	47	30	2	0	0	0	7362
Percent	0.68%	77.47%	15.06%	0.49%	4.58%	0.65%	0.00%	0.64%	0.41%	0.03%	0.00%	0.00%	0.00%	

AM Peak	8:00 AM	11:00 AM	7:00 AM	10:00 AM	10:00 AM	9:00 AM		7:00 AM	6:00 AM	7:00 AM				7:00 AM
Volume	6	367	70	8	43	8	0	7	3	1	0	0	0	478
PM Peak	4:00 PM	5:00 PM	2:00 PM	12:00 PM	2:00 PM	4:00 PM		5:00 PM	1:00 PM	1:00 PM				5:00 PM
Volume	8	654	119	3	28	6	0	6	3	1	0	0	0	774

Cycles:	50	0.7%
Cars and Light Trucks:	6812	92.5%
Heavy Vehicles:	500	6.8%

Mass Ave (Route 111) between
 Adams Place and Paddock Lane
 City, State: Boxborough, MA
 Client: Nitsch/ B. Zimolka
 Site Code: TBA



PDI File #: 207662 ATR-B

Count Date
 Tuesday, October 20, 2020

Speed (60-minute)

EB																
Start Time:	1 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 to 69	70+	Total	85th %ile	Ave Speed
12:00 AM	0	0	1	0	0	4	0	0	0	0	0	0	0	5	37.4	33.8
1:00 AM	0	0	1	0	0	1	1	0	0	0	0	0	0	3	39.1	32.3
2:00 AM	0	1	0	0	0	0	0	0	0	0	0	0	0	1	19.0	19.0
3:00 AM	0	0	1	1	0	3	0	0	0	0	0	0	0	5	39.0	32.2
4:00 AM	0	2	1	0	0	5	3	0	0	0	0	0	0	11	40.5	33.3
5:00 AM	2	6	3	3	12	13	9	1	0	0	0	0	0	49	40.8	31.5
6:00 AM	3	12	11	10	42	68	30	2	0	0	0	0	0	178	40.0	33.4
7:00 AM	9	17	26	16	59	98	51	12	2	0	0	0	0	290	41.0	33.5
8:00 AM	4	19	13	10	58	98	32	4	2	0	0	0	0	240	40.0	33.6
9:00 AM	2	15	15	14	52	79	22	3	0	0	0	0	0	202	39.0	32.9
10:00 AM	3	18	10	19	50	53	26	0	1	0	0	0	0	180	39.2	32.2
11:00 AM	3	17	16	12	54	74	38	9	0	0	0	0	0	223	40.0	33.6
12:00 PM	0	15	18	20	44	98	42	7	0	0	0	0	0	244	40.0	34.0
1:00 PM	4	12	10	9	48	83	32	4	0	0	0	0	0	202	40.0	33.8
2:00 PM	12	3	16	13	38	87	45	5	1	0	0	0	0	220	41.0	34.1
3:00 PM	3	18	21	12	46	97	42	10	0	0	0	0	0	249	41.0	33.8
4:00 PM	3	16	19	18	44	82	31	4	1	0	0	0	0	218	40.0	33.0
5:00 PM	7	13	29	14	73	101	29	3	0	0	0	0	0	269	39.0	32.4
6:00 PM	7	16	14	12	53	74	23	1	0	0	0	0	0	200	39.0	32.4
7:00 PM	2	16	12	8	34	27	18	4	0	0	0	0	0	121	40.0	31.3
8:00 PM	1	6	5	3	15	36	13	6	0	0	0	0	0	85	41.0	34.7
9:00 PM	1	5	9	4	7	19	7	1	0	0	0	0	0	53	38.4	31.2
10:00 PM	1	0	2	5	3	7	1	2	0	0	0	0	0	21	39.0	33.0
11:00 PM	0	2	3	0	1	5	4	1	0	0	0	0	0	16	40.8	32.7
Total	67	229	256	203	733	1212	499	79	7	0	0	0	0	3285	40.0	33.2
Percent	2.04%	6.97%	7.79%	6.18%	22.31%	36.89%	15.19%	2.40%	0.21%	0.00%	0.00%	0.00%	0.00%			

AM Peak	7:00 AM	8:00 AM	7:00 AM	10:00 AM	7:00 AM	7:00 AM	7:00 AM	7:00 AM	7:00 AM	7:00 AM						7:00 AM
Volume	9	19	26	19	59	98	51	12	2	0	0	0	0	290		
PM Peak	2:00 PM	3:00 PM	5:00 PM	12:00 PM	5:00 PM	5:00 PM	2:00 PM	3:00 PM	2:00 PM							5:00 PM
Volume	12	18	29	20	73	101	45	10	1	0	0	0	0	269		

15th Percentile:	23.0 MPH	Average Speed:	33.2 MPH	Posted Speed Limit:	40 MPH
50th Percentile:	35.0 MPH	10 MPH Pace:	32 to 41 MPH	Number of Vehicles > 40 MPH:	415
85th Percentile:	40.0 MPH	Number in Pace:	2050	Percent of Vehicles > 40 MPH:	12.6%
95th Percentile:	43.0 MPH	Percent in Pace:	62.4%		

Mass Ave (Route 111) between
 Adams Place and Paddock Lane
 City, State: Boxborough, MA
 Client: Nitsch/ B. Zimolka
 Site Code: TBA



PDI File #: 207662 ATR-B

Count Date
 Tuesday, October 20, 2020

Speed (60-minute)

WB																
Start Time:	1 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 to 69	70+	Total	85th %ile	Ave Speed
12:00 AM	0	0	0	0	0	2	1	0	0	0	0	0	0	3	39.8	38.3
1:00 AM	0	1	0	1	0	1	0	0	1	0	0	0	0	4	46.8	34.8
2:00 AM	0	0	0	0	0	0	0	1	0	0	0	0	0	1	48.0	48.0
3:00 AM	0	0	2	0	2	1	5	0	0	0	0	0	0	10	43.3	35.6
4:00 AM	3	1	1	0	1	2	3	0	0	0	0	0	0	11	41.0	27.9
5:00 AM	2	7	6	1	4	5	4	2	0	1	0	0	0	32	41.7	29.3
6:00 AM	12	24	10	4	18	33	7	1	0	0	0	0	0	109	38.8	27.9
7:00 AM	14	23	14	7	31	62	44	8	0	0	0	0	0	203	41.0	32.3
8:00 AM	8	35	18	10	37	65	36	3	0	0	0	0	0	212	40.0	31.1
9:00 AM	9	25	16	7	36	55	20	5	0	0	0	0	0	173	39.0	30.9
10:00 AM	9	24	13	16	39	58	37	2	0	0	0	0	0	198	40.0	31.9
11:00 AM	12	32	11	13	40	61	43	12	0	0	0	0	0	224	41.0	31.9
12:00 PM	5	18	15	12	36	104	57	13	0	1	0	0	0	261	42.0	34.8
1:00 PM	9	14	9	7	19	83	84	5	0	0	0	0	0	230	42.0	35.5
2:00 PM	10	15	23	9	34	110	60	10	1	0	0	0	0	272	41.0	34.3
3:00 PM	12	33	26	35	63	132	59	8	0	0	0	0	0	368	40.0	32.6
4:00 PM	7	28	10	22	73	138	68	7	0	0	0	0	0	353	40.0	34.1
5:00 PM	12	35	10	25	79	146	61	4	0	0	0	0	0	372	40.0	33.2
6:00 PM	5	16	1	6	51	90	41	6	1	0	0	0	0	217	41.0	34.8
7:00 PM	7	8	2	6	11	45	30	8	0	0	0	0	0	117	42.0	35.0
8:00 PM	1	3	5	3	7	22	22	3	0	0	0	0	0	66	43.0	35.9
9:00 PM	2	3	4	2	2	20	15	7	0	0	0	0	0	55	44.0	36.1
10:00 PM	4	6	0	0	1	9	9	2	0	0	0	0	0	31	41.5	31.3
11:00 PM	0	0	0	0	1	2	3	4	0	2	0	0	0	12	51.1	44.3
Total	143	351	196	186	585	1246	709	111	3	4	0	0	0	3534	41.0	33.2
Percent	4.05%	9.93%	5.55%	5.26%	16.55%	35.26%	20.06%	3.14%	0.08%	0.11%	0.00%	0.00%	0.00%			

AM Peak	7:00 AM	8:00 AM	8:00 AM	10:00 AM	11:00 AM	8:00 AM	7:00 AM	11:00 AM	1:00 AM	5:00 AM				11:00 AM
Volume	14	35	18	16	40	65	44	12	1	1	0	0	0	224
PM Peak	3:00 PM	5:00 PM	3:00 PM	3:00 PM	5:00 PM	5:00 PM	1:00 PM	12:00 PM	2:00 PM	11:00 PM				5:00 PM
Volume	12	35	26	35	79	146	84	13	1	2	0	0	0	372

15th Percentile:	20.0 MPH	Average Speed:	33.2 MPH	Posted Speed Limit:	40 MPH
50th Percentile:	36.0 MPH	10 MPH Pace:	33 to 42 MPH	Number of Vehicles > 40 MPH:	588
85th Percentile:	41.0 MPH	Number in Pace:	2137	Percent of Vehicles > 40 MPH:	16.6%
95th Percentile:	44.0 MPH	Percent in Pace:	60.5%		

Mass Ave (Route 111) between
 Adams Place and Paddock Lane
 City, State: Boxborough, MA
 Client: Nitsch/ B. Zimolka
 Site Code: TBA



PRECISION
 DATA
 INDUSTRIES, LLC
 46 Morton Street, Framingham, MA 01702
 Office: 508-875-0100 Fax: 508-875-0118
 Email: datarequests@pdillc.com

PDI File #: 207662 ATR-B

Count Date
 Tuesday, October 20, 2020

Speed (60-minute)

Combined EB and WB

Start Time:	1 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 to 69	70+	Total	85th %ile	Ave Speed
12:00 AM	0	0	1	0	0	6	1	0	0	0	0	0	0	8	38.0	35.5
1:00 AM	0	1	1	1	0	2	1	0	1	0	0	0	0	7	41.4	33.7
2:00 AM	0	1	0	0	0	0	0	1	0	0	0	0	0	2	43.7	33.5
3:00 AM	0	0	3	1	2	4	5	0	0	0	0	0	0	15	42.0	34.5
4:00 AM	3	3	2	0	1	7	6	0	0	0	0	0	0	22	40.9	30.6
5:00 AM	4	13	9	4	16	18	13	3	0	1	0	0	0	81	41.0	30.6
6:00 AM	15	36	21	14	60	101	37	3	0	0	0	0	0	287	39.0	31.3
7:00 AM	23	40	40	23	90	160	95	20	2	0	0	0	0	493	41.0	33.0
8:00 AM	12	54	31	20	95	163	68	7	2	0	0	0	0	452	40.0	32.4
9:00 AM	11	40	31	21	88	134	42	8	0	0	0	0	0	375	39.0	32.0
10:00 AM	12	42	23	35	89	111	63	2	1	0	0	0	0	378	40.0	32.0
11:00 AM	15	49	27	25	94	135	81	21	0	0	0	0	0	447	41.0	32.7
12:00 PM	5	33	33	32	80	202	99	20	0	1	0	0	0	505	41.0	34.4
1:00 PM	13	26	19	16	67	166	116	9	0	0	0	0	0	432	41.0	34.7
2:00 PM	22	18	39	22	72	197	105	15	2	0	0	0	0	492	41.0	34.2
3:00 PM	15	51	47	47	109	229	101	18	0	0	0	0	0	617	40.0	33.1
4:00 PM	10	44	29	40	117	220	99	11	1	0	0	0	0	571	40.0	33.7
5:00 PM	19	48	39	39	152	247	90	7	0	0	0	0	0	641	40.0	32.9
6:00 PM	12	32	15	18	104	164	64	7	1	0	0	0	0	417	40.0	33.6
7:00 PM	9	24	14	14	45	72	48	12	0	0	0	0	0	238	41.0	33.1
8:00 PM	2	9	10	6	22	58	35	9	0	0	0	0	0	151	42.0	35.2
9:00 PM	3	8	13	6	9	39	22	8	0	0	0	0	0	108	42.0	33.7
10:00 PM	5	6	2	5	4	16	10	4	0	0	0	0	0	52	41.4	32.0
11:00 PM	0	2	3	0	2	7	7	5	0	2	0	0	0	28	45.0	37.7
Total	210	580	452	389	1318	2458	1208	190	10	4	0	0	0	6819	40.0	33.2
Percent	3.08%	8.51%	6.63%	5.70%	19.33%	36.05%	17.72%	2.79%	0.15%	0.06%	0.00%	0.00%	0.00%			

AM Peak	7:00 AM	8:00 AM	7:00 AM	10:00 AM	8:00 AM	8:00 AM	7:00 AM	11:00 AM	7:00 AM	5:00 AM				7:00 AM
Volume	23	54	40	35	95	163	95	21	2	1	0	0	0	493

PM Peak	2:00 PM	3:00 PM	3:00 PM	3:00 PM	5:00 PM	5:00 PM	1:00 PM	12:00 PM	2:00 PM	11:00 PM				5:00 PM
Volume	22	51	47	47	152	247	116	20	2	2	0	0	0	641

15th Percentile:	22.0 MPH	Average Speed:	33.2 MPH	Posted Speed Limit:	40 MPH
50th Percentile:	35.0 MPH	10 MPH Pace:	32 to 41 MPH	Number of Vehicles > 40 MPH:	1003
85th Percentile:	40.0 MPH	Number in Pace:	4145	Percent of Vehicles > 40 MPH:	14.7%
95th Percentile:	43.0 MPH	Percent in Pace:	60.8%		

Mass Ave (Route 111) between
 Adams Place and Paddock Lane
 City, State: Boxborough, MA
 Client: Nitsch/ B. Zimolka
 Site Code: TBA



PDI File #: 207662 ATR-B

Count Date
 Wednesday, October 21, 2020

Speed (60-minute)

EB																
Start Time:	1 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 to 69	70+	Total	85th %ile	Ave Speed
12:00 AM	2	0	0	0	2	4	1	1	0	0	0	0	0	10	39.7	31.8
1:00 AM	0	0	0	0	0	2	2	0	0	0	0	0	0	4	40.6	38.5
2:00 AM	0	2	0	0	0	0	0	0	0	0	0	0	0	2	18.4	17.0
3:00 AM	0	1	0	0	1	0	1	0	0	0	0	0	0	3	38.2	30.3
4:00 AM	1	0	0	1	1	3	2	0	0	0	0	0	0	8	40.9	33.4
5:00 AM	4	6	5	2	7	14	4	1	0	0	0	0	0	43	39.0	29.6
6:00 AM	3	9	19	15	41	48	25	6	0	0	0	0	0	166	40.0	32.7
7:00 AM	2	16	27	22	56	92	51	7	1	0	0	0	0	274	40.1	33.5
8:00 AM	2	14	17	15	54	82	37	3	1	1	0	0	0	226	40.0	33.5
9:00 AM	0	14	12	12	37	82	40	6	0	0	0	0	0	203	41.0	34.2
10:00 AM	2	13	17	16	43	75	36	8	0	0	0	0	0	210	40.0	33.6
11:00 AM	3	14	11	25	51	90	40	3	1	0	0	0	0	238	40.0	33.7
12:00 PM	3	21	24	21	55	80	42	4	0	0	0	0	0	250	40.0	32.6
1:00 PM	3	20	12	10	45	97	42	8	0	0	0	0	0	237	41.0	34.2
2:00 PM	2	16	19	25	48	75	34	2	2	0	0	0	0	223	40.0	33.0
3:00 PM	4	19	17	14	60	117	44	7	0	0	0	0	0	282	40.0	33.8
4:00 PM	3	15	17	22	77	109	33	8	0	0	0	0	0	284	39.0	33.5
5:00 PM	7	16	33	28	102	131	30	1	1	0	0	0	0	349	38.0	32.4
6:00 PM	5	13	15	28	80	83	33	0	0	0	0	0	0	257	39.0	32.7
7:00 PM	2	6	19	9	26	54	15	2	0	0	0	0	0	133	39.0	32.5
8:00 PM	3	9	4	4	19	27	8	0	0	0	0	0	0	74	39.0	31.6
9:00 PM	0	9	8	2	7	15	12	1	0	1	0	0	0	55	41.9	32.5
10:00 PM	0	3	4	2	7	14	6	1	0	0	0	0	0	37	41.2	33.0
11:00 PM	0	3	0	0	3	4	1	0	0	0	0	0	0	11	37.0	30.5
Total	51	239	280	273	822	1298	539	69	6	2	0	0	0	3579	40.0	33.2
Percent	1.42%	6.68%	7.82%	7.63%	22.97%	36.27%	15.06%	1.93%	0.17%	0.06%	0.00%	0.00%	0.00%			

AM Peak	5:00 AM	7:00 AM	7:00 AM	11:00 AM	7:00 AM	7:00 AM	7:00 AM	10:00 AM	7:00 AM	8:00 AM					7:00 AM
Volume	4	16	27	25	56	92	51	8	1	1	0	0	0	274	
PM Peak	5:00 PM	12:00 PM	5:00 PM	5:00 PM	5:00 PM	5:00 PM	3:00 PM	1:00 PM	2:00 PM	9:00 PM					5:00 PM
Volume	7	21	33	28	102	131	44	8	2	1	0	0	0	349	

15th Percentile:	24.0 MPH	Average Speed:	33.2 MPH	Posted Speed Limit:	40 MPH
50th Percentile:	35.0 MPH	10 MPH Pace:	32 to 41 MPH	Number of Vehicles > 40 MPH:	432
85th Percentile:	40.0 MPH	Number in Pace:	2225	Percent of Vehicles > 40 MPH:	12.1%
95th Percentile:	42.0 MPH	Percent in Pace:	62.2%		

Mass Ave (Route 111) between
Adams Place and Paddock Lane
City, State: Boxborough, MA
Client: Nitsch/ B. Zimolka
Site Code: TBA



PDI File #: 207662 ATR-B

Count Date
Wednesday, October 21, 2020

Speed (60-minute)

WB																
Start Time:	1 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 to 69	70+	Total	85th %ile	Ave Speed
12:00 AM	2	1	1	0	1	5	4	1	0	0	0	0	0	15	41.9	33.6
1:00 AM	0	0	0	1	0	2	1	0	0	0	0	0	0	4	40.7	35.8
2:00 AM	1	0	0	0	0	0	0	0	0	0	0	0	0	1	13.0	13.0
3:00 AM	0	2	0	0	1	1	0	0	0	1	0	0	0	5	46.0	32.8
4:00 AM	1	2	1	0	3	2	1	1	0	0	0	0	0	11	38.0	29.1
5:00 AM	8	12	4	2	3	10	5	1	0	0	0	0	0	45	38.4	25.3
6:00 AM	10	21	8	5	16	30	13	3	0	0	0	0	0	106	39.3	29.3
7:00 AM	15	36	16	8	19	74	27	9	0	0	0	0	0	204	40.0	30.7
8:00 AM	11	19	25	8	43	73	37	4	0	0	0	0	0	220	40.0	31.8
9:00 AM	10	24	11	7	27	61	38	7	2	0	0	0	0	187	41.0	32.7
10:00 AM	9	11	25	6	33	59	36	8	3	0	0	0	0	190	41.0	32.9
11:00 AM	8	25	7	14	33	84	45	11	1	1	0	0	0	229	41.0	33.7
12:00 PM	8	24	18	13	69	108	41	3	1	0	0	0	0	285	40.0	32.8
1:00 PM	8	22	17	10	32	94	67	7	0	0	0	0	0	257	41.0	34.1
2:00 PM	2	20	22	17	64	112	65	5	0	0	0	0	0	307	41.0	34.1
3:00 PM	6	21	10	13	52	134	100	10	0	0	0	0	0	346	42.0	35.6
4:00 PM	5	24	11	20	82	151	64	2	0	0	0	0	0	359	40.0	34.2
5:00 PM	10	21	21	26	95	187	61	4	0	0	0	0	0	425	40.0	33.6
6:00 PM	5	13	13	21	59	109	34	8	2	0	0	0	0	264	40.0	34.1
7:00 PM	4	15	7	12	14	45	37	7	0	0	0	0	0	141	42.0	34.2
8:00 PM	1	8	4	6	10	18	23	8	0	0	0	0	0	78	43.0	34.9
9:00 PM	1	3	1	2	4	12	20	5	0	0	0	0	0	48	44.0	37.2
10:00 PM	1	2	1	2	5	5	8	4	1	0	0	0	0	29	45.6	35.8
11:00 PM	0	1	1	0	1	7	8	6	1	0	2	0	0	27	47.2	41.6
Total	126	327	224	193	666	1383	735	114	11	2	2	0	0	3783	41.0	33.5
Percent	3.33%	8.64%	5.92%	5.10%	17.61%	36.56%	19.43%	3.01%	0.29%	0.05%	0.05%	0.00%	0.00%			

AM Peak	7:00 AM	7:00 AM	8:00 AM	11:00 AM	8:00 AM	11:00 AM	11:00 AM	11:00 AM	10:00 AM	3:00 AM					11:00 AM
Volume	15	36	25	14	43	84	45	11	3	1	0	0	0	0	229
PM Peak	5:00 PM	12:00 PM	2:00 PM	5:00 PM	5:00 PM	5:00 PM	3:00 PM	3:00 PM	6:00 PM		11:00 PM				5:00 PM
Volume	10	24	22	26	95	187	100	10	2	0	2	0	0	0	425

15th Percentile:	21.0 MPH	Average Speed:	33.5 MPH	Posted Speed Limit:	40 MPH
50th Percentile:	36.0 MPH	10 MPH Pace:	33 to 42 MPH	Number of Vehicles > 40 MPH:	643
85th Percentile:	41.0 MPH	Number in Pace:	2282	Percent of Vehicles > 40 MPH:	17.0%
95th Percentile:	44.0 MPH	Percent in Pace:	60.3%		

Mass Ave (Route 111) between
 Adams Place and Paddock Lane
 City, State: Boxborough, MA
 Client: Nitsch/ B. Zimolka
 Site Code: TBA



PDI File #: 207662 ATR-B

Count Date
 Wednesday, October 21, 2020

Speed (60-minute)

Combined EB and WB

Start Time:	1 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 to 69	70+	Total	85th %ile	Ave Speed
12:00 AM	4	1	1	0	3	9	5	2	0	0	0	0	0	25	41.4	32.9
1:00 AM	0	0	0	1	0	4	3	0	0	0	0	0	0	8	41.0	37.1
2:00 AM	1	2	0	0	0	0	0	0	0	0	0	0	0	3	17.8	15.7
3:00 AM	0	3	0	0	2	1	1	0	0	1	0	0	0	8	39.9	31.9
4:00 AM	2	2	1	1	4	5	3	1	0	0	0	0	0	19	40.3	30.9
5:00 AM	12	18	9	4	10	24	9	2	0	0	0	0	0	88	39.0	27.4
6:00 AM	13	30	27	20	57	78	38	9	0	0	0	0	0	272	40.0	31.3
7:00 AM	17	52	43	30	75	166	78	16	1	0	0	0	0	478	40.0	32.3
8:00 AM	13	33	42	23	97	155	74	7	1	1	0	0	0	446	40.0	32.7
9:00 AM	10	38	23	19	64	143	78	13	2	0	0	0	0	390	41.0	33.5
10:00 AM	11	24	42	22	76	134	72	16	3	0	0	0	0	400	40.0	33.3
11:00 AM	11	39	18	39	84	174	85	14	2	1	0	0	0	467	41.0	33.7
12:00 PM	11	45	42	34	124	188	83	7	1	0	0	0	0	535	40.0	32.8
1:00 PM	11	42	29	20	77	191	109	15	0	0	0	0	0	494	41.0	34.1
2:00 PM	4	36	41	42	112	187	99	7	2	0	0	0	0	530	41.0	33.6
3:00 PM	10	40	27	27	112	251	144	17	0	0	0	0	0	628	41.0	34.8
4:00 PM	8	39	28	42	159	260	97	10	0	0	0	0	0	643	40.0	33.9
5:00 PM	17	37	54	54	197	318	91	5	1	0	0	0	0	774	39.0	33.1
6:00 PM	10	26	28	49	139	192	67	8	2	0	0	0	0	521	39.0	33.4
7:00 PM	6	21	26	21	40	99	52	9	0	0	0	0	0	274	41.0	33.4
8:00 PM	4	17	8	10	29	45	31	8	0	0	0	0	0	152	41.0	33.3
9:00 PM	1	12	9	4	11	27	32	6	0	1	0	0	0	103	44.0	34.7
10:00 PM	1	5	5	4	12	19	14	5	1	0	0	0	0	66	42.0	34.2
11:00 PM	0	4	1	0	4	11	9	6	1	0	2	0	0	38	47.0	38.4
Total	177	566	504	466	1488	2681	1274	183	17	4	2	0	0	7362	40.0	33.3
Percent	2.40%	7.69%	6.85%	6.33%	20.21%	36.42%	17.31%	2.49%	0.23%	0.05%	0.03%	0.00%	0.00%			

AM Peak	7:00 AM	7:00 AM	7:00 AM	11:00 AM	8:00 AM	11:00 AM	11:00 AM	7:00 AM	10:00 AM	3:00 AM					7:00 AM
Volume	17	52	43	39	97	174	85	16	3	1	0	0	0	478	
PM Peak	5:00 PM	12:00 PM	5:00 PM	5:00 PM	5:00 PM	5:00 PM	3:00 PM	3:00 PM	2:00 PM	9:00 PM	11:00 PM			5:00 PM	
Volume	17	45	54	54	197	318	144	17	2	1	2	0	0	774	

15th Percentile: 22.0 MPH Average Speed: 33.3 MPH Posted Speed Limit: 40 MPH
 50th Percentile: 35.0 MPH 10 MPH Pace: 32 to 41 MPH Number of Vehicles > 40 MPH: 1075
 85th Percentile: 40.0 MPH Number in Pace: 4472 Percent of Vehicles > 40 MPH: 14.6%
 95th Percentile: 43.0 MPH Percent in Pace: 60.7%



PRECISION
DATA
INDUSTRIES, LLC

46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Mass Ave (Route 111)
east of Paddock Lane
City, State: **Boxborough, MA**
Client: **Nitsch/ B. Zimolka**
Site Code: **TBA**

PDI File #: 207662 ATR-C

Count Date:
Tuesday, October 20, 2020

Volume

WB					EB					Combined							
Start Time:	15 min	60 min	15 min	60 min	Start Time:	15 min	60 min	15 min	60 min	Start Time:	15 min	60 min	15 min	60 min			
12:00 AM	1		12:00 PM	51	12:00 AM	4		12:00 PM	65	12:00 AM	5		12:00 PM	116			
12:15 AM	3		12:15 PM	69	12:15 AM	0		12:15 PM	56	12:15 AM	3		12:15 PM	125			
12:30 AM	1		12:30 PM	70	12:30 AM	0		12:30 PM	68	12:30 AM	1		12:30 PM	138			
12:45 AM	1	6	12:45 PM	68	258	12:45 AM	0	4	12:45 PM	55	244	12:45 AM	1	10	12:45 PM	123	502
1:00 AM	1		1:00 PM	49		1:00 AM	0		1:00 PM	41		1:00 AM	1		1:00 PM	90	
1:15 AM	0		1:15 PM	63		1:15 AM	1		1:15 PM	46		1:15 AM	1		1:15 PM	109	
1:30 AM	1		1:30 PM	62		1:30 AM	0		1:30 PM	51		1:30 AM	1		1:30 PM	113	
1:45 AM	1	3	1:45 PM	57	231	1:45 AM	2	3	1:45 PM	59	197	1:45 AM	3	6	1:45 PM	116	428
2:00 AM	0		2:00 PM	65		2:00 AM	0		2:00 PM	42		2:00 AM	0		2:00 PM	107	
2:15 AM	0		2:15 PM	71		2:15 AM	0		2:15 PM	52		2:15 AM	0		2:15 PM	123	
2:30 AM	1		2:30 PM	64		2:30 AM	1		2:30 PM	50		2:30 AM	2		2:30 PM	114	
2:45 AM	0	1	2:45 PM	65	265	2:45 AM	0	1	2:45 PM	78	222	2:45 AM	0	2	2:45 PM	143	487
3:00 AM	1		3:00 PM	99		3:00 AM	0		3:00 PM	59		3:00 AM	1		3:00 PM	158	
3:15 AM	2		3:15 PM	112		3:15 AM	1		3:15 PM	70		3:15 AM	3		3:15 PM	182	
3:30 AM	2		3:30 PM	75		3:30 AM	1		3:30 PM	57		3:30 AM	3		3:30 PM	132	
3:45 AM	5	10	3:45 PM	78	364	3:45 AM	2	4	3:45 PM	64	250	3:45 AM	7	14	3:45 PM	142	614
4:00 AM	1		4:00 PM	90		4:00 AM	2		4:00 PM	41		4:00 AM	3		4:00 PM	131	
4:15 AM	0		4:15 PM	80		4:15 AM	1		4:15 PM	50		4:15 AM	1		4:15 PM	130	
4:30 AM	2		4:30 PM	87		4:30 AM	1		4:30 PM	64		4:30 AM	3		4:30 PM	151	
4:45 AM	4	7	4:45 PM	103	360	4:45 AM	7	11	4:45 PM	51	206	4:45 AM	11	18	4:45 PM	154	566
5:00 AM	6		5:00 PM	83		5:00 AM	7		5:00 PM	67		5:00 AM	13		5:00 PM	150	
5:15 AM	4		5:15 PM	102		5:15 AM	4		5:15 PM	64		5:15 AM	8		5:15 PM	166	
5:30 AM	7		5:30 PM	87		5:30 AM	10		5:30 PM	57		5:30 AM	17		5:30 PM	144	
5:45 AM	7	24	5:45 PM	87	359	5:45 AM	26	47	5:45 PM	51	239	5:45 AM	33	71	5:45 PM	138	598
6:00 AM	8		6:00 PM	90		6:00 AM	27		6:00 PM	55		6:00 AM	35		6:00 PM	145	
6:15 AM	22		6:15 PM	49		6:15 AM	34		6:15 PM	48		6:15 AM	56		6:15 PM	97	
6:30 AM	26		6:30 PM	45		6:30 AM	48		6:30 PM	38		6:30 AM	74		6:30 PM	83	
6:45 AM	32	88	6:45 PM	41	225	6:45 AM	70	179	6:45 PM	38	179	6:45 AM	102	267	6:45 PM	79	404
7:00 AM	38		7:00 PM	28		7:00 AM	76		7:00 PM	34		7:00 AM	114		7:00 PM	62	
7:15 AM	47		7:15 PM	38		7:15 AM	78		7:15 PM	26		7:15 AM	125		7:15 PM	64	
7:30 AM	50		7:30 PM	29		7:30 AM	62		7:30 PM	29		7:30 AM	112		7:30 PM	58	
7:45 AM	48	183	7:45 PM	19	114	7:45 AM	74	290	7:45 PM	20	109	7:45 AM	122	473	7:45 PM	39	223
8:00 AM	47		8:00 PM	24		8:00 AM	56		8:00 PM	34		8:00 AM	103		8:00 PM	58	
8:15 AM	39		8:15 PM	21		8:15 AM	67		8:15 PM	18		8:15 AM	106		8:15 PM	39	
8:30 AM	48		8:30 PM	19		8:30 AM	55		8:30 PM	16		8:30 AM	103		8:30 PM	35	
8:45 AM	59	193	8:45 PM	11	75	8:45 AM	61	239	8:45 PM	14	82	8:45 AM	120	432	8:45 PM	25	157
9:00 AM	45		9:00 PM	15		9:00 AM	55		9:00 PM	10		9:00 AM	100		9:00 PM	25	
9:15 AM	47		9:15 PM	15		9:15 AM	38		9:15 PM	16		9:15 AM	85		9:15 PM	31	
9:30 AM	29		9:30 PM	17		9:30 AM	56		9:30 PM	10		9:30 AM	85		9:30 PM	27	
9:45 AM	45	166	9:45 PM	8	55	9:45 AM	53	202	9:45 PM	5	41	9:45 AM	98	368	9:45 PM	13	96
10:00 AM	45		10:00 PM	11		10:00 AM	47		10:00 PM	6		10:00 AM	92		10:00 PM	17	
10:15 AM	35		10:15 PM	7		10:15 AM	34		10:15 PM	6		10:15 AM	69		10:15 PM	13	
10:30 AM	50		10:30 PM	2		10:30 AM	39		10:30 PM	4		10:30 AM	89		10:30 PM	6	
10:45 AM	49	179	10:45 PM	4	24	10:45 AM	59	179	10:45 PM	4	20	10:45 AM	108	358	10:45 PM	8	44
11:00 AM	59		11:00 PM	5		11:00 AM	53		11:00 PM	6		11:00 AM	112		11:00 PM	11	
11:15 AM	50		11:15 PM	5		11:15 AM	40		11:15 PM	4		11:15 AM	90		11:15 PM	9	
11:30 AM	44		11:30 PM	1		11:30 AM	43		11:30 PM	1		11:30 AM	87		11:30 PM	2	
11:45 AM	55	208	11:45 PM	4	15	11:45 AM	80	216	11:45 PM	1	12	11:45 AM	135	424	11:45 PM	5	27
Total	1068		2345			Total	1375		1801			Total	2443		4146		
Percent	31.29%		68.71%			Percent	43.29%		56.71%			Percent	37.08%		62.92%		
Day Total			3413			Day Total			3176			Day Total			6589		
Peak Hour	11:45 AM		4:30 PM			Peak Hour	7:00 AM		2:45 PM			Peak Hour	11:45 AM		4:30 PM		
Volume	245		375			Volume	290		264			Volume	514		621		
P.H.F.	0.875		0.910			P.H.F.	0.929		0.846			P.H.F.	0.931		0.935		



PRECISION
DATA
INDUSTRIES, LLC

46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Mass Ave (Route 111)
east of Paddock Lane
City, State: Boxborough, MA
Client: Nitsch/ B. Zimolka
Site Code: TBA

PDI File #: 207662 ATR-C

Count Date:
Wednesday, October 21, 2020

Volume

WB					EB					Combined							
Start Time:	15 min	60 min	15 min	60 min	Start Time:	15 min	60 min	15 min	60 min	Start Time:	15 min	60 min	15 min	60 min			
12:00 AM	5		12:00 PM	59	12:00 AM	3		12:00 PM	51	12:00 AM	8		12:00 PM	110			
12:15 AM	5		12:15 PM	78	12:15 AM	1		12:15 PM	68	12:15 AM	6		12:15 PM	146			
12:30 AM	3		12:30 PM	64	12:30 AM	3		12:30 PM	60	12:30 AM	6		12:30 PM	124			
12:45 AM	2	15	12:45 PM	76	277	12:45 AM	1	8	12:45 PM	60	239	12:00 AM	0	23	12:45 PM	136	516
1:00 AM	0		1:00 PM	68		1:00 AM	0		1:00 PM	69		1:00 AM	0		1:00 PM	137	
1:15 AM	1		1:15 PM	75		1:15 AM	1		1:15 PM	62		1:15 AM	2		1:15 PM	137	
1:30 AM	2		1:30 PM	60		1:30 AM	3		1:30 PM	51		1:30 AM	5		1:30 PM	111	
1:45 AM	1	4	1:45 PM	53	256	1:45 AM	0	4	1:45 PM	53	235	1:45 AM	1	8	1:45 PM	106	491
2:00 AM	0		2:00 PM	68		2:00 AM	1		2:00 PM	48		2:00 AM	1		2:00 PM	116	
2:15 AM	0		2:15 PM	65		2:15 AM	0		2:15 PM	56		2:15 AM	0		2:15 PM	121	
2:30 AM	0		2:30 PM	88		2:30 AM	0		2:30 PM	58		2:30 AM	0		2:30 PM	146	
2:45 AM	0	0	2:45 PM	85	306	2:45 AM	1	2	2:45 PM	63	225	2:45 AM	1	2	2:45 PM	148	531
3:00 AM	0		3:00 PM	95		3:00 AM	1		3:00 PM	74		3:00 AM	1		3:00 PM	169	
3:15 AM	0		3:15 PM	99		3:15 AM	1		3:15 PM	66		3:15 AM	1		3:15 PM	165	
3:30 AM	2		3:30 PM	72		3:30 AM	0		3:30 PM	58		3:30 AM	2		3:30 PM	130	
3:45 AM	1	3	3:45 PM	80	346	3:45 AM	0	2	3:45 PM	71	269	3:45 AM	1	5	3:45 PM	151	615
4:00 AM	0		4:00 PM	114		4:00 AM	1		4:00 PM	59		4:00 AM	1		4:00 PM	173	
4:15 AM	1		4:15 PM	81		4:15 AM	2		4:15 PM	66		4:15 AM	3		4:15 PM	147	
4:30 AM	3		4:30 PM	85		4:30 AM	1		4:30 PM	79		4:30 AM	4		4:30 PM	164	
4:45 AM	5	9	4:45 PM	83	363	4:45 AM	4	8	4:45 PM	75	279	4:45 AM	9	17	4:45 PM	158	642
5:00 AM	6		5:00 PM	129		5:00 AM	6		5:00 PM	63		5:00 AM	12		5:00 PM	192	
5:15 AM	8		5:15 PM	102		5:15 AM	9		5:15 PM	88		5:15 AM	17		5:15 PM	190	
5:30 AM	9		5:30 PM	86		5:30 AM	10		5:30 PM	105		5:30 AM	19		5:30 PM	191	
5:45 AM	8	31	5:45 PM	100	417	5:45 AM	21	46	5:45 PM	71	327	5:45 AM	29	77	5:45 PM	171	744
6:00 AM	14		6:00 PM	72		6:00 AM	18		6:00 PM	77		6:00 AM	32		6:00 PM	149	
6:15 AM	25		6:15 PM	86		6:15 AM	30		6:15 PM	66		6:15 AM	55		6:15 PM	152	
6:30 AM	15		6:30 PM	60		6:30 AM	46		6:30 PM	61		6:30 AM	61		6:30 PM	121	
6:45 AM	31	85	6:45 PM	61	279	6:45 AM	72	166	6:45 PM	48	252	6:45 AM	103	251	6:45 PM	109	531
7:00 AM	44		7:00 PM	52		7:00 AM	43		7:00 PM	45		7:00 AM	87		7:00 PM	97	
7:15 AM	43		7:15 PM	34		7:15 AM	71		7:15 PM	36		7:15 AM	114		7:15 PM	70	
7:30 AM	38		7:30 PM	33		7:30 AM	75		7:30 PM	22		7:30 AM	113		7:30 PM	55	
7:45 AM	50	175	7:45 PM	29	148	7:45 AM	79	268	7:45 PM	19	122	7:45 AM	129	443	7:45 PM	48	270
8:00 AM	44		8:00 PM	26		8:00 AM	67		8:00 PM	17		8:00 AM	111		8:00 PM	43	
8:15 AM	42		8:15 PM	21		8:15 AM	58		8:15 PM	20		8:15 AM	100		8:15 PM	41	
8:30 AM	55		8:30 PM	18		8:30 AM	42		8:30 PM	20		8:30 AM	97		8:30 PM	38	
8:45 AM	70	211	8:45 PM	9	74	8:45 AM	62	229	8:45 PM	13	70	8:45 AM	132	440	8:45 PM	22	144
9:00 AM	41		9:00 PM	22		9:00 AM	60		9:00 PM	19		9:00 AM	101		9:00 PM	41	
9:15 AM	41		9:15 PM	8		9:15 AM	53		9:15 PM	11		9:15 AM	94		9:15 PM	19	
9:30 AM	34		9:30 PM	11		9:30 AM	54		9:30 PM	17		9:30 AM	88		9:30 PM	28	
9:45 AM	48	164	9:45 PM	10	51	9:45 AM	39	206	9:45 PM	6	53	9:45 AM	87	370	9:45 PM	16	104
10:00 AM	48		10:00 PM	10		10:00 AM	49		10:00 PM	15		10:00 AM	97		10:00 PM	25	
10:15 AM	38		10:15 PM	8		10:15 AM	54		10:15 PM	2		10:15 AM	92		10:15 PM	10	
10:30 AM	42		10:30 PM	3		10:30 AM	41		10:30 PM	7		10:30 AM	83		10:30 PM	10	
10:45 AM	53	181	10:45 PM	2	23	10:45 AM	58	202	10:45 PM	6	30	10:45 AM	111	383	10:45 PM	8	53
11:00 AM	41		11:00 PM	10		11:00 AM	46		11:00 PM	3		11:00 AM	87		11:00 PM	13	
11:15 AM	50		11:15 PM	8		11:15 AM	52		11:15 PM	2		11:15 AM	102		11:15 PM	10	
11:30 AM	56		11:30 PM	3		11:30 AM	59		11:30 PM	5		11:30 AM	115		11:30 PM	8	
11:45 AM	64	211	11:45 PM	9	30	11:45 AM	73	230	11:45 PM	0	10	11:45 AM	137	441	11:45 PM	9	40
Total	1089		2570			Total	1371		2111			Total	2460		4681		
Percent	29.76%		70.24%			Percent	39.37%		60.63%			Percent	34.45%		65.55%		
Day Total			3659			Day Total			3482			Day Total			7141		
Peak Hour	11:45 AM		5:00 PM			Peak Hour	7:15 AM		5:15 PM			Peak Hour	11:45 AM		5:00 PM		
Volume	265		417			Volume	292		341			Volume	517		744		
P.H.F.	0.849		0.808			P.H.F.	0.924		0.812			P.H.F.	0.885		0.969		

Mass Ave (Route 111)
 east of Paddock Lane
 City, State: Boxborough, MA
 Client: Nitsch/ B. Zimolka
 Site Code: TBA



PDI File #: 207662 ATR-C

Count Date
 Tuesday, October 20, 2020

Classification (60-minute)

WB														
Start Time:	Cycles	Cars and Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	Total
12:00 AM	0	6	0	0	0	0	0	0	0	0	0	0	0	6
1:00 AM	0	3	0	0	0	0	0	0	0	0	0	0	0	3
2:00 AM	0	0	0	0	1	0	0	0	0	0	0	0	0	1
3:00 AM	0	8	1	0	0	0	0	1	0	0	0	0	0	10
4:00 AM	0	4	3	0	0	0	0	0	0	0	0	0	0	7
5:00 AM	0	18	4	0	2	0	0	0	0	0	0	0	0	24
6:00 AM	1	55	19	0	1	6	1	3	2	0	0	0	0	88
7:00 AM	3	145	24	0	3	3	0	3	2	0	0	0	0	183
8:00 AM	1	148	34	2	7	0	0	0	0	1	0	0	0	193
9:00 AM	1	131	22	0	8	2	0	0	1	1	0	0	0	166
10:00 AM	0	139	28	1	7	2	0	1	1	0	0	0	0	179
11:00 AM	1	164	34	3	3	1	0	2	0	0	0	0	0	208
12:00 PM	2	199	45	0	4	3	0	3	1	1	0	0	0	258
1:00 PM	0	182	40	1	5	0	0	1	2	0	0	0	0	231
2:00 PM	1	205	44	0	13	1	0	1	0	0	0	0	0	265
3:00 PM	2	300	48	1	8	0	0	2	3	0	0	0	0	364
4:00 PM	0	313	32	0	9	2	0	2	2	0	0	0	0	360
5:00 PM	3	306	42	1	6	0	0	0	1	0	0	0	0	359
6:00 PM	2	196	23	0	3	0	0	1	0	0	0	0	0	225
7:00 PM	0	100	12	0	2	0	0	0	0	0	0	0	0	114
8:00 PM	0	70	5	0	0	0	0	0	0	0	0	0	0	75
9:00 PM	0	48	6	0	1	0	0	0	0	0	0	0	0	55
10:00 PM	0	22	2	0	0	0	0	0	0	0	0	0	0	24
11:00 PM	0	13	2	0	0	0	0	0	0	0	0	0	0	15
Total	17	2775	470	9	83	20	1	20	15	3	0	0	0	3413
Percent	0.50%	81.31%	13.77%	0.26%	2.43%	0.59%	0.03%	0.59%	0.44%	0.09%	0.00%	0.00%	0.00%	

AM Peak	7:00 AM	11:00 AM	8:00 AM	11:00 AM	9:00 AM	6:00 AM	6:00 AM	6:00 AM	6:00 AM	8:00 AM				11:00 AM
Volume	3	164	34	3	8	6	1	3	2	1	0	0	0	208
PM Peak	5:00 PM	4:00 PM	3:00 PM	1:00 PM	2:00 PM	12:00 PM		12:00 PM	3:00 PM	12:00 PM				3:00 PM
Volume	3	313	48	1	13	3	0	3	3	1	0	0	0	364

Cycles:	17	0.5%
Cars and Light Trucks:	3245	95.1%
Heavy Vehicles:	151	4.4%

Mass Ave (Route 111)
 east of Paddock Lane
 City, State: Boxborough, MA
 Client: Nitsch/ B. Zimolka
 Site Code: TBA



PDI File #: 207662 ATR-C

Count Date
 Tuesday, October 20, 2020

Classification (60-minute)

EB														
Start Time:	Cycles	Cars and Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	Total
12:00 AM	0	4	0	0	0	0	0	0	0	0	0	0	0	4
1:00 AM	0	3	0	0	0	0	0	0	0	0	0	0	0	3
2:00 AM	0	0	1	0	0	0	0	0	0	0	0	0	0	1
3:00 AM	0	4	0	0	0	0	0	0	0	0	0	0	0	4
4:00 AM	0	8	2	0	0	1	0	0	0	0	0	0	0	11
5:00 AM	0	25	14	1	6	1	0	0	0	0	0	0	0	47
6:00 AM	1	120	48	0	5	1	0	2	2	0	0	0	0	179
7:00 AM	3	228	41	3	10	2	0	2	1	0	0	0	0	290
8:00 AM	3	188	26	3	16	0	0	2	0	1	0	0	0	239
9:00 AM	1	156	33	0	9	2	0	0	1	0	0	0	0	202
10:00 AM	0	131	32	4	10	0	0	1	1	0	0	0	0	179
11:00 AM	0	163	39	0	11	1	0	2	0	0	0	0	0	216
12:00 PM	2	189	38	0	13	1	0	0	1	0	0	0	0	244
1:00 PM	2	155	25	0	10	0	0	3	2	0	0	0	0	197
2:00 PM	2	166	43	1	7	3	0	0	0	0	0	0	0	222
3:00 PM	2	203	31	2	9	1	0	1	1	0	0	0	0	250
4:00 PM	0	176	20	2	4	2	0	0	2	0	0	0	0	206
5:00 PM	1	212	18	1	2	3	0	1	1	0	0	0	0	239
6:00 PM	1	158	12	0	4	0	0	3	1	0	0	0	0	179
7:00 PM	0	93	13	0	1	2	0	0	0	0	0	0	0	109
8:00 PM	0	70	10	0	2	0	0	0	0	0	0	0	0	82
9:00 PM	0	37	3	0	1	0	0	0	0	0	0	0	0	41
10:00 PM	0	17	2	0	1	0	0	0	0	0	0	0	0	20
11:00 PM	0	10	2	0	0	0	0	0	0	0	0	0	0	12
PM Total	18	2516	453	17	121	20	0	17	13	1	0	0	0	3176
Percent	0.57%	79.22%	14.26%	0.54%	3.81%	0.63%	0.00%	0.54%	0.41%	0.03%	0.00%	0.00%	0.00%	

AM Peak	7:00 AM	7:00 AM	6:00 AM	10:00 AM	8:00 AM	7:00 AM		6:00 AM	6:00 AM	8:00 AM				7:00 AM
Volume	3	228	48	4	16	2	0	2	2	1	0	0	0	290
PM Peak	12:00 PM	5:00 PM	2:00 PM	3:00 PM	12:00 PM	2:00 PM		1:00 PM	1:00 PM					3:00 PM
Volume	2	212	43	2	13	3	0	3	2	0	0	0	0	250

Cycles:	18	0.6%
Cars and Light Trucks:	2969	93.5%
Heavy Vehicles:	189	6.0%

Mass Ave (Route 111)
 east of Paddock Lane
 City, State: Boxborough, MA
 Client: Nitsch/ B. Zimolka
 Site Code: TBA



PDI File #: 207662 ATR-C

Count Date
 Tuesday, October 20, 2020

Classification (60-minute)

Combined														
Start Time:	Cycles	Cars and Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	Total
12:00 AM	0	10	0	0	0	0	0	0	0	0	0	0	0	10
1:00 AM	0	6	0	0	0	0	0	0	0	0	0	0	0	6
2:00 AM	0	0	1	0	1	0	0	0	0	0	0	0	0	2
3:00 AM	0	12	1	0	0	0	0	1	0	0	0	0	0	14
4:00 AM	0	12	5	0	0	1	0	0	0	0	0	0	0	18
5:00 AM	0	43	18	1	8	1	0	0	0	0	0	0	0	71
6:00 AM	2	175	67	0	6	7	1	5	4	0	0	0	0	267
7:00 AM	6	373	65	3	13	5	0	5	3	0	0	0	0	473
8:00 AM	4	336	60	5	23	0	0	2	0	2	0	0	0	432
9:00 AM	2	287	55	0	17	4	0	0	2	1	0	0	0	368
10:00 AM	0	270	60	5	17	2	0	2	2	0	0	0	0	358
11:00 AM	1	327	73	3	14	2	0	4	0	0	0	0	0	424
12:00 PM	4	388	83	0	17	4	0	3	2	1	0	0	0	502
1:00 PM	2	337	65	1	15	0	0	4	4	0	0	0	0	428
2:00 PM	3	371	87	1	20	4	0	1	0	0	0	0	0	487
3:00 PM	4	503	79	3	17	1	0	3	4	0	0	0	0	614
4:00 PM	0	489	52	2	13	4	0	2	4	0	0	0	0	566
5:00 PM	4	518	60	2	8	3	0	1	2	0	0	0	0	598
6:00 PM	3	354	35	0	7	0	0	4	1	0	0	0	0	404
7:00 PM	0	193	25	0	3	2	0	0	0	0	0	0	0	223
8:00 PM	0	140	15	0	2	0	0	0	0	0	0	0	0	157
9:00 PM	0	85	9	0	2	0	0	0	0	0	0	0	0	96
10:00 PM	0	39	4	0	1	0	0	0	0	0	0	0	0	44
11:00 PM	0	23	4	0	0	0	0	0	0	0	0	0	0	27
PM Total	35	5291	923	26	204	40	1	37	28	4	0	0	0	6589
Percent	0.53%	80.30%	14.01%	0.39%	3.10%	0.61%	0.02%	0.56%	0.42%	0.06%	0.00%	0.00%	0.00%	

AM Peak	7:00 AM	7:00 AM	11:00 AM	8:00 AM	8:00 AM	6:00 AM	6:00 AM	6:00 AM	6:00 AM	8:00 AM				7:00 AM
Volume	6	373	73	5	23	7	1	5	4	2	0	0	0	473
PM Peak	12:00 PM	5:00 PM	2:00 PM	3:00 PM	2:00 PM	12:00 PM		1:00 PM	1:00 PM	12:00 PM				3:00 PM
Volume	4	518	87	3	20	4	0	4	4	1	0	0	0	614

Cycles:	35	0.5%
Cars and Light Trucks:	6214	94.3%
Heavy Vehicles:	340	5.2%

Mass Ave (Route 111)
 east of Paddock Lane
 City, State: Boxborough, MA
 Client: Nitsch/ B. Zimolka
 Site Code: TBA



PDI File #: 207662 ATR-C

Count Date
 Wednesday, October 21, 2020

Classification (60-minute)

WB														
Start Time:	Cycles	Cars and Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	Total
12:00 AM	0	13	2	0	0	0	0	0	0	0	0	0	0	15
1:00 AM	0	3	0	0	0	1	0	0	0	0	0	0	0	4
2:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:00 AM	0	3	0	0	0	0	0	0	0	0	0	0	0	3
4:00 AM	0	5	4	0	0	0	0	0	0	0	0	0	0	9
5:00 AM	0	23	4	0	3	0	0	0	1	0	0	0	0	31
6:00 AM	0	62	13	0	1	6	0	2	1	0	0	0	0	85
7:00 AM	2	136	24	1	5	2	0	2	2	1	0	0	0	175
8:00 AM	3	180	16	0	6	4	0	1	1	0	0	0	0	211
9:00 AM	1	123	26	0	5	5	0	2	2	0	0	0	0	164
10:00 AM	1	145	17	1	14	1	0	0	2	0	0	0	0	181
11:00 AM	1	171	27	1	7	1	0	3	0	0	0	0	0	211
12:00 PM	1	214	51	1	3	3	0	1	3	0	0	0	0	277
1:00 PM	0	213	35	1	5	1	0	0	1	0	0	0	0	256
2:00 PM	1	236	58	0	8	0	0	1	2	0	0	0	0	306
3:00 PM	1	296	41	1	5	2	0	0	0	0	0	0	0	346
4:00 PM	5	297	51	0	6	3	0	1	0	0	0	0	0	363
5:00 PM	3	368	35	0	6	1	0	3	1	0	0	0	0	417
6:00 PM	5	230	36	0	5	2	0	1	0	0	0	0	0	279
7:00 PM	2	126	17	0	1	0	0	1	1	0	0	0	0	148
8:00 PM	0	69	5	0	0	0	0	0	0	0	0	0	0	74
9:00 PM	0	50	1	0	0	0	0	0	0	0	0	0	0	51
10:00 PM	0	22	1	0	0	0	0	0	0	0	0	0	0	23
11:00 PM	0	27	2	0	1	0	0	0	0	0	0	0	0	30
Total	26	3012	466	6	81	32	0	18	17	1	0	0	0	3659
Percent	0.71%	82.32%	12.74%	0.16%	2.21%	0.87%	0.00%	0.49%	0.46%	0.03%	0.00%	0.00%	0.00%	

AM Peak	8:00 AM	8:00 AM	11:00 AM	7:00 AM	10:00 AM	6:00 AM		11:00 AM	7:00 AM	7:00 AM				8:00 AM
Volume	3	180	27	1	14	6	0	3	2	1	0	0	0	211
PM Peak	4:00 PM	5:00 PM	2:00 PM	12:00 PM	2:00 PM	12:00 PM		5:00 PM	12:00 PM					5:00 PM
Volume	5	368	58	1	8	3	0	3	3	0	0	0	0	417

Cycles:	26	0.7%
Cars and Light Trucks:	3478	95.1%
Heavy Vehicles:	155	4.2%

Mass Ave (Route 111)
 east of Paddock Lane
 City, State: Boxborough, MA
 Client: Nitsch/ B. Zimolka
 Site Code: TBA



PDI File #: 207662 ATR-C

Count Date
 Wednesday, October 21, 2020

Classification (60-minute)

EB														
Start Time:	Cycles	Cars and Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	Total
12:00 AM	0	8	0	0	0	0	0	0	0	0	0	0	0	8
1:00 AM	0	3	0	0	0	1	0	0	0	0	0	0	0	4
2:00 AM	0	1	1	0	0	0	0	0	0	0	0	0	0	2
3:00 AM	0	2	0	0	0	0	0	0	0	0	0	0	0	2
4:00 AM	0	4	2	0	1	1	0	0	0	0	0	0	0	8
5:00 AM	0	34	7	0	4	0	0	0	1	0	0	0	0	46
6:00 AM	0	109	43	2	9	0	0	1	2	0	0	0	0	166
7:00 AM	0	200	48	2	13	1	0	2	1	1	0	0	0	268
8:00 AM	2	178	34	2	12	1	0	0	0	0	0	0	0	229
9:00 AM	0	159	28	0	11	3	0	4	1	0	0	0	0	206
10:00 AM	0	140	33	0	25	4	0	0	0	0	0	0	0	202
11:00 AM	1	184	26	1	11	2	0	3	2	0	0	0	0	230
12:00 PM	1	186	37	1	10	3	0	1	0	0	0	0	0	239
1:00 PM	1	183	38	0	6	1	0	2	3	1	0	0	0	235
2:00 PM	0	169	44	1	10	1	0	0	0	0	0	0	0	225
3:00 PM	1	220	35	0	7	0	0	5	1	0	0	0	0	269
4:00 PM	4	225	38	1	4	6	1	0	0	0	0	0	0	279
5:00 PM	3	287	26	1	4	1	0	3	2	0	0	0	0	327
6:00 PM	1	215	27	0	4	2	0	1	2	0	0	0	0	252
7:00 PM	1	105	13	0	0	1	0	2	0	0	0	0	0	122
8:00 PM	0	61	6	0	2	0	0	0	1	0	0	0	0	70
9:00 PM	0	45	6	0	2	0	0	0	0	0	0	0	0	53
10:00 PM	0	28	1	0	1	0	0	0	0	0	0	0	0	30
11:00 PM	0	9	1	0	0	0	0	0	0	0	0	0	0	10
PM Total	15	2755	494	11	136	28	1	24	16	2	0	0	0	3482
Percent	0.43%	79.12%	14.19%	0.32%	3.91%	0.80%	0.03%	0.69%	0.46%	0.06%	0.00%	0.00%	0.00%	

AM Peak	8:00 AM	7:00 AM	7:00 AM	6:00 AM	10:00 AM	10:00 AM		9:00 AM	6:00 AM	7:00 AM				7:00 AM
Volume	2	200	48	2	25	4	0	4	2	1	0	0	0	268
PM Peak	4:00 PM	5:00 PM	2:00 PM	12:00 PM	12:00 PM	4:00 PM	4:00 PM	3:00 PM	1:00 PM	1:00 PM				5:00 PM
Volume	4	287	44	1	10	6	1	5	3	1	0	0	0	327

Cycles:	15	0.4%
Cars and Light Trucks:	3249	93.3%
Heavy Vehicles:	218	6.3%

Mass Ave (Route 111)
 east of Paddock Lane
 City, State: Boxborough, MA
 Client: Nitsch/ B. Zimolka
 Site Code: TBA



PDI File #: 207662 ATR-C

Count Date
 Wednesday, October 21, 2020

Classification (60-minute)

Combined														
Start Time:	Cycles	Cars and Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	Total
12:00 AM	0	21	2	0	0	0	0	0	0	0	0	0	0	23
1:00 AM	0	6	0	0	0	2	0	0	0	0	0	0	0	8
2:00 AM	0	1	1	0	0	0	0	0	0	0	0	0	0	2
3:00 AM	0	5	0	0	0	0	0	0	0	0	0	0	0	5
4:00 AM	0	9	6	0	1	1	0	0	0	0	0	0	0	17
5:00 AM	0	57	11	0	7	0	0	0	2	0	0	0	0	77
6:00 AM	0	171	56	2	10	6	0	3	3	0	0	0	0	251
7:00 AM	2	336	72	3	18	3	0	4	3	2	0	0	0	443
8:00 AM	5	358	50	2	18	5	0	1	1	0	0	0	0	440
9:00 AM	1	282	54	0	16	8	0	6	3	0	0	0	0	370
10:00 AM	1	285	50	1	39	5	0	0	2	0	0	0	0	383
11:00 AM	2	355	53	2	18	3	0	6	2	0	0	0	0	441
12:00 PM	2	400	88	2	13	6	0	2	3	0	0	0	0	516
1:00 PM	1	396	73	1	11	2	0	2	4	1	0	0	0	491
2:00 PM	1	405	102	1	18	1	0	1	2	0	0	0	0	531
3:00 PM	2	516	76	1	12	2	0	5	1	0	0	0	0	615
4:00 PM	9	522	89	1	10	9	1	1	0	0	0	0	0	642
5:00 PM	6	655	61	1	10	2	0	6	3	0	0	0	0	744
6:00 PM	6	445	63	0	9	4	0	2	2	0	0	0	0	531
7:00 PM	3	231	30	0	1	1	0	3	1	0	0	0	0	270
8:00 PM	0	130	11	0	2	0	0	0	1	0	0	0	0	144
9:00 PM	0	95	7	0	2	0	0	0	0	0	0	0	0	104
10:00 PM	0	50	2	0	1	0	0	0	0	0	0	0	0	53
11:00 PM	0	36	3	0	1	0	0	0	0	0	0	0	0	40
PM Total	41	5767	960	17	217	60	1	42	33	3	0	0	0	7141
Percent	0.57%	80.76%	13.44%	0.24%	3.04%	0.84%	0.01%	0.59%	0.46%	0.04%	0.00%	0.00%	0.00%	

AM Peak	8:00 AM	8:00 AM	7:00 AM	7:00 AM	10:00 AM	9:00 AM		9:00 AM	6:00 AM	7:00 AM				7:00 AM
Volume	5	358	72	3	39	8	0	6	3	2	0	0	0	443
PM Peak	4:00 PM	5:00 PM	2:00 PM	12:00 PM	2:00 PM	4:00 PM	4:00 PM	5:00 PM	1:00 PM	1:00 PM				5:00 PM
Volume	9	655	102	2	18	9	1	6	4	1	0	0	0	744

Cycles:	41	0.6%
Cars and Light Trucks:	6727	94.2%
Heavy Vehicles:	373	5.2%

Mass Ave (Route 111)
 east of Paddock Lane
 City, State: Boxborough, MA
 Client: Nitsch/ B. Zimolka
 Site Code: TBA



PDI File #: 207662 ATR-C

Count Date
 Tuesday, October 20, 2020

Speed (60-minute)

WB																
Start Time:	1 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 to 69	70+	Total	85th %ile	Ave Speed
12:00 AM	0	0	0	0	2	3	1	0	0	0	0	0	0	6	38.8	36.3
1:00 AM	0	0	0	0	2	0	0	1	0	0	0	0	0	3	44.5	38.0
2:00 AM	0	0	0	0	0	0	1	0	0	0	0	0	0	1	43.0	43.0
3:00 AM	0	0	0	0	2	2	6	0	0	0	0	0	0	10	41.0	37.9
4:00 AM	0	0	0	0	4	2	1	0	0	0	0	0	0	7	38.3	34.6
5:00 AM	0	0	0	0	4	12	5	2	1	0	0	0	0	24	42.6	38.9
6:00 AM	0	0	0	3	27	49	7	1	1	0	0	0	0	88	39.0	35.8
7:00 AM	0	0	0	1	28	105	45	4	0	0	0	0	0	183	41.0	37.3
8:00 AM	0	0	0	9	57	99	26	2	0	0	0	0	0	193	39.0	35.8
9:00 AM	0	0	1	3	38	95	27	2	0	0	0	0	0	166	40.0	36.7
10:00 AM	0	0	0	6	36	104	31	2	0	0	0	0	0	179	40.0	36.7
11:00 AM	0	0	0	2	48	113	39	5	1	0	0	0	0	208	41.0	36.8
12:00 PM	0	0	0	4	54	140	54	5	0	1	0	0	0	258	41.0	37.2
1:00 PM	0	0	0	1	34	139	53	4	0	0	0	0	0	231	40.0	37.4
2:00 PM	0	0	0	2	50	163	49	1	0	0	0	0	0	265	40.0	36.9
3:00 PM	0	1	4	7	108	187	53	4	0	0	0	0	0	364	40.0	36.0
4:00 PM	0	0	4	14	95	196	41	10	0	0	0	0	0	360	39.0	36.0
5:00 PM	0	0	0	6	106	190	54	3	0	0	0	0	0	359	40.0	36.3
6:00 PM	0	0	0	2	75	113	33	2	0	0	0	0	0	225	40.0	36.1
7:00 PM	0	0	0	4	26	53	26	5	0	0	0	0	0	114	41.0	36.9
8:00 PM	0	0	1	1	21	38	13	1	0	0	0	0	0	75	40.0	36.3
9:00 PM	0	0	0	1	12	25	16	0	1	0	0	0	0	55	41.9	37.5
10:00 PM	0	0	0	1	3	14	5	1	0	0	0	0	0	24	40.0	37.9
11:00 PM	0	0	0	0	5	2	6	1	1	0	0	0	0	15	44.0	40.0
Total	0	1	10	67	837	1844	592	56	5	1	0	0	0	3413	40.0	36.6
Percent	0.00%	0.03%	0.29%	1.96%	24.52%	54.03%	17.35%	1.64%	0.15%	0.03%	0.00%	0.00%	0.00%			

AM Peak		9:00 AM	8:00 AM	8:00 AM	11:00 AM	7:00 AM	11:00 AM	5:00 AM						11:00 AM
Volume	0	0	1	9	57	113	45	5	1	0	0	0	0	208
PM Peak	3:00 PM	3:00 PM	4:00 PM	3:00 PM	4:00 PM	12:00 PM	4:00 PM	9:00 PM	12:00 PM					3:00 PM
Volume	0	1	4	14	108	196	54	10	1	1	0	0	0	364

15th Percentile:	33.0 MPH	Average Speed:	36.6 MPH	Posted Speed Limit:	40 MPH
50th Percentile:	37.0 MPH	10 MPH Pace:	32 to 41 MPH	Number of Vehicles > 40 MPH:	431
85th Percentile:	40.0 MPH	Number in Pace:	2876	Percent of Vehicles > 40 MPH:	12.6%
95th Percentile:	42.0 MPH	Percent in Pace:	84.3%		

Mass Ave (Route 111)
east of Paddock Lane
City, State: Boxborough, MA
Client: Nitsch/ B. Zimolka
Site Code: TBA



PDI File #: 207662 ATR-C

Count Date
Tuesday, October 20, 2020

Speed (60-minute)

EB																
Start Time:	1 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 to 69	70+	Total	85th %ile	Ave Speed
12:00 AM	0	0	0	0	0	3	1	0	0	0	0	0	0	4	39.6	38.8
1:00 AM	1	0	0	0	0	2	0	0	0	0	0	0	0	3	38.7	29.0
2:00 AM	0	0	0	0	0	0	1	0	0	0	0	0	0	1	43.0	43.0
3:00 AM	0	0	1	0	0	2	1	0	0	0	0	0	0	4	40.1	35.3
4:00 AM	0	0	0	0	3	4	2	2	0	0	0	0	0	11	44.5	38.5
5:00 AM	0	0	0	1	14	18	10	4	0	0	0	0	0	47	42.0	37.2
6:00 AM	0	0	0	4	21	89	58	7	0	0	0	0	0	179	41.3	38.1
7:00 AM	0	0	2	2	38	145	87	14	2	0	0	0	0	290	42.0	38.2
8:00 AM	0	0	0	10	33	119	67	8	2	0	0	0	0	239	41.0	37.7
9:00 AM	0	0	1	3	39	102	52	4	1	0	0	0	0	202	41.0	37.3
10:00 AM	0	0	1	2	34	95	42	5	0	0	0	0	0	179	41.0	37.5
11:00 AM	0	0	0	1	31	107	63	13	1	0	0	0	0	216	43.0	38.4
12:00 PM	0	0	0	5	37	121	67	11	2	0	1	0	0	244	42.0	38.2
1:00 PM	0	0	0	1	25	113	49	9	0	0	0	0	0	197	41.6	38.0
2:00 PM	1	0	0	6	28	108	72	6	1	0	0	0	0	222	42.9	38.0
3:00 PM	0	0	0	4	40	121	72	13	0	0	0	0	0	250	42.0	38.0
4:00 PM	0	0	1	3	25	111	55	10	1	0	0	0	0	206	42.0	38.0
5:00 PM	0	0	0	4	34	138	58	5	0	0	0	0	0	239	41.0	37.5
6:00 PM	0	0	0	0	44	93	39	3	0	0	0	0	0	179	40.0	37.1
7:00 PM	0	0	0	2	21	45	39	2	0	0	0	0	0	109	42.0	37.7
8:00 PM	0	0	0	0	11	44	20	5	2	0	0	0	0	82	42.0	38.5
9:00 PM	0	0	0	2	6	23	7	2	1	0	0	0	0	41	42.0	37.4
10:00 PM	0	0	0	0	5	8	4	3	0	0	0	0	0	20	42.8	38.2
11:00 PM	0	0	0	0	1	5	5	1	0	0	0	0	0	12	42.7	39.4
Total	2	0	6	50	490	1616	871	127	13	0	1	0	0	3176	42.0	37.9
Percent	0.06%	0.00%	0.19%	1.57%	15.43%	50.88%	27.42%	4.00%	0.41%	0.00%	0.03%	0.00%	0.00%			

AM Peak	1:00 AM		7:00 AM	8:00 AM	9:00 AM	7:00 AM	7:00 AM	7:00 AM	7:00 AM							7:00 AM
Volume	1	0	2	10	39	145	87	14	2	0	0	0	0	0	0	290

PM Peak	2:00 PM		4:00 PM	2:00 PM	6:00 PM	5:00 PM	2:00 PM	3:00 PM	12:00 PM		12:00 PM					3:00 PM
Volume	1	0	1	6	44	138	72	13	2	0	1	0	0	0	250	

15th Percentile:	34.0 MPH	Average Speed:	37.9 MPH	Posted Speed Limit:	40 MPH
50th Percentile:	38.0 MPH	10 MPH Pace:	34 to 43 MPH	Number of Vehicles > 40 MPH:	724
85th Percentile:	42.0 MPH	Number in Pace:	2582	Percent of Vehicles > 40 MPH:	22.8%
95th Percentile:	44.0 MPH	Percent in Pace:	81.3%		

Mass Ave (Route 111)
 east of Paddock Lane
 City, State: Boxborough, MA
 Client: Nitsch/ B. Zimolka
 Site Code: TBA



PDI File #: 207662 ATR-C

Count Date
 Tuesday, October 20, 2020

Speed (60-minute)

Combined WB and EB

Start Time:	1 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 to 69	70+	Total	85th %ile	Ave Speed
12:00 AM	0	0	0	0	2	6	2	0	0	0	0	0	0	10	39.7	37.3
1:00 AM	1	0	0	0	2	2	0	1	0	0	0	0	0	6	41.5	33.5
2:00 AM	0	0	0	0	0	0	2	0	0	0	0	0	0	2	43.0	43.0
3:00 AM	0	0	1	0	2	4	7	0	0	0	0	0	0	14	41.0	37.1
4:00 AM	0	0	0	0	7	6	3	2	0	0	0	0	0	18	41.9	36.9
5:00 AM	0	0	0	1	18	30	15	6	1	0	0	0	0	71	42.0	37.7
6:00 AM	0	0	0	7	48	138	65	8	1	0	0	0	0	267	41.0	37.4
7:00 AM	0	0	2	3	66	250	132	18	2	0	0	0	0	473	42.0	37.8
8:00 AM	0	0	0	19	90	218	93	10	2	0	0	0	0	432	41.0	36.8
9:00 AM	0	0	2	6	77	197	79	6	1	0	0	0	0	368	41.0	37.0
10:00 AM	0	0	1	8	70	199	73	7	0	0	0	0	0	358	41.0	37.1
11:00 AM	0	0	0	3	79	220	102	18	2	0	0	0	0	424	41.0	37.6
12:00 PM	0	0	0	9	91	261	121	16	2	1	1	0	0	502	41.0	37.7
1:00 PM	0	0	0	2	59	252	102	13	0	0	0	0	0	428	41.0	37.7
2:00 PM	1	0	0	8	78	271	121	7	1	0	0	0	0	487	41.0	37.4
3:00 PM	0	1	4	11	148	308	125	17	0	0	0	0	0	614	41.0	36.8
4:00 PM	0	0	5	17	120	307	96	20	1	0	0	0	0	566	41.0	36.7
5:00 PM	0	0	0	10	140	328	112	8	0	0	0	0	0	598	40.0	36.8
6:00 PM	0	0	0	2	119	206	72	5	0	0	0	0	0	404	40.0	36.5
7:00 PM	0	0	0	6	47	98	65	7	0	0	0	0	0	223	41.0	37.3
8:00 PM	0	0	1	1	32	82	33	6	2	0	0	0	0	157	41.0	37.5
9:00 PM	0	0	0	3	18	48	23	2	2	0	0	0	0	96	42.0	37.5
10:00 PM	0	0	0	1	8	22	9	4	0	0	0	0	0	44	41.6	38.0
11:00 PM	0	0	0	0	6	7	11	2	1	0	0	0	0	27	44.0	39.7
Total	2	1	16	117	1327	3460	1463	183	18	1	1	0	0	6589	41.0	37.2
Percent	0.03%	0.02%	0.24%	1.78%	20.14%	52.51%	22.20%	2.78%	0.27%	0.02%	0.02%	0.00%	0.00%			

AM Peak	1:00 AM		7:00 AM	8:00 AM	8:00 AM	7:00 AM	7:00 AM	7:00 AM	7:00 AM						7:00 AM
Volume	1	0	2	19	90	250	132	18	2	0	0	0	0	0	473

PM Peak	2:00 PM	3:00 PM	4:00 PM	4:00 PM	3:00 PM	5:00 PM	3:00 PM	4:00 PM	12:00 PM	12:00 PM	12:00 PM				3:00 PM
Volume	1	1	5	17	148	328	125	20	2	1	1	0	0	0	614

15th Percentile:	33.0 MPH	Average Speed:	37.2 MPH	Posted Speed Limit:	40 MPH
50th Percentile:	37.0 MPH	10 MPH Pace:	33 to 42 MPH	Number of Vehicles > 40 MPH:	1155
85th Percentile:	41.0 MPH	Number in Pace:	5411	Percent of Vehicles > 40 MPH:	17.5%
95th Percentile:	43.0 MPH	Percent in Pace:	82.1%		

Mass Ave (Route 111)
 east of Paddock Lane
 City, State: Boxborough, MA
 Client: Nitsch/ B. Zimolka
 Site Code: TBA



PDI File #: 207662 ATR-C

Count Date
 Wednesday, October 21, 2020

Speed (60-minute)

WB																
Start Time:	1 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 to 69	70+	Total	85th %ile	Ave Speed
12:00 AM	0	0	0	0	1	10	2	2	0	0	0	0	0	15	40.0	37.9
1:00 AM	0	0	0	0	0	3	1	0	0	0	0	0	0	4	41.3	38.5
2:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0
3:00 AM	0	0	0	0	1	1	0	0	0	1	0	0	0	3	49.0	40.7
4:00 AM	0	0	0	1	4	2	2	0	0	0	0	0	0	9	39.2	34.2
5:00 AM	0	0	0	0	9	15	7	0	0	0	0	0	0	31	40.0	36.6
6:00 AM	0	0	0	1	24	42	17	1	0	0	0	0	0	85	40.4	36.4
7:00 AM	0	0	0	6	31	101	34	3	0	0	0	0	0	175	40.0	36.8
8:00 AM	0	0	3	3	43	126	35	1	0	0	0	0	0	211	40.0	36.3
9:00 AM	0	0	0	4	39	85	33	3	0	0	0	0	0	164	40.0	36.8
10:00 AM	0	0	3	8	27	101	34	7	1	0	0	0	0	181	40.0	36.8
11:00 AM	0	0	2	5	45	121	33	4	1	0	0	0	0	211	40.0	36.7
12:00 PM	0	0	0	9	79	139	45	5	0	0	0	0	0	277	40.0	36.3
1:00 PM	0	0	0	4	59	135	54	4	0	0	0	0	0	256	41.0	36.9
2:00 PM	0	0	2	14	62	169	56	3	0	0	0	0	0	306	40.0	36.4
3:00 PM	0	0	0	1	59	213	66	7	0	0	0	0	0	346	40.0	37.2
4:00 PM	0	0	0	15	99	200	46	3	0	0	0	0	0	363	39.0	35.9
5:00 PM	0	0	1	35	117	223	41	0	0	0	0	0	0	417	39.0	35.2
6:00 PM	0	0	3	24	103	120	26	2	1	0	0	0	0	279	39.0	34.8
7:00 PM	0	0	0	5	49	73	20	1	0	0	0	0	0	148	39.0	35.7
8:00 PM	0	0	0	2	17	36	17	2	0	0	0	0	0	74	41.0	37.0
9:00 PM	0	0	0	2	3	25	20	1	0	0	0	0	0	51	41.0	38.1
10:00 PM	0	0	0	0	4	11	4	4	0	0	0	0	0	23	44.7	39.0
11:00 PM	0	0	0	0	1	12	13	2	0	2	0	0	0	30	43.7	41.1
Total	0	0	14	139	876	1963	606	55	3	3	0	0	0	3659	40.0	36.3
Percent	0.00%	0.00%	0.38%	3.80%	23.94%	53.65%	16.56%	1.50%	0.08%	0.08%	0.00%	0.00%	0.00%			

AM Peak		8:00 AM	10:00 AM	11:00 AM	8:00 AM	8:00 AM	10:00 AM	10:00 AM	3:00 AM					8:00 AM
Volume	0	0	3	8	45	126	35	7	1	1	0	0	0	211
PM Peak		6:00 PM	5:00 PM	5:00 PM	5:00 PM	3:00 PM	3:00 PM	6:00 PM	11:00 PM					5:00 PM
Volume	0	0	3	35	117	223	66	7	1	2	0	0	0	417

15th Percentile:	33.0 MPH	Average Speed:	36.3 MPH	Posted Speed Limit:	40 MPH
50th Percentile:	36.0 MPH	10 MPH Pace:	32 to 41 MPH	Number of Vehicles > 40 MPH:	452
85th Percentile:	40.0 MPH	Number in Pace:	3026	Percent of Vehicles > 40 MPH:	12.4%
95th Percentile:	42.0 MPH	Percent in Pace:	82.7%		

Mass Ave (Route 111)
 east of Paddock Lane
 City, State: Boxborough, MA
 Client: Nitsch/ B. Zimolka
 Site Code: TBA



PDI File #: 207662 ATR-C

Count Date
 Wednesday, October 21, 2020

Speed (60-minute)

EB																
Start Time:	1 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 to 69	70+	Total	85th %ile	Ave Speed
12:00 AM	0	0	0	0	3	3	2	0	0	0	0	0	0	8	41.8	37.4
1:00 AM	0	0	0	0	0	1	3	0	0	0	0	0	0	4	41.6	40.5
2:00 AM	0	0	0	0	1	0	0	1	0	0	0	0	0	2	43.4	39.5
3:00 AM	0	0	0	0	1	1	0	0	0	0	0	0	0	2	38.1	36.0
4:00 AM	0	0	1	0	1	4	1	1	0	0	0	0	0	8	42.8	37.1
5:00 AM	0	0	0	1	16	18	10	1	0	0	0	0	0	46	40.3	36.2
6:00 AM	0	0	0	5	27	90	37	7	0	0	0	0	0	166	40.0	37.3
7:00 AM	0	0	0	12	29	123	85	17	2	0	0	0	0	268	42.0	38.4
8:00 AM	0	0	0	5	41	111	65	4	2	1	0	0	0	229	41.0	37.7
9:00 AM	0	0	0	3	28	118	44	11	2	0	0	0	0	206	42.0	38.0
10:00 AM	0	0	0	3	22	92	69	14	1	1	0	0	0	202	43.0	38.8
11:00 AM	0	1	0	6	42	110	60	9	1	1	0	0	0	230	42.0	37.5
12:00 PM	0	0	1	3	40	125	64	6	0	0	0	0	0	239	41.0	37.6
1:00 PM	0	0	0	2	33	112	76	11	1	0	0	0	0	235	42.0	38.4
2:00 PM	0	0	1	5	29	110	72	5	3	0	0	0	0	225	41.0	37.9
3:00 PM	0	0	0	1	32	139	90	6	1	0	0	0	0	269	41.0	38.2
4:00 PM	0	0	0	1	42	147	78	11	0	0	0	0	0	279	41.0	38.0
5:00 PM	0	0	0	6	57	192	65	7	0	0	0	0	0	327	41.0	37.1
6:00 PM	0	0	0	7	65	129	45	6	0	0	0	0	0	252	40.0	36.5
7:00 PM	0	0	0	1	31	64	25	1	0	0	0	0	0	122	40.9	36.9
8:00 PM	0	0	0	0	12	42	16	0	0	0	0	0	0	70	41.0	37.5
9:00 PM	0	0	0	1	11	23	12	5	1	0	0	0	0	53	42.4	38.3
10:00 PM	0	0	0	1	6	15	5	2	1	0	0	0	0	30	40.7	37.5
11:00 PM	0	0	0	0	1	8	1	0	0	0	0	0	0	10	38.7	36.7
Total	0	1	3	63	570	1777	925	125	15	3	0	0	0	3482	41.0	37.7
Percent	0.00%	0.03%	0.09%	1.81%	16.37%	51.03%	26.57%	3.59%	0.43%	0.09%	0.00%	0.00%	0.00%			

AM Peak		11:00 AM	4:00 AM	7:00 AM	11:00 AM	7:00 AM	7:00 AM	7:00 AM	7:00 AM	8:00 AM					7:00 AM
Volume	0	1	1	12	42	123	85	17	2	1	0	0	0	268	

PM Peak		12:00 PM	6:00 PM	6:00 PM	5:00 PM	3:00 PM	1:00 PM	2:00 PM						5:00 PM
Volume	0	0	1	7	65	192	90	11	3	0	0	0	0	327

15th Percentile:	34.0 MPH	Average Speed:	37.7 MPH	Posted Speed Limit:	40 MPH
50th Percentile:	38.0 MPH	10 MPH Pace:	33 to 42 MPH	Number of Vehicles > 40 MPH:	752
85th Percentile:	41.0 MPH	Number in Pace:	2884	Percent of Vehicles > 40 MPH:	21.6%
95th Percentile:	44.0 MPH	Percent in Pace:	82.8%		

Mass Ave (Route 111)
 east of Paddock Lane
 City, State: Boxborough, MA
 Client: Nitsch/ B. Zimolka
 Site Code: TBA



PDI File #: 207662 ATR-C

Count Date
 Wednesday, October 21, 2020

Speed (60-minute)

Combined WB and EB

Start Time:	1 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 to 69	70+	Total	85th %ile	Ave Speed
12:00 AM	0	0	0	0	4	13	4	2	0	0	0	0	0	23	41.4	37.7
1:00 AM	0	0	0	0	0	4	4	0	0	0	0	0	0	8	42.0	39.5
2:00 AM	0	0	0	0	1	0	0	1	0	0	0	0	0	2	43.4	39.5
3:00 AM	0	0	0	0	2	2	0	0	0	1	0	0	0	5	45.4	38.8
4:00 AM	0	0	1	1	5	6	3	1	0	0	0	0	0	17	40.6	35.6
5:00 AM	0	0	0	1	25	33	17	1	0	0	0	0	0	77	40.0	36.4
6:00 AM	0	0	0	6	51	132	54	8	0	0	0	0	0	251	40.0	37.0
7:00 AM	0	0	0	18	60	224	119	20	2	0	0	0	0	443	42.0	37.8
8:00 AM	0	0	3	8	84	237	100	5	2	1	0	0	0	440	41.0	37.0
9:00 AM	0	0	0	7	67	203	77	14	2	0	0	0	0	370	41.0	37.5
10:00 AM	0	0	3	11	49	193	103	21	2	1	0	0	0	383	42.0	37.9
11:00 AM	0	1	2	11	87	231	93	13	2	1	0	0	0	441	41.0	37.1
12:00 PM	0	0	1	12	119	264	109	11	0	0	0	0	0	516	41.0	36.9
1:00 PM	0	0	0	6	92	247	130	15	1	0	0	0	0	491	41.0	37.6
2:00 PM	0	0	3	19	91	279	128	8	3	0	0	0	0	531	41.0	37.0
3:00 PM	0	0	0	2	91	352	156	13	1	0	0	0	0	615	41.0	37.7
4:00 PM	0	0	0	16	141	347	124	14	0	0	0	0	0	642	40.0	36.8
5:00 PM	0	0	1	41	174	415	106	7	0	0	0	0	0	744	40.0	36.1
6:00 PM	0	0	3	31	168	249	71	8	1	0	0	0	0	531	39.5	35.6
7:00 PM	0	0	0	6	80	137	45	2	0	0	0	0	0	270	40.0	36.2
8:00 PM	0	0	0	2	29	78	33	2	0	0	0	0	0	144	41.0	37.3
9:00 PM	0	0	0	3	14	48	32	6	1	0	0	0	0	104	42.0	38.2
10:00 PM	0	0	0	1	10	26	9	6	1	0	0	0	0	53	43.2	38.2
11:00 PM	0	0	0	0	2	20	14	2	0	2	0	0	0	40	43.0	40.0
Total	0	1	17	202	1446	3740	1531	180	18	6	0	0	0	7141	41.0	37.0
Percent	0.00%	0.01%	0.24%	2.83%	20.25%	52.37%	21.44%	2.52%	0.25%	0.08%	0.00%	0.00%	0.00%			

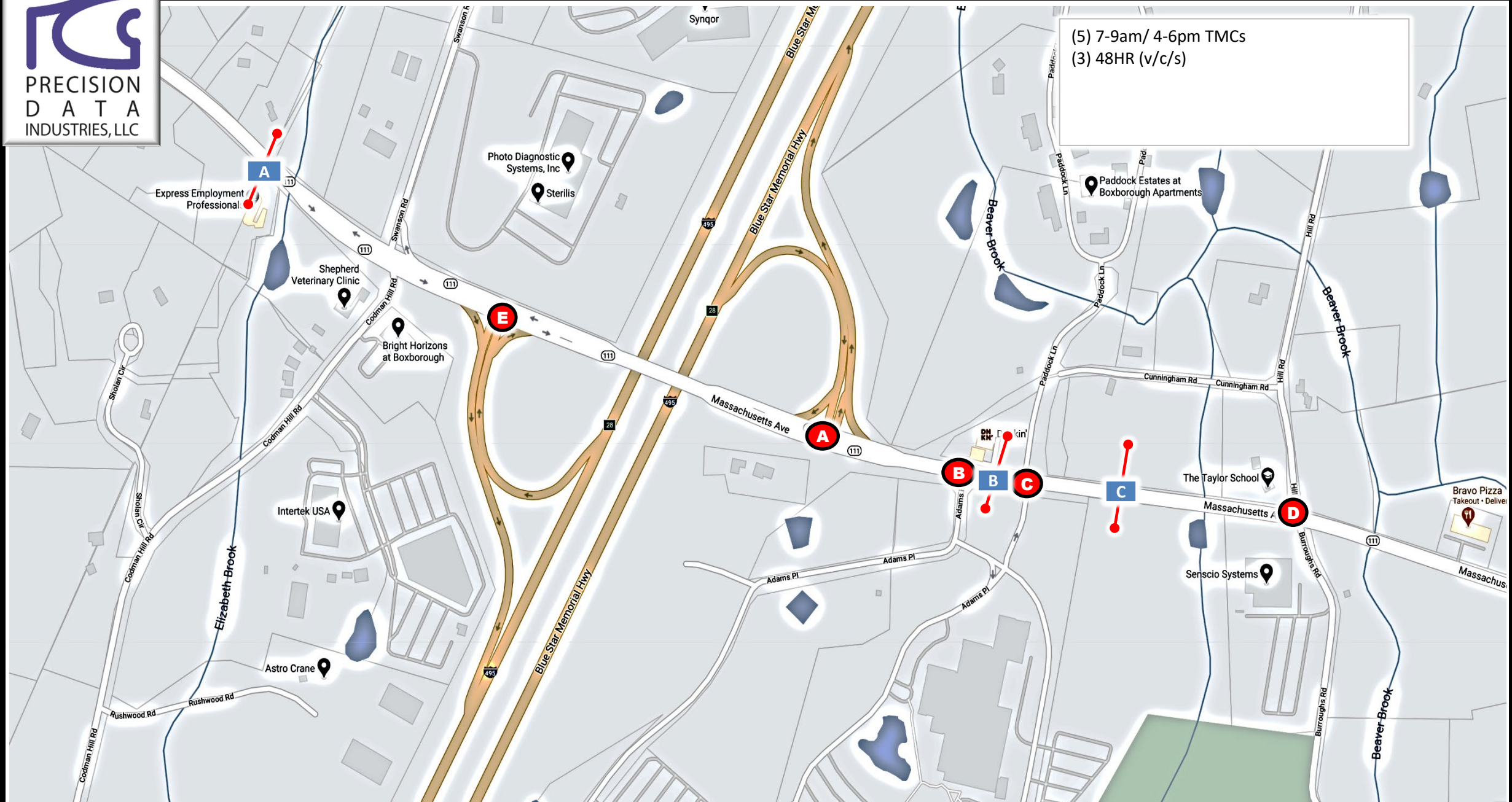
AM Peak		11:00 AM	8:00 AM	7:00 AM	11:00 AM	8:00 AM	7:00 AM	10:00 AM	7:00 AM	3:00 AM				7:00 AM
Volume	0	1	3	18	87	237	119	21	2	1	0	0	0	443
PM Peak			2:00 PM	5:00 PM	5:00 PM	5:00 PM	3:00 PM	1:00 PM	2:00 PM	11:00 PM				5:00 PM
Volume	0	0	3	41	174	415	156	15	3	2	0	0	0	744

15th Percentile:	33.0 MPH	Average Speed:	37.0 MPH	Posted Speed Limit:	40 MPH
50th Percentile:	37.0 MPH	10 MPH Pace:	33 to 42 MPH	Number of Vehicles > 40 MPH:	1204
85th Percentile:	41.0 MPH	Number in Pace:	5865	Percent of Vehicles > 40 MPH:	16.9%
95th Percentile:	43.0 MPH	Percent in Pace:	82.1%		



Location Map: 207662 Boxborough, MA

Precision Data Industries, LLC 46 Morton Street, Framingham, MA 01702 ph: 508-875-0100 email: datarequests@pdillc.com



Client:
Nitsch

Engineer:
B. Zimolka

Site Code:

Date:
Tues 10/20 thru Wed 10/21/2020

PDI Job #
207662

City, State:
Boxborough, MA

PDI File #: **207662 AA**
 Location: **N: I-495 NB Ramps S: Driveway**
 Location: **E: Mass Ave (Route 111) W: Mass Ave (Route 111)**
 City, State: **Boxborough, MA**
 Client: **Nitsch/ B. Zimolka**
 Site Code: **TBA**
 Count Date: **Tuesday, October 20, 2020**
 Start Time: **4:00 PM**
 End Time: **6:00 PM**
 Class:



Cars and Heavy Vehicles (Combined)

	I-495 NB Ramps					Mass Ave (Route 111)					Driveway					Mass Ave (Route 111)					Total	
	from North					from East					from South					from West						
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total		
4:00 PM	21	0	19	0	40	27	76	0	0	103	0	0	0	0	0	0	37	49	0	86	229	
4:15 PM	18	0	17	0	35	20	66	0	0	86	0	0	0	0	0	0	48	22	0	70	191	
4:30 PM	22	0	24	0	46	24	71	0	0	95	0	0	0	0	0	0	50	45	0	95	236	
4:45 PM	15	0	17	0	32	21	87	0	0	108	0	0	0	0	0	0	48	34	0	82	222	
Total	76	0	77	0	153	92	300	0	0	392	0	0	0	0	0	0	183	150	0	333	878	
5:00 PM	16	0	29	0	45	15	70	0	0	85	0	0	0	0	0	0	50	38	0	88	218	
5:15 PM	21	0	27	0	48	25	88	0	0	113	0	0	0	0	0	0	53	30	0	83	244	
5:30 PM	13	0	27	0	40	20	74	0	0	94	0	0	0	0	0	0	41	34	0	75	209	
5:45 PM	13	0	16	0	29	18	69	0	0	87	0	0	0	0	0	0	48	30	0	78	194	
Total	63	0	99	0	162	78	301	0	0	379	0	0	0	0	0	0	192	132	0	324	865	
Grand Total	139	0	176	0	315	170	601	0	0	771	0	0	0	0	0	0	375	282	0	657	1743	
Approach %	44.1	0.0	55.9	0.0		22.0	78.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0	57.1	42.9	0.0			
Total %	8.0	0.0	10.1	0.0	18.1	9.8	34.5	0.0	0.0	44.2	0.0	0.0	0.0	0.0	0.0	0.0	21.5	16.2	0.0	37.7		
Exiting Leg Total						452					551					0					740	1743
Cars	136	0	166	0	302	170	588	0	0	758	0	0	0	0	0	0	370	279	0	649	1709	
% Cars	97.8	0.0	94.3	0.0	95.9	100.0	97.8	0.0	0.0	98.3	0.0	0.0	0.0	0.0	0.0	0.0	98.7	98.9	0.0	98.8	98.0	
Exiting Leg Total						449					536					0					724	1709
Heavy Vehicles	3	0	10	0	13	0	13	0	0	13	0	0	0	0	0	0	5	3	0	8	34	
% Heavy Vehicles	2.2	0.0	5.7	0.0	4.1	0.0	2.2	0.0	0.0	1.7	0.0	0.0	0.0	0.0	0.0	0.0	1.3	1.1	0.0	1.2	2.0	
Exiting Leg Total						3					15					0					16	34

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

	I-495 NB Ramps					Mass Ave (Route 111)					Driveway					Mass Ave (Route 111)					Total	
	from North					from East					from South					from West						
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total		
4:30 PM	22	0	24	0	46	24	71	0	0	95	0	0	0	0	0	0	50	45	0	95	236	
4:45 PM	15	0	17	0	32	21	87	0	0	108	0	0	0	0	0	0	48	34	0	82	222	
5:00 PM	16	0	29	0	45	15	70	0	0	85	0	0	0	0	0	0	50	38	0	88	218	
5:15 PM	21	0	27	0	48	25	88	0	0	113	0	0	0	0	0	0	53	30	0	83	244	
Total Volume	74	0	97	0	171	85	316	0	0	401	0	0	0	0	0	0	201	147	0	348	920	
% Approach Total	43.3	0.0	56.7	0.0		21.2	78.8	0.0	0.0		0.0	0.0	0.0	0.0		0.0	57.8	42.2	0.0			
PHF	0.841	0.000	0.836	0.000	0.891	0.850	0.898	0.000	0.000	0.887	0.000	0.000	0.000	0.000	0.000	0.000	0.948	0.817	0.000	0.916	0.943	
Cars	74	0	92	0	166	85	307	0	0	392	0	0	0	0	0	0	200	146	0	346	904	
Cars %	100.0	0.0	94.8	0.0	97.1	100.0	97.2	0.0	0.0	97.8	0.0	0.0	0.0	0.0	0.0	0.0	99.5	99.3	0.0	99.4	98.3	
Heavy Vehicles	0	0	5	0	5	0	9	0	0	9	0	0	0	0	0	0	1	1	0	2	16	
Heavy Vehicles %	0.0	0.0	5.2	0.0	2.9	0.0	2.8	0.0	0.0	2.2	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.7	0.0	0.6	1.7	
Cars Enter Leg	74	0	92	0	166	85	307	0	0	392	0	0	0	0	0	0	200	146	0	346	904	
Heavy Enter Leg	0	0	5	0	5	0	9	0	0	9	0	0	0	0	0	0	1	1	0	2	16	
Total Entering Leg	74	0	97	0	171	85	316	0	0	401	0	0	0	0	0	0	201	147	0	348	920	
Cars Exiting Leg						231					292					0					381	904
Heavy Exiting Leg						1					6					0					9	16
Total Exiting Leg						232					298					0					390	920

PDI File #: **207662 AA**
 Location: **N: I-495 NB Ramps S: Driveway**
 Location: **E: Mass Ave (Route 111) W: Mass Ave (Route 111)**
 City, State: **Boxborough, MA**
 Client: **Nitsch/ B. Zimolka**
 Site Code: **TBA**
 Count Date: **Tuesday, October 20, 2020**
 Start Time: **4:00 PM**
 End Time: **6:00 PM**
 Class:



Cars

	I-495 NB Ramps					Mass Ave (Route 111)					Driveway					Mass Ave (Route 111)					Total					
	from North					from East					from South					from West										
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total						
4:00 PM	20	0	16	0	36	27	74	0	0	101	0	0	0	0	0	0	36	49	0	85	222					
4:15 PM	16	0	16	0	32	20	64	0	0	84	0	0	0	0	0	0	47	22	0	69	185					
4:30 PM	22	0	22	0	44	24	70	0	0	94	0	0	0	0	0	0	50	45	0	95	233					
4:45 PM	15	0	16	0	31	21	82	0	0	103	0	0	0	0	0	0	47	34	0	81	215					
Total	73	0	70	0	143	92	290	0	0	382	0	0	0	0	0	0	180	150	0	330	855					
5:00 PM	16	0	27	0	43	15	70	0	0	85	0	0	0	0	0	0	50	38	0	88	216					
5:15 PM	21	0	27	0	48	25	85	0	0	110	0	0	0	0	0	0	53	29	0	82	240					
5:30 PM	13	0	27	0	40	20	74	0	0	94	0	0	0	0	0	0	41	32	0	73	207					
5:45 PM	13	0	15	0	28	18	69	0	0	87	0	0	0	0	0	0	46	30	0	76	191					
Total	63	0	96	0	159	78	298	0	0	376	0	0	0	0	0	0	190	129	0	319	854					
Grand Total	136	0	166	0	302	170	588	0	0	758	0	0	0	0	0	0	370	279	0	649	1709					
Approach %	45.0	0.0	55.0	0.0		22.4	77.6	0.0	0.0		0.0	0.0	0.0	0.0			57.0	43.0	0.0							
Total %	8.0	0.0	9.7	0.0	17.7	9.9	34.4	0.0	0.0	44.4	0.0	0.0	0.0	0.0	0.0	0.0	21.7	16.3	0.0	38.0						
Exiting Leg Total						449					536					0					724					1709

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

	I-495 NB Ramps					Mass Ave (Route 111)					Driveway					Mass Ave (Route 111)					Total					
	from North					from East					from South					from West										
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total						
4:30 PM	22	0	22	0	44	24	70	0	0	94	0	0	0	0	0	0	50	45	0	95	233					
4:45 PM	15	0	16	0	31	21	82	0	0	103	0	0	0	0	0	0	47	34	0	81	215					
5:00 PM	16	0	27	0	43	15	70	0	0	85	0	0	0	0	0	0	50	38	0	88	216					
5:15 PM	21	0	27	0	48	25	85	0	0	110	0	0	0	0	0	0	53	29	0	82	240					
Total Volume	74	0	92	0	166	85	307	0	0	392	0	0	0	0	0	0	200	146	0	346	904					
% Approach Total	44.6	0.0	55.4	0.0		21.7	78.3	0.0	0.0		0.0	0.0	0.0	0.0			57.8	42.2	0.0							
PHF	0.841	0.000	0.852	0.000	0.865	0.850	0.903	0.000	0.000	0.891	0.000	0.000	0.000	0.000	0.000	0.000	0.943	0.811	0.000	0.911	0.942					
Entering Leg	74	0	92	0	166	85	307	0	0	392	0	0	0	0	0	0	200	146	0	346	904					
Exiting Leg						231					292					0					381					904
Total						397					684					0					727					1808

PDI File #: **207662 AA**
 Location: **N: I-495 NB Ramps S: Driveway**
 Location: **E: Mass Ave (Route 111) W: Mass Ave (Route 111)**
 City, State: **Boxborough, MA**
 Client: **Nitsch/ B. Zimolka**
 Site Code: **TBA**
 Count Date: **Tuesday, October 20, 2020**
 Start Time: **4:00 PM**
 End Time: **6:00 PM**
 Class: **Heavy Vehicles-Combined (Buses, Single-Unit Trucks, Articulated Trucks)**



Heavy Vehicles-Combined (Buses, Single-Unit Trucks, Articulated Trucks)

	I-495 NB Ramps					Mass Ave (Route 111)					Driveway					Mass Ave (Route 111)					Total
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	
4:00 PM	1	0	3	0	4	0	2	0	0	2	0	0	0	0	0	0	1	0	0	1	7
4:15 PM	2	0	1	0	3	0	2	0	0	2	0	0	0	0	0	0	1	0	0	1	6
4:30 PM	0	0	2	0	2	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	3
4:45 PM	0	0	1	0	1	0	5	0	0	5	0	0	0	0	0	0	1	0	0	1	7
Total	3	0	7	0	10	0	10	0	0	10	0	0	0	0	0	0	3	0	0	3	23
5:00 PM	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
5:15 PM	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	0	1	0	1	4
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	2
5:45 PM	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	3
Total	0	0	3	0	3	0	3	0	0	3	0	0	0	0	0	0	2	3	0	5	11
Grand Total	3	0	10	0	13	0	13	0	0	13	0	0	0	0	0	0	5	3	0	8	34
Approach %	23.1	0.0	76.9	0.0		0.0	100.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0	62.5	37.5	0.0		
Total %	8.8	0.0	29.4	0.0	38.2	0.0	38.2	0.0	0.0	38.2	0.0	0.0	0.0	0.0	0.0	0.0	14.7	8.8	0.0	23.5	
Exiting Leg Total	3					15					0					16					34
Buses	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	2
% Buses	0.0	0.0	0.0	0.0	0.0	0.0	7.7	0.0	0.0	7.7	0.0	0.0	0.0	0.0	0.0	0.0	20.0	0.0	0.0	12.5	5.9
Exiting Leg Total	0					1					0					1					2
Single-Unit Trucks	2	0	5	0	7	0	8	0	0	8	0	0	0	0	0	0	1	0	0	1	16
% Single-Unit	66.7	0.0	50.0	0.0	53.8	0.0	61.5	0.0	0.0	61.5	0.0	0.0	0.0	0.0	0.0	0.0	20.0	0.0	0.0	12.5	47.1
Exiting Leg Total	0					6					0					10					16
Articulated Trucks	1	0	5	0	6	0	4	0	0	4	0	0	0	0	0	0	3	3	0	6	16
% Articulated	33.3	0.0	50.0	0.0	46.2	0.0	30.8	0.0	0.0	30.8	0.0	0.0	0.0	0.0	0.0	0.0	60.0	100.0	0.0	75.0	47.1
Exiting Leg Total	3					8					0					5					16

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

4:00 PM	I-495 NB Ramps					Mass Ave (Route 111)					Driveway					Mass Ave (Route 111)					Total
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	
4:00 PM	1	0	3	0	4	0	2	0	0	2	0	0	0	0	0	0	1	0	0	1	7
4:15 PM	2	0	1	0	3	0	2	0	0	2	0	0	0	0	0	0	1	0	0	1	6
4:30 PM	0	0	2	0	2	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	3
4:45 PM	0	0	1	0	1	0	5	0	0	5	0	0	0	0	0	0	1	0	0	1	7
Total Volume	3	0	7	0	10	0	10	0	0	10	0	0	0	0	0	0	3	0	0	3	23
% Approach Total	30.0	0.0	70.0	0.0		0.0	100.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0		
PHF	0.375	0.000	0.583	0.000	0.625	0.000	0.500	0.000	0.000	0.500	0.000	0.000	0.000	0.000	0.000	0.000	0.750	0.000	0.000	0.750	0.821
Buses	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	2
Buses %	0.0	0.0	0.0	0.0	0.0	0.0	10.0	0.0	0.0	10.0	0.0	0.0	0.0	0.0	0.0	0.0	33.3	0.0	0.0	33.3	8.7
Single-Unit Trucks	2	0	3	0	5	0	6	0	0	6	0	0	0	0	0	0	0	0	0	0	11
Single-Unit %	66.7	0.0	42.9	0.0	50.0	0.0	60.0	0.0	0.0	60.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	47.8
Articulated Trucks	1	0	4	0	5	0	3	0	0	3	0	0	0	0	0	0	2	0	0	2	10
Articulated %	33.3	0.0	57.1	0.0	50.0	0.0	30.0	0.0	0.0	30.0	0.0	0.0	0.0	0.0	0.0	0.0	66.7	0.0	0.0	66.7	43.5
Buses	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	2
Single-Unit Trucks	2	0	3	0	5	0	6	0	0	6	0	0	0	0	0	0	0	0	0	0	11
Articulated Trucks	1	0	4	0	5	0	3	0	0	3	0	0	0	0	0	0	2	0	0	2	10
Total Entering Leg	3	0	7	0	10	0	10	0	0	10	0	0	0	0	0	0	3	0	0	3	23
Buses	0					1					0					1					2
Single-Unit Trucks	0					3					0					8					11
Articulated Trucks	0					6					0					4					10
Total Exiting Leg	0					10					0					13					23

PDI File #: **207662 AA**
 Location: **N: I-495 NB Ramps S: Driveway**
 Location: **E: Mass Ave (Route 111) W: Mass Ave (Route 111)**
 City, State: **Boxborough, MA**
 Client: **Nitsch/ B. Zimolka**
 Site Code: **TBA**
 Count Date: **Tuesday, October 20, 2020**
 Start Time: **4:00 PM**
 End Time: **6:00 PM**
 Class:



Buses

	I-495 NB Ramps					Mass Ave (Route 111)					Driveway					Mass Ave (Route 111)					Total
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	
4:00 PM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	2
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	2
Approach %	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0
Total %	0.0	0.0	0.0	0.0	0.0	0.0	50.0	0.0	0.0	50.0	0.0	0.0	0.0	0.0	0.0	0.0	50.0	0.0	0.0	50.0	0.0
Exiting Leg Total	0					1					0					1					2

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

	I-495 NB Ramps					Mass Ave (Route 111)					Driveway					Mass Ave (Route 111)					Total
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	
4:00 PM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:45 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	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	2
% Approach Total	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0
PHF	0.000	0.000	0.000	0.000	0.000	0.000	0.250	0.000	0.000	0.250	0.000	0.000	0.000	0.000	0.000	0.000	0.250	0.000	0.000	0.250	0.500
Entering Leg	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	2
Exiting Leg	0					1					0					1					2
Total	0					2					0					2					4

PDI File #: **207662 AA**
 Location: **N: I-495 NB Ramps S: Driveway**
 Location: **E: Mass Ave (Route 111) W: Mass Ave (Route 111)**
 City, State: **Boxborough, MA**
 Client: **Nitsch/ B. Zimolka**
 Site Code: **TBA**
 Count Date: **Tuesday, October 20, 2020**
 Start Time: **4:00 PM**
 End Time: **6:00 PM**
 Class:



Single-Unit Trucks

	I-495 NB Ramps					Mass Ave (Route 111)					Driveway					Mass Ave (Route 111)					Total
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	
4:00 PM	1	0	0	0	1	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	2
4:15 PM	1	0	1	0	2	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	4
4:30 PM	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
4:45 PM	0	0	1	0	1	0	3	0	0	3	0	0	0	0	0	0	0	0	0	0	4
Total	2	0	3	0	5	0	6	0	0	6	0	0	0	0	0	0	0	0	0	0	11
5:00 PM	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
5:15 PM	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	2
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	2
Total	0	0	2	0	2	0	2	0	0	2	0	0	0	0	0	0	1	0	0	1	5
Grand Total	2	0	5	0	7	0	8	0	0	8	0	0	0	0	0	0	1	0	0	1	16
Approach %	28.6	0.0	71.4	0.0		0.0	100.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0		
Total %	12.5	0.0	31.3	0.0	43.8	0.0	50.0	0.0	0.0	50.0	0.0	0.0	0.0	0.0	0.0	0.0	6.3	0.0	0.0	6.3	
Exiting Leg Total	0					6					0					10					16

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

	I-495 NB Ramps					Mass Ave (Route 111)					Driveway					Mass Ave (Route 111)					Total
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	
4:00 PM	1	0	0	0	1	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	2
4:15 PM	1	0	1	0	2	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	4
4:30 PM	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
4:45 PM	0	0	1	0	1	0	3	0	0	3	0	0	0	0	0	0	0	0	0	0	4
Total Volume	2	0	3	0	5	0	6	0	0	6	0	0	0	0	0	0	0	0	0	0	11
% Approach Total	40.0	0.0	60.0	0.0		0.0	100.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0		
PHF	0.500	0.000	0.750	0.000	0.625	0.000	0.500	0.000	0.000	0.500	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.688
Entering Leg	2	0	3	0	5	0	6	0	0	6	0	0	0	0	0	0	0	0	0	0	11
Exiting Leg	0					3					0					8					11
Total	5					9					0					8					22

PDI File #: **207662 AA**
 Location: **N: I-495 NB Ramps S: Driveway**
 Location: **E: Mass Ave (Route 111) W: Mass Ave (Route 111)**
 City, State: **Boxborough, MA**
 Client: **Nitsch/ B. Zimolka**
 Site Code: **TBA**
 Count Date: **Tuesday, October 20, 2020**
 Start Time: **4:00 PM**
 End Time: **6:00 PM**
 Class:



Articulated Trucks

	I-495 NB Ramps					Mass Ave (Route 111)					Driveway					Mass Ave (Route 111)					Total
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	
4:00 PM	0	0	3	0	3	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	4
4:15 PM	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
4:30 PM	0	0	1	0	1	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	2
4:45 PM	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	1	0	0	1	3
Total	1	0	4	0	5	0	3	0	0	3	0	0	0	0	0	0	2	0	0	2	10
5:00 PM	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
5:15 PM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	1	0	1	2
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	2
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
Total	0	0	1	0	1	0	1	0	0	1	0	0	0	0	0	0	1	3	0	4	6
Grand Total	1	0	5	0	6	0	4	0	0	4	0	0	0	0	0	0	3	3	0	6	16
Approach %	16.7	0.0	83.3	0.0		0.0	100.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0	50.0	50.0	0.0		
Total %	6.3	0.0	31.3	0.0	37.5	0.0	25.0	0.0	0.0	25.0	0.0	0.0	0.0	0.0	0.0	0.0	18.8	18.8	0.0	37.5	
Exiting Leg Total	3					8					0					5					16

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

	I-495 NB Ramps					Mass Ave (Route 111)					Driveway					Mass Ave (Route 111)					Total
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	
4:00 PM	0	0	3	0	3	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	4
4:15 PM	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
4:30 PM	0	0	1	0	1	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	2
4:45 PM	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	1	0	0	1	3
Total Volume	1	0	4	0	5	0	3	0	0	3	0	0	0	0	0	0	2	0	0	2	10
% Approach Total	20.0	0.0	80.0	0.0		0.0	100.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0		
PHF	0.250	0.000	0.333	0.000	0.417	0.000	0.375	0.000	0.000	0.375	0.000	0.000	0.000	0.000	0.000	0.000	0.500	0.000	0.000	0.500	0.625
Entering Leg	1	0	4	0	5	0	3	0	0	3	0	0	0	0	0	0	2	0	0	2	10
Exiting Leg	0					6					0					4					10
Total	5					9					0					6					20

PDI File #: **207662 AA**
 Location: **N: I-495 NB Ramps S: Driveway**
 Location: **E: Mass Ave (Route 111) W: Mass Ave (Route 111)**
 City, State: **Boxborough, MA**
 Client: **Nitsch/ B. Zimolka**
 Site Code: **TBA**
 Count Date: **Tuesday, October 20, 2020**
 Start Time: **4:00 PM**
 End Time: **6:00 PM**
 Class:



Bicycles (on Roadway and Crosswalks)

	I-495 NB Ramps								Mass Ave (Route 111)								Driveway								Mass Ave (Route 111)								Total						
	from North								from East								from South								from West														
	Right	Thru	Left	U-Turn	CW-EB	CW-WB	Total		Right	Thru	Left	U-Turn	CW-SB	CW-NB	Total		Right	Thru	Left	U-Turn	CW-WB	CW-EB	Total		Right	Thru	Left	U-Turn	CW-NB	CW-SB	Total								
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	0	0	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	2	2
Total	0	0	0	0	0	0	0	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	2	2
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	0	0	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	1	1
Total	0	0	0	0	0	0	0	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	1	1
Grand Total	0	0	0	0	0	0	0	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	3	3
Approach %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0		
Total %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	100.0		
Exiting Leg Total	0								3								0								0	3													

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

	I-495 NB Ramps								Mass Ave (Route 111)								Driveway								Mass Ave (Route 111)								Total						
	from North								from East								from South								from West														
	Right	Thru	Left	U-Turn	CW-EB	CW-WB	Total		Right	Thru	Left	U-Turn	CW-SB	CW-NB	Total		Right	Thru	Left	U-Turn	CW-WB	CW-EB	Total		Right	Thru	Left	U-Turn	CW-NB	CW-SB	Total								
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	0	0	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	2	2
Total Volume	0	0	0	0	0	0	0	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	2	2
% Approach Total	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0		
PHF	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.250	0.000	0.000	0.000	0.000	0.250	0.250		
Entering Leg	0	0	0	0	0	0	0	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	2	2
Exiting Leg	0								2								0								0	2													
Total	0								2								0								0	4													

PDI File #: 207662 AA
 Location: N: I-495 NB Ramps S: Driveway
 Location: E: Mass Ave (Route 111) W: Mass Ave (Route 111)
 City, State: Boxborough, MA
 Client: Nitsch/ B. Zimolka
 Site Code: TBA
 Count Date: Tuesday, October 20, 2020
 Start Time: 4:00 PM
 End Time: 6:00 PM
 Class:



Pedestrians

	I-495 NB Ramps							Mass Ave (Route 111)							Driveway							Mass Ave (Route 111)							Total
	from North							from East							from South							from West							
	Right	Thru	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	Left	U-Turn	CW-SB	CW-NB	Total	Right	Thru	Left	U-Turn	CW-WB	CW-EB	Total	Right	Thru	Left	U-Turn	CW-NB	CW-SB	Total	
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Grand Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Approach %	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Total %	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Exiting Leg Total	0							0							0							0							0

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

	I-495 NB Ramps							Mass Ave (Route 111)							Driveway							Mass Ave (Route 111)							Total
	from North							from East							from South							from West							
	Right	Thru	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	Left	U-Turn	CW-SB	CW-NB	Total	Right	Thru	Left	U-Turn	CW-WB	CW-EB	Total	Right	Thru	Left	U-Turn	CW-NB	CW-SB	Total	
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Total Volume	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
% Approach Total	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
PHF	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Entering Leg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Exiting Leg	0							0							0							0							0
Total	0							0							0							0							0

PDI File #: 207662 BB

Location: N: Gulf (West Drive) S: Adams Place NE: Gulf (East Drive)

Location: E: Mass Ave (Route 111) W: Mass Ave (Route 111)

City, State: Boxborough, MA

Client: Nitsch/ B. Zimolka

Site Code: TBA

Count Date: Tuesday, October 20, 2020

Start Time: 4:00 PM

End Time: 6:00 PM

Class:



46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Cars and Heavy Vehicles (Combined)

Table with columns for location (Gulf West Drive, Gulf East Drive, Mass Ave, Adams Place, Mass Ave) and direction (from North, Northeast, East, South, West). Rows include time intervals (4:00 PM to 5:45 PM), totals, and percentages for various vehicle types.

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

Table showing peak hour analysis for 4:30 PM. Columns and structure are similar to the main table, but with a specific time slot and detailed PHF (Peak Hour Factor) and percentage data.

PDI File #: 207662 BB
 Location: N: Gulf (West Drive) S: Adams Place NE: Gulf (East Drive)
 Location: E: Mass Ave (Route 111) W: Mass Ave (Route 111)
 City, State: Boxborough, MA
 Client: Nitsch/ B. Zimolka
 Site Code: TBA
 Count Date: Tuesday, October 20, 2020
 Start Time: 4:00 PM
 End Time: 6:00 PM
 Class:



Cars

	Gulf (West Drive)						Gulf (East Drive)						Mass Ave (Route 111)						Adams Place						Mass Ave (Route 111)						Total
	from North						from Northeast						from East						from South						from West						
	Right	Thru	Left	Hard Left	U-Turn	Total	Hard Right	Bear Right	Bear Left	Hard Left	U-Turn	Total	Hard Right	Right	Thru	Left	U-Turn	Total	Right	Bear Right	Thru	Left	U-Turn	Total	Right	Thru	Bear Left	Left	U-Turn	Total	
4:00 PM	7	0	1	0	0	8	0	12	0	1	0	13	1	2	80	0	0	83	1	0	0	3	0	4	3	42	4	9	0	58	166
4:15 PM	8	0	1	0	0	9	0	5	0	0	0	5	5	2	75	0	0	82	0	0	0	4	0	4	1	57	2	5	0	65	165
4:30 PM	6	0	0	0	0	6	0	7	0	5	0	12	6	1	82	0	0	89	0	0	0	0	0	0	1	58	3	12	0	74	181
4:45 PM	6	0	1	0	0	7	0	6	0	3	0	9	6	3	94	0	0	103	0	0	0	5	0	5	2	52	3	9	0	66	190
Total	27	0	3	0	0	30	0	30	0	9	0	39	18	8	331	0	0	357	1	0	0	12	0	13	7	209	12	35	0	263	702
5:00 PM	12	1	1	0	0	14	0	2	0	0	0	2	6	1	75	0	0	82	1	0	0	2	0	3	2	68	3	5	0	78	179
5:15 PM	8	0	4	0	0	12	0	7	0	3	0	10	1	3	95	0	0	99	0	0	0	2	0	2	4	70	3	8	0	85	208
5:30 PM	6	1	1	0	0	8	0	2	1	2	0	5	3	0	85	1	0	89	2	0	0	1	0	3	0	63	2	2	0	67	172
5:45 PM	3	0	0	0	0	3	0	5	0	0	0	5	7	0	77	0	0	84	0	0	0	0	0	0	1	58	0	6	0	65	157
Total	29	2	6	0	0	37	0	16	1	5	0	22	17	4	332	1	0	354	3	0	0	5	0	8	7	259	8	21	0	295	716
Grand Total	56	2	9	0	0	67	0	46	1	14	0	61	35	12	663	1	0	711	4	0	0	17	0	21	14	468	20	56	0	558	1418
Approach %	83.6	3.0	13.4	0.0	0.0		0.0	75.4	1.6	23.0	0.0		4.9	1.7	93.2	0.1	0.0		19.0	0.0	0.0	81.0	0.0		2.5	83.9	3.6	10.0	0.0		
Total %	3.9	0.1	0.6	0.0	0.0	4.7	0.0	3.2	0.1	1.0	0.0	4.3	2.5	0.8	46.8	0.1	0.0	50.1	0.3	0.0	0.0	1.2	0.0	1.5	1.0	33.0	1.4	3.9	0.0	39.4	
Exiting Leg Total	68						55						495						18						782						1418

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

	Gulf (West Drive)						Gulf (East Drive)						Mass Ave (Route 111)						Adams Place						Mass Ave (Route 111)						Total
	from North						from Northeast						from East						from South						from West						
	Right	Thru	Left	Hard Left	U-Turn	Total	Hard Right	Bear Right	Bear Left	Hard Left	U-Turn	Total	Hard Right	Right	Thru	Left	U-Turn	Total	Right	Bear Right	Thru	Left	U-Turn	Total	Right	Thru	Bear Left	Left	U-Turn	Total	
4:30 PM	6	0	0	0	0	6	0	7	0	5	0	12	6	1	82	0	0	89	0	0	0	0	0	0	1	58	3	12	0	74	181
4:45 PM	6	0	1	0	0	7	0	6	0	3	0	9	6	3	94	0	0	103	0	0	0	5	0	5	2	52	3	9	0	66	190
5:00 PM	12	1	1	0	0	14	0	2	0	0	0	2	6	1	75	0	0	82	1	0	0	2	0	3	2	68	3	5	0	78	179
5:15 PM	8	0	4	0	0	12	0	7	0	3	0	10	1	3	95	0	0	99	0	0	0	2	0	2	4	70	3	8	0	85	208
Total Volume	32	1	6	0	0	39	0	22	0	11	0	33	19	8	346	0	0	373	1	0	0	9	0	10	9	248	12	34	0	303	758
% Approach Total	82.1	2.6	15.4	0.0	0.0		0.0	66.7	0.0	33.3	0.0		5.1	2.1	92.8	0.0	0.0		10.0	0.0	0.0	90.0	0.0		3.0	81.8	4.0	11.2	0.0		
PHF	0.667	0.250	0.375	0.000	0.000	0.696	0.000	0.786	0.000	0.550	0.000	0.688	0.792	0.667	0.911	0.000	0.000	0.905	0.250	0.000	0.000	0.450	0.000	0.500	0.563	0.886	1.000	0.708	0.000	0.891	0.911
Entering Leg	32	1	6	0	0	39	0	22	0	11	0	33	19	8	346	0	0	373	1	0	0	9	0	10	9	248	12	34	0	303	758
Exiting Leg	42						31						266						10						409						758
Total	81						64						639						20						712						1516

PDI File #: 207662 BB
 Location: N: Gulf (West Drive) S: Adams Place NE: Gulf (East Drive)
 Location: E: Mass Ave (Route 111) W: Mass Ave (Route 111)
 City, State: Boxborough, MA
 Client: Nitsch/ B. Zimolka
 Site Code: TBA
 Count Date: Tuesday, October 20, 2020
 Start Time: 4:00 PM
 End Time: 6:00 PM
 Class:



Heavy Vehicles-Combined (Buses, Single-Unit Trucks, Articulated Trucks)

	Gulf (West Drive)							Gulf (East Drive)					Mass Ave (Route 111)						Adams Place						Mass Ave (Route 111)						Total		
	from North							from Northeast					from East						from South						from West								
	Right	Thru	Left	Hard Left	U-Turn	Total		Hard Right	Bear Right	Bear Left	Hard Left	U-Turn	Total	Hard Right	Right	Thru	Left	U-Turn	Total	Right	Bear Right	Thru	Left	U-Turn	Total	Right	Thru	Bear Left	Left	U-Turn		Total	
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3	0	0	0	4	0	0	0	1	0	1	0	2	0	0	0	2	7
4:15 PM	1	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	4	1	0	0	0	5	7	
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	0	1	0	1	0	2	3	
4:45 PM	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	5	0	0	5	0	0	0	1	0	1	0	3	0	0	0	3	10	
Total	2	0	0	0	0	2	0	0	0	0	0	0	0	0	1	10	0	0	11	0	0	0	2	0	2	0	10	1	1	0	12	27	
5:00 PM	2	0	0	0	0	2	0	1	0	0	0	1	1	1	2	0	0	4	0	0	0	1	0	1	0	1	0	1	0	0	1	9	
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0	0	3	0	0	0	0	0	0	0	1	0	0	0	0	1	4	
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	2	0	2	3	
Total	2	0	0	0	0	2	0	1	0	0	0	1	1	2	6	0	0	9	0	0	0	1	0	1	0	2	0	2	0	0	4	17	
Grand Total	4	0	0	0	0	4	0	1	0	0	0	1	1	3	16	0	0	20	0	0	0	3	0	3	0	12	1	3	0	16	44		
Approach %	100.0	0.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0	0.0		5.0	15.0	80.0	0.0	0.0		0.0	0.0	0.0	100.0	0.0		0.0	75.0	6.3	18.8	0.0				
Total %	9.1	0.0	0.0	0.0	0.0	9.1	0.0	2.3	0.0	0.0	0.0	2.3	2.3	6.8	36.4	0.0	0.0	45.5	0.0	0.0	0.0	6.8	0.0	6.8	0.0	27.3	2.3	6.8	0.0	36.4			
Exiting Leg Total	6						2					12						0						24						44			
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	0	1	0	1	0	2	4		
% Buses	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	12.5	0.0	0.0	10.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.3	0.0	33.3	0.0	12.5	9.1		
Exiting Leg Total	1						0					1						0						2						4			
Single-Unit Trucks	3	0	0	0	0	3	0	1	0	0	0	1	1	3	9	0	0	13	0	0	0	2	0	2	0	7	1	2	0	10	29		
% Single-Unit	75.0	0.0	0.0	0.0	0.0	75.0	0.0	100.0	0.0	0.0	0.0	100.0	100.0	100.0	56.3	0.0	0.0	65.0	0.0	0.0	0.0	66.7	0.0	66.7	0.0	58.3	100.0	66.7	0.0	62.5	65.9		
Exiting Leg Total	5						2					7						0						15						29			
Articulated Trucks	1	0	0	0	0	1	0	0	0	0	0	0	0	0	5	0	0	5	0	0	0	1	0	1	0	4	0	0	0	4	11		
% Articulated	25.0	0.0	0.0	0.0	0.0	25.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	31.3	0.0	0.0	25.0	0.0	0.0	0.0	33.3	0.0	33.3	0.0	33.3	0.0	0.0	0.0	25.0	25.0		
Exiting Leg Total	0						0					4						0						7						11			

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

4:15 PM	Gulf (West Drive)							Gulf (East Drive)					Mass Ave (Route 111)						Adams Place						Mass Ave (Route 111)						Total
	from North							from Northeast					from East						from South						from West						
	Right	Thru	Left	Hard Left	U-Turn	Total		Hard Right	Bear Right	Bear Left	Hard Left	U-Turn	Total	Hard Right	Right	Thru	Left	U-Turn	Total	Right	Bear Right	Thru	Left	U-Turn	Total	Right	Thru	Bear Left	Left	U-Turn	
4:15 PM	1	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	4	1	0	0	5	7
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	1	0	1	0	2	3
4:45 PM	1	0	0	0	0	1	0	0	0	0	0	0	0	0	5	0	0	5	0	0	0	1	0	1	0	3	0	0	0	3	10
5:00 PM	2	0	0	0	0	2	0	1	0	0	0	1	1	1	2	0	0	4	0	0	0	1	0	1	0	1	0	0	0	1	9
Total Volume	4	0	0	0	0	4	0	1	0	0	0	1	1	1	9	0	0	11	0	0	0	2	0	2	0	9	1	1	0	11	29
% Approach Total	100.0	0.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0	0.0		9.1	9.1	81.8	0.0	0.0		0.0	0.0	0.0	100.0	0.0		0.0	81.8	9.1	9.1	0.0		
PHF	0.500	0.000	0.000	0.000	0.000	0.500	0.000	0.250	0.000	0.000	0.000	0.250	0.250	0.250	0.450	0.000	0.000	0.550	0.000	0.000	0.000	0.500	0.000	0.500	0.000	0.563	0.250	0.250	0.000	0.550	0.725
Buses	0	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	1	1
Buses %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11.1	0.0	0.0	0.0	9.1	3.4
Single-Unit Trucks	3	0	0	0	0	3	0	1	0	0	0	1	1	1	6	0	0	8	0	0	0	2	0	2	0	6	1	1	0	8	22
Single-Unit %	75.0	0.0	0.0	0.0	0.0	75.0	0.0	100.0	0.0	0.0	0.0	100.0	100.0	100.0	66.7	0.0	0.0	72.7	0.0	0.0	0.0	100.0	0.0	100.0	0.0	66.7	100.0	100.0	0.0	72.7	75.9
Articulated Trucks	1	0	0	0	0	1	0	0	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	0	2	0	0	0	2	6
Articulated %	25.0	0.0	0.0	0.0	0.0	25.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	33.3	0.0	0.0	27.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	22.2	0.0	0.0	0.0	18.2	20.7
Buses	0	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	1	1
Single-Unit Trucks	3	0	0	0	0	3	0	1	0	0	0	1	1	1	6	0	0	8	0	0	0	2	0	2	0	6	1	1	0	8	22
Articulated Trucks	1	0	0	0	0	1	0	0	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	0	2	0	0	0	2	6
Total Entering Leg	4	0	0	0	0	4	0	1	0	0	0	1	1	1	9	0	0	11	0	0	0	2	0	2	0	9	1	1	0	11	29
Buses	0						0					1						0						0						1	
Single-Unit Trucks	2						2					6						0						12						22	
Articulated Trucks	0						0					2						0						4						6	

PDI File #: **207662 BB**
 Location: **N: Gulf (West Drive) S: Adams Place NE: Gulf (East Drive)**
 Location: **E: Mass Ave (Route 111) W: Mass Ave (Route 111)**
 City, State: **Boxborough, MA**
 Client: **Nitsch/ B. Zimolka**
 Site Code: **TBA**
 Count Date: **Tuesday, October 20, 2020**
 Start Time: **4:00 PM**
 End Time: **6:00 PM**
 Class:



46 Morton Street, Framingham, MA 01702
 Office: 508-875-0100 Fax: 508-875-0118
 Email: datarequests@pdillc.com

Heavy Vehicles-Combined (Buses, Single-Unit Trucks, Articulated Trucks)

Gulf (West Drive)							Gulf (East Drive)					Mass Ave (Route 111)					Adams Place					Mass Ave (Route 111)													
from North							from Northeast					from East					from South					from West													
Right	Thru	Left	Hard Left	U-Turn	Total		Hard Right	Bear Right	Bear Left	Hard Left	U-Turn	Total	Hard Right	Right	Thru	Left	U-Turn	Total	Right	Bear Right	Thru	Left	U-Turn	Total	Right	Thru	Bear Left	Left	U-Turn	Total	Total				
					2							2							9						0						16	29			
Total Exiting Leg						2							2							9							0							16	29

PDI File #: 207662 BB

Location: N: Gulf (West Drive) S: Adams Place NE: Gulf (East Drive)

Location: E: Mass Ave (Route 111) W: Mass Ave (Route 111)

City, State: Boxborough, MA

Client: Nitsch/ B. Zimolka

Site Code: TBA

Count Date: Tuesday, October 20, 2020

Start Time: 4:00 PM

End Time: 6:00 PM

Class:



46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Buses

	Gulf (West Drive)						Gulf (East Drive)						Mass Ave (Route 111)						Adams Place						Mass Ave (Route 111)						Total											
	from North						from Northeast						from East						from South						from West																	
	Right	Thru	Left	Hard Left	U-Turn	Total	Hard Right	Bear Right	Bear Left	Hard Left	U-Turn	Total	Hard Right	Right	Thru	Left	U-Turn	Total	Right	Bear Right	Thru	Left	U-Turn	Total	Right	Thru	Bear Left	Left	U-Turn	Total												
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1					
4:15 PM	0	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	0	0	0	1					
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	2					
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	2					
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	2					
Grand Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	1	0	0	4					
Approach %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	50.0	0.0	50.0	0.0	0.0	25.0	0.0	25.0	0.0	50.0	0.0									
Total %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	50.0	0.0	0.0	50.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	25.0	0.0	25.0	0.0	50.0	0.0												
Exiting Leg Total							1						0						1						0						2						4					

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

4:00 PM	Gulf (West Drive)						Gulf (East Drive)						Mass Ave (Route 111)						Adams Place						Mass Ave (Route 111)						Total						
	from North						from Northeast						from East						from South						from West												
	Right	Thru	Left	Hard Left	U-Turn	Total	Hard Right	Bear Right	Bear Left	Hard Left	U-Turn	Total	Hard Right	Right	Thru	Left	U-Turn	Total	Right	Bear Right	Thru	Left	U-Turn	Total	Right	Thru	Bear Left	Left	U-Turn	Total							
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
4:15 PM	0	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	0	0	0	1
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Volume	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	2
% Approach Total	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	25.0	0.0	25.0	0.0	50.0	0.0				
PHF	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.250	0.000	0.000	0.250	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.250	0.000	0.000	0.000	0.250	0.500						
Entering Leg	0						0						1						0						1						2						
Exiting Leg	0						0						1						0						1						2						
Total	0						0						2						0						2						4						

PDI File #: **207662 BB**
 Location: **N: Gulf (West Drive) S: Adams Place NE: Gulf (East Drive)**
 Location: **E: Mass Ave (Route 111) W: Mass Ave (Route 111)**
 City, State: **Boxborough, MA**
 Client: **Nitsch/ B. Zimolka**
 Site Code: **TBA**
 Count Date: **Tuesday, October 20, 2020**
 Start Time: **4:00 PM**
 End Time: **6:00 PM**
 Class:



Single-Unit Trucks

	Gulf (West Drive)							Gulf (East Drive)					Mass Ave (Route 111)						Adams Place						Mass Ave (Route 111)						Total			
	from North							from Northeast					from East						from South						from West									
	Right	Thru	Left	Hard Left	U-Turn	Total		Hard Right	Bear Right	Bear Left	Hard Left	U-Turn	Total	Hard Right	Right	Thru	Left	U-Turn	Total	Right	Bear Right	Thru	Left	U-Turn	Total	Right	Thru	Bear Left	Left	U-Turn		Total		
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	2
4:15 PM	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	3	1	0	0	0	4		
4:30 PM	0	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	2			
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	3	0	0	0	1	0	1	0	2	0	0	0	2		
Total	1	0	0	0	0	1	0	0	0	0	0	0	0	0	1	5	0	0	6	0	0	0	1	0	1	0	6	1	1	0	8			
5:00 PM	2	0	0	0	0	2	0	1	0	0	0	1	1	1	2	0	0	4	0	0	0	1	0	1	0	0	0	0	0	0	8			
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	2	0	0	0	0	0	0	0	1	0	0	0	1				
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0				
5:45 PM	0	0	0	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				
Total	2	0	0	0	0	2	0	1	0	0	0	1	1	2	4	0	0	7	0	0	0	1	0	1	0	1	0	1	0	2				
Grand Total	3	0	0	0	0	3	0	1	0	0	0	1	1	3	9	0	0	13	0	0	0	2	0	2	0	7	1	2	0	10				
Approach %	100.0	0.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0	0.0		7.7	23.1	69.2	0.0	0.0		0.0	0.0	0.0	100.0	0.0		0.0	70.0	10.0	20.0	0.0					
Total %	10.3	0.0	0.0	0.0	0.0	10.3	0.0	3.4	0.0	0.0	3.4	3.4	10.3	31.0	0.0	0.0	44.8	0.0	0.0	0.0	6.9	0.0	6.9	0.0	24.1	3.4	6.9	0.0	34.5					
Exiting Leg Total	5						2					7						0						15						29				

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

4:15 PM	Gulf (West Drive)							Gulf (East Drive)					Mass Ave (Route 111)						Adams Place						Mass Ave (Route 111)						Total
	from North							from Northeast					from East						from South						from West						
	Right	Thru	Left	Hard Left	U-Turn	Total		Hard Right	Bear Right	Bear Left	Hard Left	U-Turn	Total	Hard Right	Right	Thru	Left	U-Turn	Total	Right	Bear Right	Thru	Left	U-Turn	Total	Right	Thru	Bear Left	Left	U-Turn	
4:15 PM	1	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	3	1	0	0	4	
4:30 PM	0	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	2	
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	3	0	0	0	1	0	1	0	2	0	0	0	2	
5:00 PM	2	0	0	0	0	2	0	1	0	0	0	1	1	1	2	0	0	4	0	0	0	1	0	1	0	0	0	0	0	0	
Total Volume	3	0	0	0	0	3	0	1	0	0	0	1	1	1	6	0	0	8	0	0	0	2	0	2	0	6	1	1	0	8	
% Approach Total	100.0	0.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0	0.0		12.5	12.5	75.0	0.0	0.0		0.0	0.0	0.0	100.0	0.0		0.0	75.0	12.5	12.5	0.0		
PHF	0.375	0.000	0.000	0.000	0.000	0.375	0.000	0.250	0.000	0.000	0.250	0.250	0.250	0.500	0.000	0.000	0.500	0.000	0.000	0.000	0.500	0.000	0.500	0.000	0.500	0.250	0.250	0.000	0.500		
Entering Leg	3	0	0	0	0	3	0	1	0	0	0	1	1	1	6	0	0	8	0	0	0	2	0	2	0	6	1	1	0	8	
Exiting Leg	2						2					6						0						12							
Total	5						3					14						2						20							

PDI File #: 207662 BB

Location: N: Gulf (West Drive) S: Adams Place NE: Gulf (East Drive)

Location: E: Mass Ave (Route 111) W: Mass Ave (Route 111)

City, State: Boxborough, MA

Client: Nitsch/ B. Zimolka

Site Code: TBA

Count Date: Tuesday, October 20, 2020

Start Time: 4:00 PM

End Time: 6:00 PM

Class:



PRECISION DATA INDUSTRIES, LLC

46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Articulated Trucks

Table with columns for location (Gulf (West Drive), Gulf (East Drive), Mass Ave (Route 111), Adams Place, Mass Ave (Route 111)) and movement (Right, Thru, Left, Hard Left, U-Turn, Total). Rows include time intervals (4:00 PM to 5:45 PM) and summary rows (Total, Grand Total, Approach %, Total %, Exiting Leg Total).

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

Table with columns for location (Gulf (West Drive), Gulf (East Drive), Mass Ave (Route 111), Adams Place, Mass Ave (Route 111)) and movement (Right, Thru, Left, Hard Left, U-Turn, Total). Rows include time intervals (4:00 PM to 4:45 PM), Total Volume, % Approach Total, PHF, and summary rows (Entering Leg, Exiting Leg, Total).

PDI File #: **207662 CC**
 Location: **N: Paddock Lane S: Cisco Driveway**
 Location: **E: Mass Ave (Route 111) W: Mass Ave (Route 111)**
 City, State: **Boxborough, MA**
 Client: **Nitsch/ B. Zimolka**
 Site Code: **TBA**
 Count Date: **Tuesday, October 20, 2020**
 Start Time: **4:00 PM**
 End Time: **6:00 PM**
 Class:



Cars and Heavy Vehicles (Combined)

	Paddock Lane					Mass Ave (Route 111)					Cisco Driveway					Mass Ave (Route 111)					Total
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	
4:00 PM	4	0	4	0	8	5	85	0	0	90	0	0	0	0	0	2	38	3	0	43	141
4:15 PM	2	0	0	0	2	3	77	0	0	80	0	0	2	0	2	0	53	6	0	59	143
4:30 PM	10	0	6	0	16	5	80	0	0	85	0	0	0	0	0	0	57	6	0	63	164
4:45 PM	6	0	7	0	13	11	99	0	0	110	0	0	0	0	0	1	46	11	0	58	181
Total	22	0	17	0	39	24	341	0	0	365	0	0	2	0	2	3	194	26	0	223	629
5:00 PM	10	0	3	0	13	4	77	0	0	81	0	0	0	0	0	0	65	4	0	69	163
5:15 PM	6	0	3	0	9	5	99	0	0	104	0	0	0	0	0	0	62	11	0	73	186
5:30 PM	9	0	1	0	10	6	80	0	0	86	0	0	1	0	1	1	55	12	0	68	165
5:45 PM	4	0	3	0	7	5	81	0	0	86	0	0	0	0	0	0	49	10	0	59	152
Total	29	0	10	0	39	20	337	0	0	357	0	0	1	0	1	1	231	37	0	269	666
Grand Total	51	0	27	0	78	44	678	0	0	722	0	0	3	0	3	4	425	63	0	492	1295
Approach %	65.4	0.0	34.6	0.0		6.1	93.9	0.0	0.0		0.0	0.0	100.0	0.0		0.8	86.4	12.8	0.0		
Total %	3.9	0.0	2.1	0.0	6.0	3.4	52.4	0.0	0.0	55.8	0.0	0.0	0.2	0.0	0.2	0.3	32.8	4.9	0.0	38.0	
Exiting Leg Total	107					452					4					732					1295
Cars	47	0	27	0	74	44	663	0	0	707	0	0	3	0	3	4	415	63	0	482	1266
% Cars	92.2	0.0	100.0	0.0	94.9	100.0	97.8	0.0	0.0	97.9	0.0	0.0	100.0	0.0	100.0	100.0	97.6	100.0	0.0	98.0	97.8
Exiting Leg Total	107					442					4					713					1266
Heavy Vehicles	4	0	0	0	4	0	15	0	0	15	0	0	0	0	0	0	10	0	0	10	29
% Heavy Vehicles	7.8	0.0	0.0	0.0	5.1	0.0	2.2	0.0	0.0	2.1	0.0	0.0	0.0	0.0	0.0	0.0	2.4	0.0	0.0	2.0	2.2
Exiting Leg Total	0					10					0					19					29

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

	Paddock Lane					Mass Ave (Route 111)					Cisco Driveway					Mass Ave (Route 111)					Total
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	
4:45 PM	6	0	7	0	13	11	99	0	0	110	0	0	0	0	0	1	46	11	0	58	181
5:00 PM	10	0	3	0	13	4	77	0	0	81	0	0	0	0	0	0	65	4	0	69	163
5:15 PM	6	0	3	0	9	5	99	0	0	104	0	0	0	0	0	0	62	11	0	73	186
5:30 PM	9	0	1	0	10	6	80	0	0	86	0	0	1	0	1	1	55	12	0	68	165
Total Volume	31	0	14	0	45	26	355	0	0	381	0	0	1	0	1	2	228	38	0	268	695
% Approach Total	68.9	0.0	31.1	0.0		6.8	93.2	0.0	0.0		0.0	0.0	100.0	0.0		0.7	85.1	14.2	0.0		
PHF	0.775	0.000	0.500	0.000	0.865	0.591	0.896	0.000	0.000	0.866	0.000	0.000	0.250	0.000	0.250	0.500	0.877	0.792	0.000	0.918	0.934
Cars	29	0	14	0	43	26	345	0	0	371	0	0	1	0	1	2	224	38	0	264	679
Cars %	93.5	0.0	100.0	0.0	95.6	100.0	97.2	0.0	0.0	97.4	0.0	0.0	100.0	0.0	100.0	100.0	98.2	100.0	0.0	98.5	97.7
Heavy Vehicles	2	0	0	0	2	0	10	0	0	10	0	0	0	0	0	0	4	0	0	4	16
Heavy Vehicles %	6.5	0.0	0.0	0.0	4.4	0.0	2.8	0.0	0.0	2.6	0.0	0.0	0.0	0.0	0.0	0.0	1.8	0.0	0.0	1.5	2.3
Cars Enter Leg	29	0	14	0	43	26	345	0	0	371	0	0	1	0	1	2	224	38	0	264	679
Heavy Enter Leg	2	0	0	0	2	0	10	0	0	10	0	0	0	0	0	0	4	0	0	4	16
Total Entering Leg	31	0	14	0	45	26	355	0	0	381	0	0	1	0	1	2	228	38	0	268	695
Cars Exiting Leg	64					238					2					375					679
Heavy Exiting Leg	0					4					0					12					16
Total Exiting Leg	64					242					2					387					695

PDI File #: **207662 CC**
 Location: **N: Paddock Lane S: Cisco Driveway**
 Location: **E: Mass Ave (Route 111) W: Mass Ave (Route 111)**
 City, State: **Boxborough, MA**
 Client: **Nitsch/ B. Zimolka**
 Site Code: **TBA**
 Count Date: **Tuesday, October 20, 2020**
 Start Time: **4:00 PM**
 End Time: **6:00 PM**
 Class:



Cars

	Paddock Lane					Mass Ave (Route 111)					Cisco Driveway					Mass Ave (Route 111)					Total
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	
4:00 PM	3	0	4	0	7	5	82	0	0	87	0	0	0	0	0	2	36	3	0	41	135
4:15 PM	2	0	0	0	2	3	76	0	0	79	0	0	2	0	2	0	51	6	0	57	140
4:30 PM	9	0	6	0	15	5	79	0	0	84	0	0	0	0	0	0	55	6	0	61	160
4:45 PM	4	0	7	0	11	11	94	0	0	105	0	0	0	0	0	1	45	11	0	57	173
Total	18	0	17	0	35	24	331	0	0	355	0	0	2	0	2	3	187	26	0	216	608
5:00 PM	10	0	3	0	13	4	76	0	0	80	0	0	0	0	0	0	63	4	0	67	160
5:15 PM	6	0	3	0	9	5	97	0	0	102	0	0	0	0	0	0	61	11	0	72	183
5:30 PM	9	0	1	0	10	6	78	0	0	84	0	0	1	0	1	1	55	12	0	68	163
5:45 PM	4	0	3	0	7	5	81	0	0	86	0	0	0	0	0	0	49	10	0	59	152
Total	29	0	10	0	39	20	332	0	0	352	0	0	1	0	1	1	228	37	0	266	658
Grand Total	47	0	27	0	74	44	663	0	0	707	0	0	3	0	3	4	415	63	0	482	1266
Approach %	63.5	0.0	36.5	0.0		6.2	93.8	0.0	0.0		0.0	0.0	100.0	0.0		0.8	86.1	13.1	0.0		
Total %	3.7	0.0	2.1	0.0	5.8	3.5	52.4	0.0	0.0	55.8	0.0	0.0	0.2	0.0	0.2	0.3	32.8	5.0	0.0	38.1	
Exiting Leg Total	107					442					4					713					1266

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

	Paddock Lane					Mass Ave (Route 111)					Cisco Driveway					Mass Ave (Route 111)					Total
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	
4:45 PM	4	0	7	0	11	11	94	0	0	105	0	0	0	0	0	1	45	11	0	57	173
5:00 PM	10	0	3	0	13	4	76	0	0	80	0	0	0	0	0	0	63	4	0	67	160
5:15 PM	6	0	3	0	9	5	97	0	0	102	0	0	0	0	0	0	61	11	0	72	183
5:30 PM	9	0	1	0	10	6	78	0	0	84	0	0	1	0	1	1	55	12	0	68	163
Total Volume	29	0	14	0	43	26	345	0	0	371	0	0	1	0	1	2	224	38	0	264	679
% Approach Total	67.4	0.0	32.6	0.0		7.0	93.0	0.0	0.0		0.0	0.0	100.0	0.0		0.8	84.8	14.4	0.0		
PHF	0.725	0.000	0.500	0.000	0.827	0.591	0.889	0.000	0.000	0.883	0.000	0.000	0.250	0.000	0.250	0.500	0.889	0.792	0.000	0.917	0.928
Entering Leg	29	0	14	0	43	26	345	0	0	371	0	0	1	0	1	2	224	38	0	264	679
Exiting Leg	64					238					2					375					679
Total	107					609					3					639					1358

PDI File #: **207662 CC**
 Location: **N: Paddock Lane S: Cisco Driveway**
 Location: **E: Mass Ave (Route 111) W: Mass Ave (Route 111)**
 City, State: **Boxborough, MA**
 Client: **Nitsch/ B. Zimolka**
 Site Code: **TBA**
 Count Date: **Tuesday, October 20, 2020**
 Start Time: **4:00 PM**
 End Time: **6:00 PM**
 Class: **Heavy Vehicles-Combined (Buses, Single-Unit Trucks, Articulated Trucks)**



	Paddock Lane					Mass Ave (Route 111)					Cisco Driveway					Mass Ave (Route 111)					Total
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	
4:00 PM	1	0	0	0	1	0	3	0	0	3	0	0	0	0	0	0	2	0	0	2	6
4:15 PM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	2	0	0	2	3
4:30 PM	1	0	0	0	1	0	1	0	0	1	0	0	0	0	0	0	2	0	0	2	4
4:45 PM	2	0	0	0	2	0	5	0	0	5	0	0	0	0	0	0	1	0	0	1	8
Total	4	0	0	0	4	0	10	0	0	10	0	0	0	0	0	0	7	0	0	7	21
5:00 PM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	2	0	0	2	3
5:15 PM	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	1	0	0	1	3
5:30 PM	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	2
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	5	0	0	5	0	0	0	0	0	0	3	0	0	3	8
Grand Total	4	0	0	0	4	0	15	0	0	15	0	0	0	0	0	0	10	0	0	10	29
Approach %	100.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0		
Total %	13.8	0.0	0.0	0.0	13.8	0.0	51.7	0.0	0.0	51.7	0.0	0.0	0.0	0.0	0.0	0.0	34.5	0.0	0.0	34.5	
Exiting Leg Total	0					10					0					19					29
Buses	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	0	2	0	0	2	6
% Buses	0.0	0.0	0.0	0.0	0.0	0.0	26.7	0.0	0.0	26.7	0.0	0.0	0.0	0.0	0.0	0.0	20.0	0.0	0.0	20.0	20.7
Exiting Leg Total	0					2					0					4					6
Single-Unit Trucks	3	0	0	0	3	0	7	0	0	7	0	0	0	0	0	0	5	0	0	5	15
% Single-Unit	75.0	0.0	0.0	0.0	75.0	0.0	46.7	0.0	0.0	46.7	0.0	0.0	0.0	0.0	0.0	0.0	50.0	0.0	0.0	50.0	51.7
Exiting Leg Total	0					5					0					10					15
Articulated Trucks	1	0	0	0	1	0	4	0	0	4	0	0	0	0	0	0	3	0	0	3	8
% Articulated	25.0	0.0	0.0	0.0	25.0	0.0	26.7	0.0	0.0	26.7	0.0	0.0	0.0	0.0	0.0	0.0	30.0	0.0	0.0	30.0	27.6
Exiting Leg Total	0					3					0					5					8

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

4:00 PM	Paddock Lane					Mass Ave (Route 111)					Cisco Driveway					Mass Ave (Route 111)					Total
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	
4:00 PM	1	0	0	0	1	0	3	0	0	3	0	0	0	0	0	0	2	0	0	2	6
4:15 PM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	2	0	0	2	3
4:30 PM	1	0	0	0	1	0	1	0	0	1	0	0	0	0	0	0	2	0	0	2	4
4:45 PM	2	0	0	0	2	0	5	0	0	5	0	0	0	0	0	0	1	0	0	1	8
Total Volume	4	0	0	0	4	0	10	0	0	10	0	0	0	0	0	0	7	0	0	7	21
% Approach Total	100.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0		
PHF	0.500	0.000	0.000	0.000	0.500	0.000	0.500	0.000	0.000	0.500	0.000	0.000	0.000	0.000	0.000	0.000	0.875	0.000	0.000	0.875	0.656
Buses	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	1	0	0	1	3
Buses %	0.0	0.0	0.0	0.0	0.0	0.0	20.0	0.0	0.0	20.0	0.0	0.0	0.0	0.0	0.0	0.0	14.3	0.0	0.0	14.3	14.3
Single-Unit Trucks	3	0	0	0	3	0	5	0	0	5	0	0	0	0	0	0	3	0	0	3	11
Single-Unit %	75.0	0.0	0.0	0.0	75.0	0.0	50.0	0.0	0.0	50.0	0.0	0.0	0.0	0.0	0.0	0.0	42.9	0.0	0.0	42.9	52.4
Articulated Trucks	1	0	0	0	1	0	3	0	0	3	0	0	0	0	0	0	3	0	0	3	7
Articulated %	25.0	0.0	0.0	0.0	25.0	0.0	30.0	0.0	0.0	30.0	0.0	0.0	0.0	0.0	0.0	0.0	42.9	0.0	0.0	42.9	33.3
Buses	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	1	0	0	1	3
Single-Unit Trucks	3	0	0	0	3	0	5	0	0	5	0	0	0	0	0	0	3	0	0	3	11
Articulated Trucks	1	0	0	0	1	0	3	0	0	3	0	0	0	0	0	0	3	0	0	3	7
Total Entering Leg	4	0	0	0	4	0	10	0	0	10	0	0	0	0	0	0	7	0	0	7	21
Buses	0					1					0					2					3
Single-Unit Trucks	0					3					0					8					11
Articulated Trucks	0					3					0					4					7
Total Exiting Leg	0					7					0					14					21

PDI File #: **207662 CC**
 Location: **N: Paddock Lane S: Cisco Driveway**
 Location: **E: Mass Ave (Route 111) W: Mass Ave (Route 111)**
 City, State: **Boxborough, MA**
 Client: **Nitsch/ B. Zimolka**
 Site Code: **TBA**
 Count Date: **Tuesday, October 20, 2020**
 Start Time: **4:00 PM**
 End Time: **6:00 PM**
 Class:



Buses

	Paddock Lane					Mass Ave (Route 111)					Cisco Driveway					Mass Ave (Route 111)					Total
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	
4:00 PM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
Total	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	1	0	0	1	3
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
5:15 PM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
5:30 PM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	1	0	0	1	3
Grand Total	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	0	2	0	0	2	6
Approach %	0.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0		
Total %	0.0	0.0	0.0	0.0	0.0	0.0	66.7	0.0	0.0	66.7	0.0	0.0	0.0	0.0	0.0	0.0	33.3	0.0	0.0	33.3	
Exiting Leg Total	0					2					0					4					6

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

	Paddock Lane					Mass Ave (Route 111)					Cisco Driveway					Mass Ave (Route 111)					Total
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	
4:45 PM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
5:15 PM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
5:30 PM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
Total Volume	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	1	0	0	1	4
% Approach Total	0.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0		
PHF	0.000	0.000	0.000	0.000	0.000	0.000	0.750	0.000	0.000	0.750	0.000	0.000	0.000	0.000	0.000	0.000	0.250	0.000	0.000	0.250	1.000
Entering Leg	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	1	0	0	1	4
Exiting Leg	0					1					0					3					4
Total	0					4					0					4					8

PDI File #: **207662 CC**
 Location: **N: Paddock Lane S: Cisco Driveway**
 Location: **E: Mass Ave (Route 111) W: Mass Ave (Route 111)**
 City, State: **Boxborough, MA**
 Client: **Nitsch/ B. Zimolka**
 Site Code: **TBA**
 Count Date: **Tuesday, October 20, 2020**
 Start Time: **4:00 PM**
 End Time: **6:00 PM**
 Class:



Single-Unit Trucks

	Paddock Lane					Mass Ave (Route 111)					Cisco Driveway					Mass Ave (Route 111)					Total
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	
4:00 PM	1	0	0	0	1	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	3
4:15 PM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	2
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
4:45 PM	2	0	0	0	2	0	2	0	0	2	0	0	0	0	0	0	1	0	0	1	5
Total	3	0	0	0	3	0	5	0	0	5	0	0	0	0	0	0	3	0	0	3	11
5:00 PM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	2
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
5:30 PM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	2	0	0	2	4
Grand Total	3	0	0	0	3	0	7	0	0	7	0	0	0	0	0	0	5	0	0	5	15
Approach %	100.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0		
Total %	20.0	0.0	0.0	0.0	20.0	0.0	46.7	0.0	0.0	46.7	0.0	0.0	0.0	0.0	0.0	0.0	33.3	0.0	0.0	33.3	
Exiting Leg Total	0					5					0					10					15

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

	Paddock Lane					Mass Ave (Route 111)					Cisco Driveway					Mass Ave (Route 111)					Total
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	
4:00 PM	1	0	0	0	1	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	3
4:15 PM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	2
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
4:45 PM	2	0	0	0	2	0	2	0	0	2	0	0	0	0	0	0	1	0	0	1	5
Total Volume	3	0	0	0	3	0	5	0	0	5	0	0	0	0	0	0	3	0	0	3	11
% Approach Total	100.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0		
PHF	0.375	0.000	0.000	0.000	0.375	0.000	0.625	0.000	0.000	0.625	0.000	0.000	0.000	0.000	0.000	0.000	0.750	0.000	0.000	0.750	0.550
Entering Leg	3	0	0	0	3	0	5	0	0	5	0	0	0	0	0	0	3	0	0	3	11
Exiting Leg	0					3					0					8					11
Total	3					8					0					11					22

PDI File #: **207662 CC**
 Location: **N: Paddock Lane S: Cisco Driveway**
 Location: **E: Mass Ave (Route 111) W: Mass Ave (Route 111)**
 City, State: **Boxborough, MA**
 Client: **Nitsch/ B. Zimolka**
 Site Code: **TBA**
 Count Date: **Tuesday, October 20, 2020**
 Start Time: **4:00 PM**
 End Time: **6:00 PM**
 Class:



Articulated Trucks

	Paddock Lane					Mass Ave (Route 111)					Cisco Driveway					Mass Ave (Route 111)					Total
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	2
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM	1	0	0	0	1	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	3
4:45 PM	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	2
Total	1	0	0	0	1	0	3	0	0	3	0	0	0	0	0	0	3	0	0	3	7
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
Grand Total	1	0	0	0	1	0	4	0	0	4	0	0	0	0	0	0	3	0	0	3	8
Approach %	100.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0		
Total %	12.5	0.0	0.0	0.0	12.5	0.0	50.0	0.0	0.0	50.0	0.0	0.0	0.0	0.0	0.0	0.0	37.5	0.0	0.0	37.5	
Exiting Leg Total	0					3					0					5					8

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

	Paddock Lane					Mass Ave (Route 111)					Cisco Driveway					Mass Ave (Route 111)					Total
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	2
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM	1	0	0	0	1	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	3
4:45 PM	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	2
Total Volume	1	0	0	0	1	0	3	0	0	3	0	0	0	0	0	0	3	0	0	3	7
% Approach Total	100.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0		
PHF	0.250	0.000	0.000	0.000	0.250	0.000	0.375	0.000	0.000	0.375	0.000	0.000	0.000	0.000	0.000	0.000	0.375	0.000	0.000	0.375	0.583
Entering Leg	1	0	0	0	1	0	3	0	0	3	0	0	0	0	0	0	3	0	0	3	7
Exiting Leg	0					3					0					4					7
Total	1					6					0					7					14

PDI File #: **207662 CC**
 Location: **N: Paddock Lane S: Cisco Driveway**
 Location: **E: Mass Ave (Route 111) W: Mass Ave (Route 111)**
 City, State: **Boxborough, MA**
 Client: **Nitsch/ B. Zimolka**
 Site Code: **TBA**
 Count Date: **Tuesday, October 20, 2020**
 Start Time: **4:00 PM**
 End Time: **6:00 PM**
 Class:



Bicycles (on Roadway and Crosswalks)

	Paddock Lane							Mass Ave (Route 111)							Cisco Driveway							Mass Ave (Route 111)							Total
	from North							from East							from South							from West							
	Right	Thru	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	Left	U-Turn	CW-SB	CW-NB	Total	Right	Thru	Left	U-Turn	CW-WB	CW-EB	Total	Right	Thru	Left	U-Turn	CW-NB	CW-SB	Total	
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
4:45 PM	0	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	2		
Total	0	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	2		
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
5:30 PM	0	1	0	0	0	0	1	1	1	0	0	2	0	4	0	0	0	0	0	0	0	0	0	0	0	1	6		
5:45 PM	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	1	1	5		
Total	0	1	0	0	0	0	1	2	1	0	0	2	0	5	0	0	1	0	0	0	0	0	0	1	2	1	11		
Grand Total	0	1	0	0	0	0	1	2	1	0	0	2	0	5	0	0	1	0	0	0	0	0	0	1	2	3	13		
Approach %	0.0	100.0	0.0	0.0	0.0	0.0		40.0	20.0	0.0	0.0	40.0	0.0		0.0	0.0	100.0	0.0	0.0	0.0			33.3	50.0	16.7	0.0			
Total %	0.0	7.7	0.0	0.0	0.0	0.0	7.7	15.4	7.7	0.0	0.0	15.4	0.0	38.5	0.0	0.0	7.7	0.0	0.0	0.0	0.0	7.7	15.4	23.1	7.7	46.2			
Exiting Leg Total	3							5							3							2							13

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

5:00 PM	Paddock Lane							Mass Ave (Route 111)							Cisco Driveway							Mass Ave (Route 111)							Total
	from North							from East							from South							from West							
	Right	Thru	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	Left	U-Turn	CW-SB	CW-NB	Total	Right	Thru	Left	U-Turn	CW-WB	CW-EB	Total	Right	Thru	Left	U-Turn	CW-NB	CW-SB	Total	
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
5:30 PM	0	1	0	0	0	0	1	1	1	0	0	2	0	4	0	0	0	0	0	0	0	0	0	0	1	0	6		
5:45 PM	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	1	1	5		
Total Volume	0	1	0	0	0	0	1	2	1	0	0	2	0	5	0	0	1	0	0	0	0	0	1	2	1	1	11		
% Approach Total	0.0	100.0	0.0	0.0	0.0	0.0		40.0	20.0	0.0	0.0	40.0	0.0		0.0	0.0	100.0	0.0	0.0	0.0			50.0	25.0	25.0	0.0			
PHF	0.000	0.250	0.000	0.000	0.000	0.000	0.250	0.500	0.250	0.000	0.000	0.250	0.000	0.313	0.000	0.000	0.250	0.000	0.000	0.000	0.250			0.500	0.250	0.250	0.458		
Entering Leg	0							2							0							2							11
Exiting Leg	1							3							3							4							11
Total	4							8							4							6							22

PDI File #: 207662 CC
 Location: N: Paddock Lane S: Cisco Driveway
 Location: E: Mass Ave (Route 111) W: Mass Ave (Route 111)
 City, State: Boxborough, MA
 Client: Nitsch/ B. Zimolka
 Site Code: TBA
 Count Date: Tuesday, October 20, 2020
 Start Time: 4:00 PM
 End Time: 6:00 PM
 Class: Pedestrians



Pedestrians

	Paddock Lane							Mass Ave (Route 111)							Cisco Driveway							Mass Ave (Route 111)							Total
	from North							from East							from South							from West							
	Right	Thru	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	Left	U-Turn	CW-SB	CW-NB	Total	Right	Thru	Left	U-Turn	CW-WB	CW-EB	Total	Right	Thru	Left	U-Turn	CW-NB	CW-SB	Total	
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Grand Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Approach %	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Total %	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Exiting Leg Total	0							0							0							0							0

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

4:00 PM	Paddock Lane							Mass Ave (Route 111)							Cisco Driveway							Mass Ave (Route 111)							Total
	from North							from East							from South							from West							
	Right	Thru	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	Left	U-Turn	CW-SB	CW-NB	Total	Right	Thru	Left	U-Turn	CW-WB	CW-EB	Total	Right	Thru	Left	U-Turn	CW-NB	CW-SB	Total	
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Total Volume	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
% Approach Total	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
PHF	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Entering Leg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Exiting Leg	0							0							0							0							0
Total	0							0							0							0							0

PDI File #: **207662 DD**
 Location: **N: Hill Road S: Burroughs Street**
 Location: **E: Mass Ave (Route 111) W: Mass Ave (Route 111)**
 City, State: **Boxborough, MA**
 Client: **Nitsch/ B. Zimolka**
 Site Code: **TBA**
 Count Date: **Tuesday, October 20, 2020**
 Start Time: **4:00 PM**
 End Time: **6:00 PM**
 Class:



Cars and Heavy Vehicles (Combined)

	Hill Road					Mass Ave (Route 111)					Burroughs Street					Mass Ave (Route 111)					Total
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	
4:00 PM	8	1	3	0	12	2	76	0	0	78	3	1	7	0	11	5	31	5	0	41	142
4:15 PM	1	0	1	0	2	4	71	0	0	75	1	0	6	0	7	6	40	5	0	51	135
4:30 PM	3	0	1	0	4	1	71	3	0	75	4	2	11	0	17	7	54	4	0	65	161
4:45 PM	6	2	2	0	10	2	96	2	0	100	0	0	7	0	7	6	42	5	0	53	170
Total	18	3	7	0	28	9	314	5	0	328	8	3	31	0	42	24	167	19	0	210	608
5:00 PM	5	1	2	0	8	6	71	0	0	77	2	0	6	0	8	12	44	10	0	66	159
5:15 PM	6	2	4	0	12	2	83	3	0	88	2	0	12	0	14	9	51	5	0	65	179
5:30 PM	3	0	2	0	5	1	68	4	0	73	4	1	14	0	19	9	41	6	0	56	153
5:45 PM	3	0	3	0	6	1	76	2	0	79	3	1	9	0	13	6	44	2	0	52	150
Total	17	3	11	0	31	10	298	9	0	317	11	2	41	0	54	36	180	23	0	239	641
Grand Total	35	6	18	0	59	19	612	14	0	645	19	5	72	0	96	60	347	42	0	449	1249
Approach %	59.3	10.2	30.5	0.0		2.9	94.9	2.2	0.0		19.8	5.2	75.0	0.0		13.4	77.3	9.4	0.0		
Total %	2.8	0.5	1.4	0.0	4.7	1.5	49.0	1.1	0.0	51.6	1.5	0.4	5.8	0.0	7.7	4.8	27.8	3.4	0.0	35.9	
Exiting Leg Total	66					384					80					719					1249
Cars	34	6	18	0	58	17	592	14	0	623	18	5	72	0	95	60	336	41	0	437	1213
% Cars	97.1	100.0	100.0	0.0	98.3	89.5	96.7	100.0	0.0	96.6	94.7	100.0	100.0	0.0	99.0	100.0	96.8	97.6	0.0	97.3	97.1
Exiting Leg Total	63					372					80					698					1213
Heavy Vehicles	1	0	0	0	1	2	20	0	0	22	1	0	0	0	1	0	11	1	0	12	36
% Heavy Vehicles	2.9	0.0	0.0	0.0	1.7	10.5	3.3	0.0	0.0	3.4	5.3	0.0	0.0	0.0	1.0	0.0	3.2	2.4	0.0	2.7	2.9
Exiting Leg Total	3					12					0					21					36

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

	Hill Road					Mass Ave (Route 111)					Burroughs Street					Mass Ave (Route 111)					Total
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	
4:30 PM	3	0	1	0	4	1	71	3	0	75	4	2	11	0	17	7	54	4	0	65	161
4:45 PM	6	2	2	0	10	2	96	2	0	100	0	0	7	0	7	6	42	5	0	53	170
5:00 PM	5	1	2	0	8	6	71	0	0	77	2	0	6	0	8	12	44	10	0	66	159
5:15 PM	6	2	4	0	12	2	83	3	0	88	2	0	12	0	14	9	51	5	0	65	179
Total Volume	20	5	9	0	34	11	321	8	0	340	8	2	36	0	46	34	191	24	0	249	669
% Approach Total	58.8	14.7	26.5	0.0		3.2	94.4	2.4	0.0		17.4	4.3	78.3	0.0		13.7	76.7	9.6	0.0		
PHF	0.833	0.625	0.563	0.000	0.708	0.458	0.836	0.667	0.000	0.850	0.500	0.250	0.750	0.000	0.676	0.708	0.884	0.600	0.000	0.943	0.934
Cars	20	5	9	0	34	9	305	8	0	322	7	2	36	0	45	34	183	24	0	241	642
Cars %	100.0	100.0	100.0	0.0	100.0	81.8	95.0	100.0	0.0	94.7	87.5	100.0	100.0	0.0	97.8	100.0	95.8	100.0	0.0	96.8	96.0
Heavy Vehicles	0	0	0	0	0	2	16	0	0	18	1	0	0	0	1	0	8	0	0	8	27
Heavy Vehicles %	0.0	0.0	0.0	0.0	0.0	18.2	5.0	0.0	0.0	5.3	12.5	0.0	0.0	0.0	2.2	0.0	4.2	0.0	0.0	3.2	4.0
Cars Enter Leg	20	5	9	0	34	9	305	8	0	322	7	2	36	0	45	34	183	24	0	241	642
Heavy Enter Leg	0	0	0	0	0	2	16	0	0	18	1	0	0	0	1	0	8	0	0	8	27
Total Entering Leg	20	5	9	0	34	11	321	8	0	340	8	2	36	0	46	34	191	24	0	249	669
Cars Exiting Leg	35					199					47					361					642
Heavy Exiting Leg	2					9					0					16					27
Total Exiting Leg	37					208					47					377					669

PDI File #: **207662 DD**
 Location: **N: Hill Road S: Burroughs Street**
 Location: **E: Mass Ave (Route 111) W: Mass Ave (Route 111)**
 City, State: **Boxborough, MA**
 Client: **Nitsch/ B. Zimolka**
 Site Code: **TBA**
 Count Date: **Tuesday, October 20, 2020**
 Start Time: **4:00 PM**
 End Time: **6:00 PM**
 Class:



Cars

	Hill Road					Mass Ave (Route 111)					Burroughs Street					Mass Ave (Route 111)					Total
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	
4:00 PM	7	1	3	0	11	2	74	0	0	76	3	1	7	0	11	5	30	5	0	40	138
4:15 PM	1	0	1	0	2	4	70	0	0	74	1	0	6	0	7	6	40	4	0	50	133
4:30 PM	3	0	1	0	4	1	69	3	0	73	3	2	11	0	16	7	53	4	0	64	157
4:45 PM	6	2	2	0	10	1	88	2	0	91	0	0	7	0	7	6	39	5	0	50	158
Total	17	3	7	0	27	8	301	5	0	314	7	3	31	0	41	24	162	18	0	204	586
5:00 PM	5	1	2	0	8	5	68	0	0	73	2	0	6	0	8	12	42	10	0	64	153
5:15 PM	6	2	4	0	12	2	80	3	0	85	2	0	12	0	14	9	49	5	0	63	174
5:30 PM	3	0	2	0	5	1	67	4	0	72	4	1	14	0	19	9	41	6	0	56	152
5:45 PM	3	0	3	0	6	1	76	2	0	79	3	1	9	0	13	6	42	2	0	50	148
Total	17	3	11	0	31	9	291	9	0	309	11	2	41	0	54	36	174	23	0	233	627
Grand Total	34	6	18	0	58	17	592	14	0	623	18	5	72	0	95	60	336	41	0	437	1213
Approach %	58.6	10.3	31.0	0.0		2.7	95.0	2.2	0.0		18.9	5.3	75.8	0.0		13.7	76.9	9.4	0.0		
Total %	2.8	0.5	1.5	0.0	4.8	1.4	48.8	1.2	0.0	51.4	1.5	0.4	5.9	0.0	7.8	4.9	27.7	3.4	0.0	36.0	
Exiting Leg Total	63					372					80					698					1213

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

	Hill Road					Mass Ave (Route 111)					Burroughs Street					Mass Ave (Route 111)					Total
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	
4:30 PM	3	0	1	0	4	1	69	3	0	73	3	2	11	0	16	7	53	4	0	64	157
4:45 PM	6	2	2	0	10	1	88	2	0	91	0	0	7	0	7	6	39	5	0	50	158
5:00 PM	5	1	2	0	8	5	68	0	0	73	2	0	6	0	8	12	42	10	0	64	153
5:15 PM	6	2	4	0	12	2	80	3	0	85	2	0	12	0	14	9	49	5	0	63	174
Total Volume	20	5	9	0	34	9	305	8	0	322	7	2	36	0	45	34	183	24	0	241	642
% Approach Total	58.8	14.7	26.5	0.0		2.8	94.7	2.5	0.0		15.6	4.4	80.0	0.0		14.1	75.9	10.0	0.0		
PHF	0.833	0.625	0.563	0.000	0.708	0.450	0.866	0.667	0.000	0.885	0.583	0.250	0.750	0.000	0.703	0.708	0.863	0.600	0.000	0.941	0.922
Entering Leg	20	5	9	0	34	9	305	8	0	322	7	2	36	0	45	34	183	24	0	241	642
Exiting Leg	35					199					47					361					642
Total	69					521					92					602					1284

PDI File #: 207662 DD
 Location: N: Hill Road S: Burroughs Street
 Location: E: Mass Ave (Route 111) W: Mass Ave (Route 111)
 City, State: Boxborough, MA
 Client: Nitsch/ B. Zimolka
 Site Code: TBA
 Count Date: Tuesday, October 20, 2020
 Start Time: 4:00 PM
 End Time: 6:00 PM
 Class: Heavy Vehicles-Combined (Buses, Single-Unit Trucks, Articulated Trucks)



	Hill Road					Mass Ave (Route 111)					Burroughs Street					Mass Ave (Route 111)					Total
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	
4:00 PM	1	0	0	0	1	0	2	0	0	2	0	0	0	0	0	0	1	0	0	1	4
4:15 PM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	1	0	1	2
4:30 PM	0	0	0	0	0	0	2	0	0	2	1	0	0	0	1	0	1	0	0	1	4
4:45 PM	0	0	0	0	0	1	8	0	0	9	0	0	0	0	0	0	3	0	0	3	12
Total	1	0	0	0	1	1	13	0	0	14	1	0	0	0	1	0	5	1	0	6	22
5:00 PM	0	0	0	0	0	1	3	0	0	4	0	0	0	0	0	0	2	0	0	2	6
5:15 PM	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	2	0	0	2	5
5:30 PM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	2
Total	0	0	0	0	0	1	7	0	0	8	0	0	0	0	0	0	6	0	0	6	14
Grand Total	1	0	0	0	1	2	20	0	0	22	1	0	0	0	1	0	11	1	0	12	36
Approach %	100.0	0.0	0.0	0.0		9.1	90.9	0.0	0.0		100.0	0.0	0.0	0.0		0.0	91.7	8.3	0.0		
Total %	2.8	0.0	0.0	0.0	2.8	5.6	55.6	0.0	0.0	61.1	2.8	0.0	0.0	0.0	2.8	0.0	30.6	2.8	0.0	33.3	
Exiting Leg Total	3					12					0					21					36
Buses	1	0	0	0	1	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	2
% Buses	100.0	0.0	0.0	0.0	100.0	0.0	5.0	0.0	0.0	4.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.6
Exiting Leg Total	0					0					0					2					2
Single-Unit Trucks	0	0	0	0	0	2	16	0	0	18	1	0	0	0	1	0	4	1	0	5	24
% Single-Unit	0.0	0.0	0.0	0.0	0.0	100.0	80.0	0.0	0.0	81.8	100.0	0.0	0.0	0.0	100.0	0.0	36.4	100.0	0.0	41.7	66.7
Exiting Leg Total	3					5					0					16					24
Articulated Trucks	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	7	0	0	7	10
% Articulated	0.0	0.0	0.0	0.0	0.0	0.0	15.0	0.0	0.0	13.6	0.0	0.0	0.0	0.0	0.0	0.0	63.6	0.0	0.0	58.3	27.8
Exiting Leg Total	0					7					0					3					10

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

	Hill Road					Mass Ave (Route 111)					Burroughs Street					Mass Ave (Route 111)					Total
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	
4:30 PM	0	0	0	0	0	0	2	0	0	2	1	0	0	0	1	0	1	0	0	1	4
4:45 PM	0	0	0	0	0	1	8	0	0	9	0	0	0	0	0	0	3	0	0	3	12
5:00 PM	0	0	0	0	0	1	3	0	0	4	0	0	0	0	0	0	2	0	0	2	6
5:15 PM	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	2	0	0	2	5
Total Volume	0	0	0	0	0	2	16	0	0	18	1	0	0	0	1	0	8	0	0	8	27
% Approach Total	0.0	0.0	0.0	0.0	0.0	11.1	88.9	0.0	0.0	100.0	0.0	0.0	0.0	100.0	0.0	100.0	0.0	0.0			
PHF	0.000	0.000	0.000	0.000	0.000	0.500	0.500	0.000	0.000	0.500	0.250	0.000	0.000	0.000	0.250	0.000	0.667	0.000	0.000	0.667	0.563
Buses	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
Buses %	0.0	0.0	0.0	0.0	0.0	0.0	6.3	0.0	0.0	5.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.7
Single-Unit Trucks	0	0	0	0	0	2	13	0	0	15	1	0	0	0	1	0	4	0	0	4	20
Single-Unit %	0.0	0.0	0.0	0.0	0.0	100.0	81.3	0.0	0.0	83.3	100.0	0.0	0.0	0.0	100.0	0.0	50.0	0.0	0.0	50.0	74.1
Articulated Trucks	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	4	0	0	4	6
Articulated %	0.0	0.0	0.0	0.0	0.0	0.0	12.5	0.0	0.0	11.1	0.0	0.0	0.0	0.0	0.0	0.0	50.0	0.0	0.0	50.0	22.2
Buses	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
Single-Unit Trucks	0	0	0	0	0	2	13	0	0	15	1	0	0	0	1	0	4	0	0	4	20
Articulated Trucks	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	4	0	0	4	6
Total Entering Leg	0	0	0	0	0	2	16	0	0	18	1	0	0	0	1	0	8	0	0	8	27
Buses	0					0					0					1					1
Single-Unit Trucks	2					5					0					13					20
Articulated Trucks	0					4					0					2					6
Total Exiting Leg	2					9					0					16					27

PDI File #: **207662 DD**
 Location: **N: Hill Road S: Burroughs Street**
 Location: **E: Mass Ave (Route 111) W: Mass Ave (Route 111)**
 City, State: **Boxborough, MA**
 Client: **Nitsch/ B. Zimolka**
 Site Code: **TBA**
 Count Date: **Tuesday, October 20, 2020**
 Start Time: **4:00 PM**
 End Time: **6:00 PM**
 Class:



Buses

	Hill Road					Mass Ave (Route 111)					Burroughs Street					Mass Ave (Route 111)					Total					
	from North					from East					from South					from West										
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total						
4:00 PM	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	1
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Total	1	0	0	0	1	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	1	0	0	0	1	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Approach %	100.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0							
Total %	50.0	0.0	0.0	0.0	50.0	0.0	50.0	0.0	0.0	50.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Exiting Leg Total	0					0					0					2					2					

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

	Hill Road					Mass Ave (Route 111)					Burroughs Street					Mass Ave (Route 111)					Total					
	from North					from East					from South					from West										
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total						
4:00 PM	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	1
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Total Volume	1	0	0	0	1	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
% Approach Total	100.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0							
PHF	0.250	0.000	0.000	0.000	0.250	0.000	0.250	0.000	0.000	0.250	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.500	
Entering Leg	1	0	0	0	1	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Exiting Leg	0					0					0					2					2					
Total	1					1					0					2					4					

PDI File #: **207662 DD**
 Location: **N: Hill Road S: Burroughs Street**
 Location: **E: Mass Ave (Route 111) W: Mass Ave (Route 111)**
 City, State: **Boxborough, MA**
 Client: **Nitsch/ B. Zimolka**
 Site Code: **TBA**
 Count Date: **Tuesday, October 20, 2020**
 Start Time: **4:00 PM**
 End Time: **6:00 PM**
 Class:



Single-Unit Trucks

	Hill Road					Mass Ave (Route 111)					Burroughs Street					Mass Ave (Route 111)					Total
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	
4:00 PM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
4:15 PM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	1	0	1	2
4:30 PM	0	0	0	0	0	0	2	0	0	2	1	0	0	0	1	0	0	0	0	0	3
4:45 PM	0	0	0	0	0	1	5	0	0	6	0	0	0	0	0	0	2	0	0	2	8
Total	0	0	0	0	0	1	9	0	0	10	1	0	0	0	1	0	2	1	0	3	14
5:00 PM	0	0	0	0	0	1	3	0	0	4	0	0	0	0	0	0	1	0	0	1	5
5:15 PM	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	1	0	0	1	4
5:30 PM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	1	7	0	0	8	0	0	0	0	0	0	2	0	0	2	10
Grand Total	0	0	0	0	0	2	16	0	0	18	1	0	0	0	1	0	4	1	0	5	24
Approach %	0.0	0.0	0.0	0.0	0.0	11.1	88.9	0.0	0.0	18	100.0	0.0	0.0	0.0	1	0.0	80.0	20.0	0.0	5	24
Total %	0.0	0.0	0.0	0.0	0.0	8.3	66.7	0.0	0.0	75.0	4.2	0.0	0.0	0.0	4.2	0.0	16.7	4.2	0.0	20.8	24
Exiting Leg Total	3					5					0					16					24

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

	Hill Road					Mass Ave (Route 111)					Burroughs Street					Mass Ave (Route 111)					Total
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	
4:30 PM	0	0	0	0	0	0	2	0	0	2	1	0	0	0	1	0	0	0	0	0	3
4:45 PM	0	0	0	0	0	1	5	0	0	6	0	0	0	0	0	0	2	0	0	2	8
5:00 PM	0	0	0	0	0	1	3	0	0	4	0	0	0	0	0	0	1	0	0	1	5
5:15 PM	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	1	0	0	1	4
Total Volume	0	0	0	0	0	2	13	0	0	15	1	0	0	0	1	0	4	0	0	4	20
% Approach Total	0.0	0.0	0.0	0.0	0.0	13.3	86.7	0.0	0.0	15	100.0	0.0	0.0	0.0	1	0.0	100.0	0.0	0.0	4	20
PHF	0.000	0.000	0.000	0.000	0.000	0.500	0.650	0.000	0.000	0.625	0.250	0.000	0.000	0.000	0.250	0.000	0.500	0.000	0.000	0.500	0.625
Entering Leg	0	0	0	0	0	2	13	0	0	15	1	0	0	0	1	0	4	0	0	4	20
Exiting Leg	2					5					0					13					20
Total	2					20					1					17					40

PDI File #: **207662 DD**
 Location: **N: Hill Road S: Burroughs Street**
 Location: **E: Mass Ave (Route 111) W: Mass Ave (Route 111)**
 City, State: **Boxborough, MA**
 Client: **Nitsch/ B. Zimolka**
 Site Code: **TBA**
 Count Date: **Tuesday, October 20, 2020**
 Start Time: **4:00 PM**
 End Time: **6:00 PM**
 Class:



Articulated Trucks

	Hill Road					Mass Ave (Route 111)					Burroughs Street					Mass Ave (Route 111)					Total
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	
4:00 PM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	2
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
4:45 PM	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	1	0	0	1	3
Total	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	3	0	0	3	6
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	2
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	4	4
Grand Total	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	7	0	0	7	10
Approach %	0.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0		
Total %	0.0	0.0	0.0	0.0	0.0	0.0	30.0	0.0	0.0	30.0	0.0	0.0	0.0	0.0	0.0	0.0	70.0	0.0	0.0	70.0	
Exiting Leg Total	0					7					0					3					10

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

	Hill Road					Mass Ave (Route 111)					Burroughs Street					Mass Ave (Route 111)					Total
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	
4:00 PM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	2
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
4:45 PM	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	1	0	0	1	3
Total Volume	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	3	0	0	3	6
% Approach Total	0.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0		
PHF	0.000	0.000	0.000	0.000	0.000	0.000	0.375	0.000	0.000	0.375	0.000	0.000	0.000	0.000	0.000	0.000	0.750	0.000	0.000	0.750	0.500
Entering Leg	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	3	0	0	3	6
Exiting Leg	0					3					0					3					6
Total	0					6					0					6					12

PDI File #: 207662 DD
 Location: N: Hill Road S: Burroughs Street
 Location: E: Mass Ave (Route 111) W: Mass Ave (Route 111)
 City, State: Boxborough, MA
 Client: Nitsch/ B. Zimolka
 Site Code: TBA
 Count Date: Tuesday, October 20, 2020
 Start Time: 4:00 PM
 End Time: 6:00 PM
 Class:



Bicycles (on Roadway and Crosswalks)

	Hill Road							Mass Ave (Route 111)							Burroughs Street							Mass Ave (Route 111)							Total
	from North							from East							from South							from West							
	Right	Thru	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	Left	U-Turn	CW-SB	CW-NB	Total	Right	Thru	Left	U-Turn	CW-WB	CW-EB	Total	Right	Thru	Left	U-Turn	CW-NB	CW-SB	Total	
4:00 PM	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
4:15 PM	0	0	0	0	0	0	0	1	1	0	0	0	0	2	0	1	0	0	0	0	1	0	0	0	0	0	0	0	3
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	2	1	0	0	0	0	3	0	1	0	0	0	0	1	0	0	0	0	0	0	0	4
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	0	0	0	0	0	2	1	0	0	0	0	3	0	1	0	0	0	0	1	0	0	0	0	0	0	0	4
Approach %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	66.7	33.3	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Total %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	50.0	25.0	0.0	0.0	0.0	0.0	75.0	0.0	25.0	0.0	0.0	0.0	0.0	25.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Exiting Leg Total	3							0							0							1	4						

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

	Hill Road							Mass Ave (Route 111)							Burroughs Street							Mass Ave (Route 111)							Total
	from North							from East							from South							from West							
	Right	Thru	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	Left	U-Turn	CW-SB	CW-NB	Total	Right	Thru	Left	U-Turn	CW-WB	CW-EB	Total	Right	Thru	Left	U-Turn	CW-NB	CW-SB	Total	
4:00 PM	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
4:15 PM	0	0	0	0	0	0	0	1	1	0	0	0	0	2	0	1	0	0	0	0	1	0	0	0	0	0	0	0	3
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Volume	0	0	0	0	0	0	0	2	1	0	0	0	0	3	0	1	0	0	0	0	1	0	0	0	0	0	0	0	4
% Approach Total	0.0	0.0	0.0	0.0	0.0	0.0	0.0	66.7	33.3	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
PHF	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.500	0.250	0.000	0.000	0.000	0.375	0.000	0.250	0.000	0.000	0.000	0.250	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.333		
Entering Leg	0	0	0	0	0	0	0	2	1	0	0	0	3	0	1	0	0	0	0	1	0	0	0	0	0	0	0	4	
Exiting Leg	3							0							0							1	4						
Total	3							3							1							1	8						

PDI File #: 207662 DD
 Location: N: Hill Road S: Burroughs Street
 Location: E: Mass Ave (Route 111) W: Mass Ave (Route 111)
 City, State: Boxborough, MA
 Client: Nitsch/ B. Zimolka
 Site Code: TBA
 Count Date: Tuesday, October 20, 2020
 Start Time: 4:00 PM
 End Time: 6:00 PM
 Class:



Pedestrians

	Hill Road							Mass Ave (Route 111)							Burroughs Street							Mass Ave (Route 111)							Total
	from North							from East							from South							from West							
	Right	Thru	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	Left	U-Turn	CW-SB	CW-NB	Total	Right	Thru	Left	U-Turn	CW-WB	CW-EB	Total	Right	Thru	Left	U-Turn	CW-NB	CW-SB	Total	
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
Total	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
Grand Total	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
Approach %	0	0	0	0	0	0	0	0	0	0	0	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Total %	0	0	0	0	0	0	0	0	0	0	0	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Exiting Leg Total	0							1							0							0							1

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

	Hill Road							Mass Ave (Route 111)							Burroughs Street							Mass Ave (Route 111)							Total
	from North							from East							from South							from West							
	Right	Thru	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	Left	U-Turn	CW-SB	CW-NB	Total	Right	Thru	Left	U-Turn	CW-WB	CW-EB	Total	Right	Thru	Left	U-Turn	CW-NB	CW-SB	Total	
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
Total Volume	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
% Approach Total	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
PHF	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.250	0.250	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.250	
Entering Leg	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
Exiting Leg	0							1							0							0							1
Total	0							2							0							0							2

PDI File #: **207662 EE**
 Location: **N: S: I-495 SB Ramps**
 Location: **E: Mass Ave (Route 111) W: Mass Ave (Route 111)**
 City, State: **Boxborough, MA**
 Client: **Nitsch/ B. Zimolka**
 Site Code: **TBA**
 Count Date: **Tuesday, October 20, 2020**
 Start Time: **4:00 PM**
 End Time: **6:00 PM**
 Class:



Cars and Heavy Vehicles (Combined)

	Mass Ave (Route 111)				I-495 SB Ramps				Mass Ave (Route 111)				Total
	from East				from South				from West				
	Thru	Left	U-Turn	Total	Right	Left	U-Turn	Total	Right	Thru	U-Turn	Total	
4:00 PM	76	23	0	99	12	48	0	60	51	88	0	139	298
4:15 PM	64	28	0	92	15	44	0	59	27	62	0	89	240
4:30 PM	54	19	0	73	17	37	0	54	36	78	0	114	241
4:45 PM	63	20	0	83	18	38	0	56	28	58	0	86	225
Total	257	90	0	347	62	167	0	229	142	286	0	428	1004
5:00 PM	64	35	0	99	22	43	0	65	30	106	0	136	300
5:15 PM	74	27	0	101	19	48	0	67	15	63	0	78	246
5:30 PM	63	21	0	84	20	38	0	58	18	64	0	82	224
5:45 PM	62	25	0	87	20	37	0	57	27	55	0	82	226
Total	263	108	0	371	81	166	0	247	90	288	0	378	996
Grand Total	520	198	0	718	143	333	0	476	232	574	0	806	2000
Approach %	72.4	27.6	0.0		30.0	70.0	0.0		28.8	71.2	0.0		
Total %	26.0	9.9	0.0	35.9	7.2	16.7	0.0	23.8	11.6	28.7	0.0	40.3	
Exiting Leg Total				717				430				853	2000
Cars	507	194	0	701	139	327	0	466	231	565	0	796	1963
% Cars	97.5	98.0	0.0	97.6	97.2	98.2	0.0	97.9	99.6	98.4	0.0	98.8	98.2
Exiting Leg Total				704				425				834	1963
Heavy Vehicles	13	4	0	17	4	6	0	10	1	9	0	10	37
% Heavy Vehicles	2.5	2.0	0.0	2.4	2.8	1.8	0.0	2.1	0.4	1.6	0.0	1.2	1.9
Exiting Leg Total				13				5				19	37

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

4:30 PM	Mass Ave (Route 111)				I-495 SB Ramps				Mass Ave (Route 111)				Total
	from East				from South				from West				
	Thru	Left	U-Turn	Total	Right	Left	U-Turn	Total	Right	Thru	U-Turn	Total	
4:30 PM	54	19	0	73	17	37	0	54	36	78	0	114	241
4:45 PM	63	20	0	83	18	38	0	56	28	58	0	86	225
5:00 PM	64	35	0	99	22	43	0	65	30	106	0	136	300
5:15 PM	74	27	0	101	19	48	0	67	15	63	0	78	246
Total Volume	255	101	0	356	76	166	0	242	109	305	0	414	1012
% Approach Total	71.6	28.4	0.0		31.4	68.6	0.0		26.3	73.7	0.0		
PHF	0.861	0.721	0.000	0.881	0.864	0.865	0.000	0.903	0.757	0.719	0.000	0.761	0.843
Cars	248	100	0	348	75	164	0	239	108	301	0	409	996
Cars %	97.3	99.0	0.0	97.8	98.7	98.8	0.0	98.8	99.1	98.7	0.0	98.8	98.4
Heavy Vehicles	7	1	0	8	1	2	0	3	1	4	0	5	16
Heavy Vehicles %	2.7	1.0	0.0	2.2	1.3	1.2	0.0	1.2	0.9	1.3	0.0	1.2	1.6
Cars Enter Leg	248	100	0	348	75	164	0	239	108	301	0	409	996
Heavy Enter Leg	7	1	0	8	1	2	0	3	1	4	0	5	16
Total Entering Leg	255	101	0	356	76	166	0	242	109	305	0	414	1012
Cars Exiting Leg				376				208				412	996
Heavy Exiting Leg				5				2				9	16
Total Exiting Leg				381				210				421	1012

PDI File #: **207662 EE**
 Location: **N: S: I-495 SB Ramps**
 Location: **E: Mass Ave (Route 111) W: Mass Ave (Route 111)**
 City, State: **Boxborough, MA**
 Client: **Nitsch/ B. Zimolka**
 Site Code: **TBA**
 Count Date: **Tuesday, October 20, 2020**
 Start Time: **4:00 PM**
 End Time: **6:00 PM**
 Class:



Cars

	Mass Ave (Route 111)				I-495 SB Ramps				Mass Ave (Route 111)				Total
	from East				from South				from West				
	Thru	Left	U-Turn	Total	Right	Left	U-Turn	Total	Right	Thru	U-Turn	Total	
4:00 PM	75	22	0	97	11	44	0	55	51	87	0	138	290
4:15 PM	64	27	0	91	15	44	0	59	27	60	0	87	237
4:30 PM	52	18	0	70	16	37	0	53	36	78	0	114	237
4:45 PM	62	20	0	82	18	36	0	54	27	57	0	84	220
Total	253	87	0	340	60	161	0	221	141	282	0	423	984
5:00 PM	61	35	0	96	22	43	0	65	30	104	0	134	295
5:15 PM	73	27	0	100	19	48	0	67	15	62	0	77	244
5:30 PM	60	21	0	81	19	38	0	57	18	62	0	80	218
5:45 PM	60	24	0	84	19	37	0	56	27	55	0	82	222
Total	254	107	0	361	79	166	0	245	90	283	0	373	979
Grand Total	507	194	0	701	139	327	0	466	231	565	0	796	1963
Approach %	72.3	27.7	0.0		29.8	70.2	0.0		29.0	71.0	0.0		
Total %	25.8	9.9	0.0	35.7	7.1	16.7	0.0	23.7	11.8	28.8	0.0	40.6	
Exiting Leg Total				704				425				834	1963

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

	Mass Ave (Route 111)				I-495 SB Ramps				Mass Ave (Route 111)				Total
	from East				from South				from West				
	Thru	Left	U-Turn	Total	Right	Left	U-Turn	Total	Right	Thru	U-Turn	Total	
4:30 PM	52	18	0	70	16	37	0	53	36	78	0	114	237
4:45 PM	62	20	0	82	18	36	0	54	27	57	0	84	220
5:00 PM	61	35	0	96	22	43	0	65	30	104	0	134	295
5:15 PM	73	27	0	100	19	48	0	67	15	62	0	77	244
Total Volume	248	100	0	348	75	164	0	239	108	301	0	409	996
% Approach Total	71.3	28.7	0.0		31.4	68.6	0.0		26.4	73.6	0.0		
PHF	0.849	0.714	0.000	0.870	0.852	0.854	0.000	0.892	0.750	0.724	0.000	0.763	0.844
Entering Leg	248	100	0	348	75	164	0	239	108	301	0	409	996
Exiting Leg				376				208				412	996
Total				724				447				821	1992

PDI File #: 207662 EE
 Location: N: S: I-495 SB Ramps
 Location: E: Mass Ave (Route 111) W: Mass Ave (Route 111)
 City, State: Boxborough, MA
 Client: Nitsch/ B. Zimolka
 Site Code: TBA
 Count Date: Tuesday, October 20, 2020
 Start Time: 4:00 PM
 End Time: 6:00 PM



Class: Heavy Vehicles-Combined (Buses, Single-Unit Trucks, Articulated Trucks)

	Mass Ave (Route 111)				I-495 SB Ramps				Mass Ave (Route 111)				Total
	from East				from South				from West				
	Thru	Left	U-Turn	Total	Right	Left	U-Turn	Total	Right	Thru	U-Turn	Total	
4:00 PM	1	1	0	2	1	4	0	5	0	1	0	1	8
4:15 PM	0	1	0	1	0	0	0	0	0	2	0	2	3
4:30 PM	2	1	0	3	1	0	0	1	0	0	0	0	4
4:45 PM	1	0	0	1	0	2	0	2	1	1	0	2	5
Total	4	3	0	7	2	6	0	8	1	4	0	5	20
5:00 PM	3	0	0	3	0	0	0	0	0	2	0	2	5
5:15 PM	1	0	0	1	0	0	0	0	0	1	0	1	2
5:30 PM	3	0	0	3	1	0	0	1	0	2	0	2	6
5:45 PM	2	1	0	3	1	0	0	1	0	0	0	0	4
Total	9	1	0	10	2	0	0	2	0	5	0	5	17
Grand Total	13	4	0	17	4	6	0	10	1	9	0	10	37
Approach %	76.5	23.5	0.0		40.0	60.0	0.0		10.0	90.0	0.0		
Total %	35.1	10.8	0.0	45.9	10.8	16.2	0.0	27.0	2.7	24.3	0.0	27.0	
Exiting Leg Total				13				5				19	37
Buses	1	0	0	1	0	0	0	0	0	1	0	1	2
% Buses	7.7	0.0	0.0	5.9	0.0	0.0	0.0	0.0	0.0	11.1	0.0	10.0	5.4
Exiting Leg Total				1				0				1	2
Single-Unit Trucks	8	1	0	9	1	6	0	7	1	3	0	4	20
% Single-Unit	61.5	25.0	0.0	52.9	25.0	100.0	0.0	70.0	100.0	33.3	0.0	40.0	54.1
Exiting Leg Total				4				2				14	20
Articulated Trucks	4	3	0	7	3	0	0	3	0	5	0	5	15
% Articulated	30.8	75.0	0.0	41.2	75.0	0.0	0.0	30.0	0.0	55.6	0.0	50.0	40.5
Exiting Leg Total				8				3				4	15

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

4:00 PM	Mass Ave (Route 111)				I-495 SB Ramps				Mass Ave (Route 111)				Total
	from East				from South				from West				
	Thru	Left	U-Turn	Total	Right	Left	U-Turn	Total	Right	Thru	U-Turn	Total	
4:00 PM	1	1	0	2	1	4	0	5	0	1	0	1	8
4:15 PM	0	1	0	1	0	0	0	0	0	2	0	2	3
4:30 PM	2	1	0	3	1	0	0	1	0	0	0	0	4
4:45 PM	1	0	0	1	0	2	0	2	1	1	0	2	5
Total Volume	4	3	0	7	2	6	0	8	1	4	0	5	20
% Approach Total	57.1	42.9	0.0		25.0	75.0	0.0		20.0	80.0	0.0		
PHF	0.500	0.750	0.000	0.583	0.500	0.375	0.000	0.400	0.250	0.500	0.000	0.625	0.625
Buses	1	0	0	1	0	0	0	0	0	1	0	1	2
Buses %	25.0	0.0	0.0	14.3	0.0	0.0	0.0	0.0	0.0	25.0	0.0	20.0	10.0
Single-Unit Trucks	1	1	0	2	1	6	0	7	1	1	0	2	11
Single-Unit %	25.0	33.3	0.0	28.6	50.0	100.0	0.0	87.5	100.0	25.0	0.0	40.0	55.0
Articulated Trucks	2	2	0	4	1	0	0	1	0	2	0	2	7
Articulated %	50.0	66.7	0.0	57.1	50.0	0.0	0.0	12.5	0.0	50.0	0.0	40.0	35.0
Buses	1	0	0	1	0	0	0	0	0	1	0	1	2
Single-Unit Trucks	1	1	0	2	1	6	0	7	1	1	0	2	11
Articulated Trucks	2	2	0	4	1	0	0	1	0	2	0	2	7
Total Entering Leg	4	3	0	7	2	6	0	8	1	4	0	5	20
Buses				1				0				1	2
Single-Unit Trucks				2				2				7	11
Articulated Trucks				3				2				2	7
Total Exiting Leg				6				4				10	20

PDI File #: **207662 EE**
 Location: **N: S: I-495 SB Ramps**
 Location: **E: Mass Ave (Route 111) W: Mass Ave (Route 111)**
 City, State: **Boxborough, MA**
 Client: **Nitsch/ B. Zimolka**
 Site Code: **TBA**
 Count Date: **Tuesday, October 20, 2020**
 Start Time: **4:00 PM**
 End Time: **6:00 PM**
 Class:



Buses

	Mass Ave (Route 111)				I-495 SB Ramps				Mass Ave (Route 111)				Total
	from East				from South				from West				
	Thru	Left	U-Turn	Total	Right	Left	U-Turn	Total	Right	Thru	U-Turn	Total	
4:00 PM	1	0	0	1	0	0	0	0	0	1	0	1	2
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	1	0	0	1	0	0	0	0	0	1	0	1	2
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	1	0	0	1	0	0	0	0	0	1	0	1	2
Approach %	100.0	0.0	0.0		0.0	0.0	0.0		0.0	100.0	0.0		
Total %	50.0	0.0	0.0	50.0	0.0	0.0	0.0	0.0	0.0	50.0	0.0	50.0	
Exiting Leg Total				1				0				1	2

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

4:00 PM	Mass Ave (Route 111)				I-495 SB Ramps				Mass Ave (Route 111)				Total
	from East				from South				from West				
	Thru	Left	U-Turn	Total	Right	Left	U-Turn	Total	Right	Thru	U-Turn	Total	
4:00 PM	1	0	0	1	0	0	0	0	0	1	0	1	2
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Volume	1	0	0	1	0	0	0	0	0	1	0	1	2
% Approach Total	100.0	0.0	0.0		0.0	0.0	0.0		0.0	100.0	0.0		
PHF	0.250	0.000	0.000	0.250	0.000	0.000	0.000	0.000	0.000	0.250	0.000	0.250	0.250
Entering Leg	1	0	0	1	0	0	0	0	0	1	0	1	2
Exiting Leg				1				0				1	2
Total				2				0				2	4

PDI File #: **207662 EE**
 Location: **N: S: I-495 SB Ramps**
 Location: **E: Mass Ave (Route 111) W: Mass Ave (Route 111)**
 City, State: **Boxborough, MA**
 Client: **Nitsch/ B. Zimolka**
 Site Code: **TBA**
 Count Date: **Tuesday, October 20, 2020**
 Start Time: **4:00 PM**
 End Time: **6:00 PM**
 Class:



Single-Unit Trucks

	Mass Ave (Route 111)				I-495 SB Ramps				Mass Ave (Route 111)				Total
	from East				from South				from West				
	Thru	Left	U-Turn	Total	Right	Left	U-Turn	Total	Right	Thru	U-Turn	Total	
4:00 PM	0	0	0	0	1	4	0	5	0	0	0	0	5
4:15 PM	0	1	0	1	0	0	0	0	0	1	0	1	2
4:30 PM	1	0	0	1	0	0	0	0	0	0	0	0	1
4:45 PM	0	0	0	0	0	2	0	2	1	0	0	1	3
Total	1	1	0	2	1	6	0	7	1	1	0	2	11
5:00 PM	3	0	0	3	0	0	0	0	0	0	0	0	3
5:15 PM	0	0	0	0	0	0	0	0	0	1	0	1	1
5:30 PM	2	0	0	2	0	0	0	0	0	1	0	1	3
5:45 PM	2	0	0	2	0	0	0	0	0	0	0	0	2
Total	7	0	0	7	0	0	0	0	0	2	0	2	9
Grand Total	8	1	0	9	1	6	0	7	1	3	0	4	20
Approach %	88.9	11.1	0.0		14.3	85.7	0.0		25.0	75.0	0.0		
Total %	40.0	5.0	0.0	45.0	5.0	30.0	0.0	35.0	5.0	15.0	0.0	20.0	
Exiting Leg Total				4				2				14	20

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

4:00 PM	Mass Ave (Route 111)				I-495 SB Ramps				Mass Ave (Route 111)				Total
	from East				from South				from West				
	Thru	Left	U-Turn	Total	Right	Left	U-Turn	Total	Right	Thru	U-Turn	Total	
4:00 PM	0	0	0	0	1	4	0	5	0	0	0	0	5
4:15 PM	0	1	0	1	0	0	0	0	0	1	0	1	2
4:30 PM	1	0	0	1	0	0	0	0	0	0	0	0	1
4:45 PM	0	0	0	0	0	2	0	2	1	0	0	1	3
Total Volume	1	1	0	2	1	6	0	7	1	1	0	2	11
% Approach Total	50.0	50.0	0.0		14.3	85.7	0.0		50.0	50.0	0.0		
PHF	0.250	0.250	0.000	0.500	0.250	0.375	0.000	0.350	0.250	0.250	0.000	0.500	0.550
Entering Leg	1	1	0	2	1	6	0	7	1	1	0	2	11
Exiting Leg				2				2				7	11
Total				4				9				9	22

PDI File #: **207662 EE**
 Location: **N: S: I-495 SB Ramps**
 Location: **E: Mass Ave (Route 111) W: Mass Ave (Route 111)**
 City, State: **Boxborough, MA**
 Client: **Nitsch/ B. Zimolka**
 Site Code: **TBA**
 Count Date: **Tuesday, October 20, 2020**
 Start Time: **4:00 PM**
 End Time: **6:00 PM**
 Class:



Articulated Trucks

	Mass Ave (Route 111)				I-495 SB Ramps				Mass Ave (Route 111)				Total
	from East				from South				from West				
	Thru	Left	U-Turn	Total	Right	Left	U-Turn	Total	Right	Thru	U-Turn	Total	
4:00 PM	0	1	0	1	0	0	0	0	0	0	0	0	1
4:15 PM	0	0	0	0	0	0	0	0	0	1	0	1	1
4:30 PM	1	1	0	2	1	0	0	1	0	0	0	0	3
4:45 PM	1	0	0	1	0	0	0	0	0	1	0	1	2
Total	2	2	0	4	1	0	0	1	0	2	0	2	7
5:00 PM	0	0	0	0	0	0	0	0	0	2	0	2	2
5:15 PM	1	0	0	1	0	0	0	0	0	0	0	0	1
5:30 PM	1	0	0	1	1	0	0	1	0	1	0	1	3
5:45 PM	0	1	0	1	1	0	0	1	0	0	0	0	2
Total	2	1	0	3	2	0	0	2	0	3	0	3	8
Grand Total	4	3	0	7	3	0	0	3	0	5	0	5	15
Approach %	57.1	42.9	0.0		100.0	0.0	0.0		0.0	100.0	0.0		
Total %	26.7	20.0	0.0	46.7	20.0	0.0	0.0	20.0	0.0	33.3	0.0	33.3	
Exiting Leg Total				8				3				4	15

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

4:15 PM	Mass Ave (Route 111)				I-495 SB Ramps				Mass Ave (Route 111)				Total
	from East				from South				from West				
	Thru	Left	U-Turn	Total	Right	Left	U-Turn	Total	Right	Thru	U-Turn	Total	
4:15 PM	0	0	0	0	0	0	0	0	0	0	1	0	1
4:30 PM	1	1	0	2	1	0	0	1	0	0	0	0	3
4:45 PM	1	0	0	1	0	0	0	0	0	1	0	1	2
5:00 PM	0	0	0	0	0	0	0	0	0	2	0	2	2
Total Volume	2	1	0	3	1	0	0	1	0	4	0	4	8
% Approach Total	66.7	33.3	0.0		100.0	0.0	0.0		0.0	100.0	0.0		
PHF	0.500	0.250	0.000	0.375	0.250	0.000	0.000	0.250	0.000	0.500	0.000	0.500	0.667
Entering Leg	2	1	0	3	1	0	0	1	0	4	0	4	8
Exiting Leg				5				1				2	8
Total				8				2				6	16

PDI File #: 207662 EE
 Location: N: S: I-495 SB Ramps
 Location: E: Mass Ave (Route 111) W: Mass Ave (Route 111)
 City, State: Boxborough, MA
 Client: Nitsch/ B. Zimolka
 Site Code: TBA
 Count Date: Tuesday, October 20, 2020
 Start Time: 4:00 PM
 End Time: 6:00 PM



Bicycles (on Roadway and Crosswalks)

	Mass Ave (Route 111)						I-495 SB Ramps						Mass Ave (Route 111)						Total
	from East						from South						from West						
	Thru	Left	U-Turn	CW-SB	CW-NB	Total	Right	Left	U-Turn	CW-WB	CW-EB	Total	Right	Thru	U-Turn	CW-NB	CW-SB	Total	
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1
Grand Total	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2	2
Approach %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	
Total %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	100.0	
Exiting Leg Total	2						0						0						2

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

4:30 PM	Mass Ave (Route 111)						I-495 SB Ramps						Mass Ave (Route 111)						Total
	from East						from South						from West						
	Thru	Left	U-Turn	CW-SB	CW-NB	Total	Right	Left	U-Turn	CW-WB	CW-EB	Total	Right	Thru	U-Turn	CW-NB	CW-SB	Total	
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1
Total Volume	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2	2
% Approach Total	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	
PHF	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.500	0.000	0.000	0.000	0.500	0.500
Entering Leg	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2	2
Exiting Leg	2						0						0						2
Total	2						0						2						4

PDI File #: 207662 EE
 Location: N: S: I-495 SB Ramps
 Location: E: Mass Ave (Route 111) W: Mass Ave (Route 111)
 City, State: Boxborough, MA
 Client: Nitsch/ B. Zimolka
 Site Code: TBA
 Count Date: Tuesday, October 20, 2020
 Start Time: 4:00 PM
 End Time: 6:00 PM
 Class:



Pedestrians

	Mass Ave (Route 111)						I-495 SB Ramps						Mass Ave (Route 111)						Total
	from East						from South						from West						
	Thru	Left	U-Turn	CW-SB	CW-NB	Total	Right	Left	U-Turn	CW-WB	CW-EB	Total	Right	Thru	U-Turn	CW-NB	CW-SB	Total	
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Approach %	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total %	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Exiting Leg Total	0						0						0						0

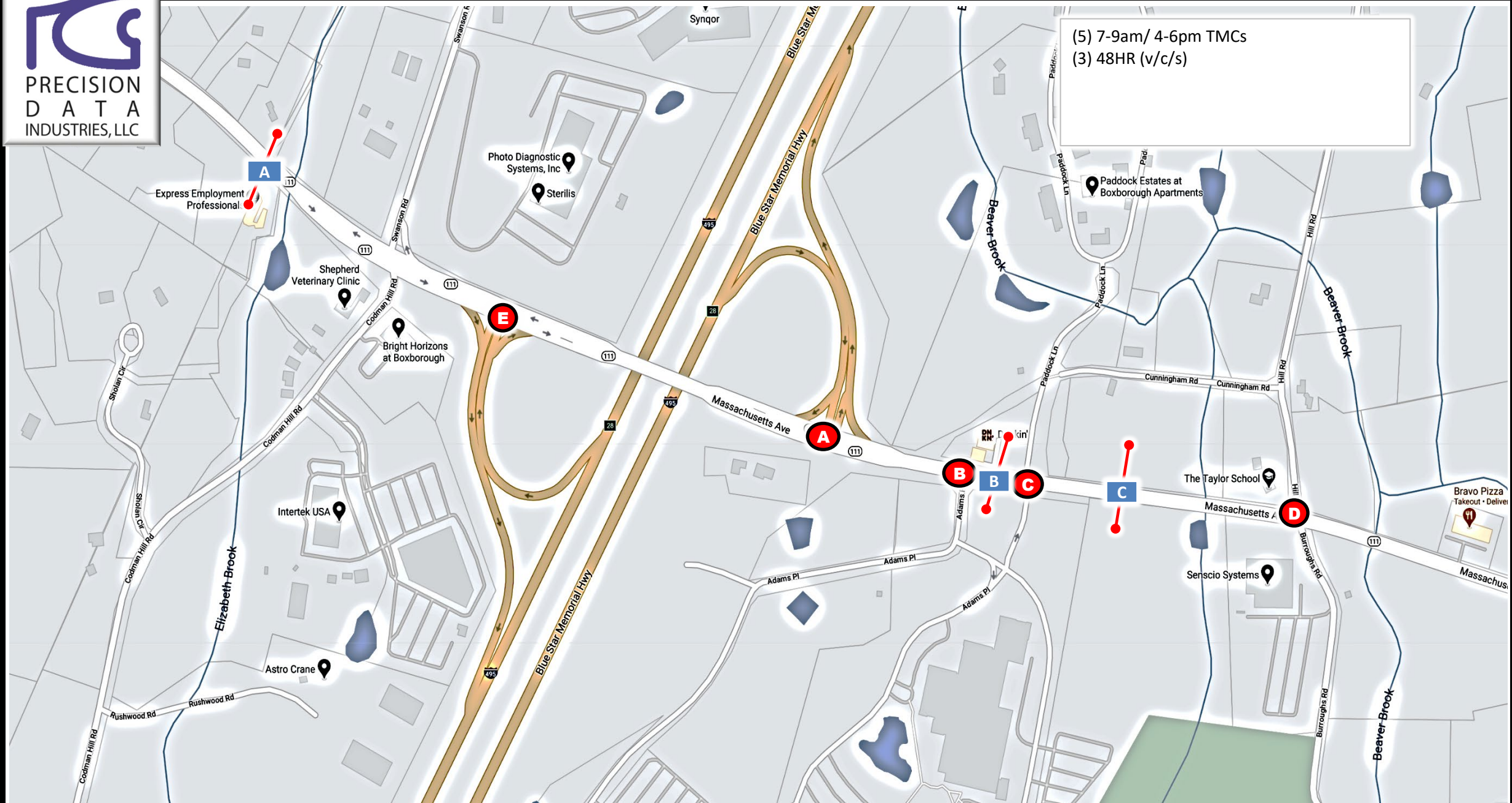
Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

4:00 PM	Mass Ave (Route 111)						I-495 SB Ramps						Mass Ave (Route 111)						Total
	from East						from South						from West						
	Thru	Left	U-Turn	CW-SB	CW-NB	Total	Right	Left	U-Turn	CW-WB	CW-EB	Total	Right	Thru	U-Turn	CW-NB	CW-SB	Total	
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Volume	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Approach Total	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PHF	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Entering Leg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Exiting Leg	0						0						0						0
Total	0						0						0						0



Location Map: 207662 Boxborough, MA

Precision Data Industries, LLC 46 Morton Street, Framingham, MA 01702 ph: 508-875-0100 email: datarequests@pdillc.com



Client:
Nitsch

Engineer:
B. Zimolka

Site Code:

Date:
Tues 10/20 thru Wed 10/21/2020

PDI Job #
207662

City, State:
Boxborough, MA

PDI File #: **207662 A**
 Location: **N: I-495 NB Ramps S: Driveway**
 Location: **E: Mass Ave (Route 111) W: Mass Ave (Route 111)**
 City, State: **Boxborough, MA**
 Client: **Nitsch/ B. Zimolka**
 Site Code: **TBA**
 Count Date: **Tuesday, October 20, 2020**
 Start Time: **7:00 AM**
 End Time: **9:00 AM**
 Class:



Cars and Heavy Vehicles (Combined)

	I-495 NB Ramps					Mass Ave (Route 111)					Driveway					Mass Ave (Route 111)					Total
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	
7:00 AM	12	0	25	0	37	16	31	0	0	47	0	0	0	0	0	0	49	16	0	65	149
7:15 AM	15	0	25	0	40	20	44	0	0	64	0	0	0	0	0	0	54	24	0	78	182
7:30 AM	5	0	14	0	19	17	48	0	0	65	0	0	0	0	0	1	65	20	0	86	170
7:45 AM	12	0	17	0	29	19	40	1	0	60	0	0	0	0	0	0	66	21	0	87	176
Total	44	0	81	0	125	72	163	1	0	236	0	0	0	0	0	1	234	81	0	316	677
8:00 AM	14	0	18	0	32	18	36	0	0	54	0	0	0	0	0	0	42	26	0	68	154
8:15 AM	14	0	20	0	34	14	31	0	0	45	0	0	0	0	0	0	56	27	0	83	162
8:30 AM	25	0	20	0	45	23	38	0	0	61	0	1	3	0	4	0	33	26	0	59	169
8:45 AM	20	0	18	0	38	19	54	0	0	73	0	1	0	0	1	0	50	29	0	79	191
Total	73	0	76	0	149	74	159	0	0	233	0	2	3	0	5	0	181	108	0	289	676
Grand Total	117	0	157	0	274	146	322	1	0	469	0	2	3	0	5	1	415	189	0	605	1353
Approach %	42.7	0.0	57.3	0.0		31.1	68.7	0.2	0.0		0.0	40.0	60.0	0.0		0.2	68.6	31.2	0.0		
Total %	8.6	0.0	11.6	0.0	20.3	10.8	23.8	0.1	0.0	34.7	0.0	0.1	0.2	0.0	0.4	0.1	30.7	14.0	0.0	44.7	
Exiting Leg Total	337					572					2					442					1353
Cars	114	0	149	0	263	146	307	1	0	454	0	2	3	0	5	1	396	180	0	577	1299
% Cars	97.4	0.0	94.9	0.0	96.0	100.0	95.3	100.0	0.0	96.8	0.0	100.0	100.0	0.0	100.0	100.0	95.4	95.2	0.0	95.4	96.0
Exiting Leg Total	328					545					2					424					1299
Heavy Vehicles	3	0	8	0	11	0	15	0	0	15	0	0	0	0	0	0	19	9	0	28	54
% Heavy Vehicles	2.6	0.0	5.1	0.0	4.0	0.0	4.7	0.0	0.0	3.2	0.0	0.0	0.0	0.0	0.0	0.0	4.6	4.8	0.0	4.6	4.0
Exiting Leg Total	9					27					0					18					54

Peak Hour Analysis from 07:00 AM to 09:00 AM begins at:

7:15 AM	I-495 NB Ramps					Mass Ave (Route 111)					Driveway					Mass Ave (Route 111)					Total
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	
7:15 AM	15	0	25	0	40	20	44	0	0	64	0	0	0	0	0	0	54	24	0	78	182
7:30 AM	5	0	14	0	19	17	48	0	0	65	0	0	0	0	0	1	65	20	0	86	170
7:45 AM	12	0	17	0	29	19	40	1	0	60	0	0	0	0	0	0	66	21	0	87	176
8:00 AM	14	0	18	0	32	18	36	0	0	54	0	0	0	0	0	0	42	26	0	68	154
Total Volume	46	0	74	0	120	74	168	1	0	243	0	0	0	0	0	1	227	91	0	319	682
% Approach Total	38.3	0.0	61.7	0.0		30.5	69.1	0.4	0.0		0.0	0.0	0.0	0.0		0.3	71.2	28.5	0.0		
PHF	0.767	0.000	0.740	0.000	0.750	0.925	0.875	0.250	0.000	0.935	0.000	0.000	0.000	0.000	0.000	0.250	0.860	0.875	0.000	0.917	0.937
Cars	45	0	71	0	116	74	161	1	0	236	0	0	0	0	0	1	221	85	0	307	659
Cars %	97.8	0.0	95.9	0.0	96.7	100.0	95.8	100.0	0.0	97.1	0.0	0.0	0.0	0.0	0.0	100.0	97.4	93.4	0.0	96.2	96.6
Heavy Vehicles	1	0	3	0	4	0	7	0	0	7	0	0	0	0	0	0	6	6	0	12	23
Heavy Vehicles %	2.2	0.0	4.1	0.0	3.3	0.0	4.2	0.0	0.0	2.9	0.0	0.0	0.0	0.0	0.0	0.0	2.6	6.6	0.0	3.8	3.4
Cars Enter Leg	45	0	71	0	116	74	161	1	0	236	0	0	0	0	0	1	221	85	0	307	659
Heavy Enter Leg	1	0	3	0	4	0	7	0	0	7	0	0	0	0	0	0	6	6	0	12	23
Total Entering Leg	46	0	74	0	120	74	168	1	0	243	0	0	0	0	0	1	227	91	0	319	682
Cars Exiting Leg	159					292					2					206					659
Heavy Exiting Leg	6					9					0					8					23
Total Exiting Leg	165					301					2					214					682

PDI File #: **207662 A**
 Location: **N: I-495 NB Ramps S: Driveway**
 Location: **E: Mass Ave (Route 111) W: Mass Ave (Route 111)**
 City, State: **Boxborough, MA**
 Client: **Nitsch/ B. Zimolka**
 Site Code: **TBA**
 Count Date: **Tuesday, October 20, 2020**
 Start Time: **7:00 AM**
 End Time: **9:00 AM**
 Class:



Cars

	I-495 NB Ramps					Mass Ave (Route 111)					Driveway					Mass Ave (Route 111)					Total					
	from North					from East					from South					from West										
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total						
7:00 AM	12	0	24	0	36	16	28	0	0	44	0	0	0	0	0	0	42	15	0	57	137					
7:15 AM	15	0	24	0	39	20	43	0	0	63	0	0	0	0	0	0	52	22	0	74	176					
7:30 AM	5	0	14	0	19	17	47	0	0	64	0	0	0	0	0	1	65	19	0	85	168					
7:45 AM	12	0	17	0	29	19	39	1	0	59	0	0	0	0	0	0	64	19	0	83	171					
Total	44	0	79	0	123	72	157	1	0	230	0	0	0	0	0	1	223	75	0	299	652					
8:00 AM	13	0	16	0	29	18	32	0	0	50	0	0	0	0	0	0	40	25	0	65	144					
8:15 AM	14	0	19	0	33	14	28	0	0	42	0	0	0	0	0	0	52	27	0	79	154					
8:30 AM	24	0	18	0	42	23	37	0	0	60	0	1	3	0	4	0	31	24	0	55	161					
8:45 AM	19	0	17	0	36	19	53	0	0	72	0	1	0	0	1	0	50	29	0	79	188					
Total	70	0	70	0	140	74	150	0	0	224	0	2	3	0	5	0	173	105	0	278	647					
Grand Total	114	0	149	0	263	146	307	1	0	454	0	2	3	0	5	1	396	180	0	577	1299					
Approach %	43.3	0.0	56.7	0.0		32.2	67.6	0.2	0.0		0.0	40.0	60.0	0.0		0.2	68.6	31.2	0.0							
Total %	8.8	0.0	11.5	0.0	20.2	11.2	23.6	0.1	0.0	34.9	0.0	0.2	0.2	0.0	0.4	0.1	30.5	13.9	0.0	44.4						
Exiting Leg Total						328					545					2					424					1299

Peak Hour Analysis from 07:00 AM to 09:00 AM begins at:

	I-495 NB Ramps					Mass Ave (Route 111)					Driveway					Mass Ave (Route 111)					Total					
	from North					from East					from South					from West										
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total						
7:15 AM	15	0	24	0	39	20	43	0	0	63	0	0	0	0	0	0	52	22	0	74	176					
7:30 AM	5	0	14	0	19	17	47	0	0	64	0	0	0	0	0	1	65	19	0	85	168					
7:45 AM	12	0	17	0	29	19	39	1	0	59	0	0	0	0	0	0	64	19	0	83	171					
8:00 AM	13	0	16	0	29	18	32	0	0	50	0	0	0	0	0	0	40	25	0	65	144					
Total Volume	45	0	71	0	116	74	161	1	0	236	0	0	0	0	0	1	221	85	0	307	659					
% Approach Total	38.8	0.0	61.2	0.0		31.4	68.2	0.4	0.0		0.0	0.0	0.0	0.0		0.3	72.0	27.7	0.0							
PHF	0.750	0.000	0.740	0.000	0.744	0.925	0.856	0.250	0.000	0.922	0.000	0.000	0.000	0.000	0.000	0.250	0.850	0.850	0.000	0.903	0.936					
Entering Leg	45	0	71	0	116	74	161	1	0	236	0	0	0	0	0	1	221	85	0	307	659					
Exiting Leg						159					292					2					206					659
Total						275					528					2					513					1318

PDI File #: 207662 A
 Location: N: I-495 NB Ramps S: Driveway
 Location: E: Mass Ave (Route 111) W: Mass Ave (Route 111)
 City, State: Boxborough, MA
 Client: Nitsch/ B. Zimolka
 Site Code: TBA
 Count Date: Tuesday, October 20, 2020
 Start Time: 7:00 AM
 End Time: 9:00 AM



Heavy Vehicles-Combined (Buses, Single-Unit Trucks, Articulated Trucks)

	I-495 NB Ramps					Mass Ave (Route 111)					Driveway					Mass Ave (Route 111)					Total
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	
7:00 AM	0	0	1	0	1	0	3	0	0	3	0	0	0	0	0	0	7	1	0	8	12
7:15 AM	0	0	1	0	1	0	1	0	0	1	0	0	0	0	0	0	2	2	0	4	6
7:30 AM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	1	0	1	2
7:45 AM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	2	2	0	4	5
Total	0	0	2	0	2	0	6	0	0	6	0	0	0	0	0	0	11	6	0	17	25
8:00 AM	1	0	2	0	3	0	4	0	0	4	0	0	0	0	0	0	2	1	0	3	10
8:15 AM	0	0	1	0	1	0	3	0	0	3	0	0	0	0	0	0	4	0	0	4	8
8:30 AM	1	0	2	0	3	0	1	0	0	1	0	0	0	0	0	0	2	2	0	4	8
8:45 AM	1	0	1	0	2	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	3
Total	3	0	6	0	9	0	9	0	0	9	0	0	0	0	0	0	8	3	0	11	29
Grand Total	3	0	8	0	11	0	15	0	0	15	0	0	0	0	0	0	19	9	0	28	54
Approach %	27.3	0.0	72.7	0.0		0.0	100.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0	67.9	32.1	0.0		
Total %	5.6	0.0	14.8	0.0	20.4	0.0	27.8	0.0	0.0	27.8	0.0	0.0	0.0	0.0	0.0	0.0	35.2	16.7	0.0	51.9	
Exiting Leg Total	9					27					0					18					54
Buses	0	0	0	0	0	0	8	0	0	8	0	0	0	0	0	0	3	1	0	4	12
% Buses	0.0	0.0	0.0	0.0	0.0	0.0	53.3	0.0	0.0	53.3	0.0	0.0	0.0	0.0	0.0	0.0	15.8	11.1	0.0	14.3	22.2
Exiting Leg Total	1					3					0					8					12
Single-Unit Trucks	3	0	8	0	11	0	3	0	0	3	0	0	0	0	0	0	12	5	0	17	31
% Single-Unit	100.0	0.0	100.0	0.0	100.0	0.0	20.0	0.0	0.0	20.0	0.0	0.0	0.0	0.0	0.0	0.0	63.2	55.6	0.0	60.7	57.4
Exiting Leg Total	5					20					0					6					31
Articulated Trucks	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	0	4	3	0	7	11
% Articulated	0.0	0.0	0.0	0.0	0.0	0.0	26.7	0.0	0.0	26.7	0.0	0.0	0.0	0.0	0.0	0.0	21.1	33.3	0.0	25.0	20.4
Exiting Leg Total	3					4					0					4					11

Peak Hour Analysis from 07:00 AM to 09:00 AM begins at:

	I-495 NB Ramps					Mass Ave (Route 111)					Driveway					Mass Ave (Route 111)					Total
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	
7:45 AM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	2	2	0	4	5
8:00 AM	1	0	2	0	3	0	4	0	0	4	0	0	0	0	0	0	2	1	0	3	10
8:15 AM	0	0	1	0	1	0	3	0	0	3	0	0	0	0	0	0	4	0	0	4	8
8:30 AM	1	0	2	0	3	0	1	0	0	1	0	0	0	0	0	0	2	2	0	4	8
Total Volume	2	0	5	0	7	0	9	0	0	9	0	0	0	0	0	0	10	5	0	15	31
% Approach Total	28.6	0.0	71.4	0.0		0.0	100.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0	66.7	33.3	0.0		
PHF	0.500	0.000	0.625	0.000	0.583	0.000	0.563	0.000	0.000	0.563	0.000	0.000	0.000	0.000	0.000	0.000	0.625	0.625	0.000	0.938	0.775
Buses	0	0	0	0	0	0	6	0	0	6	0	0	0	0	0	0	3	0	0	3	9
Buses %	0.0	0.0	0.0	0.0	0.0	0.0	66.7	0.0	0.0	66.7	0.0	0.0	0.0	0.0	0.0	0.0	30.0	0.0	0.0	20.0	29.0
Single-Unit Trucks	2	0	5	0	7	0	2	0	0	2	0	0	0	0	0	0	5	3	0	8	17
Single-Unit %	100.0	0.0	100.0	0.0	100.0	0.0	22.2	0.0	0.0	22.2	0.0	0.0	0.0	0.0	0.0	0.0	50.0	60.0	0.0	53.3	54.8
Articulated Trucks	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	2	2	0	4	5
Articulated %	0.0	0.0	0.0	0.0	0.0	0.0	11.1	0.0	0.0	11.1	0.0	0.0	0.0	0.0	0.0	0.0	20.0	40.0	0.0	26.7	16.1
Buses	0	0	0	0	0	0	6	0	0	6	0	0	0	0	0	0	3	0	0	3	9
Single-Unit Trucks	2	0	5	0	7	0	2	0	0	2	0	0	0	0	0	0	5	3	0	8	17
Articulated Trucks	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	2	2	0	4	5
Total Entering Leg	2	0	5	0	7	0	9	0	0	9	0	0	0	0	0	0	10	5	0	15	31
Buses	0					3					0					6					9
Single-Unit Trucks	3					10					0					4					17
Articulated Trucks	2					2					0					1					5
Total Exiting Leg	5					15					0					11					31

PDI File #: **207662 A**
 Location: **N: I-495 NB Ramps S: Driveway**
 Location: **E: Mass Ave (Route 111) W: Mass Ave (Route 111)**
 City, State: **Boxborough, MA**
 Client: **Nitsch/ B. Zimolka**
 Site Code: **TBA**
 Count Date: **Tuesday, October 20, 2020**
 Start Time: **7:00 AM**
 End Time: **9:00 AM**
 Class:



Buses

	I-495 NB Ramps					Mass Ave (Route 111)					Driveway					Mass Ave (Route 111)					Total
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	
7:00 AM	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	2
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	0	1	0	1	3
8:00 AM	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	0	1	0	0	1	5
8:15 AM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	2	0	0	2	3
8:30 AM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	6	0	0	6	0	0	0	0	0	0	3	0	0	3	9
Grand Total	0	0	0	0	0	0	8	0	0	8	0	0	0	0	0	0	3	1	0	4	12
Approach %	0.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0	75.0	25.0	0.0		
Total %	0.0	0.0	0.0	0.0	0.0	0.0	66.7	0.0	0.0	66.7	0.0	0.0	0.0	0.0	0.0	0.0	25.0	8.3	0.0	33.3	
Exiting Leg Total	1					3					0					8					12

Peak Hour Analysis from 07:00 AM to 09:00 AM begins at:

	I-495 NB Ramps					Mass Ave (Route 111)					Driveway					Mass Ave (Route 111)					Total
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:00 AM	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	0	1	0	0	1	5
8:15 AM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	2	0	0	2	3
Total Volume	0	0	0	0	0	0	5	0	0	5	0	0	0	0	0	0	3	1	0	4	9
% Approach Total	0.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0	75.0	25.0	0.0		
PHF	0.000	0.000	0.000	0.000	0.000	0.000	0.313	0.000	0.000	0.313	0.000	0.000	0.000	0.000	0.000	0.000	0.375	0.250	0.000	0.500	0.450
Entering Leg	0	0	0	0	0	0	5	0	0	5	0	0	0	0	0	0	3	1	0	4	9
Exiting Leg	1					3					0					5					9
Total	1					8					0					9					18

PDI File #: **207662 A**
 Location: **N: I-495 NB Ramps S: Driveway**
 Location: **E: Mass Ave (Route 111) W: Mass Ave (Route 111)**
 City, State: **Boxborough, MA**
 Client: **Nitsch/ B. Zimolka**
 Site Code: **TBA**
 Count Date: **Tuesday, October 20, 2020**
 Start Time: **7:00 AM**
 End Time: **9:00 AM**
 Class:



Single-Unit Trucks

	I-495 NB Ramps					Mass Ave (Route 111)					Driveway					Mass Ave (Route 111)					Total	
	from North					from East					from South					from West						
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total		
7:00 AM	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	7	0	0	7	8	
7:15 AM	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	3	
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	2	2	
Total	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	8	3	0	11	13	
8:00 AM	1	0	2	0	3	0	0	0	0	0	0	0	0	0	0	0	1	1	0	2	5	
8:15 AM	0	0	1	0	1	0	2	0	0	2	0	0	0	0	0	0	1	0	0	1	4	
8:30 AM	1	0	2	0	3	0	0	0	0	0	0	0	0	0	0	0	2	1	0	3	6	
8:45 AM	1	0	1	0	2	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	3	
Total	3	0	6	0	9	0	3	0	0	3	0	0	0	0	0	0	4	2	0	6	18	
Grand Total	3	0	8	0	11	0	3	0	0	3	0	0	0	0	0	0	12	5	0	17	31	
Approach %	27.3	0.0	72.7	0.0		0.0	100.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0	70.6	29.4	0.0			
Total %	9.7	0.0	25.8	0.0	35.5	0.0	9.7	0.0	0.0	9.7	0.0	0.0	0.0	0.0	0.0	0.0	38.7	16.1	0.0	54.8		
Exiting Leg Total						5					20					0					6	31

Peak Hour Analysis from 07:00 AM to 09:00 AM begins at:

	I-495 NB Ramps					Mass Ave (Route 111)					Driveway					Mass Ave (Route 111)					Total	
	from North					from East					from South					from West						
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total		
8:00 AM	1	0	2	0	3	0	0	0	0	0	0	0	0	0	0	0	1	1	0	2	5	
8:15 AM	0	0	1	0	1	0	2	0	0	2	0	0	0	0	0	0	1	0	0	1	4	
8:30 AM	1	0	2	0	3	0	0	0	0	0	0	0	0	0	0	0	2	1	0	3	6	
8:45 AM	1	0	1	0	2	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	3	
Total Volume	3	0	6	0	9	0	3	0	0	3	0	0	0	0	0	0	4	2	0	6	18	
% Approach Total	33.3	0.0	66.7	0.0		0.0	100.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0	66.7	33.3	0.0			
PHF	0.750	0.000	0.750	0.000	0.750	0.000	0.375	0.000	0.000	0.375	0.000	0.000	0.000	0.000	0.000	0.000	0.500	0.500	0.000	0.500	0.750	
Entering Leg	3	0	6	0	9	0	3	0	0	3	0	0	0	0	0	0	4	2	0	6	18	
Exiting Leg						2					10					0					6	18
Total						11					13					0					12	36

PDI File #: **207662 A**
 Location: **N: I-495 NB Ramps S: Driveway**
 Location: **E: Mass Ave (Route 111) W: Mass Ave (Route 111)**
 City, State: **Boxborough, MA**
 Client: **Nitsch/ B. Zimolka**
 Site Code: **TBA**
 Count Date: **Tuesday, October 20, 2020**
 Start Time: **7:00 AM**
 End Time: **9:00 AM**
 Class:



Articulated Trucks

	I-495 NB Ramps					Mass Ave (Route 111)					Driveway					Mass Ave (Route 111)					Total	
	from North					from East					from South					from West						
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total		
7:00 AM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	1	0	1	2	
7:15 AM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	2	0	0	2	3	
7:30 AM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1	
7:45 AM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	1	0	2	3	
Total	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	0	3	2	0	5	9	
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
8:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1	
8:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	
8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	2	2	
Grand Total	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	0	4	3	0	7	11	
Approach %	0.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0	57.1	42.9	0.0			
Total %	0.0	0.0	0.0	0.0	0.0	0.0	36.4	0.0	0.0	36.4	0.0	0.0	0.0	0.0	0.0	0.0	36.4	27.3	0.0	63.6		
Exiting Leg Total						3					4					0					4	11

Peak Hour Analysis from 07:00 AM to 09:00 AM begins at:

	I-495 NB Ramps					Mass Ave (Route 111)					Driveway					Mass Ave (Route 111)					Total	
	from North					from East					from South					from West						
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total		
7:00 AM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	1	0	1	2	
7:15 AM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	2	0	0	2	3	
7:30 AM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1	
7:45 AM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	1	0	2	3	
Total Volume	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	0	3	2	0	5	9	
% Approach Total	0.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0	60.0	40.0	0.0			
PHF	0.000	0.000	0.000	0.000	0.000	0.000	1.000	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.375	0.500	0.000	0.625	0.750	
Entering Leg	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	0	3	2	0	5	9	
Exiting Leg						2					3					0					4	9
Total						2					7					0					9	18

PDI File #: **207662 A**
 Location: **N: I-495 NB Ramps S: Driveway**
 Location: **E: Mass Ave (Route 111) W: Mass Ave (Route 111)**
 City, State: **Boxborough, MA**
 Client: **Nitsch/ B. Zimolka**
 Site Code: **TBA**
 Count Date: **Tuesday, October 20, 2020**
 Start Time: **7:00 AM**
 End Time: **9:00 AM**
 Class:



Bicycles (on Roadway and Crosswalks)

	I-495 NB Ramps								Mass Ave (Route 111)								Driveway								Mass Ave (Route 111)								Total
	from North								from East								from South								from West								
	Right	Thru	Left	U-Turn	CW-EB	CW-WB	Total		Right	Thru	Left	U-Turn	CW-SB	CW-NB	Total		Right	Thru	Left	U-Turn	CW-WB	CW-EB	Total		Right	Thru	Left	U-Turn	CW-NB	CW-SB	Total		
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
7:45 AM	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	1	1		
Total	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	1	1		
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
8:15 AM	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	1	1		
8:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
8:45 AM	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	2	2		
Total	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	3	3		
Grand Total	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	4	4		
Approach %	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0	0.0	0.0						
Total %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	100.0					
Exiting Leg Total	0								4								0								0								

Peak Hour Analysis from 07:00 AM to 09:00 AM begins at:

	I-495 NB Ramps								Mass Ave (Route 111)								Driveway								Mass Ave (Route 111)								Total
	from North								from East								from South								from West								
	Right	Thru	Left	U-Turn	CW-EB	CW-WB	Total		Right	Thru	Left	U-Turn	CW-SB	CW-NB	Total		Right	Thru	Left	U-Turn	CW-WB	CW-EB	Total		Right	Thru	Left	U-Turn	CW-NB	CW-SB	Total		
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
8:15 AM	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	1	1		
8:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
8:45 AM	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	2	2		
Total Volume	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	3	3		
% Approach Total	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0	0.0	0.0						
PHF	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.375	0.000	0.000	0.000	0.000	0.375	0.375				
Entering Leg	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	3	3			
Exiting Leg	0								3								0								0								
Total	0								3								0								3								

PDI File #: 207662 B
 Location: N: Gulf (West Drive) S: Adams Place NE: Gulf (East Drive)
 Location: E: Mass Ave (Route 111) W: Mass Ave (Route 111)
 City, State: Boxborough, MA
 Client: Nitsch/ B. Zimolka
 Site Code: TBA
 Count Date: Tuesday, October 20, 2020
 Start Time: 7:00 AM
 End Time: 9:00 AM
 Class:



PRECISION
 DATA
 INDUSTRIES, LLC

46 Morton Street, Framingham, MA 01702
 Office: 508-875-0100 Fax: 508-875-0118
 Email: datarequests@pdillc.com

Cars and Heavy Vehicles (Combined)

	Gulf (West Drive)						Gulf (East Drive)						Mass Ave (Route 111)						Adams Place						Mass Ave (Route 111)						Total
	from North						from Northeast						from East						from South						from West						
	Right	Thru	Left	Hard Left	U-Turn	Total	Hard Right	Bear Right	Bear Left	Hard Left	U-Turn	Total	Hard Right	Right	Thru	Left	U-Turn	Total	Right	Bear Right	Thru	Left	U-Turn	Total	Right	Thru	Bear Left	Left	U-Turn	Total	
7:00 AM	2	0	3	0	0	5	0	5	0	9	0	14	5	1	43	0	0	49	2	2	1	3	0	8	4	60	2	10	0	76	152
7:15 AM	7	0	2	0	0	9	1	6	0	7	0	14	11	0	40	0	0	51	0	0	0	3	0	3	1	55	5	6	0	67	144
7:30 AM	10	0	1	0	0	11	0	8	0	7	0	15	7	2	51	0	0	60	0	0	0	4	0	4	6	64	6	9	0	85	175
7:45 AM	3	1	3	0	0	7	0	9	0	8	0	17	6	0	46	0	0	52	0	0	0	2	0	2	4	59	10	11	0	84	162
Total	22	1	9	0	0	32	1	28	0	31	0	60	29	3	180	0	0	212	2	2	1	12	0	17	15	238	23	36	0	312	633
8:00 AM	11	0	2	0	0	13	0	1	0	3	0	4	7	1	42	0	0	50	0	0	0	2	0	2	1	54	4	2	0	61	130
8:15 AM	6	0	1	0	0	7	0	6	0	5	0	11	5	0	38	0	0	43	0	0	0	0	0	0	1	58	5	10	0	74	135
8:30 AM	6	0	4	0	0	10	0	7	0	4	0	11	11	1	48	0	0	60	0	0	0	2	0	2	0	44	2	10	0	56	139
8:45 AM	11	0	2	0	0	13	0	12	0	6	0	18	7	4	44	0	0	55	1	0	0	1	0	2	3	54	4	10	0	71	159
Total	34	0	9	0	0	43	0	26	0	18	0	44	30	6	172	0	0	208	1	0	0	5	0	6	5	210	15	32	0	262	563
Grand Total	56	1	18	0	0	75	1	54	0	49	0	104	59	9	352	0	0	420	3	2	1	17	0	23	20	448	38	68	0	574	1196
Approach %	74.7	1.3	24.0	0.0	0.0		1.0	51.9	0.0	47.1	0.0		14.0	2.1	83.8	0.0	0.0		13.0	8.7	4.3	73.9	0.0		3.5	78.0	6.6	11.8	0.0		
Total %	4.7	0.1	1.5	0.0	0.0	6.3	0.1	4.5	0.0	4.1	0.0	8.7	4.9	0.8	29.4	0.0	0.0	35.1	0.3	0.2	0.1	1.4	0.0	1.9	1.7	37.5	3.2	5.7	0.0	48.0	
Exiting Leg Total	79						99						518						21						479						1196
Cars	55	1	18	0	0	74	1	53	0	47	0	101	59	8	341	0	0	408	3	2	1	14	0	20	17	427	38	63	0	545	1148
% Cars	98.2	100.0	100.0	0.0	0.0	98.7	100.0	98.1	0.0	95.9	0.0	97.1	100.0	88.9	96.9	0.0	0.0	97.1	100.0	100.0	100.0	82.4	0.0	87.0	85.0	95.3	100.0	92.6	0.0	94.9	96.0
Exiting Leg Total	73						99						495						18						463						1148
Heavy Vehicles	1	0	0	0	0	1	0	1	0	2	0	3	0	1	11	0	0	12	0	0	0	3	0	3	3	21	0	5	0	29	48
% Heavy Vehicles	1.8	0.0	0.0	0.0	0.0	1.3	0.0	1.9	0.0	4.1	0.0	2.9	0.0	11.1	3.1	0.0	2.9	0.0	0.0	0.0	17.6	0.0	13.0	15.0	4.7	0.0	7.4	0.0	5.1	4.0	
Exiting Leg Total	6						0						23						3						16						48

Peak Hour Analysis from 07:00 AM to 09:00 AM begins at:

7:00 AM	Gulf (West Drive)						Gulf (East Drive)						Mass Ave (Route 111)						Adams Place						Mass Ave (Route 111)						Total
	from North						from Northeast						from East						from South						from West						
	Right	Thru	Left	Hard Left	U-Turn	Total	Hard Right	Bear Right	Bear Left	Hard Left	U-Turn	Total	Hard Right	Right	Thru	Left	U-Turn	Total	Right	Bear Right	Thru	Left	U-Turn	Total	Right	Thru	Bear Left	Left	U-Turn	Total	
7:00 AM	2	0	3	0	0	5	0	5	0	9	0	14	5	1	43	0	0	49	2	2	1	3	0	8	4	60	2	10	0	76	152
7:15 AM	7	0	2	0	0	9	1	6	0	7	0	14	11	0	40	0	0	51	0	0	0	3	0	3	1	55	5	6	0	67	144
7:30 AM	10	0	1	0	0	11	0	8	0	7	0	15	7	2	51	0	0	60	0	0	0	4	0	4	6	64	6	9	0	85	175
7:45 AM	3	1	3	0	0	7	0	9	0	8	0	17	6	0	46	0	0	52	0	0	0	2	0	2	4	59	10	11	0	84	162
Total Volume	22	1	9	0	0	32	1	28	0	31	0	60	29	3	180	0	0	212	2	2	1	12	0	17	15	238	23	36	0	312	633
% Approach Total	68.8	3.1	28.1	0.0	0.0		1.7	46.7	0.0	51.7	0.0		13.7	1.4	84.9	0.0	0.0		11.8	11.8	5.9	70.6	0.0		4.8	76.3	7.4	11.5	0.0		
PHF	0.550	0.250	0.750	0.000	0.000	0.727	0.250	0.778	0.000	0.861	0.000	0.882	0.659	0.375	0.882	0.000	0.000	0.883	0.250	0.250	0.250	0.750	0.000	0.531	0.625	0.930	0.575	0.818	0.000	0.918	0.904
Cars	22	1	9	0	0	32	1	28	0	30	0	59	29	3	177	0	0	209	2	2	1	10	0	15	12	226	23	34	0	295	610
Cars %	100.0	100.0	100.0	0.0	0.0	100.0	100.0	100.0	0.0	96.8	0.0	98.3	100.0	100.0	98.3	0.0	0.0	98.6	100.0	100.0	100.0	83.3	0.0	88.2	80.0	95.0	100.0	94.4	0.0	94.6	96.4
Heavy Vehicles	0	0	0	0	0	0	0	0	0	1	0	1	0	0	3	0	0	3	0	0	0	2	0	2	3	12	0	2	0	17	23
Heavy Vehicles %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.2	0.0	1.7	0.0	0.0	1.7	0.0	0.0	1.4	0.0	0.0	0.0	16.7	0.0	11.8	20.0	5.0	0.0	5.6	0.0	5.4	3.6
Cars Enter Leg	22	1	9	0	0	32	1	28	0	30	0	59	29	3	177	0	0	209	2	2	1	10	0	15	12	226	23	34	0	295	610
Heavy Enter Leg	0	0	0	0	0	0	0	0	0	1	0	1	0	0	3	0	0	3	0	0	0	2	0	2	3	12	0	2	0	17	23
Total Entering Leg	22	1	9	0	0	32	1	28	0	31	0	60	29	3	180	0	0	212	2	2	1	12	0	17	15	238	23	36	0	312	633
Cars Exiting Leg	39						54						267						13						237						610
Heavy Exiting Leg	2						0						13						3						5						23
Total Exiting Leg	41						54						280						16						242						633

PDI File #: 207662 B
 Location: N: Gulf (West Drive) S: Adams Place NE: Gulf (East Drive)
 Location: E: Mass Ave (Route 111) W: Mass Ave (Route 111)
 City, State: Boxborough, MA
 Client: Nitsch/ B. Zimolka
 Site Code: TBA
 Count Date: Tuesday, October 20, 2020
 Start Time: 7:00 AM
 End Time: 9:00 AM
 Class:



Cars

	Gulf (West Drive)							Gulf (East Drive)					Mass Ave (Route 111)						Adams Place						Mass Ave (Route 111)						Total
	from North							from Northeast					from East						from South						from West						
	Right	Thru	Left	Hard Left	U-Turn	Total	Hard Right	Bear Right	Bear Left	Hard Left	U-Turn	Total	Hard Right	Right	Thru	Left	U-Turn	Total	Right	Bear Right	Thru	Left	U-Turn	Total	Right	Thru	Bear Left	Left	U-Turn	Total	
7:00 AM	2	0	3	0	0	5	0	5	0	8	0	13	5	1	41	0	0	47	2	2	1	3	0	8	2	54	2	10	0	68	141
7:15 AM	7	0	2	0	0	9	1	6	0	7	0	14	11	0	40	0	0	51	0	0	0	3	0	3	1	51	5	6	0	63	140
7:30 AM	10	0	1	0	0	11	0	8	0	7	0	15	7	2	50	0	0	59	0	0	0	3	0	3	6	64	6	9	0	85	173
7:45 AM	3	1	3	0	0	7	0	9	0	8	0	17	6	0	46	0	0	52	0	0	0	1	0	1	3	57	10	9	0	79	156
Total	22	1	9	0	0	32	1	28	0	30	0	59	29	3	177	0	0	209	2	2	1	10	0	15	12	226	23	34	0	295	610
8:00 AM	11	0	2	0	0	13	0	1	0	3	0	4	7	1	38	0	0	46	0	0	0	2	0	2	1	51	4	1	0	57	122
8:15 AM	5	0	1	0	0	6	0	6	0	4	0	10	5	0	36	0	0	41	0	0	0	0	0	0	1	54	5	9	0	69	126
8:30 AM	6	0	4	0	0	10	0	7	0	4	0	11	11	1	46	0	0	58	0	0	0	1	0	1	0	42	2	9	0	53	133
8:45 AM	11	0	2	0	0	13	0	11	0	6	0	17	7	3	44	0	0	54	1	0	0	1	0	2	3	54	4	10	0	71	157
Total	33	0	9	0	0	42	0	25	0	17	0	42	30	5	164	0	0	199	1	0	0	4	0	5	5	201	15	29	0	250	538
Grand Total	55	1	18	0	0	74	1	53	0	47	0	101	59	8	341	0	0	408	3	2	1	14	0	20	17	427	38	63	0	545	1148
Approach %	74.3	1.4	24.3	0.0	0.0		1.0	52.5	0.0	46.5	0.0		14.5	2.0	83.6	0.0	0.0		15.0	10.0	5.0	70.0	0.0		3.1	78.3	7.0	11.6	0.0		
Total %	4.8	0.1	1.6	0.0	0.0	6.4	0.1	4.6	0.0	4.1	0.0	8.8	5.1	0.7	29.7	0.0	0.0	35.5	0.3	0.2	0.1	1.2	0.0	1.7	1.5	37.2	3.3	5.5	0.0	47.5	
Exiting Leg Total						73						99					495						18							463	1148

Peak Hour Analysis from 07:00 AM to 09:00 AM begins at:

	Gulf (West Drive)							Gulf (East Drive)					Mass Ave (Route 111)						Adams Place						Mass Ave (Route 111)						Total
	from North							from Northeast					from East						from South						from West						
	Right	Thru	Left	Hard Left	U-Turn	Total	Hard Right	Bear Right	Bear Left	Hard Left	U-Turn	Total	Hard Right	Right	Thru	Left	U-Turn	Total	Right	Bear Right	Thru	Left	U-Turn	Total	Right	Thru	Bear Left	Left	U-Turn	Total	
7:00 AM	2	0	3	0	0	5	0	5	0	8	0	13	5	1	41	0	0	47	2	2	1	3	0	8	2	54	2	10	0	68	141
7:15 AM	7	0	2	0	0	9	1	6	0	7	0	14	11	0	40	0	0	51	0	0	0	3	0	3	1	51	5	6	0	63	140
7:30 AM	10	0	1	0	0	11	0	8	0	7	0	15	7	2	50	0	0	59	0	0	0	3	0	3	6	64	6	9	0	85	173
7:45 AM	3	1	3	0	0	7	0	9	0	8	0	17	6	0	46	0	0	52	0	0	0	1	0	1	3	57	10	9	0	79	156
Total Volume	22	1	9	0	0	32	1	28	0	30	0	59	29	3	177	0	0	209	2	2	1	10	0	15	12	226	23	34	0	295	610
% Approach Total	68.8	3.1	28.1	0.0	0.0		1.7	47.5	0.0	50.8	0.0		13.9	1.4	84.7	0.0	0.0		13.3	13.3	6.7	66.7	0.0		4.1	76.6	7.8	11.5	0.0		
PHF	0.550	0.250	0.750	0.000	0.000	0.727	0.250	0.778	0.000	0.938	0.000	0.868	0.659	0.375	0.885	0.000	0.000	0.886	0.250	0.250	0.250	0.833	0.000	0.469	0.500	0.883	0.575	0.850	0.000	0.868	0.882
Entering Leg	22	1	9	0	0	32	1	28	0	30	0	59	29	3	177	0	0	209	2	2	1	10	0	15	12	226	23	34	0	295	610
Exiting Leg						39						54					267						13							237	610
Total						71						113					476						28							532	1220

PDI File #: 207662 B

Location: N: Gulf (West Drive) S: Adams Place NE: Gulf (East Drive)

Location: E: Mass Ave (Route 111) W: Mass Ave (Route 111)

City, State: Boxborough, MA

Client: Nitsch/ B. Zimolka

Site Code: TBA

Count Date: Tuesday, October 20, 2020

Start Time: 7:00 AM

End Time: 9:00 AM

Class:



PRECISION DATA INDUSTRIES, LLC

46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Heavy Vehicles-Combined (Buses, Single-Unit Trucks, Articulated Trucks)

Table with 30 columns for vehicle movements and 18 rows of data including time intervals (7:00 AM to 8:45 AM), totals, grand totals, and percentages for various vehicle types.

Peak Hour Analysis from 07:00 AM to 09:00 AM begins at:

Table with 30 columns for vehicle movements and 18 rows of data for peak hour analysis, including time intervals (7:45 AM to 8:30 AM), PHF, and vehicle type breakdowns.

PDI File #: **207662 B**
 Location: **N: Gulf (West Drive) S: Adams Place NE: Gulf (East Drive)**
 Location: **E: Mass Ave (Route 111) W: Mass Ave (Route 111)**
 City, State: **Boxborough, MA**
 Client: **Nitsch/ B. Zimolka**
 Site Code: **TBA**
 Count Date: **Tuesday, October 20, 2020**
 Start Time: **7:00 AM**
 End Time: **9:00 AM**



PRECISION
 D A T A
 INDUSTRIES, LLC

46 Morton Street, Framingham, MA 01702
 Office: 508-875-0100 Fax: 508-875-0118
 Email: datarequests@pdillc.com

Heavy Vehicles-Combined (Buses, Single-Unit Trucks, Articulated Trucks)

	Gulf (West Drive)						Gulf (East Drive)						Mass Ave (Route 111)						Adams Place						Mass Ave (Route 111)						Total
	from North						from Northeast						from East						from South						from West						
	Right	Thru	Left	Hard Left	U-Turn	Total	Hard Right	Bear Right	Bear Left	Hard Left	U-Turn	Total	Hard Right	Right	Thru	Left	U-Turn	Total	Right	Bear Right	Thru	Left	U-Turn	Total	Right	Thru	Bear Left	Left	U-Turn	Total	
Single-Unit Trucks	3						0						6						0						2						11
Articulated Trucks	2						0						2						1						3						8
Total Exiting Leg	5						0						12						1						11						29

PDI File #: 207662 B
 Location: N: Gulf (West Drive) S: Adams Place NE: Gulf (East Drive)
 Location: E: Mass Ave (Route 111) W: Mass Ave (Route 111)
 City, State: Boxborough, MA
 Client: Nitsch/ B. Zimolka
 Site Code: TBA
 Count Date: Tuesday, October 20, 2020
 Start Time: 7:00 AM
 End Time: 9:00 AM
 Class:



PRECISION
 DATA
 INDUSTRIES, LLC

46 Morton Street, Framingham, MA 01702
 Office: 508-875-0100 Fax: 508-875-0118
 Email: datarequests@pdillc.com

Buses

	Gulf (West Drive)							Gulf (East Drive)					Mass Ave (Route 111)						Adams Place						Mass Ave (Route 111)						Total		
	from North							from Northeast					from East						from South						from West								
	Right	Thru	Left	Hard Left	U-Turn	Total		Hard Right	Bear Right	Bear Left	Hard Left	U-Turn	Total	Hard Right	Right	Thru	Left	U-Turn	Total	Right	Bear Right	Thru	Left	U-Turn	Total	Right	Thru	Bear Left	Left	U-Turn		Total	
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	1	1	0	0	0	2	3
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	1	1	0	0	0	2	3
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	0	0	0	2	0	0	0	2	6	
8:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	2	0	0	0	2	3		
8:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0	6	0	0	0	0	0	0	0	0	4	0	0	0	4	10	
Grand Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	0	0	7	0	0	0	0	0	0	0	1	5	0	0	0	6	13	
Approach %	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	100.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0		16.7	83.3	0.0	0.0	0.0				
Total %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	53.8	0.0	0.0	53.8	0.0	0.0	0.0	0.0	0.0	0.0	7.7	38.5	0.0	0.0	0.0	46.2			
Exiting Leg Total	0						0						5						1						7						13		

Peak Hour Analysis from 07:00 AM to 09:00 AM begins at:

7:45 AM	Gulf (West Drive)							Gulf (East Drive)					Mass Ave (Route 111)						Adams Place						Mass Ave (Route 111)						Total
	from North							from Northeast					from East						from South						from West						
	Right	Thru	Left	Hard Left	U-Turn	Total		Hard Right	Bear Right	Bear Left	Hard Left	U-Turn	Total	Hard Right	Right	Thru	Left	U-Turn	Total	Right	Bear Right	Thru	Left	U-Turn	Total	Right	Thru	Bear Left	Left	U-Turn	
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	0	0	2	0	0	0	2	6
8:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	2	0	0	0	2	3
8:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
Total Volume	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0	6	0	0	0	0	0	0	0	4	0	0	0	4	10
% Approach Total	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0	0.0		
PHF	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.375	0.000	0.375		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.500	0.000	0.000	0.000	0.500	0.417
Entering Leg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0	6	0	0	0	0	0	0	0	4	0	0	0	4	10
Exiting Leg	0						0						4						0						6						10
Total	0						0						10						0						10						20

PDI File #: 207662 B
 Location: N: Gulf (West Drive) S: Adams Place NE: Gulf (East Drive)
 Location: E: Mass Ave (Route 111) W: Mass Ave (Route 111)
 City, State: Boxborough, MA
 Client: Nitsch/ B. Zimolka
 Site Code: TBA
 Count Date: Tuesday, October 20, 2020
 Start Time: 7:00 AM
 End Time: 9:00 AM
 Class:



PRECISION
 DATA
 INDUSTRIES, LLC

46 Morton Street, Framingham, MA 01702
 Office: 508-875-0100 Fax: 508-875-0118
 Email: datarequests@pdillc.com

Single-Unit Trucks

	Gulf (West Drive)							Gulf (East Drive)					Mass Ave (Route 111)						Adams Place						Mass Ave (Route 111)						Total					
	from North							from Northeast					from East						from South						from West											
	Right	Thru	Left	Hard Left	U-Turn	Total		Hard Right	Bear Right	Bear Left	Hard Left	U-Turn	Total	Hard Right	Right	Thru	Left	U-Turn	Total	Right	Bear Right	Thru	Left	U-Turn	Total	Right	Thru	Bear Left	Left	U-Turn		Total				
7:00 AM	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	1	4	0	0	0	5	6					
7:15 AM	0	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	4	4					
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
7:45 AM	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	1	1						
Total	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	1	9	0	0	0	10	11					
8:00 AM	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	2	2						
8:15 AM	1	0	0	0	0	1	0	0	0	1	0	1	0	0	1	0	0	1	0	0	0	0	0	0	1	0	1	0	2	5						
8:30 AM	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	1	0	3	3						
8:45 AM	0	0	0	0	0	0	0	1	0	0	0	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	2					
Total	1	0	0	0	0	1	0	1	0	1	0	2	0	1	1	0	0	2	0	0	0	0	0	0	0	4	0	3	0	7	12					
Grand Total	1	0	0	0	0	1	0	1	0	2	0	3	0	1	1	0	0	2	0	0	0	0	0	0	1	13	0	3	0	17	23					
Approach %	100.0	0.0	0.0	0.0	0.0		0.0	33.3	0.0	66.7	0.0		0.0	50.0	50.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0		5.9	76.5	0.0	17.6	0.0							
Total %	4.3	0.0	0.0	0.0	0.0	4.3	0.0	4.3	0.0	8.7	0.0	13.0	0.0	4.3	4.3	0.0	0.0	8.7	0.0	0.0	0.0	0.0	0.0	0.0	4.3	56.5	0.0	13.0	0.0	73.9						
Exiting Leg Total							4							0							15							1							3	23

Peak Hour Analysis from 07:00 AM to 09:00 AM begins at:

8:00 AM	Gulf (West Drive)							Gulf (East Drive)					Mass Ave (Route 111)						Adams Place						Mass Ave (Route 111)						Total					
	from North							from Northeast					from East						from South						from West											
	Right	Thru	Left	Hard Left	U-Turn	Total		Hard Right	Bear Right	Bear Left	Hard Left	U-Turn	Total	Hard Right	Right	Thru	Left	U-Turn	Total	Right	Bear Right	Thru	Left	U-Turn	Total	Right	Thru	Bear Left	Left	U-Turn		Total				
8:00 AM	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	2	2						
8:15 AM	1	0	0	0	0	1	0	0	0	1	0	1	0	0	1	0	0	1	0	0	0	0	0	0	1	0	1	0	2	5						
8:30 AM	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	1	0	3	3						
8:45 AM	0	0	0	0	0	0	0	1	0	0	0	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	2						
Total Volume	1	0	0	0	0	1	0	1	0	1	0	2	0	1	1	0	0	2	0	0	0	0	0	0	0	4	0	3	0	7	12					
% Approach Total	100.0	0.0	0.0	0.0	0.0		0.0	50.0	0.0	50.0	0.0		0.0	50.0	50.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	57.1	0.0	42.9	0.0							
PHF	0.250	0.000	0.000	0.000	0.000	0.250	0.000	0.250	0.000	0.250	0.000	0.500	0.000	0.250	0.250	0.000	0.000	0.500	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.500	0.000	0.750	0.000	0.583	0.600					
Entering Leg	1	0	0	0	0	1	0	1	0	1	0	2	0	1	1	0	0	2	0	0	0	0	0	0	0	4	0	3	0	7	12					
Exiting Leg							4							0							5							0							3	12
Total							5							2							7							0							10	24

PDI File #: 207662 B
 Location: N: Gulf (West Drive) S: Adams Place NE: Gulf (East Drive)
 Location: E: Mass Ave (Route 111) W: Mass Ave (Route 111)
 City, State: Boxborough, MA
 Client: Nitsch/ B. Zimolka
 Site Code: TBA
 Count Date: Tuesday, October 20, 2020
 Start Time: 7:00 AM
 End Time: 9:00 AM
 Class:



Articulated Trucks

	Gulf (West Drive)							Gulf (East Drive)					Mass Ave (Route 111)						Adams Place						Mass Ave (Route 111)						Total					
	from North							from Northeast					from East						from South						from West											
	Right	Thru	Left	Hard Left	U-Turn	Total		Hard Right	Bear Right	Bear Left	Hard Left	U-Turn	Total	Hard Right	Right	Thru	Left	U-Turn	Total	Right	Bear Right	Thru	Left	U-Turn	Total	Right	Thru	Bear Left	Left	U-Turn		Total				
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	1	2
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	2
7:45 AM	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	1	1	0	2	0	2	0	4	5	
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	0	0	0	2	0	2	1	2	0	2	0	2	0	5	9	9		
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
8:15 AM	0	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	1	1	1	1	
8:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	2	
8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	1	0	1	0	1	0	1	0	1	0	0	0	1	3	
Grand Total	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	3	0	0	0	3	0	3	1	3	0	2	0	6	12	12	12	12	12		
Approach %	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	100.0	0.0	0.0		0.0	0.0	0.0	100.0	0.0		16.7	50.0	0.0	33.3	0.0							
Total %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	25.0	0.0	0.0	25.0	0.0	0.0	0.0	25.0	0.0	25.0	8.3	25.0	0.0	16.7	0.0	50.0						
Exiting Leg Total							2							0							3							1							6	12

Peak Hour Analysis from 07:00 AM to 09:00 AM begins at:

	Gulf (West Drive)							Gulf (East Drive)					Mass Ave (Route 111)						Adams Place						Mass Ave (Route 111)						Total					
	from North							from Northeast					from East						from South						from West											
	Right	Thru	Left	Hard Left	U-Turn	Total		Hard Right	Bear Right	Bear Left	Hard Left	U-Turn	Total	Hard Right	Right	Thru	Left	U-Turn	Total	Right	Bear Right	Thru	Left	U-Turn	Total	Right	Thru	Bear Left	Left	U-Turn		Total				
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	1	0	2	0	4	5	5	5	5		
Total Volume	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	0	0	0	2	0	2	1	2	0	2	0	5	9	9	9	9		
% Approach Total	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	100.0	0.0	0.0		0.0	0.0	0.0	100.0	0.0		20.0	40.0	0.0	40.0	0.0							
PHF	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.500	0.000	0.000	0.500	0.000	0.000	0.000	0.500	0.000	0.500	0.250	0.500	0.000	0.250	0.000	0.313	0.450	0.450	0.450			
Entering Leg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	0	0	0	2	0	2	1	2	0	2	0	5	9	9	9	9		
Exiting Leg							2							0							2							1							4	9
Total							2							0							4							3							9	18

PDI File #: 207662 C
 Location: N: Paddock Lane S: Cisco Driveway
 Location: E: Mass Ave (Route 111) W: Mass Ave (Route 111)
 City, State: Boxborough, MA
 Client: Nitsch/ B. Zimolka
 Site Code: TBA
 Count Date: Tuesday, October 20, 2020
 Start Time: 7:00 AM
 End Time: 9:00 AM
 Class:



Cars and Heavy Vehicles (Combined)

	Paddock Lane					Mass Ave (Route 111)					Cisco Driveway					Mass Ave (Route 111)					Total
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	
7:00 AM	9	0	6	0	15	1	38	0	0	39	0	0	2	0	2	2	72	3	0	77	133
7:15 AM	10	0	6	0	16	1	48	0	0	49	0	0	1	0	1	0	70	6	0	76	142
7:30 AM	10	0	3	0	13	2	49	0	0	51	0	0	1	0	1	0	66	5	0	71	136
7:45 AM	4	0	3	0	7	2	46	0	0	48	0	0	0	0	0	0	69	2	0	71	126
Total	33	0	18	0	51	6	181	0	0	187	0	0	4	0	4	2	277	16	0	295	537
8:00 AM	3	0	3	0	6	1	46	0	0	47	1	0	0	0	1	0	54	4	0	58	112
8:15 AM	8	0	1	0	9	2	37	0	0	39	2	0	0	0	2	0	64	3	0	67	117
8:30 AM	10	0	6	0	16	2	50	0	0	52	0	0	1	0	1	1	47	4	0	52	121
8:45 AM	4	0	2	0	6	4	55	0	0	59	0	0	0	0	0	0	60	3	0	63	128
Total	25	0	12	0	37	9	188	0	0	197	3	0	1	0	4	1	225	14	0	240	478
Grand Total	58	0	30	0	88	15	369	0	0	384	3	0	5	0	8	3	502	30	0	535	1015
Approach %	65.9	0.0	34.1	0.0		3.9	96.1	0.0	0.0		37.5	0.0	62.5	0.0		0.6	93.8	5.6	0.0		
Total %	5.7	0.0	3.0	0.0	8.7	1.5	36.4	0.0	0.0	37.8	0.3	0.0	0.5	0.0	0.8	0.3	49.5	3.0	0.0	52.7	
Exiting Leg Total	45					535					3					432					1015
Cars	56	0	29	0	85	14	357	0	0	371	3	0	5	0	8	1	476	28	0	505	969
% Cars	96.6	0.0	96.7	0.0	96.6	93.3	96.7	0.0	0.0	96.6	100.0	0.0	100.0	0.0	100.0	33.3	94.8	93.3	0.0	94.4	95.5
Exiting Leg Total	42					508					1					418					969
Heavy Vehicles	2	0	1	0	3	1	12	0	0	13	0	0	0	0	0	2	26	2	0	30	46
% Heavy Vehicles	3.4	0.0	3.3	0.0	3.4	6.7	3.3	0.0	0.0	3.4	0.0	0.0	0.0	0.0	0.0	66.7	5.2	6.7	0.0	5.6	4.5
Exiting Leg Total	3					27					2					14					46

Peak Hour Analysis from 07:00 AM to 09:00 AM begins at:

	Paddock Lane					Mass Ave (Route 111)					Cisco Driveway					Mass Ave (Route 111)					Total
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	
7:00 AM	9	0	6	0	15	1	38	0	0	39	0	0	2	0	2	2	72	3	0	77	133
7:15 AM	10	0	6	0	16	1	48	0	0	49	0	0	1	0	1	0	70	6	0	76	142
7:30 AM	10	0	3	0	13	2	49	0	0	51	0	0	1	0	1	0	66	5	0	71	136
7:45 AM	4	0	3	0	7	2	46	0	0	48	0	0	0	0	0	0	69	2	0	71	126
Total Volume	33	0	18	0	51	6	181	0	0	187	0	0	4	0	4	2	277	16	0	295	537
% Approach Total	64.7	0.0	35.3	0.0		3.2	96.8	0.0	0.0		0.0	0.0	100.0	0.0		0.7	93.9	5.4	0.0		
PHF	0.825	0.000	0.750	0.000	0.797	0.750	0.923	0.000	0.000	0.917	0.000	0.000	0.500	0.000	0.500	0.250	0.962	0.667	0.000	0.958	0.945
Cars	32	0	18	0	50	6	176	0	0	182	0	0	4	0	4	1	264	15	0	280	516
Cars %	97.0	0.0	100.0	0.0	98.0	100.0	97.2	0.0	0.0	97.3	0.0	0.0	100.0	0.0	100.0	50.0	95.3	93.8	0.0	94.9	96.1
Heavy Vehicles	1	0	0	0	1	0	5	0	0	5	0	0	0	0	0	1	13	1	0	15	21
Heavy Vehicles %	3.0	0.0	0.0	0.0	2.0	0.0	2.8	0.0	0.0	2.7	0.0	0.0	0.0	0.0	0.0	50.0	4.7	6.3	0.0	5.1	3.9
Cars Enter Leg	32	0	18	0	50	6	176	0	0	182	0	0	4	0	4	1	264	15	0	280	516
Heavy Enter Leg	1	0	0	0	1	0	5	0	0	5	0	0	0	0	0	1	13	1	0	15	21
Total Entering Leg	33	0	18	0	51	6	181	0	0	187	0	0	4	0	4	2	277	16	0	295	537
Cars Exiting Leg	21					282					1					212					516
Heavy Exiting Leg	1					13					1					6					21
Total Exiting Leg	22					295					2					218					537

PDI File #: **207662 C**
 Location: **N: Paddock Lane S: Cisco Driveway**
 Location: **E: Mass Ave (Route 111) W: Mass Ave (Route 111)**
 City, State: **Boxborough, MA**
 Client: **Nitsch/ B. Zimolka**
 Site Code: **TBA**
 Count Date: **Tuesday, October 20, 2020**
 Start Time: **7:00 AM**
 End Time: **9:00 AM**
 Class:



Cars

	Paddock Lane					Mass Ave (Route 111)					Cisco Driveway					Mass Ave (Route 111)					Total					
	from North					from East					from South					from West										
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total						
7:00 AM	8	0	6	0	14	1	35	0	0	36	0	0	2	0	2	1	66	2	0	69	121					
7:15 AM	10	0	6	0	16	1	47	0	0	48	0	0	1	0	1	0	66	6	0	72	137					
7:30 AM	10	0	3	0	13	2	48	0	0	50	0	0	1	0	1	0	65	5	0	70	134					
7:45 AM	4	0	3	0	7	2	46	0	0	48	0	0	0	0	0	0	67	2	0	69	124					
Total	32	0	18	0	50	6	176	0	0	182	0	0	4	0	4	1	264	15	0	280	516					
8:00 AM	3	0	3	0	6	1	42	0	0	43	1	0	0	0	1	0	51	3	0	54	104					
8:15 AM	7	0	1	0	8	2	35	0	0	37	2	0	0	0	2	0	57	3	0	60	107					
8:30 AM	10	0	6	0	16	1	49	0	0	50	0	0	1	0	1	0	45	4	0	49	116					
8:45 AM	4	0	1	0	5	4	55	0	0	59	0	0	0	0	0	0	59	3	0	62	126					
Total	24	0	11	0	35	8	181	0	0	189	3	0	1	0	4	0	212	13	0	225	453					
Grand Total	56	0	29	0	85	14	357	0	0	371	3	0	5	0	8	1	476	28	0	505	969					
Approach %	65.9	0.0	34.1	0.0		3.8	96.2	0.0	0.0		37.5	0.0	62.5	0.0		0.2	94.3	5.5	0.0							
Total %	5.8	0.0	3.0	0.0	8.8	1.4	36.8	0.0	0.0	38.3	0.3	0.0	0.5	0.0	0.8	0.1	49.1	2.9	0.0	52.1						
Exiting Leg Total						42					508					1					418					969

Peak Hour Analysis from 07:00 AM to 09:00 AM begins at:

	Paddock Lane					Mass Ave (Route 111)					Cisco Driveway					Mass Ave (Route 111)					Total					
	from North					from East					from South					from West										
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total						
7:00 AM	8	0	6	0	14	1	35	0	0	36	0	0	2	0	2	1	66	2	0	69	121					
7:15 AM	10	0	6	0	16	1	47	0	0	48	0	0	1	0	1	0	66	6	0	72	137					
7:30 AM	10	0	3	0	13	2	48	0	0	50	0	0	1	0	1	0	65	5	0	70	134					
7:45 AM	4	0	3	0	7	2	46	0	0	48	0	0	0	0	0	0	67	2	0	69	124					
Total Volume	32	0	18	0	50	6	176	0	0	182	0	0	4	0	4	1	264	15	0	280	516					
% Approach Total	64.0	0.0	36.0	0.0		3.3	96.7	0.0	0.0		0.0	0.0	100.0	0.0		0.4	94.3	5.4	0.0							
PHF	0.800	0.000	0.750	0.000	0.781	0.750	0.917	0.000	0.000	0.910	0.000	0.000	0.500	0.000	0.500	0.250	0.985	0.625	0.000	0.972	0.942					
Entering Leg	32	0	18	0	50	6	176	0	0	182	0	0	4	0	4	1	264	15	0	280	516					
Exiting Leg						21					282					1					212					516
Total						71					464					5					492					1032

PDI File #: 207662 C
 Location: N: Paddock Lane S: Cisco Driveway
 Location: E: Mass Ave (Route 111) W: Mass Ave (Route 111)
 City, State: Boxborough, MA
 Client: Nitsch/ B. Zimolka
 Site Code: TBA
 Count Date: Tuesday, October 20, 2020
 Start Time: 7:00 AM
 End Time: 9:00 AM



Heavy Vehicles-Combined (Buses, Single-Unit Trucks, Articulated Trucks)

	Paddock Lane					Mass Ave (Route 111)					Cisco Driveway					Mass Ave (Route 111)					Total
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	
7:00 AM	1	0	0	0	1	0	3	0	0	3	0	0	0	0	0	1	6	1	0	8	12
7:15 AM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	4	0	0	4	5
7:30 AM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	2
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	2
Total	1	0	0	0	1	0	5	0	0	5	0	0	0	0	0	1	13	1	0	15	21
8:00 AM	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	0	3	1	0	4	8
8:15 AM	1	0	0	0	1	0	2	0	0	2	0	0	0	0	0	0	7	0	0	7	10
8:30 AM	0	0	0	0	0	1	1	0	0	2	0	0	0	0	0	1	2	0	0	3	5
8:45 AM	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	2
Total	1	0	1	0	2	1	7	0	0	8	0	0	0	0	0	1	13	1	0	15	25
Grand Total	2	0	1	0	3	1	12	0	0	13	0	0	0	0	0	2	26	2	0	30	46
Approach %	66.7	0.0	33.3	0.0		7.7	92.3	0.0	0.0		0.0	0.0	0.0	0.0		6.7	86.7	6.7	0.0		
Total %	4.3	0.0	2.2	0.0	6.5	2.2	26.1	0.0	0.0	28.3	0.0	0.0	0.0	0.0	0.0	4.3	56.5	4.3	0.0	65.2	
Exiting Leg Total					3					27					2					14	46
Buses	0	0	0	0	0	0	9	0	0	9	0	0	0	0	0	0	7	0	0	7	16
% Buses	0.0	0.0	0.0	0.0	0.0	0.0	75.0	0.0	0.0	69.2	0.0	0.0	0.0	0.0	0.0	0.0	26.9	0.0	0.0	23.3	34.8
Exiting Leg Total					0					7					0					9	16
Single-Unit Trucks	2	0	1	0	3	1	1	0	0	2	0	0	0	0	0	2	13	1	0	16	21
% Single-Unit	100.0	0.0	100.0	0.0	100.0	100.0	8.3	0.0	0.0	15.4	0.0	0.0	0.0	0.0	0.0	100.0	50.0	50.0	0.0	53.3	45.7
Exiting Leg Total					2					14					2					3	21
Articulated Trucks	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	6	1	0	7	9
% Articulated	0.0	0.0	0.0	0.0	0.0	0.0	16.7	0.0	0.0	15.4	0.0	0.0	0.0	0.0	0.0	0.0	23.1	50.0	0.0	23.3	19.6
Exiting Leg Total					1					6					0					2	9

Peak Hour Analysis from 07:00 AM to 09:00 AM begins at:

	Paddock Lane					Mass Ave (Route 111)					Cisco Driveway					Mass Ave (Route 111)					Total
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	2
8:00 AM	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	0	3	1	0	4	8
8:15 AM	1	0	0	0	1	0	2	0	0	2	0	0	0	0	0	0	7	0	0	7	10
8:30 AM	0	0	0	0	0	1	1	0	0	2	0	0	0	0	0	1	2	0	0	3	5
Total Volume	1	0	0	0	1	1	7	0	0	8	0	0	0	0	0	1	14	1	0	16	25
% Approach Total	100.0	0.0	0.0	0.0		12.5	87.5	0.0	0.0		0.0	0.0	0.0	0.0		6.3	87.5	6.3	0.0		
PHF	0.250	0.000	0.000	0.000	0.250	0.250	0.438	0.000	0.000	0.500	0.000	0.000	0.000	0.000	0.000	0.250	0.500	0.250	0.000	0.571	0.625
Buses	0	0	0	0	0	0	6	0	0	6	0	0	0	0	0	0	5	0	0	5	11
Buses %	0.0	0.0	0.0	0.0	0.0	0.0	85.7	0.0	0.0	75.0	0.0	0.0	0.0	0.0	0.0	0.0	35.7	0.0	0.0	31.3	44.0
Single-Unit Trucks	1	0	0	0	1	1	1	0	0	2	0	0	0	0	0	1	6	0	0	7	10
Single-Unit %	100.0	0.0	0.0	0.0	100.0	100.0	14.3	0.0	0.0	25.0	0.0	0.0	0.0	0.0	0.0	100.0	42.9	0.0	0.0	43.8	40.0
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	1	0	4	4
Articulated %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	21.4	100.0	0.0	25.0	16.0
Buses	0	0	0	0	0	0	6	0	0	6	0	0	0	0	0	0	5	0	0	5	11
Single-Unit Trucks	1	0	0	0	1	1	1	0	0	2	0	0	0	0	0	1	6	0	0	7	10
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	1	0	4	4
Total Entering Leg	1	0	0	0	1	1	7	0	0	8	0	0	0	0	0	1	14	1	0	16	25
Buses					0					5					0					6	11
Single-Unit Trucks					1					6					1					2	10
Articulated Trucks					1					3					0					0	4
Total Exiting Leg					2					14					1					8	25

PDI File #: **207662 C**
 Location: **N: Paddock Lane S: Cisco Driveway**
 Location: **E: Mass Ave (Route 111) W: Mass Ave (Route 111)**
 City, State: **Boxborough, MA**
 Client: **Nitsch/ B. Zimolka**
 Site Code: **TBA**
 Count Date: **Tuesday, October 20, 2020**
 Start Time: **7:00 AM**
 End Time: **9:00 AM**
 Class:



Buses

	Paddock Lane					Mass Ave (Route 111)					Cisco Driveway					Mass Ave (Route 111)					Total
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	
7:00 AM	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	2
7:15 AM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	2	0	0	2	3
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	2	0	0	2	5
8:00 AM	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	0	2	0	0	2	6
8:15 AM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	3	0	0	3	4
8:30 AM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	6	0	0	6	0	0	0	0	0	0	5	0	0	5	11
Grand Total	0	0	0	0	0	0	9	0	0	9	0	0	0	0	0	0	7	0	0	7	16
Approach %	0.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0		
Total %	0.0	0.0	0.0	0.0	0.0	0.0	56.3	0.0	0.0	56.3	0.0	0.0	0.0	0.0	0.0	0.0	43.8	0.0	0.0	43.8	
Exiting Leg Total	0					7					0					9					16

Peak Hour Analysis from 07:00 AM to 09:00 AM begins at:

7:45 AM	Paddock Lane					Mass Ave (Route 111)					Cisco Driveway					Mass Ave (Route 111)					Total
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:00 AM	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	0	2	0	0	2	6
8:15 AM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	3	0	0	3	4
8:30 AM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
Total Volume	0	0	0	0	0	0	6	0	0	6	0	0	0	0	0	0	5	0	0	5	11
% Approach Total	0.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0		
PHF	0.000	0.000	0.000	0.000	0.000	0.000	0.375	0.000	0.000	0.375	0.000	0.000	0.000	0.000	0.000	0.000	0.417	0.000	0.000	0.417	0.458
Entering Leg	0	0	0	0	0	0	6	0	0	6	0	0	0	0	0	0	5	0	0	5	11
Exiting Leg	0					5					0					6					11
Total	0					11					0					11					22

PDI File #: **207662 C**
 Location: **N: Paddock Lane S: Cisco Driveway**
 Location: **E: Mass Ave (Route 111) W: Mass Ave (Route 111)**
 City, State: **Boxborough, MA**
 Client: **Nitsch/ B. Zimolka**
 Site Code: **TBA**
 Count Date: **Tuesday, October 20, 2020**
 Start Time: **7:00 AM**
 End Time: **9:00 AM**
 Class:



Single-Unit Trucks

	Paddock Lane					Mass Ave (Route 111)					Cisco Driveway					Mass Ave (Route 111)					Total
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	
7:00 AM	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	5	1	0	7	8
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
Total	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	7	1	0	9	10
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
8:15 AM	1	0	0	0	1	0	1	0	0	1	0	0	0	0	0	0	2	0	0	2	4
8:30 AM	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	1	2	0	0	3	4
8:45 AM	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	2
Total	1	0	1	0	2	1	1	0	0	2	0	0	0	0	0	1	6	0	0	7	11
Grand Total	2	0	1	0	3	1	1	0	0	2	0	0	0	0	0	2	13	1	0	16	21
Approach %	66.7	0.0	33.3	0.0		50.0	50.0	0.0	0.0		0.0	0.0	0.0	0.0		12.5	81.3	6.3	0.0		
Total %	9.5	0.0	4.8	0.0	14.3	4.8	4.8	0.0	0.0	9.5	0.0	0.0	0.0	0.0	0.0	9.5	61.9	4.8	0.0	76.2	
Exiting Leg Total	2					14					2					3					21

Peak Hour Analysis from 07:00 AM to 09:00 AM begins at:

8:00 AM	Paddock Lane					Mass Ave (Route 111)					Cisco Driveway					Mass Ave (Route 111)					Total
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
8:15 AM	1	0	0	0	1	0	1	0	0	1	0	0	0	0	0	0	2	0	0	2	4
8:30 AM	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	1	2	0	0	3	4
8:45 AM	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	2
Total Volume	1	0	1	0	2	1	1	0	0	2	0	0	0	0	0	1	6	0	0	7	11
% Approach Total	50.0	0.0	50.0	0.0		50.0	50.0	0.0	0.0		0.0	0.0	0.0	0.0		14.3	85.7	0.0	0.0		
PHF	0.250	0.000	0.250	0.000	0.500	0.250	0.250	0.000	0.000	0.500	0.000	0.000	0.000	0.000	0.000	0.250	0.750	0.000	0.000	0.583	0.688
Entering Leg	1	0	1	0	2	1	1	0	0	2	0	0	0	0	0	1	6	0	0	7	11
Exiting Leg	1					7					1					2					11
Total	3					9					1					9					22

PDI File #: 207662 C
 Location: N: Paddock Lane S: Cisco Driveway
 Location: E: Mass Ave (Route 111) W: Mass Ave (Route 111)
 City, State: Boxborough, MA
 Client: Nitsch/ B. Zimolka
 Site Code: TBA
 Count Date: Tuesday, October 20, 2020
 Start Time: 7:00 AM
 End Time: 9:00 AM
 Class:



Articulated Trucks

	Paddock Lane					Mass Ave (Route 111)					Cisco Driveway					Mass Ave (Route 111)					Total
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	
7:00 AM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	2
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
7:30 AM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	2
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
Total	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	4	0	0	4	6
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
8:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	2
8:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	0	3	3
Grand Total	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	6	1	0	7	9
Approach %	0.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0	85.7	14.3	0.0		
Total %	0.0	0.0	0.0	0.0	0.0	0.0	22.2	0.0	0.0	22.2	0.0	0.0	0.0	0.0	0.0	0.0	66.7	11.1	0.0	77.8	
Exiting Leg Total	1					6					0					2					9

Peak Hour Analysis from 07:00 AM to 09:00 AM begins at:

7:00 AM	Paddock Lane					Mass Ave (Route 111)					Cisco Driveway					Mass Ave (Route 111)					Total
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	
7:00 AM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	2
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
7:30 AM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	2
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
Total Volume	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	4	0	0	4	6
% Approach Total	0.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0		
PHF	0.000	0.000	0.000	0.000	0.000	0.000	0.500	0.000	0.000	0.500	0.000	0.000	0.000	0.000	0.000	0.000	1.000	0.000	0.000	1.000	0.750
Entering Leg	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	4	0	0	4	6
Exiting Leg	0					4					0					2					6
Total	0					6					0					6					12

PDI File #: 207662 C
 Location: N: Paddock Lane S: Cisco Driveway
 Location: E: Mass Ave (Route 111) W: Mass Ave (Route 111)
 City, State: Boxborough, MA
 Client: Nitsch/ B. Zimolka
 Site Code: TBA
 Count Date: Tuesday, October 20, 2020
 Start Time: 7:00 AM
 End Time: 9:00 AM
 Class:



46 Morton Street, Framingham, MA 01702
 Office: 508-875-0100 Fax: 508-875-0118
 Email: datarequests@pdillc.com

Bicycles (on Roadway and Crosswalks)

	Paddock Lane								Mass Ave (Route 111)								Cisco Driveway								Mass Ave (Route 111)								Total
	from North								from East								from South								from West								
	Right	Thru	Left	U-Turn	CW-EB	CW-WB	Total		Right	Thru	Left	U-Turn	CW-SB	CW-NB	Total		Right	Thru	Left	U-Turn	CW-WB	CW-EB	Total		Right	Thru	Left	U-Turn	CW-NB	CW-SB	Total		
7:00 AM	2	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2	4			
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
7:30 AM	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	1	1			
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
Total	2	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0	0	0	3	5			
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
8:15 AM	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	1	1			
8:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
8:45 AM	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	2	2			
Total	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	3	3			
Grand Total	2	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	2	0	0	0	6	8			
Approach %	100.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	66.7	33.3	0.0	0.0	0.0						
Total %	25.0	0.0	0.0	0.0	0.0	0.0	25.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	50.0	25.0	0.0	0.0	0.0	75.0					
Exiting Leg Total	2							4							0							2							8				

Peak Hour Analysis from 07:00 AM to 09:00 AM begins at:

	Paddock Lane								Mass Ave (Route 111)								Cisco Driveway								Mass Ave (Route 111)								Total
	from North								from East								from South								from West								
	Right	Thru	Left	U-Turn	CW-EB	CW-WB	Total		Right	Thru	Left	U-Turn	CW-SB	CW-NB	Total		Right	Thru	Left	U-Turn	CW-WB	CW-EB	Total		Right	Thru	Left	U-Turn	CW-NB	CW-SB	Total		
7:00 AM	2	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2	4			
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
7:30 AM	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	1	1			
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
Total Volume	2	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0	0	0	3	5			
% Approach Total	100.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	33.3	66.7	0.0	0.0	0.0						
PHF	0.250	0.000	0.000	0.000	0.000	0.000	0.250	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.250	0.250	0.000	0.000	0.000	0.375	0.313				
Entering Leg	2	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0	0	0	3	5			
Exiting Leg	2							1							0							2							5				
Total	4							1							0							5							10				

PDI File #: **207662 C**
 Location: **N: Paddock Lane S: Cisco Driveway**
 Location: **E: Mass Ave (Route 111) W: Mass Ave (Route 111)**
 City, State: **Boxborough, MA**
 Client: **Nitsch/ B. Zimolka**
 Site Code: **TBA**
 Count Date: **Tuesday, October 20, 2020**
 Start Time: **7:00 AM**
 End Time: **9:00 AM**
 Class:



Pedestrians

	Paddock Lane								Mass Ave (Route 111)								Cisco Driveway								Mass Ave (Route 111)								Total
	from North								from East								from South								from West								
	Right	Thru	Left	U-Turn	CW-EB	CW-WB	Total		Right	Thru	Left	U-Turn	CW-SB	CW-NB	Total		Right	Thru	Left	U-Turn	CW-WB	CW-EB	Total		Right	Thru	Left	U-Turn	CW-NB	CW-SB	Total		
7:00 AM	0	0	0	0	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	1	1		
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
7:45 AM	0	0	0	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	1		
Total	0	0	0	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	1	2	2		
8:00 AM	0	0	0	0	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	1	1		
8:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
8:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
8:45 AM	0	0	0	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	1		
Total	0	0	0	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	1	2	2		
Grand Total	0	0	0	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	2	4	4		
Approach %	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	50	50					
Total %	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	50	50	100				
Exiting Leg Total	0								0								0								4								4

Peak Hour Analysis from 07:00 AM to 09:00 AM begins at:

	Paddock Lane								Mass Ave (Route 111)								Cisco Driveway								Mass Ave (Route 111)								Total
	from North								from East								from South								from West								
	Right	Thru	Left	U-Turn	CW-EB	CW-WB	Total		Right	Thru	Left	U-Turn	CW-SB	CW-NB	Total		Right	Thru	Left	U-Turn	CW-WB	CW-EB	Total		Right	Thru	Left	U-Turn	CW-NB	CW-SB	Total		
7:00 AM	0	0	0	0	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	1	1		
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
7:45 AM	0	0	0	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	1		
Total Volume	0	0	0	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	1	2	2		
% Approach Total	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	50.0	50.0				
PHF	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.250	0.250	0.500	0.500			
Entering Leg	0	0	0	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	1	2	2		
Exiting Leg	0								0								0								2								2
Total	0								0								0								4								4

PDI File #: **207662 D**
 Location: **N: Hill Road S: Burroughs Street**
 Location: **E: Mass Ave (Route 111) W: Mass Ave (Route 111)**
 City, State: **Boxborough, MA**
 Client: **Nitsch/ B. Zimolka**
 Site Code: **TBA**
 Count Date: **Tuesday, October 20, 2020**
 Start Time: **7:00 AM**
 End Time: **9:00 AM**
 Class:



Cars and Heavy Vehicles (Combined)

	Hill Road					Mass Ave (Route 111)					Burroughs Street					Mass Ave (Route 111)					Total
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	
7:00 AM	2	0	1	0	3	4	28	0	0	32	0	0	10	0	10	9	67	0	0	76	121
7:15 AM	3	0	0	0	3	5	44	0	0	49	2	0	4	0	6	3	70	2	0	75	133
7:30 AM	3	0	2	0	5	1	37	1	0	39	3	0	10	0	13	3	55	3	0	61	118
7:45 AM	3	0	1	0	4	3	39	0	0	42	1	0	8	0	9	6	63	6	0	75	130
Total	11	0	4	0	15	13	148	1	0	162	6	0	32	0	38	21	255	11	0	287	502
8:00 AM	2	2	3	0	7	3	34	1	0	38	1	2	9	0	12	4	47	3	0	54	111
8:15 AM	5	0	4	0	9	5	28	1	0	34	1	4	7	0	12	5	59	4	0	68	123
8:30 AM	7	0	5	0	12	3	32	3	0	38	1	0	12	0	13	6	42	5	0	53	116
8:45 AM	5	1	4	0	10	6	46	1	0	53	3	1	7	0	11	17	42	2	0	61	135
Total	19	3	16	0	38	17	140	6	0	163	6	7	35	0	48	32	190	14	0	236	485
Grand Total	30	3	20	0	53	30	288	7	0	325	12	7	67	0	86	53	445	25	0	523	987
Approach %	56.6	5.7	37.7	0.0		9.2	88.6	2.2	0.0		14.0	8.1	77.9	0.0		10.1	85.1	4.8	0.0		
Total %	3.0	0.3	2.0	0.0	5.4	3.0	29.2	0.7	0.0	32.9	1.2	0.7	6.8	0.0	8.7	5.4	45.1	2.5	0.0	53.0	
Exiting Leg Total	62					477					63					385					987
Cars	29	3	20	0	52	26	270	6	0	302	9	6	66	0	81	50	427	25	0	502	937
% Cars	96.7	100.0	100.0	0.0	98.1	86.7	93.8	85.7	0.0	92.9	75.0	85.7	98.5	0.0	94.2	94.3	96.0	100.0	0.0	96.0	94.9
Exiting Leg Total	57					456					59					365					937
Heavy Vehicles	1	0	0	0	1	4	18	1	0	23	3	1	1	0	5	3	18	0	0	21	50
% Heavy Vehicles	3.3	0.0	0.0	0.0	1.9	13.3	6.3	14.3	0.0	7.1	25.0	14.3	1.5	0.0	5.8	5.7	4.0	0.0	0.0	4.0	5.1
Exiting Leg Total	5					21					4					20					50

Peak Hour Analysis from 07:00 AM to 09:00 AM begins at:

7:00 AM	Hill Road					Mass Ave (Route 111)					Burroughs Street					Mass Ave (Route 111)					Total
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	
7:00 AM	2	0	1	0	3	4	28	0	0	32	0	0	10	0	10	9	67	0	0	76	121
7:15 AM	3	0	0	0	3	5	44	0	0	49	2	0	4	0	6	3	70	2	0	75	133
7:30 AM	3	0	2	0	5	1	37	1	0	39	3	0	10	0	13	3	55	3	0	61	118
7:45 AM	3	0	1	0	4	3	39	0	0	42	1	0	8	0	9	6	63	6	0	75	130
Total Volume	11	0	4	0	15	13	148	1	0	162	6	0	32	0	38	21	255	11	0	287	502
% Approach Total	73.3	0.0	26.7	0.0		8.0	91.4	0.6	0.0		15.8	0.0	84.2	0.0		7.3	88.9	3.8	0.0		
PHF	0.917	0.000	0.500	0.000	0.750	0.650	0.841	0.250	0.000	0.827	0.500	0.000	0.800	0.000	0.731	0.583	0.911	0.458	0.000	0.944	0.944
Cars	11	0	4	0	15	11	139	1	0	151	4	0	32	0	36	20	247	11	0	278	480
Cars %	100.0	0.0	100.0	0.0	100.0	84.6	93.9	100.0	0.0	93.2	66.7	0.0	100.0	0.0	94.7	95.2	96.9	100.0	0.0	96.9	95.6
Heavy Vehicles	0	0	0	0	0	2	9	0	0	11	2	0	0	0	2	1	8	0	0	9	22
Heavy Vehicles %	0.0	0.0	0.0	0.0	0.0	15.4	6.1	0.0	0.0	6.8	33.3	0.0	0.0	0.0	5.3	4.8	3.1	0.0	0.0	3.1	4.4
Cars Enter Leg	11	0	4	0	15	11	139	1	0	151	4	0	32	0	36	20	247	11	0	278	480
Heavy Enter Leg	0	0	0	0	0	2	9	0	0	11	2	0	0	0	2	1	8	0	0	9	22
Total Entering Leg	11	0	4	0	15	13	148	1	0	162	6	0	32	0	38	21	255	11	0	287	502
Cars Exiting Leg	22					255					21					182					480
Heavy Exiting Leg	2					10					1					9					22
Total Exiting Leg	24					265					22					191					502

PDI File #: **207662 D**
 Location: **N: Hill Road S: Burroughs Street**
 Location: **E: Mass Ave (Route 111) W: Mass Ave (Route 111)**
 City, State: **Boxborough, MA**
 Client: **Nitsch/ B. Zimolka**
 Site Code: **TBA**
 Count Date: **Tuesday, October 20, 2020**
 Start Time: **7:00 AM**
 End Time: **9:00 AM**
 Class:



Cars

	Hill Road					Mass Ave (Route 111)					Burroughs Street					Mass Ave (Route 111)					Total					
	from North					from East					from South					from West										
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total						
7:00 AM	2	0	1	0	3	3	23	0	0	26	0	0	10	0	10	8	66	0	0	74	113					
7:15 AM	3	0	0	0	3	4	42	0	0	46	1	0	4	0	5	3	66	2	0	71	125					
7:30 AM	3	0	2	0	5	1	36	1	0	38	2	0	10	0	12	3	54	3	0	60	115					
7:45 AM	3	0	1	0	4	3	38	0	0	41	1	0	8	0	9	6	61	6	0	73	127					
Total	11	0	4	0	15	11	139	1	0	151	4	0	32	0	36	20	247	11	0	278	480					
8:00 AM	1	2	3	0	6	3	31	1	0	35	1	2	9	0	12	4	46	3	0	53	106					
8:15 AM	5	0	4	0	9	4	25	0	0	29	1	3	7	0	11	4	53	4	0	61	110					
8:30 AM	7	0	5	0	12	3	30	3	0	36	1	0	11	0	12	5	40	5	0	50	110					
8:45 AM	5	1	4	0	10	5	45	1	0	51	2	1	7	0	10	17	41	2	0	60	131					
Total	18	3	16	0	37	15	131	5	0	151	5	6	34	0	45	30	180	14	0	224	457					
Grand Total	29	3	20	0	52	26	270	6	0	302	9	6	66	0	81	50	427	25	0	502	937					
Approach %	55.8	5.8	38.5	0.0		8.6	89.4	2.0	0.0		11.1	7.4	81.5	0.0		10.0	85.1	5.0	0.0							
Total %	3.1	0.3	2.1	0.0	5.5	2.8	28.8	0.6	0.0	32.2	1.0	0.6	7.0	0.0	8.6	5.3	45.6	2.7	0.0	53.6						
Exiting Leg Total						57					456					59					365					937

Peak Hour Analysis from 07:00 AM to 09:00 AM begins at:

	Hill Road					Mass Ave (Route 111)					Burroughs Street					Mass Ave (Route 111)					Total					
	from North					from East					from South					from West										
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total						
7:00 AM	2	0	1	0	3	3	23	0	0	26	0	0	10	0	10	8	66	0	0	74	113					
7:15 AM	3	0	0	0	3	4	42	0	0	46	1	0	4	0	5	3	66	2	0	71	125					
7:30 AM	3	0	2	0	5	1	36	1	0	38	2	0	10	0	12	3	54	3	0	60	115					
7:45 AM	3	0	1	0	4	3	38	0	0	41	1	0	8	0	9	6	61	6	0	73	127					
Total Volume	11	0	4	0	15	11	139	1	0	151	4	0	32	0	36	20	247	11	0	278	480					
% Approach Total	73.3	0.0	26.7	0.0		7.3	92.1	0.7	0.0		11.1	0.0	88.9	0.0		7.2	88.8	4.0	0.0							
PHF	0.917	0.000	0.500	0.000	0.750	0.688	0.827	0.250	0.000	0.821	0.500	0.000	0.800	0.000	0.750	0.625	0.936	0.458	0.000	0.939	0.945					
Entering Leg	11	0	4	0	15	11	139	1	0	151	4	0	32	0	36	20	247	11	0	278	480					
Exiting Leg						22					255					21					182					480
Total						37					406					57					460					960

PDI File #: **207662 D**
 Location: **N: Hill Road S: Burroughs Street**
 Location: **E: Mass Ave (Route 111) W: Mass Ave (Route 111)**
 City, State: **Boxborough, MA**
 Client: **Nitsch/ B. Zimolka**
 Site Code: **TBA**
 Count Date: **Tuesday, October 20, 2020**
 Start Time: **7:00 AM**
 End Time: **9:00 AM**



Heavy Vehicles-Combined (Buses, Single-Unit Trucks, Articulated Trucks)

	Hill Road					Mass Ave (Route 111)					Burroughs Street					Mass Ave (Route 111)					Total
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	
7:00 AM	0	0	0	0	0	1	5	0	0	6	0	0	0	0	0	1	1	0	0	2	8
7:15 AM	0	0	0	0	0	1	2	0	0	3	1	0	0	0	1	0	4	0	0	4	8
7:30 AM	0	0	0	0	0	0	1	0	0	1	1	0	0	0	1	0	1	0	0	1	3
7:45 AM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	2	0	0	2	3
Total	0	0	0	0	0	2	9	0	0	11	2	0	0	0	2	1	8	0	0	9	22
8:00 AM	1	0	0	0	1	0	3	0	0	3	0	0	0	0	0	0	1	0	0	1	5
8:15 AM	0	0	0	0	0	1	3	1	0	5	0	1	0	0	1	1	6	0	0	7	13
8:30 AM	0	0	0	0	0	0	2	0	0	2	0	0	1	0	1	1	2	0	0	3	6
8:45 AM	0	0	0	0	0	1	1	0	0	2	1	0	0	0	1	0	1	0	0	1	4
Total	1	0	0	0	1	2	9	1	0	12	1	1	1	0	3	2	10	0	0	12	28
Grand Total	1	0	0	0	1	4	18	1	0	23	3	1	1	0	5	3	18	0	0	21	50
Approach %	100.0	0.0	0.0	0.0		17.4	78.3	4.3	0.0		60.0	20.0	20.0	0.0		14.3	85.7	0.0	0.0		
Total %	2.0	0.0	0.0	0.0	2.0	8.0	36.0	2.0	0.0	46.0	6.0	2.0	2.0	0.0	10.0	6.0	36.0	0.0	0.0	42.0	
Exiting Leg Total	5					21					4					20					50
Buses	1	0	0	0	1	3	6	0	0	9	2	1	1	0	4	1	3	0	0	4	18
% Buses	100.0	0.0	0.0	0.0	100.0	75.0	33.3	0.0	0.0	39.1	66.7	100.0	100.0	0.0	80.0	33.3	16.7	0.0	0.0	19.0	36.0
Exiting Leg Total	4					5					1					8					18
Single-Unit Trucks	0	0	0	0	0	1	11	1	0	13	1	0	0	0	1	2	10	0	0	12	26
% Single-Unit	0.0	0.0	0.0	0.0	0.0	25.0	61.1	100.0	0.0	56.5	33.3	0.0	0.0	0.0	20.0	66.7	55.6	0.0	0.0	57.1	52.0
Exiting Leg Total	1					11					3					11					26
Articulated Trucks	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	5	0	0	5	6
% Articulated	0.0	0.0	0.0	0.0	0.0	0.0	5.6	0.0	0.0	4.3	0.0	0.0	0.0	0.0	0.0	0.0	27.8	0.0	0.0	23.8	12.0
Exiting Leg Total	0					5					0					1					6

Peak Hour Analysis from 07:00 AM to 09:00 AM begins at:

	Hill Road					Mass Ave (Route 111)					Burroughs Street					Mass Ave (Route 111)					Total
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	
8:00 AM	1	0	0	0	1	0	3	0	0	3	0	0	0	0	0	0	1	0	0	1	5
8:15 AM	0	0	0	0	0	1	3	1	0	5	0	1	0	0	1	1	6	0	0	7	13
8:30 AM	0	0	0	0	0	0	2	0	0	2	0	0	1	0	1	1	2	0	0	3	6
8:45 AM	0	0	0	0	0	1	1	0	0	2	1	0	0	0	1	0	1	0	0	1	4
Total Volume	1	0	0	0	1	2	9	1	0	12	1	1	1	0	3	2	10	0	0	12	28
% Approach Total	100.0	0.0	0.0	0.0		16.7	75.0	8.3	0.0		33.3	33.3	33.3	0.0		16.7	83.3	0.0	0.0		
PHF	0.250	0.000	0.000	0.000	0.250	0.500	0.750	0.250	0.000	0.600	0.250	0.250	0.250	0.000	0.750	0.500	0.417	0.000	0.000	0.429	0.538
Buses	1	0	0	0	1	1	4	0	0	5	0	1	1	0	2	1	3	0	0	4	12
Buses %	100.0	0.0	0.0	0.0	100.0	50.0	44.4	0.0	0.0	41.7	0.0	100.0	100.0	0.0	66.7	50.0	30.0	0.0	0.0	33.3	42.9
Single-Unit Trucks	0	0	0	0	0	1	5	1	0	7	1	0	0	0	1	1	5	0	0	6	14
Single-Unit %	0.0	0.0	0.0	0.0	0.0	50.0	55.6	100.0	0.0	58.3	100.0	0.0	0.0	0.0	33.3	50.0	50.0	0.0	0.0	50.0	50.0
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	2
Articulated %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.0	0.0	0.0	16.7	7.1
Buses	1	0	0	0	1	1	4	0	0	5	0	1	1	0	2	1	3	0	0	4	12
Single-Unit Trucks	0	0	0	0	0	1	5	1	0	7	1	0	0	0	1	1	5	0	0	6	14
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	2
Total Entering Leg	1	0	0	0	1	2	9	1	0	12	1	1	1	0	3	2	10	0	0	12	28
Buses	2					3					1					6					12
Single-Unit Trucks	1					6					2					5					14
Articulated Trucks	0					2					0					0					2
Total Exiting Leg	3					11					3					11					28

PDI File #: **207662 D**
 Location: **N: Hill Road S: Burroughs Street**
 Location: **E: Mass Ave (Route 111) W: Mass Ave (Route 111)**
 City, State: **Boxborough, MA**
 Client: **Nitsch/ B. Zimolka**
 Site Code: **TBA**
 Count Date: **Tuesday, October 20, 2020**
 Start Time: **7:00 AM**
 End Time: **9:00 AM**
 Class:



Buses

	Hill Road					Mass Ave (Route 111)					Burroughs Street					Mass Ave (Route 111)					Total
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	
7:00 AM	0	0	0	0	0	1	2	0	0	3	0	0	0	0	0	0	0	0	0	0	3
7:15 AM	0	0	0	0	0	1	0	0	0	1	1	0	0	0	1	0	0	0	0	0	2
7:30 AM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	1
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	2	2	0	0	4	2	0	0	0	2	0	0	0	0	0	6
8:00 AM	1	0	0	0	1	0	3	0	0	3	0	0	0	0	0	0	0	0	0	0	4
8:15 AM	0	0	0	0	0	1	1	0	0	2	0	1	0	0	1	1	3	0	0	4	7
8:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	1
8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	1	0	0	0	1	1	4	0	0	5	0	1	1	0	2	1	3	0	0	4	12
Grand Total	1	0	0	0	1	3	6	0	0	9	2	1	1	0	4	1	3	0	0	4	18
Approach %	100.0	0.0	0.0	0.0		33.3	66.7	0.0	0.0		50.0	25.0	25.0	0.0		25.0	75.0	0.0	0.0		
Total %	5.6	0.0	0.0	0.0	5.6	16.7	33.3	0.0	0.0	50.0	11.1	5.6	5.6	0.0	22.2	5.6	16.7	0.0	0.0	22.2	
Exiting Leg Total					4					5					1					8	18

Peak Hour Analysis from 07:00 AM to 09:00 AM begins at:

7:30 AM	Hill Road					Mass Ave (Route 111)					Burroughs Street					Mass Ave (Route 111)					Total
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	
7:30 AM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	1
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:00 AM	1	0	0	0	1	0	3	0	0	3	0	0	0	0	0	0	0	0	0	0	4
8:15 AM	0	0	0	0	0	1	1	0	0	2	0	1	0	0	1	1	3	0	0	4	7
Total Volume	1	0	0	0	1	1	4	0	0	5	1	1	0	0	2	1	3	0	0	4	12
% Approach Total	100.0	0.0	0.0	0.0		20.0	80.0	0.0	0.0		50.0	50.0	0.0	0.0		25.0	75.0	0.0	0.0		
PHF	0.250	0.000	0.000	0.000	0.250	0.250	0.333	0.000	0.000	0.417	0.250	0.250	0.000	0.000	0.500	0.250	0.250	0.000	0.000	0.250	0.429
Entering Leg	1	0	0	0	1	1	4	0	0	5	1	1	0	0	2	1	3	0	0	4	12
Exiting Leg					2					4					1					5	12
Total					3					9					3					9	24

PDI File #: **207662 D**
 Location: **N: Hill Road S: Burroughs Street**
 Location: **E: Mass Ave (Route 111) W: Mass Ave (Route 111)**
 City, State: **Boxborough, MA**
 Client: **Nitsch/ B. Zimolka**
 Site Code: **TBA**
 Count Date: **Tuesday, October 20, 2020**
 Start Time: **7:00 AM**
 End Time: **9:00 AM**
 Class:



Single-Unit Trucks

	Hill Road					Mass Ave (Route 111)					Burroughs Street					Mass Ave (Route 111)					Total		
	from North					from East					from South					from West							
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total			
7:00 AM	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	1	1	0	0	2	5		
7:15 AM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	2	0	0	2	3		
7:30 AM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1		
7:45 AM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	2	0	0	2	3		
Total	0	0	0	0	0	0	6	0	0	6	0	0	0	0	0	1	5	0	0	6	12		
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1		
8:15 AM	0	0	0	0	0	0	2	1	0	3	0	0	0	0	0	0	2	0	0	2	5		
8:30 AM	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	1	2	0	0	3	5		
8:45 AM	0	0	0	0	0	1	1	0	0	2	1	0	0	0	1	0	0	0	0	0	3		
Total	0	0	0	0	0	1	5	1	0	7	1	0	0	0	1	1	5	0	0	6	14		
Grand Total	0	0	0	0	0	1	11	1	0	13	1	0	0	0	1	2	10	0	0	12	26		
Approach %	0.0	0.0	0.0	0.0		7.7	84.6	7.7	0.0		100.0	0.0	0.0	0.0		16.7	83.3	0.0	0.0				
Total %	0.0	0.0	0.0	0.0	0.0	3.8	42.3	3.8	0.0	50.0	3.8	0.0	0.0	0.0	3.8	7.7	38.5	0.0	0.0	46.2			
Exiting Leg Total						1					11					3					11		26

Peak Hour Analysis from 07:00 AM to 09:00 AM begins at:

7:45 AM	Hill Road					Mass Ave (Route 111)					Burroughs Street					Mass Ave (Route 111)					Total		
	from North					from East					from South					from West							
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total			
7:45 AM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	2	0	0	2	3		
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1		
8:15 AM	0	0	0	0	0	0	2	1	0	3	0	0	0	0	0	0	2	0	0	2	5		
8:30 AM	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	1	2	0	0	3	5		
Total Volume	0	0	0	0	0	0	5	1	0	6	0	0	0	0	0	1	7	0	0	8	14		
% Approach Total	0.0	0.0	0.0	0.0		0.0	83.3	16.7	0.0		0.0	0.0	0.0	0.0		12.5	87.5	0.0	0.0				
PHF	0.000	0.000	0.000	0.000	0.000	0.000	0.625	0.250	0.000	0.500	0.000	0.000	0.000	0.000	0.000	0.250	0.875	0.000	0.000	0.667	0.700		
Entering Leg	0	0	0	0	0	0	5	1	0	6	0	0	0	0	0	1	7	0	0	8	14		
Exiting Leg						0					7					2					5		
Total						0					13					2					13		28

PDI File #: **207662 D**
 Location: **N: Hill Road S: Burroughs Street**
 Location: **E: Mass Ave (Route 111) W: Mass Ave (Route 111)**
 City, State: **Boxborough, MA**
 Client: **Nitsch/ B. Zimolka**
 Site Code: **TBA**
 Count Date: **Tuesday, October 20, 2020**
 Start Time: **7:00 AM**
 End Time: **9:00 AM**
 Class:



Articulated Trucks

	Hill Road					Mass Ave (Route 111)					Burroughs Street					Mass Ave (Route 111)					Total
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15 AM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	2	0	0	2	3
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	3	0	0	3	4
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
8:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	2
Grand Total	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	5	0	0	5	6
Approach %	0.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0		
Total %	0.0	0.0	0.0	0.0	0.0	0.0	16.7	0.0	0.0	16.7	0.0	0.0	0.0	0.0	0.0	0.0	83.3	0.0	0.0	83.3	
Exiting Leg Total	0					5					0					1					6

Peak Hour Analysis from 07:00 AM to 09:00 AM begins at:

	Hill Road					Mass Ave (Route 111)					Burroughs Street					Mass Ave (Route 111)					Total
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15 AM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	2	0	0	2	3
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Volume	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	3	0	0	3	4
% Approach Total	0.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0		
PHF	0.000	0.000	0.000	0.000	0.000	0.000	0.250	0.000	0.000	0.250	0.000	0.000	0.000	0.000	0.000	0.000	0.375	0.000	0.000	0.375	0.333
Entering Leg	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	3	0	0	3	4
Exiting Leg	0					3					0					1					4
Total	0					4					0					4					8

PDI File #: **207662 E**
 Location: **N: Lynn Street S: I-495 SB Ramps**
 Location: **E: Mass Ave (Route 111) W: Mass Ave (Route 111)**
 City, State: **Boxborough, MA**
 Client: **Nitsch/ B. Zimolka**
 Site Code: **TBA**
 Count Date: **Thursday, October 22, 2020**
 Start Time: **7:00 AM**
 End Time: **9:00 AM**



Cars and Heavy Vehicles (Combined)

	Mass Ave (Route 111)				I-495 SB Ramps				Mass Ave (Route 111)				Total
	from East				from South				from West				
	Thru	Left	U-Turn	Total	Right	Left	U-Turn	Total	Right	Thru	U-Turn	Total	
7:00 AM	38	13	0	51	9	36	0	45	21	53	0	74	170
7:15 AM	35	18	0	53	20	38	0	58	17	66	0	83	194
7:30 AM	52	13	0	65	15	43	0	58	28	62	0	90	213
7:45 AM	41	8	0	49	25	57	0	82	21	62	0	83	214
Total	166	52	0	218	69	174	0	243	87	243	0	330	791
8:00 AM	44	15	0	59	10	54	0	64	17	57	0	74	197
8:15 AM	39	9	0	48	11	45	0	56	20	61	0	81	185
8:30 AM	44	26	0	70	16	48	0	64	19	39	0	58	192
8:45 AM	40	11	0	51	10	51	0	61	17	66	0	83	195
Total	167	61	0	228	47	198	0	245	73	223	0	296	769
Grand Total	333	113	0	446	116	372	0	488	160	466	0	626	1560
Approach %	74.7	25.3	0.0		23.8	76.2	0.0		25.6	74.4	0.0		
Total %	21.3	7.2	0.0	28.6	7.4	23.8	0.0	31.3	10.3	29.9	0.0	40.1	
Exiting Leg Total				582				273				705	1560
Cars	305	112	0	417	108	351	0	459	151	436	0	587	1463
% Cars	91.6	99.1	0.0	93.5	93.1	94.4	0.0	94.1	94.4	93.6	0.0	93.8	93.8
Exiting Leg Total				544				263				656	1463
Heavy Vehicles	28	1	0	29	8	21	0	29	9	30	0	39	97
% Heavy Vehicles	8.4	0.9	0.0	6.5	6.9	5.6	0.0	5.9	5.6	6.4	0.0	6.2	6.2
Exiting Leg Total				38				10				49	97

Peak Hour Analysis from 07:00 AM to 09:00 AM begins at:

	Mass Ave (Route 111)				I-495 SB Ramps				Mass Ave (Route 111)				Total
	from East				from South				from West				
	Thru	Left	U-Turn	Total	Right	Left	U-Turn	Total	Right	Thru	U-Turn	Total	
7:15 AM	35	18	0	53	20	38	0	58	17	66	0	83	194
7:30 AM	52	13	0	65	15	43	0	58	28	62	0	90	213
7:45 AM	41	8	0	49	25	57	0	82	21	62	0	83	214
8:00 AM	44	15	0	59	10	54	0	64	17	57	0	74	197
Total Volume	172	54	0	226	70	192	0	262	83	247	0	330	818
% Approach Total	76.1	23.9	0.0		26.7	73.3	0.0		25.2	74.8	0.0		
PHF	0.827	0.750	0.000	0.869	0.700	0.842	0.000	0.799	0.741	0.936	0.000	0.917	0.956
Cars	158	54	0	212	65	182	0	247	79	224	0	303	762
Cars %	91.9	100.0	0.0	93.8	92.9	94.8	0.0	94.3	95.2	90.7	0.0	91.8	93.2
Heavy Vehicles	14	0	0	14	5	10	0	15	4	23	0	27	56
Heavy Vehicles %	8.1	0.0	0.0	6.2	7.1	5.2	0.0	5.7	4.8	9.3	0.0	8.2	6.8
Cars Enter Leg	158	54	0	212	65	182	0	247	79	224	0	303	762
Heavy Enter Leg	14	0	0	14	5	10	0	15	4	23	0	27	56
Total Entering Leg	172	54	0	226	70	192	0	262	83	247	0	330	818
Cars Exiting Leg				289				133				340	762
Heavy Exiting Leg				28				4				24	56
Total Exiting Leg				317				137				364	818

PDI File #: **207662 E**
 Location: **N: Lynn Street S: I-495 SB Ramps**
 Location: **E: Mass Ave (Route 111) W: Mass Ave (Route 111)**
 City, State: **Boxborough, MA**
 Client: **Nitsch/ B. Zimolka**
 Site Code: **TBA**
 Count Date: **Thursday, October 22, 2020**
 Start Time: **7:00 AM**
 End Time: **9:00 AM**
 Class:



Cars

	Mass Ave (Route 111)				I-495 SB Ramps				Mass Ave (Route 111)				Total
	from East				from South				from West				
	Thru	Left	U-Turn	Total	Right	Left	U-Turn	Total	Right	Thru	U-Turn	Total	
7:00 AM	36	13	0	49	8	34	0	42	21	50	0	71	162
7:15 AM	32	18	0	50	18	36	0	54	16	57	0	73	177
7:30 AM	51	13	0	64	14	42	0	56	25	59	0	84	204
7:45 AM	37	8	0	45	23	56	0	79	21	55	0	76	200
Total	156	52	0	208	63	168	0	231	83	221	0	304	743
8:00 AM	38	15	0	53	10	48	0	58	17	53	0	70	181
8:15 AM	36	8	0	44	10	45	0	55	18	59	0	77	176
8:30 AM	39	26	0	65	15	43	0	58	18	39	0	57	180
8:45 AM	36	11	0	47	10	47	0	57	15	64	0	79	183
Total	149	60	0	209	45	183	0	228	68	215	0	283	720
Grand Total	305	112	0	417	108	351	0	459	151	436	0	587	1463
Approach %	73.1	26.9	0.0		23.5	76.5	0.0		25.7	74.3	0.0		
Total %	20.8	7.7	0.0	28.5	7.4	24.0	0.0	31.4	10.3	29.8	0.0	40.1	
Exiting Leg Total				544				263				656	1463

Peak Hour Analysis from 07:00 AM to 09:00 AM begins at:

	Mass Ave (Route 111)				I-495 SB Ramps				Mass Ave (Route 111)				Total
	from East				from South				from West				
	Thru	Left	U-Turn	Total	Right	Left	U-Turn	Total	Right	Thru	U-Turn	Total	
7:15 AM	32	18	0	50	18	36	0	54	16	57	0	73	177
7:30 AM	51	13	0	64	14	42	0	56	25	59	0	84	204
7:45 AM	37	8	0	45	23	56	0	79	21	55	0	76	200
8:00 AM	38	15	0	53	10	48	0	58	17	53	0	70	181
Total Volume	158	54	0	212	65	182	0	247	79	224	0	303	762
% Approach Total	74.5	25.5	0.0		26.3	73.7	0.0		26.1	73.9	0.0		
PHF	0.775	0.750	0.000	0.828	0.707	0.813	0.000	0.782	0.790	0.949	0.000	0.902	0.934
Entering Leg	158	54	0	212	65	182	0	247	79	224	0	303	762
Exiting Leg				289				133				340	762
Total				501				380				643	1524

PDI File #: 207662 E
 Location: N: Lynn Street S: I-495 SB Ramps
 Location: E: Mass Ave (Route 111) W: Mass Ave (Route 111)
 City, State: Boxborough, MA
 Client: Nitsch/ B. Zimolka
 Site Code: TBA
 Count Date: Thursday, October 22, 2020
 Start Time: 7:00 AM
 End Time: 9:00 AM



Class: Heavy Vehicles-Combined (Buses, Single-Unit Trucks, Articulated Trucks)

	Mass Ave (Route 111)				I-495 SB Ramps				Mass Ave (Route 111)				Total
	from East				from South				from West				
	Thru	Left	U-Turn	Total	Right	Left	U-Turn	Total	Right	Thru	U-Turn	Total	
7:00 AM	2	0	0	2	1	2	0	3	0	3	0	3	8
7:15 AM	3	0	0	3	2	2	0	4	1	9	0	10	17
7:30 AM	1	0	0	1	1	1	0	2	3	3	0	6	9
7:45 AM	4	0	0	4	2	1	0	3	0	7	0	7	14
Total	10	0	0	10	6	6	0	12	4	22	0	26	48
8:00 AM	6	0	0	6	0	6	0	6	0	4	0	4	16
8:15 AM	3	1	0	4	1	0	0	1	2	2	0	4	9
8:30 AM	5	0	0	5	1	5	0	6	1	0	0	1	12
8:45 AM	4	0	0	4	0	4	0	4	2	2	0	4	12
Total	18	1	0	19	2	15	0	17	5	8	0	13	49
Grand Total	28	1	0	29	8	21	0	29	9	30	0	39	97
Approach %	96.6	3.4	0.0		27.6	72.4	0.0		23.1	76.9	0.0		
Total %	28.9	1.0	0.0	29.9	8.2	21.6	0.0	29.9	9.3	30.9	0.0	40.2	
Exiting Leg Total				38				10				49	97
Buses	7	0	0	7	1	1	0	2	1	3	0	4	13
% Buses	25.0	0.0	0.0	24.1	12.5	4.8	0.0	6.9	11.1	10.0	0.0	10.3	13.4
Exiting Leg Total				4				1				8	13
Single-Unit Trucks	16	1	0	17	4	15	0	19	4	18	0	22	58
% Single-Unit	57.1	100.0	0.0	58.6	50.0	71.4	0.0	65.5	44.4	60.0	0.0	56.4	59.8
Exiting Leg Total				22				5				31	58
Articulated Trucks	5	0	0	5	3	5	0	8	4	9	0	13	26
% Articulated	17.9	0.0	0.0	17.2	37.5	23.8	0.0	27.6	44.4	30.0	0.0	33.3	26.8
Exiting Leg Total				12				4				10	26

Peak Hour Analysis from 07:00 AM to 09:00 AM begins at:

	Mass Ave (Route 111)				I-495 SB Ramps				Mass Ave (Route 111)				Total
	from East				from South				from West				
	Thru	Left	U-Turn	Total	Right	Left	U-Turn	Total	Right	Thru	U-Turn	Total	
7:15 AM	3	0	0	3	2	2	0	4	1	9	0	10	17
7:30 AM	1	0	0	1	1	1	0	2	3	3	0	6	9
7:45 AM	4	0	0	4	2	1	0	3	0	7	0	7	14
8:00 AM	6	0	0	6	0	6	0	6	0	4	0	4	16
Total Volume	14	0	0	14	5	10	0	15	4	23	0	27	56
% Approach Total	100.0	0.0	0.0		33.3	66.7	0.0		14.8	85.2	0.0		
PHF	0.583	0.000	0.000	0.583	0.625	0.417	0.000	0.625	0.333	0.639	0.000	0.675	0.824
Buses	5	0	0	5	1	1	0	2	1	2	0	3	10
Buses %	35.7	0.0	0.0	35.7	20.0	10.0	0.0	13.3	25.0	8.7	0.0	11.1	17.9
Single-Unit Trucks	8	0	0	8	2	7	0	9	2	15	0	17	34
Single-Unit %	57.1	0.0	0.0	57.1	40.0	70.0	0.0	60.0	50.0	65.2	0.0	63.0	60.7
Articulated Trucks	1	0	0	1	2	2	0	4	1	6	0	7	12
Articulated %	7.1	0.0	0.0	7.1	40.0	20.0	0.0	26.7	25.0	26.1	0.0	25.9	21.4
Buses	5	0	0	5	1	1	0	2	1	2	0	3	10
Single-Unit Trucks	8	0	0	8	2	7	0	9	2	15	0	17	34
Articulated Trucks	1	0	0	1	2	2	0	4	1	6	0	7	12
Total Entering Leg	14	0	0	14	5	10	0	15	4	23	0	27	56
Buses				3				1				6	10
Single-Unit Trucks				17				2				15	34
Articulated Trucks				8				1				3	12
Total Exiting Leg				28				4				24	56

PDI File #: **207662 E**
 Location: **N: Lynn Street S: I-495 SB Ramps**
 Location: **E: Mass Ave (Route 111) W: Mass Ave (Route 111)**
 City, State: **Boxborough, MA**
 Client: **Nitsch/ B. Zimolka**
 Site Code: **TBA**
 Count Date: **Thursday, October 22, 2020**
 Start Time: **7:00 AM**
 End Time: **9:00 AM**
 Class:



Buses

	Mass Ave (Route 111)				I-495 SB Ramps				Mass Ave (Route 111)				Total
	from East				from South				from West				
	Thru	Left	U-Turn	Total	Right	Left	U-Turn	Total	Right	Thru	U-Turn	Total	
7:00 AM	1	0	0	1	0	0	0	0	0	0	0	0	1
7:15 AM	1	0	0	1	1	0	0	1	1	0	0	1	3
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	2	0	0	2	1	0	0	1	1	0	0	1	4
8:00 AM	4	0	0	4	0	1	0	1	0	2	0	2	7
8:15 AM	1	0	0	1	0	0	0	0	0	1	0	1	2
8:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	5	0	0	5	0	1	0	1	0	3	0	3	9
Grand Total	7	0	0	7	1	1	0	2	1	3	0	4	13
Approach %	100.0	0.0	0.0		50.0	50.0	0.0		25.0	75.0	0.0		
Total %	53.8	0.0	0.0	53.8	7.7	7.7	0.0	15.4	7.7	23.1	0.0	30.8	
Exiting Leg Total				4				1				8	13

Peak Hour Analysis from 07:00 AM to 09:00 AM begins at:

7:15 AM	Mass Ave (Route 111)				I-495 SB Ramps				Mass Ave (Route 111)				Total
	from East				from South				from West				
	Thru	Left	U-Turn	Total	Right	Left	U-Turn	Total	Right	Thru	U-Turn	Total	
7:15 AM	1	0	0	1	1	0	0	1	1	0	0	1	3
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
8:00 AM	4	0	0	4	0	1	0	1	0	2	0	2	7
Total Volume	5	0	0	5	1	1	0	2	1	2	0	3	10
% Approach Total	100.0	0.0	0.0		50.0	50.0	0.0		33.3	66.7	0.0		
PHF	0.313	0.000	0.000	0.313	0.250	0.250	0.000	0.500	0.250	0.250	0.000	0.375	0.357
Entering Leg	5	0	0	5	1	1	0	2	1	2	0	3	10
Exiting Leg				3				1				6	10
Total				8				3				9	20

PDI File #: **207662 E**
 Location: **N: Lynn Street S: I-495 SB Ramps**
 Location: **E: Mass Ave (Route 111) W: Mass Ave (Route 111)**
 City, State: **Boxborough, MA**
 Client: **Nitsch/ B. Zimolka**
 Site Code: **TBA**
 Count Date: **Thursday, October 22, 2020**
 Start Time: **7:00 AM**
 End Time: **9:00 AM**
 Class:



Single-Unit Trucks

	Mass Ave (Route 111)				I-495 SB Ramps				Mass Ave (Route 111)				Total
	from East				from South				from West				
	Thru	Left	U-Turn	Total	Right	Left	U-Turn	Total	Right	Thru	U-Turn	Total	
7:00 AM	1	0	0	1	0	1	0	1	0	2	0	2	4
7:15 AM	2	0	0	2	0	2	0	2	0	7	0	7	11
7:30 AM	1	0	0	1	1	1	0	2	2	1	0	3	6
7:45 AM	3	0	0	3	1	1	0	2	0	5	0	5	10
Total	7	0	0	7	2	5	0	7	2	15	0	17	31
8:00 AM	2	0	0	2	0	3	0	3	0	2	0	2	7
8:15 AM	1	1	0	2	1	0	0	1	1	1	0	2	5
8:30 AM	4	0	0	4	1	4	0	5	1	0	0	1	10
8:45 AM	2	0	0	2	0	3	0	3	0	0	0	0	5
Total	9	1	0	10	2	10	0	12	2	3	0	5	27
Grand Total	16	1	0	17	4	15	0	19	4	18	0	22	58
Approach %	94.1	5.9	0.0		21.1	78.9	0.0		18.2	81.8	0.0		
Total %	27.6	1.7	0.0	29.3	6.9	25.9	0.0	32.8	6.9	31.0	0.0	37.9	
Exiting Leg Total				22				5				31	58

Peak Hour Analysis from 07:00 AM to 09:00 AM begins at:

7:15 AM	Mass Ave (Route 111)				I-495 SB Ramps				Mass Ave (Route 111)				Total
	from East				from South				from West				
	Thru	Left	U-Turn	Total	Right	Left	U-Turn	Total	Right	Thru	U-Turn	Total	
7:15 AM	2	0	0	2	0	2	0	2	0	7	0	7	11
7:30 AM	1	0	0	1	1	1	0	2	2	1	0	3	6
7:45 AM	3	0	0	3	1	1	0	2	0	5	0	5	10
8:00 AM	2	0	0	2	0	3	0	3	0	2	0	2	7
Total Volume	8	0	0	8	2	7	0	9	2	15	0	17	34
% Approach Total	100.0	0.0	0.0		22.2	77.8	0.0		11.8	88.2	0.0		
PHF	0.667	0.000	0.000	0.667	0.500	0.583	0.000	0.750	0.250	0.536	0.000	0.607	0.773
Entering Leg	8	0	0	8	2	7	0	9	2	15	0	17	34
Exiting Leg				17				2				15	34
Total				25				11				32	68

PDI File #: **207662 E**
 Location: **N: Lynn Street S: I-495 SB Ramps**
 Location: **E: Mass Ave (Route 111) W: Mass Ave (Route 111)**
 City, State: **Boxborough, MA**
 Client: **Nitsch/ B. Zimolka**
 Site Code: **TBA**
 Count Date: **Thursday, October 22, 2020**
 Start Time: **7:00 AM**
 End Time: **9:00 AM**
 Class:



Articulated Trucks

	Mass Ave (Route 111)				I-495 SB Ramps				Mass Ave (Route 111)				Total
	from East				from South				from West				
	Thru	Left	U-Turn	Total	Right	Left	U-Turn	Total	Right	Thru	U-Turn	Total	
7:00 AM	0	0	0	0	1	1	0	2	0	1	0	1	3
7:15 AM	0	0	0	0	1	0	0	1	0	2	0	2	3
7:30 AM	0	0	0	0	0	0	0	0	1	2	0	3	3
7:45 AM	1	0	0	1	1	0	0	1	0	2	0	2	4
Total	1	0	0	1	3	1	0	4	1	7	0	8	13
8:00 AM	0	0	0	0	0	2	0	2	0	0	0	0	2
8:15 AM	1	0	0	1	0	0	0	0	1	0	0	1	2
8:30 AM	1	0	0	1	0	1	0	1	0	0	0	0	2
8:45 AM	2	0	0	2	0	1	0	1	2	2	0	4	7
Total	4	0	0	4	0	4	0	4	3	2	0	5	13
Grand Total	5	0	0	5	3	5	0	8	4	9	0	13	26
Approach %	100.0	0.0	0.0		37.5	62.5	0.0		30.8	69.2	0.0		
Total %	19.2	0.0	0.0	19.2	11.5	19.2	0.0	30.8	15.4	34.6	0.0	50.0	
Exiting Leg Total				12				4				10	26

Peak Hour Analysis from 07:00 AM to 09:00 AM begins at:

7:00 AM	Mass Ave (Route 111)				I-495 SB Ramps				Mass Ave (Route 111)				Total
	from East				from South				from West				
	Thru	Left	U-Turn	Total	Right	Left	U-Turn	Total	Right	Thru	U-Turn	Total	
7:00 AM	0	0	0	0	1	1	0	2	0	1	0	1	3
7:15 AM	0	0	0	0	1	0	0	1	0	2	0	2	3
7:30 AM	0	0	0	0	0	0	0	0	1	2	0	3	3
7:45 AM	1	0	0	1	1	0	0	1	0	2	0	2	4
Total Volume	1	0	0	1	3	1	0	4	1	7	0	8	13
% Approach Total	100.0	0.0	0.0		75.0	25.0	0.0		12.5	87.5	0.0		
PHF	0.250	0.000	0.000	0.250	0.750	0.250	0.000	0.500	0.250	0.875	0.000	0.667	0.813
Entering Leg	1	0	0	1	3	1	0	4	1	7	0	8	13
Exiting Leg				10				1				2	13
Total				11				5				10	26

PDI File #: 207662 E
 Location: N: Lynn Street S: I-495 SB Ramps
 Location: E: Mass Ave (Route 111) W: Mass Ave (Route 111)
 City, State: Boxborough, MA
 Client: Nitsch/ B. Zimolka
 Site Code: TBA



46 Morton Street, Framingham, MA 01702
 Office: 508-875-0100 Fax: 508-875-0118
 Email: datarequests@pdillc.com

Count Date: Thursday, October 22, 2020
 Start Time: 7:00 AM
 End Time: 9:00 AM

Class: **Bicycles (on Roadway and Crosswalks)**

	Mass Ave (Route 111)						I-495 SB Ramps						Mass Ave (Route 111)						Total
	from East						from South						from West						
	Thru	Left	U-Turn	CW-SB	CW-NB	Total	Right	Left	U-Turn	CW-WB	CW-EB	Total	Right	Thru	U-Turn	CW-NB	CW-SB	Total	
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1
8:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1
8:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1
8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	3	3
Grand Total	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	4	4
Approach %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0
Total %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	100.0	0.0
Exiting Leg Total	4						0						0						4

Peak Hour Analysis from 07:00 AM to 09:00 AM begins at:

7:45 AM	Mass Ave (Route 111)						I-495 SB Ramps						Mass Ave (Route 111)						Total
	from East						from South						from West						
	Thru	Left	U-Turn	CW-SB	CW-NB	Total	Right	Left	U-Turn	CW-WB	CW-EB	Total	Right	Thru	U-Turn	CW-NB	CW-SB	Total	
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1
8:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1
8:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1
Total Volume	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	4	4
% Approach Total	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0
PHF	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.000	0.000	0.000	0.000	1.000	1.000
Entering Leg	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	4	4
Exiting Leg	4						0						0						4
Total	4						0						4						8

PDI File #: **207662 E**
 Location: **N: Lynn Street S: I-495 SB Ramps**
 Location: **E: Mass Ave (Route 111) W: Mass Ave (Route 111)**
 City, State: **Boxborough, MA**
 Client: **Nitsch/ B. Zimolka**
 Site Code: **TBA**
 Count Date: **Thursday, October 22, 2020**
 Start Time: **7:00 AM**
 End Time: **9:00 AM**
 Class:



Pedestrians

	Mass Ave (Route 111)						I-495 SB Ramps						Mass Ave (Route 111)						Total
	from East						from South						from West						
	Thru	Left	U-Turn	CW-SB	CW-NB	Total	Right	Left	U-Turn	CW-WB	CW-EB	Total	Right	Thru	U-Turn	CW-NB	CW-SB	Total	
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Approach %	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total %	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Exiting Leg Total	0						0						0						0

Peak Hour Analysis from 07:00 AM to 09:00 AM begins at:

	Mass Ave (Route 111)						I-495 SB Ramps						Mass Ave (Route 111)						Total
	from East						from South						from West						
	Thru	Left	U-Turn	CW-SB	CW-NB	Total	Right	Left	U-Turn	CW-WB	CW-EB	Total	Right	Thru	U-Turn	CW-NB	CW-SB	Total	
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Volume	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Approach Total	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PHF	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Entering Leg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Exiting Leg	0						0						0						0
Total	0						0						0						0

Appendix B

2014 Raw Traffic Counts & 2007 Manual Traffic Counts

Massachusetts Avenue (Route 111) between
Hill Road and Cisco East Driveway
City, State: Boxborough, MA
Client: VHB/ V. Kalikiri



PRECISION
D A T A
INDUSTRIES, LLC
P.O. Box 301 Berlin, MA 01503
Office: 508.481.3999 Fax: 508.545.1234
Email: datarequests@pdillc.com

144204 A Volume
Site Code: TBA

Start Time	EB		WB		Combin ed		19-Nov-14 Wed
	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	
12:00	5	68	4	89	9	157	
12:15	3	84	5	50	8	134	
12:30	1	61	1	69	2	130	
12:45	0	46	259	0	10	58	266
01:00	4	56	3	66	7	122	19
01:15	0	55	1	75	1	130	
01:30	0	69	0	57	0	126	
01:45	1	65	245	0	4	73	271
02:00	0	63	0	64	0	127	9
02:15	0	48	1	57	1	105	
02:30	2	76	1	82	3	158	
02:45	0	62	249	0	2	81	284
03:00	2	73	0	101	2	174	4
03:15	1	79	2	81	3	160	
03:30	0	87	3	79	3	166	
03:45	1	68	307	1	6	102	363
04:00	0	103	0	108	0	211	10
04:15	1	92	2	108	3	200	
04:30	2	71	1	103	3	174	
04:45	4	78	344	1	4	97	416
05:00	8	106	3	122	11	228	11
05:15	8	111	5	108	13	219	
05:30	15	98	14	108	29	206	
05:45	29	115	430	15	37	91	429
06:00	28	89	22	83	50	172	97
06:15	26	60	30	81	56	141	
06:30	65	78	51	70	116	148	
06:45	81	79	306	55	158	70	304
07:00	76	60	72	61	148	121	358
07:15	82	53	106	49	188	102	
07:30	97	34	95	51	192	85	
07:45	107	35	182	97	370	52	213
08:00	105	21	88	33	193	54	732
08:15	96	41	82	54	178	95	
08:30	74	36	91	31	165	67	
08:45	100	375	28	126	78	339	23
09:00	69	32	81	42	150	74	141
09:15	62	17	69	34	131	51	178
09:30	54	16	81	20	135	36	
09:45	46	231	9	74	40	271	8
10:00	41	9	62	11	103	20	104
10:15	42	11	44	10	86	21	86
10:30	38	9	40	12	78	21	103
10:45	49	170	4	33	38	184	6
11:00	37	3	49	12	86	15	39
11:15	58	4	54	4	112	8	87
11:30	57	4	56	7	113	11	354
11:45	83	235	2	13	69	228	7
					30	152	463
Total	1660	2568	1613	2860	3273	5428	
Percent	50.7%	47.3%	49.3%	52.7%			
Day Total		4228		4473		8701	
Peak	07:30	-	05:00	-	07:15	-	05:00
Vol.	405	-	430	-	386	-	859
P.H.F.	0.946	-	0.935	-	0.910	-	0.942

Massachusetts Avenue (Route 111) between
Hill Road and Cisco East Driveway
City, State: Boxborough, MA
Client: VHB/ V. Kalikiri



PRECISION
DATA
INDUSTRIES, LLC
P.O. Box 301 Berlin, MA 01503
Office: 508.481.3999 Fax: 508.545.1234
Email: datarequests@pdillc.com

144204 A Volume
Site Code: TBA

Start Time	EB		WB		Combin ed		20-Nov-14 Thu	
	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.		
12:00	3	78	3	62	6	140		
12:15	1	66	2	63	3	129		
12:30	3	61	1	89	4	150		
12:45	1	53	258	3	9	70	284	
01:00	1	55		2	74	3	129	
01:15	3	62		0	66	3	128	
01:30	0	48		1	66	1	114	
01:45	0	59	224	1	4	51	257	
02:00	0	41		0	53	0	94	
02:15	2	52		1	54	3	106	
02:30	1	58		2	70	3	128	
02:45	0	3	52	203	0	3	86	263
03:00	0	63		0	96	0	159	
03:15	1	79		3	77	4	156	
03:30	2	82		1	89	3	171	
03:45	1	4	64	288	4	8	97	359
04:00	2	84		1	103	3	187	
04:15	4	67		1	95	5	162	
04:30	1	84		2	95	3	179	
04:45	6	13	86	321	1	5	108	401
05:00	6	102		1	107	7	209	
05:15	7	99		6	105	13	204	
05:30	18	100		12	100	30	200	
05:45	27	58	101	402	24	43	118	430
06:00	30	94		17	84	47	178	
06:15	34	62		26	65	60	127	
06:30	61	69		39	64	100	133	
06:45	75	200	49	274	50	132	52	265
07:00	71	62		76	61	147	123	
07:15	102	60		104	50	206	110	
07:30	97	30		89	45	186	75	
07:45	96	366	48	200	92	361	47	203
08:00	103	30		91	37	194	67	
08:15	104	19		94	38	198	57	
08:30	92	31		98	26	190	57	
08:45	85	384	27	107	83	366	19	120
09:00	70	23		79	22	149	45	
09:15	48	28		71	29	119	57	
09:30	58	22		63	25	121	47	
09:45	58	234	13	86	64	277	20	96
10:00	37	15		52	20	89	35	
10:15	53	8		42	9	95	17	
10:30	44	13		42	16	86	29	
10:45	56	190	9	45	53	189	16	61
11:00	46	7		42	8	88	15	
11:15	51	4		45	8	96	12	
11:30	59	2		55	5	114	7	
11:45	61	217	4	17	55	197	5	26
Total	1681	2425	1594	2765	3275	5190		
Percent	51.3%	46.7%	48.7%	53.3%				
Day Total		4106		4359		8465		
Peak Vol.	07:30	-	05:00	-	07:15	-	05:00	-
P.H.F.	400	-	402	-	376	-	430	-
	0.962	-	0.985	-	0.904	-	0.911	-
							0.939	
							0.950	

Massachusetts Avenue (Route 111) between
Hill Road and Cisco East Driveway
City, State: Boxborough, MA
Client: VHB/ V. Kalikiri



PRECISION
D A T A
INDUSTRIES, LLC

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Email: datarequests@pdillc.com

144204 A Class
Site Code: TBA

EB

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Total
11/19/1														
4	0	9	0	0	0	0	0	0	0	0	0	0	0	9
01:00	0	5	0	0	0	0	0	0	0	0	0	0	0	5
02:00	0	2	0	0	0	0	0	0	0	0	0	0	0	2
03:00	0	3	0	0	0	0	0	1	0	0	0	0	0	4
04:00	0	4	2	0	1	0	0	0	0	0	0	0	0	7
05:00	0	45	10	0	4	0	0	1	0	0	0	0	0	60
06:00	3	154	38	0	4	0	0	1	0	0	0	0	0	200
07:00	4	290	50	2	14	0	0	2	0	0	0	0	0	362
08:00	5	314	29	3	16	2	1	5	0	0	0	0	0	375
09:00	3	173	41	1	12	0	0	1	0	0	0	0	0	231
10:00	4	129	20	1	14	0	0	2	0	0	0	0	0	170
11:00	0	179	46	2	6	0	1	1	0	0	0	0	0	235
12 PM	2	205	39	1	11	0	0	1	0	0	0	0	0	259
13:00	4	192	34	3	10	0	0	2	0	0	0	0	0	245
14:00	3	204	31	1	10	0	0	0	0	0	0	0	0	249
15:00	3	254	34	1	12	1	0	2	0	0	0	0	0	307
16:00	2	296	41	0	5	0	0	0	0	0	0	0	0	344
17:00	12	374	33	1	10	0	0	0	0	0	0	0	0	430
18:00	1	283	21	0	1	0	0	0	0	0	0	0	0	306
19:00	2	163	13	0	3	0	0	1	0	0	0	0	0	182
20:00	0	114	12	0	0	0	0	0	0	0	0	0	0	126
21:00	1	70	3	0	0	0	0	0	0	0	0	0	0	74
22:00	0	31	2	0	0	0	0	0	0	0	0	0	0	33
23:00	0	12	0	0	1	0	0	0	0	0	0	0	0	13
Total	49	3505	499	16	134	3	2	20	0	0	0	0	0	4228
Percent	1.2%	82.9%	11.8%	0.4%	3.2%	0.1%	0.0%	0.5%	0.0%	0.0%	0.0%	0.0%	0.0%	
AM Peak	08:00	08:00	07:00	08:00	08:00	08:00	08:00	08:00						08:00
Vol.	5	314	50	3	16	2	1	5						375
PM Peak	17:00	17:00	16:00	13:00	15:00	15:00		13:00						17:00
Vol.	12	374	41	3	12	1		2						430

Massachusetts Avenue (Route 111) between
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144204 A Class
Site Code: TBA

EB

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Total
11/20/1														
4	0	6	2	0	0	0	0	0	0	0	0	0	0	8
01:00	0	2	2	0	0	0	0	0	0	0	0	0	0	4
02:00	0	2	0	0	1	0	0	0	0	0	0	0	0	3
03:00	0	4	0	0	0	0	0	0	0	0	0	0	0	4
04:00	0	8	3	0	2	0	0	0	0	0	0	0	0	13
05:00	0	43	10	0	5	0	0	0	0	0	0	0	0	58
06:00	0	153	41	0	6	0	0	0	0	0	0	0	0	200
07:00	1	285	57	3	17	2	0	1	0	0	0	0	0	366
08:00	6	321	39	4	10	1	0	3	0	0	0	0	0	384
09:00	4	179	38	4	8	0	0	1	0	0	0	0	0	234
10:00	1	142	35	0	11	0	0	1	0	0	0	0	0	190
11:00	2	165	36	1	12	0	0	1	0	0	0	0	0	217
12 PM	2	201	33	3	13	1	0	5	0	0	0	0	0	258
13:00	3	184	26	1	10	0	0	0	0	0	0	0	0	224
14:00	2	155	33	0	12	0	0	1	0	0	0	0	0	203
15:00	3	241	36	0	6	0	0	2	0	0	0	0	0	288
16:00	4	278	30	2	7	0	0	0	0	0	0	0	0	321
17:00	4	363	32	0	3	0	0	0	0	0	0	0	0	402
18:00	3	254	12	0	5	0	0	0	0	0	0	0	0	274
19:00	2	184	12	0	2	0	0	0	0	0	0	0	0	200
20:00	0	96	8	0	3	0	0	0	0	0	0	0	0	107
21:00	0	82	4	0	0	0	0	0	0	0	0	0	0	86
22:00	0	41	4	0	0	0	0	0	0	0	0	0	0	45
23:00	0	14	2	0	1	0	0	0	0	0	0	0	0	17
Total	37	3403	495	18	134	4	0	15	0	0	0	0	0	4106
Percent	0.9%	82.9%	12.1%	0.4%	3.3%	0.1%	0.0%	0.4%	0.0%	0.0%	0.0%	0.0%	0.0%	
AM Peak	08:00	08:00	07:00	08:00	07:00	07:00		08:00						08:00
Vol.	6	321	57	4	17	2		3						384
PM Peak	16:00	17:00	15:00	12:00	12:00	12:00		12:00						17:00
Vol.	4	363	36	3	13	1		5						402

Massachusetts Avenue (Route 111) between
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144204 A Class
Site Code: TBA

WB

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Total
11/19/1														
4	0	8	2	0	0	0	0	0	0	0	0	0	0	10
01:00	0	4	0	0	0	0	0	0	0	0	0	0	0	4
02:00	0	2	0	0	0	0	0	0	0	0	0	0	0	2
03:00	0	4	0	1	1	0	0	0	0	0	0	0	0	6
04:00	0	2	1	0	1	0	0	0	0	0	0	0	0	4
05:00	0	24	10	0	3	0	0	0	0	0	0	0	0	37
06:00	1	112	31	4	9	0	0	1	0	0	0	0	0	158
07:00	7	304	44	2	13	0	0	0	0	0	0	0	0	370
08:00	3	253	55	4	23	0	0	1	0	0	0	0	0	339
09:00	1	194	55	1	19	0	0	1	0	0	0	0	0	271
10:00	1	125	34	1	20	0	0	3	0	0	0	0	0	184
11:00	2	150	43	3	28	0	0	2	0	0	0	0	0	228
12 PM	2	168	71	4	21	0	0	0	0	0	0	0	0	266
13:00	4	174	63	6	23	0	0	1	0	0	0	0	0	271
14:00	3	190	67	1	21	2	0	0	0	0	0	0	0	284
15:00	6	235	78	2	39	0	0	3	0	0	0	0	0	363
16:00	6	288	91	0	26	0	0	5	0	0	0	0	0	416
17:00	10	305	87	1	26	0	0	0	0	0	0	0	0	429
18:00	3	228	60	0	13	0	0	0	0	0	0	0	0	304
19:00	1	152	49	0	10	0	0	1	0	0	0	0	0	213
20:00	2	111	23	1	4	0	0	0	0	0	0	0	0	141
21:00	0	82	20	0	2	0	0	0	0	0	0	0	0	104
22:00	0	32	7	0	0	0	0	0	0	0	0	0	0	39
23:00	0	23	4	0	3	0	0	0	0	0	0	0	0	30
Total	52	3170	895	31	305	2	0	18	0	0	0	0	0	4473
Percent	1.2%	70.9%	20.0%	0.7%	6.8%	0.0%	0.0%	0.4%	0.0%	0.0%	0.0%	0.0%	0.0%	
AM Peak	07:00	07:00	08:00	06:00	11:00			10:00						07:00
Vol.	7	304	55	4	28			3						370
PM Peak	17:00	17:00	16:00	13:00	15:00	14:00		16:00						17:00
Vol.	10	305	91	6	39	2		5						429

Massachusetts Avenue (Route 111) between
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144204 A Class
Site Code: TBA

WB

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Total
11/20/1														
4	0	6	2	0	1	0	0	0	0	0	0	0	0	9
01:00	0	1	3	0	0	0	0	0	0	0	0	0	0	4
02:00	0	2	0	0	1	0	0	0	0	0	0	0	0	3
03:00	0	4	2	1	1	0	0	0	0	0	0	0	0	8
04:00	0	2	3	0	0	0	0	0	0	0	0	0	0	5
05:00	0	24	13	0	5	0	0	1	0	0	0	0	0	43
06:00	0	89	25	3	15	0	0	0	0	0	0	0	0	132
07:00	7	276	51	5	18	0	0	4	0	0	0	0	0	361
08:00	6	262	77	2	17	0	0	2	0	0	0	0	0	366
09:00	3	193	62	2	17	0	0	0	0	0	0	0	0	277
10:00	0	134	35	0	20	0	0	0	0	0	0	0	0	189
11:00	1	132	40	0	22	0	0	2	0	0	0	0	0	197
12 PM	4	183	70	6	18	0	0	3	0	0	0	0	0	284
13:00	2	179	49	2	25	0	0	0	0	0	0	0	0	257
14:00	2	177	56	4	22	1	0	1	0	0	0	0	0	263
15:00	2	237	86	3	27	0	0	4	0	0	0	0	0	359
16:00	6	288	72	1	30	0	0	4	0	0	0	0	0	401
17:00	7	312	81	1	28	0	0	1	0	0	0	0	0	430
18:00	3	193	49	0	20	0	0	0	0	0	0	0	0	265
19:00	2	155	37	0	9	0	0	0	0	0	0	0	0	203
20:00	1	89	21	1	8	0	0	0	0	0	0	0	0	120
21:00	1	76	17	0	2	0	0	0	0	0	0	0	0	96
22:00	0	49	11	0	1	0	0	0	0	0	0	0	0	61
23:00	0	22	4	0	0	0	0	0	0	0	0	0	0	26
Total	47	3085	866	31	307	1	0	22	0	0	0	0	0	4359
Percent	1.1%	70.8%	19.9%	0.7%	7.0%	0.0%	0.0%	0.5%	0.0%	0.0%	0.0%	0.0%	0.0%	
AM Peak	07:00	07:00	08:00	07:00	11:00			07:00						08:00
Vol.	7	276	77	5	22			4						366
PM Peak	17:00	17:00	15:00	12:00	16:00	14:00		15:00						17:00
Vol.	7	312	86	6	30	1		4						430

Massachusetts Avenue (Route 111) between
Hill Road and Cisco East Driveway
City, State: Boxborough, MA
Client: VHB/ V. Kalikiri



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144204 A Speed
Site Code: TBA

EB

Start Time	1 14	15 19	20 24	25 29	30 34	35 39	40 44	45 49	50 54	55 59	60 64	65 69	70 9999	Total	85th % ile	Ave Speed
11/19/ 14	0	0	0	0	2	1	3	2	1	0	0	0	0	9	48	41
01:00	0	0	0	0	1	2	0	2	0	0	0	0	0	5	47	40
02:00	0	0	0	0	0	1	1	0	0	0	0	0	0	2	42	40
03:00	0	0	0	0	0	2	2	0	0	0	0	0	0	4	42	40
04:00	0	0	0	1	0	1	3	2	0	0	0	0	0	7	46	41
05:00	0	0	0	0	3	19	25	12	1	0	0	0	0	60	45	41
06:00	2	1	0	0	18	78	85	15	0	1	0	0	0	200	43	39
07:00	2	0	1	4	26	147	149	30	3	0	0	0	0	362	43	39
08:00	4	1	0	9	53	169	111	27	1	0	0	0	0	375	42	38
09:00	2	1	0	5	18	76	102	23	4	0	0	0	0	231	43	40
10:00	4	0	0	6	18	59	61	19	2	1	0	0	0	170	43	39
11:00	0	0	0	4	17	94	101	15	4	0	0	0	0	235	43	40
12 PM	2	0	0	2	14	89	124	27	1	0	0	0	0	259	43	40
13:00	3	1	0	3	16	93	111	16	2	0	0	0	0	245	43	39
14:00	1	1	0	0	18	96	103	25	4	0	0	0	1	249	43	40
15:00	3	0	0	6	31	146	98	18	4	0	0	0	1	307	42	38
16:00	3	0	2	1	46	164	114	14	0	0	0	0	0	344	42	38
17:00	11	2	0	5	99	236	72	3	1	0	0	0	1	430	39	36
18:00	0	1	0	5	38	174	75	12	0	0	0	0	1	306	41	38
19:00	1	1	0	1	20	94	55	9	1	0	0	0	0	182	42	38
20:00	0	0	0	1	12	58	47	6	2	0	0	0	0	126	42	39
21:00	1	0	0	0	10	36	26	1	0	0	0	0	0	74	42	38
22:00	0	0	0	0	2	11	17	1	0	2	0	0	0	33	43	41
23:00	0	0	0	0	2	4	6	1	0	0	0	0	0	13	43	39
Total	39	9	3	53	464	1850	1491	280	31	4	0	0	4	4228		
%	0.9%	0.2%	0.1%	1.3%	11.0%	43.8%	35.3%	6.6%	0.7%	0.1%	0.0%	0.0%	0.1%			
AM Peak	08:00	06:00	07:00	08:00	08:00	08:00	07:00	07:00	09:00	06:00				08:00		
Vol.	4	1	1	9	53	169	149	30	4	1				375		
PM Peak	17:00	17:00	16:00	15:00	17:00	17:00	12:00	12:00	14:00	22:00			14:00	17:00		
Vol.	11	2	2	6	99	236	124	27	4	2			1	430		

Stats
15th Percentile : 34 MPH
50th Percentile : 38 MPH
85th Percentile : 42 MPH
95th Percentile : 45 MPH

Mean Speed(Average) : 39 MPH
10 MPH Pace Speed : 35-44 MPH
Number in Pace : 3341
Percent in Pace : 79.1%
Number of Vehicles > 40 MPH : 1512
Percent of Vehicles > 40 MPH : 35.8%

Massachusetts Avenue (Route 111) between
Hill Road and Cisco East Driveway
City, State: Boxborough, MA
Client: VHB/ V. Kalikiri



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144204 A Speed
Site Code: TBA

EB

Start Time	14	15 19	20 24	25 29	30 34	35 39	40 44	45 49	50 54	55 59	60 64	65 69	70 9999	Total	85th % ile	Ave Speed
11/20/14	0	0	0	0	1	4	3	0	0	0	0	0	0	8	42	38
01:00	0	0	0	0	0	1	2	1	0	0	0	0	0	4	46	42
02:00	0	0	0	0	1	0	2	0	0	0	0	0	0	3	42	39
03:00	0	0	0	0	0	1	2	0	1	0	0	0	0	4	51	43
04:00	0	0	0	1	1	3	6	2	0	0	0	0	0	13	44	40
05:00	0	0	0	0	5	21	27	5	0	0	0	0	0	58	43	40
06:00	0	0	0	1	12	80	85	19	3	0	0	0	0	200	43	40
07:00	1	0	0	11	35	147	147	21	3	0	0	0	1	366	42	39
08:00	5	1	1	5	42	174	139	17	0	0	0	0	0	384	42	38
09:00	3	0	0	1	9	93	101	24	3	0	0	0	0	234	43	40
10:00	1	0	0	1	9	56	100	21	1	0	0	0	1	190	43	40
11:00	2	0	1	2	11	77	99	22	3	0	0	0	0	217	43	40
12 PM	1	0	0	11	28	85	104	25	4	0	0	0	0	258	43	39
13:00	3	0	0	2	20	74	104	19	2	0	0	0	0	224	43	39
14:00	1	1	0	1	7	68	104	21	0	0	0	0	0	203	43	40
15:00	3	0	0	2	14	133	103	28	4	1	0	0	0	288	43	39
16:00	2	1	1	5	40	163	95	13	0	0	0	0	1	321	42	38
17:00	3	1	0	3	90	218	70	12	4	0	1	0	0	402	40	37
18:00	12	3	7	12	34	124	70	11	1	0	0	0	0	274	41	36
19:00	1	0	0	0	19	96	71	9	3	0	1	0	0	200	42	39
20:00	0	0	0	1	8	53	34	11	0	0	0	0	0	107	43	39
21:00	0	0	1	1	14	32	33	5	0	0	0	0	0	86	42	38
22:00	0	0	0	0	1	18	21	2	3	0	0	0	0	45	43	41
23:00	0	0	0	0	1	5	9	1	1	0	0	0	0	17	43	41
Total	38	7	11	60	402	1726	1531	289	36	1	2	0	3	4106		
%	0.9%	0.2%	0.3%	1.5%	9.8%	42.0%	37.3%	7.0%	0.9%	0.0%	0.0%	0.0%	0.1%			
AM Peak	08:00	08:00	08:00	07:00	08:00	08:00	07:00	09:00	06:00				07:00	08:00		
Vol.	5	1	1	11	42	174	147	24	3				1	384		
PM Peak	18:00	18:00	18:00	18:00	17:00	17:00	12:00	15:00	12:00	15:00	17:00		16:00	17:00		
Vol.	12	3	7	12	90	218	104	28	4	1	1		1	402		

Stats
15th Percentile : 34 MPH
50th Percentile : 38 MPH
85th Percentile : 43 MPH
95th Percentile : 46 MPH

Mean Speed(Average) : 39 MPH
10 MPH Pace Speed : 35-44 MPH
Number in Pace : 3257
Percent in Pace : 79.4%
Number of Vehicles > 40 MPH : 1556
Percent of Vehicles > 40 MPH : 37.9%



PRECISION
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Massachusetts Avenue (Route 111) between
Hill Road and Cisco East Driveway
City, State: Boxborough, MA
Client: VHB/ V. Kalikiri

144204 A Speed
Site Code: TBA

WB

Start Time	14	15	19	20	24	25	29	30	34	35	39	40	44	45	49	50	54	55	59	60	64	65	69	70	9999	Total	85th % ile	Ave Speed
11/19/14	0	0	0	0	0	0	0	0	0	0	0	6	3	1	0	0	0	0	0	0	0	0	0	0	0	10	48	45
01:00	0	0	0	0	0	0	0	0	0	3	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	4	46	40
02:00	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	2	43	42
03:00	0	0	0	0	0	0	0	0	0	2	0	2	0	2	2	0	0	0	0	0	0	0	0	0	0	6	51	45
04:00	0	0	0	0	0	0	0	0	0	1	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	4	46	42
05:00	0	0	0	0	0	4	6	15	10	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	37	47	42
06:00	1	0	0	1	11	56	66	19	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	158	43	40
07:00	2	3	0	2	30	119	149	58	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	370	44	40
08:00	2	1	0	2	15	81	166	64	6	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	339	45	41
09:00	1	0	0	0	7	61	143	55	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	271	45	42
10:00	1	0	0	2	2	37	83	52	5	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	184	47	42
11:00	2	0	0	1	7	47	100	60	9	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	228	46	42
12 PM	2	0	0	0	8	47	131	67	10	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	266	46	42
13:00	2	1	1	0	6	61	130	58	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	271	46	42
14:00	1	1	0	6	10	53	148	53	11	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	284	46	42
15:00	6	2	6	5	25	84	180	50	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	363	44	40
16:00	6	1	2	4	32	147	177	41	3	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	416	43	39
17:00	7	2	0	1	38	191	159	27	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	429	42	39
18:00	3	0	0	0	6	98	146	48	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	304	44	41
19:00	0	1	0	1	2	37	109	56	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	213	46	42
20:00	2	0	0	2	3	29	57	35	10	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	141	47	42
21:00	0	0	0	0	2	18	50	23	10	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	104	47	43
22:00	0	0	0	1	3	5	16	11	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	39	47	42
23:00	0	0	0	0	1	2	12	9	5	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	30	50	45
Total	38	12	9	28	212	1185	2047	803	118	16	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4473		
%	0.8%	0.3%	0.2%	0.6%	4.7%	26.5%	45.8%	18.0%	2.6%	0.4%	0.0%	0.0%	0.0%	0.1%														
AM Peak	07:00	07:00		07:00	07:00	07:00	08:00	08:00	11:00	10:00																07:00	07:00	
Vol.	2	3		2	30	119	166	64	9	2															1	370		
PM Peak	17:00	15:00	15:00	14:00	17:00	17:00	15:00	12:00	13:00	20:00	17:00															16:00	17:00	
Vol.	7	2	6	6	38	191	180	67	12	3	1														1	429		

Stats
 15th Percentile : 35 MPH
 50th Percentile : 40 MPH
 85th Percentile : 45 MPH
 95th Percentile : 48 MPH

Mean Speed(Average) : 41 MPH
 10 MPH Pace Speed : 35-44 MPH
 Number in Pace : 3232
 Percent in Pace : 72.3%
 Number of Vehicles > 40 MPH : 2580
 Percent of Vehicles > 40 MPH : 57.7%

Massachusetts Avenue (Route 111) between
 Hill Road and Cisco East Driveway
 City, State: Boxborough, MA
 Client: VHB/ V. Kalikiri



PRECISION
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144204 A Speed
 Site Code: TBA

WB

Start Time	1	15	20	25	30	35	40	45	50	55	60	65	70	Total	85th % ile	Ave Speed
	14	19	24	29	34	39	44	49	54	59	64	69	9999			
11/20/																
14	0	0	0	0	0	0	4	4	1	0	0	0	0	9	48	45
01:00	0	0	0	0	0	0	3	0	0	0	1	0	0	4	61	47
02:00	0	0	0	0	0	1	2	0	0	0	0	0	0	3	42	40
03:00	0	0	0	0	1	0	1	2	2	1	1	0	0	8	57	49
04:00	0	0	0	0	0	2	2	0	1	0	0	0	0	5	50	42
05:00	0	0	0	0	0	11	17	15	0	0	0	0	0	43	46	42
06:00	0	0	0	0	4	41	50	26	9	2	0	0	0	132	47	42
07:00	7	0	0	0	4	77	181	81	9	2	0	0	0	361	46	42
08:00	5	7	4	3	7	94	173	63	10	0	0	0	0	366	45	40
09:00	2	0	1	0	5	48	139	67	11	4	0	0	0	277	47	42
10:00	0	0	0	1	4	31	83	53	15	2	0	0	0	189	47	43
11:00	1	0	0	0	7	37	96	52	4	0	0	0	0	197	46	42
12 PM	4	0	0	2	19	52	113	84	9	1	0	0	0	284	47	42
13:00	1	1	0	0	8	60	124	55	7	0	0	0	1	257	46	42
14:00	2	0	0	0	15	57	100	78	11	0	0	0	0	263	47	42
15:00	2	0	0	0	4	100	180	67	6	0	0	0	0	359	45	41
16:00	5	0	0	8	29	138	171	46	4	0	0	0	0	401	43	39
17:00	4	3	0	0	14	170	185	52	2	0	0	0	0	430	43	40
18:00	3	0	0	4	18	77	109	46	7	1	0	0	0	265	45	40
19:00	1	1	0	0	5	38	100	47	9	2	0	0	0	203	46	42
20:00	1	0	0	0	2	26	48	37	6	0	0	0	0	120	47	43
21:00	1	0	0	0	1	15	49	25	4	1	0	0	0	96	47	43
22:00	0	0	0	0	0	9	20	25	5	2	0	0	0	61	48	45
23:00	0	0	0	0	0	3	7	12	2	2	0	0	0	26	49	46
Total	39	12	5	18	147	1087	1957	937	134	20	2	0	1	4359		
%	0.9%	0.3%	0.1%	0.4%	3.4%	24.9%	44.9%	21.5%	3.1%	0.5%	0.0%	0.0%	0.0%			
AM Peak	07:00	08:00	08:00	08:00	08:00	08:00	07:00	07:00	10:00	09:00	01:00			08:00		
Vol.	7	7	4	3	7	94	181	81	15	4	1			366		
PM Peak	16:00	17:00		16:00	16:00	17:00	17:00	12:00	14:00	19:00			13:00	17:00		
Vol.	5	3		8	29	170	185	84	11	2			1	430		

Stats
 15th Percentile : 35 MPH
 50th Percentile : 41 MPH
 85th Percentile : 46 MPH
 95th Percentile : 48 MPH

Mean Speed(Average) : 41 MPH
 10 MPH Pace Speed : 35-44 MPH
 Number in Pace : 3044
 Percent in Pace : 69.8%
 Number of Vehicles > 40 MPH : 2660
 Percent of Vehicles > 40 MPH : 61.0%



PRECISION
D A T A
INDUSTRIES, LLC

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File Name : 144204 A
Site Code : TBA
Start Date : 11/20/2014
Page No : 1

S: I-495 SB Ramps
E/W: Massachusetts Avenue (Route 111)
City, State: Boxborough, MA
Client: VHB/ V. Kalikiri

Groups Printed- Cars - Heavy Vehicles

Start Time	Massachusetts Avenue (Route 111) From East			I-495 SB Ramps From South			Massachusetts Avenue (Route 111) From West			Int. Total
	Thru	Left	U-Turn	Right	Left	U-Turn	Right	Thru	U-Turn	
07:00 AM	34	36	0	22	16	0	37	98	0	243
07:15 AM	64	65	0	29	36	0	49	88	0	331
07:30 AM	64	42	0	26	33	0	54	100	0	319
07:45 AM	99	47	0	36	47	0	49	115	0	393
Total	261	190	0	113	132	0	189	401	0	1286
08:00 AM	70	52	0	28	40	0	40	95	0	325
08:15 AM	62	45	0	24	49	0	52	104	0	336
08:30 AM	72	43	0	36	50	0	34	89	0	324
08:45 AM	70	34	0	39	53	0	26	82	0	304
Total	274	174	0	127	192	0	152	370	0	1289
Grand Total	535	364	0	240	324	0	341	771	0	2575
Apprch %	59.5	40.5	0	42.6	57.4	0	30.7	69.3	0	
Total %	20.8	14.1	0	9.3	12.6	0	13.2	29.9	0	
Cars	511	354	0	226	314	0	335	746	0	2486
% Cars	95.5	97.3	0	94.2	96.9	0	98.2	96.8	0	96.5
Heavy Vehicles	24	10	0	14	10	0	6	25	0	89
% Heavy Vehicles	4.5	2.7	0	5.8	3.1	0	1.8	3.2	0	3.5

Start Time	Massachusetts Avenue (Route 111) From East				I-495 SB Ramps From South				Massachusetts Avenue (Route 111) From West				Int. Total
	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Right	Thru	U-Turn	App. Total	
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 07:45 AM													
07:45 AM	99	47	0	146	36	47	0	83	49	115	0	164	393
08:00 AM	70	52	0	122	28	40	0	68	40	95	0	135	325
08:15 AM	62	45	0	107	24	49	0	73	52	104	0	156	336
08:30 AM	72	43	0	115	36	50	0	86	34	89	0	123	324
Total Volume	303	187	0	490	124	186	0	310	175	403	0	578	1378
% App. Total	61.8	38.2	0		40	60	0		30.3	69.7	0		
PHF	.765	.899	.000	.839	.861	.930	.000	.901	.841	.876	.000	.881	.877
Cars	288	181	0	469	116	177	0	293	173	392	0	565	1327
% Cars	95.0	96.8	0	95.7	93.5	95.2	0	94.5	98.9	97.3	0	97.8	96.3
Heavy Vehicles	15	6	0	21	8	9	0	17	2	11	0	13	51
% Heavy Vehicles	5.0	3.2	0	4.3	6.5	4.8	0	5.5	1.1	2.7	0	2.2	3.7



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File Name : 144204 A
Site Code : TBA
Start Date : 11/20/2014
Page No : 1

S: I-495 SB Ramps
E/W: Massachusetts Avenue (Route 111)
City, State: Boxborough, MA
Client: VHB/ V. Kalikiri

Groups Printed- Cars

Start Time	Massachusetts Avenue (Route 111) From East			I-495 SB Ramps From South			Massachusetts Avenue (Route 111) From West			Int. Total
	Thru	Left	U-Turn	Right	Left	U-Turn	Right	Thru	U-Turn	
07:00 AM	32	35	0	22	16	0	35	92	0	232
07:15 AM	63	62	0	26	36	0	48	85	0	320
07:30 AM	60	42	0	25	32	0	54	98	0	311
07:45 AM	92	43	0	34	40	0	49	114	0	372
Total	247	182	0	107	124	0	186	389	0	1235
08:00 AM	66	52	0	25	39	0	39	92	0	313
08:15 AM	59	45	0	23	48	0	52	101	0	328
08:30 AM	71	41	0	34	50	0	33	85	0	314
08:45 AM	68	34	0	37	53	0	25	79	0	296
Total	264	172	0	119	190	0	149	357	0	1251
Grand Total	511	354	0	226	314	0	335	746	0	2486
Apprch %	59.1	40.9	0	41.9	58.1	0	31	69	0	
Total %	20.6	14.2	0	9.1	12.6	0	13.5	30	0	

Start Time	Massachusetts Avenue (Route 111) From East				I-495 SB Ramps From South				Massachusetts Avenue (Route 111) From West				Int. Total
	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Right	Thru	U-Turn	App. Total	
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 07:45 AM													
07:45 AM	92	43	0	135	34	40	0	74	49	114	0	163	372
08:00 AM	66	52	0	118	25	39	0	64	39	92	0	131	313
08:15 AM	59	45	0	104	23	48	0	71	52	101	0	153	328
08:30 AM	71	41	0	112	34	50	0	84	33	85	0	118	314
Total Volume	288	181	0	469	116	177	0	293	173	392	0	565	1327
% App. Total	61.4	38.6	0		39.6	60.4	0		30.6	69.4	0		
PHF	.783	.870	.000	.869	.853	.885	.000	.872	.832	.860	.000	.867	.892



PRECISION
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File Name : 144204 A
Site Code : TBA
Start Date : 11/20/2014
Page No : 1

S: I-495 SB Ramps
E/W: Massachusetts Avenue (Route 111)
City, State: Boxborough, MA
Client: VHB/ V. Kalikiri

Groups Printed- Heavy Vehicles

Start Time	Massachusetts Avenue (Route 111) From East			I-495 SB Ramps From South			Massachusetts Avenue (Route 111) From West			Int. Total
	Thru	Left	U-Turn	Right	Left	U-Turn	Right	Thru	U-Turn	
07:00 AM	2	1	0	0	0	0	2	6	0	11
07:15 AM	1	3	0	3	0	0	1	3	0	11
07:30 AM	4	0	0	1	1	0	0	2	0	8
07:45 AM	7	4	0	2	7	0	0	1	0	21
Total	14	8	0	6	8	0	3	12	0	51
08:00 AM	4	0	0	3	1	0	1	3	0	12
08:15 AM	3	0	0	1	1	0	0	3	0	8
08:30 AM	1	2	0	2	0	0	1	4	0	10
08:45 AM	2	0	0	2	0	0	1	3	0	8
Total	10	2	0	8	2	0	3	13	0	38
Grand Total	24	10	0	14	10	0	6	25	0	89
Apprch %	70.6	29.4	0	58.3	41.7	0	19.4	80.6	0	
Total %	27	11.2	0	15.7	11.2	0	6.7	28.1	0	

Start Time	Massachusetts Avenue (Route 111) From East				I-495 SB Ramps From South				Massachusetts Avenue (Route 111) From West				Int. Total
	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Right	Thru	U-Turn	App. Total	
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 07:15 AM													
07:15 AM	1	3	0	4	3	0	0	3	1	3	0	4	11
07:30 AM	4	0	0	4	1	1	0	2	0	2	0	2	8
07:45 AM	7	4	0	11	2	7	0	9	0	1	0	1	21
08:00 AM	4	0	0	4	3	1	0	4	1	3	0	4	12
Total Volume	16	7	0	23	9	9	0	18	2	9	0	11	52
% App. Total	69.6	30.4	0		50	50	0		18.2	81.8	0		
PHF	.571	.438	.000	.523	.750	.321	.000	.500	.500	.750	.000	.688	.619



PRECISION
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File Name : 144204 A
Site Code : TBA
Start Date : 11/20/2014
Page No : 1

S: I-495 SB Ramps
E/W: Massachusetts Avenue (Route 111)
City, State: Boxborough, MA
Client: VHB/ V. Kalikiri

Groups Printed- Peds and Bicycles

Start Time	Massachusetts Avenue (Route 111) From East				I-495 SB Ramps From South				Massachusetts Avenue (Route 111) From West				Int. Total
	Thru	Left	Peds SB	Peds NB	Right	Left	Peds WB	Peds EB	Right	Thru	Peds NB	Peds SB	
07:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
07:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
07:30 AM	0	0	0	0	0	0	0	0	0	1	0	0	1
07:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	1	0	0	1
08:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
08:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
08:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
08:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	0	0	0	0	0	0	0	1	0	0	1
Apprch %	0	0	0	0	0	0	0	0	0	100	0	0	
Total %	0	0	0	0	0	0	0	0	0	100	0	0	

Start Time	Massachusetts Avenue (Route 111) From East					I-495 SB Ramps From South					Massachusetts Avenue (Route 111) From West					Int. Total
	Thru	Left	Peds SB	Peds NB	App. Total	Right	Left	Peds WB	Peds EB	App. Total	Right	Thru	Peds NB	Peds SB	App. 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	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:30 AM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
07:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Volume	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
% App. Total	0	0	0	0	0	0	0	0	0	0	0	100	0	0		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.250	.000	.000	.250	.250



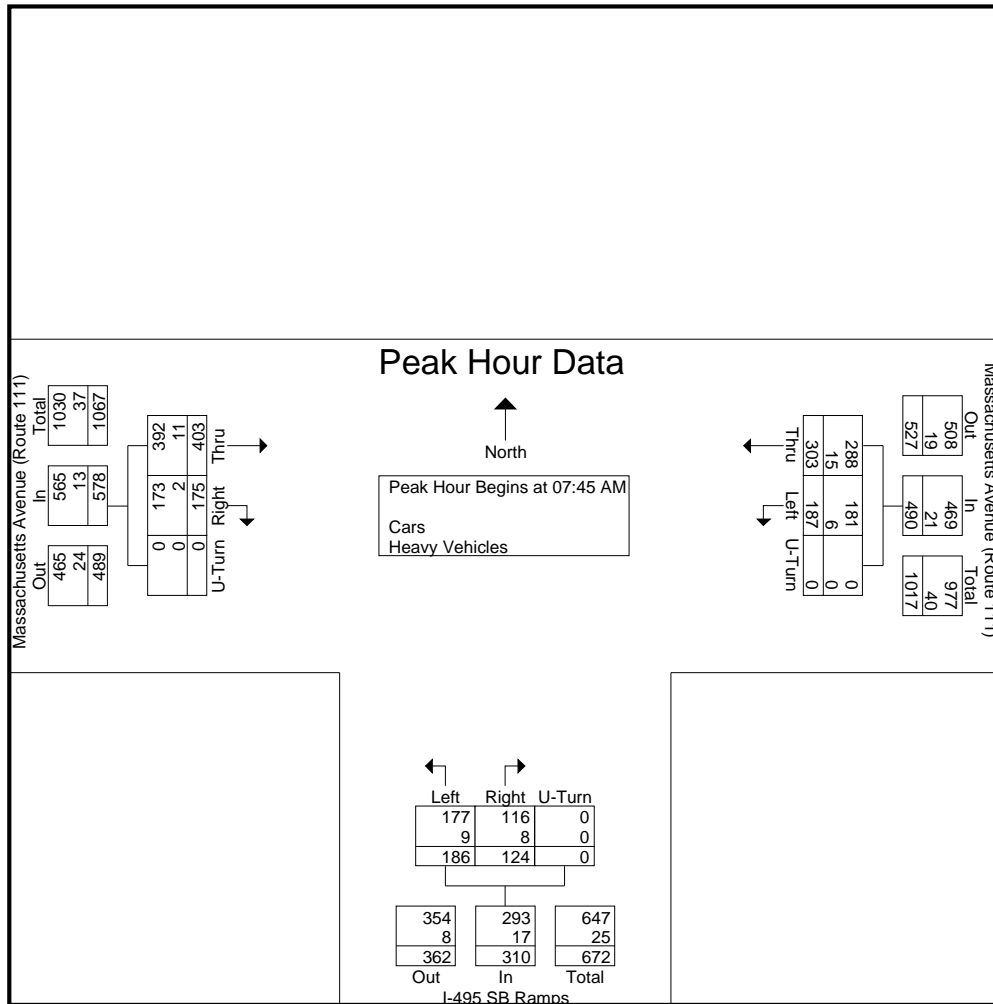
PRECISION
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INDUSTRIES, LLC

P.O. Box 301 Berlin, MA 01503
Office: 508.481.3999 Fax: 508.545.1234
Email: datarequests@pdillc.com

S: I-495 SB Ramps
E/W: Massachusetts Avenue (Route 111)
City, State: Boxborough, MA
Client: VHB/ V. Kalikiri

File Name : 144204 A
Site Code : TBA
Start Date : 11/20/2014
Page No : 1

Start Time	Massachusetts Avenue (Route 111) From East				I-495 SB Ramps From South				Massachusetts Avenue (Route 111) From West				Int. Total
	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Right	Thru	U-Turn	App. Total	
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 07:45 AM													
07:45 AM	99	47	0	146	36	47	0	83	49	115	0	164	393
08:00 AM	70	52	0	122	28	40	0	68	40	95	0	135	325
08:15 AM	62	45	0	107	24	49	0	73	52	104	0	156	336
08:30 AM	72	43	0	115	36	50	0	86	34	89	0	123	324
Total Volume	303	187	0	490	124	186	0	310	175	403	0	578	1378
% App. Total	61.8	38.2	0		40	60	0		30.3	69.7	0		
PHF	.765	.899	.000	.839	.861	.930	.000	.901	.841	.876	.000	.881	.877
Cars	288	181	0	469	116	177	0	293	173	392	0	565	1327
% Cars	95.0	96.8	0	95.7	93.5	95.2	0	94.5	98.9	97.3	0	97.8	96.3
Heavy Vehicles	15	6	0	21	8	9	0	17	2	11	0	13	51
% Heavy Vehicles	5.0	3.2	0	4.3	6.5	4.8	0	5.5	1.1	2.7	0	2.2	3.7





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File Name : 144204 AA
Site Code : TBA
Start Date : 11/20/2014
Page No : 1

S: I-495 SB Ramps
E/W: Massachusetts Avenue (Route 111)
City, State: Boxborough, MA
Client: VHB/ V. Kalikiri

Groups Printed- Cars - Heavy Vehicles

Start Time	Massachusetts Avenue (Route 111) From East			I-495 SB Ramps From South			Massachusetts Avenue (Route 111) From West			Int. Total
	Thru	Left	U-Turn	Right	Left	U-Turn	Right	Thru	U-Turn	
04:00 PM	73	52	0	24	22	0	63	65	0	299
04:15 PM	82	31	0	22	16	0	33	80	0	264
04:30 PM	72	51	0	20	22	0	29	89	0	283
04:45 PM	94	32	0	22	34	0	31	76	0	289
Total	321	166	0	88	94	0	156	310	0	1135
05:00 PM	85	40	0	23	21	0	44	119	0	332
05:15 PM	87	33	0	23	26	0	46	103	0	318
05:30 PM	99	34	0	19	28	0	34	112	0	326
05:45 PM	127	49	0	22	33	0	29	78	0	338
Total	398	156	0	87	108	0	153	412	0	1314
Grand Total	719	322	0	175	202	0	309	722	0	2449
Apprch %	69.1	30.9	0	46.4	53.6	0	30	70	0	
Total %	29.4	13.1	0	7.1	8.2	0	12.6	29.5	0	
Cars	706	317	0	172	199	0	305	710	0	2409
% Cars	98.2	98.4	0	98.3	98.5	0	98.7	98.3	0	98.4
Heavy Vehicles	13	5	0	3	3	0	4	12	0	40
% Heavy Vehicles	1.8	1.6	0	1.7	1.5	0	1.3	1.7	0	1.6

Start Time	Massachusetts Avenue (Route 111) From East				I-495 SB Ramps From South				Massachusetts Avenue (Route 111) From West				Int. Total
	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Right	Thru	U-Turn	App. 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	85	40	0	125	23	21	0	44	44	119	0	163	332
05:15 PM	87	33	0	120	23	26	0	49	46	103	0	149	318
05:30 PM	99	34	0	133	19	28	0	47	34	112	0	146	326
05:45 PM	127	49	0	176	22	33	0	55	29	78	0	107	338
Total Volume	398	156	0	554	87	108	0	195	153	412	0	565	1314
% App. Total	71.8	28.2	0		44.6	55.4	0		27.1	72.9	0		
PHF	.783	.796	.000	.787	.946	.818	.000	.886	.832	.866	.000	.867	.972
Cars	398	155	0	553	87	108	0	195	150	410	0	560	1308
% Cars	100	99.4	0	99.8	100	100	0	100	98.0	99.5	0	99.1	99.5
Heavy Vehicles	0	1	0	1	0	0	0	0	3	2	0	5	6
% Heavy Vehicles	0	0.6	0	0.2	0	0	0	0	2.0	0.5	0	0.9	0.5



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File Name : 144204 AA
Site Code : TBA
Start Date : 11/20/2014
Page No : 1

S: I-495 SB Ramps
E/W: Massachusetts Avenue (Route 111)
City, State: Boxborough, MA
Client: VHB/ V. Kalikiri

Groups Printed- Cars

Start Time	Massachusetts Avenue (Route 111) From East			I-495 SB Ramps From South			Massachusetts Avenue (Route 111) From West			Int. Total
	Thru	Left	U-Turn	Right	Left	U-Turn	Right	Thru	U-Turn	
04:00 PM	72	51	0	22	21	0	62	63	0	291
04:15 PM	79	30	0	21	16	0	33	77	0	256
04:30 PM	66	49	0	20	20	0	29	86	0	270
04:45 PM	91	32	0	22	34	0	31	74	0	284
Total	308	162	0	85	91	0	155	300	0	1101
05:00 PM	85	40	0	23	21	0	44	118	0	331
05:15 PM	87	33	0	23	26	0	45	102	0	316
05:30 PM	99	34	0	19	28	0	32	112	0	324
05:45 PM	127	48	0	22	33	0	29	78	0	337
Total	398	155	0	87	108	0	150	410	0	1308
Grand Total	706	317	0	172	199	0	305	710	0	2409
Apprch %	69	31	0	46.4	53.6	0	30	70	0	
Total %	29.3	13.2	0	7.1	8.3	0	12.7	29.5	0	

Start Time	Massachusetts Avenue (Route 111) From East				I-495 SB Ramps From South				Massachusetts Avenue (Route 111) From West				Int. Total
	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Right	Thru	U-Turn	App. 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	85	40	0	125	23	21	0	44	44	118	0	162	331
05:15 PM	87	33	0	120	23	26	0	49	45	102	0	147	316
05:30 PM	99	34	0	133	19	28	0	47	32	112	0	144	324
05:45 PM	127	48	0	175	22	33	0	55	29	78	0	107	337
Total Volume	398	155	0	553	87	108	0	195	150	410	0	560	1308
% App. Total	72	28	0		44.6	55.4	0		26.8	73.2	0		
PHF	.783	.807	.000	.790	.946	.818	.000	.886	.833	.869	.000	.864	.970



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File Name : 144204 AA
Site Code : TBA
Start Date : 11/20/2014
Page No : 1

S: I-495 SB Ramps
E/W: Massachusetts Avenue (Route 111)
City, State: Boxborough, MA
Client: VHB/ V. Kalikiri

Groups Printed- Heavy Vehicles

Start Time	Massachusetts Avenue (Route 111) From East			I-495 SB Ramps From South			Massachusetts Avenue (Route 111) From West			Int. Total
	Thru	Left	U-Turn	Right	Left	U-Turn	Right	Thru	U-Turn	
04:00 PM	1	1	0	2	1	0	1	2	0	8
04:15 PM	3	1	0	1	0	0	0	3	0	8
04:30 PM	6	2	0	0	2	0	0	3	0	13
04:45 PM	3	0	0	0	0	0	0	2	0	5
Total	13	4	0	3	3	0	1	10	0	34
05:00 PM	0	0	0	0	0	0	0	1	0	1
05:15 PM	0	0	0	0	0	0	1	1	0	2
05:30 PM	0	0	0	0	0	0	2	0	0	2
05:45 PM	0	1	0	0	0	0	0	0	0	1
Total	0	1	0	0	0	0	3	2	0	6
Grand Total	13	5	0	3	3	0	4	12	0	40
Apprch %	72.2	27.8	0	50	50	0	25	75	0	
Total %	32.5	12.5	0	7.5	7.5	0	10	30	0	

Start Time	Massachusetts Avenue (Route 111) From East				I-495 SB Ramps From South				Massachusetts Avenue (Route 111) From West				Int. Total
	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Right	Thru	U-Turn	App. 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	1	0	2	2	1	0	3	1	2	0	3	8
04:15 PM	3	1	0	4	1	0	0	1	0	3	0	3	8
04:30 PM	6	2	0	8	0	2	0	2	0	3	0	3	13
04:45 PM	3	0	0	3	0	0	0	0	0	2	0	2	5
Total Volume	13	4	0	17	3	3	0	6	1	10	0	11	34
% App. Total	76.5	23.5	0		50	50	0		9.1	90.9	0		
PHF	.542	.500	.000	.531	.375	.375	.000	.500	.250	.833	.000	.917	.654



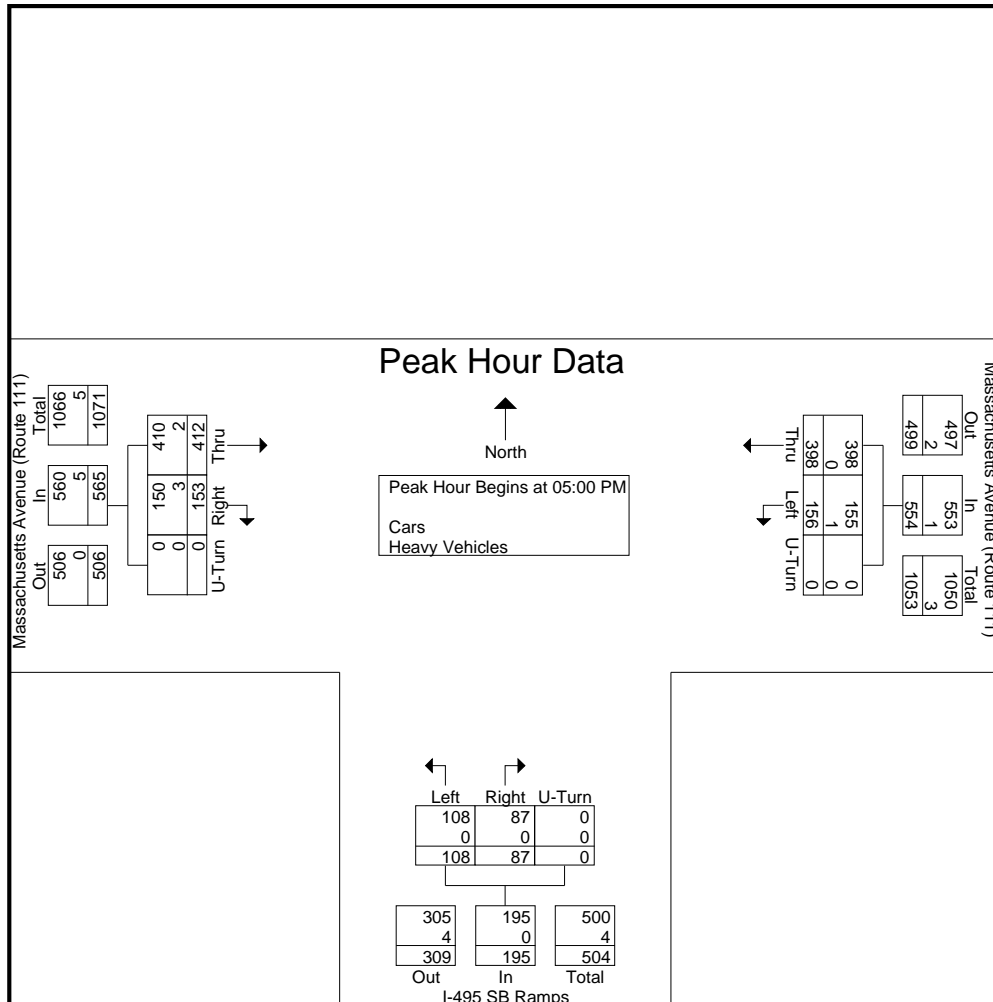
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S: I-495 SB Ramps
E/W: Massachusetts Avenue (Route 111)
City, State: Boxborough, MA
Client: VHB/ V. Kalikiri

File Name : 144204 AA
Site Code : TBA
Start Date : 11/20/2014
Page No : 1

Start Time	Massachusetts Avenue (Route 111) From East				I-495 SB Ramps From South				Massachusetts Avenue (Route 111) From West				Int. Total
	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Right	Thru	U-Turn	App. 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	85	40	0	125	23	21	0	44	44	119	0	163	332
05:15 PM	87	33	0	120	23	26	0	49	46	103	0	149	318
05:30 PM	99	34	0	133	19	28	0	47	34	112	0	146	326
05:45 PM	127	49	0	176	22	33	0	55	29	78	0	107	338
Total Volume	398	156	0	554	87	108	0	195	153	412	0	565	1314
% App. Total	71.8	28.2	0		44.6	55.4	0		27.1	72.9	0		
PHF	.783	.796	.000	.787	.946	.818	.000	.886	.832	.866	.000	.867	.972
Cars	398	155	0	553	87	108	0	195	150	410	0	560	1308
% Cars	100	99.4	0	99.8	100	100	0	100	98.0	99.5	0	99.1	99.5
Heavy Vehicles	0	1	0	1	0	0	0	0	3	2	0	5	6
% Heavy Vehicles	0	0.6	0	0.2	0	0	0	0	2.0	0.5	0	0.9	0.5





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N/S: I-495 NB Ramps/ Driveway
E/W: Massachusetts Avenue (Route 111)
City, State: Boxborough, MA
Client: VHB/ V. Kalikiri

File Name : 144204 B
Site Code : TBA
Start Date : 11/20/2014
Page No : 1

Groups Printed- Cars - Heavy Vehicles

Start Time	I-495 NB Ramps From North				Massachusetts Avenue (Route 111) From East				Driveway From South				Massachusetts Avenue (Route 111) From West				Int. Total
	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	
07:00 AM	19	0	25	0	36	54	0	0	0	0	0	0	0	75	45	0	254
07:15 AM	33	0	34	1	24	94	0	0	0	0	0	0	0	80	38	0	304
07:30 AM	35	0	36	0	42	74	0	0	1	0	0	0	0	90	36	0	314
07:45 AM	61	0	43	0	34	85	0	0	0	0	0	0	0	102	49	0	374
Total	148	0	138	1	136	307	0	0	1	0	0	0	0	347	168	0	1246
08:00 AM	30	0	44	0	36	89	0	0	0	0	0	0	0	93	28	0	320
08:15 AM	25	0	41	0	27	84	0	0	0	0	0	0	0	95	34	0	306
08:30 AM	32	0	44	0	32	86	0	0	0	0	0	0	0	93	34	0	321
08:45 AM	36	0	37	0	34	65	0	0	0	0	0	0	0	80	40	0	292
Total	123	0	166	0	129	324	0	0	0	0	0	0	0	361	136	0	1239
Grand Total	271	0	304	1	265	631	0	0	1	0	0	0	0	708	304	0	2485
Apprch %	47	0	52.8	0.2	29.6	70.4	0	0	100	0	0	0	0	70	30	0	
Total %	10.9	0	12.2	0	10.7	25.4	0	0	0	0	0	0	0	28.5	12.2	0	
Cars	258	0	284	1	249	611	0	0	1	0	0	0	0	673	300	0	2377
% Cars	95.2	0	93.4	100	94	96.8	0	0	100	0	0	0	0	95.1	98.7	0	95.7
Heavy Vehicles	13	0	20	0	16	20	0	0	0	0	0	0	0	35	4	0	108
% Heavy Vehicles	4.8	0	6.6	0	6	3.2	0	0	0	0	0	0	0	4.9	1.3	0	4.3

Start Time	I-495 NB Ramps From North					Massachusetts Avenue (Route 111) From East					Driveway From South					Massachusetts Avenue (Route 111) From West					Int. Total	
	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		
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																						
Peak Hour for Entire Intersection Begins at 07:45 AM																						
07:45 AM	61	0	43	0	104	34	85	0	0	119	0	0	0	0	0	0	102	49	0	151	374	
08:00 AM	30	0	44	0	74	36	89	0	0	125	0	0	0	0	0	0	0	93	28	0	121	320
08:15 AM	25	0	41	0	66	27	84	0	0	111	0	0	0	0	0	0	0	95	34	0	129	306
08:30 AM	32	0	44	0	76	32	86	0	0	118	0	0	0	0	0	0	0	93	34	0	127	321
Total Volume	148	0	172	0	320	129	344	0	0	473	0	0	0	0	0	0	0	383	145	0	528	1321
% App. Total	46.2	0	53.8	0		27.3	72.7	0	0		0	0	0	0		0	0	72.5	27.5	0		
PHF	.607	.000	.977	.000	.769	.896	.966	.000	.000	.946	.000	.000	.000	.000	.000	.000	.000	.939	.740	.000	.874	.883
Cars	140	0	159	0	299	120	331	0	0	451	0	0	0	0	0	0	0	368	143	0	511	1261
% Cars	94.6	0	92.4	0	93.4	93.0	96.2	0	0	95.3	0	0	0	0	0	0	0	96.1	98.6	0	96.8	95.5
Heavy Vehicles	8	0	13	0	21	9	13	0	0	22	0	0	0	0	0	0	0	15	2	0	17	60
% Heavy Vehicles	5.4	0	7.6	0	6.6	7.0	3.8	0	0	4.7	0	0	0	0	0	0	0	3.9	1.4	0	3.2	4.5



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N/S: I-495 NB Ramps/ Driveway
E/W: Massachusetts Avenue (Route 111)
City, State: Boxborough, MA
Client: VHB/ V. Kalikiri

File Name : 144204 B
Site Code : TBA
Start Date : 11/20/2014
Page No : 1

Groups Printed- Cars

Start Time	I-495 NB Ramps From North				Massachusetts Avenue (Route 111) From East				Driveway From South				Massachusetts Avenue (Route 111) From West				Int. Total
	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	
07:00 AM	18	0	24	0	36	52	0	0	0	0	0	0	0	68	45	0	243
07:15 AM	31	0	31	1	20	92	0	0	0	0	0	0	0	73	37	0	285
07:30 AM	35	0	35	0	41	72	0	0	1	0	0	0	0	88	35	0	307
07:45 AM	56	0	40	0	31	79	0	0	0	0	0	0	0	99	49	0	354
Total	140	0	130	1	128	295	0	0	1	0	0	0	0	328	166	0	1189
08:00 AM	29	0	40	0	35	87	0	0	0	0	0	0	0	89	28	0	308
08:15 AM	24	0	38	0	25	82	0	0	0	0	0	0	0	91	33	0	293
08:30 AM	31	0	41	0	29	83	0	0	0	0	0	0	0	89	33	0	306
08:45 AM	34	0	35	0	32	64	0	0	0	0	0	0	0	76	40	0	281
Total	118	0	154	0	121	316	0	0	0	0	0	0	0	345	134	0	1188
Grand Total	258	0	284	1	249	611	0	0	1	0	0	0	0	673	300	0	2377
Apprch %	47.5	0	52.3	0.2	29	71	0	0	100	0	0	0	0	69.2	30.8	0	
Total %	10.9	0	11.9	0	10.5	25.7	0	0	0	0	0	0	0	28.3	12.6	0	

Start Time	I-495 NB Ramps From North					Massachusetts Avenue (Route 111) From East					Driveway From South					Massachusetts Avenue (Route 111) From West					Int. Total
	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	
07:30 AM	35	0	35	0	70	41	72	0	0	113	1	0	0	0	1	0	88	35	0	123	307
07:45 AM	56	0	40	0	96	31	79	0	0	110	0	0	0	0	0	0	99	49	0	148	354
08:00 AM	29	0	40	0	69	35	87	0	0	122	0	0	0	0	0	0	89	28	0	117	308
08:15 AM	24	0	38	0	62	25	82	0	0	107	0	0	0	0	0	0	91	33	0	124	293
Total Volume	144	0	153	0	297	132	320	0	0	452	1	0	0	0	1	0	367	145	0	512	1262
% App. Total	48.5	0	51.5	0		29.2	70.8	0	0		100	0	0	0		0	71.7	28.3	0		
PHF	.643	.000	.956	.000	.773	.805	.920	.000	.000	.926	.250	.000	.000	.000	.250	.000	.927	.740	.000	.865	.891

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



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N/S: I-495 NB Ramps/ Driveway
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City, State: Boxborough, MA
Client: VHB/ V. Kalikiri

File Name : 144204 B
Site Code : TBA
Start Date : 11/20/2014
Page No : 1

Groups Printed- Heavy Vehicles

Start Time	I-495 NB Ramps From North				Massachusetts Avenue (Route 111) From East				Driveway From South				Massachusetts Avenue (Route 111) From West				Int. Total
	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	
07:00 AM	1	0	1	0	0	2	0	0	0	0	0	0	0	7	0	0	11
07:15 AM	2	0	3	0	4	2	0	0	0	0	0	0	0	7	1	0	19
07:30 AM	0	0	1	0	1	2	0	0	0	0	0	0	0	2	1	0	7
07:45 AM	5	0	3	0	3	6	0	0	0	0	0	0	0	3	0	0	20
Total	8	0	8	0	8	12	0	0	0	0	0	0	0	19	2	0	57
08:00 AM	1	0	4	0	1	2	0	0	0	0	0	0	0	4	0	0	12
08:15 AM	1	0	3	0	2	2	0	0	0	0	0	0	0	4	1	0	13
08:30 AM	1	0	3	0	3	3	0	0	0	0	0	0	0	4	1	0	15
08:45 AM	2	0	2	0	2	1	0	0	0	0	0	0	0	4	0	0	11
Total	5	0	12	0	8	8	0	0	0	0	0	0	0	16	2	0	51
Grand Total	13	0	20	0	16	20	0	0	0	0	0	0	0	35	4	0	108
Apprch %	39.4	0	60.6	0	44.4	55.6	0	0	0	0	0	0	0	89.7	10.3	0	
Total %	12	0	18.5	0	14.8	18.5	0	0	0	0	0	0	0	32.4	3.7	0	

Start Time	I-495 NB Ramps From North					Massachusetts Avenue (Route 111) From East					Driveway From South					Massachusetts Avenue (Route 111) From West					Int. Total
	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	
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:45 AM																					
07:45 AM	5	0	3	0	8	3	6	0	0	9	0	0	0	0	0	0	3	0	0	3	20
08:00 AM	1	0	4	0	5	1	2	0	0	3	0	0	0	0	0	0	4	0	0	4	12
08:15 AM	1	0	3	0	4	2	2	0	0	4	0	0	0	0	0	0	4	1	0	5	13
08:30 AM	1	0	3	0	4	3	3	0	0	6	0	0	0	0	0	0	4	1	0	5	15
Total Volume	8	0	13	0	21	9	13	0	0	22	0	0	0	0	0	0	15	2	0	17	60
% App. Total	38.1	0	61.9	0		40.9	59.1	0	0		0	0	0	0		0	88.2	11.8	0		
PHF	.400	.000	.813	.000	.656	.750	.542	.000	.000	.611	.000	.000	.000	.000	.000	.000	.938	.500	.000	.850	.750



PRECISION
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N/S: I-495 NB Ramps/ Driveway
E/W: Massachusetts Avenue (Route 111)
City, State: Boxborough, MA
Client: VHB/ V. Kalikiri

File Name : 144204 B
Site Code : TBA
Start Date : 11/20/2014
Page No : 1

Groups Printed- Peds and Bicycles

Start Time	I-495 NB Ramps From North					Massachusetts Avenue (Route 111) From East					Driveway From South					Massachusetts Avenue (Route 111) From West					Int. Total
	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	
07:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
07:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
08:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:30 AM	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
08:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Grand Total	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	3
Apprch %	0	0	0	50	50	0	0	0	0	0	0	0	0	0	0	0	100	0	0	0	
Total %	0	0	0	33.3	33.3	0	0	0	0	0	0	0	0	0	0	0	33.3	0	0	0	

Start Time	I-495 NB Ramps From North						Massachusetts Avenue (Route 111) From East						Driveway From South						Massachusetts Avenue (Route 111) From West						Int. Total			
	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				
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																												
Peak Hour for Entire Intersection Begins at 07:45 AM																												
07:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:30 AM	0	0	0	1	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Total Volume	0	0	0	1	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
% App. Total	0	0	0	50	50		0	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	0	0	
PHF	.000	.000	.000	.250	.250	.250	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.250



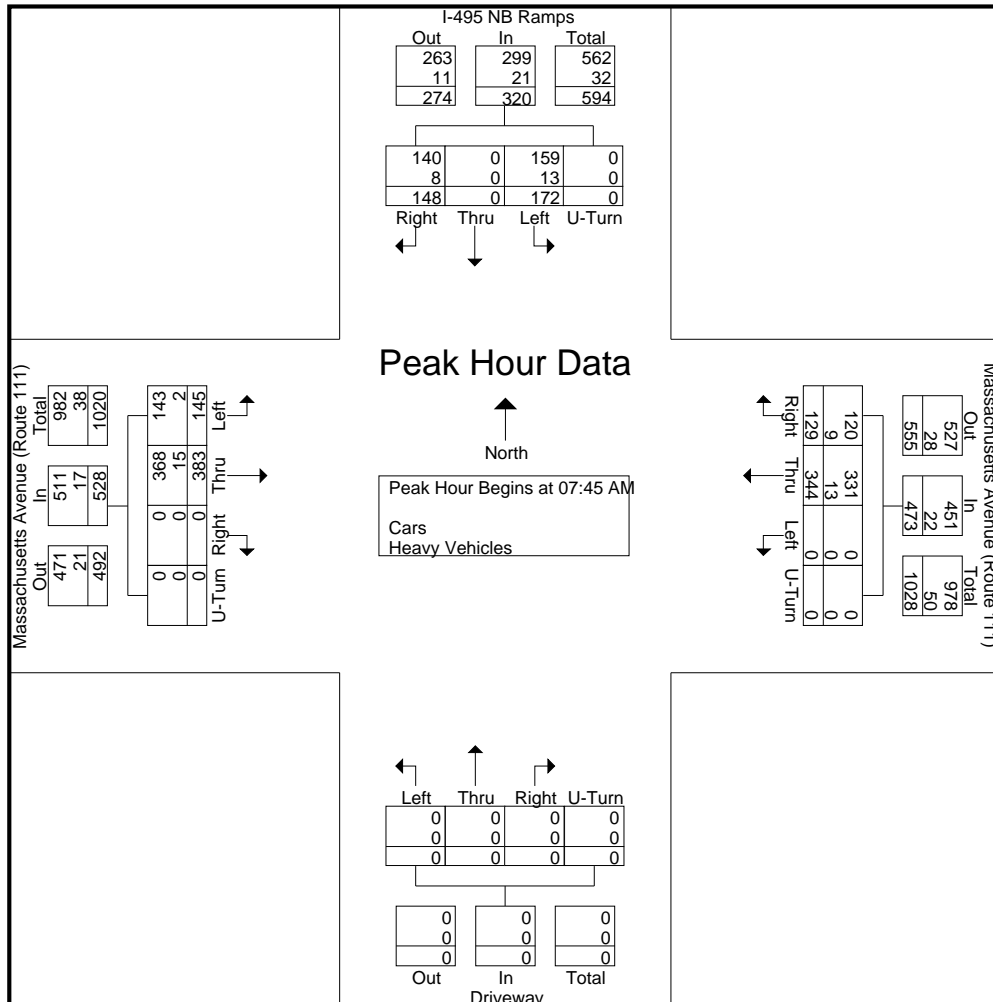
PRECISION
DATA
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N/S: I-495 NB Ramps/ Driveway
E/W: Massachusetts Avenue (Route 111)
City, State: Boxborough, MA
Client: VHB/ V. Kalikiri

File Name : 144204 B
Site Code : TBA
Start Date : 11/20/2014
Page No : 1

Start Time	I-495 NB Ramps From North					Massachusetts Avenue (Route 111) From East					Driveway From South					Massachusetts Avenue (Route 111) From West					Int. Total
	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	
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:45 AM																					
07:45 AM	61	0	43	0	104	34	85	0	0	119	0	0	0	0	0	0	102	49	0	151	374
08:00 AM	30	0	44	0	74	36	89	0	0	125	0	0	0	0	0	0	93	28	0	121	320
08:15 AM	25	0	41	0	66	27	84	0	0	111	0	0	0	0	0	0	95	34	0	129	306
08:30 AM	32	0	44	0	76	32	86	0	0	118	0	0	0	0	0	0	93	34	0	127	321
Total Volume	148	0	172	0	320	129	344	0	0	473	0	0	0	0	0	0	383	145	0	528	1321
% App. Total	46.2	0	53.8	0		27.3	72.7	0	0		0	0	0	0	0	0	72.5	27.5	0		
PHF	.607	.000	.977	.000	.769	.896	.966	.000	.000	.946	.000	.000	.000	.000	.000	.000	.939	.740	.000	.874	.883
Cars	140	0	159	0	299	120	331	0	0	451	0	0	0	0	0	0	368	143	0	511	1261
% Cars	94.6	0	92.4	0	93.4	93.0	96.2	0	0	95.3	0	0	0	0	0	0	96.1	98.6	0	96.8	95.5
Heavy Vehicles	8	0	13	0	21	9	13	0	0	22	0	0	0	0	0	0	15	2	0	17	60
% Heavy Vehicles	5.4	0	7.6	0	6.6	7.0	3.8	0	0	4.7	0	0	0	0	0	0	3.9	1.4	0	3.2	4.5





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N/S: I-495 NB Ramps/ Driveway
E/W: Massachusetts Avenue (Route 111)
City, State: Boxborough, MA
Client: VHB/ V. Kalikiri

File Name : 144204 BB
Site Code : TBA
Start Date : 11/20/2014
Page No : 1

Groups Printed- Cars - Heavy Vehicles

Start Time	I-495 NB Ramps From North				Massachusetts Avenue (Route 111) From East				Driveway From South				Massachusetts Avenue (Route 111) From West				Int. Total
	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	
04:00 PM	18	0	45	0	27	106	0	0	0	0	0	0	0	58	39	0	293
04:15 PM	29	0	28	0	17	90	0	0	0	0	0	0	0	60	41	0	265
04:30 PM	30	0	38	0	29	97	0	0	0	0	0	0	0	60	46	0	300
04:45 PM	27	0	47	0	22	94	1	0	0	0	0	0	0	56	37	0	284
Total	104	0	158	0	95	387	1	0	0	0	0	0	0	234	163	0	1142
05:00 PM	31	0	51	0	38	92	0	0	0	0	0	0	0	73	73	0	358
05:15 PM	28	0	46	0	33	98	0	0	0	0	0	0	0	72	59	0	336
05:30 PM	38	0	52	0	32	88	0	0	0	0	0	0	0	67	66	0	343
05:45 PM	52	0	64	0	42	129	0	0	0	0	0	0	0	72	30	0	389
Total	149	0	213	0	145	407	0	0	0	0	0	0	0	284	228	0	1426
Grand Total	253	0	371	0	240	794	1	0	0	0	0	0	0	518	391	0	2568
Apprch %	40.5	0	59.5	0	23.2	76.7	0.1	0	0	0	0	0	0	57	43	0	
Total %	9.9	0	14.4	0	9.3	30.9	0	0	0	0	0	0	0	20.2	15.2	0	
Cars	251	0	365	0	238	776	1	0	0	0	0	0	0	507	385	0	2523
% Cars	99.2	0	98.4	0	99.2	97.7	100	0	0	0	0	0	0	97.9	98.5	0	98.2
Heavy Vehicles	2	0	6	0	2	18	0	0	0	0	0	0	0	11	6	0	45
% Heavy Vehicles	0.8	0	1.6	0	0.8	2.3	0	0	0	0	0	0	0	2.1	1.5	0	1.8

Start Time	I-495 NB Ramps From North					Massachusetts Avenue (Route 111) From East					Driveway From South					Massachusetts Avenue (Route 111) From West					Int. Total
	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	
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	31	0	51	0	82	38	92	0	0	130	0	0	0	0	0	0	73	73	0	146	358
05:15 PM	28	0	46	0	74	33	98	0	0	131	0	0	0	0	0	0	72	59	0	131	336
05:30 PM	38	0	52	0	90	32	88	0	0	120	0	0	0	0	0	0	67	66	0	133	343
05:45 PM	52	0	64	0	116	42	129	0	0	171	0	0	0	0	0	0	72	30	0	102	389
Total Volume	149	0	213	0	362	145	407	0	0	552	0	0	0	0	0	0	284	228	0	512	1426
% App. Total	41.2	0	58.8	0		26.3	73.7	0	0		0	0	0	0	0	0	55.5	44.5	0		
PHF	.716	.000	.832	.000	.780	.863	.789	.000	.000	.807	.000	.000	.000	.000	.000	.000	.973	.781	.000	.877	.916
Cars	148	0	210	0	358	143	404	0	0	547	0	0	0	0	0	0	283	228	0	511	1416
% Cars	99.3	0	98.6	0	98.9	98.6	99.3	0	0	99.1	0	0	0	0	0	0	99.6	100	0	99.8	99.3
Heavy Vehicles	1	0	3	0	4	2	3	0	0	5	0	0	0	0	0	0	1	0	0	1	10
% Heavy Vehicles	0.7	0	1.4	0	1.1	1.4	0.7	0	0	0.9	0	0	0	0	0	0	0.4	0	0	0.2	0.7



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N/S: I-495 NB Ramps/ Driveway
E/W: Massachusetts Avenue (Route 111)
City, State: Boxborough, MA
Client: VHB/ V. Kalikiri

File Name : 144204 BB
Site Code : TBA
Start Date : 11/20/2014
Page No : 1

Groups Printed- Cars

Start Time	I-495 NB Ramps From North				Massachusetts Avenue (Route 111) From East				Driveway From South				Massachusetts Avenue (Route 111) From West				Int. Total
	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	
04:00 PM	18	0	42	0	27	104	0	0	0	0	0	0	0	53	36	0	280
04:15 PM	29	0	28	0	17	87	0	0	0	0	0	0	0	57	40	0	258
04:30 PM	29	0	38	0	29	90	0	0	0	0	0	0	0	59	45	0	290
04:45 PM	27	0	47	0	22	91	1	0	0	0	0	0	0	55	36	0	279
Total	103	0	155	0	95	372	1	0	0	0	0	0	0	224	157	0	1107
05:00 PM	31	0	50	0	38	91	0	0	0	0	0	0	0	73	73	0	356
05:15 PM	27	0	45	0	33	98	0	0	0	0	0	0	0	71	59	0	333
05:30 PM	38	0	51	0	31	88	0	0	0	0	0	0	0	67	66	0	341
05:45 PM	52	0	64	0	41	127	0	0	0	0	0	0	0	72	30	0	386
Total	148	0	210	0	143	404	0	0	0	0	0	0	0	283	228	0	1416
Grand Total	251	0	365	0	238	776	1	0	0	0	0	0	0	507	385	0	2523
Apprch %	40.7	0	59.3	0	23.4	76.5	0.1	0	0	0	0	0	0	56.8	43.2	0	
Total %	9.9	0	14.5	0	9.4	30.8	0	0	0	0	0	0	0	20.1	15.3	0	

Start Time	I-495 NB Ramps From North					Massachusetts Avenue (Route 111) From East					Driveway From South					Massachusetts Avenue (Route 111) From West					Int. Total
	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	
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	31	0	50	0	81	38	91	0	0	129	0	0	0	0	0	0	73	73	0	146	356
05:15 PM	27	0	45	0	72	33	98	0	0	131	0	0	0	0	0	0	71	59	0	130	333
05:30 PM	38	0	51	0	89	31	88	0	0	119	0	0	0	0	0	0	67	66	0	133	341
05:45 PM	52	0	64	0	116	41	127	0	0	168	0	0	0	0	0	0	72	30	0	102	386
Total Volume	148	0	210	0	358	143	404	0	0	547	0	0	0	0	0	0	283	228	0	511	1416
% App. Total	41.3	0	58.7	0		26.1	73.9	0	0		0	0	0	0	0	0	55.4	44.6	0		
PHF	.712	.000	.820	.000	.772	.872	.795	.000	.000	.814	.000	.000	.000	.000	.000	.000	.969	.781	.000	.875	.917



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Client: VHB/ V. Kalikiri

File Name : 144204 BB
Site Code : TBA
Start Date : 11/20/2014
Page No : 1

Groups Printed- Heavy Vehicles

Start Time	I-495 NB Ramps From North				Massachusetts Avenue (Route 111) From East				Driveway From South				Massachusetts Avenue (Route 111) From West				Int. Total
	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	
04:00 PM	0	0	3	0	0	2	0	0	0	0	0	0	0	5	3	0	13
04:15 PM	0	0	0	0	0	3	0	0	0	0	0	0	0	3	1	0	7
04:30 PM	1	0	0	0	0	7	0	0	0	0	0	0	0	1	1	0	10
04:45 PM	0	0	0	0	0	3	0	0	0	0	0	0	0	1	1	0	5
Total	1	0	3	0	0	15	0	0	0	0	0	0	0	10	6	0	35
05:00 PM	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	2
05:15 PM	1	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	3
05:30 PM	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	2
05:45 PM	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	3
Total	1	0	3	0	2	3	0	0	0	0	0	0	0	1	0	0	10
Grand Total	2	0	6	0	2	18	0	0	0	0	0	0	0	11	6	0	45
Apprch %	25	0	75	0	10	90	0	0	0	0	0	0	0	64.7	35.3	0	
Total %	4.4	0	13.3	0	4.4	40	0	0	0	0	0	0	0	24.4	13.3	0	

Start Time	I-495 NB Ramps From North					Massachusetts Avenue (Route 111) From East					Driveway From South					Massachusetts Avenue (Route 111) From West					Int. Total
	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	
04:00 PM	0	0	3	0	3	0	2	0	0	2	0	0	0	0	0	0	5	3	0	8	13
04:15 PM	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	3	1	0	4	7
04:30 PM	1	0	0	0	1	0	7	0	0	7	0	0	0	0	0	0	1	1	0	2	10
04:45 PM	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	1	1	0	2	5
Total Volume	1	0	3	0	4	0	15	0	0	15	0	0	0	0	0	0	10	6	0	16	35
% App. Total	25	0	75	0		0	100	0	0		0	0	0	0		0	62.5	37.5	0		
PHF	.250	.000	.250	.000	.333	.000	.536	.000	.000	.536	.000	.000	.000	.000	.000	.000	.500	.500	.000	.500	.673

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



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Groups Printed- Peds and Bicycles

Start Time	I-495 NB Ramps From North					Massachusetts Avenue (Route 111) From East					Driveway From South					Massachusetts Avenue (Route 111) From West					Int. Total
	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	
04:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Apprch %	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total %																					

Start Time	I-495 NB Ramps From North						Massachusetts Avenue (Route 111) From East						Driveway From South						Massachusetts Avenue (Route 111) From West						Int. Total			
	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				
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	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Volume	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% App. Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000

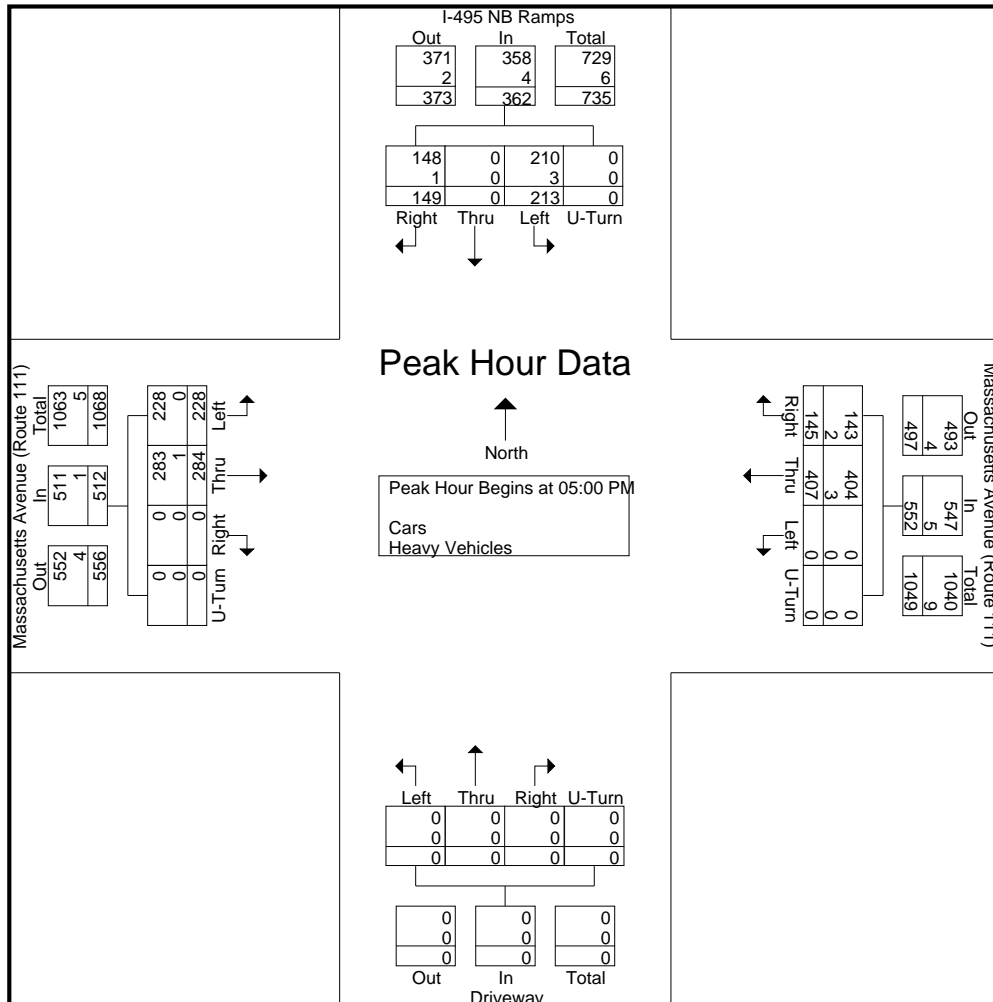


PRECISION
D A T A
INDUSTRIES, LLC
P.O. Box 301 Berlin, MA 01503
Office: 508.481.3999 Fax: 508.545.1234
Email: datarequests@pdillc.com

N/S: I-495 NB Ramps/ Driveway
E/W: Massachusetts Avenue (Route 111)
City, State: Boxborough, MA
Client: VHB/ V. Kalikiri

File Name : 144204 BB
Site Code : TBA
Start Date : 11/20/2014
Page No : 1

Start Time	I-495 NB Ramps From North					Massachusetts Avenue (Route 111) From East					Driveway From South					Massachusetts Avenue (Route 111) From West					Int. Total
	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	
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	31	0	51	0	82	38	92	0	0	130	0	0	0	0	0	0	73	73	0	146	358
05:15 PM	28	0	46	0	74	33	98	0	0	131	0	0	0	0	0	0	72	59	0	131	336
05:30 PM	38	0	52	0	90	32	88	0	0	120	0	0	0	0	0	0	67	66	0	133	343
05:45 PM	52	0	64	0	116	42	129	0	0	171	0	0	0	0	0	0	72	30	0	102	389
Total Volume	149	0	213	0	362	145	407	0	0	552	0	0	0	0	0	0	284	228	0	512	1426
% App. Total	41.2	0	58.8	0		26.3	73.7	0	0		0	0	0	0	0	0	55.5	44.5	0		
PHF	.716	.000	.832	.000	.780	.863	.789	.000	.000	.807	.000	.000	.000	.000	.000	.000	.973	.781	.000	.877	.916
Cars	148	0	210	0	358	143	404	0	0	547	0	0	0	0	0	0	283	228	0	511	1416
% Cars	99.3	0	98.6	0	98.9	98.6	99.3	0	0	99.1	0	0	0	0	0	0	99.6	100	0	99.8	99.3
Heavy Vehicles	1	0	3	0	4	2	3	0	0	5	0	0	0	0	0	0	1	0	0	1	10
% Heavy Vehicles	0.7	0	1.4	0	1.1	1.4	0.7	0	0	0.9	0	0	0	0	0	0	0.4	0	0	0.2	0.7





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N/NW/S: Gulf Dr/ Cunningham Rd/ Cisco E/W: Massachusetts Avenue (Route 111) City, State: Boxborough, MA Client: VHB/ V. Kalikiri

File Name : 144204 C Site Code : TBA Start Date : 11/20/2014 Page No : 1

Groups Printed- Cars - Heavy Vehicles

Table with columns for Start Time, direction (North, East, South, West, Northwest), and vehicle counts (Right, Thru, Left, U-Turn, Hard Right, Bear Right, etc.). Includes Grand Total and % breakdowns for Cars and Heavy Vehicles.

Table showing Peak Hour Analysis from 07:00 AM to 08:45 AM. Includes PHF (Peak Hour Factor) and detailed vehicle counts for Cars and Heavy Vehicles by time interval.



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N/NW/S: Gulf Dr/ Cunningham Rd/ Cisco E/W: Massachusetts Avenue (Route 111) City, State: Boxborough, MA Client: VHB/ V. Kalikiri

File Name : 144204 C Site Code : TBA Start Date : 11/20/2014 Page No : 1

Groups Printed- Cars

Table with columns for Start Time, direction (North, East, South, West, Northwest), and vehicle movements (Right, Thru, Left, U-Turn, Bear Right, Bear Left, Hard Right, Hard Left). Includes Grand Total and Apprch % rows.

Table showing Peak Hour Analysis from 07:00 AM to 08:45 AM. Includes a section for 'Peak Hour for Entire Intersection Begins at 07:45 AM' and a PHF (Peak Hour Factor) row at the bottom.



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N/NW/S: Gulf Dr/ Cunningham Rd/ Cisco
E/W: Massachusetts Avenue (Route 111)
City, State: Boxborough, MA
Client: VHB/ V. Kalikiri

File Name : 144204 C
Site Code : TBA
Start Date : 11/20/2014
Page No : 1

Groups Printed- Peds and Bicycles

Table with columns for Start Time, Gulf Driveway From North, Massachusetts Avenue (Route 111) From East, Cisco/Holiday Inn Drive From South, Massachusetts Avenue (Route 111) From West, and Cunningham Road From Northwest. Rows include time intervals (07:00 AM to 08:45 AM) and a Grand Total row.

Table with columns for Start Time, Gulf Driveway From North, Massachusetts Avenue (Route 111) From East, Cisco/Holiday Inn Drive From South, Massachusetts Avenue (Route 111) From West, and Cunningham Road From Northwest. Rows include Peak Hour Analysis (07:00 AM to 08:45 AM) and PHF (Peak Hour Factor) values.

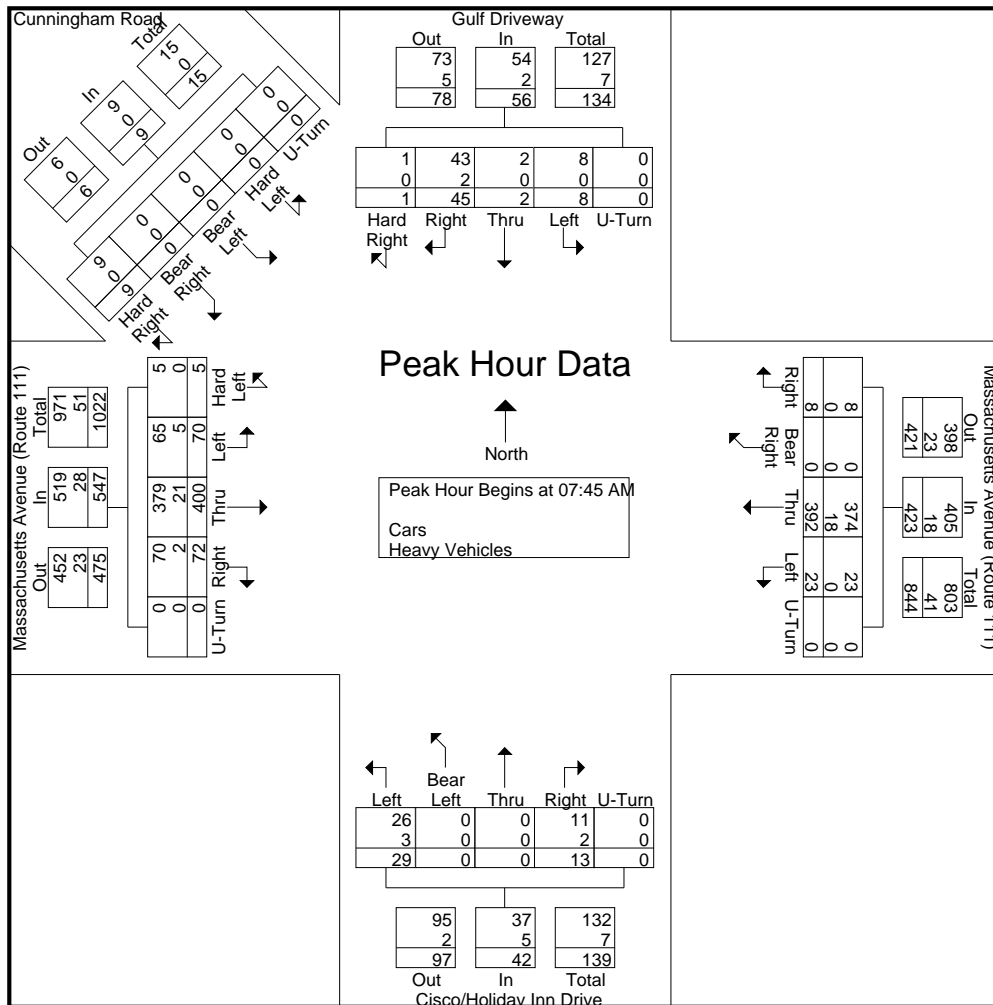
N/NW/S: Gulf Dr/ Cunningham Rd/ Cisco
 E/W: Massachusetts Avenue (Route 111)
 City, State: Boxborough, MA
 Client: VHB/ V. Kalikiri



PRECISION
 DATA
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File Name : 144204 C
 Site Code : TBA
 Start Date : 11/20/2014
 Page No : 1

Start Time	Gulf Driveway From North					Massachusetts Avenue (Route 111) From East					Cisco/Holiday Inn Drive From South					Massachusetts Avenue (Route 111) From West					Cunningham Road From Northwest					Int. Total					
	Hard Right	Right	Thru	Left	U-Turn	App. Total	Right	Bear Right	Thru	Left	U-Turn	App. Total	Right	Thru	Bear Left	Left	U-Turn	App. Total	Right	Thru	Left	Hard Left	U-Turn	App. Total	Hard Right		Bear Right	Bear Left	Hard Left	U-Turn	App. Total
07:45 AM	0	12	0	3	0	15	1	0	100	2	0	103	1	0	0	5	0	6	15	104	18	0	0	137	2	0	0	0	0	2	263
08:00 AM	0	14	1	2	0	17	1	0	101	5	0	107	5	0	0	7	0	12	18	105	15	3	0	141	3	0	0	0	0	3	280
08:15 AM	0	11	0	3	0	14	4	0	93	8	0	105	4	0	0	7	0	11	16	100	14	1	0	131	4	0	0	0	0	4	265
08:30 AM	1	8	1	0	0	10	2	0	98	8	0	108	3	0	0	10	0	13	23	91	23	1	0	138	0	0	0	0	0	0	269
Total Volume	1	45	2	8	0	56	8	0	392	23	0	423	13	0	0	29	0	42	72	400	70	5	0	547	9	0	0	0	0	9	1077
% App. Total	1.8	80.4	3.6	14.3	0		1.9	0	92.7	5.4	0		31	0	0	69	0		13.2	73.1	12.8	0.9	0		100	0	0	0	0	0	
PHF	.250	.804	.500	.667	.000	.824	.500	.000	.970	.719	.000	.979	.650	.000	.000	.725	.000	.808	.783	.952	.761	.417	.000	.970	.563	.000	.000	.000	.000	.563	.962
Cars	1	43	2	8	0	54	8	0	374	23	0	405	11	0	0	26	0	37	70	379	65	5	0	519	9	0	0	0	0	9	1024
% Cars	100	95.6	100	100	0	96.4	100	0	95.4	100	0	95.7	84.6	0	0	89.7	0	88.1	97.2	94.8	92.9	100	0	94.9	100	0	0	0	0	100	95.1
Heavy Vehicles	0	2	0	0	0	2	0	0	18	0	0	18	2	0	0	3	0	5	2	21	5	0	0	28	0	0	0	0	0	0	53
% Heavy Vehicles	0	4.4	0	0	0	3.6	0	0	4.6	0	0	4.3	15.4	0	0	10.3	0	11.9	2.8	5.3	7.1	0	0	5.1	0	0	0	0	0	0	4.9





PRECISION DATA INDUSTRIES, LLC

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N/NW/S: Gulf Dr/ Cunningham Rd/ Cisco E/W: Massachusetts Avenue (Route 111) City, State: Boxborough, MA Client: VHB/ V. Kalikiri

File Name : 144204 CC Site Code : TBA Start Date : 11/20/2014 Page No : 1

Groups Printed- Cars - Heavy Vehicles

Table with columns for Start Time, direction (North, East, South, West, Northwest), and vehicle counts for various movements (Right, Thru, Left, U-Turn, Hard Right, Bear Right, etc.). Includes a Grand Total row and percentage breakdowns.

Table showing Peak Hour Analysis for the intersection from 05:00 PM to 05:45 PM. Includes PHF (Peak Hour Factor) and % App. Total for various movements.



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INDUSTRIES, LLC

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N/NW/S: Gulf Dr/ Cunningham Rd/ Cisco
E/W: Massachusetts Avenue (Route 111)
City, State: Boxborough, MA
Client: VHB/ V. Kalikiri

File Name : 144204 CC
Site Code : TBA
Start Date : 11/20/2014
Page No : 1

Groups Printed- Cars

Start Time	Gulf Driveway From North					Massachusetts Avenue (Route 111) From East					Cisco/Holiday Inn Drive From South					Massachusetts Avenue (Route 111) From West					Cunningham Road From Northwest					Int. Total
	Hard Right	Right	Thru	Left	U-Turn	Right	Bear Right	Thru	Left	U-Turn	Right	Thru	Bear Left	Left	U-Turn	Right	Thru	Left	Hard Left	U-Turn	Hard Right	Bear Right	Bear Left	Hard Left	U-Turn	
04:00 PM	0	10	2	1	0	0	0	113	5	0	1	0	0	3	0	9	80	12	1	0	1	0	0	0	0	238
04:15 PM	0	11	0	1	0	1	0	87	5	0	2	0	0	5	0	13	63	8	1	0	1	0	0	0	0	198
04:30 PM	1	19	0	3	0	0	0	92	8	0	1	0	0	5	0	4	80	9	2	0	2	0	0	0	0	226
04:45 PM	0	10	0	2	0	1	0	100	14	0	1	0	0	5	0	10	86	10	2	0	2	0	0	0	0	243
Total	1	50	2	7	0	2	0	392	32	0	5	0	0	18	0	36	309	39	6	0	6	0	0	0	0	905
05:00 PM	0	7	0	3	0	3	0	122	2	0	0	0	0	1	0	10	100	9	1	0	1	0	1	0	0	260
05:15 PM	0	5	0	2	0	0	0	121	5	0	1	0	0	4	0	10	90	12	2	0	0	0	0	0	0	252
05:30 PM	0	9	0	2	0	4	0	107	1	0	0	0	0	4	0	13	97	3	1	0	2	0	0	0	0	243
05:45 PM	0	13	0	0	0	2	0	144	2	0	1	0	0	6	0	16	108	9	1	0	4	0	0	0	0	306
Total	0	34	0	7	0	9	0	494	10	0	2	0	0	15	0	49	395	33	5	0	7	0	1	0	0	1061
Grand Total	1	84	2	14	0	11	0	886	42	0	7	0	0	33	0	85	704	72	11	0	13	0	1	0	0	1966
Apprch %	1	83.2	2	13.9	0	1.2	0	94.4	4.5	0	17.5	0	0	82.5	0	9.7	80.7	8.3	1.3	0	92.9	0	7.1	0	0	
Total %	0.1	4.3	0.1	0.7	0	0.6	0	45.1	2.1	0	0.4	0	0	1.7	0	4.3	35.8	3.7	0.6	0	0.7	0	0.1	0	0	

Start Time	Gulf Driveway From North						Massachusetts Avenue (Route 111) From East						Cisco/Holiday Inn Drive From South						Massachusetts Avenue (Route 111) From West						Cunningham Road From Northwest						Int. Total	
	Hard Right	Right	Thru	Left	U-Turn	App. Total	Right	Bear Right	Thru	Left	U-Turn	App. Total	Right	Thru	Bear Left	Left	U-Turn	App. Total	Right	Thru	Left	Hard Left	U-Turn	App. Total	Hard Right	Bear Right	Bear Left	Hard Left	U-Turn	App. 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	3	0	10	3	0	122	2	0	127	0	0	0	1	0	1	10	100	9	1	0	120	1	0	1	0	0	2	260	
05:15 PM	0	5	0	2	0	7	0	0	121	5	0	126	1	0	0	4	0	5	10	90	12	2	0	114	0	0	0	0	0	0	252	
05:30 PM	0	9	0	2	0	11	4	0	107	1	0	112	0	0	0	4	0	4	13	97	3	1	0	114	2	0	0	0	0	2	243	
05:45 PM	0	13	0	0	0	13	2	0	144	2	0	148	1	0	0	6	0	7	16	108	9	1	0	134	4	0	0	0	0	4	306	
Total Volume	0	34	0	7	0	41	9	0	494	10	0	513	2	0	0	15	0	17	49	395	33	5	0	482	7	0	1	0	0	8	1061	
% App. Total	0	82.9	0	17.1	0	1.8	0	96.3	1.9	0	11.8	0	0	88.2	0	10.2	82	6.8	1	0	87.5	0	12.5	0	0							
PHF	.000	.654	.000	.583	.000	.788	.563	.000	.858	.500	.000	.867	.500	.000	.000	.625	.000	.607	.766	.914	.688	.625	.000	.899	.438	.000	.250	.000	.000	.500	.867	



PRECISION DATA INDUSTRIES, LLC

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Office: 508.481.3999 Fax: 508.545.1234
Email: datarequests@pdillc.com

N/NW/S: Gulf Dr/ Cunningham Rd/ Cisco
E/W: Massachusetts Avenue (Route 111)
City, State: Boxborough, MA
Client: VHB/ V. Kalikiri

File Name : 144204 CC
Site Code : TBA
Start Date : 11/20/2014
Page No : 1

Groups Printed- Peds and Bicycles

Table with columns for Start Time, Gulf Driveway From North, Massachusetts Avenue (Route 111) From East, Cisco/Holiday Inn Drive From South, Massachusetts Avenue (Route 111) From West, and Cunningham Road From Northwest. Rows include time intervals (04:00 PM to 05:45 PM) and a Grand Total row.

Table with columns for Start Time, Gulf Driveway From North, Massachusetts Avenue (Route 111) From East, Cisco/Holiday Inn Drive From South, Massachusetts Avenue (Route 111) From West, and Cunningham Road From Northwest. Rows include Peak Hour Analysis (04:00 PM to 05:45 PM) and PHF (Peak Hour Factor) values.



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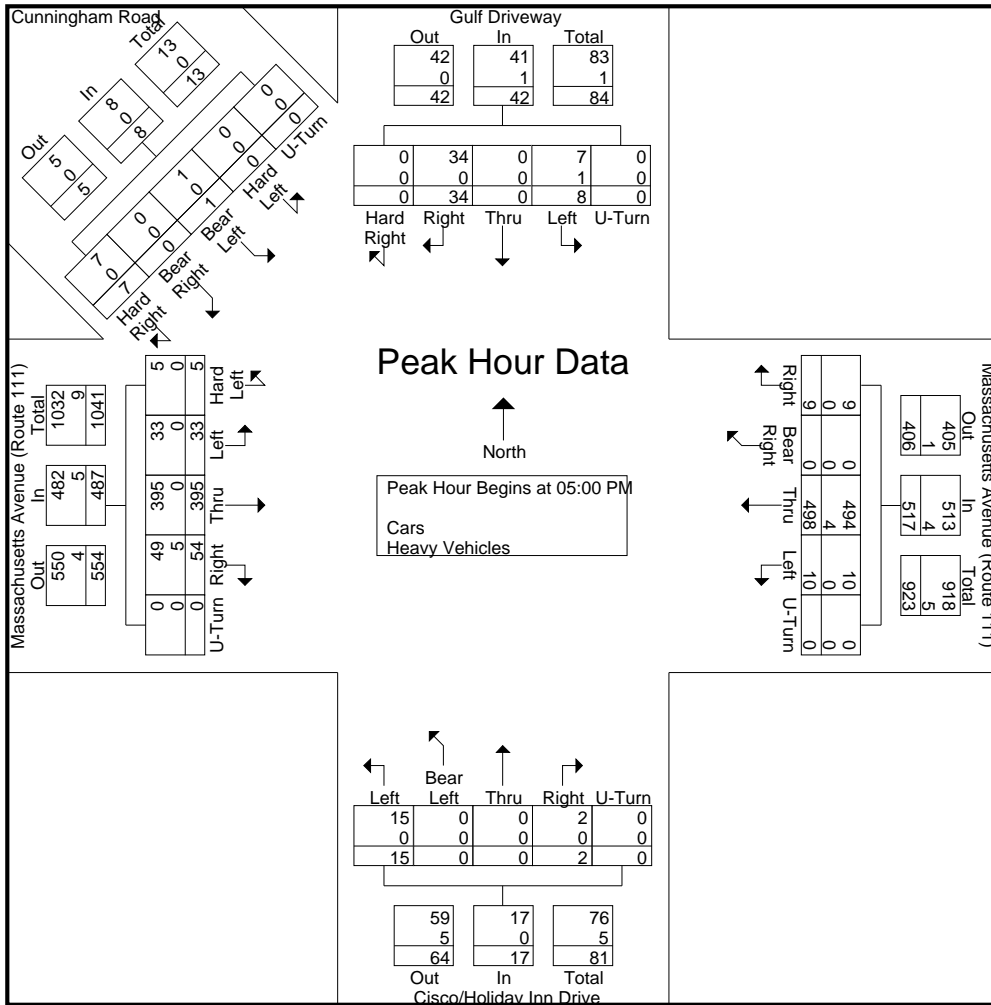
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N/NW/S: Gulf Dr/ Cunningham Rd/ Cisco
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City, State: Boxborough, MA
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File Name : 144204 CC
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Start Date : 11/20/2014
Page No : 1

Start Time	Gulf Driveway From North					Massachusetts Avenue (Route 111) From East					Cisco/Holiday Inn Drive From South					Massachusetts Avenue (Route 111) From West					Cunningham Road From Northwest					Int. Total					
	Hard Right	Right	Thru	Left	U-Turn	App. Total	Right	Bear Right	Thru	Left	U-Turn	App. Total	Right	Thru	Bear Left	Left	U-Turn	App. Total	Right	Thru	Left	Hard Left	U-Turn	App. Total	Hard Right		Bear Right	Bear Left	Hard Left	U-Turn	App. Total
05:00 PM	0	7	0	3	0	10	3	0	123	2	0	128	0	0	0	1	0	1	11	100	9	1	0	121	1	0	1	0	0	2	262
05:15 PM	0	5	0	2	0	7	0	0	122	5	0	127	1	0	0	4	0	5	12	90	12	2	0	116	0	0	0	0	0	0	255
05:30 PM	0	9	0	3	0	12	4	0	108	1	0	113	0	0	0	4	0	4	15	97	3	1	0	116	2	0	0	0	0	2	247
05:45 PM	0	13	0	0	0	13	2	0	145	2	0	149	1	0	0	6	0	7	16	108	9	1	0	134	4	0	0	0	0	4	307
Total Volume	0	34	0	8	0	42	9	0	498	10	0	517	2	0	0	15	0	17	54	395	33	5	0	487	7	0	1	0	0	8	1071
% App. Total	0	81	0	19	0		1.7	0	96.3	1.9	0		11.8	0	0	88.2	0		11.1	81.1	6.8	1	0		87.5	0	12.5	0	0		
PHF	.000	.654	.000	.667	.000	.808	.563	.000	.859	.500	.000	.867	.500	.000	.000	.625	.000	.607	.844	.914	.688	.625	.000	.909	.438	.000	.250	.000	.000	.500	.872
Cars	0	34	0	7	0	41	9	0	494	10	0	513	2	0	0	15	0	17	49	395	33	5	0	482	7	0	1	0	0	8	1061
% Cars	0	100	0	87.5	0	97.6	100	0	99.2	100	0	99.2	100	0	0	100	0	100	90.7	100	100	100	0	99.0	100	0	100	0	0	100	99.1
Heavy Vehicles	0	0	0	1	0	1	0	0	4	0	0	4	0	0	0	0	0	0	5	0	0	0	0	5	0	0	0	0	0	0	10
% Heavy Vehicles	0	0	0	12.5	0	2.4	0	0	0.8	0	0	0.8	0	0	0	0	0	0	9.3	0	0	0	0	1.0	0	0	0	0	0	0	0.9

Peak Hour for Entire Intersection Begins at 05:00 PM





PRECISION
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N/S: Driveway/ Cisco East Driveway
E/W: Massachusetts Avenue (Route 111)
City, State: Boxborough, MA
Client: VHB/ V. Kalikiri

File Name : 144204 D
Site Code : TBA
Start Date : 11/20/2014
Page No : 1

Groups Printed- Cars - Heavy Vehicles

Start Time	Driveway From North				Massachusetts Avenue (Route 111) From East				Cisco East Driveway From South				Massachusetts Avenue (Route 111) From West				Int. Total
	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	
07:00 AM	11	0	7	0	12	64	0	0	0	0	0	0	0	65	16	0	175
07:15 AM	7	0	14	0	11	91	0	0	0	0	2	0	0	89	7	1	222
07:30 AM	16	0	5	1	16	73	0	0	0	0	3	0	0	94	13	0	221
07:45 AM	18	0	2	0	9	75	0	0	0	0	0	0	0	95	10	0	209
Total	52	0	28	1	48	303	0	0	0	0	5	0	0	343	46	1	827
08:00 AM	16	0	0	0	1	90	0	0	1	0	1	0	1	104	11	0	225
08:15 AM	17	0	0	0	0	92	0	0	0	0	3	0	0	106	11	0	229
08:30 AM	18	0	0	0	0	98	0	0	0	0	2	0	0	90	11	0	219
08:45 AM	11	0	3	0	2	82	0	0	0	0	4	0	0	83	13	0	198
Total	62	0	3	0	3	362	0	0	1	0	10	0	1	383	46	0	871
Grand Total	114	0	31	1	51	665	0	0	1	0	15	0	1	726	92	1	1698
Apprch %	78.1	0	21.2	0.7	7.1	92.9	0	0	6.2	0	93.8	0	0.1	88.5	11.2	0.1	
Total %	6.7	0	1.8	0.1	3	39.2	0	0	0.1	0	0.9	0	0.1	42.8	5.4	0.1	
Cars	113	0	28	1	50	637	0	0	1	0	13	0	1	684	88	0	1616
% Cars	99.1	0	90.3	100	98	95.8	0	0	100	0	86.7	0	100	94.2	95.7	0	95.2
Heavy Vehicles	1	0	3	0	1	28	0	0	0	0	2	0	0	42	4	1	82
% Heavy Vehicles	0.9	0	9.7	0	2	4.2	0	0	0	0	13.3	0	0	5.8	4.3	100	4.8

Start Time	Driveway From North					Massachusetts Avenue (Route 111) From East					Cisco East Driveway From South					Massachusetts Avenue (Route 111) From West					Int. Total
	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	
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	16	0	5	1	22	16	73	0	0	89	0	0	3	0	3	0	94	13	0	107	221
07:45 AM	18	0	2	0	20	9	75	0	0	84	0	0	0	0	0	0	95	10	0	105	209
08:00 AM	16	0	0	0	16	1	90	0	0	91	1	0	1	0	2	1	104	11	0	116	225
08:15 AM	17	0	0	0	17	0	92	0	0	92	0	0	3	0	3	0	106	11	0	117	229
Total Volume	67	0	7	1	75	26	330	0	0	356	1	0	7	0	8	1	399	45	0	445	884
% App. Total	89.3	0	9.3	1.3		7.3	92.7	0	0		12.5	0	87.5	0		0.2	89.7	10.1	0		
PHF	.931	.000	.350	.250	.852	.406	.897	.000	.000	.967	.250	.000	.583	.000	.667	.250	.941	.865	.000	.951	.965
Cars	66	0	7	1	74	26	314	0	0	340	1	0	5	0	6	1	377	43	0	421	841
% Cars	98.5	0	100	100	98.7	100	95.2	0	0	95.5	100	0	71.4	0	75.0	100	94.5	95.6	0	94.6	95.1
Heavy Vehicles	1	0	0	0	1	0	16	0	0	16	0	0	2	0	2	0	22	2	0	24	43
% Heavy Vehicles	1.5	0	0	0	1.3	0	4.8	0	0	4.5	0	0	28.6	0	25.0	0	5.5	4.4	0	5.4	4.9



PRECISION
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N/S: Driveway/ Cisco East Driveway
E/W: Massachusetts Avenue (Route 111)
City, State: Boxborough, MA
Client: VHB/ V. Kalikiri

File Name : 144204 D
Site Code : TBA
Start Date : 11/20/2014
Page No : 1

Groups Printed- Cars

Start Time	Driveway From North				Massachusetts Avenue (Route 111) From East				Cisco East Driveway From South				Massachusetts Avenue (Route 111) From West				Int. Total
	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	
07:00 AM	11	0	7	0	12	63	0	0	0	0	0	0	0	61	16	0	170
07:15 AM	7	0	11	0	11	87	0	0	0	0	2	0	0	82	6	0	206
07:30 AM	16	0	5	1	16	70	0	0	0	0	1	0	0	91	13	0	213
07:45 AM	18	0	2	0	9	65	0	0	0	0	0	0	0	89	10	0	193
Total	52	0	25	1	48	285	0	0	0	0	3	0	0	323	45	0	782
08:00 AM	15	0	0	0	1	89	0	0	1	0	1	0	1	97	9	0	214
08:15 AM	17	0	0	0	0	90	0	0	0	0	3	0	0	100	11	0	221
08:30 AM	18	0	0	0	0	93	0	0	0	0	2	0	0	86	10	0	209
08:45 AM	11	0	3	0	1	80	0	0	0	0	4	0	0	78	13	0	190
Total	61	0	3	0	2	352	0	0	1	0	10	0	1	361	43	0	834
Grand Total	113	0	28	1	50	637	0	0	1	0	13	0	1	684	88	0	1616
Apprch %	79.6	0	19.7	0.7	7.3	92.7	0	0	7.1	0	92.9	0	0.1	88.5	11.4	0	
Total %	7	0	1.7	0.1	3.1	39.4	0	0	0.1	0	0.8	0	0.1	42.3	5.4	0	

Start Time	Driveway From North					Massachusetts Avenue (Route 111) From East					Cisco East Driveway From South					Massachusetts Avenue (Route 111) From West					Int. Total
	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	
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	16	0	5	1	22	16	70	0	0	86	0	0	1	0	1	0	91	13	0	104	213
07:45 AM	18	0	2	0	20	9	65	0	0	74	0	0	0	0	0	0	89	10	0	99	193
08:00 AM	15	0	0	0	15	1	89	0	0	90	1	0	1	0	2	1	97	9	0	107	214
08:15 AM	17	0	0	0	17	0	90	0	0	90	0	0	3	0	3	0	100	11	0	111	221
Total Volume	66	0	7	1	74	26	314	0	0	340	1	0	5	0	6	1	377	43	0	421	841
% App. Total	89.2	0	9.5	1.4		7.6	92.4	0	0		16.7	0	83.3	0		0.2	89.5	10.2	0		
PHF	.917	.000	.350	.250	.841	.406	.872	.000	.000	.944	.250	.000	.417	.000	.500	.250	.943	.827	.000	.948	.951



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N/S: Driveway/ Cisco East Driveway
E/W: Massachusetts Avenue (Route 111)
City, State: Boxborough, MA
Client: VHB/ V. Kalikiri

File Name : 144204 D
Site Code : TBA
Start Date : 11/20/2014
Page No : 1

Groups Printed- Heavy Vehicles

Start Time	Driveway From North				Massachusetts Avenue (Route 111) From East				Cisco East Driveway From South				Massachusetts Avenue (Route 111) From West				Int. Total
	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	
07:00 AM	0	0	0	0	0	1	0	0	0	0	0	0	0	4	0	0	5
07:15 AM	0	0	3	0	0	4	0	0	0	0	0	0	0	7	1	1	16
07:30 AM	0	0	0	0	0	3	0	0	0	0	2	0	0	3	0	0	8
07:45 AM	0	0	0	0	0	10	0	0	0	0	0	0	0	6	0	0	16
Total	0	0	3	0	0	18	0	0	0	0	2	0	0	20	1	1	45
08:00 AM	1	0	0	0	0	1	0	0	0	0	0	0	0	7	2	0	11
08:15 AM	0	0	0	0	0	2	0	0	0	0	0	0	0	6	0	0	8
08:30 AM	0	0	0	0	0	5	0	0	0	0	0	0	0	4	1	0	10
08:45 AM	0	0	0	0	1	2	0	0	0	0	0	0	0	5	0	0	8
Total	1	0	0	0	1	10	0	0	0	0	0	0	0	22	3	0	37
Grand Total	1	0	3	0	1	28	0	0	0	0	2	0	0	42	4	1	82
Apprch %	25	0	75	0	3.4	96.6	0	0	0	0	100	0	0	89.4	8.5	2.1	
Total %	1.2	0	3.7	0	1.2	34.1	0	0	0	0	2.4	0	0	51.2	4.9	1.2	

Start Time	Driveway From North					Massachusetts Avenue (Route 111) From East					Cisco East Driveway From South					Massachusetts Avenue (Route 111) From West					Int. Total
	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	
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:15 AM																					
07:15 AM	0	0	3	0	3	0	4	0	0	4	0	0	0	0	0	0	7	1	1	9	16
07:30 AM	0	0	0	0	0	0	3	0	0	3	0	0	2	0	2	0	3	0	0	3	8
07:45 AM	0	0	0	0	0	0	10	0	0	10	0	0	0	0	0	0	6	0	0	6	16
08:00 AM	1	0	0	0	1	0	1	0	0	1	0	0	0	0	0	0	7	2	0	9	11
Total Volume	1	0	3	0	4	0	18	0	0	18	0	0	2	0	2	0	23	3	1	27	51
% App. Total	25	0	75	0		0	100	0	0		0	0	100	0		0	85.2	11.1	3.7		
PHF	.250	.000	.250	.000	.333	.000	.450	.000	.000	.450	.000	.000	.250	.000	.250	.000	.821	.375	.250	.750	.797



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N/S: Driveway/ Cisco East Driveway
E/W: Massachusetts Avenue (Route 111)
City, State: Boxborough, MA
Client: VHB/ V. Kalikiri

File Name : 144204 D
Site Code : TBA
Start Date : 11/20/2014
Page No : 1

Groups Printed- Peds and Bicycles

Table with columns: Start Time, Driveway From North (Right, Thru, Left, Peds EB, Peds WB), Massachusetts Avenue (Route 111) From East (Right, Thru, Left, Peds SB, Peds NB), Cisco East Driveway From South (Right, Thru, Left, Peds WB, Peds EB), Massachusetts Avenue (Route 111) From West (Right, Thru, Left, Peds NB, Peds SB), Int. Total. Rows include time intervals from 07:00 AM to 08:45 AM and Grand Total.

Table with columns: Start Time, Driveway From North (Right, Thru, Left, Peds EB, Peds WB, App. Total), Massachusetts Avenue (Route 111) From East (Right, Thru, Left, Peds SB, Peds NB, App. Total), Cisco East Driveway From South (Right, Thru, Left, Peds WB, Peds EB, App. Total), Massachusetts Avenue (Route 111) From West (Right, Thru, Left, Peds NB, Peds SB, App. Total), Int. Total. Rows include Peak Hour Analysis and PHF (Peak Hour Factor).



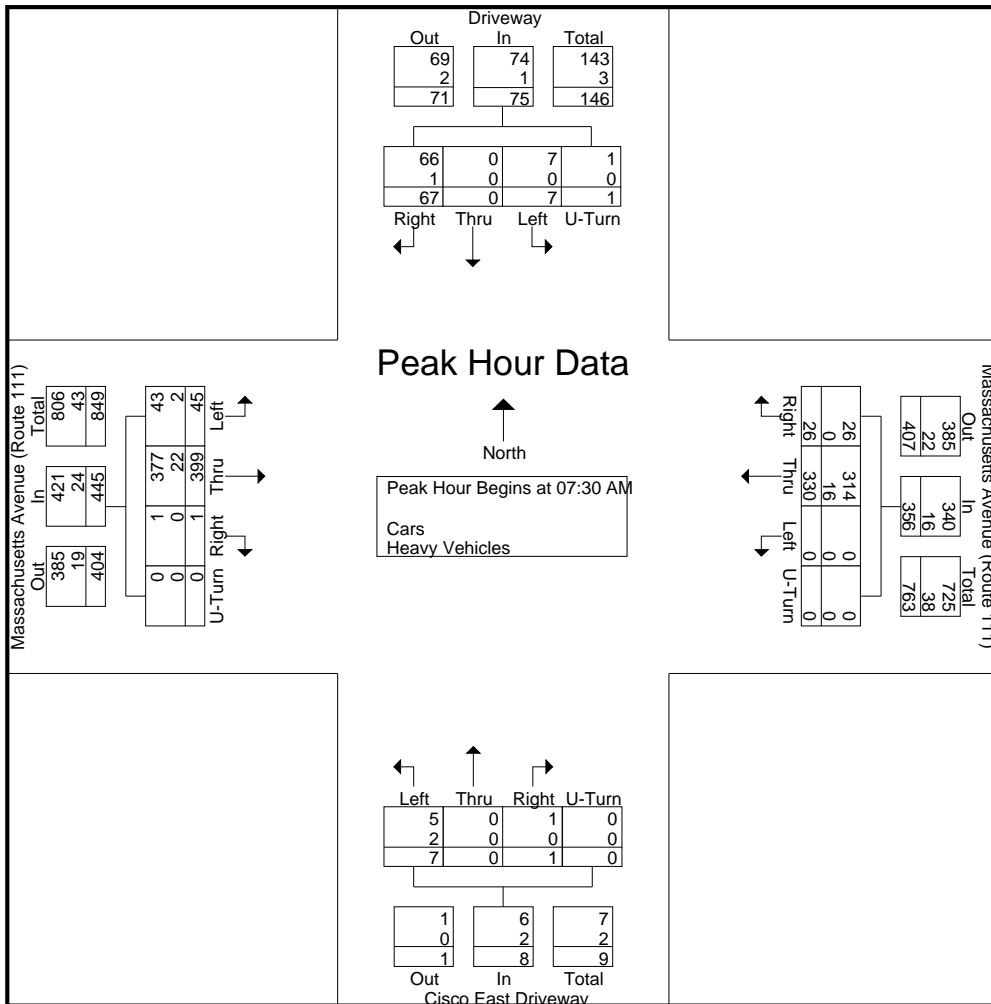
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N/S: Driveway/ Cisco East Driveway
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Client: VHB/ V. Kalikiri

File Name : 144204 D
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Start Date : 11/20/2014
Page No : 1

Start Time	Driveway From North					Massachusetts Avenue (Route 111) From East					Cisco East Driveway From South					Massachusetts Avenue (Route 111) From West					Int. Total
	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	
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	16	0	5	1	22	16	73	0	0	89	0	0	3	0	3	0	94	13	0	107	221
07:45 AM	18	0	2	0	20	9	75	0	0	84	0	0	0	0	0	0	95	10	0	105	209
08:00 AM	16	0	0	0	16	1	90	0	0	91	1	0	1	0	2	1	104	11	0	116	225
08:15 AM	17	0	0	0	17	0	92	0	0	92	0	0	3	0	3	0	106	11	0	117	229
Total Volume	67	0	7	1	75	26	330	0	0	356	1	0	7	0	8	1	399	45	0	445	884
% App. Total	89.3	0	9.3	1.3		7.3	92.7	0	0		12.5	0	87.5	0		0.2	89.7	10.1	0		
PHF	.931	.000	.350	.250	.852	.406	.897	.000	.000	.967	.250	.000	.583	.000	.667	.250	.941	.865	.000	.951	.965
Cars	66	0	7	1	74	26	314	0	0	340	1	0	5	0	6	1	377	43	0	421	841
% Cars	98.5	0	100	100	98.7	100	95.2	0	0	95.5	100	0	71.4	0	75.0	100	94.5	95.6	0	94.6	95.1
Heavy Vehicles	1	0	0	0	1	0	16	0	0	16	0	0	2	0	2	0	22	2	0	24	43
% Heavy Vehicles	1.5	0	0	0	1.3	0	4.8	0	0	4.5	0	0	28.6	0	25.0	0	5.5	4.4	0	5.4	4.9





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Site Code : TBA
Start Date : 11/20/2014
Page No : 1

N/S: Driveway/ Cisco East Driveway
E/W: Massachusetts Avenue (Route 111)
City, State: Boxborough, MA
Client: VHB/ V. Kalikiri

Groups Printed- Cars - Heavy Vehicles

Start Time	Driveway From North				Massachusetts Avenue (Route 111) From East				Cisco East Driveway From South				Massachusetts Avenue (Route 111) From West				Int. Total
	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	
04:00 PM	14	0	0	0	4	101	0	0	5	0	8	0	0	82	6	0	220
04:15 PM	4	0	0	0	6	87	0	0	4	0	7	0	0	65	6	0	179
04:30 PM	11	0	1	0	15	86	0	0	5	1	9	0	0	83	10	0	221
04:45 PM	8	0	0	0	5	101	0	0	6	0	6	0	0	88	7	0	221
Total	37	0	1	0	30	375	0	0	20	1	30	0	0	318	29	0	841
05:00 PM	10	0	0	0	0	108	0	0	7	0	13	0	0	98	0	0	236
05:15 PM	9	0	0	0	0	106	0	0	4	0	13	0	0	94	4	0	230
05:30 PM	8	0	0	0	0	101	0	0	4	0	15	0	0	99	6	0	233
05:45 PM	10	0	0	0	0	118	0	0	2	0	18	0	0	104	7	0	259
Total	37	0	0	0	0	433	0	0	17	0	59	0	0	395	17	0	958
Grand Total	74	0	1	0	30	808	0	0	37	1	89	0	0	713	46	0	1799
Apprch %	98.7	0	1.3	0	3.6	96.4	0	0	29.1	0.8	70.1	0	0	93.9	6.1	0	
Total %	4.1	0	0.1	0	1.7	44.9	0	0	2.1	0.1	4.9	0	0	39.6	2.6	0	
Cars	73	0	1	0	30	788	0	0	35	0	87	0	0	703	46	0	1763
% Cars	98.6	0	100	0	100	97.5	0	0	94.6	0	97.8	0	0	98.6	100	0	98
Heavy Vehicles	1	0	0	0	0	20	0	0	2	1	2	0	0	10	0	0	36
% Heavy Vehicles	1.4	0	0	0	0	2.5	0	0	5.4	100	2.2	0	0	1.4	0	0	2

Start Time	Driveway From North					Massachusetts Avenue (Route 111) From East					Cisco East Driveway From South					Massachusetts Avenue (Route 111) From West					Int. Total
	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	
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	10	0	0	0	10	0	108	0	0	108	7	0	13	0	20	0	98	0	0	98	236
05:15 PM	9	0	0	0	9	0	106	0	0	106	4	0	13	0	17	0	94	4	0	98	230
05:30 PM	8	0	0	0	8	0	101	0	0	101	4	0	15	0	19	0	99	6	0	105	233
05:45 PM	10	0	0	0	10	0	118	0	0	118	2	0	18	0	20	0	104	7	0	111	259
Total Volume	37	0	0	0	37	0	433	0	0	433	17	0	59	0	76	0	395	17	0	412	958
% App. Total	100	0	0	0		0	100	0	0		22.4	0	77.6	0		0	95.9	4.1	0		
PHF	.925	.000	.000	.000	.925	.000	.917	.000	.000	.917	.607	.000	.819	.000	.950	.000	.950	.607	.000	.928	.925
Cars	37	0	0	0	37	0	427	0	0	427	17	0	58	0	75	0	394	17	0	411	950
% Cars	100	0	0	0	100	0	98.6	0	0	98.6	100	0	98.3	0	98.7	0	99.7	100	0	99.8	99.2
Heavy Vehicles	0	0	0	0	0	0	6	0	0	6	0	0	1	0	1	0	1	0	0	1	8
% Heavy Vehicles	0	0	0	0	0	0	1.4	0	0	1.4	0	0	1.7	0	1.3	0	0.3	0	0	0.2	0.8



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File Name : 144204 DD
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N/S: Driveway/ Cisco East Driveway
E/W: Massachusetts Avenue (Route 111)
City, State: Boxborough, MA
Client: VHB/ V. Kalikiri

Groups Printed- Cars

Start Time	Driveway From North				Massachusetts Avenue (Route 111) From East				Cisco East Driveway From South				Massachusetts Avenue (Route 111) From West				Int. Total
	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	
04:00 PM	14	0	0	0	4	100	0	0	3	0	8	0	0	78	6	0	213
04:15 PM	4	0	0	0	6	82	0	0	4	0	7	0	0	63	6	0	172
04:30 PM	11	0	1	0	15	81	0	0	5	0	8	0	0	81	10	0	212
04:45 PM	7	0	0	0	5	98	0	0	6	0	6	0	0	87	7	0	216
Total	36	0	1	0	30	361	0	0	18	0	29	0	0	309	29	0	813
05:00 PM	10	0	0	0	0	107	0	0	7	0	13	0	0	98	0	0	235
05:15 PM	9	0	0	0	0	105	0	0	4	0	13	0	0	94	4	0	229
05:30 PM	8	0	0	0	0	100	0	0	4	0	14	0	0	98	6	0	230
05:45 PM	10	0	0	0	0	115	0	0	2	0	18	0	0	104	7	0	256
Total	37	0	0	0	0	427	0	0	17	0	58	0	0	394	17	0	950
Grand Total	73	0	1	0	30	788	0	0	35	0	87	0	0	703	46	0	1763
Apprch %	98.6	0	1.4	0	3.7	96.3	0	0	28.7	0	71.3	0	0	93.9	6.1	0	
Total %	4.1	0	0.1	0	1.7	44.7	0	0	2	0	4.9	0	0	39.9	2.6	0	

Start Time	Driveway From North					Massachusetts Avenue (Route 111) From East					Cisco East Driveway From South					Massachusetts Avenue (Route 111) From West					Int. Total
	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	
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	10	0	0	0	10	0	107	0	0	107	7	0	13	0	20	0	98	0	0	98	235
05:15 PM	9	0	0	0	9	0	105	0	0	105	4	0	13	0	17	0	94	4	0	98	229
05:30 PM	8	0	0	0	8	0	100	0	0	100	4	0	14	0	18	0	98	6	0	104	230
05:45 PM	10	0	0	0	10	0	115	0	0	115	2	0	18	0	20	0	104	7	0	111	256
Total Volume	37	0	0	0	37	0	427	0	0	427	17	0	58	0	75	0	394	17	0	411	950
% App. Total	100	0	0	0		0	100	0	0		22.7	0	77.3	0		0	95.9	4.1	0		
PHF	.925	.000	.000	.000	.925	.000	.928	.000	.000	.928	.607	.000	.806	.000	.938	.000	.947	.607	.000	.926	.928



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INDUSTRIES, LLC

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Office: 508.481.3999 Fax: 508.545.1234
Email: datarequests@pdillc.com

N/S: Driveway/ Cisco East Driveway
E/W: Massachusetts Avenue (Route 111)
City, State: Boxborough, MA
Client: VHB/ V. Kalikiri

File Name : 144204 DD
Site Code : TBA
Start Date : 11/20/2014
Page No : 1

Groups Printed- Heavy Vehicles

Start Time	Driveway From North				Massachusetts Avenue (Route 111) From East				Cisco East Driveway From South				Massachusetts Avenue (Route 111) From West				Int. Total
	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	
04:00 PM	0	0	0	0	0	1	0	0	2	0	0	0	0	4	0	0	7
04:15 PM	0	0	0	0	0	5	0	0	0	0	0	0	0	2	0	0	7
04:30 PM	0	0	0	0	0	5	0	0	0	1	1	0	0	2	0	0	9
04:45 PM	1	0	0	0	0	3	0	0	0	0	0	0	0	1	0	0	5
Total	1	0	0	0	0	14	0	0	2	1	1	0	0	9	0	0	28
05:00 PM	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
05:15 PM	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
05:30 PM	0	0	0	0	0	1	0	0	0	0	1	0	0	1	0	0	3
05:45 PM	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	3
Total	0	0	0	0	0	6	0	0	0	0	1	0	0	1	0	0	8
Grand Total	1	0	0	0	0	20	0	0	2	1	2	0	0	10	0	0	36
Apprch %	100	0	0	0	0	100	0	0	40	20	40	0	0	100	0	0	
Total %	2.8	0	0	0	0	55.6	0	0	5.6	2.8	5.6	0	0	27.8	0	0	

Start Time	Driveway From North					Massachusetts Avenue (Route 111) From East					Cisco East Driveway From South					Massachusetts Avenue (Route 111) From West					Int. Total
	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	
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	0	0	0	0	0	1	0	0	1	2	0	0	0	2	0	4	0	0	4	7
04:15 PM	0	0	0	0	0	0	5	0	0	5	0	0	0	0	0	0	2	0	0	2	7
04:30 PM	0	0	0	0	0	0	5	0	0	5	0	1	1	0	2	0	2	0	0	2	9
04:45 PM	1	0	0	0	1	0	3	0	0	3	0	0	0	0	0	0	1	0	0	1	5
Total Volume	1	0	0	0	1	0	14	0	0	14	2	1	1	0	4	0	9	0	0	9	28
% App. Total	100	0	0	0		0	100	0	0		50	25	25	0		0	100	0	0		
PHF	.250	.000	.000	.000	.250	.000	.700	.000	.000	.700	.250	.250	.250	.000	.500	.000	.563	.000	.000	.563	.778



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City, State: Boxborough, MA
Client: VHB/ V. Kalikiri

File Name : 144204 DD
Site Code : TBA
Start Date : 11/20/2014
Page No : 1

Groups Printed- Peds and Bicycles

Start Time	Driveway From North					Massachusetts Avenue (Route 111) From East					Cisco East Driveway From South					Massachusetts Avenue (Route 111) From West					Int. Total
	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	
04:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Apprch %	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total %																					

Start Time	Driveway From North						Massachusetts Avenue (Route 111) From East						Cisco East Driveway From South						Massachusetts Avenue (Route 111) From West						Int. Total				
	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					
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	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Volume	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% App. Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000



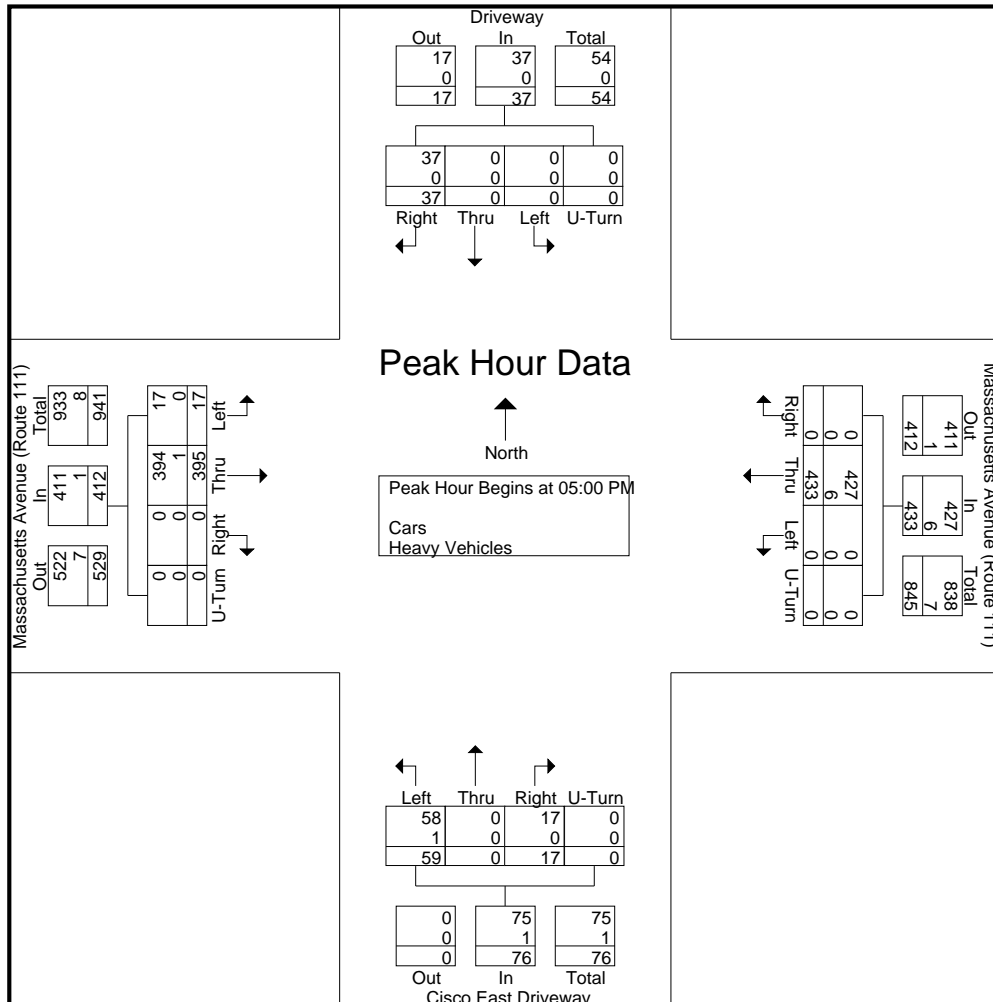
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Start Time	Driveway From North					Massachusetts Avenue (Route 111) From East					Cisco East Driveway From South					Massachusetts Avenue (Route 111) From West					Int. Total
	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	
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	10	0	0	0	10	0	108	0	0	108	7	0	13	0	20	0	98	0	0	98	236
05:15 PM	9	0	0	0	9	0	106	0	0	106	4	0	13	0	17	0	94	4	0	98	230
05:30 PM	8	0	0	0	8	0	101	0	0	101	4	0	15	0	19	0	99	6	0	105	233
05:45 PM	10	0	0	0	10	0	118	0	0	118	2	0	18	0	20	0	104	7	0	111	259
Total Volume	37	0	0	0	37	0	433	0	0	433	17	0	59	0	76	0	395	17	0	412	958
% App. Total	100	0	0	0		0	100	0	0		22.4	0	77.6	0		0	95.9	4.1	0		
PHF	.925	.000	.000	.000	.925	.000	.917	.000	.000	.917	.607	.000	.819	.000	.950	.000	.950	.607	.000	.928	.925
Cars	37	0	0	0	37	0	427	0	0	427	17	0	58	0	75	0	394	17	0	411	950
% Cars	100	0	0	0	100	0	98.6	0	0	98.6	100	0	98.3	0	98.7	0	99.7	100	0	99.8	99.2
Heavy Vehicles	0	0	0	0	0	0	6	0	0	6	0	0	1	0	1	0	1	0	0	1	8
% Heavy Vehicles	0	0	0	0	0	0	1.4	0	0	1.4	0	0	1.7	0	1.3	0	0.3	0	0	0.2	0.8





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N/S: Hill Road/ Burroughs Road
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City, State: Boxborough, MA
Client: VHB/ V. Kalikiri

File Name : 144204 E
Site Code : TBA
Start Date : 11/20/2014
Page No : 1

Groups Printed- Cars - Heavy Vehicles

Start Time	Hill Road From North				Massachusetts Avenue (Route 111) From East				Burroughs Road From South				Massachusetts Avenue (Route 111) From West				Int. Total
	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	
07:00 AM	7	1	3	0	0	45	1	0	2	0	26	0	6	61	1	0	153
07:15 AM	4	2	0	0	1	72	2	0	1	0	23	0	6	96	2	0	209
07:30 AM	4	0	1	0	0	68	2	0	3	1	15	0	3	95	1	0	193
07:45 AM	4	0	1	0	3	73	2	0	1	0	16	0	8	87	2	0	197
Total	19	3	5	0	4	258	7	0	7	1	80	0	23	339	6	0	752
08:00 AM	4	0	2	0	1	66	1	0	5	0	18	0	14	89	1	0	201
08:15 AM	6	0	5	0	2	77	5	0	6	0	14	0	10	93	2	0	220
08:30 AM	5	0	4	0	1	78	2	0	2	2	14	0	12	76	3	0	199
08:45 AM	3	0	1	0	0	69	5	0	3	1	14	0	11	72	2	0	181
Total	18	0	12	0	4	290	13	0	16	3	60	0	47	330	8	0	801
Grand Total	37	3	17	0	8	548	20	0	23	4	140	0	70	669	14	0	1553
Apprch %	64.9	5.3	29.8	0	1.4	95.1	3.5	0	13.8	2.4	83.8	0	9.3	88.8	1.9	0	
Total %	2.4	0.2	1.1	0	0.5	35.3	1.3	0	1.5	0.3	9	0	4.5	43.1	0.9	0	
Cars	36	3	15	0	6	525	19	0	23	4	137	0	68	627	14	0	1477
% Cars	97.3	100	88.2	0	75	95.8	95	0	100	100	97.9	0	97.1	93.7	100	0	95.1
Heavy Vehicles	1	0	2	0	2	23	1	0	0	0	3	0	2	42	0	0	76
% Heavy Vehicles	2.7	0	11.8	0	25	4.2	5	0	0	0	2.1	0	2.9	6.3	0	0	4.9

Start Time	Hill Road From North					Massachusetts Avenue (Route 111) From East					Burroughs Road From South					Massachusetts Avenue (Route 111) From West					Int. Total
	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	
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:45 AM																					
07:45 AM	4	0	1	0	5	3	73	2	0	78	1	0	16	0	17	8	87	2	0	97	197
08:00 AM	4	0	2	0	6	1	66	1	0	68	5	0	18	0	23	14	89	1	0	104	201
08:15 AM	6	0	5	0	11	2	77	5	0	84	6	0	14	0	20	10	93	2	0	105	220
08:30 AM	5	0	4	0	9	1	78	2	0	81	2	2	14	0	18	12	76	3	0	91	199
Total Volume	19	0	12	0	31	7	294	10	0	311	14	2	62	0	78	44	345	8	0	397	817
% App. Total	61.3	0	38.7	0		2.3	94.5	3.2	0		17.9	2.6	79.5	0		11.1	86.9	2	0		
PHF	.792	.000	.600	.000	.705	.583	.942	.500	.000	.926	.583	.250	.861	.000	.848	.786	.927	.667	.000	.945	.928
Cars	18	0	10	0	28	5	280	10	0	295	14	2	60	0	76	42	326	8	0	376	775
% Cars	94.7	0	83.3	0	90.3	71.4	95.2	100	0	94.9	100	100	96.8	0	97.4	95.5	94.5	100	0	94.7	94.9
Heavy Vehicles	1	0	2	0	3	2	14	0	0	16	0	0	2	0	2	2	19	0	0	21	42
% Heavy Vehicles	5.3	0	16.7	0	9.7	28.6	4.8	0	0	5.1	0	0	3.2	0	2.6	4.5	5.5	0	0	5.3	5.1



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Groups Printed- Cars

Start Time	Hill Road From North				Massachusetts Avenue (Route 111) From East				Burroughs Road From South				Massachusetts Avenue (Route 111) From West				Int. Total
	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	
07:00 AM	7	1	3	0	0	44	1	0	2	0	26	0	6	57	1	0	148
07:15 AM	4	2	0	0	1	70	2	0	1	0	22	0	6	85	2	0	195
07:30 AM	4	0	1	0	0	65	2	0	3	1	15	0	3	92	1	0	187
07:45 AM	3	0	1	0	3	66	2	0	1	0	16	0	8	83	2	0	185
Total	18	3	5	0	4	245	7	0	7	1	79	0	23	317	6	0	715
08:00 AM	4	0	1	0	0	63	1	0	5	0	18	0	12	84	1	0	189
08:15 AM	6	0	4	0	1	75	5	0	6	0	14	0	10	87	2	0	210
08:30 AM	5	0	4	0	1	76	2	0	2	2	12	0	12	72	3	0	191
08:45 AM	3	0	1	0	0	66	4	0	3	1	14	0	11	67	2	0	172
Total	18	0	10	0	2	280	12	0	16	3	58	0	45	310	8	0	762
Grand Total	36	3	15	0	6	525	19	0	23	4	137	0	68	627	14	0	1477
Apprch %	66.7	5.6	27.8	0	1.1	95.5	3.5	0	14	2.4	83.5	0	9.6	88.4	2	0	
Total %	2.4	0.2	1	0	0.4	35.5	1.3	0	1.6	0.3	9.3	0	4.6	42.5	0.9	0	

Start Time	Hill Road From North					Massachusetts Avenue (Route 111) From East					Burroughs Road From South					Massachusetts Avenue (Route 111) From West					Int. Total
	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	
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:45 AM																					
07:45 AM	3	0	1	0	4	3	66	2	0	71	1	0	16	0	17	8	83	2	0	93	185
08:00 AM	4	0	1	0	5	0	63	1	0	64	5	0	18	0	23	12	84	1	0	97	189
08:15 AM	6	0	4	0	10	1	75	5	0	81	6	0	14	0	20	10	87	2	0	99	210
08:30 AM	5	0	4	0	9	1	76	2	0	79	2	2	12	0	16	12	72	3	0	87	191
Total Volume	18	0	10	0	28	5	280	10	0	295	14	2	60	0	76	42	326	8	0	376	775
% App. Total	64.3	0	35.7	0		1.7	94.9	3.4	0		18.4	2.6	78.9	0		11.2	86.7	2.1	0		
PHF	.750	.000	.625	.000	.700	.417	.921	.500	.000	.910	.583	.250	.833	.000	.826	.875	.937	.667	.000	.949	.923



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Start Time	Hill Road From North				Massachusetts Avenue (Route 111) From East				Burroughs Road From South				Massachusetts Avenue (Route 111) From West				Int. Total	
	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn		
07:00 AM	0	0	0	0	0	1	0	0	0	0	0	0	0	4	0	0	5	
07:15 AM	0	0	0	0	0	2	0	0	0	0	0	1	0	11	0	0	14	
07:30 AM	0	0	0	0	0	3	0	0	0	0	0	0	0	3	0	0	6	
07:45 AM	1	0	0	0	0	7	0	0	0	0	0	0	0	4	0	0	12	
Total	1	0	0	0	0	13	0	0	0	0	0	1	0	0	22	0	0	37
08:00 AM	0	0	1	0	1	3	0	0	0	0	0	0	0	2	5	0	0	12
08:15 AM	0	0	1	0	1	2	0	0	0	0	0	0	0	6	0	0	10	
08:30 AM	0	0	0	0	0	2	0	0	0	0	0	2	0	4	0	0	8	
08:45 AM	0	0	0	0	0	3	1	0	0	0	0	0	0	5	0	0	9	
Total	0	0	2	0	2	10	1	0	0	0	0	2	0	2	20	0	0	39
Grand Total	1	0	2	0	2	23	1	0	0	0	3	0	0	2	42	0	0	76
Apprch %	33.3	0	66.7	0	7.7	88.5	3.8	0	0	0	100	0	4.5	95.5	0	0	0	
Total %	1.3	0	2.6	0	2.6	30.3	1.3	0	0	0	3.9	0	2.6	55.3	0	0	0	

Start Time	Hill Road From North					Massachusetts Avenue (Route 111) From East					Burroughs Road From South					Massachusetts Avenue (Route 111) From West					Int. Total
	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	
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:15 AM																					
07:15 AM	0	0	0	0	0	0	2	0	0	2	0	0	1	0	1	0	11	0	0	11	14
07:30 AM	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	3	0	0	3	6
07:45 AM	1	0	0	0	1	0	7	0	0	7	0	0	0	0	0	0	4	0	0	4	12
08:00 AM	0	0	1	0	1	1	3	0	0	4	0	0	0	0	0	2	5	0	0	7	12
Total Volume	1	0	1	0	2	1	15	0	0	16	0	0	1	0	1	2	23	0	0	25	44
% App. Total	50	0	50	0		6.2	93.8	0	0		0	0	100	0		8	92	0	0		
PHF	.250	.000	.250	.000	.500	.250	.536	.000	.000	.571	.000	.000	.250	.000	.250	.250	.523	.000	.000	.568	.786



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File Name : 144204 E
Site Code : TBA
Start Date : 11/20/2014
Page No : 1

Groups Printed- Peds and Bicycles

Start Time	Hill Road From North					Massachusetts Avenue (Route 111) From East					Burroughs Road From South					Massachusetts Avenue (Route 111) From West					Int. Total
	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	
07:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
07:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1
08:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1
Apprch %	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	0	0	0	0	0
Total %	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	0	0	0	0	0

Start Time	Hill Road From North						Massachusetts Avenue (Route 111) From East						Burroughs Road From South						Massachusetts Avenue (Route 111) From West						Int. Total			
	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				
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	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:30 AM	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	1
07:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Volume	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	1
% App. Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	0	0	100
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.250	.000	.000	.000	.000	.000	.250	.250		

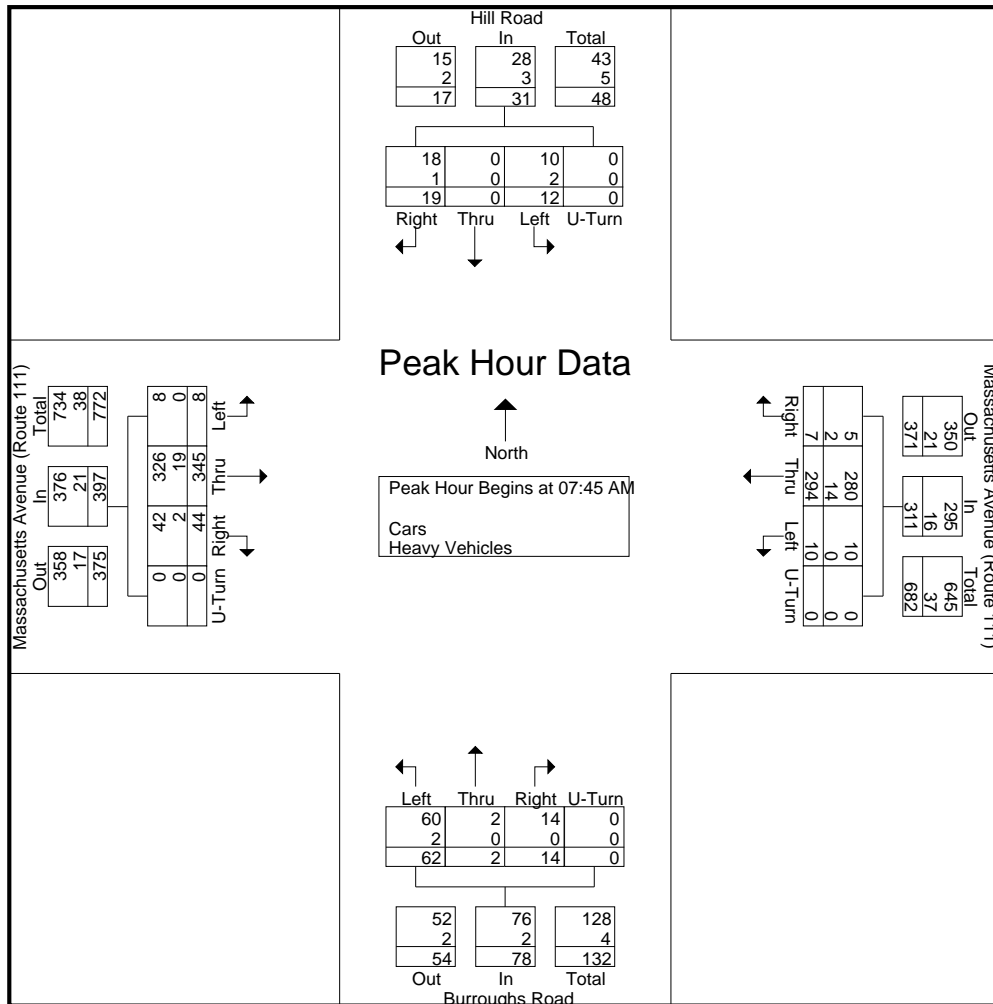


PRECISION
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N/S: Hill Road/ Burroughs Road
E/W: Massachusetts Avenue (Route 111)
City, State: Boxborough, MA
Client: VHB/ V. Kalikiri

File Name : 144204 E
Site Code : TBA
Start Date : 11/20/2014
Page No : 1

Start Time	Hill Road From North					Massachusetts Avenue (Route 111) From East					Burroughs Road From South					Massachusetts Avenue (Route 111) From West					Int. Total
	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	
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:45 AM																					
07:45 AM	4	0	1	0	5	3	73	2	0	78	1	0	16	0	17	8	87	2	0	97	197
08:00 AM	4	0	2	0	6	1	66	1	0	68	5	0	18	0	23	14	89	1	0	104	201
08:15 AM	6	0	5	0	11	2	77	5	0	84	6	0	14	0	20	10	93	2	0	105	220
08:30 AM	5	0	4	0	9	1	78	2	0	81	2	0	14	0	18	12	76	3	0	91	199
Total Volume	19	0	12	0	31	7	294	10	0	311	14	2	62	0	78	44	345	8	0	397	817
% App. Total	61.3	0	38.7	0		2.3	94.5	3.2	0		17.9	2.6	79.5	0		11.1	86.9	2	0		
PHF	.792	.000	.600	.000	.705	.583	.942	.500	.000	.926	.583	.250	.861	.000	.848	.786	.927	.667	.000	.945	.928
Cars	18	0	10	0	28	5	280	10	0	295	14	2	60	0	76	42	326	8	0	376	775
% Cars	94.7	0	83.3	0	90.3	71.4	95.2	100	0	94.9	100	100	96.8	0	97.4	95.5	94.5	100	0	94.7	94.9
Heavy Vehicles	1	0	2	0	3	2	14	0	0	16	0	0	2	0	2	2	19	0	0	21	42
% Heavy Vehicles	5.3	0	16.7	0	9.7	28.6	4.8	0	0	5.1	0	0	3.2	0	2.6	4.5	5.5	0	0	5.3	5.1





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City, State: Boxborough, MA
Client: VHB/ V. Kalikiri

File Name : 144204 EE
Site Code : TBA
Start Date : 11/20/2014
Page No : 1

Groups Printed- Cars - Heavy Vehicles

Start Time	Hill Road From North				Massachusetts Avenue (Route 111) From East				Burroughs Road From South				Massachusetts Avenue (Route 111) From West				Int. Total
	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	
04:00 PM	3	4	1	0	3	86	3	0	1	2	20	0	7	77	3	0	210
04:15 PM	2	0	1	0	4	85	1	0	4	1	8	0	8	61	1	0	176
04:30 PM	1	2	3	0	1	79	2	0	3	0	16	0	12	71	4	0	194
04:45 PM	3	0	0	0	2	93	4	0	3	1	11	0	3	82	3	0	205
Total	9	6	5	0	10	343	10	0	11	4	55	0	30	291	11	0	785
05:00 PM	3	3	0	0	1	82	1	0	4	1	24	0	10	90	2	0	221
05:15 PM	6	0	1	0	1	85	3	0	5	1	14	0	12	83	6	0	217
05:30 PM	2	3	1	0	2	88	4	0	3	1	11	0	11	90	2	0	218
05:45 PM	2	0	1	0	2	111	3	0	5	0	9	0	16	82	3	0	234
Total	13	6	3	0	6	366	11	0	17	3	58	0	49	345	13	0	890
Grand Total	22	12	8	0	16	709	21	0	28	7	113	0	79	636	24	0	1675
Apprch %	52.4	28.6	19	0	2.1	95	2.8	0	18.9	4.7	76.4	0	10.7	86.1	3.2	0	
Total %	1.3	0.7	0.5	0	1	42.3	1.3	0	1.7	0.4	6.7	0	4.7	38	1.4	0	
Cars	22	12	7	0	16	693	21	0	28	7	108	0	79	624	23	0	1640
% Cars	100	100	87.5	0	100	97.7	100	0	100	100	95.6	0	100	98.1	95.8	0	97.9
Heavy Vehicles	0	0	1	0	0	16	0	0	0	0	5	0	0	12	1	0	35
% Heavy Vehicles	0	0	12.5	0	0	2.3	0	0	0	0	4.4	0	0	1.9	4.2	0	2.1

Start Time	Hill Road From North					Massachusetts Avenue (Route 111) From East					Burroughs Road From South					Massachusetts Avenue (Route 111) From West					Int. Total
	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	
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	3	3	0	0	6	1	82	1	0	84	4	1	24	0	29	10	90	2	0	102	221
05:15 PM	6	0	1	0	7	1	85	3	0	89	5	1	14	0	20	12	83	6	0	101	217
05:30 PM	2	3	1	0	6	2	88	4	0	94	3	1	11	0	15	11	90	2	0	103	218
05:45 PM	2	0	1	0	3	2	111	3	0	116	5	0	9	0	14	16	82	3	0	101	234
Total Volume	13	6	3	0	22	6	366	11	0	383	17	3	58	0	78	49	345	13	0	407	890
% App. Total	59.1	27.3	13.6	0		1.6	95.6	2.9	0		21.8	3.8	74.4	0		12	84.8	3.2	0		
PHF	.542	.500	.750	.000	.786	.750	.824	.688	.000	.825	.850	.750	.604	.000	.672	.766	.958	.542	.000	.988	.951
Cars	13	6	3	0	22	6	359	11	0	376	17	3	57	0	77	49	343	13	0	405	880
% Cars	100	100	100	0	100	100	98.1	100	0	98.2	100	100	98.3	0	98.7	100	99.4	100	0	99.5	98.9
Heavy Vehicles	0	0	0	0	0	0	7	0	0	7	0	0	1	0	1	0	2	0	0	2	10
% Heavy Vehicles	0	0	0	0	0	0	1.9	0	0	1.8	0	0	1.7	0	1.3	0	0.6	0	0	0.5	1.1



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Client: VHB/ V. Kalikiri

File Name : 144204 EE
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Start Date : 11/20/2014
Page No : 1

Groups Printed- Cars

Start Time	Hill Road From North				Massachusetts Avenue (Route 111) From East				Burroughs Road From South				Massachusetts Avenue (Route 111) From West				Int. Total
	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	
04:00 PM	3	4	1	0	3	86	3	0	1	2	19	0	7	71	2	0	202
04:15 PM	2	0	1	0	4	80	1	0	4	1	7	0	8	60	1	0	169
04:30 PM	1	2	2	0	1	76	2	0	3	0	15	0	12	69	4	0	187
04:45 PM	3	0	0	0	2	92	4	0	3	1	10	0	3	81	3	0	202
Total	9	6	4	0	10	334	10	0	11	4	51	0	30	281	10	0	760
05:00 PM	3	3	0	0	1	80	1	0	4	1	24	0	10	89	2	0	218
05:15 PM	6	0	1	0	1	84	3	0	5	1	13	0	12	83	6	0	215
05:30 PM	2	3	1	0	2	87	4	0	3	1	11	0	11	89	2	0	216
05:45 PM	2	0	1	0	2	108	3	0	5	0	9	0	16	82	3	0	231
Total	13	6	3	0	6	359	11	0	17	3	57	0	49	343	13	0	880
Grand Total	22	12	7	0	16	693	21	0	28	7	108	0	79	624	23	0	1640
Apprch %	53.7	29.3	17.1	0	2.2	94.9	2.9	0	19.6	4.9	75.5	0	10.9	86	3.2	0	
Total %	1.3	0.7	0.4	0	1	42.3	1.3	0	1.7	0.4	6.6	0	4.8	38	1.4	0	

Start Time	Hill Road From North					Massachusetts Avenue (Route 111) From East					Burroughs Road From South					Massachusetts Avenue (Route 111) From West					Int. Total
	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	
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	3	3	0	0	6	1	80	1	0	82	4	1	24	0	29	10	89	2	0	101	218
05:15 PM	6	0	1	0	7	1	84	3	0	88	5	1	13	0	19	12	83	6	0	101	215
05:30 PM	2	3	1	0	6	2	87	4	0	93	3	1	11	0	15	11	89	2	0	102	216
05:45 PM	2	0	1	0	3	2	108	3	0	113	5	0	9	0	14	16	82	3	0	101	231
Total Volume	13	6	3	0	22	6	359	11	0	376	17	3	57	0	77	49	343	13	0	405	880
% App. Total	59.1	27.3	13.6	0		1.6	95.5	2.9	0		22.1	3.9	74	0		12.1	84.7	3.2	0		
PHF	.542	.500	.750	.000	.786	.750	.831	.688	.000	.832	.850	.750	.594	.000	.664	.766	.963	.542	.000	.993	.952



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Groups Printed- Heavy Vehicles

Start Time	Hill Road From North				Massachusetts Avenue (Route 111) From East				Burroughs Road From South				Massachusetts Avenue (Route 111) From West				Int. Total
	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	
04:00 PM	0	0	0	0	0	0	0	0	0	0	1	0	0	6	1	0	8
04:15 PM	0	0	0	0	0	5	0	0	0	0	1	0	0	1	0	0	7
04:30 PM	0	0	1	0	0	3	0	0	0	0	1	0	0	2	0	0	7
04:45 PM	0	0	0	0	0	1	0	0	0	0	1	0	0	1	0	0	3
Total	0	0	1	0	0	9	0	0	0	0	4	0	0	10	1	0	25
05:00 PM	0	0	0	0	0	2	0	0	0	0	0	0	0	1	0	0	3
05:15 PM	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	2
05:30 PM	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	2
05:45 PM	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	3
Total	0	0	0	0	0	7	0	0	0	0	1	0	0	2	0	0	10
Grand Total	0	0	1	0	0	16	0	0	0	0	5	0	0	12	1	0	35
Apprch %	0	0	100	0	0	100	0	0	0	0	100	0	0	92.3	7.7	0	
Total %	0	0	2.9	0	0	45.7	0	0	0	0	14.3	0	0	34.3	2.9	0	

Start Time	Hill Road From North					Massachusetts Avenue (Route 111) From East					Burroughs Road From South					Massachusetts Avenue (Route 111) From West					Int. Total
	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	
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	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	6	1	0	7	8
04:15 PM	0	0	0	0	0	0	5	0	0	5	0	0	1	0	1	0	1	0	0	1	7
04:30 PM	0	0	1	0	1	0	3	0	0	3	0	0	1	0	1	0	2	0	0	2	7
04:45 PM	0	0	0	0	0	0	1	0	0	1	0	0	1	0	1	0	1	0	0	1	3
Total Volume	0	0	1	0	1	0	9	0	0	9	0	0	4	0	4	0	10	1	0	11	25
% App. Total	0	0	100	0		0	100	0	0		0	0	100	0		0	90.9	9.1	0		
PHF	.000	.000	.250	.000	.250	.000	.450	.000	.000	.450	.000	.000	1.00	.000	1.00	.000	.417	.250	.000	.393	.781



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Start Time	Hill Road From North					Massachusetts Avenue (Route 111) From East					Burroughs Road From South					Massachusetts Avenue (Route 111) From West					Int. Total
	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	
04:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Apprch %	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total %																					

Start Time	Hill Road From North						Massachusetts Avenue (Route 111) From East						Burroughs Road From South						Massachusetts Avenue (Route 111) From West						Int. Total			
	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				
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	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Volume	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% App. Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000



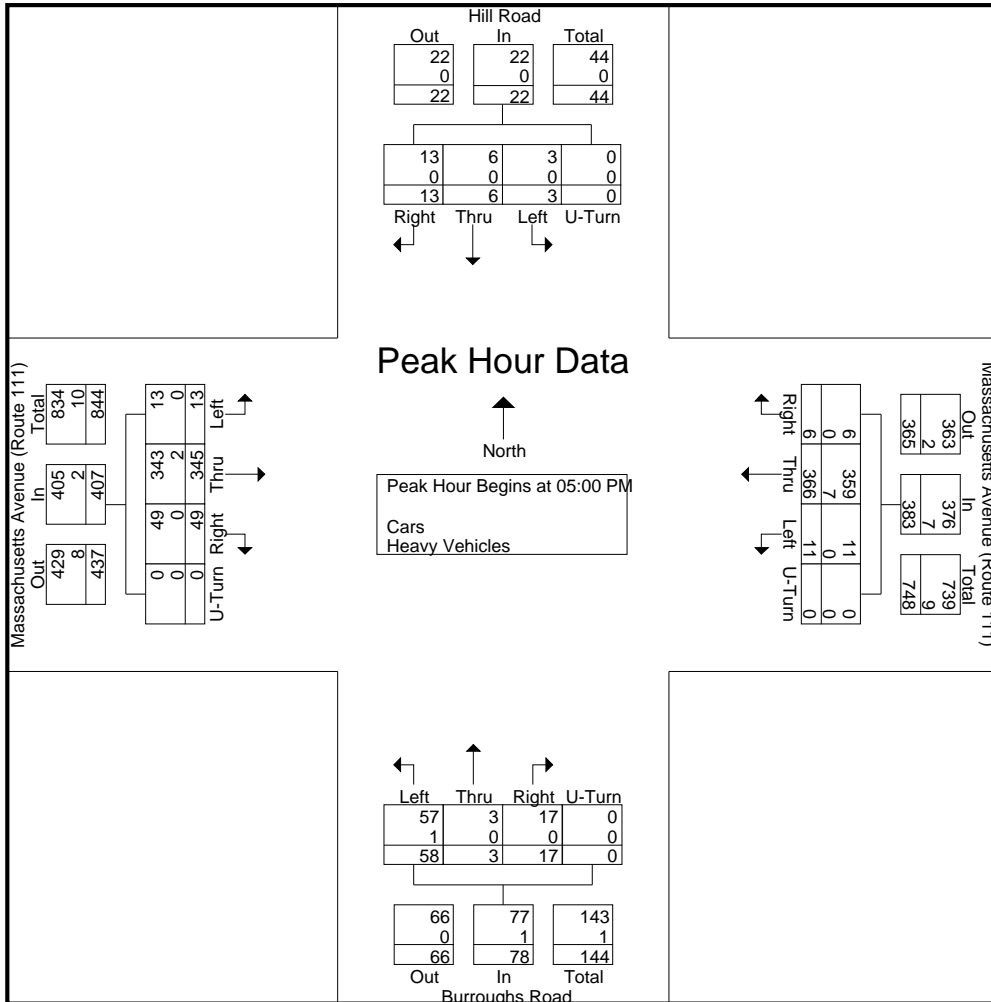
PRECISION
D A T A
INDUSTRIES, LLC

P.O. Box 301 Berlin, MA 01503
Office: 508.481.3999 Fax: 508.545.1234
Email: datarequests@pdillc.com

N/S: Hill Road/ Burroughs Road
E/W: Massachusetts Avenue (Route 111)
City, State: Boxborough, MA
Client: VHB/ V. Kalikiri

File Name : 144204 EE
Site Code : TBA
Start Date : 11/20/2014
Page No : 1

Start Time	Hill Road From North					Massachusetts Avenue (Route 111) From East					Burroughs Road From South					Massachusetts Avenue (Route 111) From West					Int. Total
	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	
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	3	3	0	0	6	1	82	1	0	84	4	1	24	0	29	10	90	2	0	102	221
05:15 PM	6	0	1	0	7	1	85	3	0	89	5	1	14	0	20	12	83	6	0	101	217
05:30 PM	2	3	1	0	6	2	88	4	0	94	3	1	11	0	15	11	90	2	0	103	218
05:45 PM	2	0	1	0	3	2	111	3	0	116	5	0	9	0	14	16	82	3	0	101	234
Total Volume	13	6	3	0	22	6	366	11	0	383	17	3	58	0	78	49	345	13	0	407	890
% App. Total	59.1	27.3	13.6	0		1.6	95.6	2.9	0		21.8	3.8	74.4	0		12	84.8	3.2	0		
PHF	.542	.500	.750	.000	.786	.750	.824	.688	.000	.825	.850	.750	.604	.000	.672	.766	.958	.542	.000	.988	.951
Cars	13	6	3	0	22	6	359	11	0	376	17	3	57	0	77	49	343	13	0	405	880
% Cars	100	100	100	0	100	100	98.1	100	0	98.2	100	100	98.3	0	98.7	100	99.4	100	0	99.5	98.9
Heavy Vehicles	0	0	0	0	0	0	7	0	0	7	0	0	1	0	1	0	2	0	0	2	10
% Heavy Vehicles	0	0	0	0	0	0	1.9	0	0	1.8	0	0	1.7	0	1.3	0	0.6	0	0	0.5	1.1





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N/S: Hill Road
E/W: Driveway/ Cunningham Road
City, State: Boxborough, MA
Client: VHB/ V. Kalikiri

File Name : 144204 F
Site Code : TBA
Start Date : 11/20/2014
Page No : 1

Groups Printed- Cars - Heavy Vehicles

Start Time	Hill Road From North				Driveway From East				Hill Road From South				Cunningham Road From West				Int. Total	
	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn		
07:00 AM	1	11	0	0	0	0	0	0	0	1	0	0	0	0	0	3	0	16
07:15 AM	1	8	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	12
07:30 AM	6	4	0	0	0	0	0	0	0	2	0	0	0	0	0	1	0	13
07:45 AM	1	4	0	0	0	0	0	0	0	5	0	0	1	0	0	0	0	11
Total	9	27	0	0	0	0	0	0	0	11	0	0	1	0	4	0	0	52
08:00 AM	4	6	0	0	0	0	0	0	0	2	0	0	0	0	4	0	0	16
08:15 AM	3	8	0	0	0	0	1	0	0	4	0	0	2	0	1	0	0	19
08:30 AM	0	9	0	0	0	0	0	0	0	6	0	0	0	0	2	0	0	17
08:45 AM	3	4	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	10
Total	10	27	0	0	0	0	1	0	0	15	0	0	2	0	7	0	0	62
Grand Total	19	54	0	0	0	0	1	0	0	26	0	0	3	0	11	0	0	114
Apprch %	26	74	0	0	0	0	100	0	0	100	0	0	21.4	0	78.6	0	0	
Total %	16.7	47.4	0	0	0	0	0.9	0	0	22.8	0	0	2.6	0	9.6	0	0	
Cars	19	52	0	0	0	0	1	0	0	25	0	0	1	0	10	0	0	108
% Cars	100	96.3	0	0	0	0	100	0	0	96.2	0	0	33.3	0	90.9	0	0	94.7
Heavy Vehicles	0	2	0	0	0	0	0	0	0	1	0	0	2	0	1	0	0	6
% Heavy Vehicles	0	3.7	0	0	0	0	0	0	0	3.8	0	0	66.7	0	9.1	0	0	5.3

Start Time	Hill Road From North					Driveway From East					Hill Road From South					Cunningham Road From West					Int. Total
	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	
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:45 AM																					
07:45 AM	1	4	0	0	5	0	0	0	0	0	0	5	0	0	5	1	0	0	0	1	11
08:00 AM	4	6	0	0	10	0	0	0	0	0	0	2	0	0	2	0	0	4	0	4	16
08:15 AM	3	8	0	0	11	0	0	1	0	1	0	4	0	0	4	2	0	1	0	3	19
08:30 AM	0	9	0	0	9	0	0	0	0	0	0	6	0	0	6	0	0	2	0	2	17
Total Volume	8	27	0	0	35	0	0	1	0	1	0	17	0	0	17	3	0	7	0	10	63
% App. Total	22.9	77.1	0	0		0	0	100	0		0	100	0	0		30	0	70	0		
PHF	.500	.750	.000	.000	.795	.000	.000	.250	.000	.250	.000	.708	.000	.000	.708	.375	.000	.438	.000	.625	.829
Cars	8	25	0	0	33	0	0	1	0	1	0	16	0	0	16	1	0	6	0	7	57
% Cars	100	92.6	0	0	94.3	0	0	100	0	100	0	94.1	0	0	94.1	33.3	0	85.7	0	70.0	90.5
Heavy Vehicles	0	2	0	0	2	0	0	0	0	0	0	1	0	0	1	2	0	1	0	3	6
% Heavy Vehicles	0	7.4	0	0	5.7	0	0	0	0	0	0	5.9	0	0	5.9	66.7	0	14.3	0	30.0	9.5



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N/S: Hill Road
E/W: Driveway/ Cunningham Road
City, State: Boxborough, MA
Client: VHB/ V. Kalikiri

File Name : 144204 F
Site Code : TBA
Start Date : 11/20/2014
Page No : 1

Groups Printed- Cars

Start Time	Hill Road From North				Driveway From East				Hill Road From South				Cunningham Road From West				Int. Total	
	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn		
07:00 AM	1	11	0	0	0	0	0	0	0	1	0	0	0	0	0	3	0	16
07:15 AM	1	8	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	12
07:30 AM	6	4	0	0	0	0	0	0	0	2	0	0	0	0	0	1	0	13
07:45 AM	1	4	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	10
Total	9	27	0	0	0	0	0	0	0	11	0	0	0	0	0	4	0	51
08:00 AM	4	5	0	0	0	0	0	0	0	1	0	0	0	0	0	3	0	13
08:15 AM	3	8	0	0	0	0	1	0	0	4	0	0	1	0	1	0	0	18
08:30 AM	0	8	0	0	0	0	0	0	0	6	0	0	0	0	2	0	0	16
08:45 AM	3	4	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	10
Total	10	25	0	0	0	0	1	0	0	14	0	0	1	0	6	0	0	57
Grand Total	19	52	0	0	0	0	1	0	0	25	0	0	1	0	10	0	0	108
Apprch %	26.8	73.2	0	0	0	0	100	0	0	100	0	0	9.1	0	90.9	0	0	
Total %	17.6	48.1	0	0	0	0	0.9	0	0	23.1	0	0	0.9	0	9.3	0	0	

Start Time	Hill Road From North					Driveway From East					Hill Road From South					Cunningham Road From West					Int. Total
	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	
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:45 AM																					
07:45 AM	1	4	0	0	5	0	0	0	0	0	0	5	0	0	5	0	0	0	0	0	10
08:00 AM	4	5	0	0	9	0	0	0	0	0	0	1	0	0	1	0	0	3	0	3	13
08:15 AM	3	8	0	0	11	0	0	1	0	1	0	4	0	0	4	1	0	1	0	2	18
08:30 AM	0	8	0	0	8	0	0	0	0	0	0	6	0	0	6	0	0	2	0	2	16
Total Volume	8	25	0	0	33	0	0	1	0	1	0	16	0	0	16	1	0	6	0	7	57
% App. Total	24.2	75.8	0	0		0	0	100	0		0	100	0	0		14.3	0	85.7	0		
PHF	.500	.781	.000	.000	.750	.000	.000	.250	.000	.250	.000	.667	.000	.000	.667	.250	.000	.500	.000	.583	.792



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N/S: Hill Road
E/W: Driveway/ Cunningham Road
City, State: Boxborough, MA
Client: VHB/ V. Kalikiri

File Name : 144204 F
Site Code : TBA
Start Date : 11/20/2014
Page No : 1

Groups Printed- Heavy Vehicles

Start Time	Hill Road From North				Driveway From East				Hill Road From South				Cunningham Road From West				Int. Total
	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	
07:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
Total	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
08:00 AM	0	1	0	0	0	0	0	0	0	1	0	0	0	0	1	0	3
08:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
08:30 AM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
08:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	2	0	0	0	0	0	0	0	1	0	0	1	0	1	0	5
Grand Total	0	2	0	0	0	0	0	0	0	1	0	0	2	0	1	0	6
Apprch %	0	100	0	0	0	0	0	0	0	100	0	0	66.7	0	33.3	0	
Total %	0	33.3	0	0	0	0	0	0	0	16.7	0	0	33.3	0	16.7	0	

Start Time	Hill Road From North					Driveway From East					Hill Road From South					Cunningham Road From West					Int. Total
	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	
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:45 AM																					
07:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1
08:00 AM	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	0	0	1	0	1	3
08:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1
08:30 AM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Total Volume	0	2	0	0	2	0	0	0	0	0	0	1	0	0	1	2	0	1	0	3	6
% App. Total	0	100	0	0		0	0	0	0		0	100	0	0		66.7	0	33.3	0		
PHF	.000	.500	.000	.000	.500	.000	.000	.000	.000	.000	.000	.250	.000	.000	.250	.500	.000	.250	.000	.750	.500



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N/S: Hill Road
E/W: Driveway/ Cunningham Road
City, State: Boxborough, MA
Client: VHB/ V. Kalikiri

File Name : 144204 F
Site Code : TBA
Start Date : 11/20/2014
Page No : 1

Groups Printed- Peds and Bicycles

Start Time	Hill Road From North					Driveway From East					Hill Road From South					Cunningham Road From West					Int. Total
	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	
07:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
08:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
Grand Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
Apprch %	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	0	
Total %	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	0	

Start Time	Hill Road From North						Driveway From East						Hill Road From South						Cunningham Road From West						Int. Total				
	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					
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	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:15 AM	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	1	1	1
Total Volume	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	1	1	1
% App. Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	0	0	0	0	0	0	0
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.250	.000	.250	.000	.000	.250	.250	.250



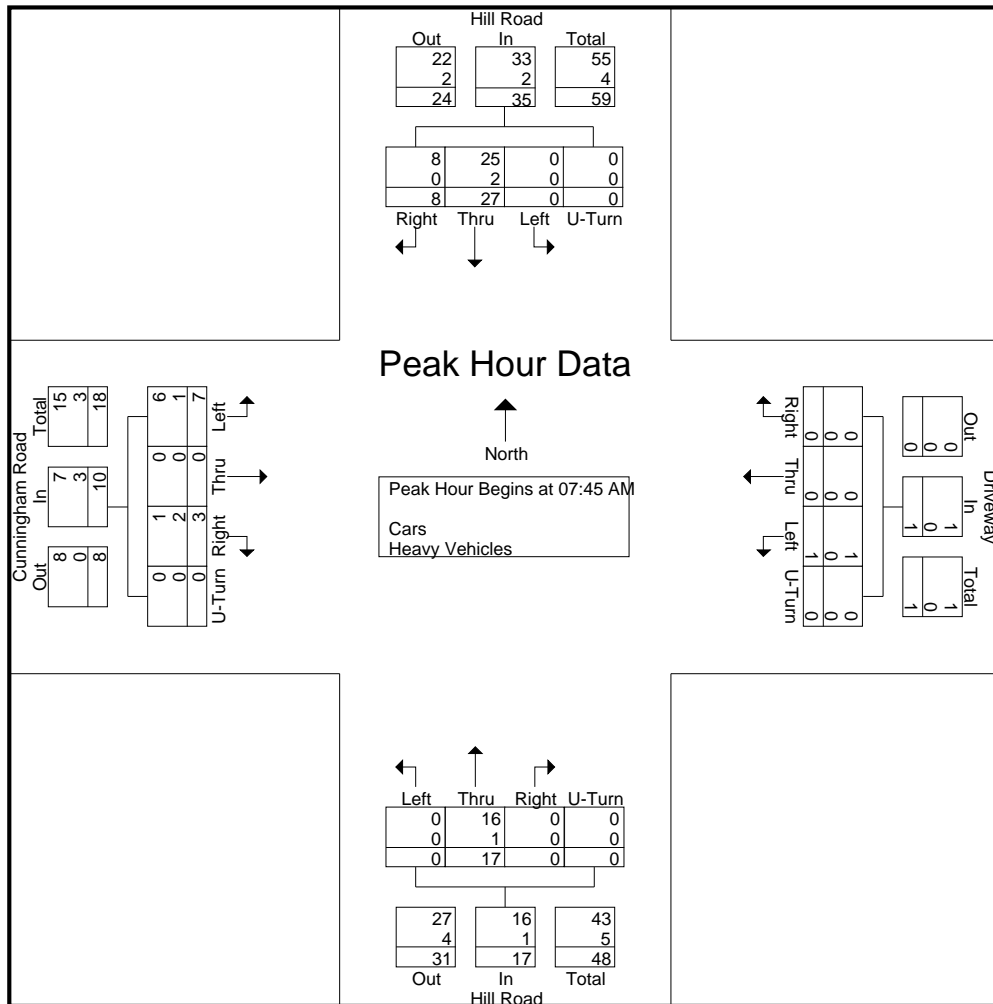
PRECISION
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Start Time	Hill Road From North					Driveway From East					Hill Road From South					Cunningham Road From West					Int. Total
	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:45 AM																					
07:45 AM	1	4	0	0	5	0	0	0	0	0	0	5	0	0	5	1	0	0	0	1	11
08:00 AM	4	6	0	0	10	0	0	0	0	0	0	2	0	0	2	0	0	4	0	4	16
08:15 AM	3	8	0	0	11	0	0	1	0	1	0	4	0	0	4	2	0	1	0	3	19
08:30 AM	0	9	0	0	9	0	0	0	0	0	0	6	0	0	6	0	0	2	0	2	17
Total Volume	8	27	0	0	35	0	0	1	0	1	0	17	0	0	17	3	0	7	0	10	63
% App. Total	22.9	77.1	0	0		0	0	100	0		0	100	0	0		30	0	70	0		
PHF	.500	.750	.000	.000	.795	.000	.000	.250	.000	.250	.000	.708	.000	.000	.708	.375	.000	.438	.000	.625	.829
Cars	8	25	0	0	33	0	0	1	0	1	0	16	0	0	16	1	0	6	0	7	57
% Cars	100	92.6	0	0	94.3	0	0	100	0	100	0	94.1	0	0	94.1	33.3	0	85.7	0	70.0	90.5
Heavy Vehicles	0	2	0	0	2	0	0	0	0	0	0	1	0	0	1	2	0	1	0	3	6
% Heavy Vehicles	0	7.4	0	0	5.7	0	0	0	0	0	0	5.9	0	0	5.9	66.7	0	14.3	0	30.0	9.5





PRECISION
DATA
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City, State: Boxborough, MA
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File Name : 144204 FF
Site Code : TBA
Start Date : 11/20/2014
Page No : 1

Groups Printed- Cars - Heavy Vehicles

Start Time	Hill Road From North				Driveway From East				Hill Road From South				Cunningham Road From West				Int. Total
	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	
04:00 PM	0	8	0	0	0	0	0	0	0	8	1	0	0	0	1	0	18
04:15 PM	1	3	0	0	0	0	0	0	0	6	0	0	0	0	1	0	11
04:30 PM	2	6	0	0	0	0	0	0	0	5	0	0	1	0	3	0	17
04:45 PM	2	2	0	0	0	0	0	0	0	6	0	0	0	0	2	0	12
Total	5	19	0	0	0	0	0	0	0	25	1	0	1	0	7	0	58
05:00 PM	2	6	0	0	0	0	0	0	0	4	0	0	0	0	0	0	12
05:15 PM	0	7	0	0	0	0	0	0	0	8	0	0	0	0	3	0	18
05:30 PM	2	7	0	0	0	0	0	0	0	4	1	0	0	0	1	0	15
05:45 PM	3	3	0	0	0	0	0	0	0	4	0	0	0	0	1	0	11
Total	7	23	0	0	0	0	0	0	0	20	1	0	0	0	5	0	56
Grand Total	12	42	0	0	0	0	0	0	0	45	2	0	1	0	12	0	114
Apprch %	22.2	77.8	0	0	0	0	0	0	0	95.7	4.3	0	7.7	0	92.3	0	
Total %	10.5	36.8	0	0	0	0	0	0	0	39.5	1.8	0	0.9	0	10.5	0	
Cars	12	42	0	0	0	0	0	0	0	45	2	0	0	0	12	0	113
% Cars	100	100	0	0	0	0	0	0	0	100	100	0	0	0	100	0	99.1
Heavy Vehicles	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
% Heavy Vehicles	0	0	0	0	0	0	0	0	0	0	0	0	100	0	0	0	0.9

Start Time	Hill Road From North					Driveway From East					Hill Road From South					Cunningham Road From West					Int. Total
	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	
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:30 PM																					
04:30 PM	2	6	0	0	8	0	0	0	0	0	0	5	0	0	5	1	0	3	0	4	17
04:45 PM	2	2	0	0	4	0	0	0	0	0	0	6	0	0	6	0	0	2	0	2	12
05:00 PM	2	6	0	0	8	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	12
05:15 PM	0	7	0	0	7	0	0	0	0	0	0	8	0	0	8	0	0	3	0	3	18
Total Volume	6	21	0	0	27	0	0	0	0	0	0	23	0	0	23	1	0	8	0	9	59
% App. Total	22.2	77.8	0	0		0	0	0	0		0	100	0	0		11.1	0	88.9	0		
PHF	.750	.750	.000	.000	.844	.000	.000	.000	.000	.000	.000	.719	.000	.000	.719	.250	.000	.667	.000	.563	.819
Cars	6	21	0	0	27	0	0	0	0	0	0	23	0	0	23	0	0	8	0	8	58
% Cars	100	100	0	0	100	0	0	0	0	0	0	100	0	0	100	0	0	100	0	88.9	98.3
Heavy Vehicles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1
% Heavy Vehicles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	0	0	0	11.1	1.7



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Client: VHB/ V. Kalikiri

File Name : 144204 FF
Site Code : TBA
Start Date : 11/20/2014
Page No : 1

Groups Printed- Cars

Start Time	Hill Road From North				Driveway From East				Hill Road From South				Cunningham Road From West				Int. Total
	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	
04:00 PM	0	8	0	0	0	0	0	0	0	8	1	0	0	0	1	0	18
04:15 PM	1	3	0	0	0	0	0	0	0	6	0	0	0	0	1	0	11
04:30 PM	2	6	0	0	0	0	0	0	0	5	0	0	0	0	3	0	16
04:45 PM	2	2	0	0	0	0	0	0	0	6	0	0	0	0	2	0	12
Total	5	19	0	0	0	0	0	0	0	25	1	0	0	0	7	0	57
05:00 PM	2	6	0	0	0	0	0	0	0	4	0	0	0	0	0	0	12
05:15 PM	0	7	0	0	0	0	0	0	0	8	0	0	0	0	3	0	18
05:30 PM	2	7	0	0	0	0	0	0	0	4	1	0	0	0	1	0	15
05:45 PM	3	3	0	0	0	0	0	0	0	4	0	0	0	0	1	0	11
Total	7	23	0	0	0	0	0	0	0	20	1	0	0	0	5	0	56
Grand Total	12	42	0	0	0	0	0	0	0	45	2	0	0	0	12	0	113
Apprch %	22.2	77.8	0	0	0	0	0	0	0	95.7	4.3	0	0	0	100	0	
Total %	10.6	37.2	0	0	0	0	0	0	0	39.8	1.8	0	0	0	10.6	0	

Start Time	Hill Road From North					Driveway From East					Hill Road From South					Cunningham Road From West					Int. Total
	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	
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:30 PM																					
04:30 PM	2	6	0	0	8	0	0	0	0	0	0	5	0	0	5	0	0	3	0	3	16
04:45 PM	2	2	0	0	4	0	0	0	0	0	0	6	0	0	6	0	0	2	0	2	12
05:00 PM	2	6	0	0	8	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	12
05:15 PM	0	7	0	0	7	0	0	0	0	0	0	8	0	0	8	0	0	3	0	3	18
Total Volume	6	21	0	0	27	0	0	0	0	0	0	23	0	0	23	0	0	8	0	8	58
% App. Total	22.2	77.8	0	0		0	0	0	0	0	0	100	0	0		0	0	100	0		
PHF	.750	.750	.000	.000	.844	.000	.000	.000	.000	.000	.000	.719	.000	.000	.719	.000	.000	.667	.000	.667	.806



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Groups Printed- Heavy Vehicles

Start Time	Hill Road From North				Driveway From East				Hill Road From South				Cunningham Road From West				Int. Total
	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	
04:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
04:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
Apprch %	0	0	0	0	0	0	0	0	0	0	0	0	100	0	0	0	
Total %	0	0	0	0	0	0	0	0	0	0	0	0	100	0	0	0	

Start Time	Hill Road From North					Driveway From East					Hill Road From South					Cunningham Road From West					Int. Total
	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	
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	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1
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	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1
% App. Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	0	0	0	0	
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.250	.000	.000	.000	.250	.250



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Site Code : TBA
Start Date : 11/20/2014
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Groups Printed- Peds and Bicycles

Start Time	Hill Road From North					Driveway From East					Hill Road From South					Cunningham Road From West					Int. Total
	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	
04:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Apprch %	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total %																					

Start Time	Hill Road From North						Driveway From East						Hill Road From South						Cunningham Road From West						Int. Total				
	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					
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	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Volume	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% App. Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000



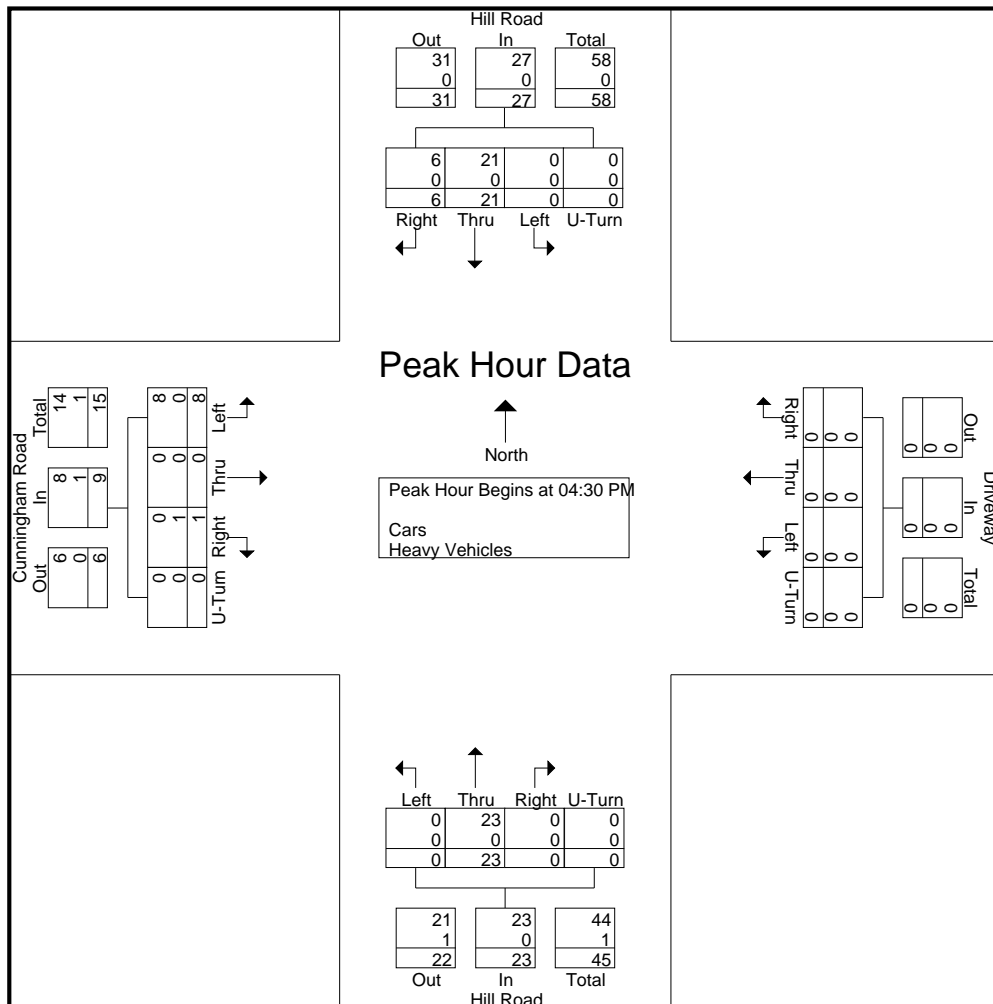
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Start Time	Hill Road From North					Driveway From East					Hill Road From South					Cunningham Road From West					Int. Total
	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:30 PM																					
04:30 PM	2	6	0	0	8	0	0	0	0	0	0	5	0	0	5	1	0	3	0	4	17
04:45 PM	2	2	0	0	4	0	0	0	0	0	0	6	0	0	6	0	0	2	0	2	12
05:00 PM	2	6	0	0	8	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	12
05:15 PM	0	7	0	0	7	0	0	0	0	0	0	8	0	0	8	0	0	3	0	3	18
Total Volume	6	21	0	0	27	0	0	0	0	0	0	23	0	0	23	1	0	8	0	9	59
% App. Total	22.2	77.8	0	0		0	0	0	0	0	0	100	0	0		11.1	0	88.9	0		
PHF	.750	.750	.000	.000	.844	.000	.000	.000	.000	.000	.000	.719	.000	.000	.719	.250	.000	.667	.000	.563	.819
Cars	6	21	0	0	27	0	0	0	0	0	0	23	0	0	23	0	0	8	0	8	58
% Cars	100	100	0	0	100	0	0	0	0	0	0	100	0	0	100	0	0	100	0	88.9	98.3
Heavy Vehicles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1
% Heavy Vehicles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	0	0	0	11.1	1.7





Project: Jefferson

Project # 05734.02

Location: Boxborough

Sheet 1 of 1

Calculated by: GJR

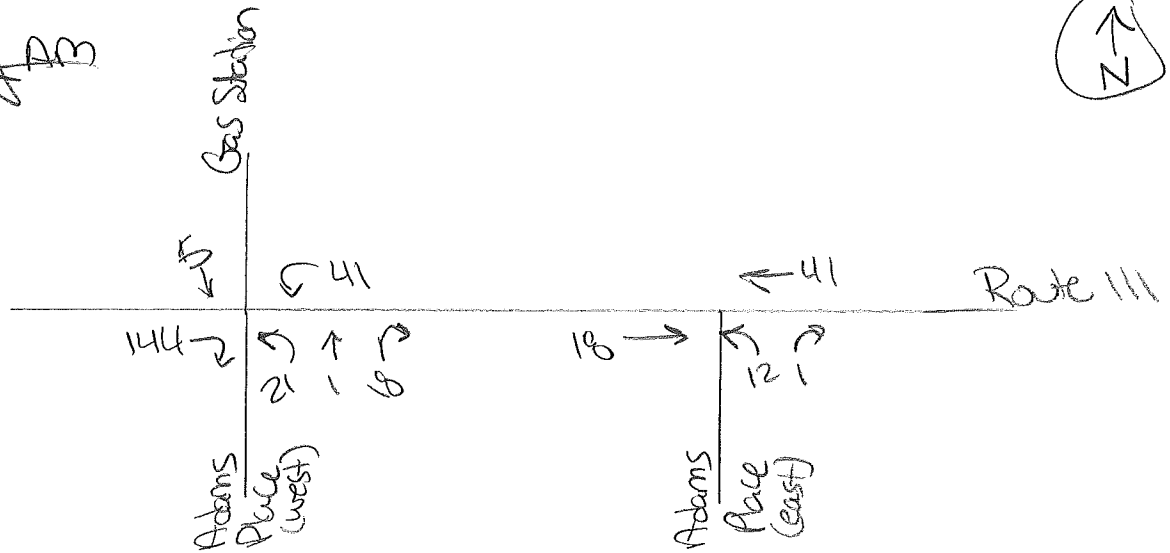
Date:

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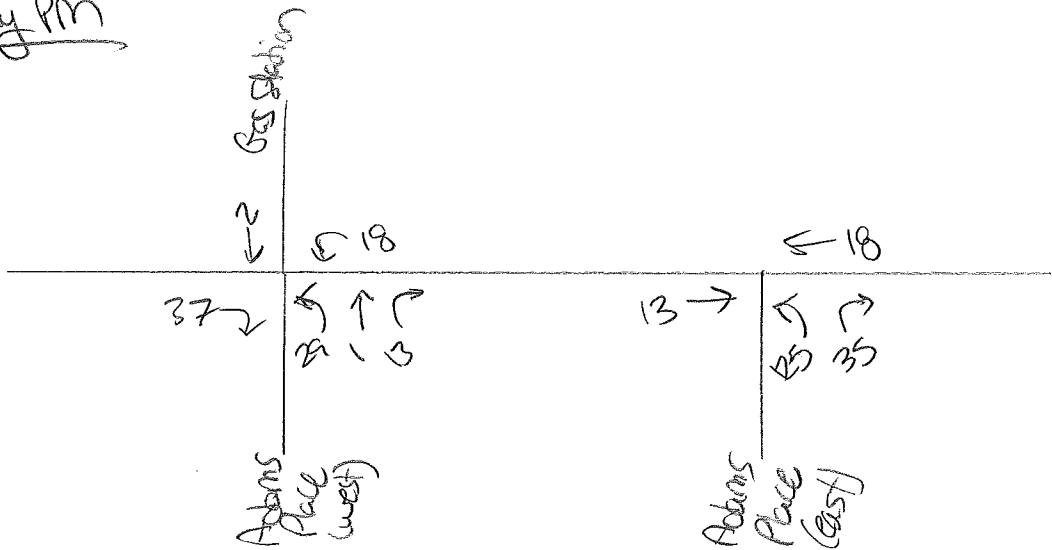
Date:

Title Adams Place 2007 occupancy*

Weekday AM



Weekday PM



* Volumes from 2007 BSC Traffic Study

MassDOT Guidance on Traffic Count Data

ENGINEERING DIRECTIVE

Patricia Leavenworth (signature on original)

CHIEF ENGINEER

Guidance on Traffic Count Data

The purpose of this Engineering Directive is to provide guidance on how to estimate existing and future traffic counts in lieu of taking new traffic counts after March 13, 2020. Due to reductions in traffic volumes caused by the COVID-19 pandemic, taking new traffic counts in 2020 may undercount the baseline for which future years are based.

Engineering Directive E-11-001 requires that all MassDOT projects follow the 2/15/11 Revision of the Traffic and Safety Engineering 25% Design Submission Guidelines, including a preference that traffic count data be less than 2 years old. This Engineering Directive introduces and makes effective the MassDOT Guidance on Traffic Count Data dated April 2020, which supersedes Section I.B (Traffic Volumes) of the Traffic and Safety Engineering 25% Design Submission Guidelines.

Historical traffic data may be used on any project to supplement and/or replace existing traffic counts, as long as it conforms to the latest version of the MassDOT Guidance on Traffic Count Data, which can be found on the MassDOT Traffic Volume and Classification webpage.

This Engineering Directive applies to all projects that have not taken traffic count data prior to March 13, 2020, and includes all projects submitted to MassDOT, including projects that are advertised by the Department, Highway Access Permit Projects that are approved by the Department, and development projects that are permitted through the Massachusetts Environmental Policy Act.

GUIDANCE ON TRAFFIC COUNT DATA

Revised: April, 2020



Introduction

Traffic counts are currently at historic lows and may underrepresent a realistic existing condition. Current MassDOT guidelines, however, require the use of existing count data for the purposes of planning and designing projects. The purpose of this document is to provide guidance for alternative methods that may be used to supplement or replace existing traffic count data.

Use of Historical Counts

MassDOT will accept the use of historical count data in lieu of new traffic counts taken after March 13, 2020. As long as the procedures found in this document are followed, counts taken between January 1, 2014 and March 13, 2020 will be accepted without any additional approval required. Counts taken prior to January 1, 2014 will need to be approved by the State Traffic Engineer prior to submitting the functional design report or other traffic engineering study.

How MassDOT Determines Growth Rates

MassDOT oversees approximately 500 permanent counting stations across the Commonwealth that are constantly taking volume data. In addition, MassDOT supplements these permanent count stations with spot counts taken at various locations. All of the count data is geolocated and, when processed, has the following metadata tagged to it:

- Geographic Area Type
 - U = Urban
 - R = Rural
- Functional Class
 - 1 = Interstate
 - 2 = Freeways & Expressways
 - 3 = Other Principal Arterial
 - 4 = Minor Arterial
 - 5 = Major Collector
 - 6 = Minor Collector
 - 7 = Local Road or Street
- Region
 - Boston = Middlesex, Suffolk, and Norfolk Counties
 - Essex = Essex County
 - *Southeast = Bristol, Plymouth, Barnstable, Nantucket, and Dukes Counties
 - *West = Berkshire, Franklin, Hampshire, and Hampden Counties
 - Worcester = Worcester County

This combination of Geographic Area Type, Functional Class, and Region is referred to as Factor Group. Based upon the aggregated count data for each Factor Group, MassDOT establishes day of week, monthly, yearly, and axle correction adjustment factors. These factors are published into reports that can be used to determine historical growth rates.

*Note that beginning in 2016, MassDOT has further refined some of the Factor Groups for portions of the Commonwealth that experience significant seasonal fluctuations in traffic. These Factor Groups supersede Geographic Area Type, Functional Class, and Region and may be applied to



counts taken in 2016 or later anywhere within their boundaries. These Factor Groups are defined as:

- REC East: all towns on Cape Cod, the Town of Plymouth south of Route 3A, all towns on Martha's Vineyard, and Nantucket.
- REC West: roadways with a Functional Class of 3-5 in the towns of Becket, Great Barrington, Lee, Lenox, Stockbridge, and West Stockbridge.

Procedures for Estimating Average Annual Daily Traffic (AADT)

To estimate existing AADT from an historical count, the count location should be classified by Geographic Area Type, Functional Class, and Region per the descriptions from the previous section. Once the classification has been completed, the following steps are required.

1. Axle Correction

(Please note this step is required only if the original count did not include vehicle classification data, typically a single pneumatic tube. If classification data has been included, please proceed directly to Step 2.)

- Identify the year the count was taken.
- Open the Weekday Seasonal Axle Correction file for the year that corresponds to the raw count data.
- Multiply the average daily traffic (ADT) taken from the raw count data by the Axle Factor for the corresponding Factor Group.

2. Seasonal Factor

- Identify the month and year the count was taken.
- Open the Weekday Seasonal Axle Correction file for the year that corresponds to the raw count data.
- Multiply the number obtained in Step 1 (or the raw count data if it contains vehicle classification data) by the Monthly Factor for the corresponding Factor Group.

3. Yearly Growth

- Identify the year the count was taken.
- Open the Yearly Growth Rate file. Note that MassDOT considers 2019 data to be existing.
- The Growth Factors are set up to factor count data to the year shown in the header column from the previous year. Therefore, using the appropriate Factor Group, multiply the number obtained in Step 2 by the growth factor for the year after it was taken. Repeat the factoring until it is grown to 2019.
 - A count taken in 2018 will only need the 2019 factor applied to it.
 - A count taken in 2015 will need to go through four steps of factoring: the 2016 factor, then the 2017 factor, then the 2018 factor, and finally the 2019 factor.

Once these steps have been completed, the existing AADT may be estimated.



Procedures for Estimating Turning Movement Counts (TMCs)

In cases where historic TMCs are available for an intersection, those volumes may be adjusted based upon these procedures in order to estimate existing traffic volumes.

1. Seasonal Factor

- Identify the day, month, and year the count was taken.
- Open the Seasonal Factors Report file for the corresponding year.
- Using the appropriate Factor Group, identify the Seasonal Factor by month and day. If that number is equal to or less than 1, then no Seasonal Factor needs to be applied. If that number is greater than one then the TMC should be multiplied by that number.

2. Yearly Growth

- Using the seasonally factored count data, follow the steps found in Part 3 of Procedures for Estimating AADT.

If no historic TMC can be obtained, consultation with MassDOT's Traffic and Safety Engineering Section is strongly encouraged prior to estimating existing volumes. Failure to do so may result in rejection of the submittal to MassDOT.

Non-Motorized Users

MassDOT does not currently have any methodologies for estimating non-motorized users from historical count data. Based upon mode share and employment data, it can be assumed that non-motorized volumes have increased on a yearly basis. However, without access to data from permanent count stations, it is difficult to provide any type of regional growth or seasonal factors compared to what is available for motorized traffic.

Capturing bicycle and pedestrian data in 2020 in areas that are typically designed to accommodate peaked volumes that are associated with commuting may not be realistic. However, there are many third-party sensor and/or probe data aggregators that may provide good baseline information from 2019. This data is acceptable for use in design and operational analysis.

For recreational facilities, taking new bicycle and pedestrian counts after March 13, 2020 will likely be acceptable, though any adjacent generators of bicycle and pedestrian traffic that are temporarily closed should be taken into consideration prior to taking new counts. Comparing historic third-party sensor or probe data to 2020 data may add additional confidence and, in addition, provide practical future growth rates.

Future Growth Rates

MassDOT recommends that 2019 counts be grown to the build year using growth rates obtained from the Regional Planning Agency (RPA), if available. If specific, known future traffic generators are identified, they may be added to the count either in addition to the growth rate or while partially discounting the growth rate. In all cases, the methodology used for growing the traffic to the build year shall be documented and shall conform to planning and engineering principles.



Traffic Signal Warrant Analysis

Traffic Signal Warrants may be estimated using historic TMC count data that is factored to 2019 using the methodology presented in this document. It is understood that many TMCs will not have 8 hours of data, so it will be acceptable to use Warrant 2 (Four-Hour Vehicular Volume) in place of the typical Warrant 1 (Eight-Hour Vehicular Volume) that MassDOT typically recommends as justification. Warrant 3 (Peak Hour) alone is still not recommended as justification for installation of a traffic signal unless very unusual circumstances exist, per MUTCD standards.

Where no TMCs exist, Traffic Signal Warrants may be estimated using third-party sensor or probe data, estimates based upon ATRs, or combinations thereof, upon authorization from the State Traffic Engineer. The methodology for estimating TMCs shall be presented to MassDOT as part of any request for approval.

Massachusetts Highway Department
Statewide Traffic Data Collection
2013 Weekday Seasonal Factors

Factor Group	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
R1	1.14	1.13	1.12	1.04	0.96	0.93	0.87	0.84	0.96	0.99	1.02	1.15
R2	1.14	1.09	1.06	1.00	0.94	0.90	0.89	0.87	0.94	0.94	1.01	0.99
R3	1.14	1.09	1.06	1.00	0.94	0.90	0.89	0.87	0.94	0.94	1.01	0.99
R4-R7	1.10	1.09	1.11	1.01	0.92	0.92	0.91	0.91	0.93	0.92	1.04	1.08
U1-Boston	1.01	1.02	1.00	0.95	0.92	0.89	0.90	0.87	0.91	0.91	0.96	1.02
U1-Essex	1.05	1.04	1.03	0.97	0.94	0.91	0.89	0.87	0.93	0.92	0.97	1.01
U1-Southeast	1.08	1.05	1.04	0.97	0.94	0.91	0.89	0.86	0.93	0.94	0.99	1.03
U1-West	1.01	0.98	0.98	0.97	0.95	0.93	0.95	0.91	0.92	0.91	0.97	0.96
U1-Worcester	1.00	0.98	1.00	0.93	0.92	0.91	0.94	0.90	0.92	0.92	0.96	1.02
U2	0.99	1.01	1.03	0.96	0.93	0.91	0.92	0.89	0.91	0.90	0.95	1.00
U3	1.02	1.01	1.01	0.94	0.92	0.90	0.93	0.91	0.91	0.91	0.96	0.98
U4-U7	1.00	1.00	0.98	0.93	0.89	0.87	0.93	0.93	0.93	0.93	0.97	0.99

Round off:

0-999 = 10

>1000 = 100

U = Urban

R = Rural

1 - Interstate

2 - Freeway and Expressway

3 - Other Principal Arterial

4 - Minor Arterial

5 - Major Collector

6 - Minor Collector

7 - Local Road and Street

2013 Weekday Axle Correction Factors

Group	Factor
R1	0.94
R2	0.96
R3	0.97
R4-R7	0.98
U1	0.94
U2	0.96
U3	0.96
U4-U7	0.97

Massachusetts Highway Department
 Statewide Traffic Data Collection
 2014 Weekday Seasonal Factors

Factor Group	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Axle Factor
R1	1.24	1.25	1.15	1.00	0.93	0.93	0.90	0.88	1.02	1.01	1.09	1.09	0.89
R2	1.14	1.09	1.06	1.00	0.94	0.90	0.89	0.87	0.94	0.94	1.01	0.99	0.95
R3	1.12	1.16	1.07	0.98	0.93	0.90	0.91	0.89	0.95	0.95	0.95	1.02	0.96
R4-R7	1.14	1.24	1.21	1.09	0.98	0.92	0.85	0.86	0.98	1.00	1.10	1.08	0.91
U1-Boston	1.06	1.09	0.99	0.95	0.93	0.89	0.91	0.88	0.92	0.93	0.99	0.99	0.93
U1-Essex	1.14	1.11	1.02	0.98	0.94	0.89	0.89	0.86	0.93	0.95	1.02	1.00	0.93
U1-Southeast	1.16	1.15	1.05	0.99	0.93	0.89	0.86	0.84	0.92	0.95	1.01	1.01	0.95
U1-West	1.06	1.04	0.98	0.95	0.95	0.94	0.95	0.93	0.93	0.93	0.99	0.99	0.94
U1-Worcester	1.05	1.07	0.96	0.93	0.92	0.88	0.91	0.89	0.90	0.90	0.95	0.98	0.92
U2	1.04	1.04	0.96	0.94	0.93	0.90	0.92	0.90	0.91	0.90	0.94	0.96	0.95
U3	1.08	1.06	1.00	0.95	0.92	0.89	0.92	0.90	0.92	0.92	0.98	0.94	0.96
U4-U7	1.07	1.09	0.98	0.94	0.89	0.88	0.93	0.92	0.89	0.91	0.97	0.98	0.94

Round off:

0-999 = 10

>1000 = 100

U = Urban

R= Rural

1 - Interstate

2 - Freeway and Expressway

3 - Other Principal Arterial

4 - Minor Arterial

5 - Major Collector

6 - Minor Collector

7 - Local Road and Street

MassDOT Yearly Growth Rates

for data from 2014 to 2018

Growth					
Group	Grow 2014 to 2015	Grow 2015 to 2016	Grow 2016 to 2017	Grow 2017 to 2018	Grow 2018 to 2019
R1	0	0.023	0.004	0.018	0.016
R2	0.05	0.068	0.004	0.014	0.014
R3	-0.038	0.002	0.008	0.011	0.06
R4-7	-0.01	0.003	0.001	0.011	0.012
Rec - East		0.032	0.02	0.041	0.025
Rec - West		0.051	-0.008	0.029	0
U1-Boston	0.061	0.07	-0.003	0.012	0.006
U1-Essex	0.024	0.025	0.007	0.014	0.011
U1-Southeast	0.05	0.062	0.021	0.014	0
U1-West	0.03	-0.027	0.02	0.028	0.013
U1-Worcester	0.042	0.005	0.018	0.01	0.01
U2	0.04	0.048	0.008	0.01	0.02
U3	0.011	0.013	0.011	0.014	0.004
U4-7	0.023	0.062	0.017	0.003	-0.004

updated 5/1/2020

Appendix D

Background Project Trip Distribution

Jefferson at Beaver Brook

Boxborough, Massachusetts

Submitted to: **Executive Office of Energy and Environmental Affairs
Massachusetts Environmental Policy Act**

PREPARED FOR

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January 2015



Site-generated Traffic Volumes

The rate at which any development generates traffic is dependent upon a number of factors such as size, location, and nature of the use. To estimate the trip-generating characteristics for a new development, traffic projections are typically derived from trip generation rates published in the Institute of Transportation Engineers (ITE) Trip Generation² manual. The analysis methodology used for the estimation of Project related traffic volumes in this Study is described below.

Project Trip Generation

For the proposed residential development, peak hour trip generation equations for ITE Land Use Code (LUC) 220 – Apartment were used. Table 4 provides the daily and peak hour trip projections based on the ITE methodology.

Table 4 Trip Generation

Peak Condition	Trips
Weekday Daily (Enter + Exit)	1,600
Weekday Morning Peak Hour (vph)	
Enter	25
<u>Exit</u>	<u>100</u>
Total	125
Weekday Evening Peak Hour (vph)	
Enter	100
<u>Exit</u>	<u>55</u>
Total	155

vph vehicle trips per hour

As shown in Table 4, the Project is estimated to generate approximately 125 vehicle trips (25 entering/100 exiting) during the weekday morning peak hour and 155 new trips (100 entering/55 exiting) during the weekday evening peak hour.

Modal Split

Transportation mode split data for the Town of Boxborough, provided by the American Community Survey, was reviewed to determine the percentage of potential residents that may be expected to utilize public transportation. Based on the most recent projections available approximately two percent of current Boxborough



² [Trip Generation Handbook](#), 9th Edition, Institute of Transportation Engineers; Washington, D.C.; 2009



residents utilize public transportation. Application of the same mode share trip rate for the estimated Site trip generation would result in a non-automobile trip count of 32 daily trips (enter + exit) and approximately three peak hour trips (enter + exit). Since these potential trip reductions are relatively small, no trip credit was applied to the trip generation calculations.

Trip Distribution

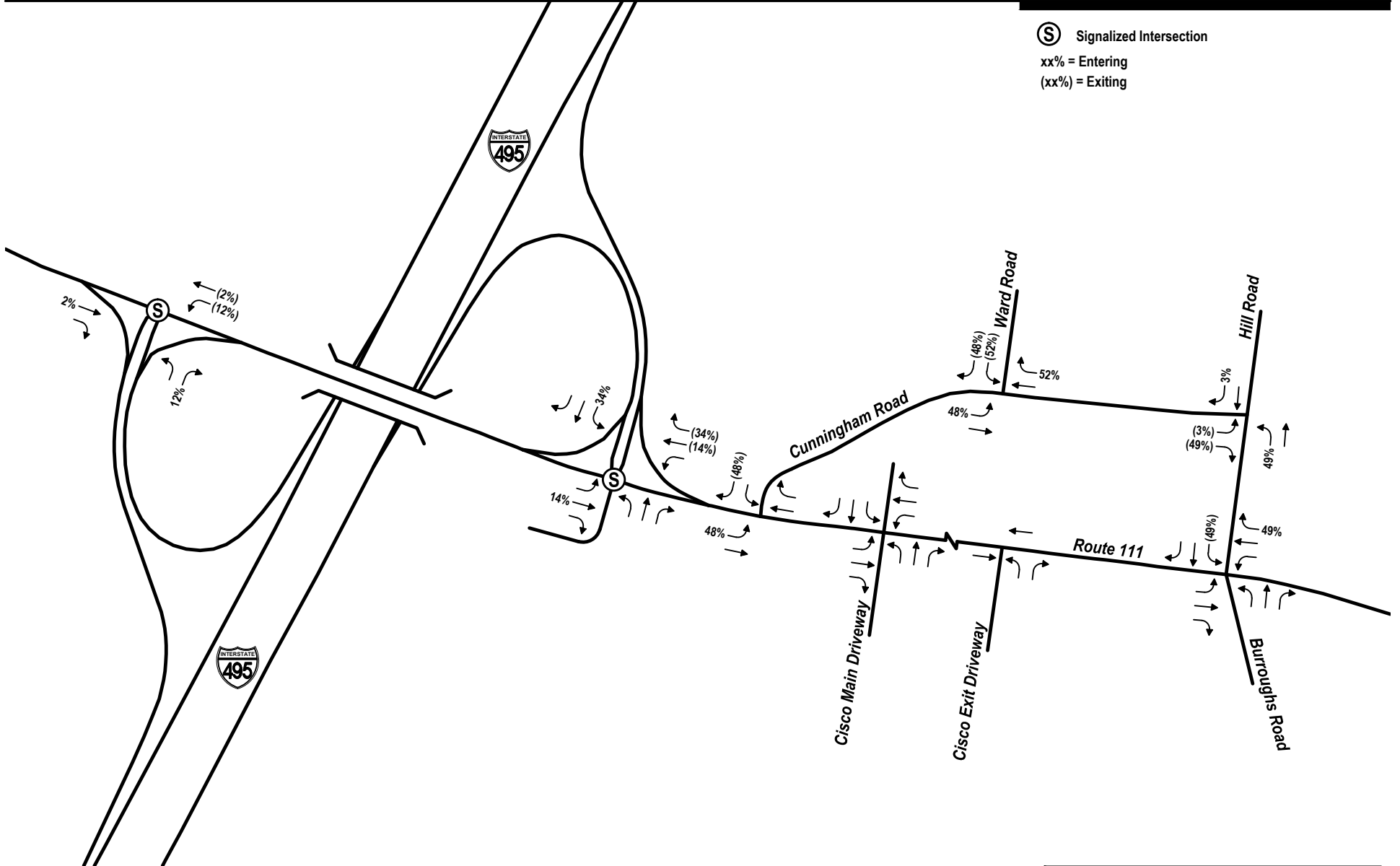
Journey-to-work data from the 2010 Census was used to develop trip distribution percentages and to confirm the assumptions made in the TSL reviewed by MassDOT. Table 5 provides a breakdown of the directional distribution of new traffic attributable to the Project. A comparison of the percentages in Table 5 with the information presented in the TSL suggests that there have been some shifts in the directional distribution of residential traffic since the 2000 census data. However, while the changes affect the calculated volume of Site traffic heading in different directions when compared to calculations based on the 2000 Census data, the changes do not affect the overall order of magnitude of the critical volumes during the peak periods, and more importantly, they do not materially affect the study area selected for analysis.

Table 5 Trip Distribution

	<u>% of Total Trips</u>
Route 111 to/from the East	49%
Route 111 to/from the West	2%
I-495 to/from the North	34%
I-495 to/from the South	12%
<u>Hill Road to/from the North</u>	<u>3%</u>
<u>Total</u>	<u>100%</u>

Figure 7 graphically depicts the trip distribution percentages within the study area. Site generated traffic volume networks and Site generated traffic percentages at each of the study locations are included in the Appendix.

To develop the Build conditions peak hour traffic volume, Project generated traffic volumes noted above were added to the No-Build conditions peak hour traffic volumes. The Build peak hour traffic volume networks are shown on Figures 8 and 9, respectively.



Vanasse Hangen Brustlin, Inc.

Figure 7
Trip Distribution

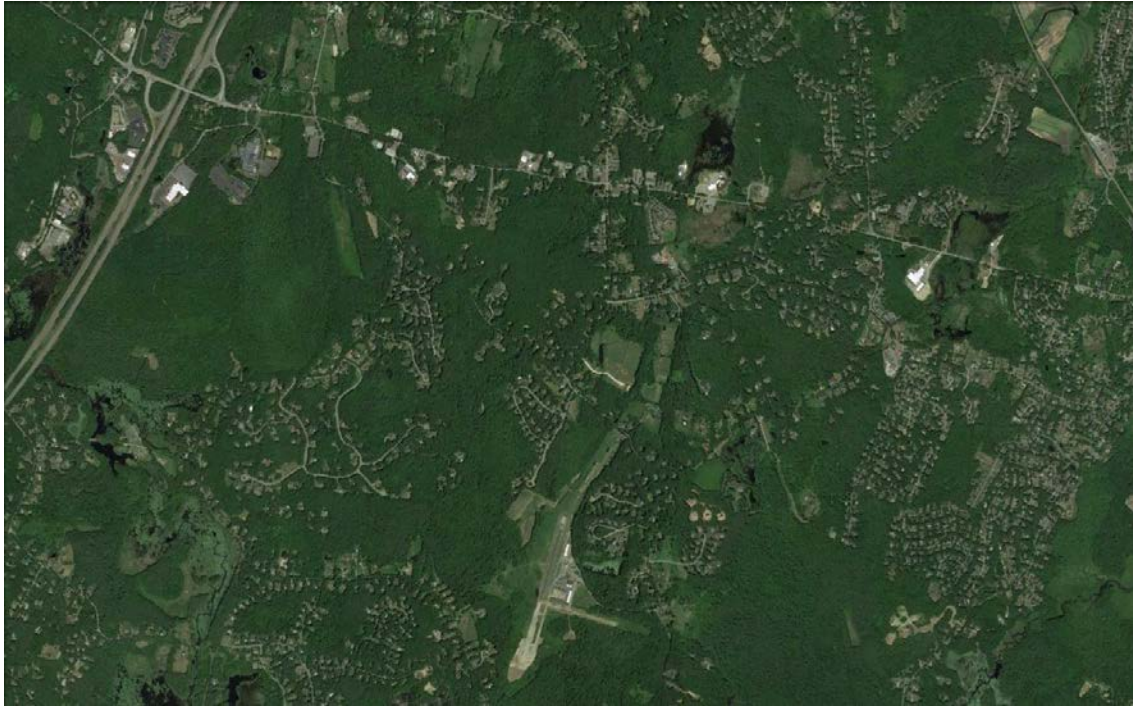
Jefferson at Beaver Brook
Boxborough, Massachusetts



Not to Scale

ENCLAVE AT BOXBOROUGH

Massachusetts Avenue



Boxborough, MA
August 2, 2019

Prepared by:



600 Unicorn Park Drive
Woburn, MA 01801

781-932-3201

www.baysideengineering.com

Prepared for:

Boxborough Town Center, LLC

FUTURE 2026 BUILD CONDITIONS

Project Description

As currently proposed, the project will consist of razing the existing home and the construction of 50 age-restricted homes. Access to the site will be provided by way of a connection to the Sheriff's Meadow/Tisbury Meadow full-movement driveway to Stow Road.

Site Traffic Generation

Site generated traffic for the redevelopment was based on trip-generation data published by the Institute of Transportation Engineers (ITE) in the *Trip Generation* manual². Trip generation data for Land Use Code (LUC) 251 – Senior Adult Housing-Detached was reviewed. The trip generation for the project is summarized in Table 4 and the worksheets are included in the Appendix.

TABLE 4
PROPOSED RESIDENTIAL
TRIP-GENERATION SUMMARY

	<u>Total Trips^a</u>
Average Weekday Daily Traffic	306
<i>Weekday Morning Peak Hour:</i>	
Entering	8
<u>Exiting</u>	<u>16</u>
Total	24
<i>Weekday Evening Peak Hour:</i>	
Entering	17
<u>Exiting</u>	<u>11</u>
Total	28

^aBased on ITE LUC 251 – Senior Adult Housing-Detached; 50 units.

On a typical weekday, the proposed residential development is expected to generate 306 daily vehicle trips. During the weekday morning peak hour, 24 vehicle trips (8 vehicles entering and 16 vehicles exiting) are expected. During the weekday evening peak hour, 28 vehicle trips (17 vehicle entering and 11 vehicles exiting) are expected.

²*Trip Generation*, Tenth Edition; Institute of Transportation Engineers; Washington, DC; 2017.

Trip Distribution

The directional distribution of the vehicular traffic approaching and departing the site is a function of population densities, the location of employment, existing travel patterns, similar uses, and the efficiency of the existing roadway system. For the proposed residences, locations of employment from the recent 2010 census was reviewed. Table 5 summarizes the expected trip distribution for the residences, also shown on Figure 4.

TABLE 5
PROPOSED TRIP DISTRIBUTION

<u>Route</u>	<u>Direction</u>	<u>Percent of Trips</u>
Massachusetts Avenue	East	31
Massachusetts Avenue	West	65
Stow Road	North	3
Middle Road	South	<u>1</u>
TOTAL		100

Future Traffic Volumes - Build Condition

The site-generated traffic was distributed within the study area according to the percentages summarized in Table 5 and are shown on Figure 5. The site generated volumes shown on Figure 5 were then superimposed onto the 2026 No-Build traffic volumes to represent the 2026 Build traffic volume conditions. The anticipated 2026 Build weekday morning and weekday evening peak-hour traffic volumes are graphically presented in Figure 6. These volumes were used as the basis for all analysis as well as to identify potential mitigation measures to ameliorate the project's impacts.

A summary of 2026 peak-hour projected traffic volume changes in the site vicinity are shown in Table 6. These volumes are based on the expected increases from the site traffic generation.

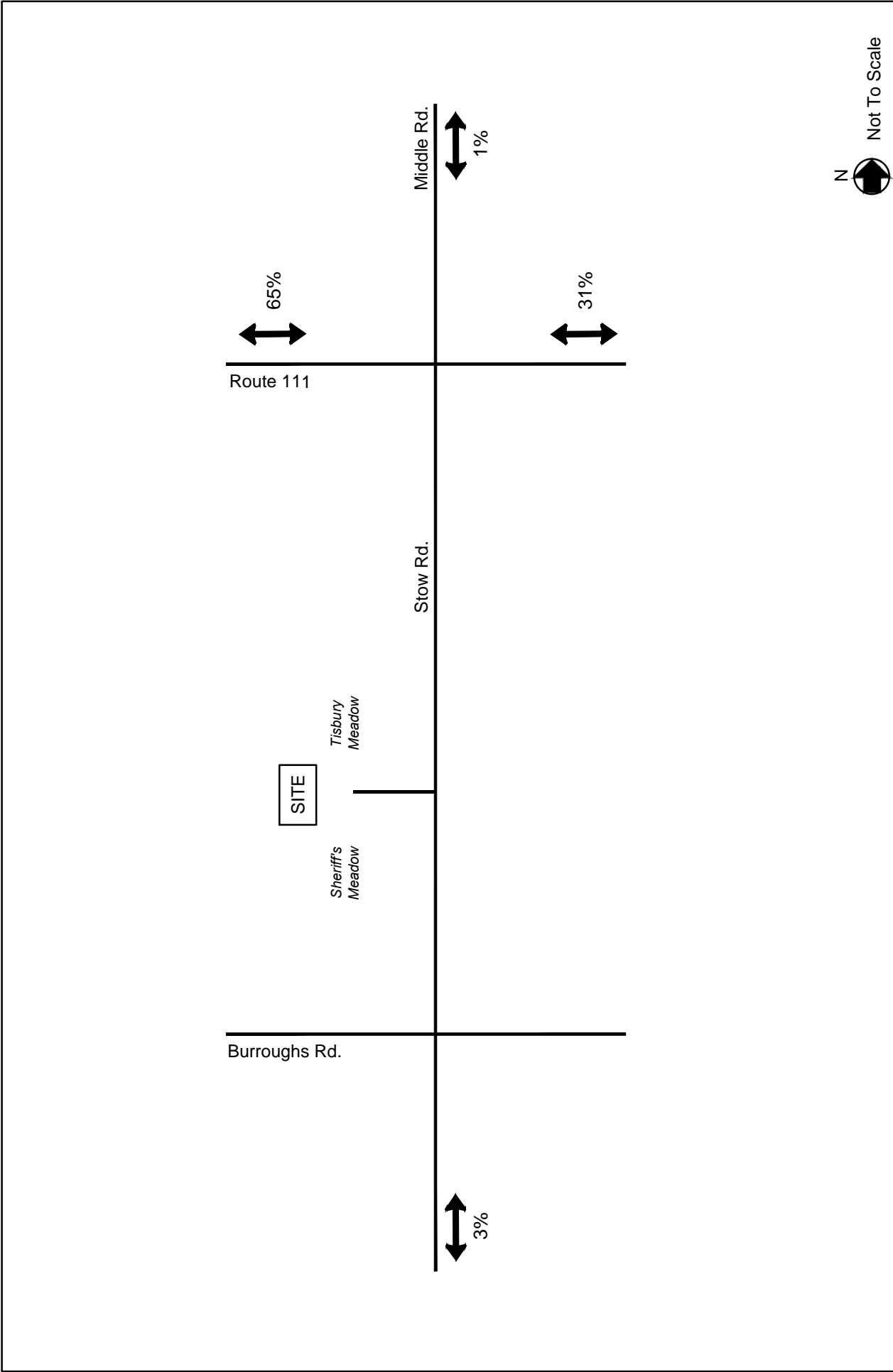


Figure 4
Trip Distribution

Enclave at Boxborough, MA



600 Unicorn Park Drive ▲ Woburn, MA 01801
 Phone: 781.932.3201 ▲ Fax: 781.932.3413
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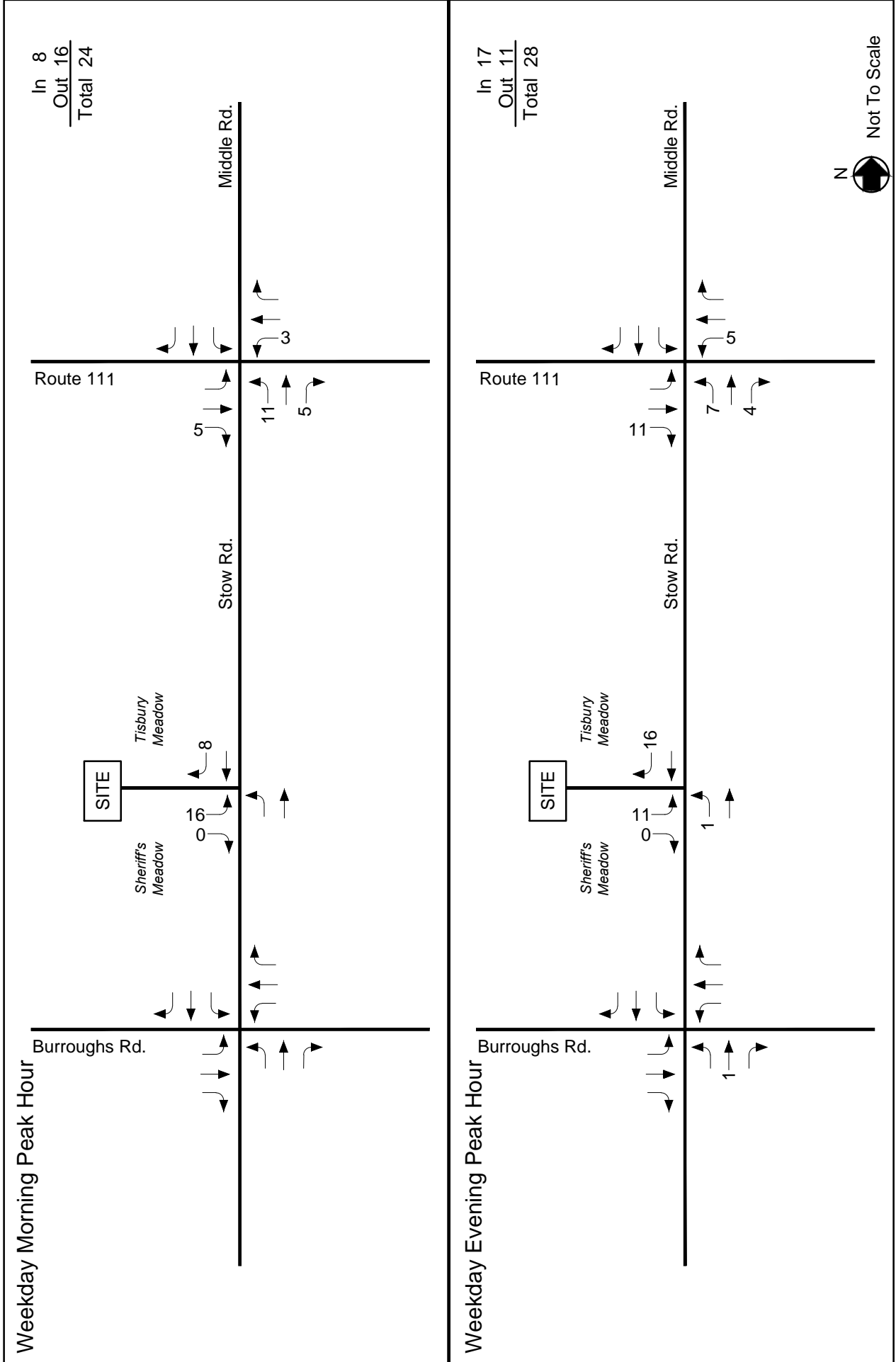


Figure 5
 Site Generated
 Peak Hour Traffic Volumes

Enclave at Boxborough, MA

Appendix E

Crash Rate Calculation Sheet

Appendix F

Trip Distribution Analysis

Home			Access Roadway Distribution						Weighted Total Distribution							
State Name	County Name	Minor Civil Division Name	Workers in Commuting Flow	% of Total	Route 111 West	Route 111 East	I-495 (North)	I-495 (South)	Hill Road	Burroughs Road	Route 111 West	Route 111 East	I-495 (North)	I-495 (South)	Hill Road	Burroughs Road
Massachusetts	Middlesex County	Boxborough town	523	12.470%		80%			10%	10%	0.00%	9.98%	0.00%	0.00%	1.25%	1.25%
Massachusetts	Middlesex County	Acton town	217	5.174%		100%					0.00%	5.17%	0.00%	0.00%	0.00%	0.00%
Massachusetts	Middlesex County	Westford town	198	4.721%			100%				0.00%	0.00%	4.72%	0.00%	0.00%	0.00%
Massachusetts	Middlesex County	Hudson town	151	3.600%				100%			0.00%	0.00%	0.00%	3.60%	0.00%	0.00%
Massachusetts	Worcester County	Worcester city	144	3.433%	30%			70%			1.03%	0.00%	0.00%	2.40%	0.00%	0.00%
Massachusetts	Middlesex County	Lowell city	130	3.100%			100%				0.00%	0.00%	3.10%	0.00%	0.00%	0.00%
Massachusetts	Worcester County	Leominster city	127	3.028%	60%		20%	20%			1.82%	0.00%	0.61%	0.61%	0.00%	0.00%
Massachusetts	Worcester County	Clinton town	105	2.504%				100%			0.00%	0.00%	0.00%	2.50%	0.00%	0.00%
Massachusetts	Middlesex County	Chelmsford town	103	2.456%			100%				0.00%	0.00%	2.46%	0.00%	0.00%	0.00%
Massachusetts	Middlesex County	Dracut town	103	2.456%			100%				0.00%	0.00%	2.46%	0.00%	0.00%	0.00%
Massachusetts	Middlesex County	Waltham city	75	1.788%		100%					0.00%	1.79%	0.00%	0.00%	0.00%	0.00%
Massachusetts	Middlesex County	Burlington town	64	1.526%		10%	90%				0.00%	0.15%	1.37%	0.00%	0.00%	0.00%
Massachusetts	Middlesex County	Somerville city	63	1.502%		20%	80%				0.00%	0.30%	1.20%	0.00%	0.00%	0.00%
Massachusetts	Middlesex County	Framingham town	61	1.454%				100%			0.00%	0.00%	0.00%	1.45%	0.00%	0.00%
Massachusetts	Worcester County	Shrewsbury town	61	1.454%				100%			0.00%	0.00%	0.00%	1.45%	0.00%	0.00%
Massachusetts	Middlesex County	Tewksbury town	59	1.407%							0.00%	0.00%	1.41%	0.00%	0.00%	0.00%
Massachusetts	Suffolk County	Boston city	59	1.407%		20%	80%				0.00%	0.28%	1.13%	0.00%	0.00%	0.00%
Massachusetts	Middlesex County	Ayer town	57	1.359%	50%			50%			0.68%	0.00%	0.68%	0.00%	0.00%	0.00%
Massachusetts	Middlesex County	Marlborough city	54	1.288%				100%			0.00%	0.00%	0.00%	1.29%	0.00%	0.00%
Massachusetts	Worcester County	Bolton town	52	1.240%				100%			0.00%	0.00%	0.00%	1.24%	0.00%	0.00%
Massachusetts	Middlesex County	Malden city	49	1.168%		20%	80%				0.00%	0.23%	0.93%	0.00%	0.00%	0.00%
Massachusetts	Middlesex County	Watertown Town	47	1.121%		100%					0.00%	1.12%	0.00%	0.00%	0.00%	0.00%
Massachusetts	Worcester County	Westborough town	47	1.121%				100%			0.00%	0.00%	0.00%	1.12%	0.00%	0.00%
Massachusetts	Middlesex County	Groton town	46	1.097%	50%			50%			0.55%	0.00%	0.55%	0.00%	0.00%	0.00%
Massachusetts	Worcester County	Boylston town	44	1.049%				100%			0.00%	0.00%	0.00%	1.05%	0.00%	0.00%
New Hampshire	Hillsborough	Nashua city	44	1.049%			100%				0.00%	0.00%	1.05%	0.00%	0.00%	0.00%
Massachusetts	Middlesex County	Tyngsborough town	41	0.978%			100%				0.00%	0.00%	0.98%	0.00%	0.00%	0.00%
Massachusetts	Essex County	Marblehead town	39	0.930%		20%	80%				0.00%	0.19%	0.74%	0.00%	0.00%	0.00%
Massachusetts	Middlesex County	Arlington town	39	0.930%		100%					0.00%	0.93%	0.00%	0.00%	0.00%	0.00%
Massachusetts	Middlesex County	Newton city	39	0.930%		100%					0.00%	0.93%	0.00%	0.00%	0.00%	0.00%
New Hampshire	Hillsborough	Manchester city	38	0.906%			100%				0.00%	0.00%	0.91%	0.00%	0.00%	0.00%
Massachusetts	Middlesex County	Billerica town	37	0.882%			100%				0.00%	0.00%	0.88%	0.00%	0.00%	0.00%
Massachusetts	Middlesex County	Natick town	37	0.882%	50%			50%			0.00%	0.44%	0.00%	0.44%	0.00%	0.00%
Massachusetts	Middlesex County	Belmont town	35	0.835%		100%					0.00%	0.83%	0.00%	0.00%	0.00%	0.00%
Massachusetts	Middlesex County	Hopkinton town	35	0.835%				100%			0.00%	0.00%	0.00%	0.83%	0.00%	0.00%
Massachusetts	Middlesex County	Lexington town	35	0.835%		100%					0.00%	0.83%	0.00%	0.00%	0.00%	0.00%
Massachusetts	Norfolk County	Westwood town	35	0.835%		50%		50%			0.00%	0.42%	0.00%	0.42%	0.00%	0.00%
Massachusetts	Middlesex County	Stow town	34	0.811%		100%					0.00%	0.81%	0.00%	0.00%	0.00%	0.00%
Massachusetts	Middlesex County	Ashland town	33	0.787%				100%			0.00%	0.00%	0.00%	0.79%	0.00%	0.00%
New Hampshire	Hillsborough	Hudson town	32	0.763%				100%			0.00%	0.00%	0.00%	0.76%	0.00%	0.00%
Massachusetts	Worcester County	Athol town	31	0.739%			100%				0.00%	0.00%	0.74%	0.00%	0.00%	0.00%
Massachusetts	Worcester County	Gardner city	31	0.739%			80%	20%			0.00%	0.00%	0.59%	0.15%	0.00%	0.00%
New Hampshire	Rockingham County	Salem town	31	0.739%			100%				0.00%	0.00%	0.74%	0.00%	0.00%	0.00%
Massachusetts	Middlesex County	Pepperell town	30	0.715%	50%			50%			0.36%	0.00%	0.36%	0.00%	0.00%	0.00%
Massachusetts	Worcester County	Milford town	30	0.715%				100%			0.00%	0.00%	0.00%	0.72%	0.00%	0.00%
Massachusetts	Middlesex County	Cambridge city	28	0.668%		100%					0.00%	0.67%	0.00%	0.00%	0.00%	0.00%
Massachusetts	Middlesex County	Sudbury town	27	0.644%		100%					0.00%	0.64%	0.00%	0.00%	0.00%	0.00%
Massachusetts	Essex County	North Andover town	26	0.620%			100%				0.00%	0.00%	0.62%	0.00%	0.00%	0.00%
Massachusetts	Middlesex County	Concord town	26	0.620%		100%					0.00%	0.62%	0.00%	0.00%	0.00%	0.00%
Massachusetts	Norfolk County	Brookline town	24	0.572%		50%		50%			0.00%	0.29%	0.00%	0.29%	0.00%	0.00%
Massachusetts	Bristol County	Berkley town	22	0.525%				100%			0.00%	0.00%	0.00%	0.52%	0.00%	0.00%

Home			Workers in Commuting Flow	Access Roadway Distribution						Weighted Total Distribution					
State Name	County Name	Minor Civil Division Name		% of Total	Route 111 West	Route 111 East	I-495 (North)	I-495 (South)	Hill Road	Burroughs Road	Route 111 West	Route 111 East	I-495 (North)	I-495 (South)	Hill Road
Massachusetts	Middlesex County	Littleton town	22	0.525%			80%		20%	0.00%	0.00%	0.42%	0.00%	0.10%	0.00%
Massachusetts	Worcester County	Fitchburg city	22	0.525%	80%				20%	0.42%	0.00%	0.00%	0.10%	0.00%	0.00%
New Hampshire	Hillsborough	New Ipswich town	21	0.501%	50%		50%			0.25%	0.00%	0.25%	0.00%	0.00%	0.00%
New Hampshire	Rockingham County	Portsmouth city	21	0.501%			100%			0.00%	0.00%	0.50%	0.00%	0.00%	0.00%
Massachusetts	Essex County	Saugus town	20	0.477%		20%	80%			0.00%	0.10%	0.38%	0.00%	0.00%	0.00%
Massachusetts	Worcester County	Sterling town	20	0.477%	50%			50%		0.24%	0.00%	0.00%	0.24%	0.00%	0.00%
Massachusetts	Middlesex County	Townsend town	19	0.453%	50%			50%		0.23%	0.00%	0.00%	0.23%	0.00%	0.00%
Massachusetts	Middlesex County	Wilmington town	19	0.453%			100%			0.00%	0.00%	0.45%	0.00%	0.00%	0.00%
Massachusetts	Worcester County	Northborough town	19	0.453%				100%		0.00%	0.00%	0.00%	0.45%	0.00%	0.00%
Massachusetts	Plymouth County	Abington town	18	0.429%		50%		50%		0.00%	0.21%	0.00%	0.21%	0.00%	0.00%
Massachusetts	Plymouth County	Plymouth town	17	0.405%				100%		0.00%	0.00%	0.00%	0.41%	0.00%	0.00%
Massachusetts	Worcester County	Westminster town	17	0.405%	100%					0.41%	0.00%	0.00%	0.00%	0.00%	0.00%
Massachusetts	Barnstable County	Mashpee town	16	0.381%				100%		0.00%	0.00%	0.00%	0.38%	0.00%	0.00%
Massachusetts	Norfolk County	Wellesley town	16	0.381%		50%		50%		0.00%	0.19%	0.00%	0.19%	0.00%	0.00%
Massachusetts	Worcester County	Lancaster town	16	0.381%				100%		0.00%	0.00%	0.00%	0.38%	0.00%	0.00%
New Hampshire	Hillsborough	Merrimack town	16	0.381%	30%		70%			0.11%	0.00%	0.27%	0.00%	0.00%	0.00%
Massachusetts	Barnstable County	Falmouth town	15	0.358%				100%		0.00%	0.00%	0.00%	0.36%	0.00%	0.00%
New Hampshire	Hillsborough	Mont Vernon town	15	0.358%			100%			0.00%	0.00%	0.36%	0.00%	0.00%	0.00%
Massachusetts	Bristol County	Westport town	14	0.334%				100%		0.00%	0.00%	0.00%	0.33%	0.00%	0.00%
Massachusetts	Essex County	Methuen Town city	14	0.334%			100%			0.00%	0.00%	0.33%	0.00%	0.00%	0.00%
Massachusetts	Middlesex County	Wakefield town	14	0.334%		20%	80%			0.00%	0.07%	0.27%	0.00%	0.00%	0.00%
Massachusetts	Worcester County	Grafton town	14	0.334%				100%		0.00%	0.00%	0.00%	0.33%	0.00%	0.00%
Massachusetts	Worcester County	Uxbridge town	14	0.334%				100%		0.00%	0.00%	0.00%	0.33%	0.00%	0.00%
Massachusetts	Bristol County	Taunton city	13	0.310%				100%		0.00%	0.00%	0.00%	0.31%	0.00%	0.00%
Massachusetts	Norfolk County	Bellingham town	13	0.310%				100%		0.00%	0.00%	0.00%	0.31%	0.00%	0.00%
Massachusetts	Worcester County	Milbury town	13	0.310%				100%		0.00%	0.00%	0.00%	0.31%	0.00%	0.00%
New Hampshire	Rockingham County	Derry town	13	0.310%			100%			0.00%	0.00%	0.31%	0.00%	0.00%	0.00%
Rhode Island	Providence County	Providence city	13	0.310%				100%		0.00%	0.00%	0.00%	0.31%	0.00%	0.00%
Massachusetts	Middlesex County	Everett city	12	0.286%		20%	80%			0.00%	0.06%	0.23%	0.00%	0.00%	0.00%
Massachusetts	Worcester County	Templeton town	12	0.286%	100%					0.29%	0.00%	0.00%	0.00%	0.00%	0.00%
Rhode Island	Kent County	East Greenwich	12	0.286%				100%		0.00%	0.00%	0.00%	0.29%	0.00%	0.00%
Rhode Island	Providence County	Central Falls city	12	0.286%				100%		0.00%	0.00%	0.00%	0.29%	0.00%	0.00%
Massachusetts	Middlesex County	Maynard town	11	0.262%		100%				0.00%	0.26%	0.00%	0.00%	0.00%	0.00%
Massachusetts	Worcester County	Holden town	11	0.262%	50%			50%		0.13%	0.00%	0.00%	0.13%	0.00%	0.00%
Rhode Island	Providence County	Johnston town	11	0.262%				100%		0.00%	0.00%	0.00%	0.26%	0.00%	0.00%
Massachusetts	Essex County	Lawrence city	10	0.238%			100%			0.00%	0.00%	0.24%	0.00%	0.00%	0.00%
Massachusetts	Worcester County	Harvard town	10	0.238%	100%					0.24%	0.00%	0.00%	0.00%	0.00%	0.00%
Massachusetts	Worcester County	Upton town	10	0.238%				100%		0.00%	0.00%	0.00%	0.24%	0.00%	0.00%
Connecticut	Tolland County	Vernon town	9	0.215%				100%		0.00%	0.00%	0.00%	0.21%	0.00%	0.00%
Massachusetts	Middlesex County	Carlisle town	9	0.215%		20%	80%			0.00%	0.04%	0.17%	0.00%	0.00%	0.00%
Massachusetts	Middlesex County	Melrose city	9	0.215%		20%	80%			0.00%	0.04%	0.17%	0.00%	0.00%	0.00%
Massachusetts	Worcester County	Lunenburg town	9	0.215%	100%					0.21%	0.00%	0.00%	0.00%	0.00%	0.00%
Massachusetts	Worcester County	Southbridge Town	9	0.215%	20%			80%		0.04%	0.00%	0.00%	0.17%	0.00%	0.00%
Connecticut	Windham County	Thompson town	8	0.191%				100%		0.00%	0.00%	0.00%	0.19%	0.00%	0.00%
Massachusetts	Essex County	Peabody city	8	0.191%		20%	80%			0.00%	0.04%	0.15%	0.00%	0.00%	0.00%
Massachusetts	Norfolk County	Medway town	8	0.191%				100%		0.00%	0.00%	0.00%	0.19%	0.00%	0.00%
Massachusetts	Worcester County	Sutton town	8	0.191%	40%			60%		0.08%	0.00%	0.00%	0.11%	0.00%	0.00%
Massachusetts	Middlesex County	Wayland town	7	0.167%		100%				0.00%	0.17%	0.00%	0.00%	0.00%	0.00%
Massachusetts	Essex County	Nahant town	6	0.143%		20%	80%			0.00%	0.03%	0.11%	0.00%	0.00%	0.00%
Massachusetts	Norfolk County	Dedham town	6	0.143%		50%		50%		0.00%	0.07%	0.00%	0.07%	0.00%	0.00%
New Hampshire	Merrimack County	Dunbarton town	6	0.143%			100%			0.00%	0.00%	0.14%	0.00%	0.00%	0.00%
Massachusetts	Worcester County	Royalston town	5	0.119%		100%				0.12%	0.00%	0.00%	0.00%	0.00%	0.00%
New Hampshire	Rockingham County	Hampton Falls town	5	0.119%			100%			0.00%	0.00%	0.12%	0.00%	0.00%	0.00%
New Hampshire	Hillsborough	Mason town	4	0.095%	50%		50%			0.05%	0.00%	0.05%	0.00%	0.00%	0.00%
New Hampshire	Sullivan County	Langdon town	3	0.072%			100%			0.00%	0.00%	0.07%	0.00%	0.00%	0.00%
New Hampshire	Rockingham County	Hampton town	2	0.048%			100%			0.00%	0.00%	0.05%	0.00%	0.00%	0.00%
			4,194	100%						10.5%	29.5%	27.4%	29.7%	1.4%	1.7%
										11%	29%	27%	30%	1.50%	1.50%

Appendix G

Traffic Signal Warrant Analysis

MUTCD Traffic Signal Warrant Summary Worksheet

The Worksheet(s) attached are provided as an attachment to the Engineering Investigation Study for:

Intersection: Massachusetts Avenue (Route 111) at Adams Place and Gas Station Drivewa
City: Boxborough

70%
Volume Level

Major Street: Massachusetts Avenue (Route 111)
Critical Approach Speed: 45 mph
Lanes: 1 lane

Minor Street: Adams Place and Gas Station Driveway
Critical Approach Speed: 30 mph
Lanes: 1 lane

% Right Turns Included

From North (SB) 100%

From East (WB) 100%

From South (NB) 100%

From West (EB) 100%

In built-up area of isolated community of < 10,000 population? No

Total number of approaches at intersection? 4 or more

Manually set volume level? No

Analysis based on PROJECTED volume data.

Forecast Year	Within 7 Years of Construction?	Time (HH:MM)			
		From	AM / PM	To	AM / PM
2027	Yes	7:00	AM	9:00	AM
		4:00	PM	6:00	PM

Warrant Evaluation Summary	Warrant Met:
Warrant 1: Eight - Hour Vehicular Volume	N/A
Condition A: Minimum Vehicular Volume Condition B: Interruption of Continuous Traffic Condition C: Combination: 80% of A and B	
Warrant 2: Four-Hour Volume	N/A
Warrant 3: Peak Hour Volume	No
Warrant 4: Pedestrian Volume	N/A
Criterion A: Four-Hour Criterion B: Peak-Hour	
Warrant 5: School Crossing	N/A
Warrant 6: Coordinated Signal System	N/A
Warrant 7: Crash Experience	N/A
Warrant 8: Roadway Network	N/A
Warrant 9: Intersection Near a Grade Crossing	N/A

Warrant Analysis Conducted By:

Name: JY

Date: 11/9/2020

Nitsch Engineering

Warrant 1: Eight - Hour Vehicular Volume 70%

Warrant Evaluated? No

Warrant Satisfied? N/A

Manually Set To:

Condition A : Min. Veh. Volume		
Volume Level	70%	56%
Major Rd. Req	350	280
Minor Rd. Req	105	84
Number of Hours	0	0

Satisfied?

Condition B: Interruption of Continuous Traffic		
Volume Level	70%	56%
Major Rd. Req	525	420
Minor Rd. Req	53	42
Number of Hours	1	2

Satisfied?

Condition C: Combination of A & B at 56%		
Number of Hours	1	2

Satisfied?

6:00 AM		Enter Start Time (Military Time) (HH:MM)			Total
Time Period	From	To	Major Road: Both App. (VPH)	Minor Road: High App. (VPH)	
1	6:00	7:00	0	0	0
2	7:00	8:00	1550	66	1616
3	8:00	9:00	0	0	0
4	9:00	10:00	0	0	0
5	10:00	11:00	0	0	0
6	11:00	12:00	0	0	0
7	12:00	13:00	0	0	0
8	13:00	14:00	0	0	0
9	14:00	15:00	0	0	0
10	15:00	16:00	0	0	0
11	16:00	17:00	0	0	0
12	17:00	18:00	1507	49	1556
13	18:00	19:00	0	0	0
14	19:00	20:00	0	0	0
15	20:00	21:00	0	0	0
16	21:00	22:00	0	0	0

Warrant 2: Four-Hour Volume 70%

Four hours with highest total volume meeting warrant criteria:

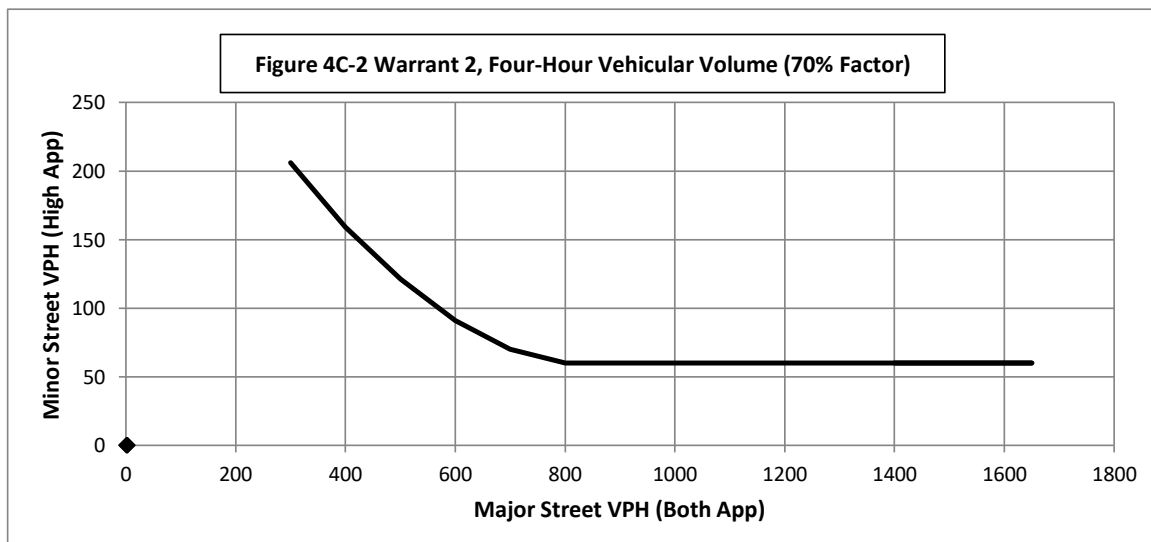
Hour Start				
Major Road Vol.				
Minor Road Vol.				

Warrant Evaluated? No

Number of Hours N/A

Warrant Satisfied? N/A

Manually Set To:



Warrant 3: Peak Hour Volume

70%

Warrant Evaluated? Yes

Warrant Satisfied? No

Manually Set To:

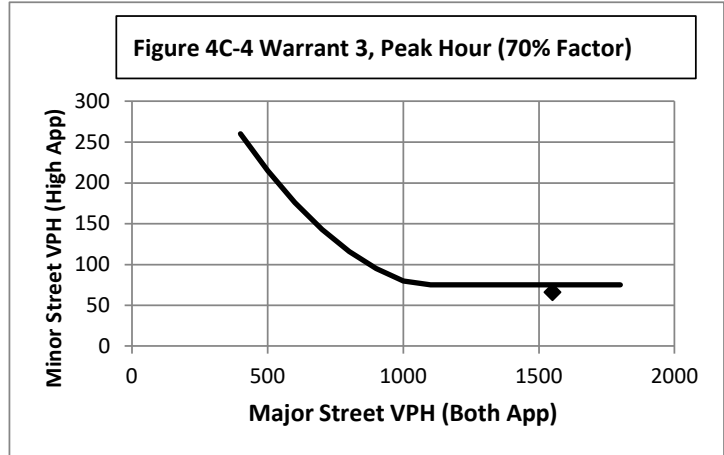
Condition justifying use of warrant:

Industrial Complex

Criteria		Met?
Delay on Minor Approach	4	Yes
Volume on Minor Approach	100	No
Total Entering Volume (veh/h)	800	

Manually Set Peak Hour?

Peak Hour	Major Road Vol. (Both App.)	Minor Road Vol. (High App.)
7:00	1550	66



Warrant 4: Pedestrian Volume

70%

Warrant Evaluated? No

Warrant Satisfied? N/A

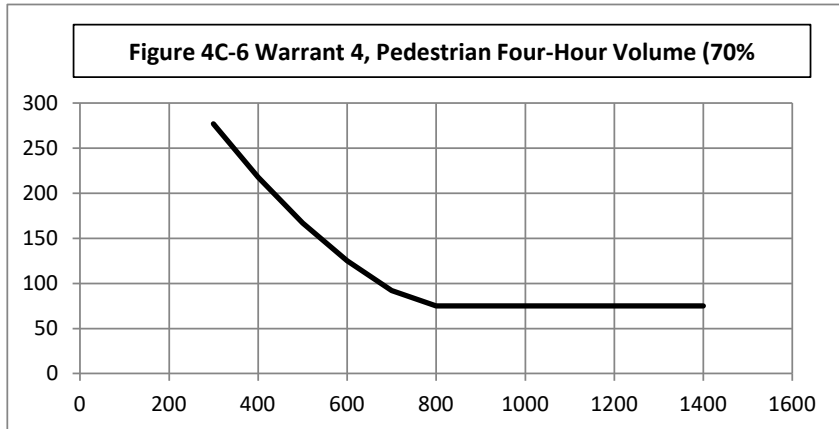
Manually Set To:

Criterion A: Four Hour

Hour (Start)	Pedestrian Volume	Major Road Vol.
		0
		0
		0
		0

Manually Set Major Rd Vol?
15th % walk speed < 3.5 ft/s?

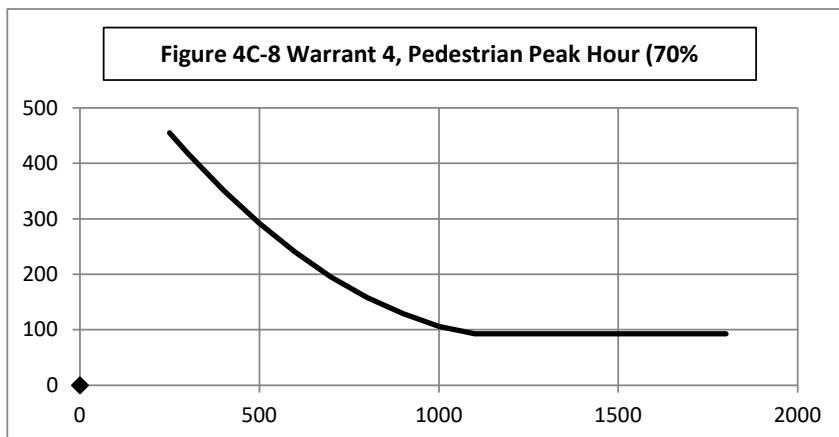
Criterion A Satisfied?



Criterion B: Peak Hour

Peak Hour	Pedestrian Vol.	Major Road Vol.
0:00	0	0

Criterion B Satisfied?



MUTCD Traffic Signal Warrant Summary Worksheet

The Worksheet(s) attached are provided as an attachment to the Engineering Investigation Study for:

Intersection: Massachusetts Avenue (Route 111) at Paddock Lane and Site Driveway
City: Boxborough

100%
Volume Level

Major Street: Massachusetts Avenue (Route 111)
Critical Approach Speed: 40 mph
Lanes: 1 lane

Minor Street: Paddock Lane and Site Driveway
Critical Approach Speed: 30 mph
Lanes: 1 lane

% Right Turns Included
From North (SB) 0%
From East (WB) 0%
From South (NB) 0%
From West (EB) 0%

In built-up area of isolated community of < 10,000 population? No
Total number of approaches at intersection? 4 or more
Manually set volume level? No

Analysis based on PROJECTED volume data.

Forecast Year	Within 7 Years of Construction?	Time (HH:MM)			
		From	AM / PM	To	AM / PM
2027	Yes	7:00	AM	9:00	AM
		4:00	PM	6:00	PM

Warrant Evaluation Summary	Warrant Met:
Warrant 1: Eight - Hour Vehicular Volume	N/A
Condition A: Minimum Vehicular Volume Condition B: Interruption of Continuous Traffic Condition C: Combination: 80% of A and B	
Warrant 2: Four-Hour Volume	N/A
Warrant 3: Peak Hour Volume	Yes
Warrant 4: Pedestrian Volume	N/A
Criterion A: Four-Hour Criterion B: Peak-Hour	
Warrant 5: School Crossing	N/A
Warrant 6: Coordinated Signal System	N/A
Warrant 7: Crash Experience	N/A
Warrant 8: Roadway Network	N/A
Warrant 9: Intersection Near a Grade Crossing	N/A

Warrant Analysis Conducted By:

Name: JY

Date: 11/9/2020

Nitsch Engineering

Warrant 1: Eight - Hour Vehicular Volume

100%

Warrant Evaluated? No

Warrant Satisfied? N/A

Manually Set To:

Condition A :		
Min. Veh. Volume		
Volume Level	100%	80%
Major Rd. Req	500	400
Minor Rd. Req	150	120
Number of Hours	1	1

Satisfied?

Condition B:		
Interruption of Continuous Traffic		
Volume Level	100%	80%
Major Rd. Req	750	600
Minor Rd. Req	75	60
Number of Hours	1	1

Satisfied?

Condition C:		
Combination of A & B at 80%		

Satisfied?

6:00 AM		Enter Start Time (Military Time) (HH:MM)			Total
Time Period	From	To	Major Road: Both App. (VPH)	Minor Road: High App. (VPH)	
1	6:00	7:00	0	0	0
2	7:00	8:00	1065	56	1121
3	8:00	9:00	0	0	0
4	9:00	10:00	0	0	0
5	10:00	11:00	0	0	0
6	11:00	12:00	0	0	0
7	12:00	13:00	0	0	0
8	13:00	14:00	0	0	0
9	14:00	15:00	0	0	0
10	15:00	16:00	0	0	0
11	16:00	17:00	0	0	0
12	17:00	18:00	1091	234	1325
13	18:00	19:00	0	0	0
14	19:00	20:00	0	0	0
15	20:00	21:00	0	0	0
16	21:00	22:00	0	0	0

Warrant 2: Four-Hour Volume

100%

Four hours with highest total volume meeting warrant criteria:

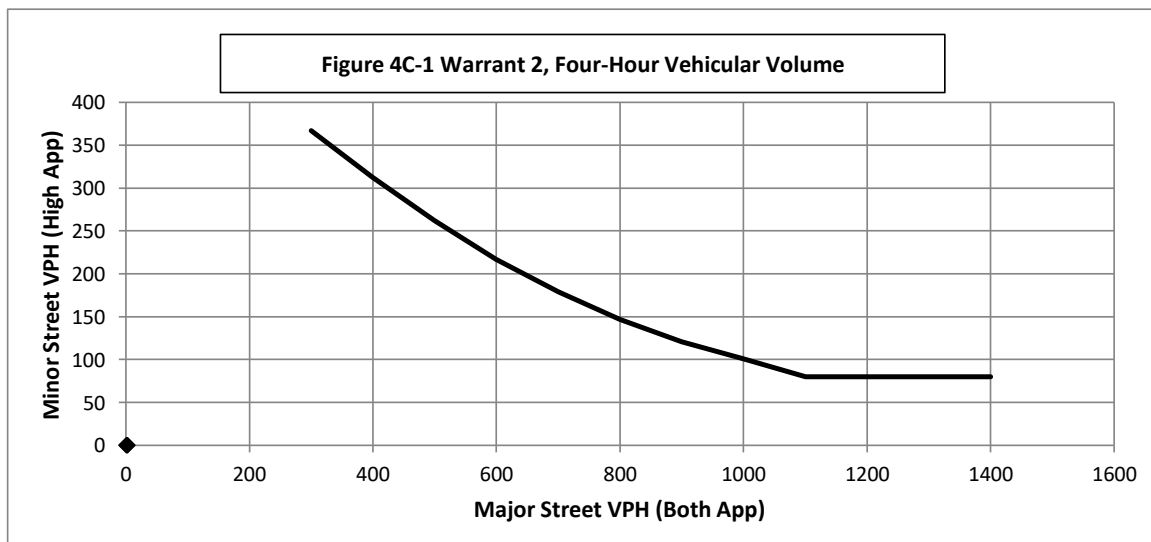
Hour Start			
Major Road Vol.			
Minor Road Vol.			

Warrant Evaluated? No

Number of Hours N/A

Warrant Satisfied? N/A

Manually Set To:



Warrant 3: Peak Hour Volume

100%

Warrant Evaluated? Yes

Warrant Satisfied? Yes

Manually Set To:

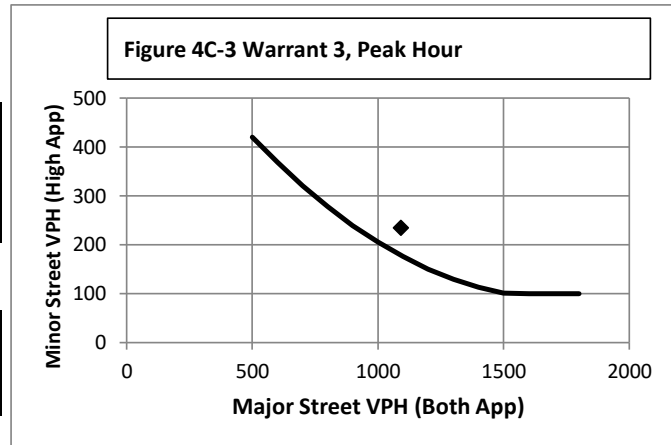
Condition justifying use of warrant:

Industrial Complex

Criteria		Met?
Delay on Minor Approach	4	Yes
Volume on Minor Approach	100	Yes
Total Entering Volume (veh/h)	800	

Manually Set Peak Hour?

Peak Hour	Major Road Vol. (Both App.)	Minor Road Vol. (High App.)
17:00	1091	234



Warrant 4: Pedestrian Volume

70%

Warrant Evaluated? No

Warrant Satisfied? N/A

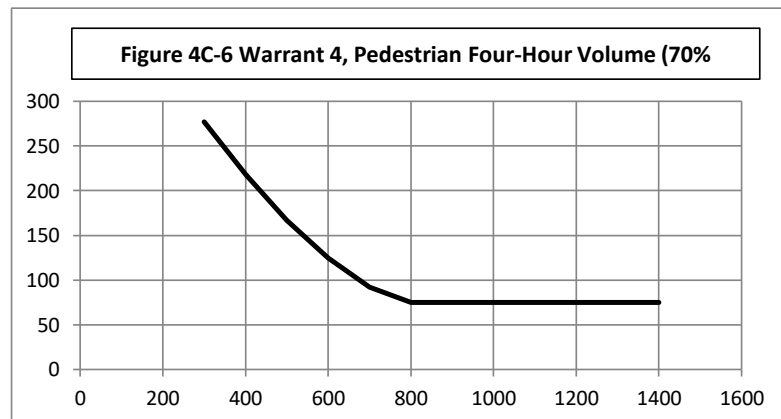
Manually Set To:

Criterion A: Four Hour

Hour (Start)	Pedestrian Volume	Major Road Vol.
		0
		0
		0
		0

Manually Set Major Rd Vol?
15th % walk speed < 3.5 ft/s?

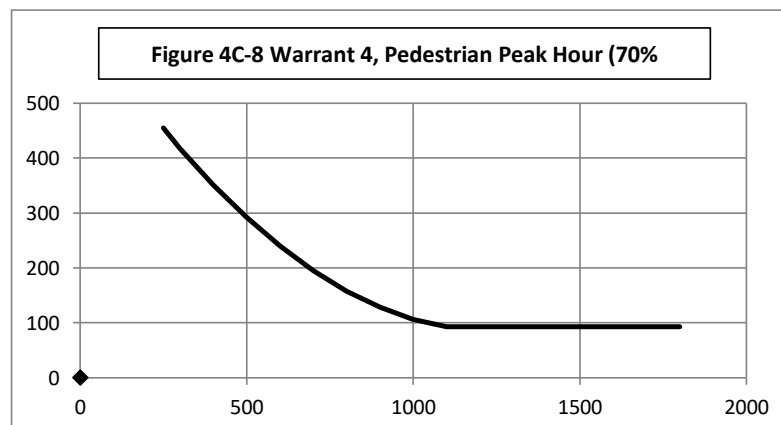
Criterion A Satisfied?



Criterion B: Peak Hour

Peak Hour	Pedestrian Vol.	Major Road Vol.
0:00	0	0

Criterion B Satisfied?



Appendix H

Yellow and All Red Clearance Calculation

Project Name:	1414 Mass Ave Traffic Impact Study	Analyst: JY
Intersection:	Mass Ave at Paddock Lane and Site Driveway	Date: November-20

Vehicular Clearance Interval Calculations

Roadway Names

EB Approach Mass Ave
WB Approach Mass Ave
NB Approach Site Driveway
SB Approach Paddock Lane

Fixed Parameters:

t = perception-reaction time = 1 s
 a = deceleration rate = 10 ft/s²
 L = length of vehicle = 20 ft

	EBL	EBT		WBT	NBL		SBL	
<i>V</i> Speed (mph)	35	40		40	25		25	
<i>g</i> Grade (decimal) *								
<i>W</i> Distance (ft)	57	80		80	60		60	
<i>Y</i> Yellow Interval (s)	3.6	3.9		3.9	3.0		3.0	
<i>Rounded value</i>	3.5	4.0		4.0	3.0		3.0	
<i>R</i> Red Interval (s)	1.6	1.0		1.0	1.7		1.7	
<i>Rounded value</i>	1.5	1.0		1.0	2.0		2.0	

* If grade is zero, no value needs to be entered. Downhill is negative grade.

$$Y = t + \frac{1.47V}{2a + 64.4g} \quad R = \frac{W + L}{1.47V} - 1$$

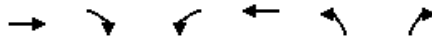
Calculations based on MassDOT memo dated January 8, 2013 entitled "MassDOT Guidance on Calculating Clearance Intervals at Traffic Signals."

Appendix I

Synchro Analysis

Lanes, Volumes, Timings
 3: I-495 SB Ramp & Mass Ave (Route 111)

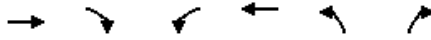
2020 Existing Condition - AM Peak Hour



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↓	↑↑	↓	↑
Traffic Volume (vph)	438	193	215	340	205	118
Future Volume (vph)	438	193	215	340	205	118
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%			0%	0%	
Storage Length (ft)		200	230		350	300
Storage Lanes		1	1		1	1
Taper Length (ft)			25		25	
Lane Util. Factor	0.95	1.00	1.00	0.95	0.97	1.00
Ped Bike Factor						
Frt		0.850				0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	3505	1599	1752	3438	3335	1509
Flt Permitted			0.950		0.950	
Satd. Flow (perm)	3505	1599	1752	3438	3335	1509
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		219				131
Link Speed (mph)	45			35	30	
Link Distance (ft)	1144			1409	648	
Travel Time (s)	17.3			27.4	14.7	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.88	0.88	0.84	0.84	0.90	0.90
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	3%	1%	3%	5%	5%	7%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	498	219	256	405	228	131
Shared Lane Traffic (%)						
Lane Group Flow (vph)	498	219	256	405	228	131
Turn Type	NA	Perm	Prot	NA	Prot	Perm
Protected Phases	2		1	6	8	
Permitted Phases		2				8
Detector Phase	2	2	1	6	8	8
Switch Phase						
Minimum Initial (s)	10.0	10.0	6.0	10.0	10.0	10.0
Minimum Split (s)	16.0	16.0	11.0	16.0	15.0	15.0
Total Split (s)	30.0	30.0	25.0	55.0	35.0	35.0
Total Split (%)	33.3%	33.3%	27.8%	61.1%	38.9%	38.9%
Maximum Green (s)	24.0	24.0	20.0	49.0	30.0	30.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	1.0	2.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	5.0	6.0	5.0	5.0
Lead/Lag	Lead	Lead	Lag			
Lead-Lag Optimize?	Yes	Yes	Yes			
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	C-Max	C-Max	None	C-Max	None	None
Walk Time (s)						
Flash Dont Walk (s)						
Pedestrian Calls (#/hr)						
Act Effct Green (s)	42.1	42.1	20.0	67.1	11.9	11.9
Actuated g/C Ratio	0.47	0.47	0.22	0.75	0.13	0.13
v/c Ratio	0.30	0.25	0.66	0.16	0.52	0.42
Control Delay	15.8	3.0	32.8	1.1	40.5	10.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	15.8	3.0	32.8	1.1	40.5	10.9
LOS	B	A	C	A	D	B
Approach Delay	11.9			13.4	29.7	
Approach LOS	B			B	C	

Lanes, Volumes, Timings
 3: I-495 SB Ramp & Mass Ave (Route 111)

2020 Existing Condition - AM Peak Hour



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Queue Length 50th (ft)	87	0	141	9	63	0
Queue Length 95th (ft)	128	36	211	10	95	48
Internal Link Dist (ft)	1064			1329	568	
Turn Bay Length (ft)		200	230		350	300
Base Capacity (vph)	1641	865	389	2564	1111	590
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.30	0.25	0.66	0.16	0.21	0.22

Intersection Summary

Area Type: Other
 Cycle Length: 90
 Actuated Cycle Length: 90
 Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green, Master Intersection
 Natural Cycle: 50
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.66
 Intersection Signal Delay: 16.1
 Intersection Capacity Utilization 45.7%
 Analysis Period (min) 15

Intersection LOS: B
 ICU Level of Service A

Splits and Phases: 3: I-495 SB Ramp & Mass Ave (Route 111)



Lanes, Volumes, Timings
5: Driveway/I-495 NB Ramp & Mass Ave (Route 111)

2020 Existing Condition - AM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	160	396	0	0	392	173	0	0	0	178	0	163
Future Volume (vph)	160	396	0	0	392	173	0	0	0	178	0	163
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	250		0	0		250	0		0	190		190
Storage Lanes	1		0	0		1	0		0	1		1
Taper Length (ft)	25			25			25			100		
Lane Util. Factor	1.00	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	0.97	1.00	1.00
Ped Bike Factor												
Frt						0.850						0.850
Flt Protected	0.950									0.950		
Satd. Flow (prot)	1770	3471	0	0	3471	1509	0	0	0	3242	0	1524
Flt Permitted	0.950									0.950		
Satd. Flow (perm)	1770	3471	0	0	3471	1509	0	0	0	3242	0	1524
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						182						212
Link Speed (mph)		45			35			30			30	
Link Distance (ft)		1409			557			391			691	
Travel Time (s)		21.3			10.9			8.9			15.7	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.87	0.87	0.87	0.95	0.95	0.95	0.92	0.92	0.92	0.77	0.77	0.77
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	4%	2%	2%	4%	7%	2%	2%	2%	8%	2%	6%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	184	455	0	0	413	182	0	0	0	231	0	212
Shared Lane Traffic (%)												
Lane Group Flow (vph)	184	455	0	0	413	182	0	0	0	231	0	212
Turn Type	Prot	NA			NA	Perm				Prot		Perm
Protected Phases	5	2			6					3		
Permitted Phases					6	6						3
Detector Phase	5	2			6	6				3		3
Switch Phase												
Minimum Initial (s)	6.0	10.0			10.0	10.0				6.0		6.0
Minimum Split (s)	11.0	15.0			16.0	16.0				12.0		12.0
Total Split (s)	30.0	68.0			38.0	38.0				22.0		22.0
Total Split (%)	33.3%	75.6%			42.2%	42.2%				24.4%		24.4%
Maximum Green (s)	25.0	63.0			32.0	32.0				16.0		16.0
Yellow Time (s)	4.0	4.0			4.0	4.0				4.0		4.0
All-Red Time (s)	1.0	1.0			2.0	2.0				2.0		2.0
Lost Time Adjust (s)	0.0	0.0			0.0	0.0				0.0		0.0
Total Lost Time (s)	5.0	5.0			6.0	6.0				6.0		6.0
Lead/Lag	Lag			Lead	Lead	Lead						
Lead-Lag Optimize?	Yes			Yes	Yes	Yes						
Vehicle Extension (s)	3.0	3.0			3.0	3.0				3.0		3.0
Minimum Gap (s)	3.0	3.0			3.0	3.0				3.0		3.0
Time Before Reduce (s)	0.0	0.0			0.0	0.0				0.0		0.0
Time To Reduce (s)	0.0	0.0			0.0	0.0				0.0		0.0
Recall Mode	None	C-Max			C-Max	C-Max				None		None
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)	25.0	67.3			36.3	36.3				11.7		11.7
Actuated g/C Ratio	0.28	0.75			0.40	0.40				0.13		0.13
v/c Ratio	0.37	0.18			0.29	0.25				0.55		0.55
Control Delay	19.0	0.7			19.4	4.1				41.4		11.1
Queue Delay	0.0	0.0			0.0	0.0				0.0		0.0
Total Delay	19.0	0.7			19.4	4.1				41.4		11.1
LOS	B	A			B	A				D		B
Approach Delay		6.0			14.7					26.9		
Approach LOS		A			B					C		

Lanes, Volumes, Timings
 5: Driveway/I-495 NB Ramp & Mass Ave (Route 111)

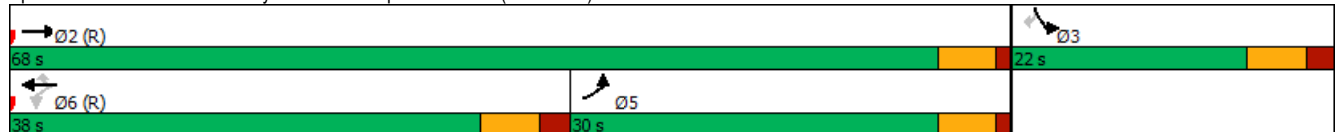
2020 Existing Condition - AM Peak Hour



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)	87	6			81	0				64		0
Queue Length 95th (ft)	147	5			125	41				81		34
Internal Link Dist (ft)		1329			477			311			611	
Turn Bay Length (ft)	250					250				190		190
Base Capacity (vph)	491	2596			1400	717				576		445
Starvation Cap Reductn	0	0			0	0				0		0
Spillback Cap Reductn	0	0			0	0				0		0
Storage Cap Reductn	0	0			0	0				0		0
Reduced v/c Ratio	0.37	0.18			0.29	0.25				0.40		0.48

Intersection Summary	
Area Type:	Other
Cycle Length:	90
Actuated Cycle Length:	90
Offset:	75 (83%), Referenced to phase 2:EBT and 6:WBTL, Start of Green
Natural Cycle:	40
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.55
Intersection Signal Delay:	14.6
Intersection Capacity Utilization:	39.4%
Analysis Period (min):	15
Intersection LOS:	B
ICU Level of Service:	A

Splits and Phases: 5: Driveway/I-495 NB Ramp & Mass Ave (Route 111)



HCM Unsignalized Intersection Capacity Analysis
 7: Adams Pl/Gas Station & Mass Ave (Route 111)



















2020 Existing Condition - AM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (veh/h)	77	467	30	13	483	9	32	0	14	10	2	50
Future Volume (Veh/h)	77	467	30	13	483	9	32	0	14	10	2	50
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.97	0.97	0.97	0.98	0.98	0.98	0.81	0.81	0.81	0.82	0.82	0.82
Hourly flow rate (vph)	79	481	31	13	493	9	40	0	17	12	2	61
Pedestrians					2						1	
Lane Width (ft)					12.0						12.0	
Walking Speed (ft/s)					3.5						3.5	
Percent Blockage					0						0	
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)		557										
pX, platoon unblocked				0.94			0.94	0.94	0.94	0.94	0.94	
vC, conflicting volume	503			512			1240	1184	498	1198	1194	498
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	503			451			1224	1164	437	1180	1176	498
tC, single (s)	4.2			4.1			7.2	6.5	6.4	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.3			2.2			3.6	4.0	3.4	3.5	4.0	3.3
p0 queue free %	92			99			66	100	97	92	99	89
cM capacity (veh/h)	1035			1055			117	167	558	143	166	567
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	591	515	57	75								
Volume Left	79	13	40	12								
Volume Right	31	9	17	61								
cSH	1035	1055	153	369								
Volume to Capacity	0.08	0.01	0.37	0.20								
Queue Length 95th (ft)	6	1	39	19								
Control Delay (s)	2.0	0.4	42.0	17.2								
Lane LOS	A	A	E	C								
Approach Delay (s)	2.0	0.4	42.0	17.2								
Approach LOS			E	C								
Intersection Summary												
Average Delay			4.1									
Intersection Capacity Utilization			76.2%		ICU Level of Service				D			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
 9: Site Dr/Paddock Lane & Mass Ave (Route 111)

2020 Existing Condition - AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	11	455	0	0	411	13	0	0	0	52	0	48
Future Volume (Veh/h)	11	455	0	0	411	13	0	0	0	52	0	48
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.97	0.97	0.97	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	12	479	0	0	424	13	0	0	0	57	0	52
Pedestrians		2										
Lane Width (ft)		12.0										
Walking Speed (ft/s)		3.5										
Percent Blockage		0										
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)		807										
pX, platoon unblocked				0.97			0.97	0.97	0.97	0.97	0.97	
vC, conflicting volume	437			479			988	940	479	934	934	432
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	437			446			971	922	446	915	915	432
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			100	100	100	77	100	92
cM capacity (veh/h)	1112			1079			206	261	597	245	263	622
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2						
Volume Total	491	437	0	0	57	52						
Volume Left	12	0	0	0	57	0						
Volume Right	0	13	0	0	0	52						
cSH	1112	1700	1700	1700	245	622						
Volume to Capacity	0.01	0.26	0.00	0.00	0.23	0.08						
Queue Length 95th (ft)	1	0	0	0	22	7						
Control Delay (s)	0.3	0.0	0.0	0.0	24.1	11.3						
Lane LOS	A		A	A	C	B						
Approach Delay (s)	0.3	0.0	0.0		18.0							
Approach LOS			A		C							
Intersection Summary												
Average Delay			2.0									
Intersection Capacity Utilization			42.8%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
 12: Burroughs Road/Hill Road & Mass Ave (Route 111)

2020 Existing Condition - AM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (veh/h)	17	441	49	11	324	8	68	2	15	13	0	32
Future Volume (Veh/h)	17	441	49	11	324	8	68	2	15	13	0	32
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.93	0.93	0.93	0.85	0.85	0.85	0.71	0.71	0.71
Hourly flow rate (vph)	18	464	52	12	348	9	80	2	18	18	0	45
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	357			516			948	907	490	922	928	352
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	357			516			948	907	490	922	928	352
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.3	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.7	4.0	3.3
p0 queue free %	99			99			64	99	97	92	100	93
cM capacity (veh/h)	1213			1060			220	271	582	223	263	684
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	534	369	100	63								
Volume Left	18	12	80	18								
Volume Right	52	9	18	45								
cSH	1213	1060	248	430								
Volume to Capacity	0.01	0.01	0.40	0.15								
Queue Length 95th (ft)	1	1	46	13								
Control Delay (s)	0.4	0.4	28.9	14.8								
Lane LOS	A	A	D	B								
Approach Delay (s)	0.4	0.4	28.9	14.8								
Approach LOS			D	B								
Intersection Summary												
Average Delay			3.9									
Intersection Capacity Utilization			51.4%		ICU Level of Service				A			
Analysis Period (min)			15									

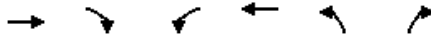
Lanes, Volumes, Timings
 3: I-495 SB Ramp & Mass Ave (Route 111)

2020 Existing Condition - PM Peak Hour

	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↘	↑↑	↘↘	↗
Traffic Volume (vph)	462	169	150	432	119	104
Future Volume (vph)	462	169	150	432	119	104
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%			0%	0%	
Storage Length (ft)		200	230		350	300
Storage Lanes		1	1		1	1
Taper Length (ft)			25		25	
Lane Util. Factor	0.95	1.00	1.00	0.95	0.97	1.00
Ped Bike Factor						
Frt		0.850				0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	3574	1583	1787	3610	3502	1615
Flt Permitted			0.950		0.950	
Satd. Flow (perm)	3574	1583	1787	3610	3502	1615
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		194				117
Link Speed (mph)	45			35	30	
Link Distance (ft)	1144			1409	648	
Travel Time (s)	17.3			27.4	14.7	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.87	0.87	0.79	0.79	0.89	0.89
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	1%	2%	1%	0%	0%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	531	194	190	547	134	117
Shared Lane Traffic (%)						
Lane Group Flow (vph)	531	194	190	547	134	117
Turn Type	NA	Perm	Prot	NA	Prot	Perm
Protected Phases	2		1	6	8	
Permitted Phases		2				8
Detector Phase	2	2	1	6	8	8
Switch Phase						
Minimum Initial (s)	10.0	10.0	6.0	10.0	10.0	10.0
Minimum Split (s)	16.0	16.0	11.0	16.0	15.0	15.0
Total Split (s)	44.0	44.0	36.0	80.0	20.0	20.0
Total Split (%)	44.0%	44.0%	36.0%	80.0%	20.0%	20.0%
Maximum Green (s)	38.0	38.0	31.0	74.0	15.0	15.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	1.0	2.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	5.0	6.0	5.0	5.0
Lead/Lag	Lead	Lead	Lag			
Lead-Lag Optimize?	Yes	Yes	Yes			
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	C-Max	C-Max	None	C-Max	None	None
Walk Time (s)						
Flash Dont Walk (s)						
Pedestrian Calls (#/hr)						
Act Effct Green (s)	42.6	42.6	31.0	78.6	10.4	10.4
Actuated g/C Ratio	0.43	0.43	0.31	0.79	0.10	0.10
v/c Ratio	0.35	0.25	0.34	0.19	0.37	0.43
Control Delay	20.2	3.6	16.4	0.8	44.8	13.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	20.2	3.6	16.4	0.8	44.8	13.2
LOS	C	A	B	A	D	B
Approach Delay	15.8			4.8	30.0	
Approach LOS	B			A	C	

Lanes, Volumes, Timings
 3: I-495 SB Ramp & Mass Ave (Route 111)

2020 Existing Condition - PM Peak Hour

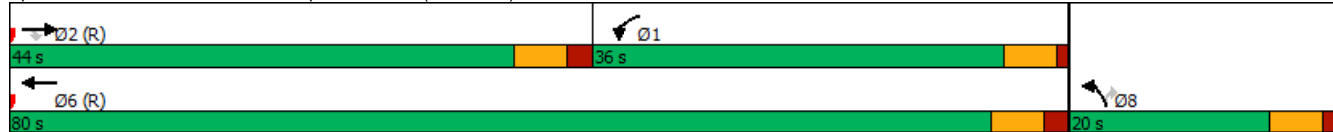


Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Queue Length 50th (ft)	116	0	106	9	41	0
Queue Length 95th (ft)	155	37	156	7	69	49
Internal Link Dist (ft)	1064			1329	568	
Turn Bay Length (ft)		200	230		350	300
Base Capacity (vph)	1523	786	553	2838	525	341
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.35	0.25	0.34	0.19	0.26	0.34

Intersection Summary

Area Type:	Other
Cycle Length:	100
Actuated Cycle Length:	100
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green, Master Intersection	
Natural Cycle:	45
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.43
Intersection Signal Delay:	13.1
Intersection Capacity Utilization	42.7%
Analysis Period (min)	15
Intersection LOS:	B
ICU Level of Service	A

Splits and Phases: 3: I-495 SB Ramp & Mass Ave (Route 111)



Lanes, Volumes, Timings
5: Driveway/I-495 NB Ramp & Mass Ave (Route 111)

2020 Existing Condition - PM Peak Hour



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗			↖	↗				↖	↗	↗
Traffic Volume (vph)	252	314	0	0	418	156	0	0	0	257	0	164
Future Volume (vph)	252	314	0	0	418	156	0	0	0	257	0	164
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	250		0	0		250	0		0	190		190
Storage Lanes	1		0	0		1	0		0	1		1
Taper Length (ft)	25			25			25			100		
Lane Util. Factor	1.00	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	0.97	1.00	1.00
Ped Bike Factor												
Frt						0.850						0.850
Flt Protected	0.950									0.950		
Satd. Flow (prot)	1805	3574	0	0	3574	1599	0	0	0	3467	0	1599
Flt Permitted	0.950									0.950		
Satd. Flow (perm)	1805	3574	0	0	3574	1599	0	0	0	3467	0	1599
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						193						210
Link Speed (mph)		45			35			30			30	
Link Distance (ft)		1409			557			391			691	
Travel Time (s)		21.3			10.9			8.9			15.7	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.88	0.88	0.88	0.81	0.81	0.81	0.92	0.92	0.92	0.78	0.78	0.78
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	1%	2%	0%	1%	1%	2%	2%	2%	1%	2%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	286	357	0	0	516	193	0	0	0	329	0	210
Shared Lane Traffic (%)												
Lane Group Flow (vph)	286	357	0	0	516	193	0	0	0	329	0	210
Turn Type	Prot	NA			NA	Perm				Prot		Perm
Protected Phases	5	2			6					3		
Permitted Phases				6	6	6						3
Detector Phase	5	2		6	6	6				3		3
Switch Phase												
Minimum Initial (s)	6.0	10.0		10.0	10.0	10.0				6.0		6.0
Minimum Split (s)	11.0	15.0		16.0	16.0	16.0				12.0		12.0
Total Split (s)	44.0	80.0		36.0	36.0	36.0				20.0		20.0
Total Split (%)	44.0%	80.0%		36.0%	36.0%	36.0%				20.0%		20.0%
Maximum Green (s)	39.0	75.0		30.0	30.0	30.0				14.0		14.0
Yellow Time (s)	4.0	4.0		4.0	4.0	4.0				4.0		4.0
All-Red Time (s)	1.0	1.0		2.0	2.0	2.0				2.0		2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0				0.0		0.0
Total Lost Time (s)	5.0	5.0		6.0	6.0	6.0				6.0		6.0
Lead/Lag	Lag			Lead	Lead	Lead						
Lead-Lag Optimize?	Yes			Yes	Yes	Yes						
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0				3.0		3.0
Minimum Gap (s)	3.0	3.0		3.0	3.0	3.0				3.0		3.0
Time Before Reduce (s)	0.0	0.0		0.0	0.0	0.0				0.0		0.0
Time To Reduce (s)	0.0	0.0		0.0	0.0	0.0				0.0		0.0
Recall Mode	None	C-Max		C-Max	C-Max	C-Max				None		None
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)	39.0	75.8			30.8	30.8				13.2		13.2
Actuated g/C Ratio	0.39	0.76			0.31	0.31				0.13		0.13
v/c Ratio	0.41	0.13			0.47	0.31				0.72		0.54
Control Delay	23.5	0.6			29.9	5.4				51.2		11.1
Queue Delay	0.0	0.0			0.0	0.0				0.0		0.0
Total Delay	23.5	0.6			29.9	5.4				51.2		11.1
LOS	C	A			C	A				D		B
Approach Delay		10.8			23.2						35.6	
Approach LOS		B			C						D	

Lanes, Volumes, Timings
 5: Driveway/I-495 NB Ramp & Mass Ave (Route 111)

2020 Existing Condition - PM Peak Hour



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)	170	4			141	0				104		0
Queue Length 95th (ft)	263	3			168	34				127		38
Internal Link Dist (ft)		1329			477			311			611	
Turn Bay Length (ft)	250					250				190		190
Base Capacity (vph)	703	2710			1102	626				485		404
Starvation Cap Reductn	0	0			0	0				0		0
Spillback Cap Reductn	0	0			0	0				0		0
Storage Cap Reductn	0	0			0	0				0		0
Reduced v/c Ratio	0.41	0.13			0.47	0.31				0.68		0.52

Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 5 (5%), Referenced to phase 2:EBT and 6:WBTL, Start of Green

Natural Cycle: 50

Control Type: Actuated-Coordinated

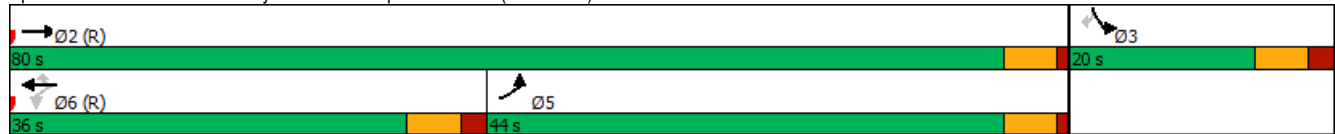
Maximum v/c Ratio: 0.72

Intersection Signal Delay: 22.5 Intersection LOS: C

Intersection Capacity Utilization 45.3% ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 5: Driveway/I-495 NB Ramp & Mass Ave (Route 111)



HCM Unsignalized Intersection Capacity Analysis
 7: Adams Pl/Gas Station & Mass Ave (Route 111)




















2020 Existing Condition - PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (veh/h)	36	501	34	15	519	10	17	0	2	9	0	38
Future Volume (Veh/h)	36	501	34	15	519	10	17	0	2	9	0	38
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.91	0.91	0.91	0.87	0.87	0.87	0.61	0.61	0.61	0.81	0.81	0.81
Hourly flow rate (vph)	40	551	37	17	597	11	28	0	3	11	0	47
Pedestrians					2						1	
Lane Width (ft)					12.0						12.0	
Walking Speed (ft/s)					3.5						3.5	
Percent Blockage					0						0	
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)		557										
pX, platoon unblocked				0.96			0.96	0.96	0.96	0.96	0.96	
vC, conflicting volume	609			588			1333	1292	572	1292	1306	604
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	609			548			1326	1283	530	1283	1297	604
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.2	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.6	4.0	3.3
p0 queue free %	96			98			75	100	99	91	100	91
cM capacity (veh/h)	978			988			111	150	528	122	147	502
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	628	625	31	58								
Volume Left	40	17	28	11								
Volume Right	37	11	3	47								
cSH	978	988	120	316								
Volume to Capacity	0.04	0.02	0.26	0.18								
Queue Length 95th (ft)	3	1	24	17								
Control Delay (s)	1.1	0.5	45.0	18.9								
Lane LOS	A	A	E	C								
Approach Delay (s)	1.1	0.5	45.0	18.9								
Approach LOS			E	C								
Intersection Summary												
Average Delay			2.6									
Intersection Capacity Utilization			56.3%		ICU Level of Service				B			
Analysis Period (min)			15									













HCM Unsignalized Intersection Capacity Analysis
 9: Site Dr/Paddock Lane & Mass Ave (Route 111)

2020 Existing Condition - PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	48	442	0	0	494	52	0	0	0	29	0	26
Future Volume (Veh/h)	48	442	0	0	494	52	0	0	0	29	0	26
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.96	0.96	0.96	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	50	460	0	0	537	57	0	0	0	32	0	28
Pedestrians		2										
Lane Width (ft)		12.0										
Walking Speed (ft/s)		3.5										
Percent Blockage		0										
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)		807										
pX, platoon unblocked				0.98			0.98	0.98	0.98	0.98	0.98	
vC, conflicting volume	594			460			1156	1154	460	1126	1126	568
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	594			439			1148	1147	439	1118	1118	568
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	95			100			100	100	100	82	100	95
cM capacity (veh/h)	992			1109			158	187	610	175	194	526
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2						
Volume Total	510	594	0	0	32	28						
Volume Left	50	0	0	0	32	0						
Volume Right	0	57	0	0	0	28						
cSH	992	1700	1700	1700	175	526						
Volume to Capacity	0.05	0.35	2.15	0.22	0.18	0.05						
Queue Length 95th (ft)	4	0	0	0	16	4						
Control Delay (s)	1.4	0.0	0.0	0.0	30.1	12.2						
Lane LOS	A		A	A	D	B						
Approach Delay (s)	1.4	0.0	0.0		21.7							
Approach LOS			A		C							
Intersection Summary												
Average Delay				1.7								
Intersection Capacity Utilization			68.4%		ICU Level of Service				C			
Analysis Period (min)			15									

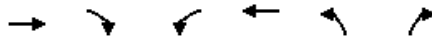
HCM Unsignalized Intersection Capacity Analysis
 12: Burroughs Road/Hill Road & Mass Ave (Route 111)

2020 Existing Condition - PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (veh/h)	22	395	54	12	457	7	64	3	19	3	7	25
Future Volume (Veh/h)	22	395	54	12	457	7	64	3	19	3	7	25
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.99	0.99	0.99	0.83	0.83	0.83	0.67	0.67	0.67	0.79	0.79	0.79
Hourly flow rate (vph)	22	399	55	14	551	8	96	4	28	4	9	32
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	559			454			1090	1058	426	1084	1081	555
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	559			454			1090	1058	426	1084	1081	555
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	98			99			44	98	96	98	96	94
cM capacity (veh/h)	1022			1117			171	219	632	180	212	535
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	476	573	128	45								
Volume Left	22	14	96	4								
Volume Right	55	8	28	32								
cSH	1022	1117	205	362								
Volume to Capacity	0.02	0.01	0.62	0.12								
Queue Length 95th (ft)	2	1	91	11								
Control Delay (s)	0.6	0.4	48.0	16.4								
Lane LOS	A	A	E	C								
Approach Delay (s)	0.6	0.4	48.0	16.4								
Approach LOS			E	C								
Intersection Summary												
Average Delay			6.0									
Intersection Capacity Utilization			52.8%		ICU Level of Service				A			
Analysis Period (min)			15									

Lanes, Volumes, Timings
 3: I-495 SB Ramp & Mass Ave (Route 111)

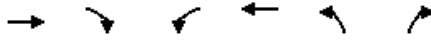
2027 No-Build Condition - AM Peak Hour



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↓	↑↑	↓	↑
Traffic Volume (vph)	487	207	239	367	220	174
Future Volume (vph)	487	207	239	367	220	174
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%			0%	0%	
Storage Length (ft)		200	230		350	300
Storage Lanes		1	1		1	1
Taper Length (ft)			25		25	
Lane Util. Factor	0.95	1.00	1.00	0.95	0.97	1.00
Ped Bike Factor						
Frt		0.850				0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	3505	1599	1752	3438	3335	1509
Flt Permitted			0.950		0.950	
Satd. Flow (perm)	3505	1599	1752	3438	3335	1509
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		225				189
Link Speed (mph)	45			35	30	
Link Distance (ft)	1144			1409	648	
Travel Time (s)	17.3			27.4	14.7	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	3%	1%	3%	5%	5%	7%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	529	225	260	399	239	189
Shared Lane Traffic (%)						
Lane Group Flow (vph)	529	225	260	399	239	189
Turn Type	NA	Perm	Prot	NA	Prot	Perm
Protected Phases	2		1	6	8	
Permitted Phases		2				8
Detector Phase	2	2	1	6	8	8
Switch Phase						
Minimum Initial (s)	10.0	10.0	6.0	10.0	10.0	10.0
Minimum Split (s)	16.0	16.0	11.0	16.0	15.0	15.0
Total Split (s)	30.0	30.0	25.0	55.0	35.0	35.0
Total Split (%)	33.3%	33.3%	27.8%	61.1%	38.9%	38.9%
Maximum Green (s)	24.0	24.0	20.0	49.0	30.0	30.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	1.0	2.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	5.0	6.0	5.0	5.0
Lead/Lag	Lead	Lead	Lag			
Lead-Lag Optimize?	Yes	Yes	Yes			
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	C-Max	C-Max	None	C-Max	None	None
Walk Time (s)						
Flash Dont Walk (s)						
Pedestrian Calls (#/hr)						
Act Effct Green (s)	41.9	41.9	20.0	66.9	12.1	12.1
Actuated g/C Ratio	0.47	0.47	0.22	0.74	0.13	0.13
v/c Ratio	0.32	0.26	0.67	0.16	0.53	0.52
Control Delay	16.2	3.1	31.4	0.9	40.5	10.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	16.2	3.1	31.4	0.9	40.5	10.8
LOS	B	A	C	A	D	B
Approach Delay	12.3			12.9	27.4	
Approach LOS	B			B	C	

Lanes, Volumes, Timings
 3: I-495 SB Ramp & Mass Ave (Route 111)

2027 No-Build Condition - AM Peak Hour

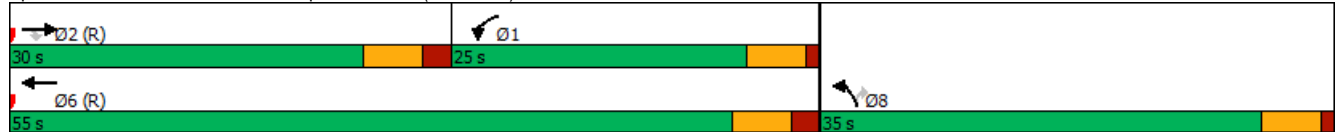


Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Queue Length 50th (ft)	95	0	144	7	66	0
Queue Length 95th (ft)	142	40	236	7	99	57
Internal Link Dist (ft)	1064			1329	568	
Turn Bay Length (ft)		200	230		350	300
Base Capacity (vph)	1630	864	389	2554	1111	629
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.32	0.26	0.67	0.16	0.22	0.30

Intersection Summary

Area Type:	Other
Cycle Length:	90
Actuated Cycle Length:	90
Offset:	0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green, Master Intersection
Natural Cycle:	50
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.67
Intersection Signal Delay:	16.0
Intersection Capacity Utilization	48.4%
Analysis Period (min)	15
Intersection LOS:	B
ICU Level of Service	A

Splits and Phases: 3: I-495 SB Ramp & Mass Ave (Route 111)



Lanes, Volumes, Timings
5: Driveway/I-495 NB Ramp & Mass Ave (Route 111)

2027 No-Build Condition - AM Peak Hour



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗			↖	↗				↖	↗	↖
Traffic Volume (vph)	172	489	0	0	431	194	0	0	0	233	0	175
Future Volume (vph)	172	489	0	0	431	194	0	0	0	233	0	175
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	250		0	0		250	0		0	190		190
Storage Lanes	1		0	0		1	0		0	1		1
Taper Length (ft)	25			25			25			100		
Lane Util. Factor	1.00	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	0.97	1.00	1.00
Ped Bike Factor												
Frt						0.850						0.850
Flt Protected	0.950									0.950		
Satd. Flow (prot)	1770	3471	0	0	3471	1509	0	0	0	3242	0	1524
Flt Permitted	0.950									0.950		
Satd. Flow (perm)	1770	3471	0	0	3471	1509	0	0	0	3242	0	1524
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						211						190
Link Speed (mph)		45			35			30			30	
Link Distance (ft)		1409			557			391			691	
Travel Time (s)		21.3			10.9			8.9			15.7	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	4%	2%	2%	4%	7%	2%	2%	2%	8%	2%	6%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	187	532	0	0	468	211	0	0	0	253	0	190
Shared Lane Traffic (%)												
Lane Group Flow (vph)	187	532	0	0	468	211	0	0	0	253	0	190
Turn Type	Prot	NA			NA	Perm				Prot		Perm
Protected Phases	5	2			6					3		
Permitted Phases				6		6						3
Detector Phase	5	2		6	6	6				3		3
Switch Phase												
Minimum Initial (s)	6.0	10.0		10.0	10.0	10.0				6.0		6.0
Minimum Split (s)	11.0	15.0		16.0	16.0	16.0				12.0		12.0
Total Split (s)	30.0	68.0		38.0	38.0	38.0				22.0		22.0
Total Split (%)	33.3%	75.6%		42.2%	42.2%	42.2%				24.4%		24.4%
Maximum Green (s)	25.0	63.0		32.0	32.0	32.0				16.0		16.0
Yellow Time (s)	4.0	4.0		4.0	4.0	4.0				4.0		4.0
All-Red Time (s)	1.0	1.0		2.0	2.0	2.0				2.0		2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0				0.0		0.0
Total Lost Time (s)	5.0	5.0			6.0	6.0				6.0		6.0
Lead/Lag	Lag			Lead	Lead	Lead						
Lead-Lag Optimize?	Yes			Yes	Yes	Yes						
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0				3.0		3.0
Minimum Gap (s)	3.0	3.0		3.0	3.0	3.0				3.0		3.0
Time Before Reduce (s)	0.0	0.0		0.0	0.0	0.0				0.0		0.0
Time To Reduce (s)	0.0	0.0		0.0	0.0	0.0				0.0		0.0
Recall Mode	None	C-Max		C-Max	C-Max	C-Max				None		None
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)	25.0	66.7			35.7	35.7				12.3		12.3
Actuated g/C Ratio	0.28	0.74			0.40	0.40				0.14		0.14
v/c Ratio	0.38	0.21			0.34	0.29				0.57		0.51
Control Delay	19.4	0.9			20.3	4.1				41.3		10.5
Queue Delay	0.0	0.0			0.0	0.0				0.0		0.0
Total Delay	19.4	0.9			20.3	4.1				41.3		10.5
LOS	B	A			C	A				D		B
Approach Delay		5.7			15.3						28.1	
Approach LOS		A			B						C	

Lanes, Volumes, Timings
 5: Driveway/I-495 NB Ramp & Mass Ave (Route 111)

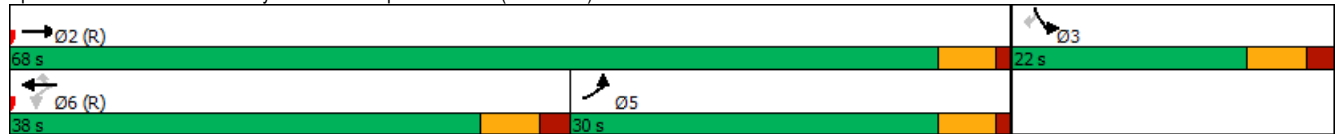
2027 No-Build Condition - AM Peak Hour



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)	88	9			95	0				70		0
Queue Length 95th (ft)	155	8			143	45				104		56
Internal Link Dist (ft)		1329			477			311			611	
Turn Bay Length (ft)	250					250				190		190
Base Capacity (vph)	491	2574			1378	726				576		427
Starvation Cap Reductn	0	0			0	0				0		0
Spillback Cap Reductn	0	0			0	0				0		0
Storage Cap Reductn	0	0			0	0				0		0
Reduced v/c Ratio	0.38	0.21			0.34	0.29				0.44		0.44













Intersection Summary	
Area Type:	Other
Cycle Length:	90
Actuated Cycle Length:	90
Offset:	75 (83%), Referenced to phase 2:EBT and 6:WBTL, Start of Green
Natural Cycle:	40
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.57
Intersection Signal Delay:	14.6
Intersection Capacity Utilization:	44.6%
Analysis Period (min):	15
Intersection LOS:	B
ICU Level of Service:	A

Splits and Phases: 5: Driveway/I-495 NB Ramp & Mass Ave (Route 111)



HCM Unsignalized Intersection Capacity Analysis
 7: Adams Pl/Gas Station & Mass Ave (Route 111)

2027 No-Build Condition - AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (veh/h)	83	505	134	62	538	9	34	0	15	11	2	53
Future Volume (Veh/h)	83	505	134	62	538	9	34	0	15	11	2	53
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	90	549	146	67	585	10	37	0	16	12	2	58
Pedestrians					2						1	
Lane Width (ft)					12.0						12.0	
Walking Speed (ft/s)					3.5						3.5	
Percent Blockage					0						0	
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)		557										
pX, platoon unblocked				0.92			0.92	0.92	0.92	0.92	0.92	
vC, conflicting volume	596			695			1585	1532	624	1545	1600	591
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	596			621			1593	1535	543	1549	1609	591
tC, single (s)	4.2			4.1			7.2	6.5	6.4	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.3			2.2			3.6	4.0	3.4	3.5	4.0	3.3
p0 queue free %	91			92			36	100	97	83	98	88
cM capacity (veh/h)	955			888			58	89	471	72	81	503
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	785	662	53	72								
Volume Left	90	67	37	12								
Volume Right	146	10	16	58								
cSH	955	888	78	235								
Volume to Capacity	0.09	0.08	0.68	0.31								
Queue Length 95th (ft)	8	6	79	31								
Control Delay (s)	2.3	1.9	117.2	26.9								
Lane LOS	A	A	F	D								
Approach Delay (s)	2.3	1.9	117.2	26.9								
Approach LOS			F	D								
Intersection Summary												
Average Delay			7.2									
Intersection Capacity Utilization			69.7%		ICU Level of Service				C			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
 9: Site Dr/Paddock Lane & Mass Ave (Route 111)














2027 No-Build Condition - AM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↕		↕	↕		↕
Traffic Volume (veh/h)	12	493	0	0	500	14	9	0	4	56	0	51
Future Volume (Veh/h)	12	493	0	0	500	14	9	0	4	56	0	51
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	13	536	0	0	543	15	10	0	4	61	0	55
Pedestrians		2										
Lane Width (ft)		12.0										
Walking Speed (ft/s)		3.5										
Percent Blockage		0										
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)		807										
pX, platoon unblocked				0.95			0.95	0.95	0.95	0.95	0.95	
vC, conflicting volume	558			536			1170	1120	536	1116	1112	552
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	558			488			1153	1101	488	1097	1093	552
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			93	100	99	66	100	90
cM capacity (veh/h)	1003			1024			147	199	552	180	203	532
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2						
Volume Total	549	558	10	4	61	55						
Volume Left	13	0	10	0	61	0						
Volume Right	0	15	0	4	0	55						
cSH	1003	1700	147	552	180	532						
Volume to Capacity	0.01	0.33	0.07	0.01	0.34	0.10						
Queue Length 95th (ft)	1	0	5	1	35	9						
Control Delay (s)	0.4	0.0	31.2	11.6	35.0	12.5						
Lane LOS	A		D	B	D	B						
Approach Delay (s)	0.4	0.0	25.6		24.3							
Approach LOS			D		C							
Intersection Summary												
Average Delay			2.7									
Intersection Capacity Utilization			45.6%		ICU Level of Service				A			
Analysis Period (min)			15									

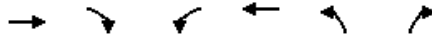
HCM Unsignalized Intersection Capacity Analysis
 12: Burroughs Road/Hill Road & Mass Ave (Route 111)

2027 No-Build Condition - AM Peak Hour

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations		↕			↕			↕			↕		
Traffic Volume (veh/h)	19	482	52	12	402	8	76	2	17	14	0	36	
Future Volume (Veh/h)	19	482	52	12	402	8	76	2	17	14	0	36	
Sign Control		Free			Free			Stop			Stop		
Grade		0%			0%			0%			0%		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Hourly flow rate (vph)	21	524	57	13	437	9	83	2	18	15	0	39	
Pedestrians													
Lane Width (ft)													
Walking Speed (ft/s)													
Percent Blockage													
Right turn flare (veh)													
Median type		None			None								
Median storage (veh)													
Upstream signal (ft)													
pX, platoon unblocked													
vC, conflicting volume	446			581			1101	1066	552	1081	1090	442	
vC1, stage 1 conf vol													
vC2, stage 2 conf vol													
vCu, unblocked vol	446			581			1101	1066	552	1081	1090	442	
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.3	6.5	6.2	
tC, 2 stage (s)													
tF (s)	2.2			2.2			3.5	4.0	3.3	3.7	4.0	3.3	
p0 queue free %	98			99			52	99	97	91	100	94	
cM capacity (veh/h)	1125			1003			172	217	537	171	210	610	
Direction, Lane #	EB 1	WB 1	NB 1	SB 1									
Volume Total	602	459	103	54									
Volume Left	21	13	83	15									
Volume Right	57	9	18	39									
cSH	1125	1003	196	356									
Volume to Capacity	0.02	0.01	0.52	0.15									
Queue Length 95th (ft)	1	1	67	13									
Control Delay (s)	0.5	0.4	42.0	16.9									
Lane LOS	A	A	E	C									
Approach Delay (s)	0.5	0.4	42.0	16.9									
Approach LOS			E	C									
Intersection Summary													
Average Delay			4.7										
Intersection Capacity Utilization			55.8%		ICU Level of Service				B				
Analysis Period (min)			15										

Lanes, Volumes, Timings
 3: I-495 SB Ramp & Mass Ave (Route 111)

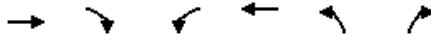
2027 No-Build Condition - PM Peak Hour



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↓	↑↑	↓	↑
Traffic Volume (vph)	497	181	212	481	128	120
Future Volume (vph)	497	181	212	481	128	120
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%			0%	0%	
Storage Length (ft)		200	230		350	300
Storage Lanes		1	1		1	1
Taper Length (ft)			25		25	
Lane Util. Factor	0.95	1.00	1.00	0.95	0.97	1.00
Ped Bike Factor						
Frt		0.850				0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	3574	1583	1787	3610	3502	1615
Flt Permitted			0.950		0.950	
Satd. Flow (perm)	3574	1583	1787	3610	3502	1615
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		197				130
Link Speed (mph)	45			35	30	
Link Distance (ft)	1144			1409	648	
Travel Time (s)	17.3			27.4	14.7	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	1%	2%	1%	0%	0%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	540	197	230	523	139	130
Shared Lane Traffic (%)						
Lane Group Flow (vph)	540	197	230	523	139	130
Turn Type	NA	Perm	Prot	NA	Prot	Perm
Protected Phases	2		1	6	8	
Permitted Phases		2				8
Detector Phase	2	2	1	6	8	8
Switch Phase						
Minimum Initial (s)	10.0	10.0	6.0	10.0	10.0	10.0
Minimum Split (s)	16.0	16.0	11.0	16.0	15.0	15.0
Total Split (s)	44.0	44.0	36.0	80.0	20.0	20.0
Total Split (%)	44.0%	44.0%	36.0%	80.0%	20.0%	20.0%
Maximum Green (s)	38.0	38.0	31.0	74.0	15.0	15.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	1.0	2.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	5.0	6.0	5.0	5.0
Lead/Lag	Lead	Lead	Lag			
Lead-Lag Optimize?	Yes	Yes	Yes			
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	C-Max	C-Max	None	C-Max	None	None
Walk Time (s)						
Flash Dont Walk (s)						
Pedestrian Calls (#/hr)						
Act Effct Green (s)	42.6	42.6	31.0	78.6	10.4	10.4
Actuated g/C Ratio	0.43	0.43	0.31	0.79	0.10	0.10
v/c Ratio	0.36	0.25	0.42	0.18	0.38	0.46
Control Delay	20.4	3.6	16.8	0.6	44.9	13.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	20.4	3.6	16.8	0.6	44.9	13.1
LOS	C	A	B	A	D	B
Approach Delay	15.9			5.6	29.5	
Approach LOS	B			A	C	

Lanes, Volumes, Timings
 3: I-495 SB Ramp & Mass Ave (Route 111)

2027 No-Build Condition - PM Peak Hour

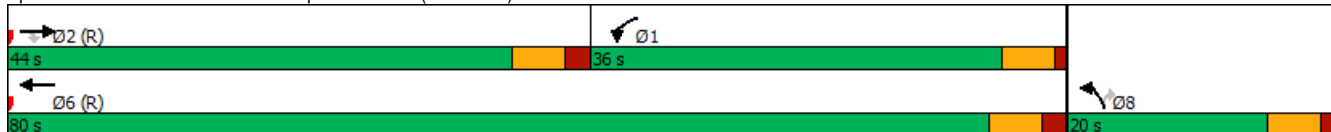


Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Queue Length 50th (ft)	118	0	132	7	43	0
Queue Length 95th (ft)	165	41	218	6	72	54
Internal Link Dist (ft)	1064			1329	568	
Turn Bay Length (ft)		200	230		350	300
Base Capacity (vph)	1521	786	553	2836	525	352
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.36	0.25	0.42	0.18	0.26	0.37

Intersection Summary

Area Type:	Other
Cycle Length:	100
Actuated Cycle Length:	100
Offset:	0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green, Master Intersection
Natural Cycle:	50
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.46
Intersection Signal Delay:	13.6
Intersection Capacity Utilization	47.2%
Analysis Period (min)	15
Intersection LOS:	B
ICU Level of Service	A

Splits and Phases: 3: I-495 SB Ramp & Mass Ave (Route 111)



Lanes, Volumes, Timings
5: Driveway/I-495 NB Ramp & Mass Ave (Route 111)

2027 No-Build Condition - PM Peak Hour



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗			↖	↗				↖	↗	↗
Traffic Volume (vph)	270	347	0	0	517	213	0	0	0	286	0	176
Future Volume (vph)	270	347	0	0	517	213	0	0	0	286	0	176
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	250		0	0		250	0		0	190		190
Storage Lanes	1		0	0		1	0		0	1		1
Taper Length (ft)	25			25			25			100		
Lane Util. Factor	1.00	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	0.97	1.00	1.00
Ped Bike Factor												
Frt						0.850						0.850
Flt Protected	0.950									0.950		
Satd. Flow (prot)	1805	3574	0	0	3574	1599	0	0	0	3467	0	1599
Flt Permitted	0.950									0.950		
Satd. Flow (perm)	1805	3574	0	0	3574	1599	0	0	0	3467	0	1599
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						232						191
Link Speed (mph)		45			35			30			30	
Link Distance (ft)		1409			557			391			691	
Travel Time (s)		21.3			10.9			8.9			15.7	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	1%	2%	0%	1%	1%	2%	2%	2%	1%	2%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	293	377	0	0	562	232	0	0	0	311	0	191
Shared Lane Traffic (%)												
Lane Group Flow (vph)	293	377	0	0	562	232	0	0	0	311	0	191
Turn Type	Prot	NA			NA	Perm				Prot		Perm
Protected Phases	5	2			6					3		
Permitted Phases				6		6						3
Detector Phase	5	2		6	6	6				3		3
Switch Phase												
Minimum Initial (s)	6.0	10.0		10.0	10.0	10.0				6.0		6.0
Minimum Split (s)	11.0	15.0		16.0	16.0	16.0				12.0		12.0
Total Split (s)	44.0	80.0		36.0	36.0	36.0				20.0		20.0
Total Split (%)	44.0%	80.0%		36.0%	36.0%	36.0%				20.0%		20.0%
Maximum Green (s)	39.0	75.0		30.0	30.0	30.0				14.0		14.0
Yellow Time (s)	4.0	4.0		4.0	4.0	4.0				4.0		4.0
All-Red Time (s)	1.0	1.0		2.0	2.0	2.0				2.0		2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0				0.0		0.0
Total Lost Time (s)	5.0	5.0		6.0	6.0	6.0				6.0		6.0
Lead/Lag	Lag			Lead	Lead	Lead						
Lead-Lag Optimize?	Yes			Yes	Yes	Yes						
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0				3.0		3.0
Minimum Gap (s)	3.0	3.0		3.0	3.0	3.0				3.0		3.0
Time Before Reduce (s)	0.0	0.0		0.0	0.0	0.0				0.0		0.0
Time To Reduce (s)	0.0	0.0		0.0	0.0	0.0				0.0		0.0
Recall Mode	None	C-Max		C-Max	C-Max	C-Max				None		None
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)	39.0	76.0			31.0	31.0				13.0		13.0
Actuated g/C Ratio	0.39	0.76			0.31	0.31				0.13		0.13
v/c Ratio	0.42	0.14			0.51	0.35				0.69		0.51
Control Delay	23.7	0.7			30.5	5.2				50.0		11.1
Queue Delay	0.0	0.0			0.0	0.0				0.0		0.0
Total Delay	23.7	0.7			30.5	5.2				50.0		11.1
LOS	C	A			C	A				D		B
Approach Delay		10.7			23.1						35.2	
Approach LOS		B			C						D	

Lanes, Volumes, Timings
 5: Driveway/I-495 NB Ramp & Mass Ave (Route 111)

2027 No-Build Condition - PM Peak Hour



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)	174	5			155	0				97		0
Queue Length 95th (ft)	276	4			209	54				143		61
Internal Link Dist (ft)		1329			477			311			611	
Turn Bay Length (ft)	250					250				190		190
Base Capacity (vph)	703	2716			1108	656				485		388
Starvation Cap Reductn	0	0			0	0				0		0
Spillback Cap Reductn	0	0			0	0				0		0
Storage Cap Reductn	0	0			0	0				0		0
Reduced v/c Ratio	0.42	0.14			0.51	0.35				0.64		0.49

Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 5 (5%), Referenced to phase 2:EBT and 6:WBTL, Start of Green

Natural Cycle: 50

Control Type: Actuated-Coordinated

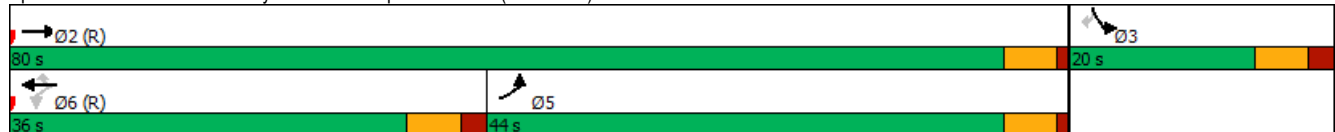
Maximum v/c Ratio: 0.69

Intersection Signal Delay: 22.0 Intersection LOS: C

Intersection Capacity Utilization 49.9% ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 5: Driveway/I-495 NB Ramp & Mass Ave (Route 111)



HCM Unsignalized Intersection Capacity Analysis
 7: Adams Pl/Gas Station & Mass Ave (Route 111)

2027 No-Build Condition - PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Traffic Volume (veh/h)	39	550	44	19	672	11	18	0	2	9	0	40
Future Volume (Veh/h)	39	550	44	19	672	11	18	0	2	9	0	40
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	42	598	48	21	730	12	20	0	2	10	0	43
Pedestrians					2						1	
Lane Width (ft)					12.0						12.0	
Walking Speed (ft/s)					3.5						3.5	
Percent Blockage					0						0	
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)		557										
pX, platoon unblocked				0.95			0.95	0.95	0.95	0.95	0.95	
vC, conflicting volume	743			646			1527	1491	624	1489	1509	737
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	743			601			1528	1491	578	1488	1509	737
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.2	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.6	4.0	3.3
p0 queue free %	95			98			74	100	100	88	100	90
cM capacity (veh/h)	873			937			78	110	493	86	107	421
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	688	763	22	53								
Volume Left	42	21	20	10								
Volume Right	48	12	2	43								
cSH	873	937	85	243								
Volume to Capacity	0.05	0.02	0.26	0.22								
Queue Length 95th (ft)	4	2	23	20								
Control Delay (s)	1.3	0.6	61.8	23.9								
Lane LOS	A	A	F	C								
Approach Delay (s)	1.3	0.6	61.8	23.9								
Approach LOS			F	C								
Intersection Summary												
Average Delay				2.6								
Intersection Capacity Utilization			61.3%		ICU Level of Service				B			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
 9: Site Dr/Paddock Lane & Mass Ave (Route 111)

2027 No-Build Condition - PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↕		↕	↕		↕
Traffic Volume (veh/h)	51	484	0	0	540	56	109	0	51	31	0	28
Future Volume (Veh/h)	51	484	0	0	540	56	109	0	51	31	0	28
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	55	526	0	0	587	61	118	0	55	34	0	30
Pedestrians		2										
Lane Width (ft)		12.0										
Walking Speed (ft/s)		3.5										
Percent Blockage		0										
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)		807										
pX, platoon unblocked				0.97			0.97	0.97	0.97	0.97	0.97	
vC, conflicting volume	648			526			1286	1284	526	1308	1254	620
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	648			492			1278	1276	492	1302	1245	620
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	94			100			6	100	90	71	100	94
cM capacity (veh/h)	947			1045			125	153	561	116	160	491
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2						
Volume Total	581	648	118	55	34	30						
Volume Left	55	0	118	0	34	0						
Volume Right	0	61	0	55	0	30						
cSH	947	1700	125	561	116	491						
Volume to Capacity	0.06	0.38	0.94	0.10	0.29	0.06						
Queue Length 95th (ft)	5	0	156	8	28	5						
Control Delay (s)	1.5	0.0	132.5	12.1	48.5	12.8						
Lane LOS	A		F	B	E	B						
Approach Delay (s)	1.5	0.0	94.2		31.8							
Approach LOS			F		D							
Intersection Summary												
Average Delay			13.1									
Intersection Capacity Utilization			76.1%		ICU Level of Service				D			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
 12: Burroughs Road/Hill Road & Mass Ave (Route 111)

2027 No-Build Condition - PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (veh/h)	25	481	60	13	500	7	69	4	20	4	7	27
Future Volume (Veh/h)	25	481	60	13	500	7	69	4	20	4	7	27
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	27	523	65	14	543	8	75	4	22	4	8	29
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	551			588			1218	1188	556	1208	1217	547
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	551			588			1218	1188	556	1208	1217	547
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	97			99			46	98	96	97	95	95
cM capacity (veh/h)	1029			997			140	182	535	147	175	541
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	615	565	101	41								
Volume Left	27	14	75	4								
Volume Right	65	8	22	29								
cSH	1029	997	168	324								
Volume to Capacity	0.03	0.01	0.60	0.13								
Queue Length 95th (ft)	2	1	81	11								
Control Delay (s)	0.7	0.4	54.3	17.7								
Lane LOS	A	A	F	C								
Approach Delay (s)	0.7	0.4	54.3	17.7								
Approach LOS			F	C								
Intersection Summary												
Average Delay			5.2									
Intersection Capacity Utilization			59.6%		ICU Level of Service				B			
Analysis Period (min)			15									

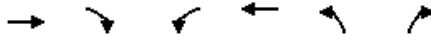
Lanes, Volumes, Timings
3: I-495 SB Ramp & Mass Ave (Route 111)

2027 Build Condition - AM Peak Hour

	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↘	↑↑	↘	↗
Traffic Volume (vph)	508	207	253	372	220	230
Future Volume (vph)	508	207	253	372	220	230
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%			0%	0%	
Storage Length (ft)		200	230		350	300
Storage Lanes		1	1		1	1
Taper Length (ft)			25		25	
Lane Util. Factor	0.95	1.00	1.00	0.95	0.97	1.00
Ped Bike Factor						
Frt		0.850				0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	3505	1599	1719	3438	3335	1524
Flt Permitted			0.950		0.950	
Satd. Flow (perm)	3505	1599	1719	3438	3335	1524
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		225				250
Link Speed (mph)	45			35	30	
Link Distance (ft)	1144			1409	648	
Travel Time (s)	17.3			27.4	14.7	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	3%	1%	5%	5%	5%	6%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	552	225	275	404	239	250
Shared Lane Traffic (%)						
Lane Group Flow (vph)	552	225	275	404	239	250
Turn Type	NA	Perm	Prot	NA	Prot	Perm
Protected Phases	2		1	6	8	
Permitted Phases		2				8
Detector Phase	2	2	1	6	8	8
Switch Phase						
Minimum Initial (s)	10.0	10.0	6.0	10.0	10.0	10.0
Minimum Split (s)	16.0	16.0	11.0	16.0	15.0	15.0
Total Split (s)	30.0	30.0	25.0	55.0	35.0	35.0
Total Split (%)	33.3%	33.3%	27.8%	61.1%	38.9%	38.9%
Maximum Green (s)	24.0	24.0	20.0	49.0	30.0	30.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	1.0	2.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	5.0	6.0	5.0	5.0
Lead/Lag	Lead	Lead	Lag			
Lead-Lag Optimize?	Yes	Yes	Yes			
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	C-Max	C-Max	None	C-Max	None	None
Walk Time (s)						
Flash Dont Walk (s)						
Pedestrian Calls (#/hr)						
Act Effct Green (s)	41.7	41.7	20.0	66.7	12.3	12.3
Actuated g/C Ratio	0.46	0.46	0.22	0.74	0.14	0.14
v/c Ratio	0.34	0.26	0.72	0.16	0.53	0.59
Control Delay	16.5	3.1	33.7	0.9	40.0	10.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	16.5	3.1	33.7	0.9	40.0	10.8
LOS	B	A	C	A	D	B
Approach Delay	12.7			14.2	25.1	
Approach LOS	B			B	C	

Lanes, Volumes, Timings
 3: I-495 SB Ramp & Mass Ave (Route 111)

2027 Build Condition - AM Peak Hour

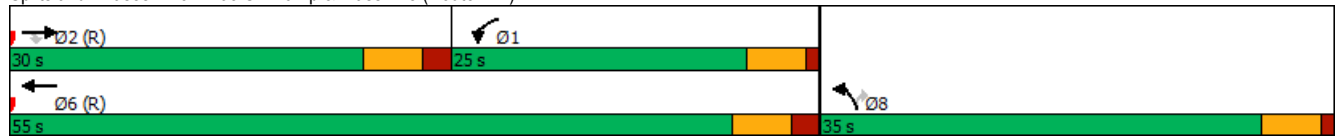


Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Queue Length 50th (ft)	100	0	155	7	66	0
Queue Length 95th (ft)	151	41	#264	7	97	63
Internal Link Dist (ft)	1064			1329	568	
Turn Bay Length (ft)		200	230		350	300
Base Capacity (vph)	1623	861	382	2547	1111	674
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.34	0.26	0.72	0.16	0.22	0.37

Intersection Summary

Area Type: Other
 Cycle Length: 90
 Actuated Cycle Length: 90
 Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green, Master Intersection
 Natural Cycle: 50
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.72
 Intersection Signal Delay: 16.3
 Intersection Capacity Utilization 49.7%
 Analysis Period (min) 15
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 3: I-495 SB Ramp & Mass Ave (Route 111)



Lanes, Volumes, Timings
5: Driveway/I-495 NB Ramp & Mass Ave (Route 111)

2027 Build Condition - AM Peak Hour



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗			↖	↗				↖	↗	↖
Traffic Volume (vph)	172	566	0	0	450	206	0	0	0	284	0	175
Future Volume (vph)	172	566	0	0	450	206	0	0	0	284	0	175
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	250		0	0		250	0		0	190		190
Storage Lanes	1		0	0		1	0		0	1		1
Taper Length (ft)	25			25			25			100		
Lane Util. Factor	1.00	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	0.97	1.00	1.00
Ped Bike Factor												
Frt						0.850						0.850
Flt Protected	0.950									0.950		
Satd. Flow (prot)	1787	3471	0	0	3438	1495	0	0	0	3273	0	1538
Flt Permitted	0.950									0.950		
Satd. Flow (perm)	1787	3471	0	0	3438	1495	0	0	0	3273	0	1538
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						224						190
Link Speed (mph)		45			35			30			30	
Link Distance (ft)		1409			557			391			691	
Travel Time (s)		21.3			10.9			8.9			15.7	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	1%	4%	2%	2%	5%	8%	2%	2%	2%	7%	2%	5%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	187	615	0	0	489	224	0	0	0	309	0	190
Shared Lane Traffic (%)												
Lane Group Flow (vph)	187	615	0	0	489	224	0	0	0	309	0	190
Turn Type	Prot	NA			NA	Perm				Prot		Perm
Protected Phases	5	2			6					3		
Permitted Phases					6	6						3
Detector Phase	5	2			6	6				3		3
Switch Phase												
Minimum Initial (s)	6.0	10.0			10.0	10.0				6.0		6.0
Minimum Split (s)	11.0	15.0			16.0	16.0				12.0		12.0
Total Split (s)	30.0	68.0			38.0	38.0				22.0		22.0
Total Split (%)	33.3%	75.6%			42.2%	42.2%				24.4%		24.4%
Maximum Green (s)	25.0	63.0			32.0	32.0				16.0		16.0
Yellow Time (s)	4.0	4.0			4.0	4.0				4.0		4.0
All-Red Time (s)	1.0	1.0			2.0	2.0				2.0		2.0
Lost Time Adjust (s)	0.0	0.0			0.0	0.0				0.0		0.0
Total Lost Time (s)	5.0	5.0			6.0	6.0				6.0		6.0
Lead/Lag	Lag			Lead	Lead	Lead						
Lead-Lag Optimize?	Yes			Yes	Yes	Yes						
Vehicle Extension (s)	3.0	3.0			3.0	3.0				3.0		3.0
Minimum Gap (s)	3.0	3.0			3.0	3.0				3.0		3.0
Time Before Reduce (s)	0.0	0.0			0.0	0.0				0.0		0.0
Time To Reduce (s)	0.0	0.0			0.0	0.0				0.0		0.0
Recall Mode	None	C-Max			C-Max	C-Max				None		None
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)	25.0	65.6			34.6	34.6				13.4		13.4
Actuated g/C Ratio	0.28	0.73			0.38	0.38				0.15		0.15
v/c Ratio	0.38	0.24			0.37	0.31				0.63		0.49
Control Delay	19.7	1.2			21.4	4.2				41.9		9.8
Queue Delay	0.0	0.0			0.0	0.0				0.0		0.0
Total Delay	19.7	1.2			21.4	4.2				41.9		9.8
LOS	B	A			C	A				D		A
Approach Delay		5.5			16.0						29.7	
Approach LOS		A			B						C	

Lanes, Volumes, Timings
 5: Driveway/I-495 NB Ramp & Mass Ave (Route 111)

2027 Build Condition - AM Peak Hour

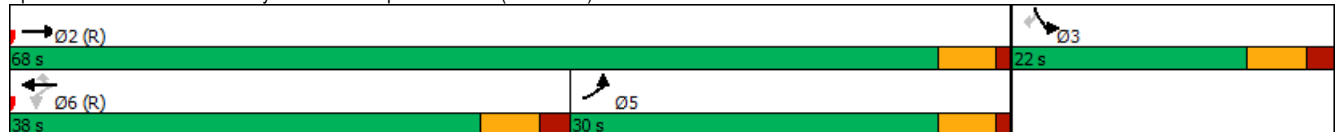


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)	88	14			103	0				86		0
Queue Length 95th (ft)	155	13			151	46				124		56
Internal Link Dist (ft)		1329			477			311			611	
Turn Bay Length (ft)	250					250				190		190
Base Capacity (vph)	496	2529			1321	712				581		429
Starvation Cap Reductn	0	0			0	0				0		0
Spillback Cap Reductn	0	0			0	0				0		0
Storage Cap Reductn	0	0			0	0				0		0
Reduced v/c Ratio	0.38	0.24			0.37	0.31				0.53		0.44

Intersection Summary














Area Type:	Other
Cycle Length:	90
Actuated Cycle Length:	90
Offset:	75 (83%), Referenced to phase 2:EBT and 6:WBTL, Start of Green
Natural Cycle:	40
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.63
Intersection Signal Delay:	15.2
Intersection LOS:	B
Intersection Capacity Utilization:	48.7%
ICU Level of Service:	A
Analysis Period (min):	15

Splits and Phases: 5: Driveway/I-495 NB Ramp & Mass Ave (Route 111)



HCM Unsignalized Intersection Capacity Analysis
 7: Adams Pl/Gas Station & Mass Ave (Route 111)

2027 Build Condition - AM Peak Hour

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations		↕			↕			↕			↕		
Traffic Volume (veh/h)	83	505	262	122	569	9	34	0	15	11	2	53	
Future Volume (Veh/h)	83	505	262	122	569	9	34	0	15	11	2	53	
Sign Control		Free			Free			Stop			Stop		
Grade		0%			0%			0%			0%		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Hourly flow rate (vph)	90	549	285	133	618	10	37	0	16	12	2	58	
Pedestrians					2						1		
Lane Width (ft)					12.0						12.0		
Walking Speed (ft/s)					3.5						3.5		
Percent Blockage					0						0		
Right turn flare (veh)													
Median type		None			None								
Median storage (veh)													
Upstream signal (ft)		557											
pX, platoon unblocked				0.90			0.90	0.90	0.90	0.90	0.90		
vC, conflicting volume	629			834			1820	1766	694	1780	1904	624	
vC1, stage 1 conf vol													
vC2, stage 2 conf vol													
vCu, unblocked vol	629			756			1857	1798	599	1812	1951	624	
tC, single (s)	4.2			4.1			7.2	6.5	6.4	7.1	6.5	6.2	
tC, 2 stage (s)													
tF (s)	2.3			2.2			3.6	4.0	3.4	3.5	4.0	3.3	
p0 queue free %	90			83			0	100	96	72	95	88	
cM capacity (veh/h)	929			761			33	53	427	42	43	481	
Direction, Lane #	EB 1	WB 1	NB 1	SB 1									
Volume Total	924	761	53	72									
Volume Left	90	133	37	12									
Volume Right	285	10	16	58									
cSH	929	761	46	160									
Volume to Capacity	0.10	0.17	1.16	0.45									
Queue Length 95th (ft)	8	16	124	52									
Control Delay (s)	2.5	4.3	328.1	44.7									
Lane LOS	A	A	F	E									
Approach Delay (s)	2.5	4.3	328.1	44.7									
Approach LOS			F	E									
Intersection Summary													
Average Delay			14.5										
Intersection Capacity Utilization			76.5%		ICU Level of Service				D				
Analysis Period (min)			15										

HCM Unsignalized Intersection Capacity Analysis
 9: Site Dr/Paddock Lane & Mass Ave (Route 111)

2027 Build Condition - AM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↕		↕	↕		↕
Traffic Volume (veh/h)	12	493	0	0	560	14	40	0	18	56	0	51
Future Volume (Veh/h)	12	493	0	0	560	14	40	0	18	56	0	51
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	13	536	0	0	609	15	43	0	20	61	0	55
Pedestrians		2										
Lane Width (ft)		12.0										
Walking Speed (ft/s)		3.5										
Percent Blockage		0										
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)		807										
pX, platoon unblocked				0.95			0.95	0.95	0.95	0.95	0.95	
vC, conflicting volume	624			536			1236	1186	536	1198	1178	618
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	624			486			1222	1170	486	1183	1162	618
tC, single (s)	4.1			4.1			7.4	6.5	6.4	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.8	4.0	3.5	3.5	4.0	3.3
p0 queue free %	99			100			63	100	96	60	100	89
cM capacity (veh/h)	948			1024			115	181	516	152	184	488
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2						
Volume Total	549	624	43	20	61	55						
Volume Left	13	0	43	0	61	0						
Volume Right	0	15	0	20	0	55						
cSH	948	1700	115	516	152	488						
Volume to Capacity	0.01	0.37	0.37	0.04	0.40	0.11						
Queue Length 95th (ft)	1	0	38	3	44	9						
Control Delay (s)	0.4	0.0	53.6	12.3	43.8	13.3						
Lane LOS	A		F	B	E	B						
Approach Delay (s)	0.4	0.0	40.5		29.3							
Approach LOS			E		D							
Intersection Summary												
Average Delay			4.6									
Intersection Capacity Utilization			47.7%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
 12: Burroughs Road/Hill Road & Mass Ave (Route 111)

2027 Build Condition - AM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (veh/h)	20	494	53	12	456	8	79	2	17	14	0	39
Future Volume (Veh/h)	20	494	53	12	456	8	79	2	17	14	0	39
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	22	537	58	13	496	9	86	2	18	15	0	42
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	505			595			1178	1141	566	1156	1166	500
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	505			595			1178	1141	566	1156	1166	500
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.3	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.7	4.0	3.3
p0 queue free %	98			99			43	99	97	90	100	93
cM capacity (veh/h)	1070			991			150	196	528	152	189	564
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	617	518	106	57								
Volume Left	22	13	86	15								
Volume Right	58	9	18	42								
cSH	1070	991	172	329								
Volume to Capacity	0.02	0.01	0.62	0.17								
Queue Length 95th (ft)	2	1	85	15								
Control Delay (s)	0.6	0.4	54.7	18.2								
Lane LOS	A	A	F	C								
Approach Delay (s)	0.6	0.4	54.7	18.2								
Approach LOS			F	C								
Intersection Summary												
Average Delay			5.7									
Intersection Capacity Utilization			57.6%		ICU Level of Service				B			
Analysis Period (min)			15									

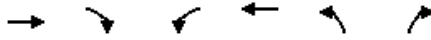
Lanes, Volumes, Timings
 3: I-495 SB Ramp & Mass Ave (Route 111)

2027 Build Condition - PM Peak Hour

	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↘	↑↑	↘↘	↗
Traffic Volume (vph)	502	181	267	501	128	135
Future Volume (vph)	502	181	267	501	128	135
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%			0%	0%	
Storage Length (ft)		200	230		350	300
Storage Lanes		1	1		1	1
Taper Length (ft)			25		25	
Lane Util. Factor	0.95	1.00	1.00	0.95	0.97	1.00
Ped Bike Factor						
Frt		0.850				0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	3574	1583	1770	3610	3502	1583
Flt Permitted			0.950		0.950	
Satd. Flow (perm)	3574	1583	1770	3610	3502	1583
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		197				147
Link Speed (mph)	45			35	30	
Link Distance (ft)	1144			1409	648	
Travel Time (s)	17.3			27.4	14.7	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	1%	2%	2%	0%	0%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	546	197	290	545	139	147
Shared Lane Traffic (%)						
Lane Group Flow (vph)	546	197	290	545	139	147
Turn Type	NA	Perm	Prot	NA	Prot	Perm
Protected Phases	2		1	6	8	
Permitted Phases		2				8
Detector Phase	2	2	1	6	8	8
Switch Phase						
Minimum Initial (s)	10.0	10.0	6.0	10.0	10.0	10.0
Minimum Split (s)	16.0	16.0	11.0	16.0	15.0	15.0
Total Split (s)	44.0	44.0	36.0	80.0	20.0	20.0
Total Split (%)	44.0%	44.0%	36.0%	80.0%	20.0%	20.0%
Maximum Green (s)	38.0	38.0	31.0	74.0	15.0	15.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	1.0	2.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	5.0	6.0	5.0	5.0
Lead/Lag	Lead	Lead	Lag			
Lead-Lag Optimize?	Yes	Yes	Yes			
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	C-Max	C-Max	None	C-Max	None	None
Walk Time (s)						
Flash Dont Walk (s)						
Pedestrian Calls (#/hr)						
Act Effct Green (s)	42.6	42.6	31.0	78.6	10.4	10.4
Actuated g/C Ratio	0.43	0.43	0.31	0.79	0.10	0.10
v/c Ratio	0.36	0.25	0.53	0.19	0.38	0.50
Control Delay	20.4	3.6	18.2	0.6	44.9	13.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	20.4	3.6	18.2	0.6	44.9	13.2
LOS	C	A	B	A	D	B
Approach Delay	16.0			6.7	28.6	
Approach LOS	B			A	C	

Lanes, Volumes, Timings
 3: I-495 SB Ramp & Mass Ave (Route 111)

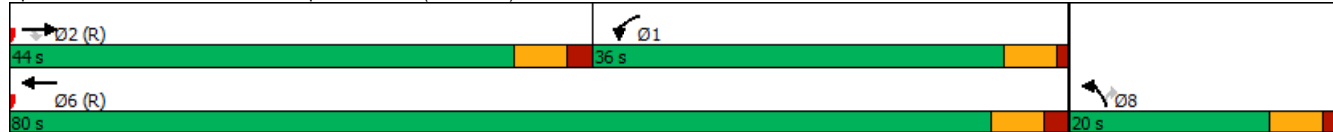
2027 Build Condition - PM Peak Hour



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Queue Length 50th (ft)	120	0	175	7	43	0
Queue Length 95th (ft)	167	41	275	6	72	56
Internal Link Dist (ft)	1064			1329	568	
Turn Bay Length (ft)		200	230		350	300
Base Capacity (vph)	1521	786	548	2836	525	362
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.36	0.25	0.53	0.19	0.26	0.41

Intersection Summary
 Area Type: Other
 Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green, Master Intersection
 Natural Cycle: 50
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.53
 Intersection Signal Delay: 13.8 Intersection LOS: B
 Intersection Capacity Utilization 50.3% ICU Level of Service A
 Analysis Period (min) 15

Splits and Phases: 3: I-495 SB Ramp & Mass Ave (Route 111)



Lanes, Volumes, Timings
5: Driveway/I-495 NB Ramp & Mass Ave (Route 111)

2027 Build Condition - PM Peak Hour



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗			↖	↗				↖	↗	↗
Traffic Volume (vph)	270	367	0	0	592	263	0	0	0	299	0	176
Future Volume (vph)	270	367	0	0	592	263	0	0	0	299	0	176
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	250		0	0		250	0		0	190		190
Storage Lanes	1		0	0		1	0		0	1		1
Taper Length (ft)	25			25			25			100		
Lane Util. Factor	1.00	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	0.97	1.00	1.00
Ped Bike Factor												
Frt						0.850						0.850
Flt Protected	0.950									0.950		
Satd. Flow (prot)	1805	3574	0	0	3539	1568	0	0	0	3433	0	1599
Flt Permitted	0.950									0.950		
Satd. Flow (perm)	1805	3574	0	0	3539	1568	0	0	0	3433	0	1599
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						286						191
Link Speed (mph)		45			35			30			30	
Link Distance (ft)		1409			557			391			691	
Travel Time (s)		21.3			10.9			8.9			15.7	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	1%	2%	0%	2%	3%	2%	2%	2%	2%	2%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	293	399	0	0	643	286	0	0	0	325	0	191
Shared Lane Traffic (%)												
Lane Group Flow (vph)	293	399	0	0	643	286	0	0	0	325	0	191
Turn Type	Prot	NA			NA	Perm				Prot		Perm
Protected Phases	5	2			6					3		
Permitted Phases				6		6						3
Detector Phase	5	2		6	6	6				3		3
Switch Phase												
Minimum Initial (s)	6.0	10.0		10.0	10.0	10.0				6.0		6.0
Minimum Split (s)	11.0	15.0		16.0	16.0	16.0				12.0		12.0
Total Split (s)	44.0	80.0		36.0	36.0	36.0				20.0		20.0
Total Split (%)	44.0%	80.0%		36.0%	36.0%	36.0%				20.0%		20.0%
Maximum Green (s)	39.0	75.0		30.0	30.0	30.0				14.0		14.0
Yellow Time (s)	4.0	4.0		4.0	4.0	4.0				4.0		4.0
All-Red Time (s)	1.0	1.0		2.0	2.0	2.0				2.0		2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0				0.0		0.0
Total Lost Time (s)	5.0	5.0		6.0	6.0	6.0				6.0		6.0
Lead/Lag	Lag			Lead	Lead	Lead						
Lead-Lag Optimize?	Yes			Yes	Yes	Yes						
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0				3.0		3.0
Minimum Gap (s)	3.0	3.0		3.0	3.0	3.0				3.0		3.0
Time Before Reduce (s)	0.0	0.0		0.0	0.0	0.0				0.0		0.0
Time To Reduce (s)	0.0	0.0		0.0	0.0	0.0				0.0		0.0
Recall Mode	None	C-Max		C-Max	C-Max	C-Max				None		None
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)	39.0	75.9			30.9	30.9				13.1		13.1
Actuated g/C Ratio	0.39	0.76			0.31	0.31				0.13		0.13
v/c Ratio	0.42	0.15			0.59	0.42				0.72		0.51
Control Delay	23.7	0.7			32.1	5.3				51.3		11.0
Queue Delay	0.0	0.0			0.0	0.0				0.0		0.0
Total Delay	23.7	0.7			32.1	5.3				51.3		11.0
LOS	C	A			C	A				D		B
Approach Delay		10.4			23.9						36.4	
Approach LOS		B			C						D	

Lanes, Volumes, Timings
 5: Driveway/I-495 NB Ramp & Mass Ave (Route 111)

2027 Build Condition - PM Peak Hour



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)	173	6			183	0				102		0
Queue Length 95th (ft)	275	4			243	59				149		61
Internal Link Dist (ft)		1329			477			311			611	
Turn Bay Length (ft)	250					250				190		190
Base Capacity (vph)	703	2711			1092	681				480		388
Starvation Cap Reductn	0	0			0	0				0		0
Spillback Cap Reductn	0	0			0	0				0		0
Storage Cap Reductn	0	0			0	0				0		0
Reduced v/c Ratio	0.42	0.15			0.59	0.42				0.68		0.49

Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 5 (5%), Referenced to phase 2:EBT and 6:WBTL, Start of Green

Natural Cycle: 55

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.72

Intersection Signal Delay: 22.5 Intersection LOS: C

Intersection Capacity Utilization 52.4% ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 5: Driveway/I-495 NB Ramp & Mass Ave (Route 111)



HCM Unsignalized Intersection Capacity Analysis
 7: Adams Pl/Gas Station & Mass Ave (Route 111)

2027 Build Condition - PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (veh/h)	39	550	77	35	797	11	18	0	2	9	0	40
Future Volume (Veh/h)	39	550	77	35	797	11	18	0	2	9	0	40
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	42	598	84	38	866	12	20	0	2	10	0	43
Pedestrians					2						1	
Lane Width (ft)					12.0						12.0	
Walking Speed (ft/s)					3.5						3.5	
Percent Blockage					0						0	
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)		557										
pX, platoon unblocked				0.95			0.95	0.95	0.95	0.95	0.95	
vC, conflicting volume	879			682			1715	1679	642	1677	1715	873
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	879			635			1727	1689	593	1687	1727	873
tC, single (s)	4.1			4.2			7.1	6.5	6.2	7.2	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.3			3.5	4.0	3.3	3.6	4.0	3.3
p0 queue free %	95			96			63	100	100	84	100	88
cM capacity (veh/h)	776			866			54	81	481	61	76	352
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	724	916	22	53								
Volume Left	42	38	20	10								
Volume Right	84	12	2	43								
cSH	776	866	59	185								
Volume to Capacity	0.05	0.04	0.37	0.29								
Queue Length 95th (ft)	4	3	34	28								
Control Delay (s)	1.4	1.2	98.9	32.1								
Lane LOS	A	A	F	D								
Approach Delay (s)	1.4	1.2	98.9	32.1								
Approach LOS			F	D								
Intersection Summary												
Average Delay			3.5									
Intersection Capacity Utilization			64.6%		ICU Level of Service				C			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
 9: Site Dr/Paddock Lane & Mass Ave (Route 111)

2027 Build Condition - PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↕		↕	↕		↕
Traffic Volume (veh/h)	51	484	0	0	556	56	234	0	110	31	0	28
Future Volume (Veh/h)	51	484	0	0	556	56	234	0	110	31	0	28
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	55	526	0	0	604	61	254	0	120	34	0	30
Pedestrians		2										
Lane Width (ft)		12.0										
Walking Speed (ft/s)		3.5										
Percent Blockage		0										
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)		807										
pX, platoon unblocked				0.97			0.97	0.97	0.97	0.97	0.97	0.97
vC, conflicting volume	665			526			1302	1301	526	1390	1270	636
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	665			491			1295	1294	491	1387	1262	636
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	94			100			0	100	78	61	100	94
cM capacity (veh/h)	934			1045			118	149	554	88	156	480
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2						
Volume Total	581	665	254	120	34	30						
Volume Left	55	0	254	0	34	0						
Volume Right	0	61	0	120	0	30						
cSH	934	1700	118	554	88	480						
Volume to Capacity	0.06	0.39	2.15	0.22	0.39	0.06						
Queue Length 95th (ft)	5	0	535	20	39	5						
Control Delay (s)	1.6	0.0	603.1	13.3	69.8	13.0						
Lane LOS	A		F	B	F	B						
Approach Delay (s)	1.6	0.0	413.9		43.2							
Approach LOS			F		E							
Intersection Summary												
Average Delay			94.1									
Intersection Capacity Utilization			83.9%		ICU Level of Service				E			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
 12: Burroughs Road/Hill Road & Mass Ave (Route 111)

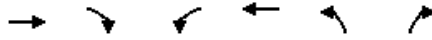
2027 Build Condition - PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (veh/h)	28	534	63	13	514	7	70	4	20	4	7	28
Future Volume (Veh/h)	28	534	63	13	514	7	70	4	20	4	7	28
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	30	580	68	14	559	8	76	4	22	4	8	30
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	567			648			1299	1269	614	1289	1299	563
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	567			648			1299	1269	614	1289	1299	563
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	97			99			37	98	96	97	95	94
cM capacity (veh/h)	1015			947			121	162	496	129	156	530
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	678	581	102	42								
Volume Left	30	14	76	4								
Volume Right	68	8	22	30								
cSH	1015	947	147	302								
Volume to Capacity	0.03	0.01	0.70	0.14								
Queue Length 95th (ft)	2	1	100	12								
Control Delay (s)	0.8	0.4	72.3	18.8								
Lane LOS	A	A	F	C								
Approach Delay (s)	0.8	0.4	72.3	18.8								
Approach LOS			F	C								
Intersection Summary												
Average Delay			6.4									
Intersection Capacity Utilization			64.2%		ICU Level of Service				C			
Analysis Period (min)			15									

Lanes, Volumes, Timings
 3: I-495 SB Ramp & Mass Ave (Route 111)

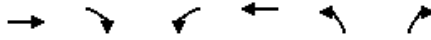
2027 Mitigation - AM Peak Hour



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↓	↑↑	↓	↑
Traffic Volume (vph)	508	207	253	372	220	230
Future Volume (vph)	508	207	253	372	220	230
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%			0%	0%	
Storage Length (ft)		200	230		350	300
Storage Lanes		1	1		1	1
Taper Length (ft)			25		25	
Lane Util. Factor	0.95	1.00	1.00	0.95	0.97	1.00
Ped Bike Factor						
Frt		0.850				0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	3505	1599	1719	3438	3335	1524
Flt Permitted			0.950		0.950	
Satd. Flow (perm)	3505	1599	1719	3438	3335	1524
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		225				250
Link Speed (mph)	45			35	30	
Link Distance (ft)	1144			1409	648	
Travel Time (s)	17.3			27.4	14.7	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	3%	1%	5%	5%	5%	6%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	552	225	275	404	239	250
Shared Lane Traffic (%)						
Lane Group Flow (vph)	552	225	275	404	239	250
Turn Type	NA	Perm	Prot	NA	Prot	Perm
Protected Phases	2		1	6	8	
Permitted Phases		2				8
Detector Phase	2	2	1	6	8	8
Switch Phase						
Minimum Initial (s)	10.0	10.0	6.0	10.0	10.0	10.0
Minimum Split (s)	16.0	16.0	11.0	16.0	15.0	15.0
Total Split (s)	33.0	33.0	33.0	66.0	24.0	24.0
Total Split (%)	36.7%	36.7%	36.7%	73.3%	26.7%	26.7%
Maximum Green (s)	27.0	27.0	28.0	60.0	19.0	19.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	1.0	2.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	5.0	6.0	5.0	5.0
Lead/Lag	Lead	Lead	Lag			
Lead-Lag Optimize?	Yes	Yes	Yes			
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	C-Max	C-Max	None	C-Max	None	None
Walk Time (s)						
Flash Dont Walk (s)						
Pedestrian Calls (#/hr)						
Act Effct Green (s)	33.8	33.8	28.0	66.8	12.2	12.2
Actuated g/C Ratio	0.38	0.38	0.31	0.74	0.14	0.14
v/c Ratio	0.42	0.30	0.51	0.16	0.53	0.59
Control Delay	22.5	4.3	14.9	1.4	40.2	10.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	22.5	4.3	14.9	1.4	40.2	10.9
LOS	C	A	B	A	D	B
Approach Delay	17.2			6.9	25.2	
Approach LOS	B			A	C	

Lanes, Volumes, Timings
 3: I-495 SB Ramp & Mass Ave (Route 111)

2027 Mitigation - AM Peak Hour



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Queue Length 50th (ft)	118	0	108	9	66	0
Queue Length 95th (ft)	177	48	173	14	98	63
Internal Link Dist (ft)	1064			1329	568	
Turn Bay Length (ft)		200	230		350	300
Base Capacity (vph)	1315	740	534	2550	704	518
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.42	0.30	0.51	0.16	0.34	0.48

Intersection Summary

Area Type: Other
 Cycle Length: 90
 Actuated Cycle Length: 90
 Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green, Master Intersection
 Natural Cycle: 50
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.59
 Intersection Signal Delay: 15.6
 Intersection Capacity Utilization 49.7%
 Analysis Period (min) 15

Intersection LOS: B
 ICU Level of Service A

Splits and Phases: 3: I-495 SB Ramp & Mass Ave (Route 111)



Lanes, Volumes, Timings
5: Driveway/I-495 NB Ramp & Mass Ave (Route 111)

2027 Mitigation - AM Peak Hour



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗			↖	↗				↖	↗	↗
Traffic Volume (vph)	172	566	0	0	450	206	0	0	0	284	0	175
Future Volume (vph)	172	566	0	0	450	206	0	0	0	284	0	175
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	250		0	0		250	0		0	190		190
Storage Lanes	1		0	0		1	0		0	1		1
Taper Length (ft)	25			25			25			100		
Lane Util. Factor	1.00	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	0.97	1.00	1.00
Ped Bike Factor												
Frt						0.850						0.850
Flt Protected	0.950									0.950		
Satd. Flow (prot)	1787	3471	0	0	3438	1495	0	0	0	3273	0	1538
Flt Permitted	0.950									0.950		
Satd. Flow (perm)	1787	3471	0	0	3438	1495	0	0	0	3273	0	1538
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						224						190
Link Speed (mph)		45			35			30			30	
Link Distance (ft)		1409			557			391			691	
Travel Time (s)		21.3			10.9			8.9			15.7	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	1%	4%	2%	2%	5%	8%	2%	2%	2%	7%	2%	5%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	187	615	0	0	489	224	0	0	0	309	0	190
Shared Lane Traffic (%)												
Lane Group Flow (vph)	187	615	0	0	489	224	0	0	0	309	0	190
Turn Type	Prot	NA			NA	Perm				Prot		Perm
Protected Phases	5	2			6					3		
Permitted Phases					6	6						3
Detector Phase	5	2			6	6				3		3
Switch Phase												
Minimum Initial (s)	6.0	10.0			10.0	10.0				6.0		6.0
Minimum Split (s)	11.0	15.0			16.0	16.0				12.0		12.0
Total Split (s)	28.0	64.0			36.0	36.0				26.0		26.0
Total Split (%)	31.1%	71.1%			40.0%	40.0%				28.9%		28.9%
Maximum Green (s)	23.0	59.0			30.0	30.0				20.0		20.0
Yellow Time (s)	4.0	4.0			4.0	4.0				4.0		4.0
All-Red Time (s)	1.0	1.0			2.0	2.0				2.0		2.0
Lost Time Adjust (s)	0.0	0.0			0.0	0.0				0.0		0.0
Total Lost Time (s)	5.0	5.0			6.0	6.0				6.0		6.0
Lead/Lag	Lag			Lead	Lead	Lead						
Lead-Lag Optimize?	Yes			Yes	Yes	Yes						
Vehicle Extension (s)	3.0	3.0			3.0	3.0				3.0		3.0
Minimum Gap (s)	3.0	3.0			3.0	3.0				3.0		3.0
Time Before Reduce (s)	0.0	0.0			0.0	0.0				0.0		0.0
Time To Reduce (s)	0.0	0.0			0.0	0.0				0.0		0.0
Recall Mode	None	C-Max			C-Max	C-Max				None		None
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)	23.0	65.1			36.1	36.1				13.9		13.9
Actuated g/C Ratio	0.26	0.72			0.40	0.40				0.15		0.15
v/c Ratio	0.41	0.25			0.35	0.31				0.61		0.48
Control Delay	26.8	1.4			15.9	2.1				40.5		9.3
Queue Delay	0.0	0.0			0.0	0.0				0.0		0.0
Total Delay	26.8	1.4			15.9	2.1				40.5		9.3
LOS	C	A			B	A				D		A
Approach Delay		7.3			11.6						28.6	
Approach LOS		A			B						C	

Lanes, Volumes, Timings
 5: Driveway/I-495 NB Ramp & Mass Ave (Route 111)

2027 Mitigation - AM Peak Hour



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)	104	14			64	0				86		0
Queue Length 95th (ft)	179	20			91	15				120		54
Internal Link Dist (ft)		1329			477			311			611	
Turn Bay Length (ft)	250					250				190		190
Base Capacity (vph)	456	2510			1378	733				727		489
Starvation Cap Reductn	0	0			0	0				0		0
Spillback Cap Reductn	0	0			0	0				0		0
Storage Cap Reductn	0	0			0	0				0		0
Reduced v/c Ratio	0.41	0.25			0.35	0.31				0.43		0.39

Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 5 (6%), Referenced to phase 2:EBT and 6:WBTL, Start of Green

Natural Cycle: 40

Control Type: Actuated-Coordinated

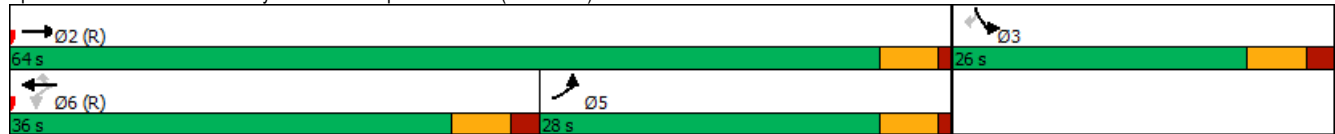
Maximum v/c Ratio: 0.61

Intersection Signal Delay: 14.1 Intersection LOS: B

Intersection Capacity Utilization 48.7% ICU Level of Service A













Analysis Period (min) 15

Splits and Phases: 5: Driveway/I-495 NB Ramp & Mass Ave (Route 111)



HCM Unsignalized Intersection Capacity Analysis
 7: Adams Pl/Gas Station & Mass Ave (Route 111)

2027 Mitigation - AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (veh/h)	83	505	262	122	569	9	34	0	15	11	2	53
Future Volume (Veh/h)	83	505	262	122	569	9	34	0	15	11	2	53
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	90	549	285	133	618	10	37	0	16	12	2	58
Pedestrians					2						1	
Lane Width (ft)					12.0						12.0	
Walking Speed (ft/s)					3.5						3.5	
Percent Blockage					0						0	
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)		557			250							
pX, platoon unblocked	0.83			0.89			0.89	0.89	0.89	0.89	0.89	0.83
vC, conflicting volume	629			834			1820	1766	694	1780	1904	624
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	455			755			1591	1532	598	1546	1687	449
tC, single (s)	4.2			4.1			7.2	6.5	6.4	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.3			2.2			3.6	4.0	3.4	3.5	4.0	3.3
p0 queue free %	90			83			27	100	96	81	97	89
cM capacity (veh/h)	899			761			51	77	427	64	62	504
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	924	761	53	72								
Volume Left	90	133	37	12								
Volume Right	285	10	16	58								
cSH	899	761	69	216								
Volume to Capacity	0.10	0.17	0.76	0.33								
Queue Length 95th (ft)	8	16	89	35								
Control Delay (s)	2.6	4.3	147.5	29.8								
Lane LOS	A	A	F	D								
Approach Delay (s)	2.6	4.3	147.5	29.8								
Approach LOS			F	D								
Intersection Summary												
Average Delay			8.7									
Intersection Capacity Utilization			76.5%		ICU Level of Service				D			
Analysis Period (min)			15									

Lanes, Volumes, Timings
 9: Site Dr/Paddock Lane & Mass Ave (Route 111)

2027 Mitigation - AM Peak Hour



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↕		↕	↕		↕
Traffic Volume (vph)	12	493	0	0	560	14	40	0	18	56	0	51
Future Volume (vph)	12	493	0	0	560	14	40	0	18	56	0	51
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	150		0	140		0
Storage Lanes	0		0	0		0	1		1	1		1
Taper Length (ft)	25			25			25			50		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor							0.99					
Frt					0.997				0.850			0.850
Flt Protected		0.999					0.950			0.950		
Satd. Flow (prot)	0	1791	0	0	1806	0	1410	0	1324	1805	0	1583
Flt Permitted		0.984					0.950			0.950		
Satd. Flow (perm)	0	1765	0	0	1806	0	1397	0	1324	1805	0	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					3				85			85
Link Speed (mph)		45			40			30			30	
Link Distance (ft)		250			1115			334			353	
Travel Time (s)		3.8			19.0			7.6			8.0	
Confl. Peds. (#/hr)							2					2
Confl. Bikes (#/hr)												
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	4%	6%	2%	2%	5%	0%	28%	2%	22%	0%	0%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	13	536	0	0	609	15	43	0	20	61	0	55
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	549	0	0	624	0	43	0	20	61	0	55
Turn Type	Perm	NA			NA		Prot		Prot	Prot		Prot
Protected Phases		2			6		4		4	8		8
Permitted Phases	2											
Detector Phase	2	2			6		4		4	8		8
Switch Phase												
Minimum Initial (s)	6.0	6.0			6.0		6.0		6.0	6.0		6.0
Minimum Split (s)	11.0	11.0			11.0		11.0		11.0	11.0		11.0
Total Split (s)	60.0	60.0			60.0		15.0		15.0	15.0		15.0
Total Split (%)	66.7%	66.7%			66.7%		16.7%		16.7%	16.7%		16.7%
Maximum Green (s)	55.0	55.0			55.0		10.0		10.0	10.0		10.0
Yellow Time (s)	4.0	4.0			4.0		3.0		3.0	3.0		3.0
All-Red Time (s)	1.0	1.0			1.0		2.0		2.0	2.0		2.0
Lost Time Adjust (s)		0.0			0.0		0.0		0.0	0.0		0.0
Total Lost Time (s)		5.0			5.0		5.0		5.0	5.0		5.0
Lead/Lag							Lag		Lag	Lead		Lead
Lead-Lag Optimize?							Yes		Yes	Yes		Yes
Vehicle Extension (s)	3.0	3.0			3.0		3.0		3.0	3.0		3.0
Minimum Gap (s)	3.0	3.0			3.0		3.0		3.0	3.0		3.0
Time Before Reduce (s)	0.0	0.0			0.0		0.0		0.0	0.0		0.0
Time To Reduce (s)	0.0	0.0			0.0		0.0		0.0	0.0		0.0
Recall Mode	C-Max	C-Max			C-Max		None		None	None		None
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)		66.5			66.5		8.1		8.1	8.2		8.2
Actuated g/C Ratio		0.74			0.74		0.09		0.09	0.09		0.09
v/c Ratio		0.42			0.47		0.34		0.10	0.37		0.25
Control Delay		4.7			8.9		45.4		1.1	44.5		6.5
Queue Delay		0.0			0.0		0.0		0.0	0.0		0.0
Total Delay		4.7			8.9		45.4		1.1	44.5		6.5
LOS		A			A		D		A	D		A
Approach Delay		4.7			8.9		31.3			26.5		
Approach LOS		A			A		C			C		

Lanes, Volumes, Timings

9: Site Dr/Paddock Lane & Mass Ave (Route 111)

2027 Mitigation - AM Peak Hour



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)		54			168		23		0	33		0
Queue Length 95th (ft)		74			286		55		0	71		18
Internal Link Dist (ft)		170			1035			254			273	
Turn Bay Length (ft)							150			140		
Base Capacity (vph)		1303			1334		156		222	200		251
Starvation Cap Reductn		0			0		0		0	0		0
Spillback Cap Reductn		0			0		0		0	0		0
Storage Cap Reductn		0			0		0		0	0		0
Reduced v/c Ratio		0.42			0.47		0.28		0.09	0.30		0.22

Intersection Summary

Area Type:	Other
Cycle Length:	90
Actuated Cycle Length:	90
Offset:	80 (89%), Referenced to phase 2:EBTL and 6:WBT, Start of Green
Natural Cycle:	55
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.47
Intersection Signal Delay:	9.8
Intersection Capacity Utilization:	50.3%
Analysis Period (min):	15
Intersection LOS:	A
ICU Level of Service:	A

Splits and Phases: 9: Site Dr/Paddock Lane & Mass Ave (Route 111)

 02 (R)	 03	 04
60 s	15 s	15 s
 06 (R)		
60 s		

HCM Unsignalized Intersection Capacity Analysis
 12: Burroughs Road/Hill Road & Mass Ave (Route 111)

2027 Mitigation - AM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (veh/h)	20	494	53	12	456	8	79	2	17	14	0	39
Future Volume (Veh/h)	20	494	53	12	456	8	79	2	17	14	0	39
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	22	537	58	13	496	9	86	2	18	15	0	42
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)		1115										
pX, platoon unblocked				0.87			0.87	0.87	0.87	0.87	0.87	
vC, conflicting volume	505			595			1178	1141	566	1156	1166	500
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	505			461			1131	1088	428	1104	1116	500
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.3	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.7	4.0	3.3
p0 queue free %	98			99			39	99	97	90	100	93
cM capacity (veh/h)	1070			967			141	183	550	143	176	564
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	617	518	106	57								
Volume Left	22	13	86	15								
Volume Right	58	9	18	42								
cSH	1070	967	162	318								
Volume to Capacity	0.02	0.01	0.65	0.18								
Queue Length 95th (ft)	2	1	92	16								
Control Delay (s)	0.6	0.4	61.3	18.8								
Lane LOS	A	A	F	C								
Approach Delay (s)	0.6	0.4	61.3	18.8								
Approach LOS			F	C								
Intersection Summary												
Average Delay			6.3									
Intersection Capacity Utilization			57.6%		ICU Level of Service				B			
Analysis Period (min)			15									

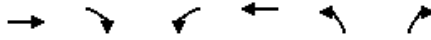
Lanes, Volumes, Timings
 3: I-495 SB Ramp & Mass Ave (Route 111)

2027 Mitigation - PM Peak Hour

	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↘	↑↑	↘↘	↗
Traffic Volume (vph)	502	181	267	501	128	135
Future Volume (vph)	502	181	267	501	128	135
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%			0%	0%	
Storage Length (ft)		200	230		350	300
Storage Lanes		1	1		1	1
Taper Length (ft)			25		25	
Lane Util. Factor	0.95	1.00	1.00	0.95	0.97	1.00
Ped Bike Factor						
Frt		0.850				0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	3574	1583	1770	3610	3502	1583
Flt Permitted			0.950		0.950	
Satd. Flow (perm)	3574	1583	1770	3610	3502	1583
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		197				147
Link Speed (mph)	45			35	30	
Link Distance (ft)	1144			1409	648	
Travel Time (s)	17.3			27.4	14.7	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	1%	2%	2%	0%	0%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	546	197	290	545	139	147
Shared Lane Traffic (%)						
Lane Group Flow (vph)	546	197	290	545	139	147
Turn Type	NA	Perm	Prot	NA	Prot	Perm
Protected Phases	2		1	6	8	
Permitted Phases		2				8
Detector Phase	2	2	1	6	8	8
Switch Phase						
Minimum Initial (s)	10.0	10.0	6.0	10.0	10.0	10.0
Minimum Split (s)	16.0	16.0	11.0	16.0	15.0	15.0
Total Split (s)	40.0	40.0	38.0	78.0	22.0	22.0
Total Split (%)	40.0%	40.0%	38.0%	78.0%	22.0%	22.0%
Maximum Green (s)	34.0	34.0	33.0	72.0	17.0	17.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	1.0	2.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	5.0	6.0	5.0	5.0
Lead/Lag	Lead	Lead	Lag			
Lead-Lag Optimize?	Yes	Yes	Yes			
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	C-Max	C-Max	None	C-Max	None	None
Walk Time (s)						
Flash Dont Walk (s)						
Pedestrian Calls (#/hr)						
Act Effct Green (s)	40.6	40.6	33.0	78.6	10.4	10.4
Actuated g/C Ratio	0.41	0.41	0.33	0.79	0.10	0.10
v/c Ratio	0.38	0.26	0.50	0.19	0.38	0.50
Control Delay	21.9	3.8	44.9	2.0	44.9	13.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	21.9	3.8	44.9	2.0	44.9	13.2
LOS	C	A	D	A	D	B
Approach Delay	17.1			16.9	28.6	
Approach LOS	B			B	C	

Lanes, Volumes, Timings
 3: I-495 SB Ramp & Mass Ave (Route 111)

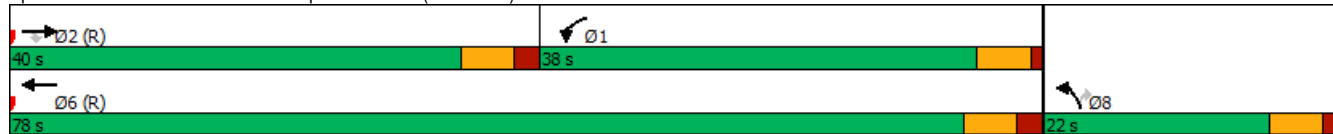
2027 Mitigation - PM Peak Hour



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Queue Length 50th (ft)	124	0	190	7	43	0
Queue Length 95th (ft)	174	43	267	20	72	56
Internal Link Dist (ft)	1064		1329		568	
Turn Bay Length (ft)		200	230		350	300
Base Capacity (vph)	1450	759	584	2836	595	391
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.38	0.26	0.50	0.19	0.23	0.38

Intersection Summary
 Area Type: Other
 Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green, Master Intersection
 Natural Cycle: 50
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.50
 Intersection Signal Delay: 18.8 Intersection LOS: B
 Intersection Capacity Utilization 50.3% ICU Level of Service A
 Analysis Period (min) 15

Splits and Phases: 3: I-495 SB Ramp & Mass Ave (Route 111)



Lanes, Volumes, Timings
5: Driveway/I-495 NB Ramp & Mass Ave (Route 111)

2027 Mitigation - PM Peak Hour



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗			↖	↗				↖	↗	↗
Traffic Volume (vph)	270	367	0	0	592	263	0	0	0	297	0	176
Future Volume (vph)	270	367	0	0	592	263	0	0	0	297	0	176
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	250		0	0		250	0		0	190		190
Storage Lanes	1		0	0		1	0		0	1		1
Taper Length (ft)	25			25			25			100		
Lane Util. Factor	1.00	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	0.97	1.00	1.00
Ped Bike Factor												
Frt						0.850						0.850
Flt Protected	0.950									0.950		
Satd. Flow (prot)	1805	3574	0	0	3539	1568	0	0	0	3433	0	1599
Flt Permitted	0.950									0.950		
Satd. Flow (perm)	1805	3574	0	0	3539	1568	0	0	0	3433	0	1599
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						286						191
Link Speed (mph)		45			35			30			30	
Link Distance (ft)		1409			557			391			691	
Travel Time (s)		21.3			10.9			8.9			15.7	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	1%	2%	0%	2%	3%	2%	2%	2%	2%	2%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	293	399	0	0	643	286	0	0	0	323	0	191
Shared Lane Traffic (%)												
Lane Group Flow (vph)	293	399	0	0	643	286	0	0	0	323	0	191
Turn Type	Prot	NA			NA	Perm				Prot		Perm
Protected Phases	5	2			6					3		
Permitted Phases						6						3
Detector Phase	5	2			6	6				3		3
Switch Phase												
Minimum Initial (s)	6.0	10.0			10.0	10.0				6.0		6.0
Minimum Split (s)	11.0	15.0			16.0	16.0				12.0		12.0
Total Split (s)	35.0	75.0			40.0	40.0				25.0		25.0
Total Split (%)	35.0%	75.0%			40.0%	40.0%				25.0%		25.0%
Maximum Green (s)	30.0	70.0			34.0	34.0				19.0		19.0
Yellow Time (s)	4.0	4.0			4.0	4.0				4.0		4.0
All-Red Time (s)	1.0	1.0			2.0	2.0				2.0		2.0
Lost Time Adjust (s)	0.0	0.0			0.0	0.0				0.0		0.0
Total Lost Time (s)	5.0	5.0			6.0	6.0				6.0		6.0
Lead/Lag	Lag			Lead	Lead	Lead						
Lead-Lag Optimize?	Yes			Yes	Yes	Yes						
Vehicle Extension (s)	3.0	3.0			3.0	3.0				3.0		3.0
Minimum Gap (s)	3.0	3.0			3.0	3.0				3.0		3.0
Time Before Reduce (s)	0.0	0.0			0.0	0.0				0.0		0.0
Time To Reduce (s)	0.0	0.0			0.0	0.0				0.0		0.0
Recall Mode	None	C-Max			C-Max	C-Max				None		None
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)	30.0	74.3			38.3	38.3				14.7		14.7
Actuated g/C Ratio	0.30	0.74			0.38	0.38				0.15		0.15
v/c Ratio	0.54	0.15			0.47	0.37				0.64		0.48
Control Delay	17.9	3.4			25.1	5.1				45.8		9.7
Queue Delay	0.0	0.0			0.0	0.0				0.0		0.0
Total Delay	17.9	3.4			25.1	5.1				45.8		9.7
LOS	B	A			C	A				D		A
Approach Delay		9.5			19.0						32.4	
Approach LOS		A			B						C	

Lanes, Volumes, Timings
 5: Driveway/I-495 NB Ramp & Mass Ave (Route 111)

2027 Mitigation - PM Peak Hour

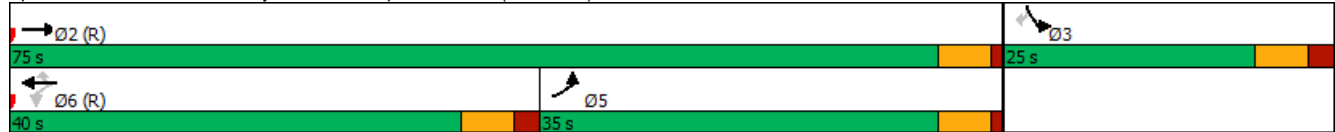


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)	59	27			182	23				101		0
Queue Length 95th (ft)	92	35			228	44				139		57
Internal Link Dist (ft)		1329			477			311			611	
Turn Bay Length (ft)	250					250				190		190
Base Capacity (vph)	541	2655			1355	776				652		458
Starvation Cap Reductn	0	0			0	0				0		0
Spillback Cap Reductn	0	0			0	0				0		0
Storage Cap Reductn	0	0			0	0				0		0
Reduced v/c Ratio	0.54	0.15			0.47	0.37				0.50		0.42

Intersection Summary

Area Type:	Other
Cycle Length:	100
Actuated Cycle Length:	100
Offset:	67 (67%), Referenced to phase 2:EBT and 6:WBTL, Start of Green
Natural Cycle:	55
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.64
Intersection Signal Delay:	19.2
Intersection Capacity Utilization	52.3%
Analysis Period (min)	15
Intersection LOS:	B
ICU Level of Service	A

Splits and Phases: 5: Driveway/I-495 NB Ramp & Mass Ave (Route 111)



HCM Unsignalized Intersection Capacity Analysis
 7: Adams Pl/Gas Station & Mass Ave (Route 111)

2027 Mitigation - PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (veh/h)	39	548	77	35	797	11	18	0	2	9	0	40
Future Volume (Veh/h)	39	548	77	35	797	11	18	0	2	9	0	40
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	42	596	84	38	866	12	20	0	2	10	0	43
Pedestrians					2						1	
Lane Width (ft)					12.0						12.0	
Walking Speed (ft/s)					3.5						3.5	
Percent Blockage					0						0	
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)		557			250							
pX, platoon unblocked	0.77			0.94			0.80	0.80	0.94	0.80	0.80	0.77
vC, conflicting volume	879			680			1713	1677	640	1675	1713	873
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	698			630			1604	1559	587	1557	1604	690
tC, single (s)	4.1			4.2			7.1	6.5	6.2	7.2	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.3			3.5	4.0	3.3	3.6	4.0	3.3
p0 queue free %	94			96			64	100	100	84	100	88
cM capacity (veh/h)	702			867			56	82	483	64	77	347
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	722	916	22	53								
Volume Left	42	38	20	10								
Volume Right	84	12	2	43								
cSH	702	867	61	188								
Volume to Capacity	0.06	0.04	0.36	0.28								
Queue Length 95th (ft)	5	3	33	28								
Control Delay (s)	1.6	1.2	95.0	31.4								
Lane LOS	A	A	F	D								
Approach Delay (s)	1.6	1.2	95.0	31.4								
Approach LOS			F	D								
Intersection Summary												
Average Delay			3.5									
Intersection Capacity Utilization			64.6%		ICU Level of Service				C			
Analysis Period (min)			15									

Lanes, Volumes, Timings

9: Site Dr/Paddock Lane & Mass Ave (Route 111)

2027 Mitigation - PM Peak Hour



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↕		↕	↕		↕
Traffic Volume (vph)	51	484	0	0	556	56	234	0	110	31	0	28
Future Volume (vph)	51	484	0	0	556	56	234	0	110	31	0	28
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	150		0	140		0
Storage Lanes	0		0	0		0	1		1	1		1
Taper Length (ft)	25			25			25			50		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor							1.00					
Frt					0.988				0.850			0.850
Flt Protected		0.995					0.950			0.950		
Satd. Flow (prot)	0	1890	0	0	1844	0	1719	0	1553	1805	0	1615
Flt Permitted		0.843					0.950			0.950		
Satd. Flow (perm)	0	1602	0	0	1844	0	1712	0	1553	1805	0	1615
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					8				120			76
Link Speed (mph)		45			40			30			30	
Link Distance (ft)		250			1115			334			353	
Travel Time (s)		3.8			19.0			7.6			8.0	
Confl. Peds. (#/hr)							2					2
Confl. Bikes (#/hr)												
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	0%	0%	0%	2%	0%	5%	0%	4%	0%	0%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	55	526	0	0	604	61	254	0	120	34	0	30
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	581	0	0	665	0	254	0	120	34	0	30
Turn Type	Perm	NA			NA		Prot		Prot	Prot		Prot
Protected Phases		2			6		4		4	8		8
Permitted Phases	2											
Detector Phase	2	2			6		4		4	8		8
Switch Phase												
Minimum Initial (s)	6.0	6.0			6.0		6.0		6.0	6.0		6.0
Minimum Split (s)	11.0	11.0			11.0		11.0		11.0	11.0		11.0
Total Split (s)	60.0	60.0			60.0		28.0		28.0	12.0		12.0
Total Split (%)	60.0%	60.0%			60.0%		28.0%		28.0%	12.0%		12.0%
Maximum Green (s)	55.0	55.0			55.0		23.0		23.0	7.0		7.0
Yellow Time (s)	4.0	4.0			4.0		4.0		4.0	4.0		4.0
All-Red Time (s)	1.0	1.0			1.0		1.0		1.0	1.0		1.0
Lost Time Adjust (s)		0.0			0.0		0.0		0.0	0.0		0.0
Total Lost Time (s)		5.0			5.0		5.0		5.0	5.0		5.0
Lead/Lag							Lead		Lead	Lag		Lag
Lead-Lag Optimize?							Yes		Yes	Yes		Yes
Vehicle Extension (s)	3.0	3.0			3.0		3.0		3.0	3.0		3.0
Minimum Gap (s)	3.0	3.0			3.0		3.0		3.0	3.0		3.0
Time Before Reduce (s)	0.0	0.0			0.0		0.0		0.0	0.0		0.0
Time To Reduce (s)	0.0	0.0			0.0		0.0		0.0	0.0		0.0
Recall Mode	C-Max	C-Max			C-Max		None		None	None		None
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)		61.3			61.3		19.1		19.1	6.8		6.8
Actuated g/C Ratio		0.61			0.61		0.19		0.19	0.07		0.07
v/c Ratio		0.59			0.59		0.77		0.31	0.28		0.17
Control Delay		7.2			15.9		54.3		8.2	50.1		2.0
Queue Delay		0.0			0.0		0.0		0.0	0.0		0.0
Total Delay		7.2			15.9		54.3		8.2	50.1		2.0
LOS		A			B		D		A	D		A
Approach Delay		7.2			15.9		39.5			27.6		
Approach LOS		A			B		D			C		

Lanes, Volumes, Timings

9: Site Dr/Paddock Lane & Mass Ave (Route 111)

2027 Mitigation - PM Peak Hour



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)		71			258		153		0	21		0
Queue Length 95th (ft)		222			403		233		44	53		0
Internal Link Dist (ft)		170			1035			254			273	
Turn Bay Length (ft)							150			140		
Base Capacity (vph)		982			1133		395		449	128		185
Starvation Cap Reductn		0			0		0		0	0		0
Spillback Cap Reductn		0			0		0		0	0		0
Storage Cap Reductn		0			0		0		0	0		0
Reduced v/c Ratio		0.59			0.59		0.64		0.27	0.27		0.16

Intersection Summary

Area Type:	Other
Cycle Length:	100
Actuated Cycle Length:	100
Offset:	32 (32%), Referenced to phase 2:EBTL and 6:WBT, Start of Green
Natural Cycle:	60
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.77
Intersection Signal Delay:	18.6
Intersection Capacity Utilization:	86.4%
Analysis Period (min):	15
Intersection LOS:	B
ICU Level of Service:	E

Splits and Phases: 9: Site Dr/Paddock Lane & Mass Ave (Route 111)

Ø2 (R) 60 s	Ø4 28 s	Ø8 12 s
Ø6 (R) 60 s		

HCM Unsignalized Intersection Capacity Analysis
 12: Burroughs Road/Hill Road & Mass Ave (Route 111)

2027 Mitigation - PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (veh/h)	28	534	63	13	514	7	70	4	20	4	7	28
Future Volume (Veh/h)	28	534	63	13	514	7	70	4	20	4	7	28
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	30	580	68	14	559	8	76	4	22	4	8	30
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)		1115										
pX, platoon unblocked				0.83			0.83	0.83	0.83	0.83	0.83	
vC, conflicting volume	567			648			1299	1269	614	1289	1299	563
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	567			469			1257	1221	428	1245	1257	563
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	97			98			29	97	96	96	94	94
cM capacity (veh/h)	1015			912			107	143	522	114	136	530
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	678	581	102	42								
Volume Left	30	14	76	4								
Volume Right	68	8	22	30								
cSH	1015	912	130	279								
Volume to Capacity	0.03	0.02	0.78	0.15								
Queue Length 95th (ft)	2	1	117	13								
Control Delay (s)	0.8	0.4	94.1	20.2								
Lane LOS	A	A	F	C								
Approach Delay (s)	0.8	0.4	94.1	20.2								
Approach LOS			F	C								
Intersection Summary												
Average Delay			8.0									
Intersection Capacity Utilization			64.2%		ICU Level of Service				C			
Analysis Period (min)			15									

Attachment 8

Circulation List

ATTACHMENT 8: CIRCULATION LIST

Bethany A. Card, Secretary
Executive Office of Energy and
Environmental Affairs
Attn: MEPA Office
100 Cambridge St., Suite 900
Boston, MA 02114
MEPA@mass.gov

Department of Environmental Protection
Commissioner's Office
One Winter Street
Boston, MA 02108
helena.boccardo@mass.gov

Department of Environmental Protection
Central Regional Office - Worcester
Attn: Commissioner's Office/MEPA
coordinator
8 New Bond Street,
Worcester, MA 01606
andrea.briggs@mass.gov

Massachusetts Department of
Transportation
Public/Private Development Unit
10 Park Plaza, Suite #4150
Boston, MA 02116
MassDOTPPDU@dot.state.ma.us

Massachusetts Department of
Transportation, District #3
Attn: MEPA Coordinator
499 Plantation Parkway,
Worcester, MA 01605
jeffrey.r.gomes@dot.state.ma.us

The Massachusetts Historical Commission
The MA Archives Building
220 Morrissey Boulevard
Boston, MA 02125

MEPA Office
Attn: EEA EJ Director
100 Cambridge Street, Suite 900
Boston, MA 02144
MEPA-EJ@mass.gov

Department of Energy Resources
Attn: MEPA Coordinator
100 Cambridge Street, 10th floor
Boston, MA 02114
paul.ormond@mass.gov
brendan.place@mass.gov

Massachusetts Water Resource Authority
Attn: MEPA Coordinator
100 First Avenue Charlestown Navy Yard
Boston, MA 02129
katherine.ronan@mwra.com

Metropolitan Area Planning Council
60 Temple Place/6th floor
Boston, MA 0211
mpillsbury@mapc.org
afelix@mapc.org

Boxborough Interim Town Administrator
Carter Terenzini
29 Middle Road
Boxborough, MA 01719

Boxborough Planning Board
Tracy Murphy, Town Planner
29 Middle Road
Boxborough, MA 01719

Boxborough Conservation Commission
Mary Nadwairski, Department Assistant
Town Hall
29 Middle Road
Boxborough, MA 01719

Boxborough Board of Health
Jim Garreffo, Board of Health Agent
29 Middle Road
Boxborough, MA 01719

Sargent Memorial Library
Peishan Bartley, Director
427 Massachusetts Ave
Boxborough, MA 01719
pbartley@cwmars.org

Harvard Town Administrator
Timothy P. Bragan, Town Administrator
13 Ayer Road
Harvard, MA 01451

Harvard Planning Board
Justin Brown, Chair
13 Ayer Road
Harvard, MA 01451

Harvard Conservation Commission
Liz Allard, Conservation Agent
Town Hall
13 Ayer Road
Harvard, MA 01451

Harvard Board of Health
Alison Flynn, Clerk
Town Hall
13 Ayer Road
Harvard, MA 01451
boh@harvard-ma.gov

Harvard Public Library
Mary Wilson, Library Director
4 Pond Road
Harvard, MA 01451

Attachment 9

List of Federal, State, and Local Permits

ATTACHMENT 9: LIST OF PERMITS

Agency Name	Permit or Action*
<i>Federal</i>	
United States Environmental Protection Agency	National Pollutant Discharge Elimination System Construction General Permit (NPDES CGP)
<i>State</i>	
Massachusetts Department of Transportation (MassDOT)	State Highway Access Permit
Massachusetts Department of Environmental Protection (MassDEP)	<ul style="list-style-type: none"> • BRP WP 83 Application to Prepare a Hydrogeological Evaluation • BRP WP 11 Individual Permit Renewal/Modification with Plan Approval • BRP WS 15 Permit - BRP WS Application for Drinking Water Program (Water Supply) Permits or Approvals • BRP WS 23A Permit - BRP WS 23 A, B, & C Approval to Construct a Facility to Treat less than One Million Gallons per Day
<i>Town of Boxborough</i>	
Planning Board	Development Approvals

Attachment 10

Resilient MA Action Team (RMAT) Report

RMAT Climate Resilience Design Standards Tool Project Report

Massachusetts Avenue Research Campus (MARC)

Date Created: 6/9/2022 11:37:11 AM

Created By: hhashimoto

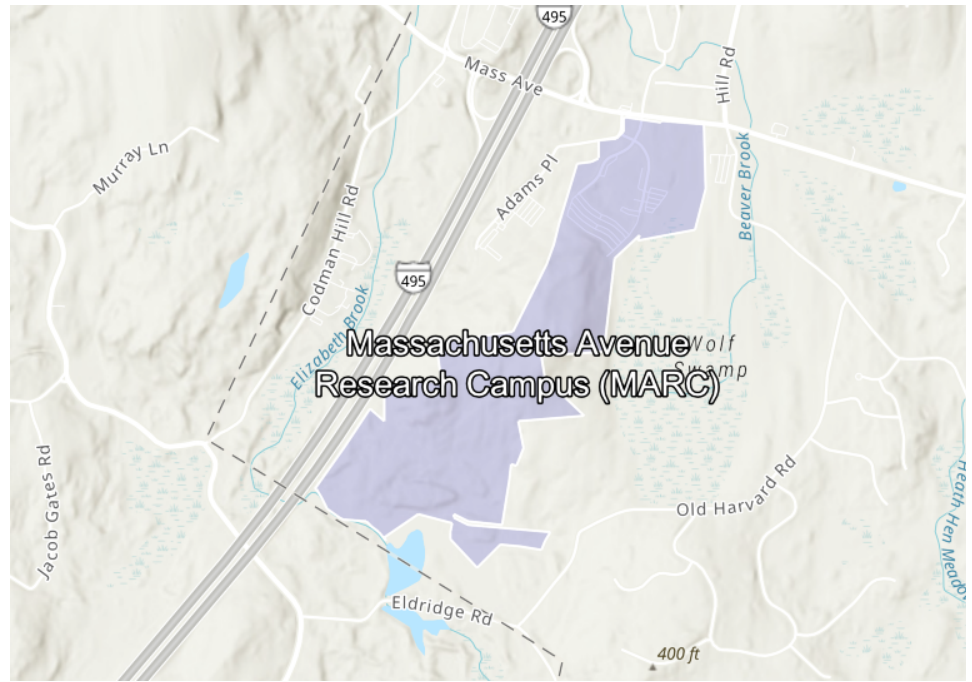
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Project Summary

[Link to Project](#)

Estimated Construction Cost: \$20000000.00
 End of Life Year: 2093
 Project within mapped Environmental Justice neighborhood: Yes

Ecosystem Benefits	Scores
Project Score	■ Moderate
Exposure	Scores
Sea Level Rise/Storm Surge	■ Not Exposed
Extreme Precipitation - Urban Flooding	■ High Exposure
Extreme Precipitation - Riverine Flooding	■ High Exposure
Extreme Heat	■ High Exposure



Asset Summary

Number of Assets: 6

Asset Risk	Sea Level Rise/Storm Surge	Extreme Precipitation - Urban Flooding	Extreme Precipitation - Riverine Flooding	Extreme Heat
Light Manufacturing Buildings	■ Low Risk	■ High Risk	■ High Risk	■ High Risk
Parking and Internal Roadways	■ Low Risk	■ High Risk	■ High Risk	■ High Risk
Existing Office	■ Low Risk	■ High Risk	■ High Risk	■ High Risk
Wastewater Treatment Plant	■ Low Risk	■ High Risk	■ High Risk	■ High Risk
Onsite Wells	■ Low Risk	■ High Risk	■ High Risk	■ High Risk
Stormwater Management System	■ Low Risk	■ High Risk	■ High Risk	■ High Risk

Project Outputs

	Target Planning Horizon	Intermediate Planning Horizon	Percentile	Return Period	Tier
Sea Level Rise/Storm Surge					
Light Manufacturing Buildings					
Parking and Internal Roadways					
Existing Office					
Wastewater Treatment Plant					
Onsite Wells					
Stormwater Management System					
Extreme Precipitation					
Light Manufacturing Buildings	2070			25-yr (4%)	Tier 2
Parking and Internal Roadways	2050			10-yr (10%)	Tier 2
Existing Office	2070			25-yr (4%)	Tier 2
Wastewater Treatment Plant	2070			25-yr (4%)	Tier 2
Onsite Wells	2070			25-yr (4%)	Tier 2
Stormwater Management System	2070			25-yr (4%)	Tier 2

Extreme Heat

Light Manufacturing Buildings	2070	50th	Tier 2
Parking and Internal Roadways	2050	50th	Tier 2
Existing Office	2070	50th	Tier 2
Wastewater Treatment Plant	2070	50th	Tier 2
Onsite Wells	2070	50th	Tier 2
Stormwater Management System	2070	50th	Tier 2

Scoring Rationale - Exposure

Sea Level Rise/Storm Surge

This project received a "Not Exposed" because of the following:

- Not located within the predicted mean high water shoreline by 2030
- No historic coastal flooding at project site
- Not located within the Massachusetts Coast Flood Risk Model (MC-FRM)

Extreme Precipitation - Urban Flooding

This project received a "High Exposure" because of the following:

- Increased impervious area
- Maximum annual daily rainfall exceeds 10 inches within the overall project's useful life
- No historic flooding at project site
- Existing impervious area of the project site is less than 10%

Extreme Precipitation - Riverine Flooding

This project received a "High Exposure" because of the following:

- Part of the project is within a mapped FEMA floodplain, outside of the Massachusetts Coast Flood Risk Model (MC-FRM)
- Part of the project is within 100ft of a waterbody
- No historic riverine flooding at project site
- Project is not likely susceptible to riverine erosion

Extreme Heat

This project received a "High Exposure" because of the following:

- 30+ days increase in days over 90 deg. F within project's useful life
- Increased impervious area
- Existing trees are being removed as part of the proposed project
- Existing impervious area of the project site is less than 10%
- Located within 100 ft of existing water body

Scoring Rationale - Asset Risk Scoring

Asset - Light Manufacturing Buildings

Primary asset criticality factors influencing risk ratings for this asset:

- Asset can be inaccessible/inoperable more than a week after natural hazard event without consequences
- Less than 1,000 people would be directly affected by the loss/inoperability of the asset
- Inoperability of the asset would not be expected to result in injuries
- Cost to replace is between \$30 million and \$100 million
- There are no hazardous materials in the asset

Asset - Parking and Internal Roadways

Primary asset criticality factors influencing risk ratings for this asset:

- Asset may be inaccessible/inoperable for more than a day but less than a week after natural hazard event
- Loss/inoperability of the asset would have impacts limited to the location of infrastructure only
- Inoperability of the asset would not be expected to result in injuries
- Inoperability may moderately impact other facilities, assets, or buildings, but is not expected to affect their ability to operate
- There are no hazardous materials in the asset

Asset - Existing Office

Primary asset criticality factors influencing risk ratings for this asset:

- Asset can be inaccessible/inoperable more than a week after natural hazard event without consequences
- Less than 1,000 people would be directly affected by the loss/inoperability of the asset
- Inoperability of the asset would not be expected to result in injuries
- Cost to replace is between \$10 million and \$30 million
- There are no hazardous materials in the asset

Asset - Wastewater Treatment Plant

Primary asset criticality factors influencing risk ratings for this asset:

- Asset may inaccessible/inoperable for more than a day but less than a week after natural hazard event
- Loss/inoperability of the asset would have impacts limited to the location of infrastructure only
- Inoperability of the asset would not be expected to result in injuries
- Cost to replace is between \$10 million and \$30 million
- There are no hazardous materials in the asset

Asset - Onsite Wells

Primary asset criticality factors influencing risk ratings for this asset:

- Asset may inaccessible/inoperable for more than a day but less than a week after natural hazard event
- Loss/inoperability of the asset would have impacts limited to the location of infrastructure only
- Inoperability of the asset would not be expected to result in injuries
- Cost to replace is between \$10 million and \$30 million
- There are no hazardous materials in the asset

Asset - Stormwater Management System

Primary asset criticality factors influencing risk ratings for this asset:

- Asset may inaccessible/inoperable for more than a day but less than a week after natural hazard event
- Loss/inoperability of the asset would have impacts limited to the location of infrastructure only
- Inoperability of the asset would not be expected to result in injuries
- Cost to replace is less than \$10 million
- Impact on natural resources can be mitigated naturally with the inoperability of the asset

Project Design Standards Output

Asset: Light Manufacturing Buildings Building/Facility

Sea Level Rise/Storm Surge Low Risk

Applicable Design Criteria

- Projected Tidal Datums:** No
- Projected Water Surface Elevation:** No
- Projected Wave Action Water Elevation:** No
- Projected Wave Heights:** No
- Projected Duration of Flooding:** No
- Projected Design Flood Velocity:** No
- Projected Scour & Erosion:** No

Extreme Precipitation High Risk

Target Planning Horizon: 2070
Return Period: 25-yr (4%)

Applicable Design Criteria

Tiered Methodology: Tier 2

Projected Total Precipitation Depth & Peak Intensity for 24-hr Design Storms: Yes

Asset Name	Recommended Planning Horizon	Recommended Return Period (Design Storm)	Projected 24-hr Total Precipitation Depth (inches)	Step-by-Step Methodology for Peak Intensity
Light Manufacturing Buildings	2070	25-Year (4%)	8.2	Downloadable Methodology PDF

Limitations: While precipitation depth is useful for project planning and design, rainfall distribution and peak intensity of the design storm is recommended to also be considered. Lower-intensity, longer-duration storms allow time for infiltration and reduce the load on the infrastructure system over the duration of the storm. Higher-intensity, shorter-duration storms often have higher runoff volumes because the water does not have enough time to infiltrate and infrastructure systems (e.g., catch basins) and may overflow or back up during such storms. In the Northeast, short -duration high intensity rain events are becoming more frequent, and there is often little early warning for these events, making it difficult to plan operationally. These events can result in the rapid inundation of the asset project location. Design should consider both short- and long-duration precipitation events and how they may impact the asset.

The precipitation values provided by this Tool (version 1) are recommended to inform planning and design, but they do not guarantee that the asset will be protected from or be able to withstand an extreme precipitation event. The planning, design, and review guidance accompanying these values is general and projects are encouraged to do their own due diligence to understand the vulnerability of their asset.

Projected Riverine Peak Discharge & Peak Flood Elevation: Yes

Extreme Heat

High Risk

Target Planning Horizon: 2070
 Percentile: 50th Percentile

Applicable Design Criteria

Tiered Methodology: Tier 2

Projected Annual/Summer/Winter Average Temperatures: Yes

Projected Heat Index: Yes

Projected Growing Degree Days: No

Projected Days Per Year With Max Temp > 95°F, >90°F, <32°F: Yes

Projected Number of Heat Waves Per Year & Average Heat Wave Duration: Yes

Projected Cooling Degree Days & Heating Degree Days (base = 65°F): Yes

Asset: Parking and Internal Roadways

Infrastructure

Sea Level Rise/Storm Surge

Low Risk

Applicable Design Criteria

Projected Tidal Datums: No

Projected Water Surface Elevation: No

Projected Wave Action Water Elevation: No

Projected Wave Heights: No

Projected Duration of Flooding: No

Projected Design Flood Velocity: No

Projected Scour & Erosion: No

Extreme Precipitation

High Risk

Target Planning Horizon: 2050
 Return Period: 10-yr (10%)

Applicable Design Criteria

Tiered Methodology: Tier 2

Projected Total Precipitation Depth & Peak Intensity for 24-hr Design Storms: Yes

Asset Name	Recommended Planning Horizon	Recommended Return Period (Design Storm)	Projected 24-hr Total Precipitation Depth (inches)	Step-by-Step Methodology for Peak Intensity
Parking and Internal Roadways	2050	10-Year (10%)	6.3	Downloadable Methodology PDF

Limitations: While precipitation depth is useful for project planning and design, rainfall distribution and peak intensity of the design storm is recommended to also be considered. Lower-intensity, longer-duration storms allow time for infiltration and reduce the load on the infrastructure system over the duration of the storm. Higher-intensity, shorter-duration storms often have higher runoff volumes because the water does not have enough time to infiltrate and infrastructure systems (e.g., catch basins) and may overflow or back up during such storms. In the Northeast, short -duration high intensity rain events are becoming more frequent, and there is often little early warning for these events, making it difficult to plan operationally. These events can result in the rapid inundation of the asset project location. Design should consider both short- and long-duration precipitation events and how they may impact the asset.

The precipitation values provided by this Tool (version 1) are recommended to inform planning and design, but they do not guarantee that the asset will be protected from or be able to withstand an extreme precipitation event. The planning, design, and review guidance accompanying these values is general and projects are encouraged to do their own due diligence to understand the vulnerability of their asset.

Projected Riverine Peak Discharge & Peak Flood Elevation: Yes

Extreme Heat

High Risk

Target Planning Horizon: 2050
 Percentile: 50th Percentile

Applicable Design Criteria

Tiered Methodology: Tier 2

Projected Annual/Summer/Winter Average Temperatures: Yes

Projected Heat Index: Yes
Projected Growing Degree Days: No
Projected Days Per Year With Max Temp > 95°F, >90°F, <32°F: Yes
Projected Number of Heat Waves Per Year & Average Heat Wave Duration: Yes
Projected Cooling Degree Days & Heating Degree Days (base = 65°F): No

Asset: Existing Office

Building/Facility

Sea Level Rise/Storm Surge

Low Risk

Applicable Design Criteria

Projected Tidal Datums: No
Projected Water Surface Elevation: No
Projected Wave Action Water Elevation: No
Projected Wave Heights: No
Projected Duration of Flooding: No
Projected Design Flood Velocity: No
Projected Scour & Erosion: No

Extreme Precipitation

High Risk

Target Planning Horizon: 2070
 Return Period: 25-yr (4%)

Applicable Design Criteria

Tiered Methodology: Tier 2

Projected Total Precipitation Depth & Peak Intensity for 24-hr Design Storms: Yes

Asset Name	Recommended Planning Horizon	Recommended Return Period (Design Storm)	Projected 24-hr Total Precipitation Depth (inches)	Step-by-Step Methodology for Peak Intensity
Existing Office	2070	25-Year (4%)	8.2	Downloadable Methodology.PDF

Limitations: While precipitation depth is useful for project planning and design, rainfall distribution and peak intensity of the design storm is recommended to also be considered. Lower-intensity, longer-duration storms allow time for infiltration and reduce the load on the infrastructure system over the duration of the storm. Higher-intensity, shorter-duration storms often have higher runoff volumes because the water does not have enough time to infiltrate and infrastructure systems (e.g., catch basins) and may overflow or back up during such storms. In the Northeast, short -duration high intensity rain events are becoming more frequent, and there is often little early warning for these events, making it difficult to plan operationally. These events can result in the rapid inundation of the asset project location. Design should consider both short- and long-duration precipitation events and how they may impact the asset.

The precipitation values provided by this Tool (version 1) are recommended to inform planning and design, but they do not guarantee that the asset will be protected from or be able to withstand an extreme precipitation event. The planning, design, and review guidance accompanying these values is general and projects are encouraged to do their own due diligence to understand the vulnerability of their asset.

Projected Riverine Peak Discharge & Peak Flood Elevation: Yes

Extreme Heat

High Risk

Target Planning Horizon: 2070
 Percentile: 50th Percentile

Applicable Design Criteria

Tiered Methodology: Tier 2

Projected Annual/Summer/Winter Average Temperatures: Yes
Projected Heat Index: Yes
Projected Growing Degree Days: No
Projected Days Per Year With Max Temp > 95°F, >90°F, <32°F: Yes
Projected Number of Heat Waves Per Year & Average Heat Wave Duration: Yes
Projected Cooling Degree Days & Heating Degree Days (base = 65°F): Yes

Asset: Wastewater Treatment Plant

Infrastructure

Sea Level Rise/Storm Surge

Low Risk

Applicable Design Criteria

Projected Tidal Datums: No
Projected Water Surface Elevation: No
Projected Wave Action Water Elevation: No

Projected Wave Heights: No
Projected Duration of Flooding: No
Projected Design Flood Velocity: No
Projected Scour & Erosion: No

Extreme Precipitation

High Risk

Target Planning Horizon: 2070
 Return Period: 25-yr (4%)

Applicable Design Criteria

Tiered Methodology: Tier 2

Projected Total Precipitation Depth & Peak Intensity for 24-hr Design Storms: Yes

Asset Name	Recommended Planning Horizon	Recommended Return Period (Design Storm)	Projected 24-hr Total Precipitation Depth (inches)	Step-by-Step Methodology for Peak Intensity
Wastewater Treatment Plant	2070	25-Year (4%)	8.2	Downloadable Methodology PDF

Limitations: While precipitation depth is useful for project planning and design, rainfall distribution and peak intensity of the design storm is recommended to also be considered. Lower-intensity, longer-duration storms allow time for infiltration and reduce the load on the infrastructure system over the duration of the storm. Higher-intensity, shorter-duration storms often have higher runoff volumes because the water does not have enough time to infiltrate and infrastructure systems (e.g., catch basins) and may overflow or back up during such storms. In the Northeast, short -duration high intensity rain events are becoming more frequent, and there is often little early warning for these events, making it difficult to plan operationally. These events can result in the rapid inundation of the asset project location. Design should consider both short- and long-duration precipitation events and how they may impact the asset.

The precipitation values provided by this Tool (version 1) are recommended to inform planning and design, but they do not guarantee that the asset will be protected from or be able to withstand an extreme precipitation event. The planning, design, and review guidance accompanying these values is general and projects are encouraged to do their own due diligence to understand the vulnerability of their asset.

Projected Riverine Peak Discharge & Peak Flood Elevation: Yes

Extreme Heat

High Risk

Target Planning Horizon: 2070
 Percentile: 50th Percentile

Applicable Design Criteria

Tiered Methodology: Tier 2

Projected Annual/Summer/Winter Average Temperatures: Yes

Projected Heat Index: Yes

Projected Growing Degree Days: No

Projected Days Per Year With Max Temp > 95°F, >90°F, <32°F: Yes

Projected Number of Heat Waves Per Year & Average Heat Wave Duration: Yes

Projected Cooling Degree Days & Heating Degree Days (base = 65°F): No

Asset: Onsite Wells

Infrastructure

Sea Level Rise/Storm Surge

Low Risk

Applicable Design Criteria

Projected Tidal Datums: No

Projected Water Surface Elevation: No

Projected Wave Action Water Elevation: No

Projected Wave Heights: No

Projected Duration of Flooding: No

Projected Design Flood Velocity: No

Projected Scour & Erosion: No

Extreme Precipitation

High Risk

Target Planning Horizon: 2070
 Return Period: 25-yr (4%)

Applicable Design Criteria

Tiered Methodology: Tier 2

Projected Total Precipitation Depth & Peak Intensity for 24-hr Design Storms: Yes

Asset Name	Recommended Planning Horizon	Recommended Return Period (Design Storm)	Projected 24-hr Total Precipitation Depth (inches)	Step-by-Step Methodology for Peak Intensity
Onsite Wells	2070	25-Year (4%)	8.2	Downloadable Methodology PDF

Limitations: While precipitation depth is useful for project planning and design, rainfall distribution and peak intensity of the design storm is recommended to also be considered. Lower-intensity, longer-duration storms allow time for infiltration and reduce the load on the infrastructure system over the duration of the storm. Higher-intensity, shorter-duration storms often have higher runoff volumes because the water does not have enough time to infiltrate and infrastructure systems (e.g., catch basins) and may overflow or back up during such storms. In the Northeast, short -duration high intensity rain events are becoming more frequent, and there is often little early warning for these events, making it difficult to plan operationally. These events can result in the rapid inundation of the asset project location. Design should consider both short- and long-duration precipitation events and how they may impact the asset.

The precipitation values provided by this Tool (version 1) are recommended to inform planning and design, but they do not guarantee that the asset will be protected from or be able to withstand an extreme precipitation event. The planning, design, and review guidance accompanying these values is general and projects are encouraged to do their own due diligence to understand the vulnerability of their asset.

Projected Riverine Peak Discharge & Peak Flood Elevation: Yes

Extreme Heat

High Risk

Target Planning Horizon: 2070
Percentile: 50th Percentile

Applicable Design Criteria

Tiered Methodology: Tier 2

Projected Annual/Summer/Winter Average Temperatures: Yes

Projected Heat Index: Yes

Projected Growing Degree Days: No

Projected Days Per Year With Max Temp > 95°F, >90°F, <32°F: Yes

Projected Number of Heat Waves Per Year & Average Heat Wave Duration: Yes

Projected Cooling Degree Days & Heating Degree Days (base = 65°F): No

Asset: Stormwater Management System

Infrastructure

Sea Level Rise/Storm Surge

Low Risk

Applicable Design Criteria

Projected Tidal Datums: No

Projected Water Surface Elevation: No

Projected Wave Action Water Elevation: No

Projected Wave Heights: No

Projected Duration of Flooding: No

Projected Design Flood Velocity: No

Projected Scour & Erosion: No

Extreme Precipitation

High Risk

Target Planning Horizon: 2070
Return Period: 25-yr (4%)

Applicable Design Criteria

Tiered Methodology: Tier 2

Projected Total Precipitation Depth & Peak Intensity for 24-hr Design Storms: Yes

Asset Name	Recommended Planning Horizon	Recommended Return Period (Design Storm)	Projected 24-hr Total Precipitation Depth (inches)	Step-by-Step Methodology for Peak Intensity
Stormwater Management System	2070	25-Year (4%)	8.2	Downloadable Methodology PDF

Limitations: While precipitation depth is useful for project planning and design, rainfall distribution and peak intensity of the design storm is recommended to also be considered. Lower-intensity, longer-duration storms allow time for infiltration and reduce the load on the infrastructure system over the duration of the storm. Higher-intensity, shorter-duration storms often have higher runoff volumes because the water does not have enough time to infiltrate and infrastructure systems (e.g., catch basins) and may overflow or back up during such storms. In the Northeast, short -duration high intensity rain events are becoming more frequent, and there is often little early warning for these events, making it difficult to plan operationally. These events can result in the rapid inundation of the asset project location. Design should consider both short- and long-duration precipitation events and how they may impact the asset.

The precipitation values provided by this Tool (version 1) are recommended to inform planning and design, but they do not guarantee that the asset will be protected from or be able to withstand an extreme precipitation event. The planning, design, and review guidance accompanying these values is

general and projects are encouraged to do their own due diligence to understand the vulnerability of their asset.

Projected Riverine Peak Discharge & Peak Flood Elevation: Yes

Extreme Heat

High Risk

Target Planning Horizon: 2070
Percentile: 50th Percentile

Applicable Design Criteria

Tiered Methodology: Tier 2

Projected Annual/Summer/Winter Average Temperatures: Yes

Projected Heat Index: Yes

Projected Growing Degree Days: No

Projected Days Per Year With Max Temp > 95°F, >90°F, <32°F: Yes

Projected Number of Heat Waves Per Year & Average Heat Wave Duration: Yes

Projected Cooling Degree Days & Heating Degree Days (base = 65°F): No

Project Inputs

Core Project Information

Name:	Massachusetts Avenue Research Campus (MARC) 2093
Given the expected useful life of the project, through what year do you estimate the project to last (i.e. before a major reconstruction/renovation)?	
Location of Project:	Boxborough
Estimated Capital Cost:	\$20,000,000
Who is the Submitting Entity?	Private Other Epsilon Associates Inc. on behalf of Lincoln Property Company David Hewett (dhewett@epsilonassociates.com)
Is this project being submitted as part of a state grant application?	No
Which grant program?	
What stage are you in your project lifecycle?	Permitting
Is climate resiliency a core objective of this project?	No
Is this project being submitted as part of the state capital planning process?	No
Is this project being submitted as part of a regulatory review process or permitting?	Yes
Brief Project Description:	The Project proposes the development of a light industrial park that will include four single-story, light manufacturing buildings with associated loading docks, access drives, parking lots (513 total spaces), landscaping, and stormwater management infrastructure. The Project also includes the installation of new on-site wells as well as an on-site wastewater treatment plant and subsurface disposal. The Project will be designed to reduce the existing peak rates and volumes of stormwater runoff from the site, and promote runoff recharge to the greatest extent practicable. To minimize the Project's susceptibility to drought conditions, the landscape design is anticipated to incorporate native and adaptive plant materials and high efficiency irrigation systems will be installed. Aeration fixtures and appliances with water conservation qualities will be chosen, conserving potable water supplies.

Project Submission Comments:

Project Ecosystem Benefits

Factors Influencing Output

- ✓ Project provides flood protection through nature-based solutions
- ✓ Project protects public water supply
- ✓ Project recharges groundwater
- ✓ Project filters stormwater using green infrastructure
- ✓ Project protects fisheries, wildlife, and plant habitat
- ✓ Project provides recreation
- ✓ Project prevents pollution

Factors to Improve Output

- ✓ Incorporate nature-based solutions that may reduce storm damage
- ✓ Incorporate nature-based solutions that improve water quality

Is the primary purpose of this project ecological restoration?

No

Project Benefits

Provides flood protection through nature-based solutions	Yes
Reduces storm damage	Maybe
Recharges groundwater	Yes
Protects public water supply	Yes
Filters stormwater using green infrastructure	Yes
Improves water quality	Maybe
Promotes decarbonization	No
Enables carbon sequestration	No
Provides oxygen production	No
Improves air quality	No
Prevents pollution	Yes
Remediates existing sources of pollution	No
Protects fisheries, wildlife, and plant habitat	Yes
Protects land containing shellfish	No
Provides pollinator habitat	No
Provides recreation	Yes
Provides cultural resources/education	No

Project Climate Exposure

Is the primary purpose of this project ecological restoration?	No
Does the project site have a history of coastal flooding?	No
Does the project site have a history of flooding during extreme precipitation events (unrelated to water/sewer damages)?	No
Does the project site have a history of riverine flooding?	No
Does the project result in a net increase in impervious area of the site?	Yes
Are existing trees being removed as part of the proposed project?	Yes

Project Assets

Asset: Light Manufacturing Buildings
 Asset Type: Typically Occupied
 Asset Sub-Type: Non-residential building (office, commercial, retail)
 Construction Type: New Construction
 Construction Year: 2023
 Useful Life: 60

Identify the length of time the asset can be inaccessible/inoperable without significant consequences.

Building may be inaccessible/inoperable more than a week after natural hazard event without consequences

Identify the geographic area directly affected by permanent loss or significant inoperability of the building/facility.

Impacts limited to site only

Identify the population directly served that would be affected by the permanent loss of use or inoperability of the building/facility.

Less than 1,000 people

Identify if the building/facility provides services to populations that reside within Environmental Justice neighborhoods or climate vulnerable populations.

The building/facility does not provide services to populations that reside within Environmental Justice neighborhoods or climate vulnerable populations.

If the building/facility became inoperable for longer than acceptable in Question 1, how, if at all, would it be expected to impact people's health and safety?

Inoperability of the building/facility would not be expected to result in injuries

If there are hazardous materials in your building/facility, what are the extent of impacts related to spills/releases of these materials?

There are no hazardous materials in the building/facility

If the building/facility became inoperable for longer than acceptable in Question 1, what are the impacts on other facilities, assets, and/or infrastructure?

Moderate – Inoperability may impact other facilities, assets, or buildings, but is not expected to affect their ability to operate

If this building/facility was damaged beyond repair, how much would it approximately cost to replace?

Between \$30 million and \$100 million

Is this a recreational facility which can be vacated during a natural hazard event?

No

If the building/facility became inoperable for longer than acceptable in Question 1, what are the public and/or social services impacts?

Many alternative programs and/or services are available to support the community

If the building/facility became inoperable for longer than acceptable in Question 1, what are the environmental impacts related to natural resources?

No impact on surrounding natural resources is expected

If the building/facility became inoperable for longer than acceptable in Question 1, what are the impacts to government services (i.e. the building is not able to serve or operate its intended users or function)?

Loss of building is not expected to reduce the ability to maintain government services.

If the building/facility became inoperable for longer than acceptable in Question 1, what are the impacts to loss of confidence in government (i.e. the building is not able to serve or operate its intended users or function)?

No Impact

Asset: Parking and Internal Roadways

Asset Type: Transportation

Asset Sub-Type: Roads (local)

Construction Type: New Construction

Construction Year: 2023

Useful Life: 30

Identify the length of time the asset can be inaccessible/inoperable without significant consequences.

Infrastructure may be inaccessible/inoperable for more than a day, but less than a week after natural hazard without consequences.

Identify the geographic area directly affected by permanent loss or significant inoperability of the infrastructure.

Impacts limited to location of infrastructure only

Identify the population directly served that would be affected by the permanent loss or significant inoperability of the infrastructure.

Less than 5,000 people

Identify if the infrastructure provides services to populations that reside within Environmental Justice neighborhoods or climate vulnerable populations.

The infrastructure does not provide services to populations that reside within Environmental Justice neighborhoods or climate vulnerable populations.

Will the infrastructure reduce the risk of flooding?

No

If the infrastructure became inoperable for longer than acceptable in Question 1, how, if at all, would it be expected to impact people's health and safety?

Inoperability of the infrastructure would not be expected to result in injuries

If there are hazardous materials in your infrastructure, what are the extents of impacts related to spills/releases of these materials?

There are no hazardous materials in the infrastructure

If the infrastructure became inoperable for longer than acceptable in Question 1, what are the impacts on other facilities, assets, and/or infrastructure?

Moderate – Inoperability may impact other facilities, assets, or buildings, but cascading impacts do not affect the ability of other facilities, assets, or buildings to operate

If the infrastructure was damaged beyond repair, how much would it approximately cost to replace?

Less than \$10 million

Does the infrastructure function as an evacuation route during emergencies? This question only applies to roadway projects.

No

If the infrastructure became inoperable for longer than acceptable in Question 1, what are the environmental impacts related to natural resources?

No impact on surrounding natural resources is expected

If the infrastructure became inoperable for longer than acceptable in Question 1, what are the impacts to government services (i.e. the infrastructure is not able to serve or operate its intended users or function)?

Loss of infrastructure is not expected to reduce the ability to maintain government services

What are the impacts to loss of confidence in government resulting from loss of infrastructure functionality (i.e. the infrastructure asset is not able to serve or operate its intended users or function)?

No Impact

Asset: Existing Office

Asset Type: Typically Occupied

Asset Sub-Type: Non-residential building (office, commercial, retail)

Construction Type: Major Repair/Retrofit

Construction Year: 2022

Useful Life: 60

Identify the length of time the asset can be inaccessible/inoperable without significant consequences.

Building may be inaccessible/inoperable more than a week after natural hazard event without consequences

Identify the geographic area directly affected by permanent loss or significant inoperability of the building/facility.

Impacts limited to site only

Identify the population directly served that would be affected by the permanent loss of use or inoperability of the building/facility.

Less than 1,000 people

Identify if the building/facility provides services to populations that reside within Environmental Justice neighborhoods or climate vulnerable populations.

The building/facility does not provide services to populations that reside within Environmental Justice neighborhoods or climate vulnerable populations.

If the building/facility became inoperable for longer than acceptable in Question 1, how, if at all, would it be expected to impact people's health and safety?

Inoperability of the building/facility would not be expected to result in injuries

If there are hazardous materials in your building/facility, what are the extent of impacts related to spills/releases of these materials?

There are no hazardous materials in the building/facility

If the building/facility became inoperable for longer than acceptable in Question 1, what are the impacts on other facilities, assets, and/or infrastructure?

Moderate – Inoperability may impact other facilities, assets, or buildings, but is not expected to affect their ability to operate

If this building/facility was damaged beyond repair, how much would it approximately cost to replace?

Between \$10 million and \$30 million

Is this a recreational facility which can be vacated during a natural hazard event?

No

If the building/facility became inoperable for longer than acceptable in Question 1, what are the public and/or social services impacts?

Many alternative programs and/or services are available to support the community

If the building/facility became inoperable for longer than acceptable in Question 1, what are the environmental impacts related to natural resources?

No impact on surrounding natural resources is expected

If the building/facility became inoperable for longer than acceptable in Question 1, what are the impacts to government services (i.e. the building is not able to serve or operate its intended users or function)?

Loss of building is not expected to reduce the ability to maintain government services.

If the building/facility became inoperable for longer than acceptable in Question 1, what are the impacts to loss of confidence in government (i.e. the building is not able to serve or operate its intended users or function)?

No Impact

Asset: Wastewater Treatment Plant

Asset Type: Utility Infrastructure

Asset Sub-Type: Wastewater

Construction Type: New Construction

Construction Year: 2023

Useful Life: 70

Identify the length of time the asset can be inaccessible/inoperable without significant consequences.

Infrastructure may be inaccessible/inoperable for more than a day, but less than a week after natural hazard without consequences.

Identify the geographic area directly affected by permanent loss or significant inoperability of the infrastructure.

Impacts limited to location of infrastructure only

Identify the population directly served that would be affected by the permanent loss or significant inoperability of the infrastructure.

Less than 5,000 people

Identify if the infrastructure provides services to populations that reside within Environmental Justice neighborhoods or climate vulnerable populations.

The infrastructure does not provide services to populations that reside within Environmental Justice neighborhoods or climate vulnerable populations.

Will the infrastructure reduce the risk of flooding?

No

If the infrastructure became inoperable for longer than acceptable in Question 1, how, if at all, would it be expected to impact people's health and safety?

Inoperability of the infrastructure would not be expected to result in injuries

If there are hazardous materials in your infrastructure, what are the extents of impacts related to spills/releases of these materials?

There are no hazardous materials in the infrastructure

If the infrastructure became inoperable for longer than acceptable in Question 1, what are the impacts on other facilities, assets, and/or infrastructure?

Moderate – Inoperability may impact other facilities, assets, or buildings, but cascading impacts do not affect the ability of other facilities, assets, or buildings to operate

If the infrastructure was damaged beyond repair, how much would it approximately cost to replace?

Between \$10 million and \$30 million

Does the infrastructure function as an evacuation route during emergencies? This question only applies to roadway projects.

No

If the infrastructure became inoperable for longer than acceptable in Question 1, what are the environmental impacts related to natural resources?

No impact on surrounding natural resources is expected

If the infrastructure became inoperable for longer than acceptable in Question 1, what are the impacts to government services (i.e. the infrastructure is not able to serve or operate its intended users or function)?

Loss of infrastructure is not expected to reduce the ability to maintain government services

What are the impacts to loss of confidence in government resulting from loss of infrastructure functionality (i.e. the infrastructure asset is not able to serve or operate its intended users or function)?

No Impact

Asset: Onsite Wells

Asset Type: Utility Infrastructure

Asset Sub-Type: Water

Construction Type: New Construction

Construction Year: 2023

Useful Life: 70

Identify the length of time the asset can be inaccessible/inoperable without significant consequences.

Infrastructure may be inaccessible/inoperable for more than a day, but less than a week after natural hazard without consequences.

Identify the geographic area directly affected by permanent loss or significant inoperability of the infrastructure.

Impacts limited to location of infrastructure only

Identify the population directly served that would be affected by the permanent loss or significant inoperability of the infrastructure.

Less than 5,000 people

Identify if the infrastructure provides services to populations that reside within Environmental Justice neighborhoods or climate vulnerable populations.

The infrastructure does not provide services to populations that reside within Environmental Justice neighborhoods or climate vulnerable populations.

Will the infrastructure reduce the risk of flooding?

No

If the infrastructure became inoperable for longer than acceptable in Question 1, how, if at all, would it be expected to impact people's health and safety?

Inoperability of the infrastructure would not be expected to result in injuries

If there are hazardous materials in your infrastructure, what are the extents of impacts related to spills/releases of these materials?

There are no hazardous materials in the infrastructure

If the infrastructure became inoperable for longer than acceptable in Question 1, what are the impacts on other facilities, assets, and/or infrastructure?

Moderate – Inoperability may impact other facilities, assets, or buildings, but cascading impacts do not affect the ability of other facilities, assets, or buildings to operate

If the infrastructure was damaged beyond repair, how much would it approximately cost to replace?

Between \$10 million and \$30 million

Does the infrastructure function as an evacuation route during emergencies? This question only applies to roadway projects.

No

If the infrastructure became inoperable for longer than acceptable in Question 1, what are the environmental impacts related to natural resources?

No impact on surrounding natural resources is expected

If the infrastructure became inoperable for longer than acceptable in Question 1, what are the impacts to government services (i.e. the infrastructure is not able to serve or operate its intended users or function)?

Loss of infrastructure is not expected to reduce the ability to maintain government services

What are the impacts to loss of confidence in government resulting from loss of infrastructure functionality (i.e. the infrastructure asset is not able to serve or operate its intended users or function)?

No Impact

Asset: Stormwater Management System

Asset Type: Utility Infrastructure

Asset Sub-Type: Stormwater utility infrastructure

Construction Type: New Construction

Construction Year: 2023

Useful Life: 70

Identify the length of time the asset can be inaccessible/inoperable without significant consequences.

Infrastructure may be inaccessible/inoperable for more than a day, but less than a week after natural hazard without consequences.

Identify the geographic area directly affected by permanent loss or significant inoperability of the infrastructure.

Impacts limited to location of infrastructure only

Identify the population directly served that would be affected by the permanent loss or significant inoperability of the infrastructure.

Less than 5,000 people

Identify if the infrastructure provides services to populations that reside within Environmental Justice neighborhoods or climate vulnerable populations.

The infrastructure does not provide services to populations that reside within Environmental Justice neighborhoods or climate vulnerable populations.

Will the infrastructure reduce the risk of flooding?

Yes

If the infrastructure became inoperable for longer than acceptable in Question 1, how, if at all, would it be expected to impact people's health and safety?

Inoperability of the infrastructure would not be expected to result in injuries

If there are hazardous materials in your infrastructure, what are the extents of impacts related to spills/releases of these materials?

There are no hazardous materials in the infrastructure

If the infrastructure became inoperable for longer than acceptable in Question 1, what are the impacts on other facilities, assets, and/or infrastructure?

Minor – Inoperability will not likely affect other facilities, assets, or buildings

If the infrastructure was damaged beyond repair, how much would it approximately cost to replace?

Less than \$10 million

Does the infrastructure function as an evacuation route during emergencies? This question only applies to roadway projects.

No

If the infrastructure became inoperable for longer than acceptable in Question 1, what are the environmental impacts related to natural resources?

Impact on natural resources can be mitigated naturally

If the infrastructure became inoperable for longer than acceptable in Question 1, what are the impacts to government services (i.e. the infrastructure is not able to serve or operate its intended users or function)?

Loss of infrastructure is not expected to reduce the ability to maintain government services

What are the impacts to loss of confidence in government resulting from loss of infrastructure functionality (i.e. the infrastructure asset is not able to serve or operate its intended users or function)?

No Impact

Report Comments

N/A

Attachment 11

EJ Screening Form and Maps

Environmental Justice Screening Form

Project Name	1414 Massachusetts Avenue
Anticipated Date of MEPA Filing	June 29, 2022
Proponent Name	Massachusetts Avenue Research Campus (MARC)
Contact Information (e.g., consultant)	David Hewett Epsilon Associates, Inc. 3 Mill & Main, Suite 250 Maynard, MA 01754 Phone: 978-897-7100 Email: dhewett@epsilonassociates.com
Public website for project or other physical location where project materials can be obtained (if available)	Proponent will provide information as it becomes available to the Albert J Sargent Memorial Library in Boxborough.
Municipality and Zip Code for Project (if known)	Boxborough, MA 01719
Project Type* (list all that apply)	Industrial
Is the project site within a mapped 100-year FEMA flood plain? Y/N/yes/unknown	No
Estimated GHG emissions of conditioned spaces if known (click here for GHG Estimation tool)	2,864 (metric) tons per year CO ₂ e

Project Description

<p>1. Provide a brief project description, including overall size of the project site and square footage of proposed buildings and structures if known.</p> <p>The Proponent proposes the development of a light industrial park that will include four single-story, light manufacturing buildings with associated loading docks, access drives, parking lots, landscaping, and stormwater management infrastructure. The Project also includes new on-site wells as well as an on-site wastewater treatment plant and subsurface disposal. The buildings will be located in the central portion of the site and will require substantial grading to accommodate their development.</p>
<p>2. List anticipated MEPA review thresholds (301 CMR 11.03) (if known)</p> <ul style="list-style-type: none"> • 301 CMR 11.03 (1)(a)2 - Creation of ten or more acres of impervious area. • 301 CMR 11.03 (1)(b)1 - Direct alteration of 25 or more acres of land, unless the Project is consistent with an approved conservation farm plan or forest cutting plan or other similar generally accepted agricultural or forestry practices. • 301 CMR 11.03 (1)(b)2 - Creation of five or more acres of impervious area.

- 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 (6)(b)14 - Generation of 1,000 or more New adt on roadways providing access to a single location and construction of 150 or more New parking spaces at a single location.
- 301 CMR 11.03 (6)(b)15 - Construction of 300 or more New parking spaces at a single location.

3. List all anticipated state, local and federal permits needed for the project (if known)

Agency Name	Permit or Action*
Federal	
United States Environmental Protection Agency	National Pollutant Discharge Elimination System Construction General Permit (NPDES CGP)
State	
MassDOT	Access Permit
MassDEP	On-site wastewater treatment and disposal permits
Town of Boxborough	
Zoning Board of Appeals	Zoning Overview-Comprehensive Permit

4. Identify EJ populations and characteristics (Minority, Income, English Isolation) within 5 miles of project site (can attach map from [EJ Maps Viewer](#) in lieu of narrative)

The Proponent identified nine Environmental Justice (EJ) Populations within 5 miles of the Project Site. They are as follows:

Block Group	Census Tract	County	Town	Criteria	Total Minority Population	Households with Language Isolation	Median Household Income
3	3881	Middlesex	Boxborough	Minority	42 %	0 %	\$73,750 (86 % of the MA median)
2	3881	Middlesex	Boxborough	Minority	30 %	0 %	\$127,159 (148 % of the MA median)
1	3251	Middlesex	Ayer	Minority	25 %	2 %	\$140,179 (163 % of the MA median)
6	7614	Worcester	Harvard	Minority	49 %	0 %	\$134,417 (157 % of the MA median)
4	7131	Worcester	Lancaster	Minority	30 %	0 %	\$95,278 (111 % of the MA median)
3	3631.04	Middlesex	Acton	Minority	48 %	7 %	\$135,710 (158 % of the MA median)

2	3632.02	Middlesex	Acton	Minority	40 %	0 %	\$134,625 (157 % of the MA median)
1	3632.02	Middlesex	Acton	Minority	41 %	0 %	\$146,125 (170 % of the MA median)
1	3631.03	Middlesex	Acton	Minority	42 %	5 %	\$144,306 (168 % of the MA median)

Using the EJ Maps Viewer that identifies “Languages Spoken in Massachusetts”, the Proponent found that there are three tracts with 5% or more of the population who do not speak English very well within five miles of the Project Site. These populations speak the following languages:

- Chinese
- Portuguese or Portuguese Creole

5. Identify any municipality or census tract meeting the definition of "vulnerable health EJ criteria" in the [DPH EJ Tool](#) located in whole or in part within a 1 mile radius of the project site

The Proponent identified five towns within one mile of the Project Site: Acton, Ayer, Boxborough, Harvard, and Lancaster. Using the DPH EJ Tool, only two towns were identified as potentially suffering from environmentally related health burdens:

- Ayer - average age-adjusted rates of heart attack hospitalizations
- Boxborough - average low birth weight rate among full term births

6. Identify potential short-term and long-term environmental and public health impacts that may affect EJ Populations and any anticipated mitigation

- Increased vehicle emissions from project associated traffic
- Temporary impacts to air quality during construction
- Increased noise levels during construction and from ongoing operations at the site

All impacts will be reviewed through MEPA and the various permitting programs and will be appropriately mitigated in accordance with applicable regulations.

7. Identify project benefits, including "Environmental Benefits" as defined in 301 CMR 11.02, that may improve environmental conditions or public health of the EJ population

- Provides new opportunities for commercial growth within an area zoned for commercial/industrial development
- Connecting more of Boxborough’s residents to employment opportunities through

the proposed Project's proximity to Interstate 495 and Route 2

- **Contribute to the economy of Boxborough and the region**
- **Provide significant new construction and long-term job opportunities**

8. Describe how the community can request a meeting to discuss the project, and how the community can request oral language interpretation services at the meeting. Specify how to request other accommodations, including meetings after business hours and at locations near public transportation.

The Project Proponent is willing to meet with community members at times and locations that are convenient to the public. To request a meeting and any needed accommodations, contact David Hewett at Epsilon Associates, the environmental consultant firm assisting the developer through the permitting process.

David Hewett

Phone: 978-897-7100

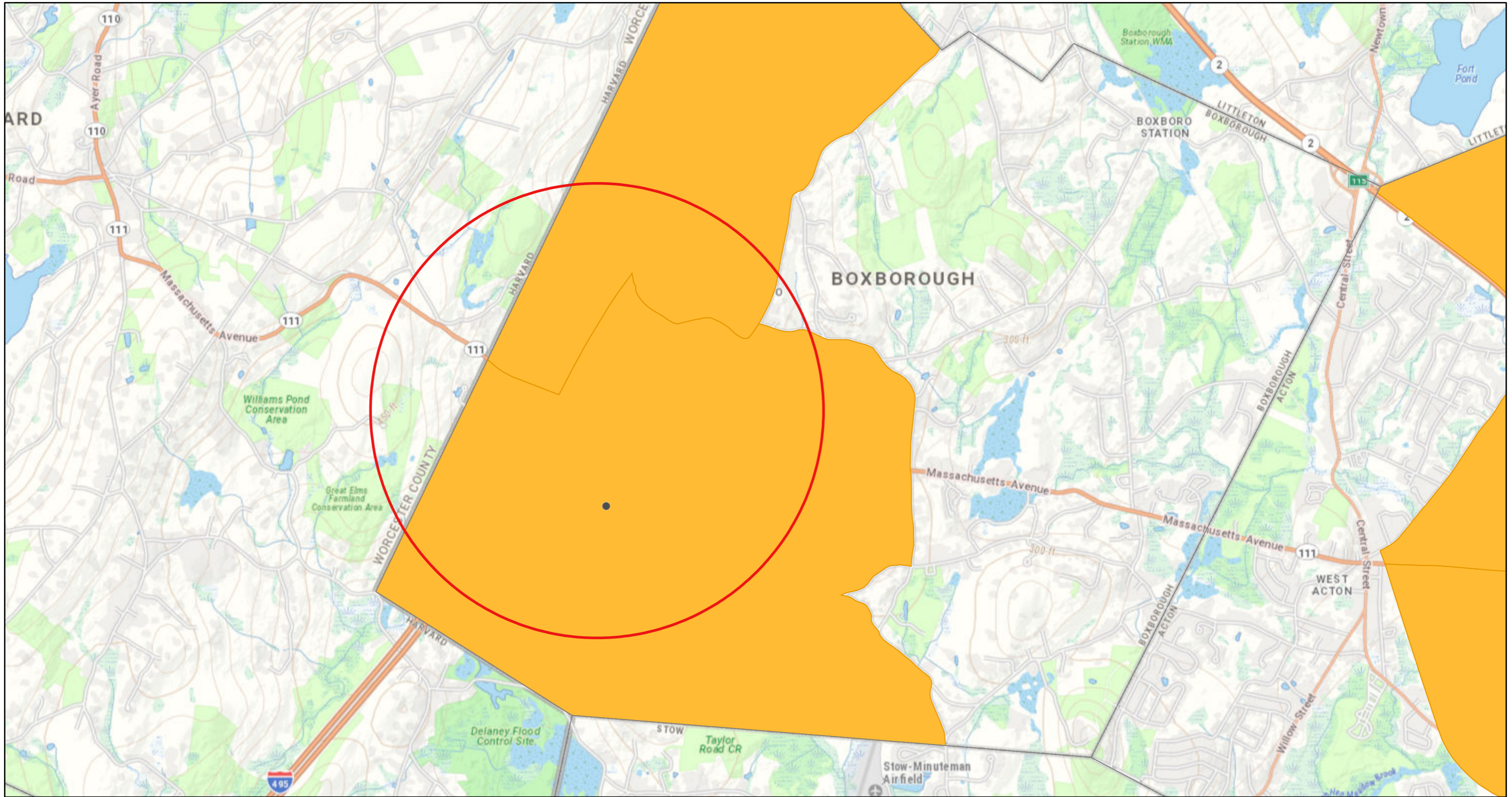
Email: dhewett@epsilonassociates.com

ENF Revisions

ATTACHMENTS:

8. Printout from the [EJ Maps Viewer](#) showing the project location relative to Environmental Justice (EJ) Populations located in whole or in part within a 1-mile and 5-mile radius of the project site.

EJ Populations within 1-mile of the Project Site

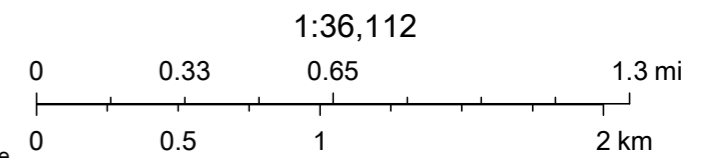


3/11/2022, 12:31:37 PM

Override 1

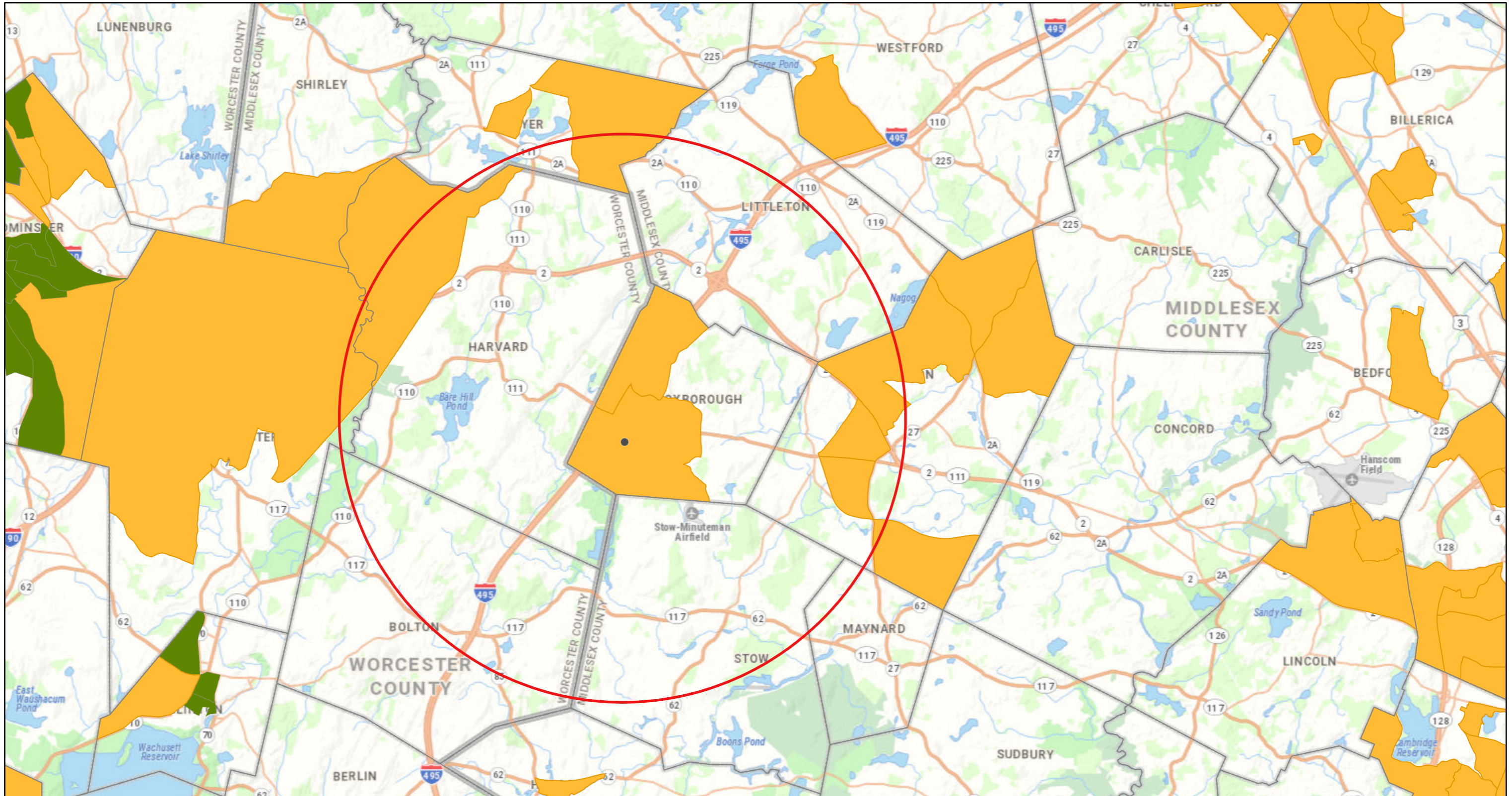
EJ 2020 with criteria explanation

Minority: the block group minority population is $\geq 40\%$, or the block group minority population is $\geq 25\%$ and the median household income of the municipality the block group is in is $< 150\%$ of the Massachusetts median household income



MassGIS

EJ Populations within 5-miles of the Project Site



3/11/2022, 12:29:34 PM

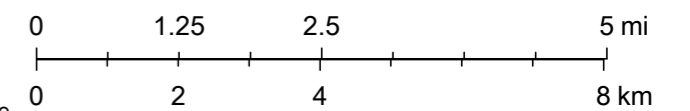
Override 1

EJ 2020 with criteria explanation

Minority: the block group minority population is $\geq 40\%$, or the block group minority population is $\geq 25\%$ and the median household income of the municipality the block group is in is $< 150\%$ of the Massachusetts median household income

Minority and income

1:144,448



MassGIS

Attachment 12

MEPA EJ Distribution List

Statewide Environmental Justice Community Based Organizations

First Name	Last Name	Title	Phone	Email	Affiliation
Julia	Blatt	Executive Director	(617) 714-4272	danielledolan@massriversalliance.org juliablatt@massriversalliance.org	Mass Rivers Alliance
Andrea	Nyamekye	Associate Director	508-505-6748	Andrea@n2nma.org elvis@n2nma.org	Neighbor to Neighbor
Ben	Hellerstein	MA State Director	617-747-4368	ben@environmentmassachusetts.org	Environment Massachusetts
Claire	B.W. Muller	Movement Building Director	508 308-9261	claire@uomassaction.org	Unitarian Universalist Mass Action Network
Cindy	Luppi	New England Director	617-338-8131 x208	cluppi@cleanwater.org	Clean Water Action
Deb	Pasternak	Director, MA Chapter	617-423-5775	deb.pasternak@sierraclub.org	Sierra Club MA
Heather	Clish	Director of Conservation & Recreation Policy	(617) 523-0655	hclish@outdoors.org	Appalachian Mountain Club
Heidi	Ricci	Director of Policy	Not Provided	hricci@massaudubon.org	Mass Audubon
Kelly	Boling	MA & RI State Director	(617) 367-6200	kelly.boling@tpl.org	The Trust for Public Land
Kerry	Bowie	Board President	Not Provided	kerry@msaadapartners.com	Browning the GreenSpace
Linda	Orel	Director of Policy	617-360-1857	lorel@thetrustees.org	The Trustees of Reservations
Nancy	Goodman	Vice President for Policy	Not Provided	ngoodman@environmentalleague.org	Environmental League of MA
Pat	Stanton	Project Manager	Not Provided	pstanton@e4thefuture.org	E4TheFuture
Rob	Moir	Executive Director	Not Provided	rob@oceanriver.org	Ocean River Institute
Robb	Johnson	Executive Director	(978) 443-2233	robb@massland.org	Mass Land Trust Coalition
Sarah	Dooling	Executive Director	Not Provided	sarah@massclimateaction.net	Mass Climate Action Network (MCAN)
Staci	Rubin	Senior Attorney	617 350-0990	srubin@clf.org	Conservation Law Foundation
Sylvia	Broude	Executive Director	617 292-4821	sylvia@communityactionworks.org	Community Action Works
Winston	Vaughan	Director of Climate Solutions	Not Provided	wvaughan@hcwh.org	Healthcare without Harm

Indigenous Organizations					
First Name	Last Name	Title	Phone	Email	Affiliation
Alma	Gordon	President	Not Provided	tribalcouncil@chappaquiddick-wampanoag.org	Chappaquiddick Tribe of the Wampanoag Nation
Cheryll	Toney Holley	Chair	774-317-9138	crwritings@aol.com	Nipmuc Nation (Hassanamisco Nipmucs)
John	Peters, Jr.	Executive Director	617-573-1292	john.peters@mass.gov	Massachusetts Commission on Indian Affairs (MCIA)
Kenneth	White	Council Chairman	508-347-7829	acw1213@verizon.net	Chaubunagungamaug Nipmuck Indian Council
Melissa	Ferretti	Chair	(508) 304-5023	melissa@herringpondtribe.org	Herring Pond Wampanoag Tribe
Patricia	D. Rocker	Council Chair	Not Provided	rockerpatriciad@verizon.net	Chappaquiddick Tribe of the Wampanoag Nation, Whale Clan
Raquel	Halsey	Executive Director	(617) 232-0343	rhalsey@naicob.org	North American Indian Center of Boston
Cora	Pierce	Not Provided	Not Provided	Coradot@yahooe.com	Pocasset Wampanoag Tribe
Elizabth	Soloman	Not Provided	Not Provided	Solomon.Elizabeth.e@gmail.com	Massachusetts Tribe at Ponkapoag

Federally Recognized Tribes					
First	Last	Title	Phone	Email	Affiliation
Bettina	Washington	Tribal Historic Preservation Officer	508-560-9014	thpo@wampanoagtribe-nsn.gov	Wampanoag Tribe of Gay Head (Aquinnah)
Bonney	Hartley	Historic Preservation Manager	413-884-6048	bonney.hartley@mohican-nsn.gov	Stockbridge-Munsee Tribe
Brian	Weeden	Chair	774-413-0520	Brian.Weeden@mwtribe-nsn.gov	Mashpee Wampanoag Tribe