Arlington Zoning Board of Appeals

Date: Tuesday, November 24, 2020
Time: 7:30 PM
Location:
Additional Details:

Agenda Items

Administrative Items

1. **Remote Participation Details**

   In accordance with the Governor's Order Suspending Certain Provisions of the Open Meeting Law, G. L. c. 30A, § 20 relating to the COVID-19 emergency, the Arlington Zoning Board of Appeals meetings shall be physically closed to the public to avoid group congregation until further notice. The meeting shall instead be held virtually using Zoom.

   Please read Governor Baker's Executive Order Suspending Certain Provision of Open Meeting Law for more information regarding virtual public hearings and meetings: https://www.mass.gov/doc/open-meeting-law-order-march-12-2020/download

   The Zoning Board of Appeals is inviting you to a scheduled Zoom meeting.
   Topic: Zoning Board of Appeals, Meeting/Hearing
   Time: November, 24, 2020, 7:30 PM Eastern Time (US and Canada)

   Hi there,
   You are invited to a Zoom meeting.
   When: Nov 24, 2020 07:30 PM Eastern Time (US and Canada)
   Register in advance for this meeting:
   https://town-arlington-ma-us.zoom.us/meeting/register/tJwkc-ygqzIrHdBwLWAujMjJGKndvr-f-xOa
   After registering, you will receive a confirmation email containing information about joining the meeting.

   Meeting ID: 989 4585 9174

   Find your local number: https://town-arlington-ma-us.zoom.us/u/adNWeNXzLr

   Dial by Location: 1-646-876-9923 US (New York)

2. **Members Vote: Approval of Meeting Minutes from October 27, 2020**

Comprehensive Permits

3. **Acceptance of New Documents**
4. **Discussion of Schedule going Forward**
5. **Discussion of the ZBA Website Revision**

Meeting Adjourn

Town of Arlington, Massachusetts

Acceptance of New Documents

ATTACHMENTS:

Type	File Name	Description
Reference Material	Report_on_Existing_Site_Conditions_Nov.2020_(00176278xBC4F6).pdf	Report on Existing Site Conditions_Nov.2020 (00176278xBC4F6)
Reference Material	2020-11-03_Thorndike_Place_Plan_Set_(1).pdf	Thorndike Place Plan Set
Reference Material	WaiverList_Nov.2020.update_(00176301xBC4F6).pdf	WaiverList_Nov.2020.update (00176301xBC4F6)
Reference Material	MugarProperty_ZBA_MyRWA.pdf	MugarProperty_ZBA_MyRWA
Reference Material	ZBA_Transmittal_-_Wetland_Delineation_2020-10-22.pdf	ZBA Transmittal - Wetland Delineation 2020-10-22
Reference Material	Wetland_Delineation_Field_Data_Forms.pdf	Wetland Delineation Field Data Forms
Reference Material	Thorndike_Place_Wetland_Delineation_Memo_REVISED_10-19-2020_gtd.pdf	Thorndike Place Wetland Delineation Memo_REVISED_10-19-2020_gtd
Reference Material	2020-11-03_Stormwater_Report.pdf	2020-11-03 Stormwater Report
Reference Material	Compliance_with_OS-Master_Plan_Statement_(00176275xBC4F6).pdf	Compliance with OS-Master Plan Statement (00176275xBC4F6)
Reference Material	ZBA_Transmittal__Supplemental_ApplicationMaterials_2020-11-03_.pdf	ZBA Transmittal _Supplemental ApplicationMaterials 2020-11-03_
Reference Material	Thorndike-Arch-Binder-sm_(002).pdf	Thorndike-Arch-Binder-sm (002)
Reference Material	ACC_Comment_Letter_to_ZBA_Thorndike_Place_20NOV2020.pdf	ACC_Comment Letter to ZBA_Thorndike_Place_20NOV2020
Reference Material	8451_TIA_111320.pdf	Transportation Impact Assessment
Reference Material	Report_Thorndike_Place_Wildlife_Habitat_and_Veg_Assessment_complete_(1).pdf	Wildlife Habitat and Vegetation Evaluation
Reference Material	2340700-CONSTRAINTS_w_Updated_Wetlands.pdf	2340700-CONSTRAINTS w Updated Wetlands
Reference Material	M_McKinnon.pdf	M McKinnon email
Reference Material	2020-11-20_Thorndike_Place_Civil-Site_Review-FINAL.pdf	2020-11-20 Thorndike Place Civil-Site Review-FINAL

SMOLAK & VAUGHAN LLP

ATTORNEYS AT LAW

To: Arlington Zoning Board of Appeals

Fr: Stephanie A. Kiefer, Esq.

Re: Narrative Report on Existing Site Condition - Thorndike Place

Date: November 3, 2020

The below narrative report on Existing Site Conditions supplements the Site Conditions Report (Part III) of Arlington Land Realty, LLC's Comprehensive Permit, previously filed with the Zoning Board on September 2, 2016. Under Section 3.2.6 of the Arlington Comprehensive Permit regulations, a report (together with applicable plans) is requested to describe existing site conditions, summarize conditions in the surrounding area, wetland or vernal pools, mature trees, existing street elevations, traffic patterns and character of open areas in the neighborhood.

A. Site Location

The Mugar property, approximately 17+ acres in size, is a largely forested site located in East Arlington, between Route 2/Concord Turnpike and residential neighborhoods to the north and east the and Thorndike athletic fields to the south. The locus is accessed via Dorothy Road, a 40-foot public way, as well as the intersecting Parker Street and Littlejohn Street. To the east, Edith Street and Burch Street access the site.

The locus is within Arlington's PUD zoning district, which zoning district specifically contemplates use of the land for larger scale developments, including higher density apartment house residential uses. The majority of the adjacent neighborhood, including abutting properties on Dorothy Road, Burch Street and Edith Street, is located in the R2 Two-Family zoning district. The portion of the neighborhood east of Littlejohn Street and north to Lake Street is within the R1 – Single-Family zoning district. Locations of existing structures and existing public roadways in the immediate vicinity of the Site are shown on the Existing Conditions Plan. There are no existing buildings located on the Mugar property.

The location of the property is well situated to both subway, bus and bike paths, to make the project a highly transit-friendly residential project. Likewise, given the size of the property, the property can support the proposed multifamily residential use while also allowing for a large portion of the site to be protected under a conservation restriction.

The MBTA Alewife Station is approximately .5 mile from the site; the Alewife station services the Red Line subway line as well as a number of MBTA bus routes, including Route 62, Route 67, Route 76, Route 79, Route 84, Route 350 and Route 351. Directly to the south of the property is Route 2/Concord Turnpike. Route 2 is classified by the MassDOT as a Principal

Arterial under MassDOT jurisdiction. Route 2 connects various towns and major highways from the New York State line to Boston. Locally, Route 2 provides a connection between I-95/Route 128 to the west with Route 16 to the east.

B. Existing Conditions of the Site

The topography of the site is undulating with small to medium sized depressions in the northeasterly portion of the property. To the north, along Dorothy Road, site elevations range from 8 to 12 feet; and the frontage along Route 2/Concord Turnpike is generally between elevation 5 to 8 feet.

The property is largely forested, with extensive areas overrun with invasive species including Garlic Mustard, Japanese Knotweed, and Oriental Bittersweet. (*See* Wildlife Habitat and Vegetation Evaluation for a more detailed description of the existing vegetation). The soils onsite are generally decomposed organic material over loose sandy and gravelly glaciofluvial deposit. The property is presently undeveloped and overgrown, with makeshift homeless camps upon the site.

The Existing Conditions Plan (Sheet V-100) prepared by the BSC Group depicts the site location, the abutting properties, existing street elevations and other relevant information with respect to the existing condition of the property, including without limitation location of buildings on adjacent properties. Please also refer to the General Notes and Utility Note on the Existing Condition Plan for further information.

C. Character of Open Areas in Vicinity

The site is presently undeveloped. The immediate neighborhood to the north and east is densely residentially developed. To the west of the site are the Thorndike athletic fields.

As part of Applicant's proposal, only the northerly/northwesterly portion of the site is proposed for the multifamily housing project and its accessory driveway access, landscaping, play area, terraces and related infrastructure. The Applicant has proposed that the environmentally sensitive portions of the site be protected by a conservation restriction or other appropriate land conservation mechanism.

D. Locations of Wetland Resource Areas and Floodplain Features

A large portion of the site is located within floodplain area and Bordering Vegetated Wetland, located predominantly on the southerly side of the site, both of which are wetland resource areas under the State Wetlands Protection Act Regulations and the Arlington Wetlands Protection Bylaw. The 100-year floodplain is identified as elevation 6.8 and has been located on the Existing Conditions and Existing Environmental Resources Plans (Sheets V-100 and C-100 in the plan set). The wetlands were delineated by BSC Group in January 2020 and again in October 2020. The wetland resource areas are shown on the Existing Environmental Resources

Plan (Sheet C-100 in the plan set) and as further documented in a Wetland Delineation Memorandum prepared by BSC Group dated October 19, 2020.

A review of the information available through MassGIS and the Natural Heritage and Endangered Species on-line data viewer determined no presence of estimated or priority habitat area, vernal pools, or any other similar jurisdictional resource area (*See* Wildlife Habitat and Vegetation Evaluation for a more detailed description of the existing wildlife).

The Existing Environmental Resources Plan (Sheet C-100) shows the locations of wetland resource areas and floodplain as surveyed and delineated by the BSC Group. The wetland resource areas are also further detailed in the BSC Group Wetlands Delineation Memorandum, dated October 19, 2020. A copy of the October 19, 2020 memorandum was previously submitted to the Board on October 22, 2020. The BSC memorandum describes both the state and locally regulated wetland resource areas and buffer zones and floodplain areas. As detailed therein, BSC delineated and flagged four Bordering Vegetated Wetland ("BVW") mapped areas, BVW Series A-D. BVW Series A and D are predominantly forested areas; BVW Series B is primarily forested with an area of herbaceous cover and BVW Series C is largely herabeous cover (common reed) with some forested area. According to BSC's observations, only a small isolated area to the west of an area previously flagged as Wetland I on the north side of the site demonstrated hydric soils. The BSC memorandum also identifies the tree species located on the property as well as the shrub and sapling species, herbaceous species and vines. As documented by BSC's field investigations, the upland areas, the tree population includes red oak, white pine, cottonwood, box elder and red maple

Further, please refer to the Wildlife Habitat and Vegetation Evaluation report submitted herewith for further detailed information on the existing vegetation, wildlife and documented conditions on the property. The Wildlife Habitat and Vegetation report documents a number of mature trees in the study areas, but has not conducted a full tree survey within the heavily wooded site.

E. <u>Traffic and Parking</u>

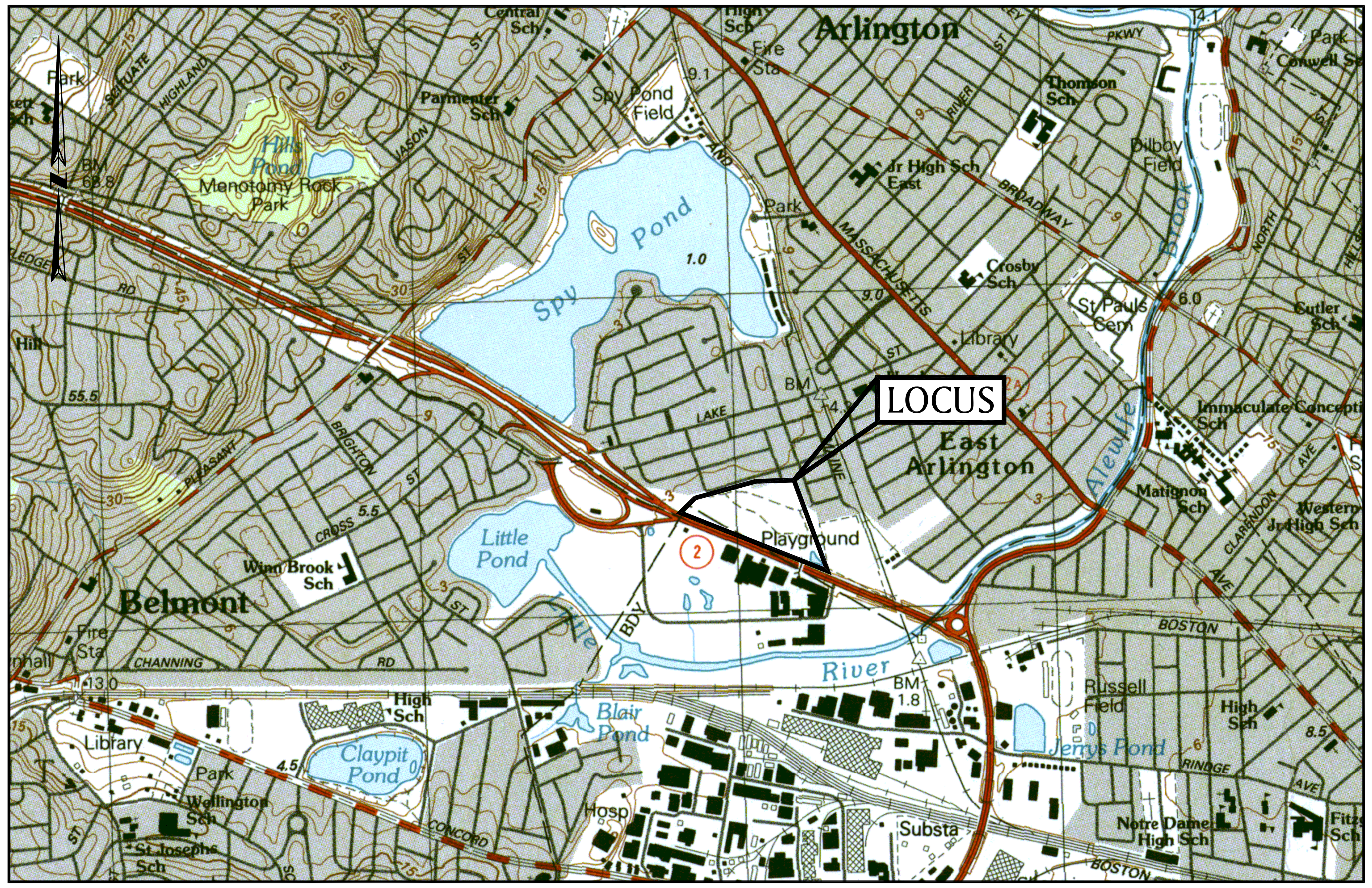
The Thorndike Place 40B project is designed to leverage its proximity to a major bike path (Minuteman Bike Path) as well as nearby transportation facilities to encourage multi-modal travel. Primary access to the 176-unit multifamily project will be at the corner of the Dorothy Road/Littlejohn Street. The detailed updated traffic impact report is being submitted to the Board under separate cover by Vanasse & Associates, which will detail the existing traffic patterns together with an analysis of the traffic presently existing and as impacted by the 40B project.

The Arlington Zoning Ordinance requires one parking space per studio apartment, 1.15 spaces per one-bedroom unit, 1.5 spaces per two-bedroom unit and 2.0 spaces per three-bedroom unit in an apartment house. The Project includes a total of 240 parking spaces in accordance with the zoning requirements, or an average of 1.36 spaces per unit which is a parking space per unit ratio generally consistent with projects of this nature. The Project also includes approximately 140 bicycle parking spaces.

THORNDIKE PLACE
COMPREHENSIVE PERMIT
DOROTHY ROAD
ARLINGTON, MASSACHUSETTS

MARCH 13, 2020

REVISED: NOVEMBER 3, 2020



LOCUS MAP

500 0 1000 2000 3000 feet

SCALE: 1" = 1000±

INDEX OF DRAWINGS

PREPARED FOR:

ARLINGTON LAND REALTY, LLC
84 SHERMAN STREET, 2ND FLOOR
CAMBRIDGE, MA 02140

PREPARED BY:

BSC GROUP
803 Summer Street
Boston, Massachusetts
02127
617 896 4300

ISSUED FOR PERMITTING
NOT FOR CONSTRUCTION

JOB NO: 23407.00 DWG NO: G-100

GENERAL NOTES

1. EXISTING CONDITIONS SURVEY INFORMATION WAS PREPARED BY BSC GROUP, INC. SURVEY IS BASED ON AN ON-THE-GROUND SURVEY CONDUCTED BY BSC GROUP IN DECEMBER 2019-FEBRUARY 2020.
2. REVIEW ALL EXISTING CONDITIONS IN THE FIELD AND REPORT ANY DISCREPANCIES BETWEEN PLANS AND ACTUAL CONDITIONS TO THE OWNER'S REPRESENTATIVE PRIOR TO STARTING WORK.
3. THE LOCATIONS OF UNDERGROUND UTILITIES SHOWN ON THIS PLAN ARE BASED ON THE SURVEY REFERENCED ABOVE. THE CONTRACTOR SHALL CONTACT DIGSAFE AND THE PROPER LOCAL AUTHORITIES OR RESPECTIVE UTILITY COMPANIES TO CONFIRM THE LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK. ANY DAMAGE DUE TO FAILURE OF THE CONTRACTOR TO CONTACT THE PROPER AUTHORITIES SHALL BE BORNE BY THE CONTRACTOR.
4. ANY DISCREPANCIES BETWEEN DRAWINGS, SPECIFICATIONS, AND SITE CONDITIONS SHALL BE REPORTED IMMEDIATELY TO THE CONTRACTOR/ENGINEER FOR CLARIFICATION AND RESOLUTION PRIOR TO BIDDING OR CONSTRUCTION.

SITE PREPARATION NOTES

1. AREAS DESIGNATED FOR CLEARING SHALL BE CLEARED ONLY.
2. THE SUBCONTRACTOR(S) IS/ARE RESPONSIBLE FOR ANY DAMAGE TO EXISTING CONDITIONS TO REMAIN THAT ARE DUE TO SUBCONTRACTOR(S) OPERATIONS.
3. ITEMS TO BE REMOVED THAT ARE NOT STOCKPILED FOR LATER REUSE ON THE PROJECT OR DELIVERED TO THE OWNER SHALL BE LEGALLY DISPOSED OF OFF SITE BY THE SUBCONTRACTOR(S).
4. THE SUBCONTRACTOR(S) SHALL BE RESPONSIBLE FOR COORDINATING THEIR EFFORTS WITH ALL TRADES.
5. THE CONTRACTOR SHALL COORDINATE ALL ADJUSTMENT OR ABANDONMENT OF UTILITIES WITH THE RESPECTIVE UTILITY COMPANY.
6. THE SUBCONTRACTOR(S) SHALL MAINTAIN OR ADJUST TO NEW FINISH GRADE AS NECESSARY ALL UTILITY AND SITE STRUCTURES SUCH AS LIGHT POLES, SIGN POLES, MAN HOLES, CATCH BASINS, HAND HOLES, WATER AND GAS GATES, HYDRANTS, ETC., FROM MAINTAINED UTILITY AND SITE SYSTEMS UNLESS OTHERWISE NOTED OR DIRECTED BY THE CONTRACTOR/ENGINEER.
7. TEMPORARY CONSTRUCTION HAUL ROADS (IF REQUIRED) SHALL BE EXCAVATED AND THE SUB-BASE COMPACTED TO 95% SPMDD. THE USE OF SEPARATION FABRICS MAY BE USED TO FACILITATE FUTURE REMOVAL AND RECOVERY OF GRANULAR MATERIALS. HAUL ROAD SHALL HAVE AT LEAST 9" OF 6-INCH MINUS STONE AND SHALL BE MAINTAINED DURING CONSTRUCTION.

EROSION AND SEDIMENT CONTROL MEASURES

1. EROSION CONTROL SHALL BE PROVIDED IN ACCORDANCE WITH THE SEQUENCE OF STAGED CONSTRUCTION. THE CONTRACTOR SHALL SUBMIT A DETAILED EROSION CONTROL PLAN INCLUDING SCHEDULE FOR APPROVAL BY THE TOWN OF ARLINGTON. A COPY OF THE APPROVED NPDES – EROSION AND SEDIMENT CONTROL PLAN SHALL BE MAINTAINED ON THE SITE.
2. ALL EROSION AND SEDIMENTATION CONTROL MEASURES SHALL BE INSTALLED PRIOR TO ANY SITE EXCAVATION OR DISTURBANCE AND SHALL BE MAINTAINED THROUGHOUT THE CONSTRUCTION PROCESS. THE SMALLEST PRACTICAL AREA OF LAND SHALL BE EXPOSED AT ANY ONE TIME.
3. SEDIMENT TRAPS SHALL BE INSTALLED AT DRAINAGE STRUCTURES IN PUBLIC STREET IN THE PROJECT AREA. STRAW BALE BARRIERS AND SILTATION FENCES ARE TO BE MAINTAINED AND CLEANED UNTIL ALL SLOPES HAVE BEEN STABILIZED.
4. SEDIMENT BARRIERS SHALL BE INSPECTED AND APPROVED BY THE TOWN OF ARLINGTON BEFORE CONSTRUCTION CAN START.
5. STRAW BALES AND MULCH SHALL BE MOWINGS OF ACCEPTABLE HERBACEOUS GROWTH, FREE OF NOXIOUS WEEDS OR WOODY STEMS, AND SHALL BE DRY WHEN INSTALLED.
6. THE UNDERSIDE OF STRAW BALES SHOULD BE KEPT IN CLOSE CONTACT (TRENCHED IN 3-INCHES MINIMUM) WITH THE EARTH AND RESET AS NECESSARY.
7. DISTURBED AREAS SHALL BE BLANKETED OR SEEDED AND MULCHED AS SOON AS PRACTICAL AFTER CONSTRUCTION ACTIVITIES IN THAT AREA HAVE CONCLUDED. ALL ERODABLE/BARE AREAS SHALL BE BLANKETED OR SEEDED AND MULCHED WITHIN 7 DAYS WITH TEMPORARY EROSION CONTROL SEEDING.
8. STABILIZE SLOPES GREATER THAN 3:1 (HORIZONTAL:VERTICAL) WITH SEED, SECURED GEOTEXTILE FABRIC, SPRAYED COMPOST BLANKET, OR RIP-RAP AS REQUIRED TO PREVENT EROSION DURING CONSTRUCTION.
9. SEDIMENT BARRIERS SHALL BE CONSTRUCTED AROUND ALL SOIL STOCKPILE AREAS.
10. CLEAN OUT DRAINAGE FEATURES AND STRUCTURES AFTER COMPLETION OF CONSTRUCTION.
11. SEDIMENT COLLECTED DURING CONSTRUCTION BY THE VARIOUS TEMPORARY EROSION CONTROL SYSTEMS SHALL BE DISPOSED OF ON THE SITE ON A REGULAR BASIS. SEDIMENT SHALL BE REMOVED FROM EROSION CONTROL SYSTEMS WHEN THE HEIGHT OF THE SEDIMENT EXCEEDS ONE-HALF OF THE HEIGHT OF THE SEDIMENT CONTROL MEASURE.
12. AFTER ALL DISTURBED AREAS HAVE BEEN STABILIZED, THE SUBCONTRACTOR(S) SHALL REMOVE ALL TEMPORARY EROSION CONTROL MEASURES AT THE CONTRACTOR/ENGINEER DIRECTION.
13. AFTER THE REMOVAL OF TEMPORARY EROSION CONTROL MEASURES, THE SUBCONTRACTOR(S) SHALL GRADE AND SEED AREA OF TEMPORARY EROSION CONTROL MEASURE.
14. DAMAGED OR DETERIORATED ITEMS WILL BE REPAIRED IMMEDIATELY AFTER IDENTIFICATION OR AS DIRECTED BY THE CONTRACTOR/ENGINEER.
15. THE CONTRACTOR'S SITE SUPERINTENDENT WILL BE RESPONSIBLE FOR DAILY INSPECTIONS, MAINTENANCE, AND REPAIR ACTIVITIES. THE CONTRACTOR SHALL INSPECT EROSION CONTROL MEASURES EVERY SEVEN (7) CALENDAR DAYS OR ONCE EVERY FOURTEEN (14) DAYS AND WITHIN 24 HOURS OF ANY STORM EXCEEDING 1/2 INCH PRECIPITATION. DAMAGED AND INEFFECTIVE EROSION CONTROL MEASURES SHALL BE REPAIRED OR REPLACED WITHIN 48 HOURS.
16. PIPE OUTLETS (IF ANY) SHALL BE STABILIZED WITH STONE.
17. TEMPORARY SEEDING SHALL BE AT A RATE OF 45 LBS PER ACRE. ERODABLE AREAS OUTSIDE AND DOWN SLOPE FROM THE CONSTRUCTION LIMITS SHALL BE SIMILARLY SEEDED.
18. WATER PUMPED OR OTHERWISE DISCHARGED FROM THE SITE DURING CONSTRUCTION DEWATERING SHALL BE FILTERED. DEWATERING PLAN SHALL BE SUBMITTED FOR APPROVAL BY THE ENGINEER.
19. WHEN TEMPORARY DRAINAGE IS ESTABLISHED, EROSION/SEDIMENTATION CONTROL MEASURES MAY BE REQUIRED BY CONTRACTOR/ENGINEER.
20. GRAVEL CONSTRUCTION ROADS AND CONSTRUCTION PARKING AREAS OF SUFFICIENT WIDTH AND LENGTH, AND VEHICLE WASH DOWN FACILITIES, SHALL BE PROVIDED TO PREVENT SOIL FROM BEING TRACKED ONTO PUBLIC OR PRIVATE ROADWAYS. ANY SOIL REACHING A PUBLIC OR PRIVATE ROADWAY SHALL BE REMOVED BEFORE THE END OF EACH WORKDAY AND AS NEEDED.
21. NECESSARY MEASURES SHALL BE TAKEN TO CONTAIN ANY FUEL OR POLLUTION RUNOFF. LEAKING EQUIPMENT OR SUPPLIES SHALL BE IMMEDIATELY REPAIRED OR REMOVED FROM THE SITE.
22. THE COST OF REPAIRING OR REMOVING SEDIMENT FROM EROSION CONTROL SYSTEMS SHALL BE INCLUDED IN THE CONTRACT UNIT PRICE FOR THE APPLICABLE EROSION CONTROL ITEM.
23. ALL EROSION CONTROL MEASURES SHALL BE KEPT OPERATIONAL AND MAINTAINED CONTINUOUSLY THROUGHOUT THE PERIOD OF LAND DISTURBANCE UNTIL PERMANENT SEDIMENT AND EROSION CONTROL MEASURES ARE OPERATIONAL. CONTRACTOR SHALL PROVIDE TO THE CONSERVATION COMMISSION MEASURES (EROSION AND SEDIMENTAITON CONTROL) FOR WORK DURING WINTER CONDITIONS.
24. CONTRACTOR SHALL SPRAY WATER FROM A WATER TRUCK ON DRY AND WINDY DAYS TO PREVENT DUST FROM FORMING.
25. EROSION CONTROL MEASURES AS SHOWN ON THESE DRAWINGS IS INTENDED TO CONVEY MINIMUM REQUIREMENTS. THE CONTRACTOR SHALL IMPLEMENT ADDITIONAL MEASURES AS NECESSARY TO PREVENT SOIL EROSION AND TO COMPLY WITH THE PROJECT'S STORMWATER POLLUTION PREVENTION PLAN.
26. SOILS ON SLOPES THAT ARE 3:1 OR STEEPER SHOULD BE ROUGHENED PER THE EPA'S NPDES SOIL ROUGHENING FACT SHEET IF THEY ARE TO BE SEEDED WITHIN 2 WEEKS OF DISTURBANCE. IF NOT, EROSION CONTROL BLANKETS SHOULD BE INSTALLED ON THESE SLOPES.

LAYOUT AND MATERIAL NOTES

1. THE FOLLOWING LAYOUT CRITERIA SHALL CONTROL UNLESS OTHERWISE NOTED ON THE PLAN:
   a. ALL TIES TO PROPERTY LINES ARE PERPENDICULAR TO THE PROPERTY LINE UNLESS OTHERWISE NOTED.
   b. DISTANCES AND DIMENSIONS ARE IN DECIMAL FEET.
2. SCREENED IMAGES SHOW EXISTING CONDITIONS. WHERE EXISTING CONDITIONS LIE UNDER OR ARE IMPINGED UPON BY PROPOSED BUILDINGS AND/OR SITE ELEMENTS, THE EXISTING CONDITION WILL BE REMOVED, ABANDONED AND/OR CAPPED OR DEMOLISHED AS REQUIRED. AMBIGUITIES IN THE PLANS SHALL BE CLARIFIED BY THE ENGINEER OR SITE SUPERINTENDENT.

GRADING AND UTILITY NOTES

1. THE LOCATIONS OF EXISTING UNDERGROUND UTILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY AND HAVE NOT BEEN INDEPENDENTLY VERIFIED BY THE APPLICANT. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK, AND AGREES TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MAY BE OCCASIONED BY THE CONTRACTOR'S FAILURE TO EXACTLY LOCATE AND PRESERVE ALL UNDERGROUND UTILITIES.
2. THE PROJECT APPLICANT SHALL OBTAIN ALL NECESSARY STREET-OPENING PERMITS, WATER AND SEWER CONNECTION PERMITS AND PAY REQUIRED FEES PRIOR TO COMMENCING WORK ON THESE UTILITIES.
3. WHERE AN EXISTING UTILITY IS FOUND TO CONFLICT WITH THE PROPOSED WORK, THE LOCATION, ELEVATION, AND SIZE OF THE UTILITY SHALL BE ACCURATELY DETERMINED WITHOUT DELAY BY COORDINATION WITH THE TOWN OF ARLINGTON.
4. ALL ARRANGEMENTS FOR THE ALTERATION AND ADJUSTMENT OF ALL GAS, ELECTRIC, TELEPHONE, AND ANY OTHER PRIVATE UTILITIES BY THE UTILITY COMPANIES SHALL BE MADE BY THE PROJECT APPLICANT.
5. AREAS OUTSIDE THE LIMITS OF PROPOSED WORK DISTURBED BY THE CONSTRUCTION SHALL BE RESTORED TO THEIR ORIGINAL CONDITION.
6. WHERE PROPOSED GRADES MEET EXISTING GRADES, SUBCONTRACTOR(S) SHALL BLEND GRADES TO PROVIDE A SMOOTH TRANSITION BETWEEN EXISTING AND NEW WORK. PONDING AT TRANSITION AREAS WILL NOT BE ALLOWED.
7. POSITIVE DRAINAGE SHALL BE MAINTAINED AWAY FROM ALL STRUCTURES.
8. SUBCONTRACTOR(S) SHALL VERIFY EXISTING GRADES AND NOTIFY THE CONTRACTOR/ENGINEER OF ANY DISCREPANCIES.
9. PRIOR TO ANY WORK OVER EXISTING TOWN-OWNED UTILITIES, CONTRACTOR TO EVALUATE CONDITION OF SUBSURFACE UTILITIES PRIOR TO CONSTRUCTION. A POST-CONSTRUCTION EVALUATION SHALL ALSO BE PERFORMED TO IDENTIFY ANY DAMAGE CAUSED DURING CONSTRUCTION.
10. ANY INSTALLATION OF UTILITY POLES OR UNDERGROUND CONDUIT WITHIN THE PUBLIC RIGHT-OF-WAY WILL REQUIRE A GRANT OF LOCATION FROM THE BOARD OF SELECTMEN.

PLANTING NOTES

1. MAINTENANCE SHALL BEGIN IMMEDIATELY AFTER PLANTING AND WILL CONTINUE UNTIL FINAL WRITTEN ACCEPTANCE OF PLANT MATERIAL.
2. MAINTAIN POSITIVE DRAINAGE AWAY FROM ALL BUILDING FOUNDATIONS AND STRUCTURES.
3. MAXIMUM SLOPE WITHIN DISTURBED AREAS SHALL NOT EXCEED 3:1, UNLESS OTHERWISE NOTED.
4. THE LANDSCAPE CONTRACTOR SHALL SUPPLY ALL PLANT MATERIALS IN QUANTITIES SUFFICIENT TO COMPLETE PLANTINGS SHOWN ON THE DRAWINGS.
5. MATERIALS SHALL CONFORM TO THE GUIDELINES ESTABLISHED BY THE AMERICAN NURSERY AND LANDSCAPE ASSOCIATION.
6. PLANTS SHALL BEAR THE SAME RELATIONSHIP TO FINISH GRADE AS TO ORIGINAL GRADES BEFORE DIGGING.
7. PLANTS TO BE BALLED IN BURLAP OR CONTAINERIZED.
8. AREAS PLANTED WITH EVERGREEN TREES SHALL BE COVERED WITH A MINIMUM 3" OF MULCH. MULCH FOR PLANTED AREAS TO BE AGED PINE BARK: PARTIALLY DECOMPOSED, DARK BROWN IN COLOR AND FREE OF WOOD CHIPS THICKER THAN 1/4 INCH.
9. THE LANDSCAPE CONTRACTOR SHALL GUARANTEE ALL PLANT MATERIALS FOR ONE (1) FULL YEAR FROM DATE OF ACCEPTANCE.
10. PLANT MATERIALS ARE SUBJECT TO THE APPROVAL OF THE LANDSCAPE ARCHITECT, AT THE NURSERY, AND AT THE SITE.
11. PLANT SPECIES AS INDICATED IN THE PLANT LIST ARE SUGGESTIONS ONLY. FINAL SELECTION OF SPECIES SHALL OCCUR AT THE TIME OF PLANT PURCHASE, DEPENDING ON AVAILABILITY. PLANT SIZE AND QUANTITY SHALL NOT CHANGE WITHOUT APPROVAL OF CONTRACTOR/LANDSCAPE ARCHITECT.

ABBREVIATIONS

BC	BOTTOM OF CURB
BIT CONC	BITUMINIOUS CONCRETE
BVW	BORDERING VEGETATED WETLANDS
CB	CATCH BASIN
CB/DH	CONC. BOUND/DRILL HOLE
CLF	CHAIN LINK FENCE
DIP	DUCTILE IRON PIPE
DMH	DRAIN MANHOLE
ECB	EROSION CONTROL BARRIER
FES	FLARED END SECTION
FH	FIRE HYDRANT
FOC	FACE OF CURB
FD	FOUND
GG	GAS GATE
HW	HEADWALL
ILSF	ISOLATED LAND SUBJECT TO FLOODING
IP	IRON PIPE
ISW	ISOLATED WETLANDS
LA	LANDSCAPED AREA
LOW	LIMIT OF WORK
N/F	NOW OR FORMERLY
NTS	NOT TO SCALE
OCS	OUTLET CONTROL STRUCTURE
PCC	PRECAST CONCRETE CURB
RW	RETAINING WALL
RCP	REINFORCED CONCRETE PIPE
SLC	STREET LIGHT CIRCUIT
SMH	SEWER MANHOLE
TC	TOP OF CURB
TEL	TELEPHONE CABLE
VGC	VERTICAL GRANITE CURB
WG	WATER GATE

LEGEND

STONE BOUND W/DRILL HOLE
STONE BOUND W/ESCUTCHEON PIN
CONCRETE BOUND
SEWER MANHOLE
DRAIN MANHOLE
WATER MANHOLE
ELECTRIC MANHOLE
TELEPHONE MANHOLE
CABLE MANHOLE
MANHOLE
CATCH BASIN
HYDRANT
WATER GATE
GAS GATE
UTILITY POLE
UTILITY POLE W/LIGHT
UTILITY POLE W/TRANSFORMER
LIGHT POLE
ELECTRIC HANDHOLE
HANDHOLE
SIGN
WETLANDS FLAG

BIT	BITUMINOUS CONCRETE
CONC	CONCRETE
EP	EDGE OF PAVEMENT
GC	GRANITE CURB
WC	WOOD CURB
I= AND INV=	INVERT
(R)	RECORD INFORMATION

S SEWER LINE
D DRAIN LINE
W WATER LINE
G GAS LINE
OHW OVERHEAD WIRE
X CHAIN LINK FENCE
STOCKADE FENCE
STEEL GUARDRAIL
TREELINE
BRUSHLINE
SURVEYED BUILDING LOCATION
GIS BUILDING LOCATION

DECIDUOUS TREES

EVERGREEN TREES

WATER VALVE
CB CATCH BASIN
FIRE HYDRANT
TF TREE FILTER
OF PARKING SPACES
SEWER MANHOLE
x FENCE LINE
PROPERTY LINE
WETLAND LINE/FLAG
100 (E) MAJOR CONTOUR
99 (E) MINOR CONTOUR
100 PROPOSED MAJOR CONTOUR
99 PROPOSED MINOR CONTOUR
100' WETLAND BUFFER ZONE
25' NO DISTURB ZONE
WATER QUALITY UNIT/INLET
WATER QUALITY UNIT

ISSUED FOR PERMITTING
NOT FOR CONSTRUCTION

PROFESSIONAL ENGINEER DATE

THORNDIKE PLACE

DOROTHY ROAD

IN

ARLINGTON MASSACHUSETTS

(MIDDLESEX COUNTY)

GENERAL NOTES AND LEGEND

MARCH 13, 2020

REVISIONS:

NO.	DATE	DESC.
1	11/03/20	REVISED BUILDING

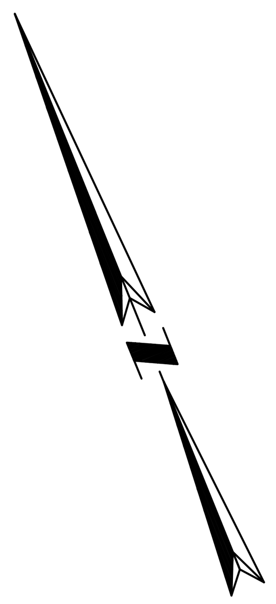
PREPARED FOR:

ARLINGTON LAND REALTY, LLC
84 SHERMAN STREET, 2ND FLOOR
CAMBRIDGE, MA 02140

BSC GROUP
803 Summer Street
Boston, Massachusetts
02127
617 896 4300

SCALE: NONE

FILE: 2340700\C\D\2340700-LN
DWG.:
JOB. NO: 23407.00
SHEET G-101



PLAN REFERENCES

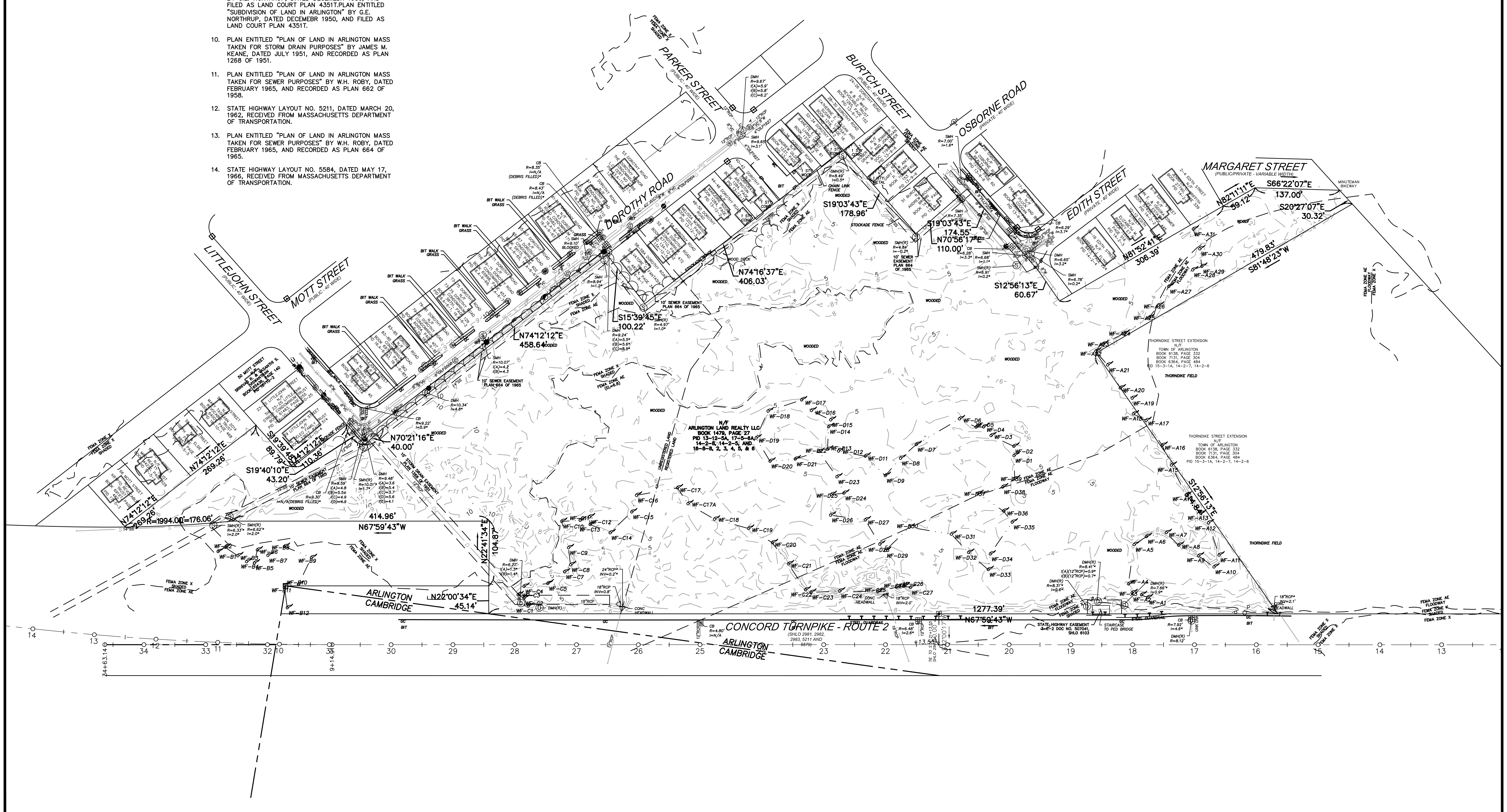
1. PLAN ENTITLED "PLAN AND PROFILE OF LITTLEJOHN STREET" BY FRANK AND DANIEL WYMAN, DATED DECEMBER 1926, AND RECEIVED FROM THE TOWN OF ARLINGTON.
2. PLAN ENTITLED "SUBDIVISION OF LAND IN ARLINGTON" BY BREMER W. POND, DATED APRIL 28, 1927, AND FILED AS LAND COURT PLAN 4351C.
3. PLAN ENTITLED "SUBDIVISION OF LAND SHOWN ON PLAN 4351A" BY J.M. KEANE, DATED OCTOBER 20, 1930, AND FILED AS LAND COURT PLAN 4351G.
4. PLAN ENTITLED "SUBDIVISION OF LAND SHOWN ON PLAN 4351A" BY J.M. KEANE, DATED APRIL 14, 1931, AND FILED AS LAND COURT PLAN 4351H.
5. STATE HIGHWAY LAYOUT NO. 2981, DATED JANUARY 17, 1933, RECEIVED FROM MASSACHUSETTS DEPARTMENT OF TRANSPORTATION.
6. STATE HIGHWAY LAYOUT NO. 2983, DATED JANUARY 17, 1933, RECEIVED FROM MASSACHUSETTS DEPARTMENT OF TRANSPORTATION.
7. PLAN ENTITLED "PLAN OF LAND IN ARLINGTON, MASS" BY C. H. GANNETT CO. CIVIL ENGINEERS, DATED APRIL 30, 1941, AND FILED AS LAND COURT PLAN 18030A.
8. PLAN ENTITLED "SUBDIVISION OF LAND IN ARLINGTON MASS" BY G.E. NORTHRUP, DATED DECEMBER 1948, AND RECORDED AS PLAN 1784 OF 1948.
9. PLAN ENTITLED "SUBDIVISION OF LAND IN ARLINGTON" BY G.E. NORTHRUP, DATED DECEMEBR 1950, AND FILED AS LAND COURT PLAN 4351T.PLAN ENTITLED "SUBDIVISION OF LAND IN ARLINGTON" BY G.E. NORTHRUP, DATED DECEMEBR 1950, AND FILED AS LAND COURT PLAN 4351T.
10. PLAN ENTITLED "PLAN OF LAND IN ARLINGTON MASS TAKEN FOR STORM DRAIN PURPOSES" BY JAMES M. KEANE, DATED JULY 1951, AND RECORDED AS PLAN 1268 OF 1951.
11. PLAN ENTITLED "PLAN OF LAND IN ARLINGTON MASS TAKEN FOR SEWER PURPOSES" BY W.H. ROBY, DATED FEBRUARY 1965, AND RECORDED AS PLAN 662 OF 1958.
12. STATE HIGHWAY LAYOUT NO. 5211, DATED MARCH 20, 1962, RECEIVED FROM MASSACHUSETTS DEPARTMENT OF TRANSPORTATION.
13. PLAN ENTITLED "PLAN OF LAND IN ARLINGTON MASS TAKEN FOR SEWER PURPOSES" BY W.H. ROBY, DATED FEBRUARY 1965, AND RECORDED AS PLAN 664 OF 1965.
14. STATE HIGHWAY LAYOUT NO. 5584, DATED MAY 17, 1966, RECEIVED FROM MASSACHUSETTS DEPARTMENT OF TRANSPORTATION.

GENERAL NOTES

1. THIS PLAN IS BASED UPON AN ON-THE-GROUND SURVEY PERFORMED BY BSC GROUP, INC. IN DECEMBER, 2019 AND JANUARY, 2020.
2. HORIZONTAL DATUM IS BASED UPON NAD '83 (12B) AS DERIVED VIA GPS OBSERVATIONS PERFORMED BY BSC GROUP, INC. IN DECEMBER 2019.
3. VERTICAL DATUM IS BASED UPON NAVD '88 AS DERIVED VIA GPS OBSERVATIONS PERFORMED BY BSC GROUP, INC. IN DECEMBER, 2019.
   TBM 18-1 ELEV=9.13'
   DESC: BACK LEFT BOLT ON HYDRANT ON OSBORNE
   TBM 18-2 ELEV=11.61'
   DESC: FRONT BOLT ON HYDRANT ACROSS FROM UTILITY POLE # 8
   TBM 18-3 ELEV=11.71'
   DESC: BACK LEFT BOLT ON HYDRANT BETWEEN UNITS
4. LOCUS IS LOCATED WITHIN ZONES ZONES AE, AE FLOODWAY, X AND X SHADED AS GRAPHICALLY DEPICTED ON FLOOD INSURANCE RATE MAP NUMBER 25017C0419E, EFFECTIVE DATE JUNE 4, 2010.
5. WETLAND RESOURCE AREAS SHOWN HEREON WERE DELINEATED BY BSC GROUP, INC. IN JANUARY AND OCTOBER 2020.
6. UTILITY RECORDS HEREON DENOTED WITH "*" ARE FROM EXISTING CONDITIONS SURVEY PREPARED BY PRECISION LAND SURVEYING OF SOUTHBOROUGH, MA IN 2009.
7. CONTOURS SHOWN WITHIN WOODED AREAS ARE BASED UPON AERIAL LIDAR COLLECTED UNDER USGS CONTRACT DURING 2013-2014. DATA MEETS OR EXCEEDS QL2 USGS SPECIFICATIONS. BSC GROUP FOUND A MEAN ERROR OF 0.20'(OBSCURED) & 0.16'(UNOBSCURED) ACROSS 15 LOCATIONS SAMPLED DURING THE ON-THE-GROUND SURVEY IN DECEMBER 2019.
8. TOWN LINE LOCATIONS ESTABLISHED FROM MASSACHUSETTS STATE HIGHWAY LAYOUTS 2981, 2982, 2983, 5211 AND 5579.
9. ABUTTING BOUNDARY LINES ARE APPROXIMATE.
10. RECORD UTILITY INFORMATION WAS NOT RECEIVED FROM VERIZON, TENNESSEE GAS AND MCI.

UTILITY NOTE

EXISTING UTILITIES, WHERE SHOWN HEREON, ARE APPROXIMATE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROPERLY LOCATING AND COORDINATING ANY ON-SITE ACTIVITY WITH DIG-SAFE AND THE APPROPRIATE UTILITY COMPANY AND MAINTAINING EXISTING UTILITY SYSTEM SERVICE. DIG-SAFE SHALL BE NOTIFIED PER THE COMMONWEALTH OF MASSACHUSETTS STATUTE CHAPTER 82, SECTION 40, AT 1-888-344-7233. NO GUARANTEE IS IMPLIED OR INTENDED AS TO THE ACCURACY, LOCATION OR THAT ALL UTILITIES AND/OR SUBSURFACE STRUCTURES ARE SHOWN. THE CONTRACTOR SHALL VERIFY SIZE, LOCATION AND INVERTS OR UTILITIES AND STRUCTURES AS REQUIRED PRIOR TO THE START OF CONSTRUCTION.



THORNDIKE PLACE

DOROTHY ROAD

IN

ARLINGTON MASSACHUSETTS

(MIDDLESEX COUNTY)

EXISTING CONDITIONS

MARCH 13, 2020

REVISIONS:

NO.	DATE	DESC.
1	10/22/20	WETLAND DELINEATION

PREPARED FOR:

ARLINGTON LAND REALTY, LLC
84 SHERMAN STREET, 2ND FLOOR
CAMBRIDGE, MA 02140

BSC GROUP

803 Summer Street
Boston, Massachusetts
02127
617 896 4300

SCALE: 1" = 80'

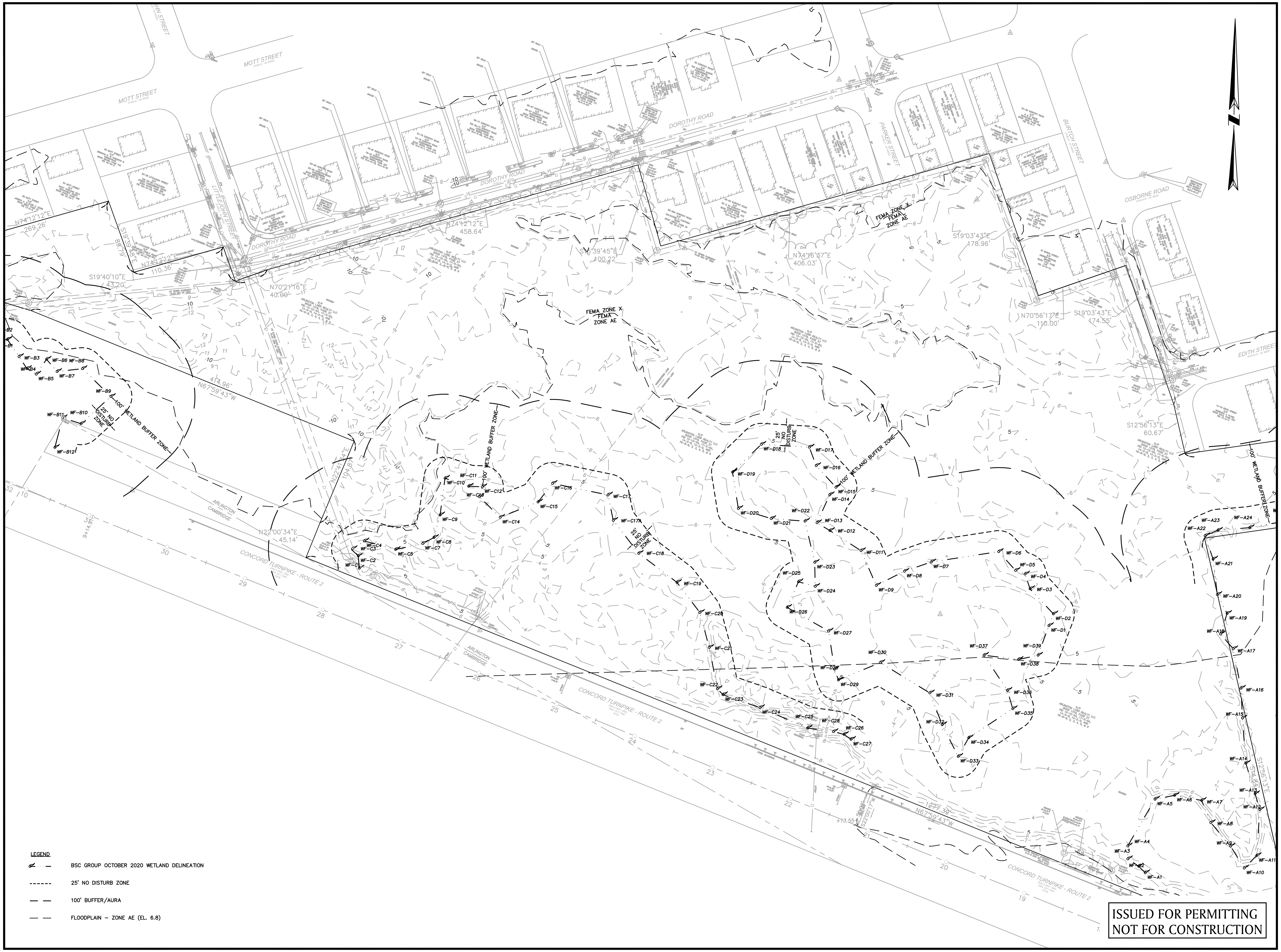
0 40 80 160 FEET

FILE: \Civil_Drawings\2340700-EC-COPY

DWG.:

JOB. NO: 23407.00

SHEET V-100



JOHN M. HESSION
CIVIL
No. 42747

PROFESSIONAL ENGINEER DATE

THORNDIKE PLACE

DOROTHY ROAD

IN

ARLINGTON
MASSACHUSETTS
(MIDDLESEX COUNTY)

EXISTING ENVIRONMENTAL RESOURCES PLAN

MARCH 13, 2020

REVISIONS:

NO.	DATE	DESC.
1	10/22/20	WETLAND DELINEATION

PREPARED FOR:

ARLINGTON LAND REALTY, LLC
84 SHERMAN STREET, 2ND FLOOR
CAMBRIDGE, MA 02140

BSC GROUP
803 Summer Street
Boston, Massachusetts
02127
617 896 4300

SCALE: 1" = 50'

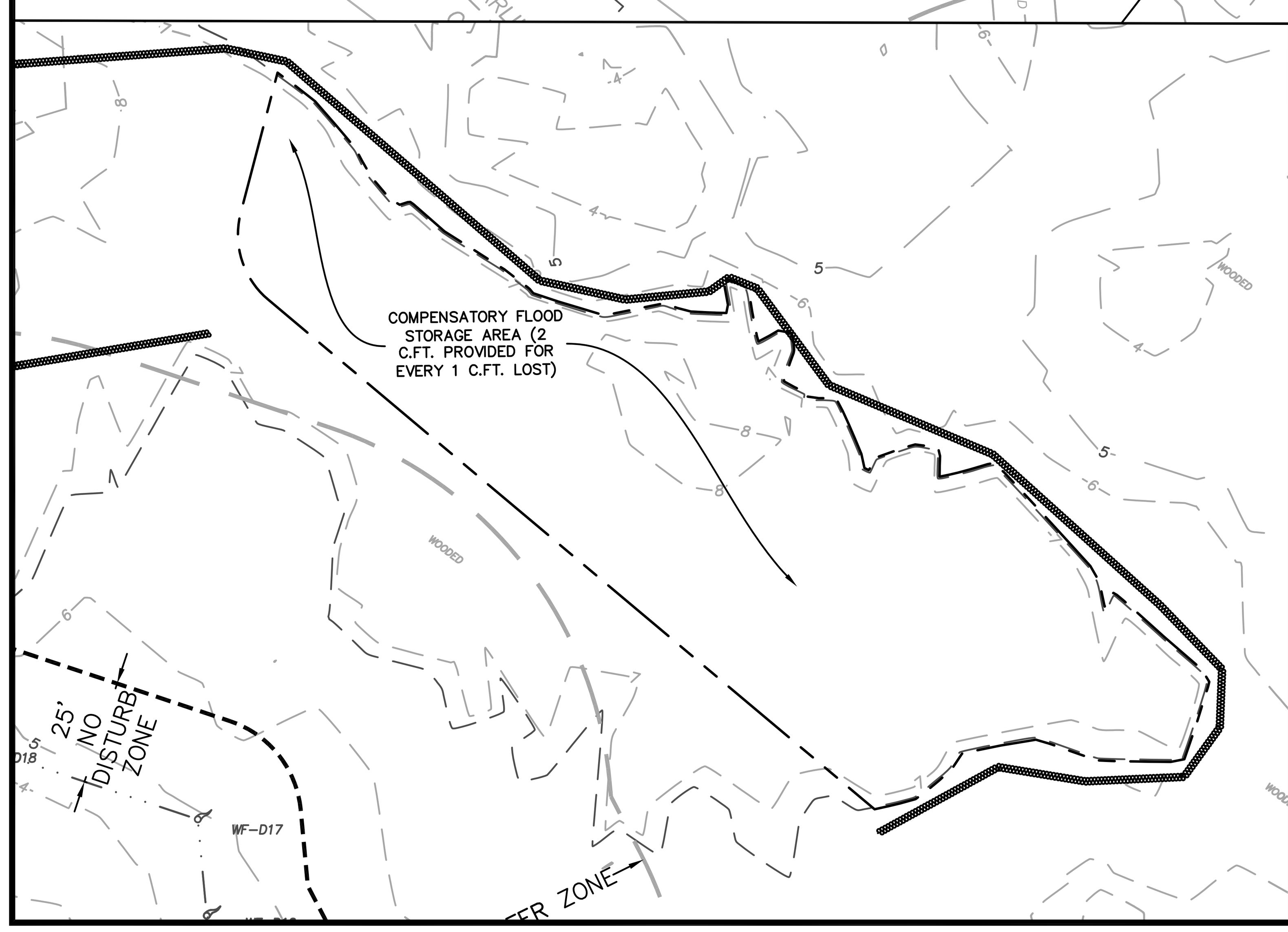
0 25 50 100 FEET

FILE: \Civil_Drwgs\2340700-CONSTRAINTS

DWG.:

JOB. NO: 23407.00

SHEET C-100



EROSION AND SEDIMENT CONTROL NOTES

1. THE PROJECT WORK SHALL COMPLY WITH THE 2017 NPDES CONSTRUCTION GENERAL PERMIT FOR MASSACHUSETTS (CGP). A STORMWATER POLLUTION PREVENTION PLAN (SWPPP) SHALL BE PREPARED AND THE CONTRACTOR SHALL COMPLY WITH ALL REQUIREMENTS OF THE SWPPP. THE CONTRACTOR SHALL PROVIDE EVIDENCE THAT A NOTICE OF INTENT (NOI) HAS BEEN FILED FOR COVERAGE UNDER THE CGP AT LEAST 14 DAYS PRIOR TO THE START OF ANY EARTH DISTURBING ACTIVITES. NO EARTH DISTURBING ACTIVITIES SHALL OCCUR UNTIL THE CONTRACTOR HAS OBTAINED COVERAGE UNDER THE CGP.
2. APPROPRIATE EROSION AND SEDIMENT CONTROL MEASURES SHALL BE INSTALLED PRIOR TO SOIL DISTURBANCE. MEASURES SHALL BE TAKEN TO CONTROL EROSION WITHIN THE PROJECT AREA. SEDIMENT IN RUNOFF WATER SHALL BE TRAPPED AND RETAINED WITHIN THE PROJECT AREA.
3. MINIMIZE TOTAL AREA OF DISTURBANCE AND PROTECT NATURAL FEATURES AND SOIL.
4. THE CONTRACTOR SHALL SEQUENCE ALL ACTIVITIES TO MINIMIZE SIMULTANEOUS AREAS OF DISTURBANCE. MASS CLEARING AND GRADING OF THE ENTIRE SITE SHALL BE AVOIDED.
5. MINIMIZE SOIL EROSION AND CONTROL SEDIMENTATION DURING CONSTRUCTION.
6. DIVERT UNCONTAMINATED WATER AROUND DISTURBED AREAS.
7. INSTALL AND MAINTAIN ALL EROSION AND SEDIMENT CONTROL MEASURES IN ACCORDANCE WITH THE MANUFACTURER'S SPECIFICATIONS AND GOOD ENGINEERING PRACTICES AND IN ACCORDANCE WITH THE 2017 EPA CONSTRUCTION GENERAL PERMIT FOR MASSACHUSETTS.
8. PROTECT AND MANAGE ON AND OFF-SITE MATERIAL STORAGE AREAS (OVERBURDEN AND STOCKPILES OF DIRT, BORROW AREAS, OR OTHER AREAS USED SOLELY BY THE PERMITTED PROJECT SHALL BE CONSIDERED A PART OF THE PROJECT).
9. COMPLY WITH APPLICABLE FEDERAL, STATE AND LOCAL LAWS AND REGULATIONS INCLUDING WASTE DISPOSAL, SANITARY OR SEWER REGULATIONS, AND AIR QUALITY REQUIREMENTS, INCLUDING DUST CONTROL.
10. SEDIMENT SHALL BE REMOVED ONCE THE VOLUME REACHES HALF THE HEIGHT OF THE EROSION CONTROL DEVICE. SEDIMENT SHALL BE REMOVED PRIOR TO REACHING THE LOAD-BEARING CAPACITY OF THE SILT FENCE WHICH MAY BE LOWER THAN HALF THE HEIGHT.

EROSION AND SEDIMENT CONTROL NOTES (CONT.)

11. BMPS TO BE USED FOR INFILTRATION AFTER CONSTRUCTION SHALL NOT BE USED AS BMPS DURING CONSTRUCTION UNLESS OTHERWISE APPROVED BY THE ENGINEER. MANY INFILTRATION TECHNOLOGIES ARE NOT DESIGNED TO HANDLE THE HIGH CONCENTRATIONS OF SEDIMENTS TYPICALLY FOUND IN CONSTRUCTION RUNOFF, AND THUS SHALL BE PROTECTED FROM CONSTRUCTION RELATED SEDIMENT LOADINGS.
12. SOIL STOCKPILE SIDE SLOPES SHALL NOT BE GREATER THAN 2H:IV. ALL STOCKPILES SHALL BE SURROUNDED BY SEDIMENT CONTROLS.
13. A TRACKING PAD OR OTHER APPROVED STABILIZATION METHOD SHALL BE CONSTRUCTED AT ALL CONSTRUCTION ENTRANCE/EXIT POINTS OF THE SITE TO REDUCE THE AMOUNT OF SOIL CARRIED ONTO ROADWAYS AND OFF THE SITE.
14. PERMANENT SEEDING SHALL BE UNDERTAKEN IN THE SPRING FROM MARCH THROUGH MAY, AND IN LATE SUMMER AND EARLY FALL FROM AUGUST TO OCTOBER 15. DURING THE PEAK SUMMER MONTHS AND IN THE FALL AFTER OCTOBER 15, WHEN SEEDING IS FOUND TO BE IMPRACTICAL, APPROPRIATE TEMPORARY STABILIZATION SHALL BE APPLIED. PERMANENT SEEDING MAY BE UNDERTAKEN DURING THE SUMMER IF PLANS PROVIDE FOR ADEQUATE MULCHING AND WATERING.
15. TEMPORARY SEDIMENT TRAPPING DEVICES SHALL NOT BE REMOVED UNTIL PERMANENT STABILIZATION IS ESTABLISHED IN ALL CONTRIBUTORY DRAINAGE AREAS.
16. ALL TEMPORARY EROSION AND SEDIMENT CONTROL MEASURES SHALL BE REMOVED AFTER FINAL SITE STABILIZATION DISTURBED SOIL AREAS RESULTING FROM THE REMOVAL OF TEMPORARY MEASURES SHALL BE PERMANENTLY STABILIZED WITHIN 30 DAYS OF REMOVAL.
17. DUST SHALL BE CONTROLLED AT THE SITE.
18. ALL PREVIOUSLY DISTURBED LAND SHALL BE STABILIZED BY APPROVED METHODS AFTER 14 DAYS IF LEFT UNDISTURBED, THIS INCLUDES STOCKPILES, CONSTRUCTION ENTRANCES, GRADED AREAS AND OTHER CONSTRUCTION ACTIVITY RELATED CLEARING.
19. IF WORK IS HALTED OVER WINTER MONTHS THE CONTRACTOR SHALL BE RESPONSIBLE FOR STABILIZING THE AREA THROUGH GROUND COVER PRACTICES.

GENERAL NOTES:

1. ALL EXISTING UTILITY STRUCTURES, CONDUITS, AND APPURTENANCES OF ANY KIND SHALL BE COMPLETELY REMOVED WITHIN THE LIMITS OF EXCAVATION FOR NEW BUILDINGS, UNLESS NOTED OTHERWISE ON THE DRAWINGS. OUTSIDE THE LIMITS OF EXCAVATION FOR NEW BUILDINGS, ALL ABANDONED AND TO-BE-ABANDONED UTILITIES GREATER THAN 8 INCHES IN DIAMETER SHALL BE SEALED BY FILLING WITH HIGH SLUMP CONCRETE (FLOWABLE FILL) AT THE LIMIT OF EXCAVATION. ALL UTILITY STRUCTURES TO BE REMOVED SHALL HAVE THE ASSOCIATED PIPES REMOVED TO A DISTANCE OF 15 FEET FROM THE STRUCTURE AND SEALED.
2. CONSTRUCTION SETUP IS SHOWN FOR REFERENCE ONLY. EROSION AND SEDIMENTATION CONTROLS TO BE APPROPRIATELY SIZED AND LOCATED/RELOCATED BY THE CONTRACTOR DURING EARTHWORK OPERATIONS.
3. CONTRACTOR SHALL WORK WITH LANDSCAPE ARCHITECT TO DETERMINE SCOPE OF TREE WORK.
4. ALL CONSTRUCTION FENCING AND WARNING SIGNS SHALL BE INSTALLED PRIOR TO ANY CONSTRUCTION. INSTALL CONSTRUCTION FENCING AT THE LIMIT OF WORK.
5. PRIOR TO THE TERMINATION, ABANDONMENT, OR REMOVAL OF ANY UTILITY, VERIFY THAT APPLICABLE NOTIFICATIONS HAVE BEEN MADE TO THE UTILITY OWNER/OPERATOR AND THAT THE UTILITY HAS BEEN PROPERLY TERMINATED, CAPPED, OR PLUGGED AS REQUIRED.
6. PROTECT ALL IMPROVEMENTS NOT INCLUDED IN THE SCOPE OF SITE DEMOLITION. ANY IMPROVEMENT WHICH IS DAMAGED SHALL BE REPAIRED OR REPLACED IN-KIND TO THE OWNER'S SATISFACTION AT NO ADDITIONAL COST.
7. UNLESS OTHERWISE INDICATED, ALL DISTURBED AREAS SHALL BE RESTORED WITH SIX (6) INCHES OF LOAM, SEEDED, FERTILIZED, AND MULCHED. PROVIDE ADDITIONAL EROSION CONTROLS AS REQUIRED.

ISSUED FOR PERMITTING
NOT FOR CONSTRUCTION

COMMONWEALTH OF MASSACHUSETTS
JOHN M. HESSION
CIVIL
No. 42747
REGISTERED PROFESSIONAL ENGINEER

PROFESSIONAL ENGINEER | DATE

THORNDIKE PLACE

DOROTHY ROAD
IN
ARLINGTON
MASSACHUSETTS
(MIDDLESEX COUNTY)

SITE PREPARATION PLAN

MARCH 13, 2020

REVISIONS:

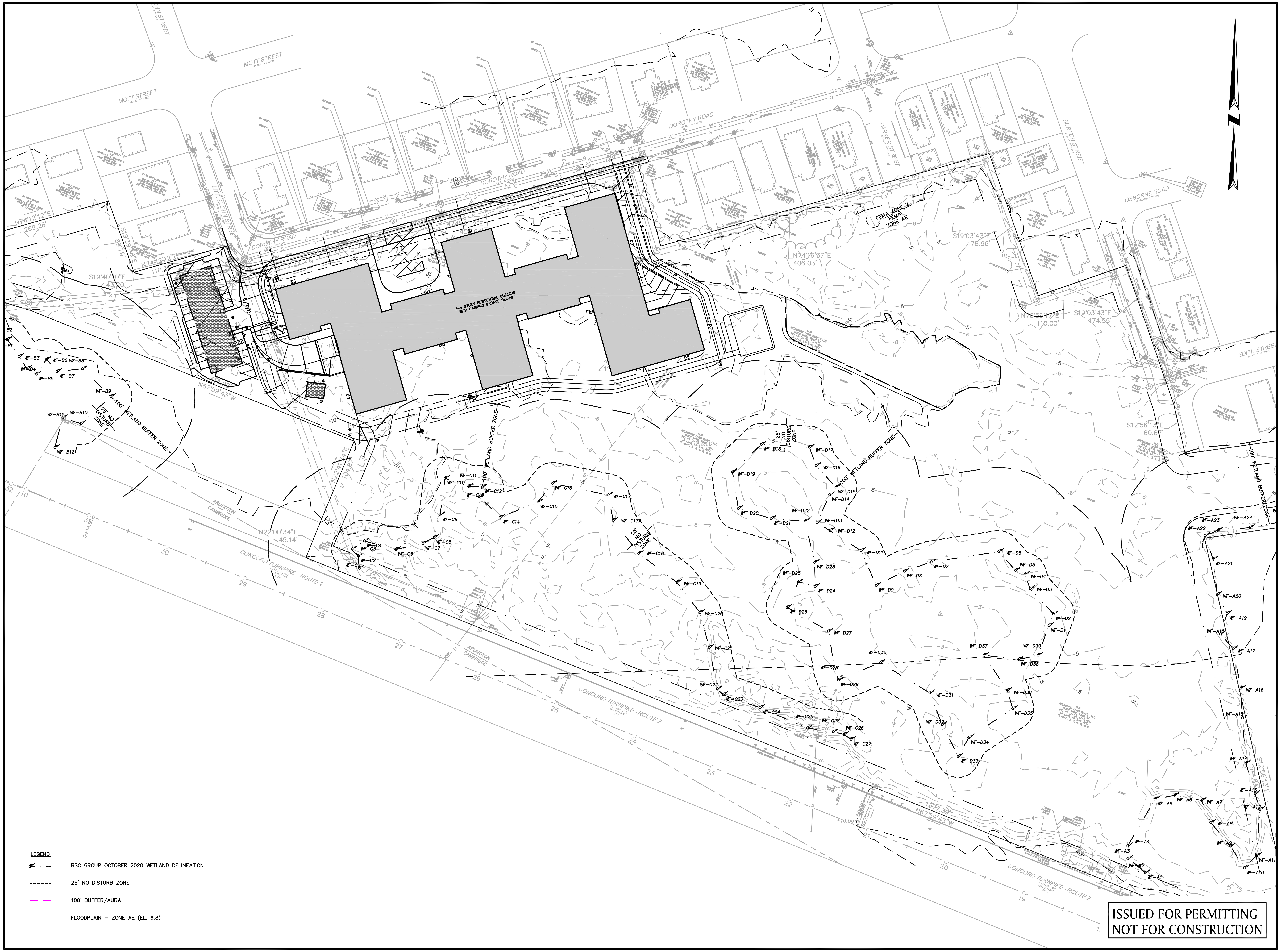
NO.	DATE	DESC.
1	11/03/20	REVISED BUILDING

PREPARED FOR:
ARLINGTON LAND REALTY, LLC
84 SHERMAN STREET, 2ND FLOOR
CAMBRIDGE, MA 02140

BSC GROUP
803 Summer Street
Boston, Massachusetts
02127
617 896 4300

SCALE: 1" = 30'
0 15 30 60 FEET

FILE: \Civil_Drawings\2340700-DEM
DWG.:
JOB. NO: 23407.00
SHEET C-101



JOHN M. HESSION
CIVIL
No. 42747

PROFESSIONAL ENGINEER DATE

THORNDIKE PLACE

DOROTHY ROAD
IN
ARLINGTON
MASSACHUSETTS
(MIDDLESEX COUNTY)

OVERALL SITE PLAN

MARCH 13, 2020

REVISIONS:

NO.	DATE	DESC.
1	9/18/20	NEW BUILDING FOOTPRINT
2	10/22/20	WETLAND DELINEATION
3	11/03/20	REVISED BUILDING

PREPARED FOR:
ARLINGTON LAND REALTY, LLC
84 SHERMAN STREET, 2ND FLOOR
CAMBRIDGE, MA 02140

BSC GROUP
803 Summer Street
Boston, Massachusetts
02127
617 896 4300

SCALE: 1" = 50'
0 25 50 100 FEET

FILE: 2340700\C\D\2340700-SP
DWG.:
JOB. NO: 23407.00
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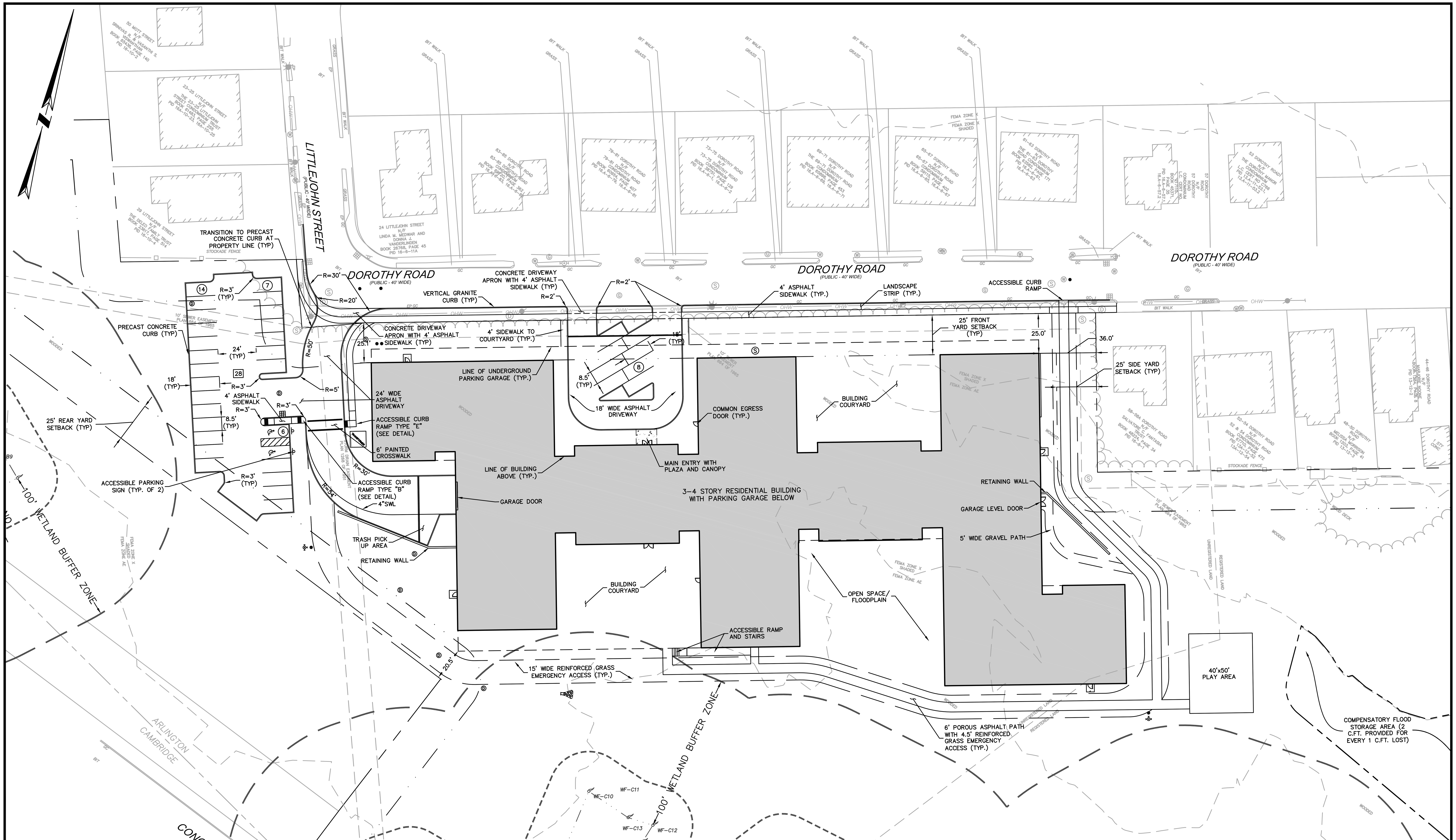


ZONING ANALYSIS TABLE		
ZONING DISTRICT	PUD – PLANNED UNIT DEVELOPMENT	
ZONING CRITERIA	REQUIRED	PROVIDED
MIN LOT AREA	200,000 SF	769,359 SF
MIN FRONT YARD	25'*	25.0'
MIN SIDE YARD	25'*	36.0'
MIN REAR YARD	25'*	20.5'
MAX BLDG HEIGHT	85', 5 STORIES	4 STORIES + GARAGE
MAX FAR	0.80	0.25
LANDSCAPED OPEN SPACE	10%	41.3%**
USABLE OPEN SPACE	10%	10.6%**

*YARD SETBACKS IN PUD ARE EQUAL TO ¼ OF THE HEIGHT OF THE AVERAGE OF THE PRINCIPAL BUILDINGS ALONG THE LOT LINE, NO LESS THAN 25'
**AREAS BASED ON LIMITS OF PROJECT DISTURBANCE

PROFESSIONAL ENGINEER
DATE

THORNDIKE PLACE

DOROTHY ROAD
IN
ARLINGTON MASSACHUSETTS
(MIDDLESEX COUNTY)

LAYOUT & MATERIALS PLAN

MARCH 13, 2020

REVISIONS:

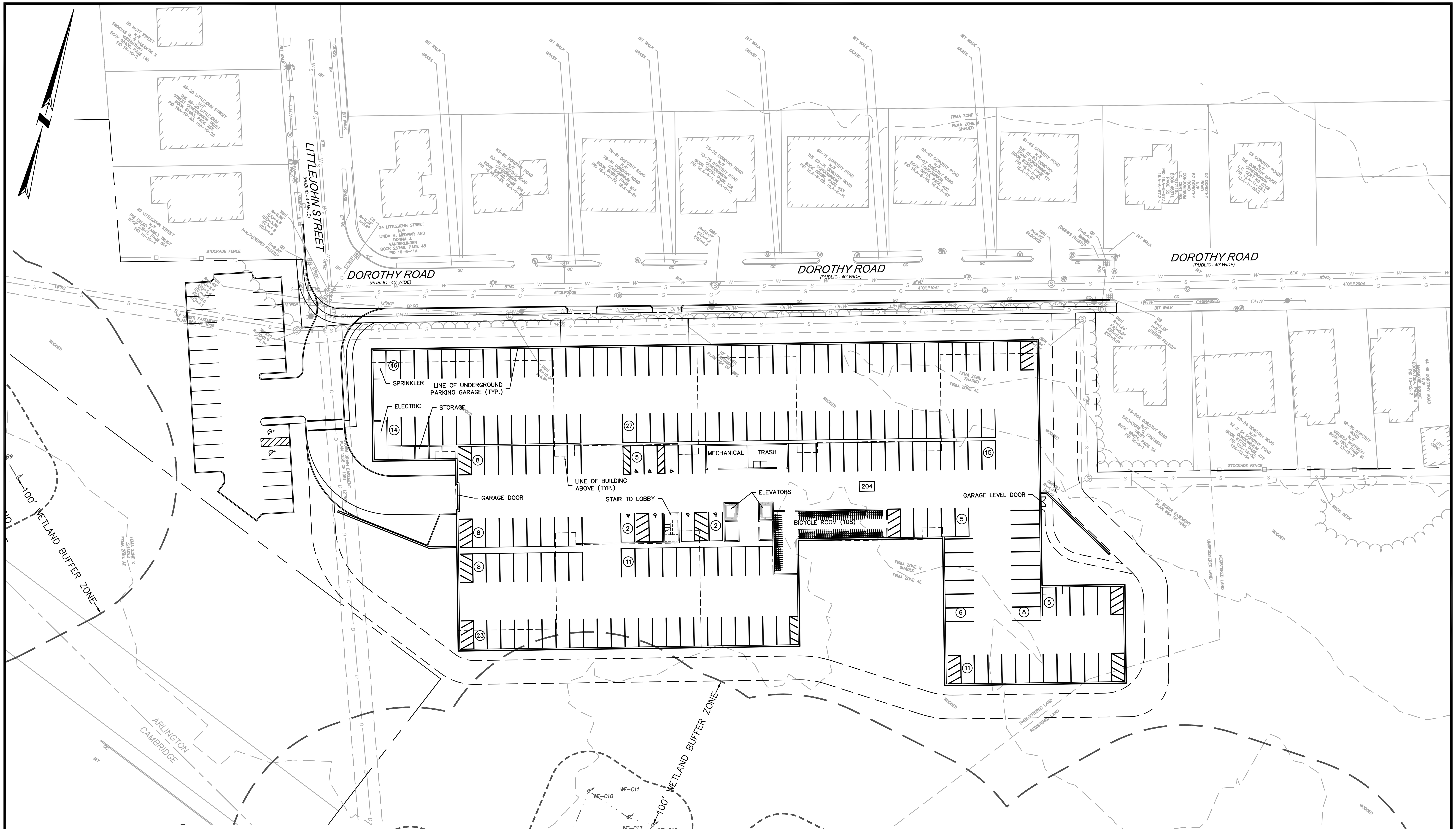
NO.	DATE	DESC.
1	9/18/20	NEW BUILDING FOOTPRINT
2	10/22/20	WETLAND DELINEATION
3	11/03/20	REVISED BUILDING

PREPARED FOR:
ARLINGTON LAND REALTY, LLC
84 SHERMAN STREET, 2ND FLOOR
CAMBRIDGE, MA 02140

BSC GROUP
803 Summer Street
Boston, Massachusetts
02127
617 896 4300

SCALE: 1" = 30'
0 15 30 60 FEET

FILE: \Civil_Drawings\2340700-LM
DWG.:
JOB. NO: 23407.00
SHEET C-103



REQUIRED/PROVIDED PARKING TABLE		
UNIT COUNTS	REQUIRED	PROVIDED
11 STUDIO	11 (1 SPACE/UNIT)	239 (SEE BELOW)
87 1–BEDROOM UNITS	101 (1.15 SPACES/UNIT)	
58 2–BEDROOM UNITS	87 (1.5 SPACES/UNIT)	
20 3–BEDROOM UNITS	40 (2 SPACES/UNIT)	

PARKING BREAKDOWN

	PROVIDED	HCP.–ACCESSIBLE REQUIRED
GARAGE	204 (197 STANDARD; 7 HCP. SPACES; 4 OF WHICH ARE VAN–ACCESSIBLE)	MIN. 7 HCP. SPACES – AT LEAST 1 OF WHICH IS VAN–ACCESSIBLE
SURFACE	27 (25 STANDARD; 2 HCP. SPACES)	MIN. 2 HCP. SPACES – AT LEAST 1 OF WHICH IS VAN–ACCESSIBLE
COURTYARD	8	0
TOTAL	239 (230 STANDARD; 9 HCP. SPACES; 5 OF WHICH ARE VAN–ACCESSIBLE)	MIN. 8 HCP. SPACES – AT LEAST 2 OF WHICH ARE VAN–ACCESSIBLE

PROFESSIONAL ENGINEER

THORNDIKE PLACE

DOROTHY ROAD
IN
ARLINGTON
MASSACHUSETTS
(MIDDLESEX COUNTY)

GARAGE LEVEL PLAN

MARCH 13, 2020

REVISIONS:

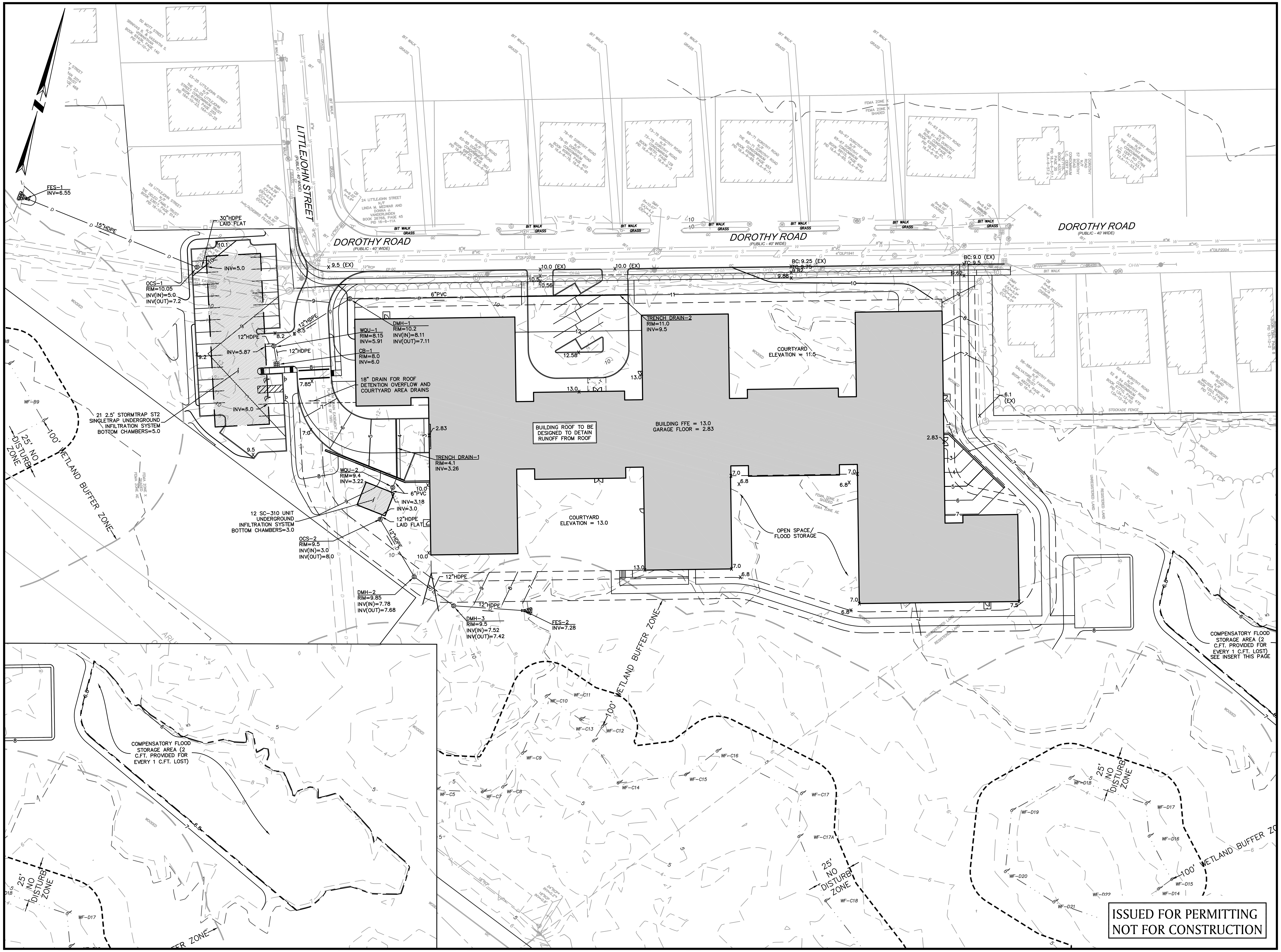
NO.	DATE	DESC.
1	11/03/20	REVISED BUILDING

PREPARED FOR:
ARLINGTON LAND REALTY, LLC
84 SHERMAN STREET, 2ND FLOOR
CAMBRIDGE, MA 02140

BSC GROUP
803 Summer Street
Boston, Massachusetts
02127
617 896 4300

SCALE: 1" = 30'
0 15 30 60 FEET

FILE: \Civil_Drawings\2340700-GARAGE
DWG.:
JOB. NO: 23407.00
SHEET C–104



PROFESSIONAL ENGINEER

DATE

JOHN M. HESSION CIVIL No. 42747

THORNDIKE PLACE

DOROTHY ROAD

IN

ARLINGTON MASSACHUSETTS

(MIDDLESEX COUNTY)

GRADING & DRAINAGE PLAN

MARCH 13, 2020

REVISIONS:

NO.	DATE	DESC.
1	9/18/20	NEW BUILDING FOOTPRINT
2	10/22/20	WETLAND DELINEATION
3	11/03/20	REVISED BUILDING

PREPARED FOR:

ARLINGTON LAND REALTY, LLC
84 SHERMAN STREET, 2ND FLOOR
CAMBRIDGE, MA 02140

BSC GROUP
803 Summer Street
Boston, Massachusetts
02127
617 896 4300

SCALE: 1" = 30'

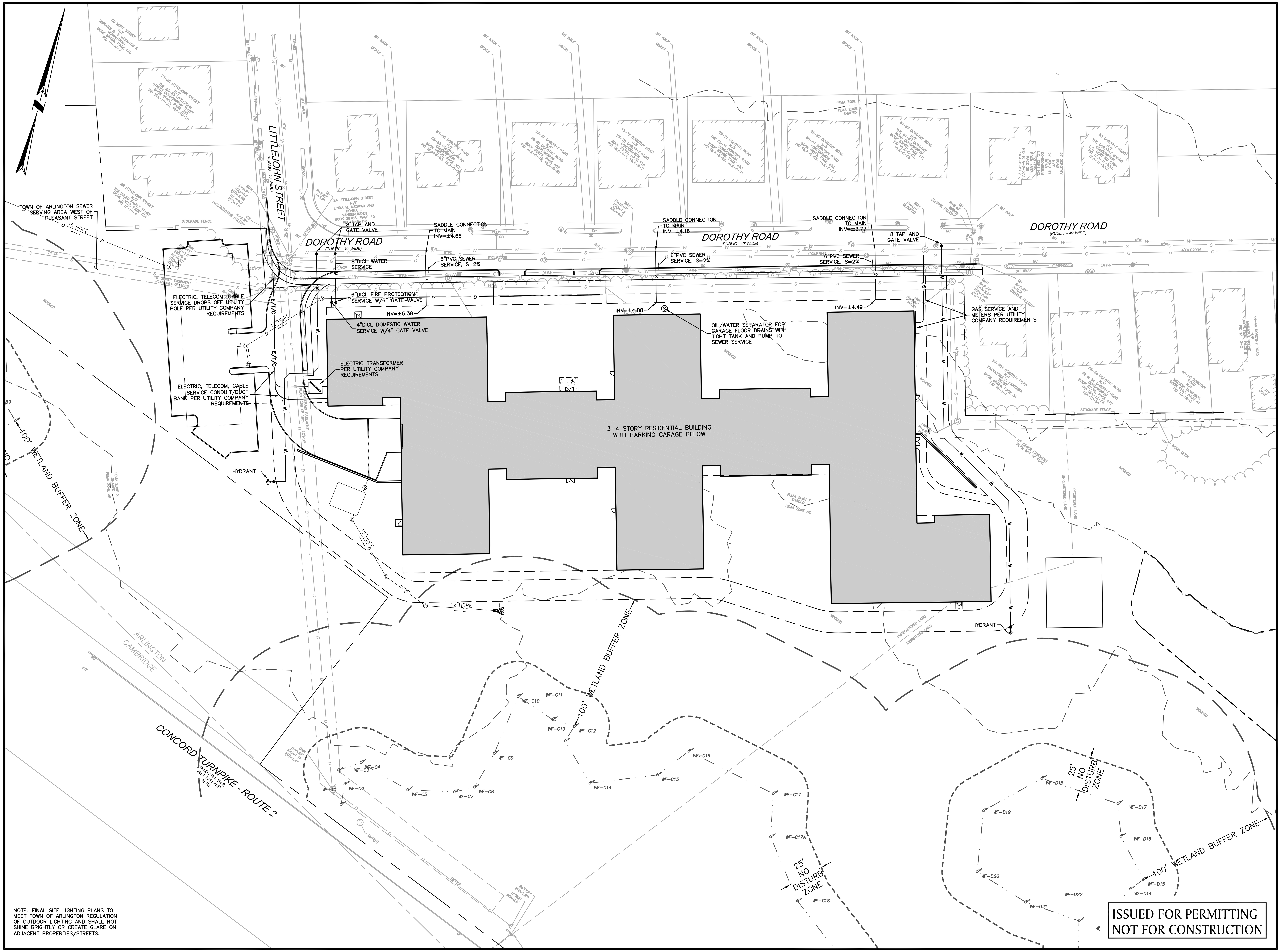
0 15 30 60 FEET

FILE: \Civil_Drawings\2340700-GR

DWG.:

JOB. NO: 23407.00

SHEET C-105



NOTE: FINAL SITE LIGHTING PLANS TO MEET TOWN OF ARLINGTON REGULATION OF OUTDOOR LIGHTING AND SHALL NOT SHINE BRIGHTLY OR CREATE GLARE ON ADJACENT PROPERTIES/STREETS.

JOHN M. HESSION CIVIL No. 42747

PROFESSIONAL ENGINEER | DATE

THORNDIKE PLACE

DOROTHY ROAD

IN

ARLINGTON MASSACHUSETTS

(MIDDLESEX COUNTY)

UTILITY PLAN

MARCH 13, 2020

REVISIONS:

NO.	DATE	DESC.
1	9/18/20	NEW BUILDING FOOTPRINT
2	10/22/20	WETLAND DELINEATION
3	11/03/20	REVISED BUILDING

PREPARED FOR:

ARLINGTON LAND REALTY, LLC
84 SHERMAN STREET, 2ND FLOOR
CAMBRIDGE, MA 02140

BSC GROUP
803 Summer Street
Boston, Massachusetts
02127
617 896 4300

SCALE: 1" = 30'

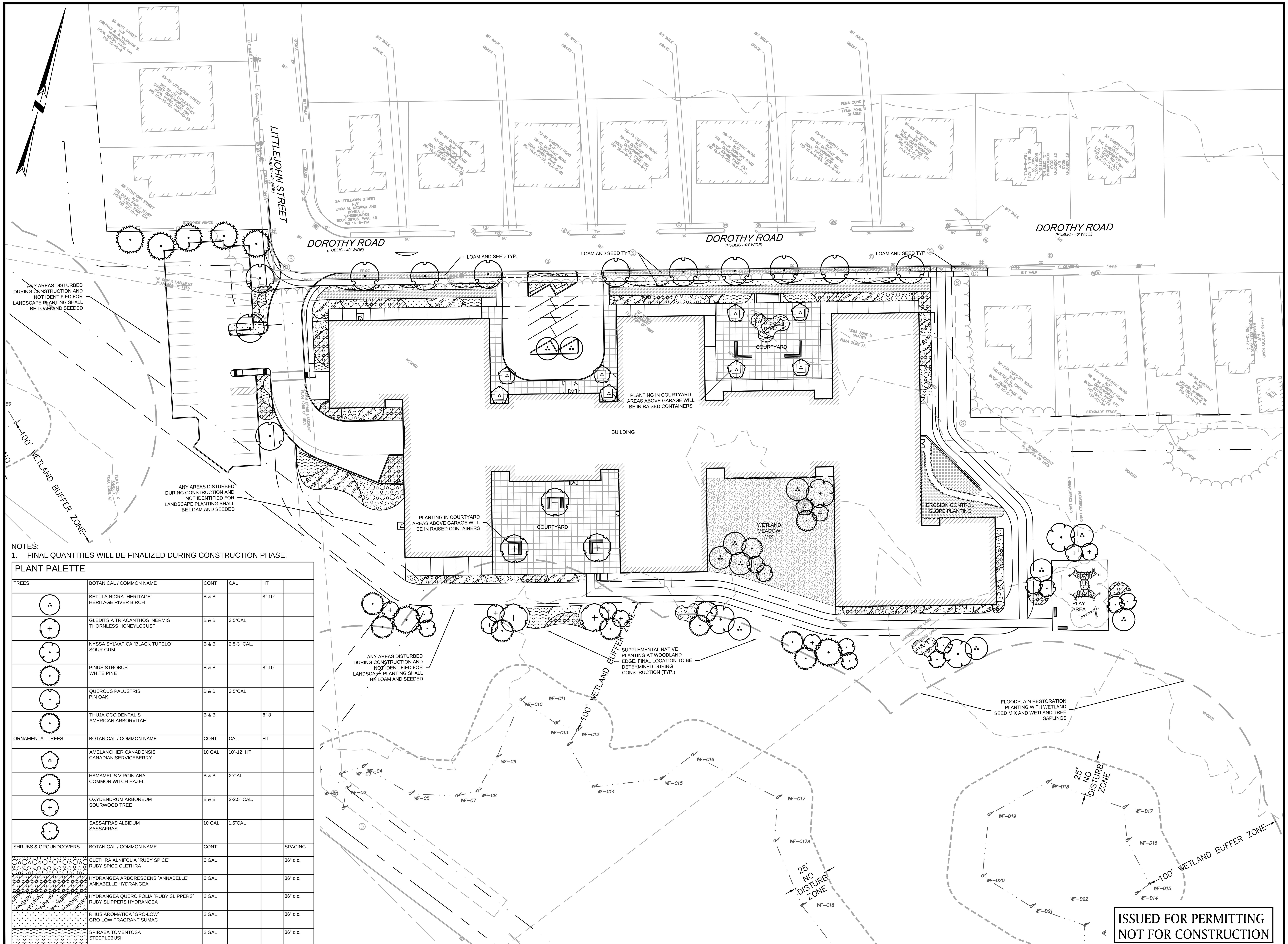
0 15 30 60 FEET

FILE: \Civil_Drawings\2340700-UT

DWG.: C104

JOB. NO: 23407.00

SHEET C-106



NOTES:
1. FINAL QUANTITIES WILL BE FINALIZED DURING CONSTRUCTION PHASE.

PLANT PALETTE

TREES	BOTANICAL / COMMON NAME	CONT	CAL	HT	
	BETULA NIGRA `HERITAGE` HERITAGE RIVER BIRCH	B & B		8`-10`	
	GLEDITSIA TRIACANTHOS INERMIS THORNLESS HONEYLOCUST	B & B	3.5"CAL		
	NYSSA SYLVATICA `BLACK TUPELO` SOUR GUM	B & B	2.5-3" CAL.		
	PINUS STROBUS WHITE PINE	B & B		8`-10`	
	QUERCUS PALUSTRIS PIN OAK	B & B	3.5"CAL		
	THUJA OCCIDENTALIS AMERICAN ARBORVITAE	B & B		6`-8`	
ORNAMENTAL TREES	BOTANICAL / COMMON NAME	CONT	CAL	HT	
	AMELANCHIER CANADENSIS CANADIAN SERVICEBERRY	10 GAL	10`-12` HT		
	HAMAMELIS VIRGINIANA COMMON WITCH HAZEL	B & B	2"CAL		
	OXYDENDRUM ARBOREUM SOURWOOD TREE	B & B	2-2.5" CAL.		
	SASSAFRAS ALBIDUM SASSAFRAS	10 GAL	1.5"CAL		
SHRUBS & GROUNDCOVERS	BOTANICAL / COMMON NAME	CONT			SPACING
	CLETHRA ALNIFOLIA `RUBY SPICE` RUBY SPICE CLETHRA	2 GAL			36" o.c.
	HYDRANGEA ARBORESCENS `ANNABELLE` ANNABELLE HYDRANGEA	2 GAL			36" o.c.
	HYDRANGEA QUERCIFOLIA `RUBY SLIPPERS` RUBY SLIPPERS HYDRANGEA	2 GAL			36" o.c.
	RHUS AROMATICA `GRO-LOW` GRO-LOW FRAGRANT SUMAC	2 GAL			36" o.c.
	SPIRAEA TOMENTOSA STEEPLEBUSH	2 GAL			36" o.c.

ISSUED FOR PERMITTING
NOT FOR CONSTRUCTION

REGISTERED LANDSCAPE ARCHITECT — DATE 2020/11/03

THORNDIKE PLACE

DOROTHY ROAD
IN
ARLINGTON
MASSACHUSETTS
(MIDDLESEX COUNTY)

PLANTING PLAN

MARCH 13, 2020

REVISIONS:

NO.	DATE	DESC.

PREPARED FOR:
ARLINGTON LAND REALTY, LLC
84 SHERMAN STREET, 2ND FLOOR
CAMBRIDGE, MA 02140

BSC GROUP
803 Summer Street
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617 896 4300

SCALE: 1" = 30'
0 15 30 60 FEET

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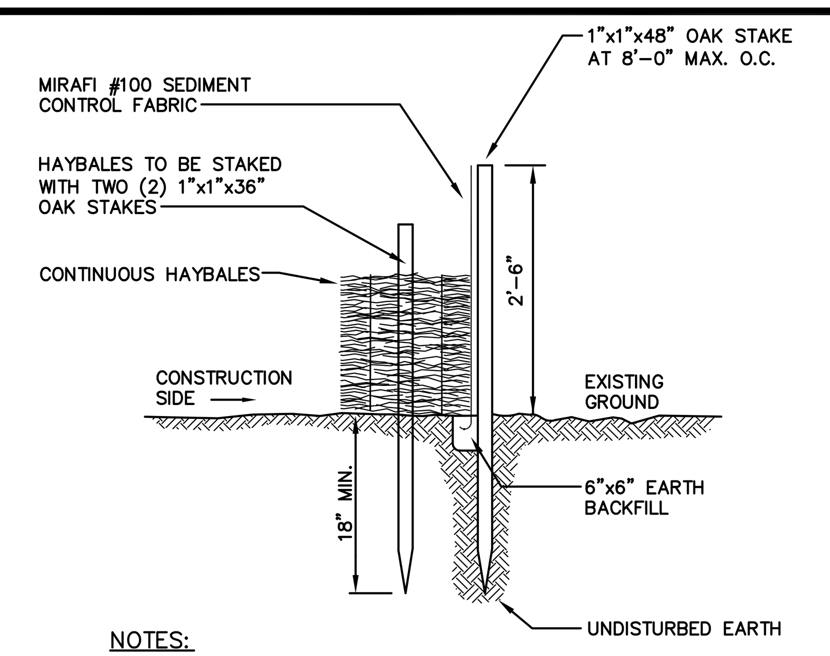
DWG.:
JOB. NO: 23407.00
SHEET L-100

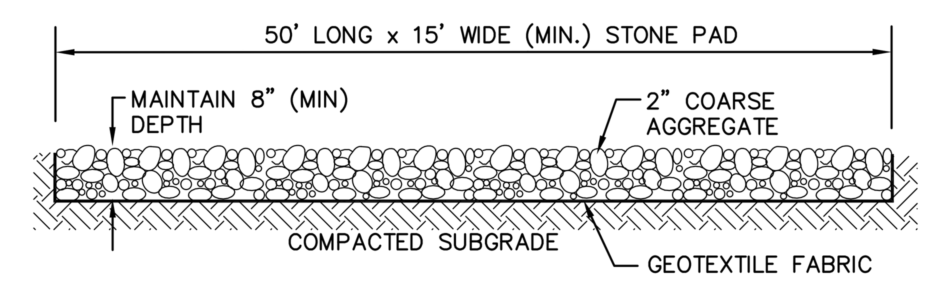


NOTES:

1. BALES SHALL BE PLACED IN A ROW WITH THE ENDS TIGHTLY ABUTTING THE ADJACENT BALES.
2. BALES SHALL BE SECURELY ANCHORED IN PLACE BY TWO (2) 1"X1"X36" OAK STAKES DRIVEN THROUGH THE BALES. THE FIRST STAKE IN EACH BALE SHALL BE ANGLED TOWARD PREVIOUSLY LAID BALE TO FORCE BALES TOGETHER.
3. INSPECTION SHALL BE FREQUENT AND REPAIR OR REPLACEMENT SHALL BE MADE PROMPTLY AS NEEDED.
4. BALES SHALL BE REMOVED AND REPLACED WHEN THEY BECOME FILLED WITH SEDIMENT AND BLOCK OR IMPEDE STORM FLOW OR DRAINAGE.
5. BALES SHALL BE REMOVED WHEN THE EMBANKMENTS STABILIZE.
6. BALES TO BE TWINE BOUND.

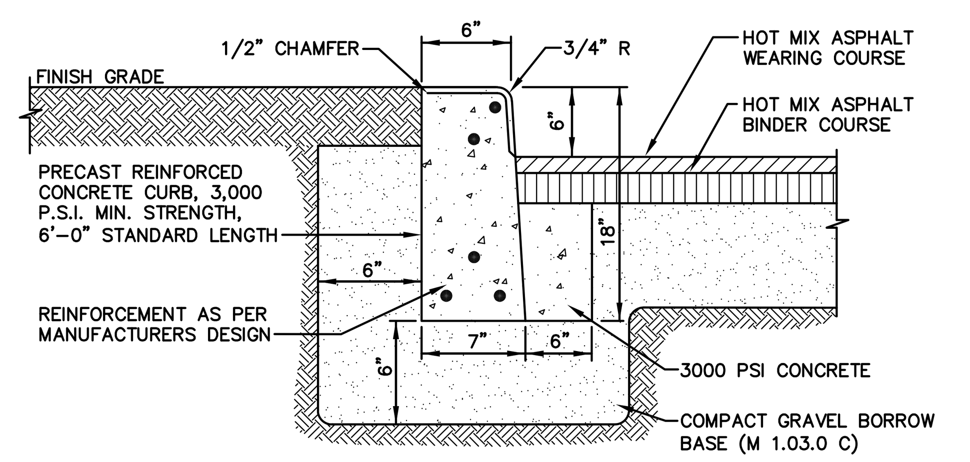
SILT FENCE WITH HAYBALES

SCALE: NONE



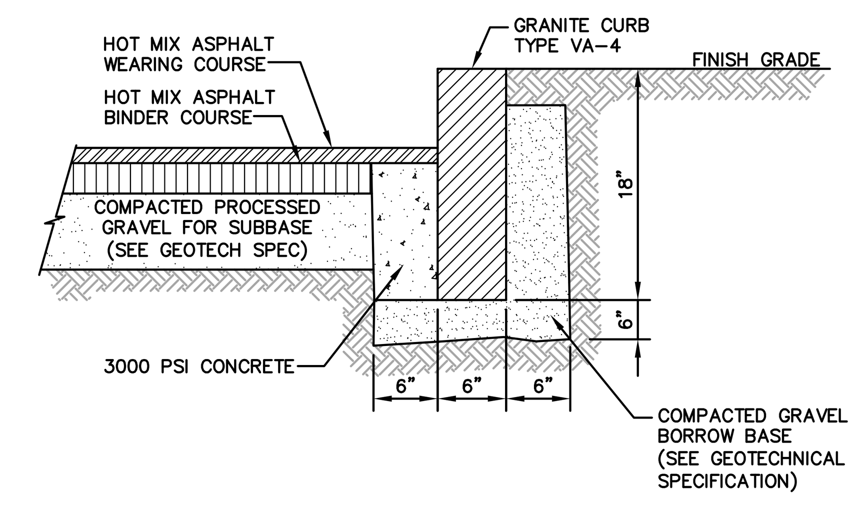
TEMPORARY CONSTRUCTION ENTRANCE

SCALE: NONE



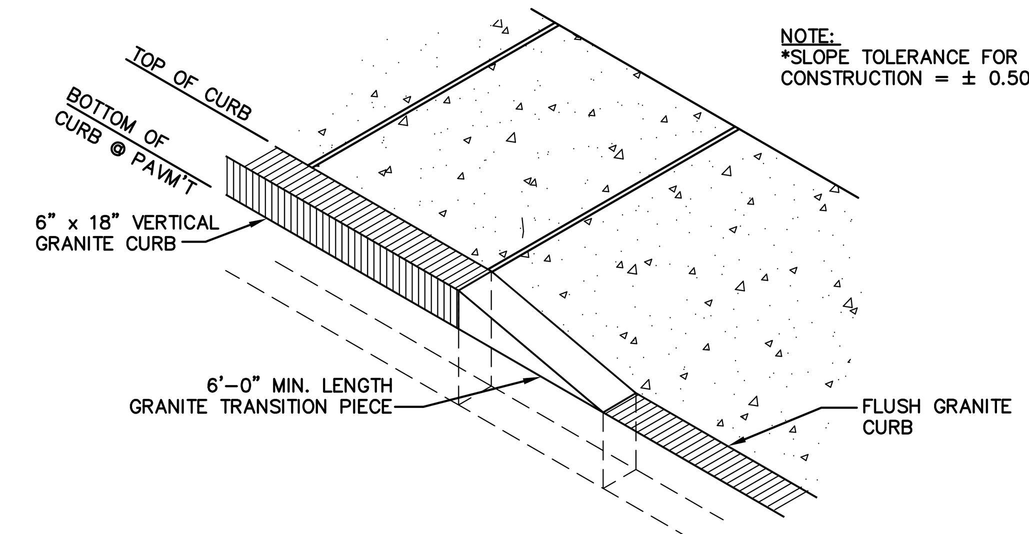
PRECAST CONCRETE CURB

SCALE: NONE



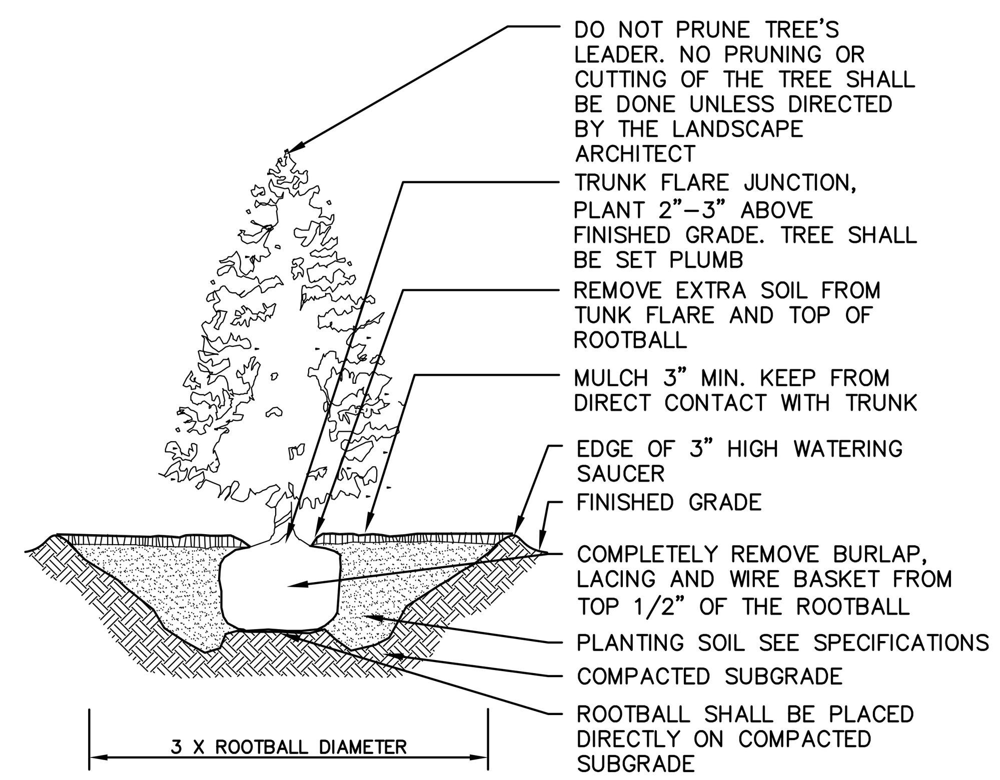
VERTICAL GRANITE CURB

SCALE: NONE



GRANITE CURB TRANSITION

SCALE: NONE



NOTE:

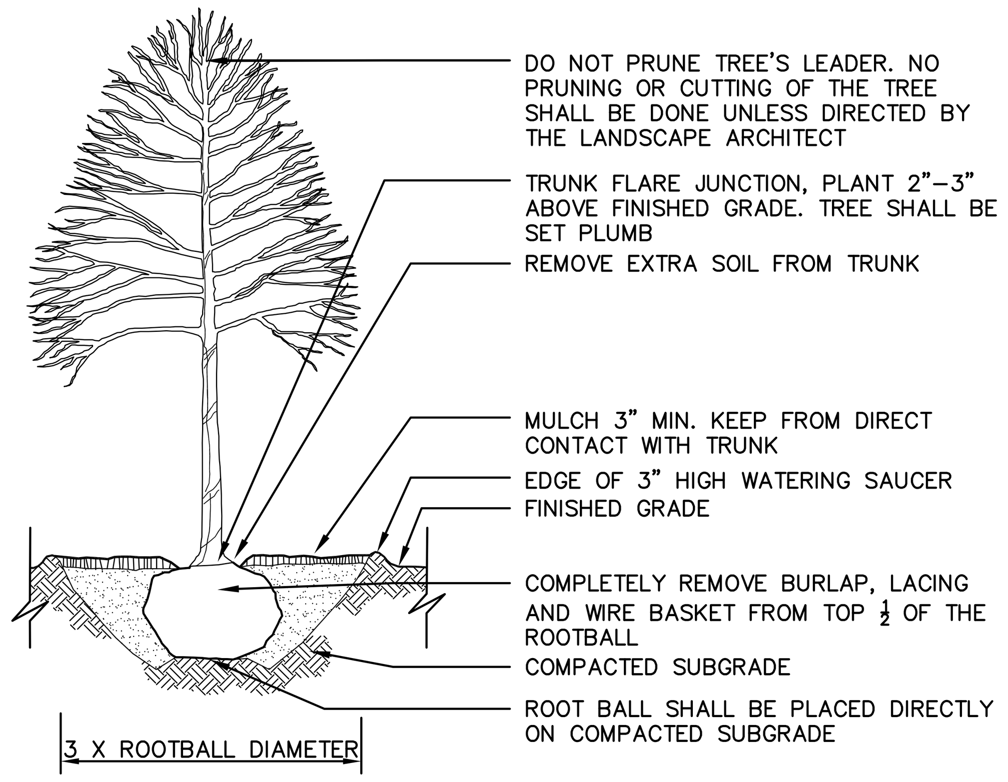
1. SEE SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.
2. SAUCER SHALL BE FLOODED TWICE DURING THE FIRST 24 HOURS AFTER PLANTING.

EVERGREEN TREE PLANTING DETAIL

SCALE: NONE

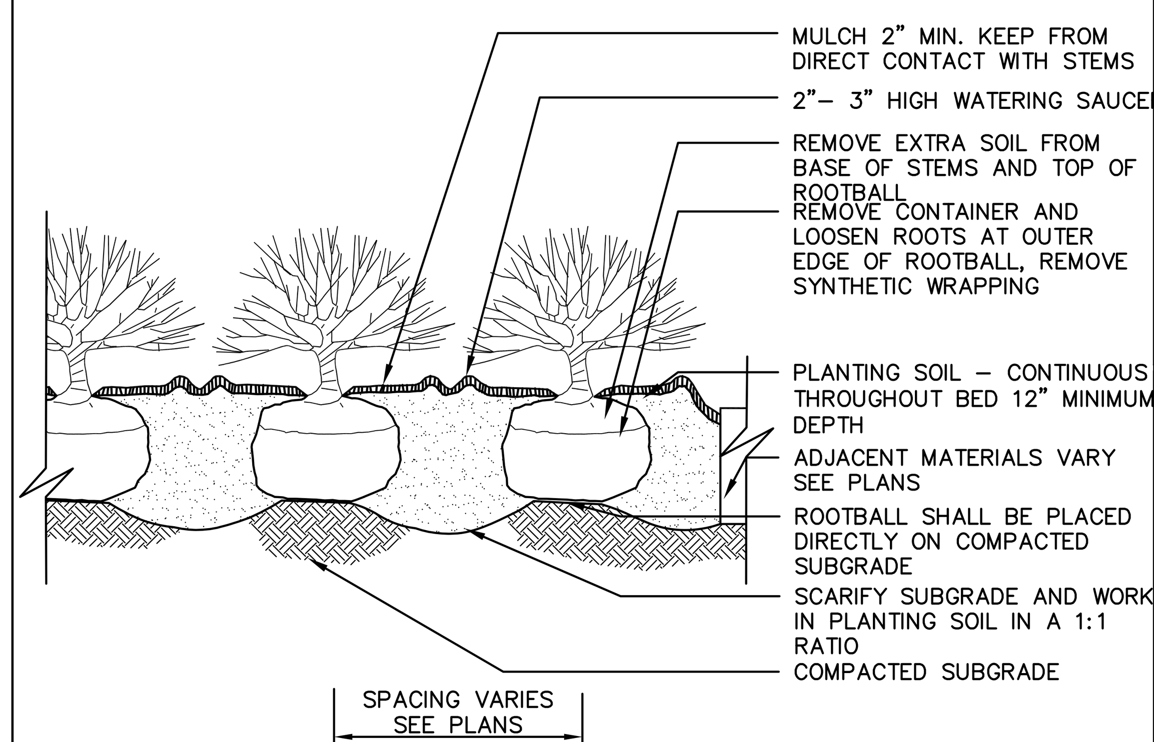
NOTES:

1. SEE SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.
2. CONTRACTOR RESPONSIBLE FOR MAINTAINING TREES IN A PLUMB CONDITION.
3. SAUCER SHALL BE FLOODED TWICE DURING THE FIRST 24 HOURS AFTER PLANTING.



DECIDUOUS TREE PLANTING DETAIL

SCALE: NONE

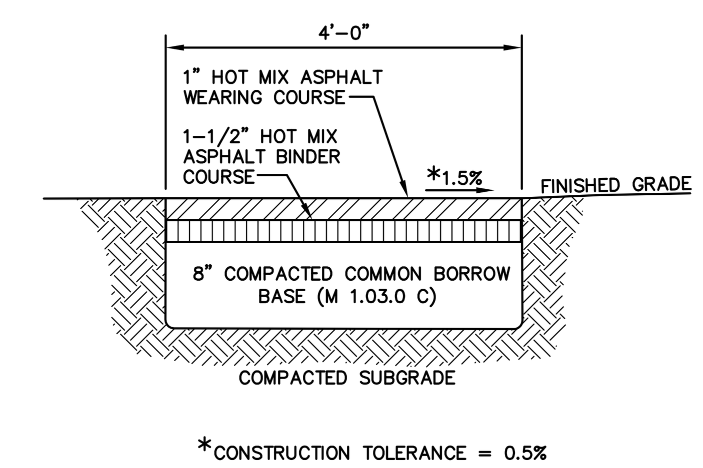


NOTES:

1. SEE SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.
2. NO PRUNING OR CUTTING UNLESS DIRECTED BY THE LANDSCAPE ARCHITECT.
3. SAUCER SHALL BE FLOODED TWICE DURING THE FIRST 24 HOURS AFTER PLANTING.
4. SHRUBS SHALL BE SET PLUMB AND PLANTED SO THAT THE TOP OF THE ROOTBALL IS 1"-2" ABOVE FINISHED GRADE.

SHRUB PLANTING BED

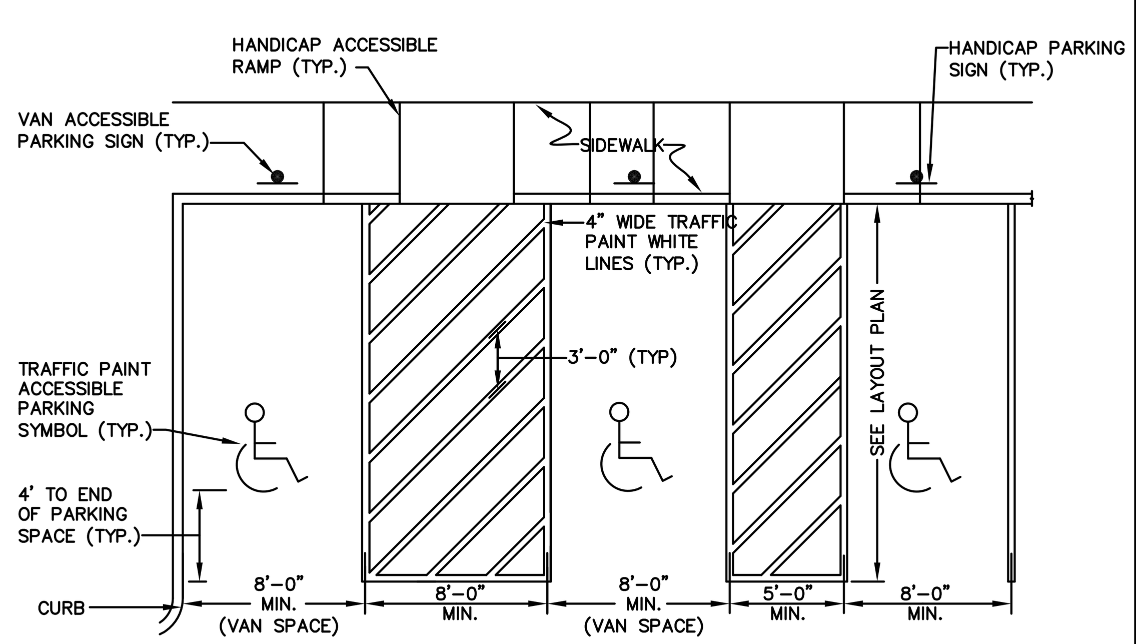
SCALE: NONE



*CONSTRUCTION TOLERANCE = 0.5%

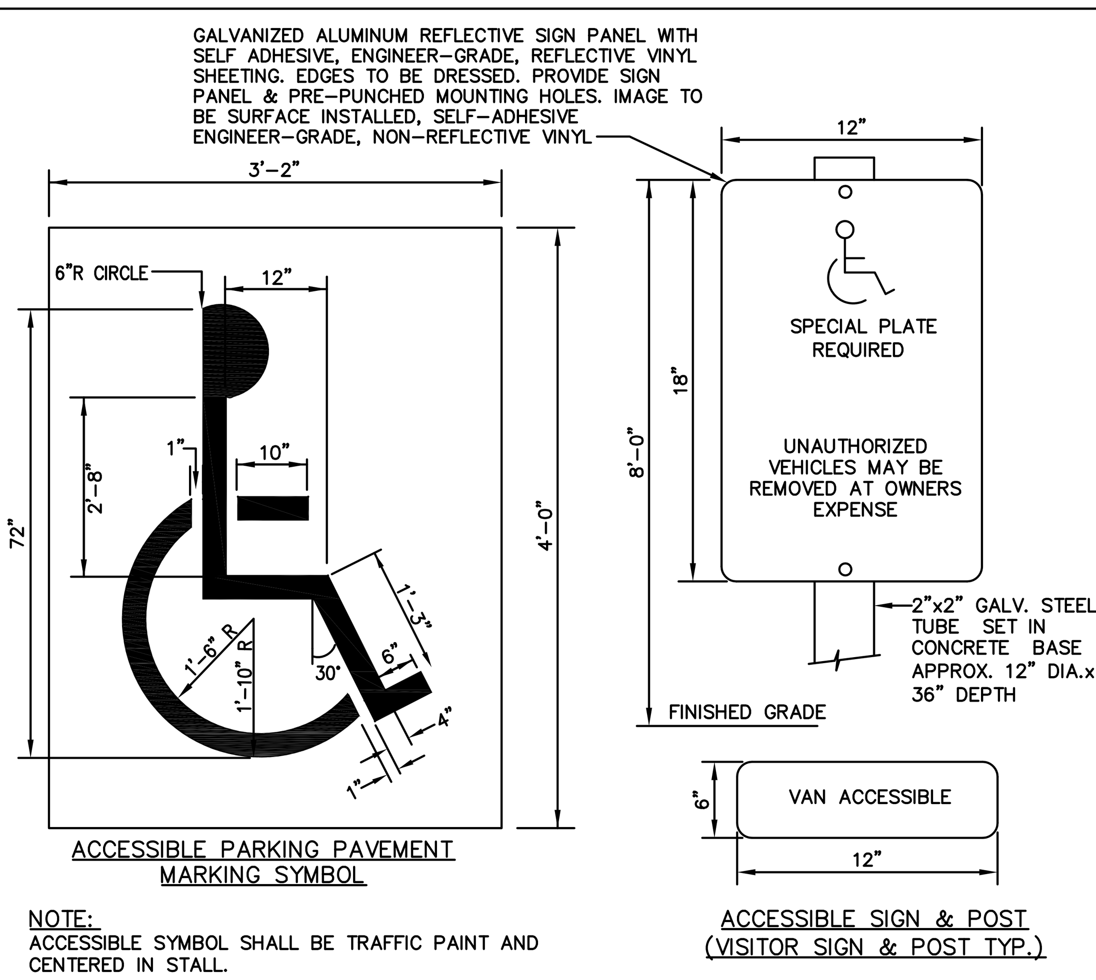
HOT MIX ASPHALT WALKWAY

SCALE: NONE



PAINTED PAVEMENT MARKINGS ACCESSIBLE PARKING SPACE

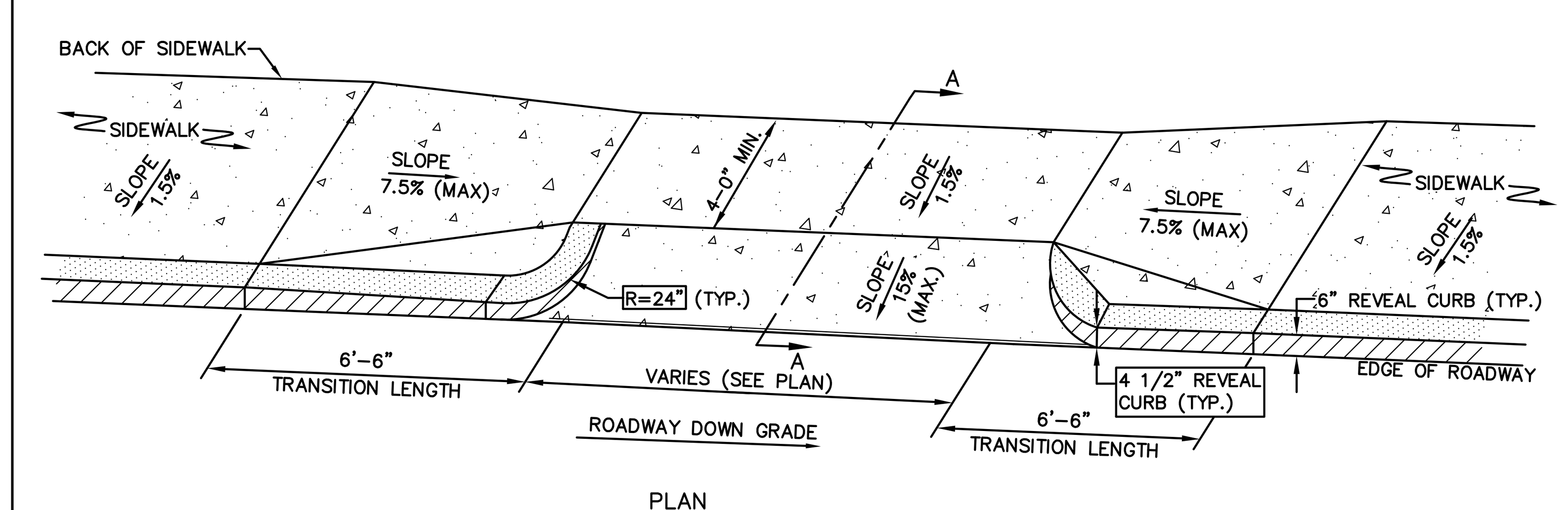
SCALE: NONE

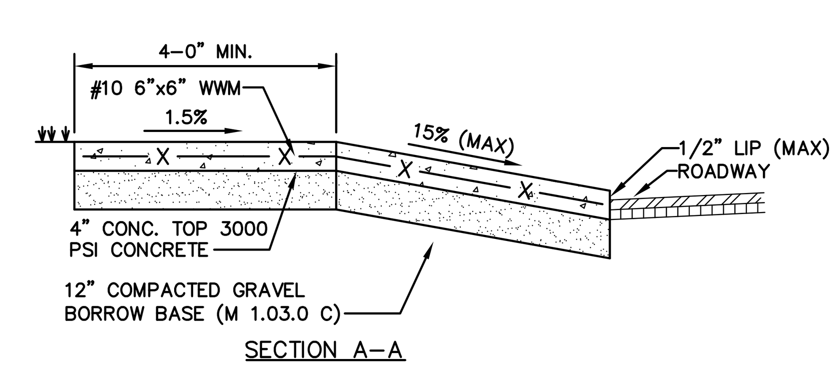


NOTE:
ACCESSIBLE SYMBOL SHALL BE TRAFFIC PAINT AND CENTERED IN STALL.

PAINTED PAVEMENT MARKINGS ACCESSIBLE PARKING SYMBOL & ACCESSIBLE PARKING SIGN

SCALE: NONE





CURB TRANSITION LENGTH FOR WHEELCHAIR RAMPS	
ROADWAY PROFILE GRADE (%)	HIGH SIDE TRANSITION LENGTH ROUNDED TO THE NEAREST 4"
0 OR LOW SIDE	6'-6"
>0 - 1	7'-8"
>1 - 2	9'-0"
>2 - 3	11'-0"
>3 - 4	14'-0"
>4	15'-0" (MAX)

NOTES:

1. BASED ON A DESIGN SLOPE OF 7.5% & A REVEAL OF 6".
2. SLOPE TOLERANCE FOR CONSTRUCTION = ± 0.50%
3. THE MAX. ALLOWABLE SLOPE OF ACCESSIBLE ROUTE EXCLUDING CURB RAMPS SHALL BE 5%.
4. THE MAX. ALLOWABLE SLOPE OF ACCESSIBLE ROUTE CURB RAMPS SHALL BE 7.5%.
5. A MINIMUM OF 3 FEET CLEAR SHALL BE MAINTAINED AT ANY PERMANENT OBSTACLE IN ACCESSIBLE ROUTE (I.E. HYDRANTS, UTILITY POLES, TREE WELLS, SIGNS, ETC.).
6. BASE OF RAMP SHALL BE GRADED TO PREVENT PONDING.

SIDEWALK THROUGH DRIVEWAY – TYPE 1

SCALE: NONE

ISSUED FOR PERMITTING
NOT FOR CONSTRUCTION

PROFESSIONAL ENGINEER

DATE

THORNDIKE PLACE

DORTHY ROAD

IN

ARLINGTON MASSACHUSETTS

(MIDDLESEX COUNTY)

CIVIL & LANDSCAPE DETAILS

MARCH 13, 2020

REVISIONS:

NO.	DATE	DESC.
1	9/18/20	NEW BUILDING FOOTPRINT
2	11/03/20	REVISED BUILDING

PREPARED FOR:

ARLINGTON LAND REALTY, LLC
84 SHERMAN STREET, 2ND FLOOR
CAMBRIDGE, MA 02140

BSC GROUP

803 Summer Street
Boston, Massachusetts
02127
617 896 4300

SCALE: AS NOTED

FILE: 2340700\C\D\2340700-DET

DWG.:

JOB. NO: 23407.00

SHEET C-200

NOTES:

1. POROUS ASPHALT AND CHOCKER COURSES SHALL MEET THE FOLLOWING REQUIREMENTS:

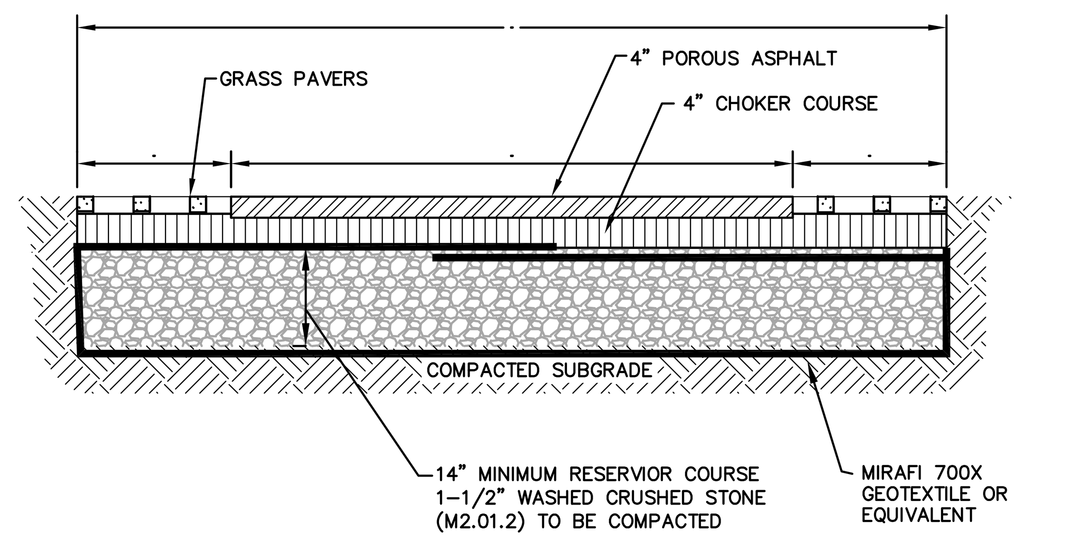
4" POROUS ASPHALT –

SHALL BE POST-BLENDED PG 64-28 SBR WITH 5 POUNDS OF FIBER PER TON OF ASPHALT MIX.

- 3/4" = 100%
- 1/2" = 85–100%
- 3/8" = 55–75%
- #4 = 10–25%
- #8 = 5–10%
- #200 = 2–4%
- AIR VOID CONTENT = 16–22%

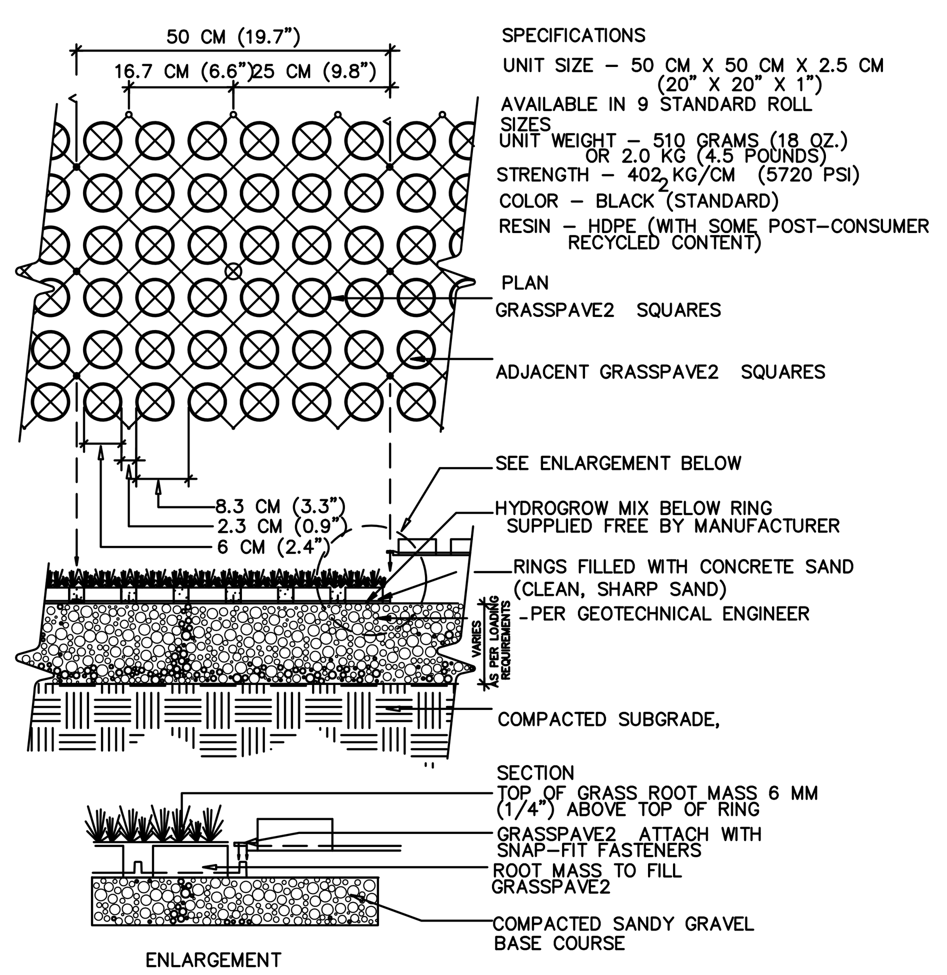
4" CHOKER COURSE SHALL MEET THE FOLLOWING GRADUATION REQUIREMENTS:

- 1-1/2" = 100%
- 1" = 95–100%
- 1/2" = 25–60%
- #4 = 0–10%
- #8 = 0–5%
- 95% COMPACTION



EMERGENCY ACCESS ROAD

SCALE: NONE



SPECIFICATIONS

UNIT SIZE – 50 CM X 50 CM X 2.5 CM (20" X 20" X 1")

AVAILABLE IN 9 STANDARD ROLL SIZES

UNIT WEIGHT – 510 GRAMS (18 OZ.) OR 2.0 KG (4.5 POUNDS)

STRENGTH – 402 KG/CM (5720 PSI)

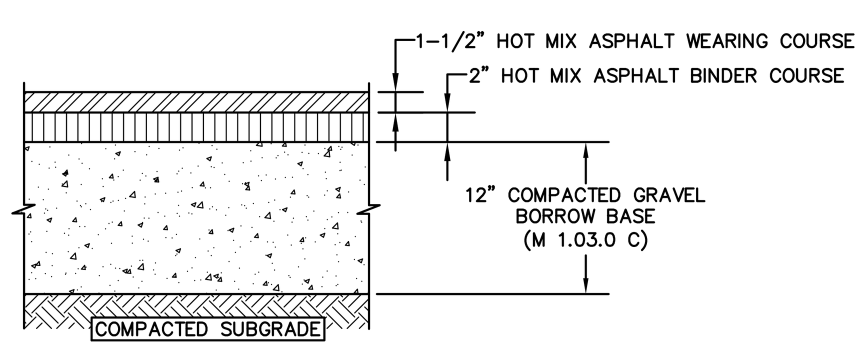
COLOR – BLACK (STANDARD)

RESIN – HDPE (WITH SOME POST-CONSUMER RECYCLED CONTENT)

NOTE: SEE LANDSCAPE PLANS FOR PLANT MIX

GRASSPAVE PRODUCT (OR APPROVED EQUAL)

SCALE: NONE



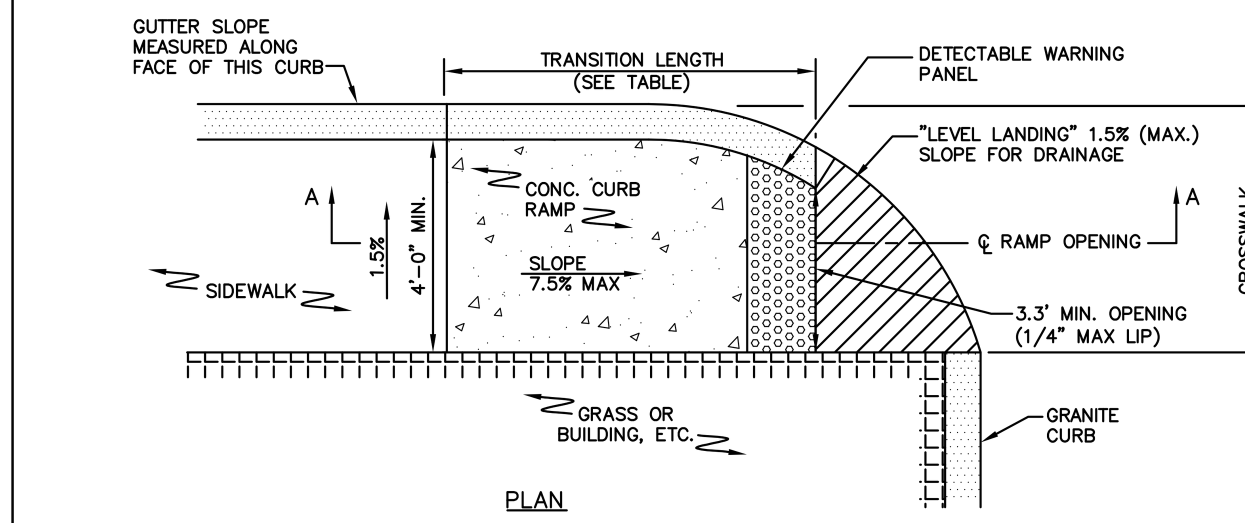
STANDARD DUTY FLEXIBLE PAVEMENT

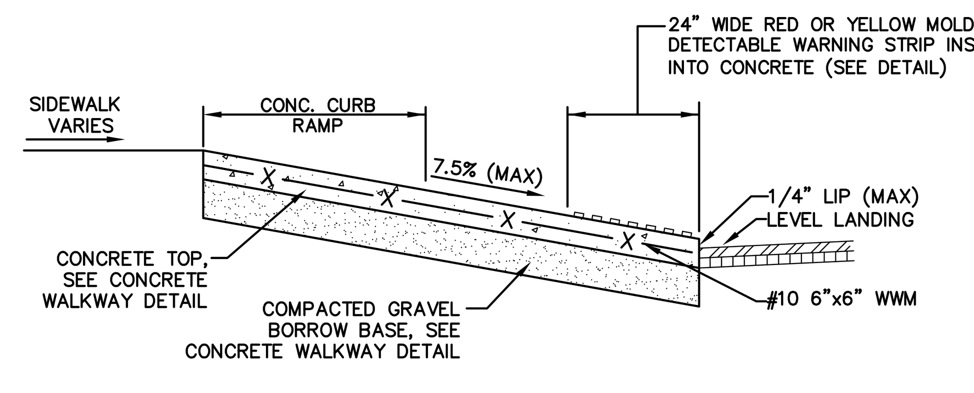
NOTE:

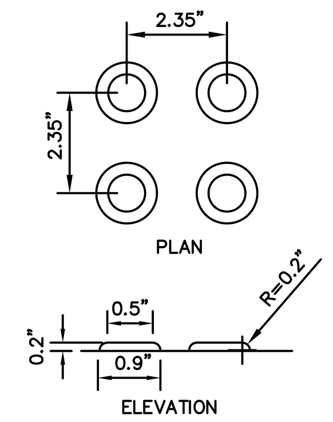
PAVEMENT SECTIONS ARE SUBJECT TO CHANGE AND WILL BE BASED ON THE RESULTS OF GEOTECHNICAL INVESTIGATIONS

HOT MIX ASPHALT PAVEMENT SECTIONS

SCALE: NONE







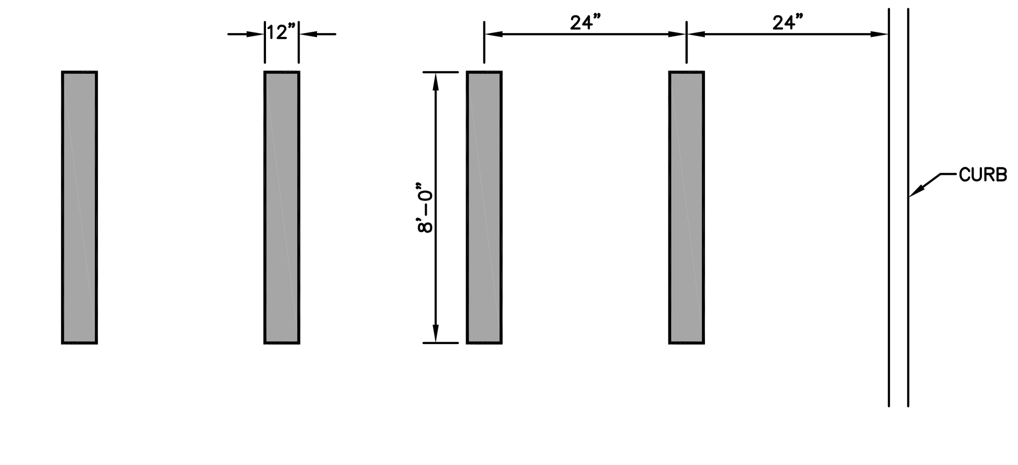
ACCESSIBLE CURB RAMP TYPE 'B' – SINGLE DIRECTION WITH LEVEL ENTRANCE

SCALE: NONE

CURB TRANSITION LENGTH FOR WHEELCHAIR RAMPS	
ROADWAY PROFILE GRADE (%)	TRANSITION LENGTH ROUNDED TO THE NEAREST 4"
0 OR LOW SIDE	6'-6"
>0 – 1	7'-8"
>1 – 2	9'-0"
>2 – 3	11'-0"
>3 – 4	14'-0"
>4	15'-0" (MAX)

NOTES:

1. SLOPE TOLERANCE FOR RAMP AND SIDEWALK CONSTRUCTION = ± 0.50%
2. THE MAX. ALLOWABLE SLOPE OF ACCESSIBLE ROUTE EXCLUDING CURB RAMPS SHALL BE 5%.
3. THE MAX. ALLOWABLE SLOPE OF ACCESSIBLE ROUTE CURB RAMPS SHALL BE 7.5%.
4. A MINIMUM OF 3 FEET CLEAR SHALL BE MAINTAINED AT ANY PERMANENT OBSTACLE IN ACCESSIBLE ROUTE (I.E. HYDRANTS, UTILITY POLES, TREE WELLS, SIGNS, ETC.).
5. BASE OF RAMP SHALL BE GRADED TO PREVENT PONDING.

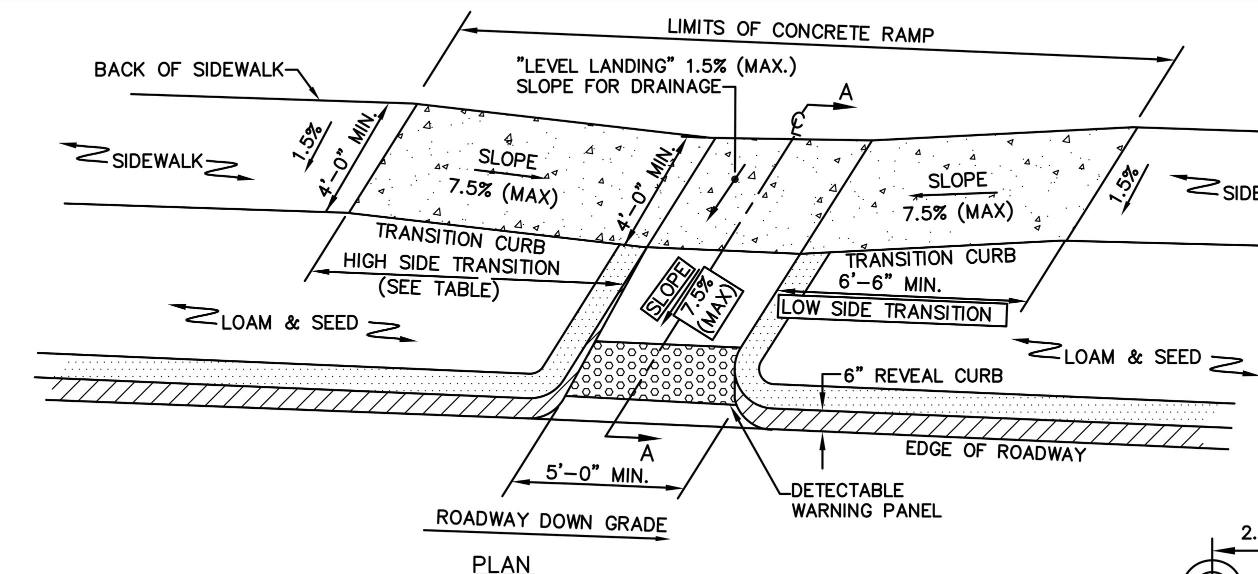


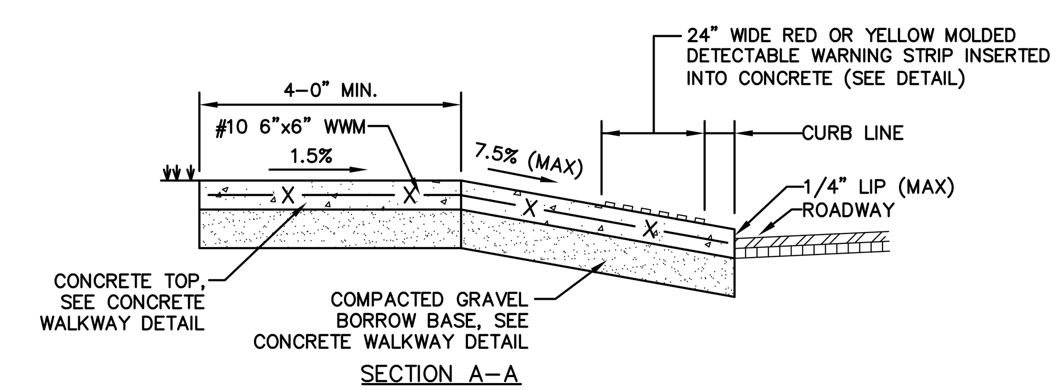
NOTES:

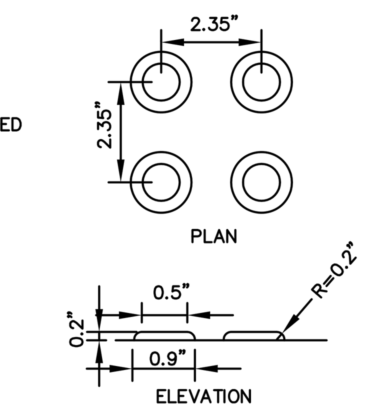
1. ALL TWELVE INCH (12") LINES SHALL BE APPLIED IN ONE APPLICATION, NO COMBINATION OF LINES (TWO – 6 INCH LINES) WILL BE ACCEPTED.
2. ALL PAVEMENT MARKING MATERIALS WHETHER THERMOPLASTIC OR WATERBORNE PAINT TO BE REFLECTORIZED WITH GLASS BEADS.
3. LONGITUDINAL CROSSWALK LINES TO BE PARALLEL TO CURBLINE.
4. ALL LONGITUDINAL CROSSWALK LINES TO BE THE SAME LENGTH AND PROPERLY DRESSED.
5. STRIPES TO BE SOLID WHITE.

PEDESTRIAN CROSSWALK MARKINGS

SCALE: NONE







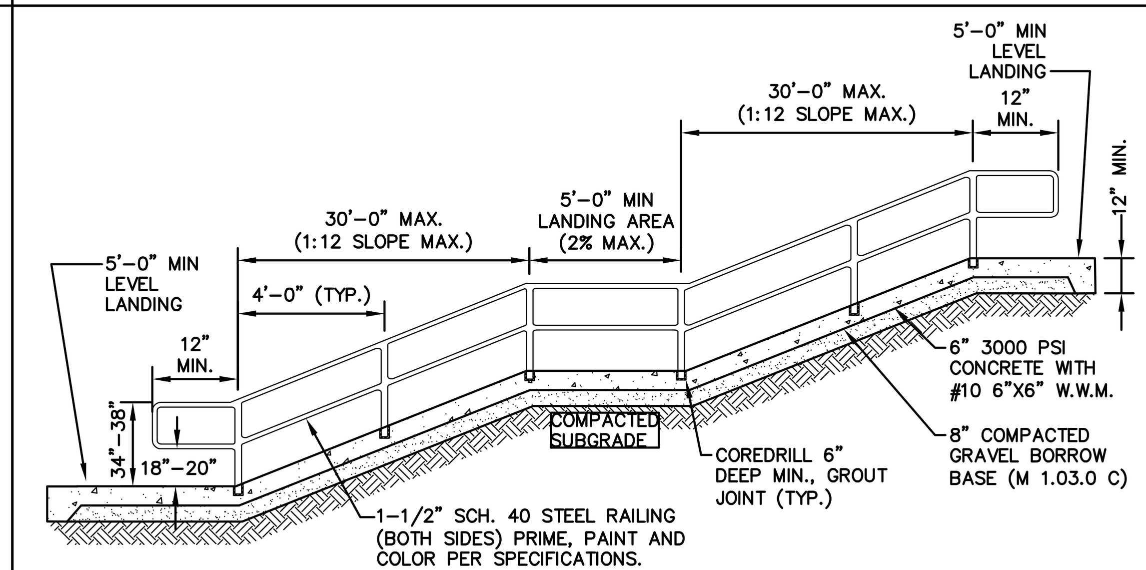
ACCESSIBLE CURB RAMP TYPE 'E' – PARALLEL PERPENDICULAR WITH LANDSCAPING STRIP

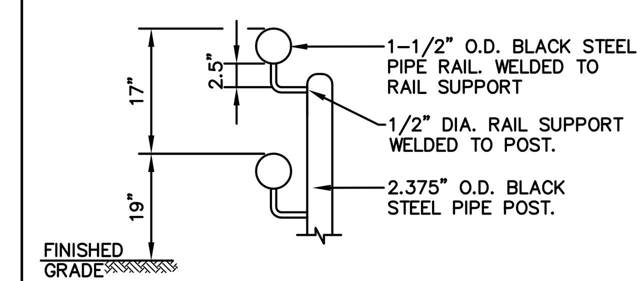
SCALE: NONE

CURB TRANSITION LENGTH FOR WHEELCHAIR RAMPS	
ROADWAY PROFILE GRADE (%)	HIGH SIDE TRANSITION LENGTH ROUNDED TO THE NEAREST 4"
0 OR LOW SIDE	6'-6"
>0 – 1	7'-8"
>1 – 2	9'-0"
>2 – 3	11'-0"
>3 – 4	14'-0"
>4	15'-0" (MAX)

NOTES:

1. SLOPE TOLERANCE FOR RAMP AND SIDEWALK CONSTRUCTION = ± 0.50%
2. THE MAX. ALLOWABLE SLOPE OF ACCESSIBLE ROUTE EXCLUDING CURB RAMPS SHALL BE 5%.
3. THE MAX. ALLOWABLE SLOPE OF ACCESSIBLE ROUTE CURB RAMPS SHALL BE 7.5%.
4. A MINIMUM OF 3 FEET CLEAR SHALL BE MAINTAINED AT ANY PERMANENT OBSTACLE IN ACCESSIBLE ROUTE (I.E. HYDRANTS, UTILITY POLES, TREE WELLS, SIGNS, ETC.).
5. BASE OF RAMP SHALL BE GRADED TO PREVENT PONDING.





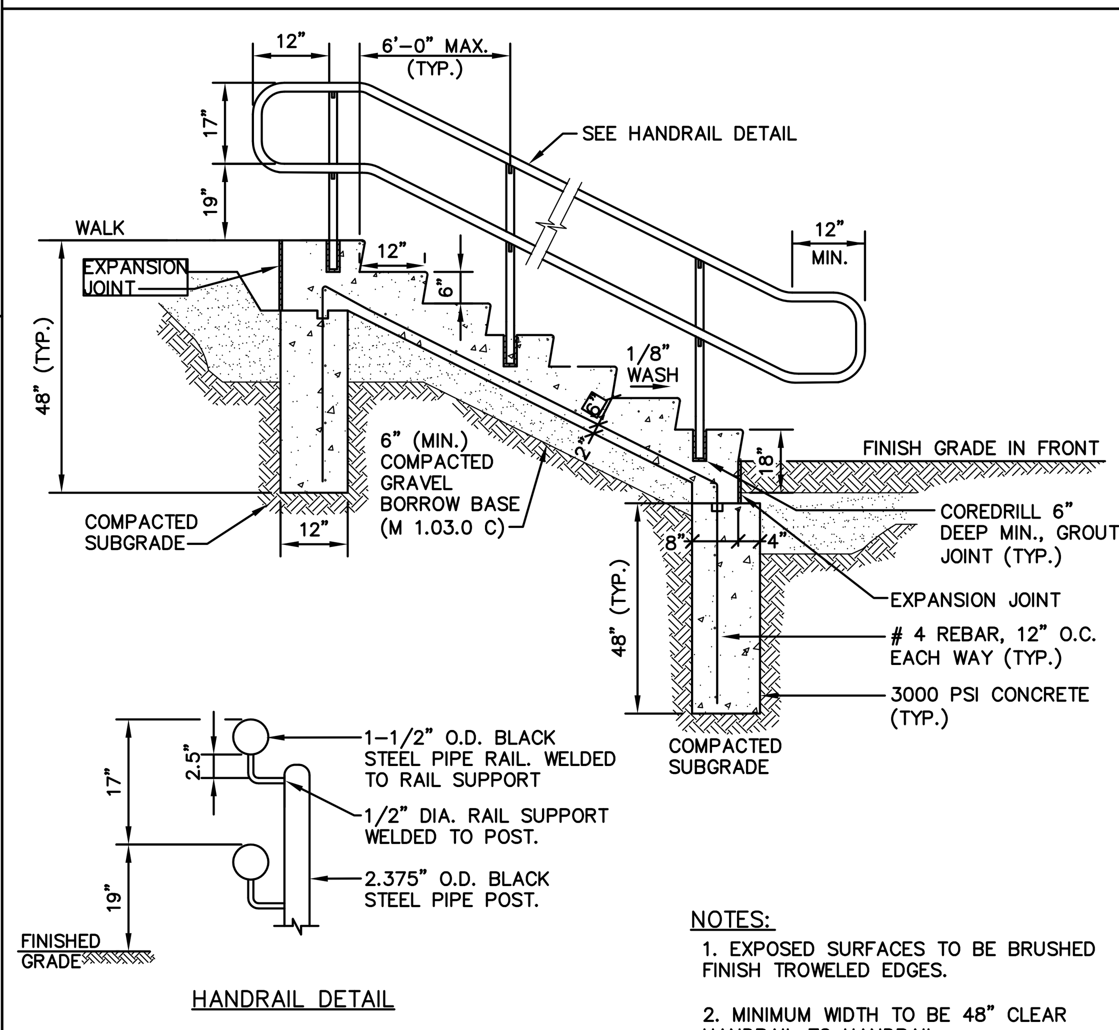
HANDRAIL DETAIL

NOTES:

1. EXPOSED SURFACES TO BE BRUSHED FINISH TROWELED EDGES.
2. MINIMUM WIDTH TO BE 48" CLEAR HANDRAIL TO HANDRAIL.

MULTI–TIER RAMP

SCALE: NONE

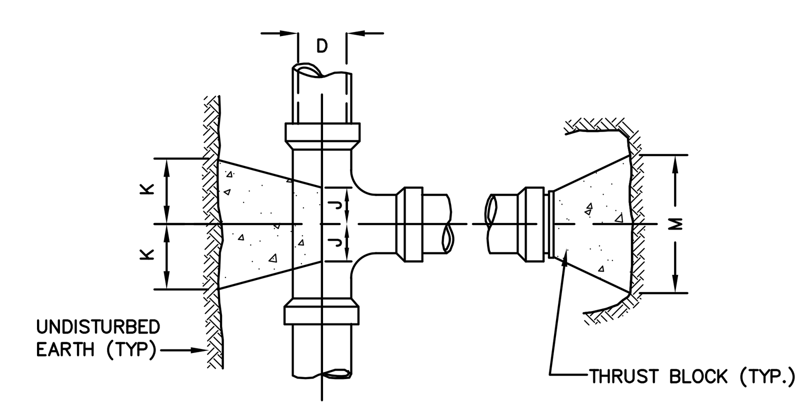


NOTES:

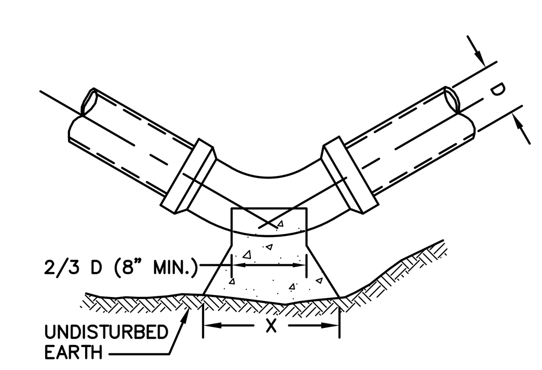
1. EXPOSED SURFACES TO BE BRUSHED FINISH TROWELED EDGES.
2. MINIMUM WIDTH TO BE 48" CLEAR HANDRAIL TO HANDRAIL.

CONCRETE STAIRS

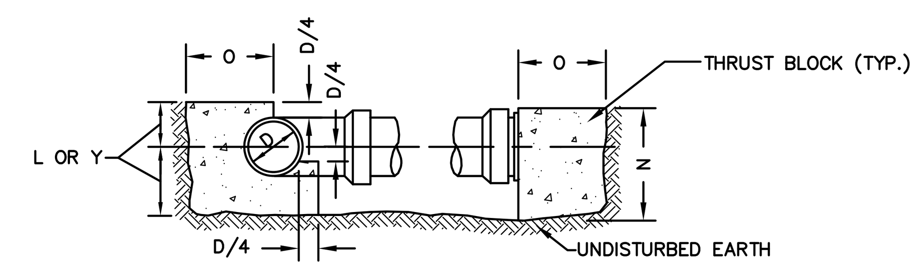
SCALE: NONE



PLAN – TEE AND PLUG



PLAN – HORIZ. AND VERT. BEND



TYPICAL SECTION

TEES, BENDS AND PLUGS

SIZE OF BRANCH	J	K	L	M	N	O
4" THRU 8"	10"	10"	1'-0"	2'-0"	1'-6"	10"
10" THRU 16"	1'-0"	1'-6"	1'-8"	3'-10"	2'-10"	1'-6"
24"	1'-4"	2'-0"	2'-6"	5'-0"	3'-6"	1'-8"

TEES AND PLUGS

	90 & 45 BENDS			22 1/2 & 11 1/4		
D	4"TO8"	10"TO16"	24"	4"TO 8"	10"TO16"	24"
X	1'-8"	3'-4"	3'-6"	1'-4"	2'-0"	3'-6"
Y	1'-2"	1'-8"	2'-4"	1'-0"	1'-2"	2'-4"

BENDS

NOTES:

1. PROVIDE 3000 PSI CONCRETE THRUST BLOCKS AT ALL BENDS, DEAD ENDS, & TEES UNLESS OTHERWISE DIRECTED. CONCRETE FOR ALL THRUST BLOCKS TO BE PLACED AGAINST FIRM, UNDISTURBED SOIL. PROVIDE APPROVED ANCHOR HARNESS RODS & SOCKET CLAMPS AS SPECIFIED & IN ACCORDANCE WITH PIPE MANUFACTURERS RECOMMENDATIONS WHERE SOIL HAS BEEN DISTURBED OR THRUST BLOCKS CANNOT BE USED, AS DIRECTED BY THE ENGINEER.
2. ALL SOCKET CLAMP METAL SHALL BE COATED WITH BLACK ASPHALTUM OR OTHER WATER DEPARTMENT APPROVED COATINGS.
3. CONCRETE THRUST BLOCKS POURED BEHIND 3-WAY TEE & HYDRANT SHOE TO BE USED WITH SOCKET CLAMPS.
4. NO CONCRETE SHALL COVER PIPE JOINTS, FITTING JOINTS, BOLTS OR HYDRANT DRAINS.

CONCRETE THRUST BLOCK FOR PRESSURE PIPE

SCALE: NONE

ISSUED FOR PERMITTING
NOT FOR CONSTRUCTION

PROFESSIONAL ENGINEER | DATE

THORNDIKE PLACE

DOROTHY ROAD

IN

ARLINGTON MASSACHUSETTS

(MIDDLESEX COUNTY)

CIVIL & LANDSCAPE DETAILS

MARCH 13, 2020

REVISIONS:

NO.	DATE	DESC.
1	9/18/20	NEW BUILDING FOOTPRINT
2	11/03/20	REVISED BUILDING

PREPARED FOR:

ARLINGTON LAND REALTY, LLC
84 SHERMAN STREET, 2ND FLOOR
CAMBRIDGE, MA 02140

BSC GROUP
803 Summer Street
Boston, Massachusetts
02127
617 896 4300

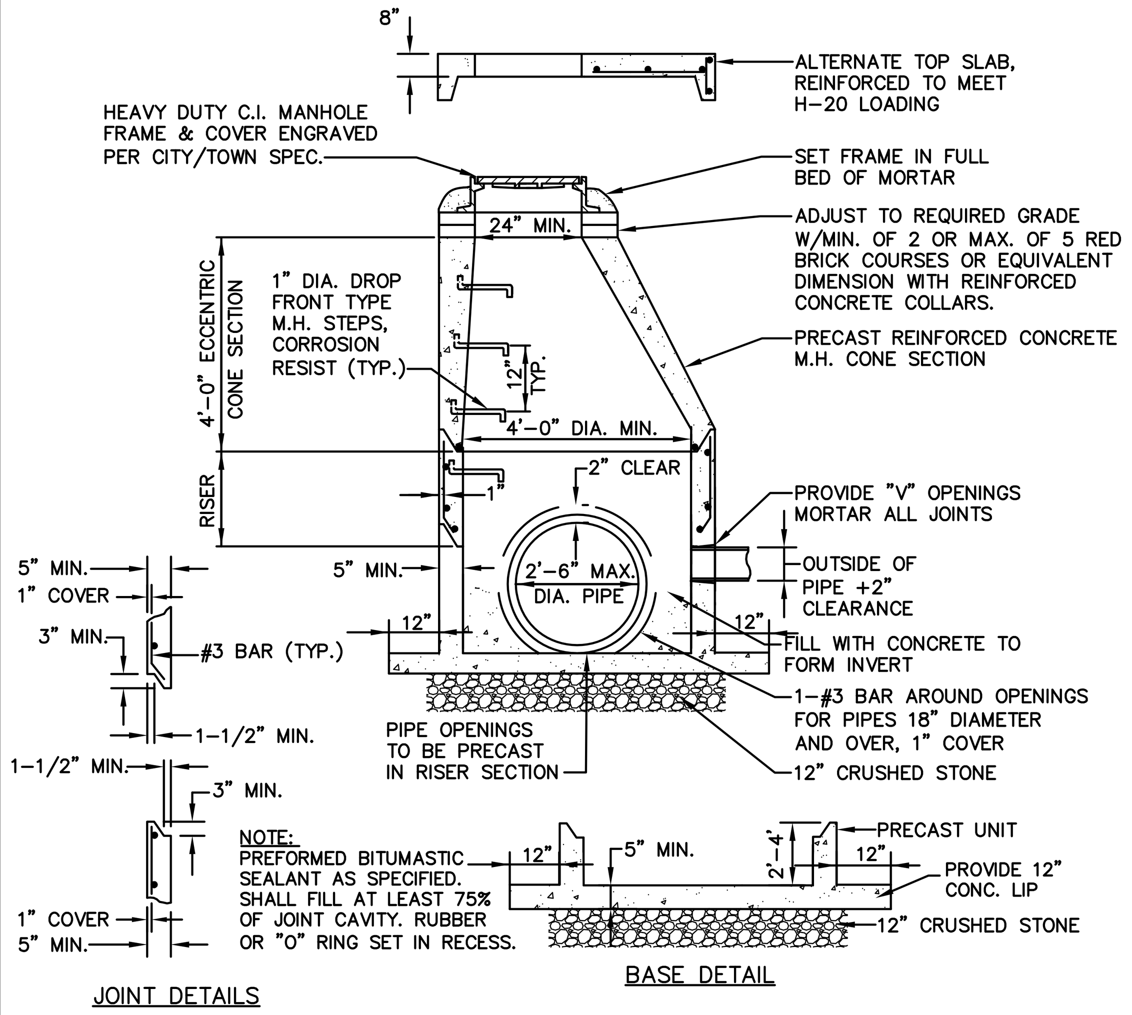
SCALE: AS NOTED

FILE: 2340700\C\D\2340700–DET

DWG.:

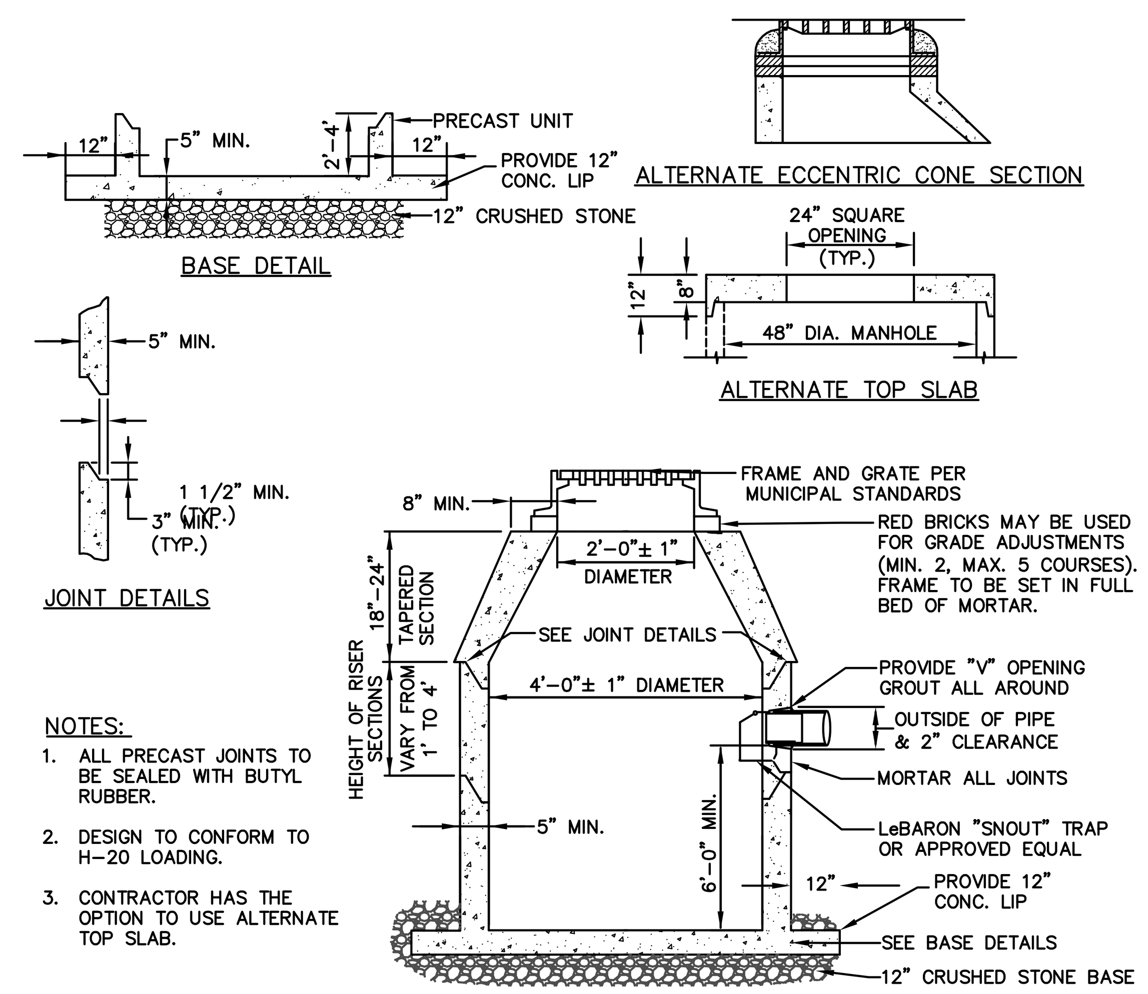
JOB. NO: 23407.00

SHEET C–201



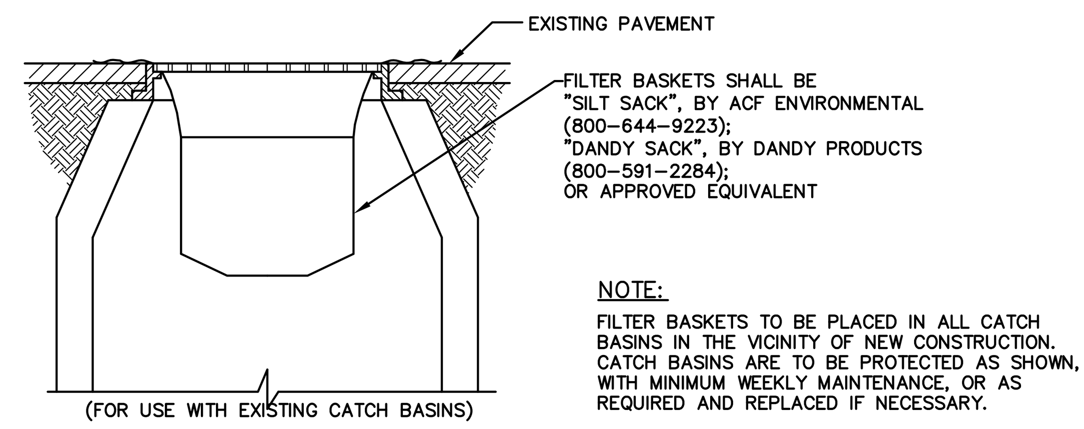
PRECAST CONCRETE DRAIN MANHOLE

SCALE: NONE



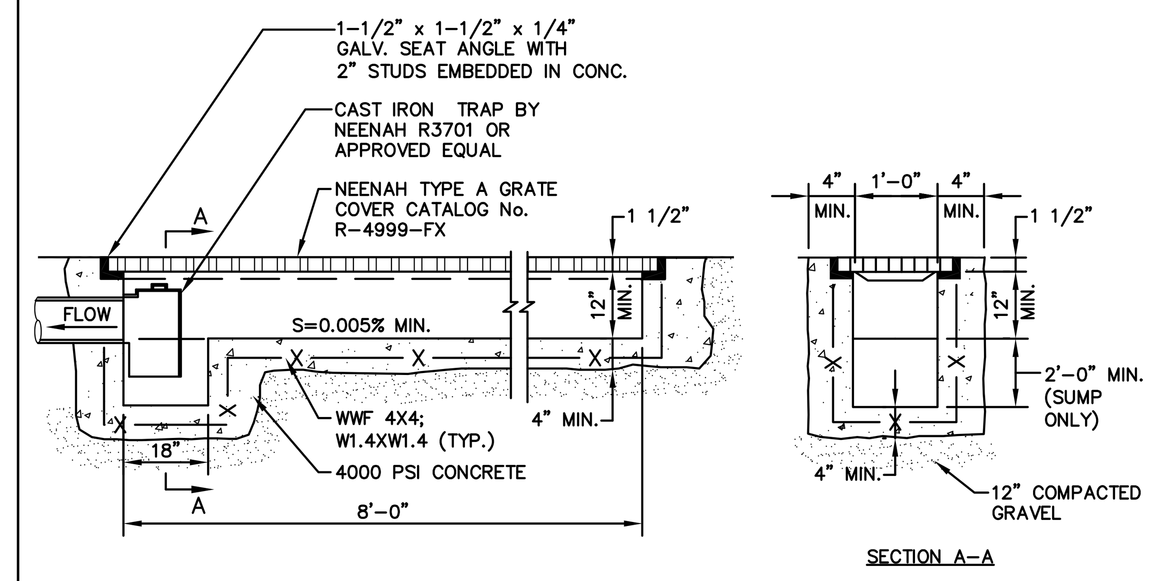
PRECAST CONCRETE CATCH BASIN

SCALE: NONE



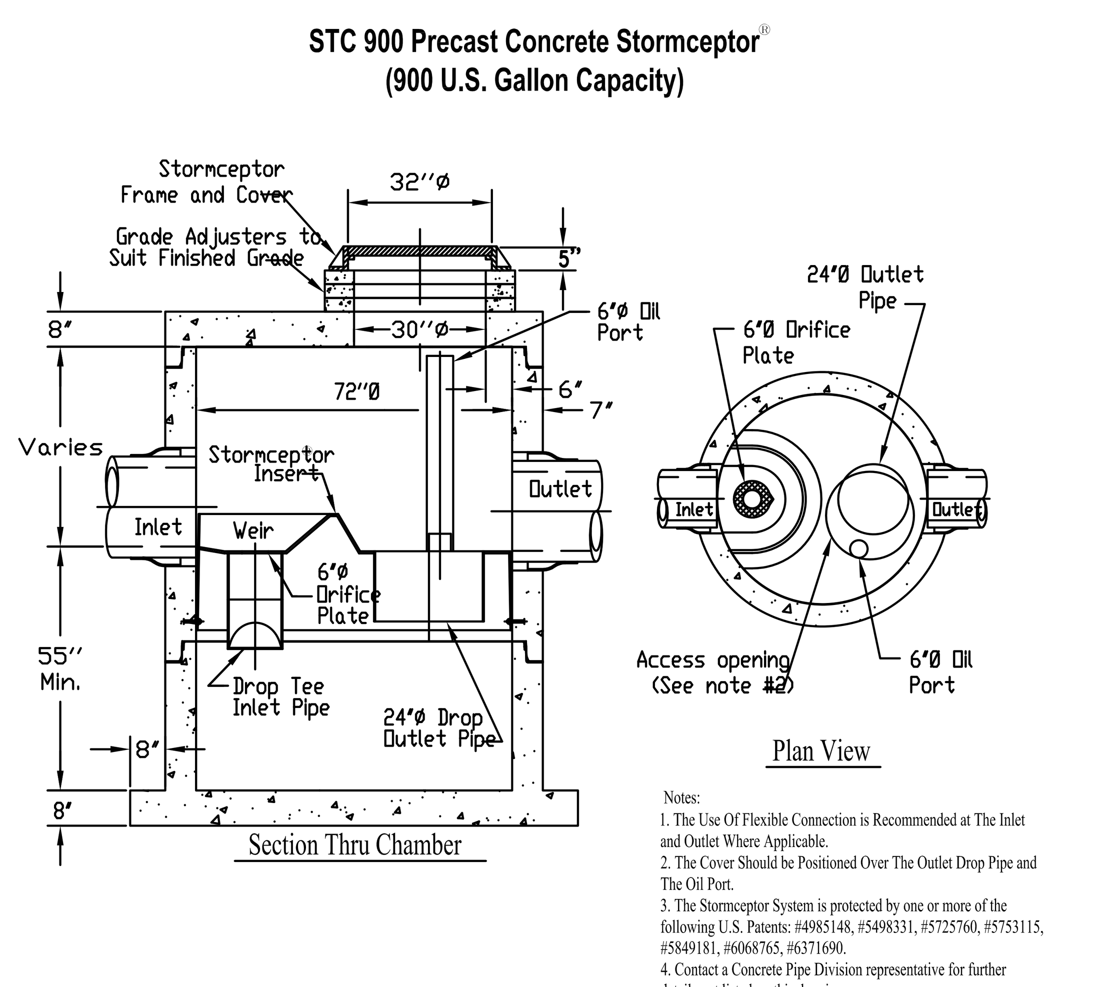
CATCH BASIN INLET PROTECTION

SCALE: NONE



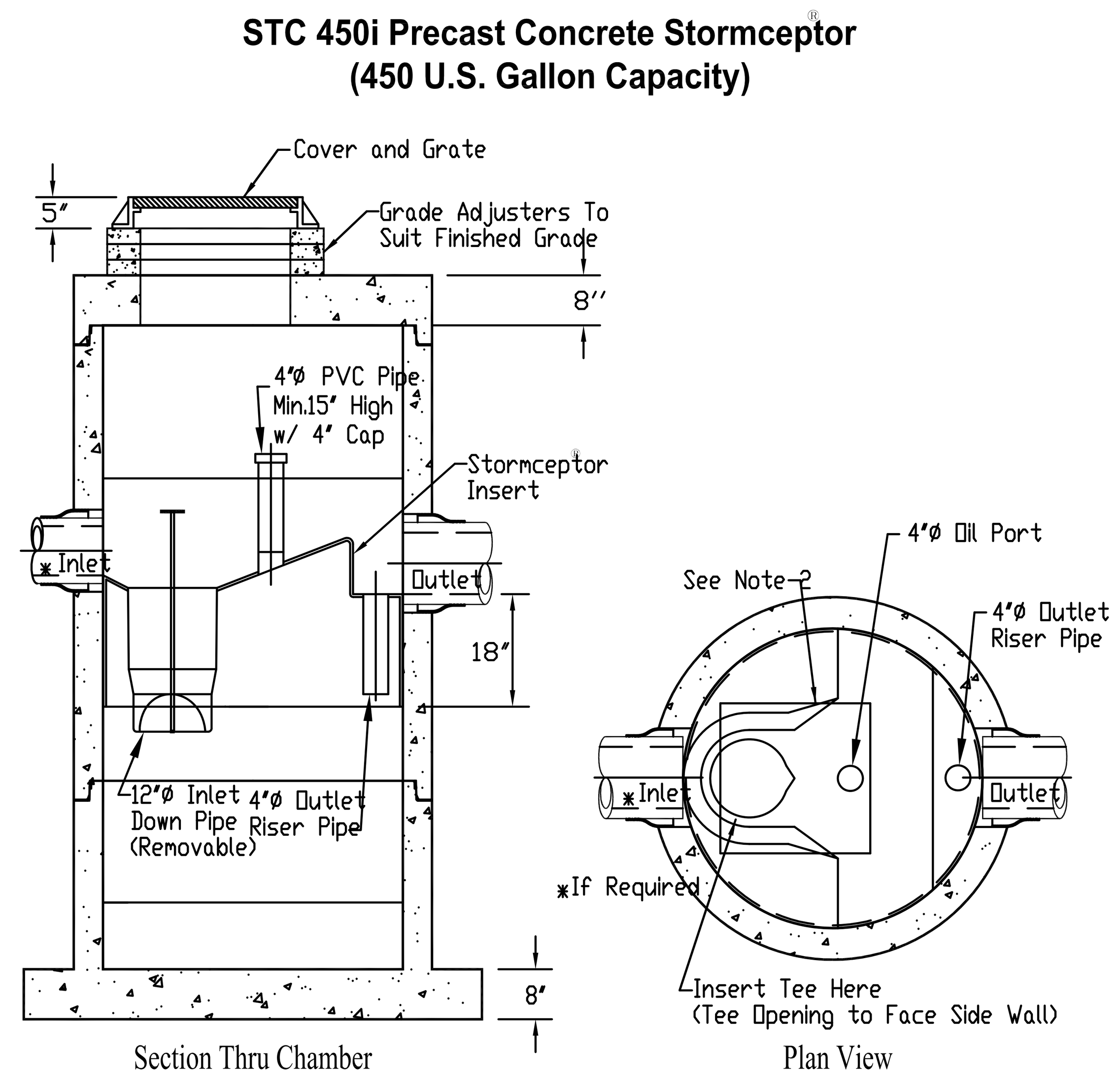
CAST IN PLACE CONCRETE TRENCH DRAIN

SCALE: NONE



WATER QUALITY UNIT (STORMCEPTOR OR APPROVED EQUAL)

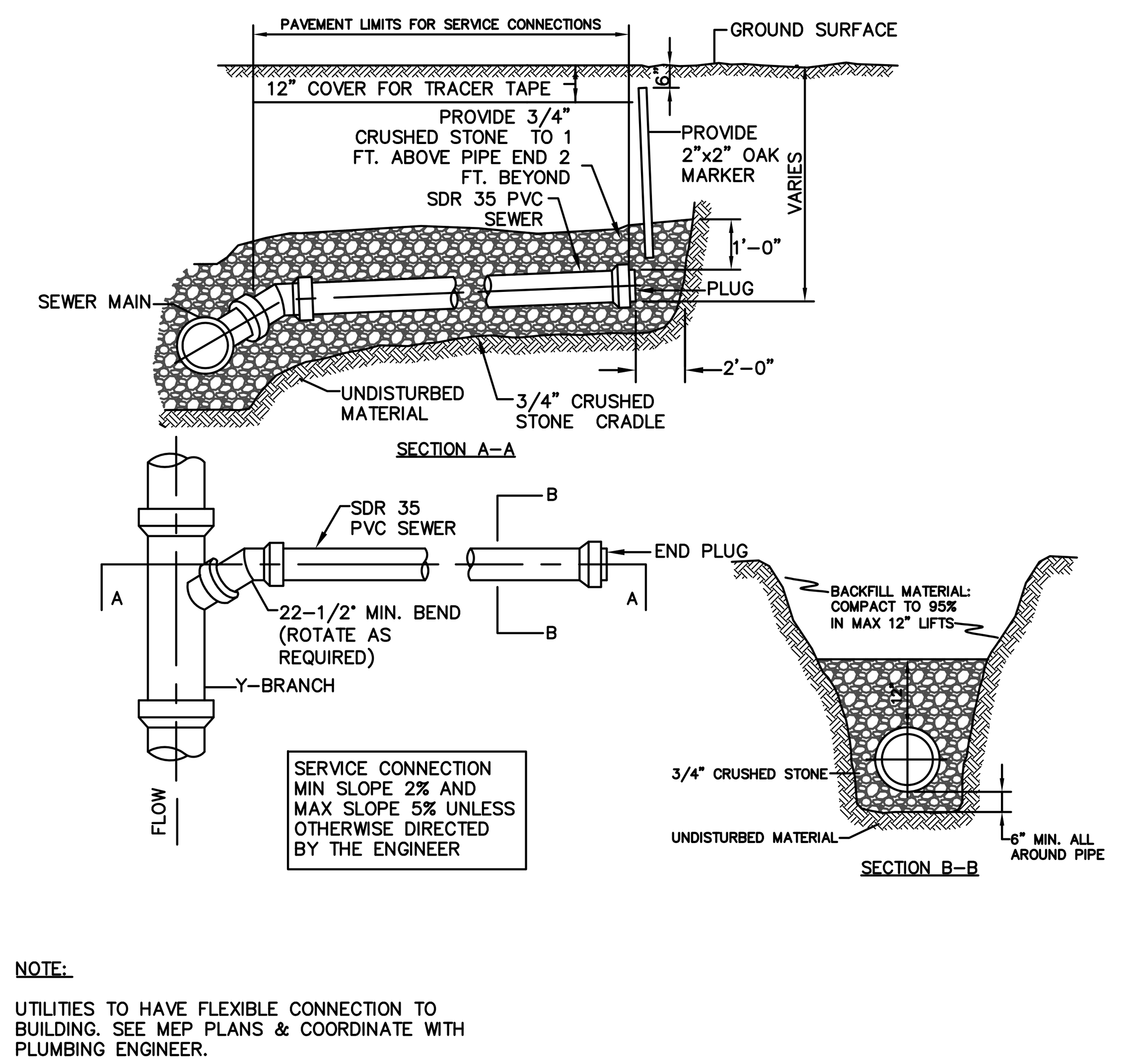
SCALE: NONE



Notes:
1. The Use Of Flexible Connection is Recommended at The Inlet and Outlet Where Applicable.
2. The Cover Should be Positioned Over The Inlet Drop Pipe and The Oil Port.
3. The Stormceptor System is protected by one or more of the following U.S. Patents: #4985148, #5498331, #5725760, #5753115, #5849181, #6068765, #6371690.
4. Contact a Concrete Pipe Division representative for further details not listed on this drawing.

WATER QUALITY CATCH BASIN (STORMCEPTOR 450i OR APPROVED EQUAL)

SCALE: NONE

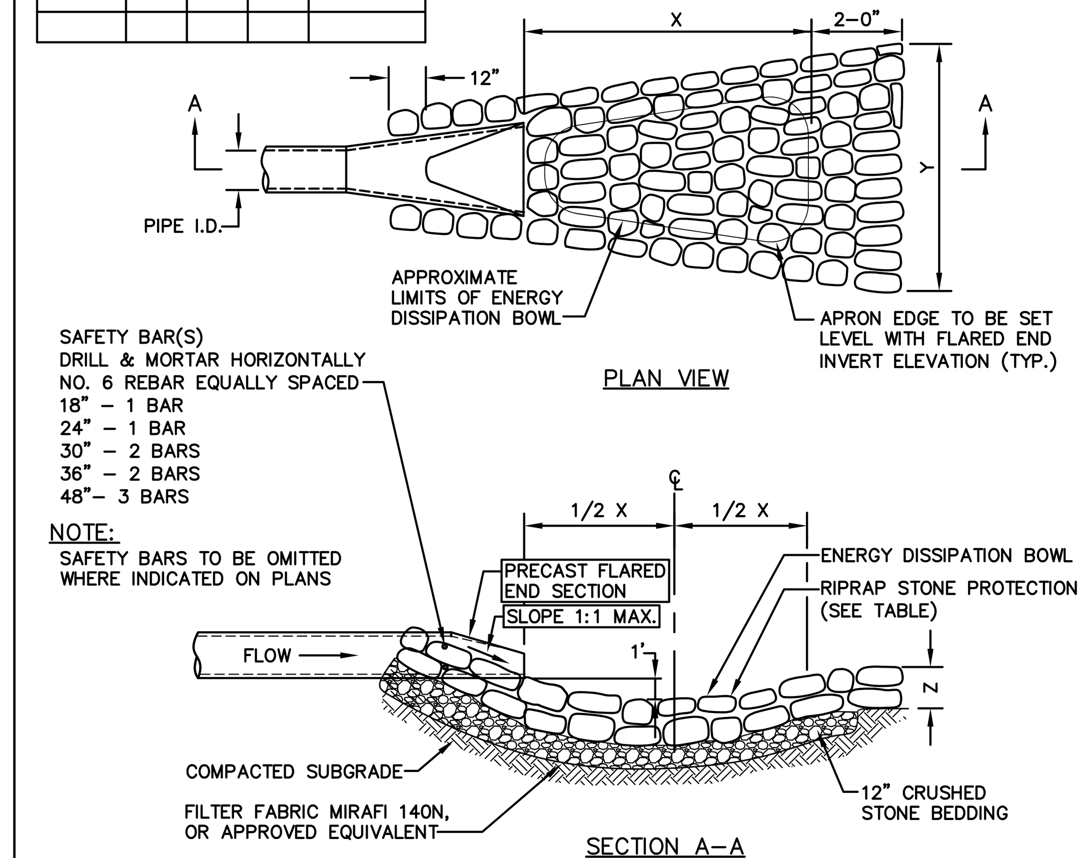


NOTE:
UTILITIES TO HAVE FLEXIBLE CONNECTION TO BUILDING. SEE MEP PLANS & COORDINATE WITH PLUMBING ENGINEER.

BUILDING SEWER SERVICE CONNECTION

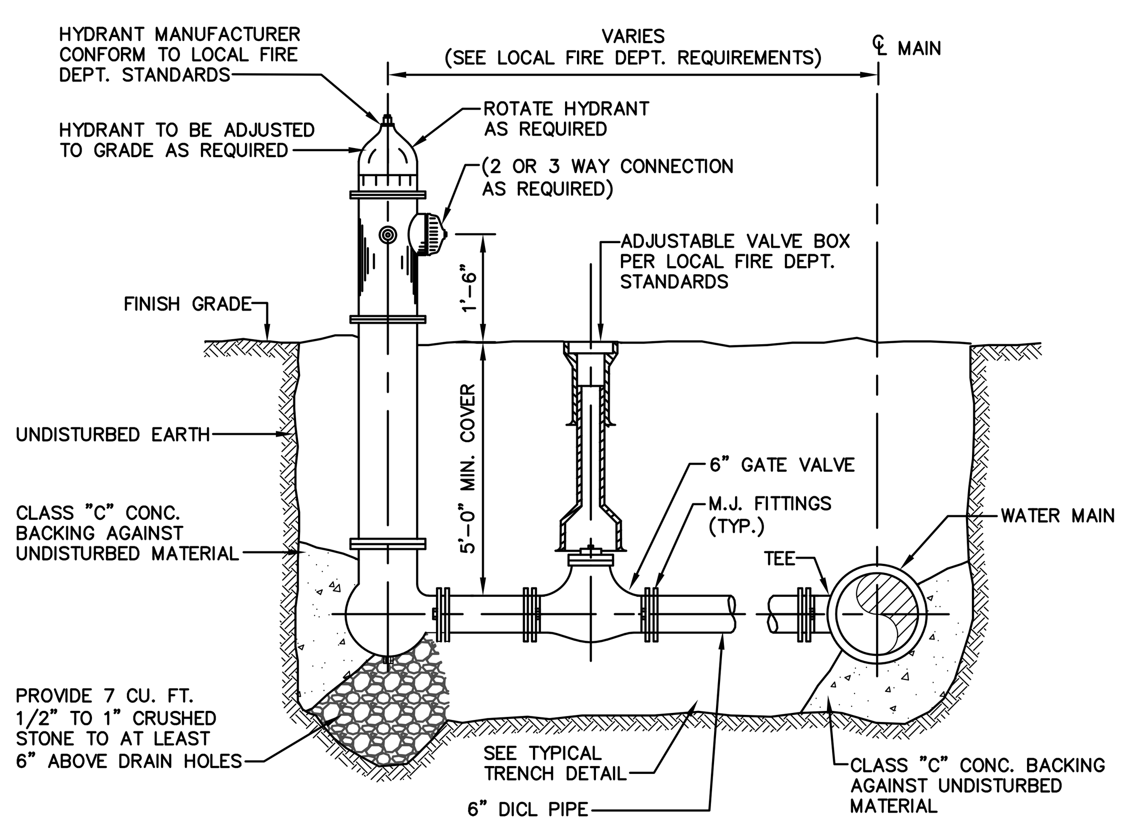
SCALE: NONE

OUTLET NO.	X	Y	Z	STONE DIA. (D50)



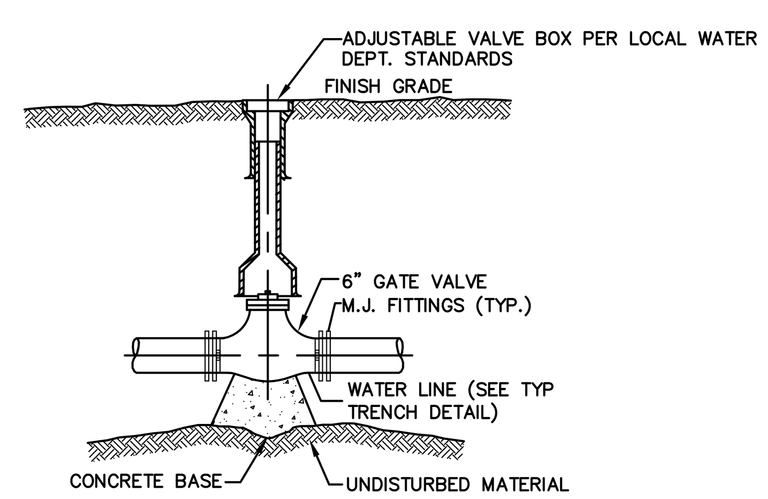
FLARED END SECTION W/ STONE PROTECTION (DISSIPATION BOWL)

SCALE: NONE



FIRE HYDRANT & VALVE

SCALE: NONE



GATE VALVE

SCALE: NONE

ISSUED FOR PERMITTING
NOT FOR CONSTRUCTION

PROFESSIONAL ENGINEER | DATE

THORNDIKE PLACE

DOROTHY ROAD
IN
ARLINGTON MASSACHUSETTS
(MIDDLESEX COUNTY)

CIVIL & LANDSCAPE DETAILS

MARCH 13, 2020

REVISIONS:

NO.	DATE	DESC.
1	9/18/20	NEW BUILDING FOOTPRINT
2	11/03/20	REVISED BUILDING

PREPARED FOR:
ARLINGTON LAND REALTY, LLC
84 SHERMAN STREET, 2ND FLOOR
CAMBRIDGE, MA 02140

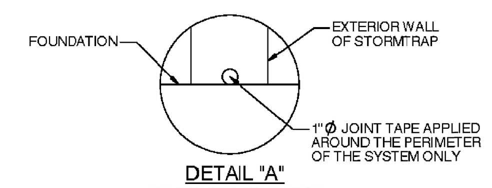
BSC GROUP
803 Summer Street
Boston, Massachusetts
02127
617 896 4300

SCALE: AS NOTED

FILE: 2340700\C\D\2340700-DET
DWG.:
JOB. NO: 23407.00
SHEET C-202

STORMTRAP INSTALLATION SPECIFICATION

1. STORMTRAP MODULES SHALL BE MANUFACTURED ACCORDING TO SHOP DRAWINGS APPROVED BY THE INSTALLING CONTRACTOR AND ENGINEER. THE SHOP DRAWINGS SHALL INDICATE SIZE AND LOCATION OF ROOF OPENINGS AND INLET/ OUTLET PIPE OPENINGS.
2. STORMTRAP SHALL BE INSTALLED IN ACCORDANCE WITH ASTM C891-09, STANDARD PRACTICE FOR INSTALLATION OF UNDERGROUND PRE-CAST CONCRETE UTILITY STRUCTURES. THE FOLLOWING ADDITIONS AND/OR EXCEPTIONS SHALL APPLY:
   - A. SPECIFICATIONS ON THE ENGINEER'S DRAWINGS SHALL TAKE PRECEDENCE.
   - B. STORMTRAP MODULES SHALL BE PLACED ON LEVEL FOUNDATION (SEE SHEET 3.1) WITH A 1'-0" OVERHANG ON ALL SIDES THAT SHALL BE POURED IN PLACE BY INSTALLING CONTRACTOR.
   - C. THE STORMTRAP MODULES SHALL BE PLACED SUCH THAT THE MAXIMUM SPACE BETWEEN ADJACENT MODULES DOES NOT EXCEED 3/4". IF THE SPACE EXCEEDS 3/4", THE MODULES SHALL BE RESET WITH APPROPRIATE ADJUSTMENT MADE TO LINE AND GRADE TO BRING THE SPACE INTO SPECIFICATION.
   - D. THE PERIMETER HORIZONTAL JOINT OF THE STORMTRAP MODULES SHALL BE SEALED TO THE FOUNDATION WITH PREFORMED MASTIC JOINT SEALER ACCORDING TO ASTM C891-09, 8.8 AND 8.12. SEE DETAIL "A".
   - E. ALL EXTERIOR JOINTS BETWEEN ADJACENT STORMTRAP MODULES SHALL BE SEALED WITH PRE-FORMED, COLD-APPLIED, SELF-ADHERING ELASTOMERIC RESIN BONDED TO A WOVEN HIGHLY PUNCTURE RESISTANT POLYMER WRAP CONFORMING TO ASTM C891-09 AND SHALL BE 0'-8" INTEGRATED PRIMER SEALANT AS APPROVED BY STORMTRAP. THE ADHESIVE EXTERIOR JOINT WRAP SHALL BE INSTALLED ACCORDING TO THE FOLLOWING INSTALLATION INSTRUCTIONS:
     1. USE A BRUSH OR WET CLOTH TO THOROUGHLY CLEAN THE OUTSIDE SURFACE AT THE POINT WHERE THE JOINT WRAP IS TO BE APPLIED.
     2. A RELEASE PAPER PROTECTS THE ADHESIVE SIDE OF THE JOINT WRAP. PLACE THE ADHESIVE TAPE (BUTYL SIDE DOWN) AROUND THE STRUCTURE, REMOVING THE RELEASE PAPER AS YOU GO. PRESS THE JOINT WRAP FIRMLY AGAINST THE STORMTRAP MODULE SURFACE WHEN APPLYING.
   - F. THE FILL PLACED AROUND THE STORMTRAP UNITS MUST BE DEPOSITED ON BOTH SIDES AT THE SAME TIME AND TO APPROXIMATELY THE SAME ELEVATION. AT NO TIME SHALL THE FILL BEHIND ONE SIDE WALL BE MORE THAN 2'-0" HIGHER THAN THE FILL ON THE OPPOSITE SIDE. BACKFILL SHALL BE COMPACTED TO 95% STANDARD PROCTOR DENSITY OR OTHERWISE SPECIFIED BY ENGINEER. CARE SHALL BE TAKEN TO PREVENT ANY WEDGING ACTION AGAINST THE STRUCTURE, AND ALL SLOPES BOUNDING OR WITHIN THE AREA TO BE BACKFILLED MUST BE STEPPED OR SERRATED TO PREVENT WEDGE ACTION. (REFERENCE ARTICLE 502.10 I.D.O.T. S.S.R.B.C.) CARE SHALL ALSO BE TAKEN AS NOT TO DISRUPT THE JOINT WRAP FROM THE JOINT DURING THE BACKFILL PROCESS. BACKFILL MATERIAL SHALL BE CLEAN, CRUSHED, ANGULAR No.5 (AASHTO M43) AGGREGATE.



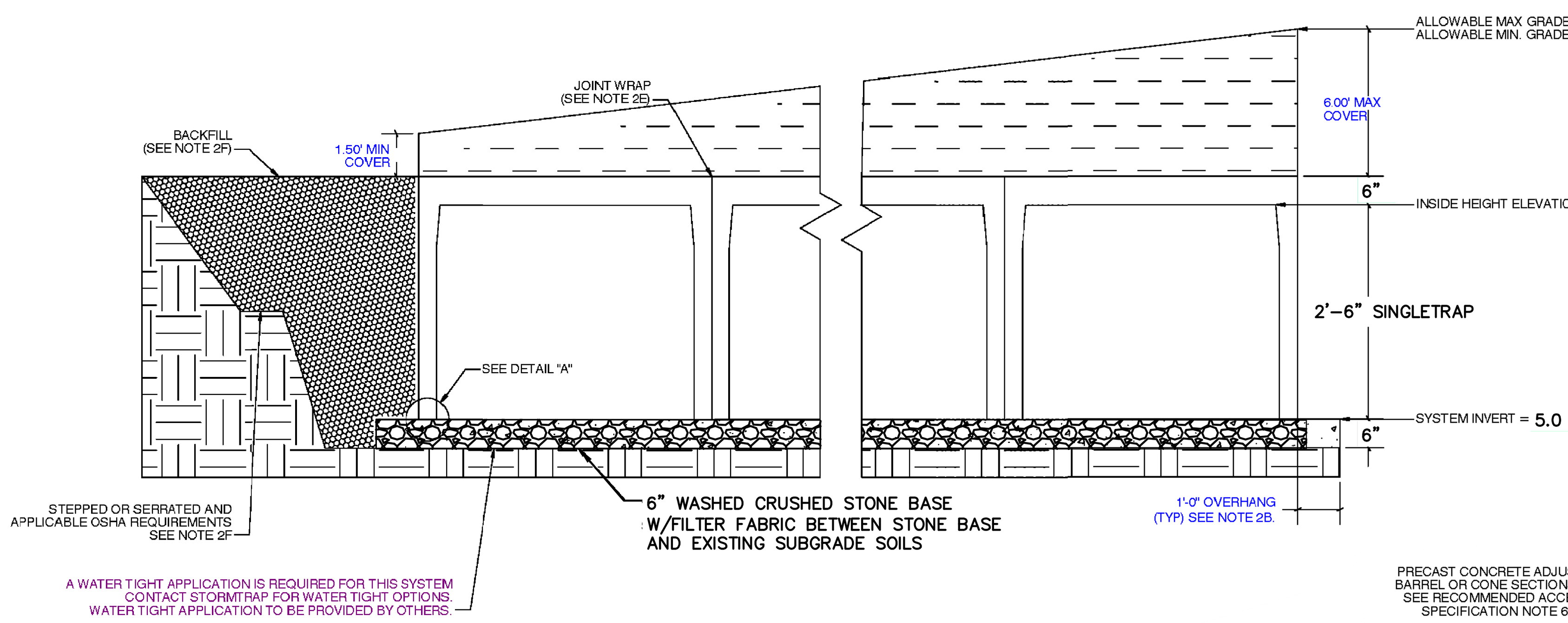
DETAIL "A"
JOINT TAPE INSTALLATION

RECOMMENDED PIPE OPENING SPECIFICATION

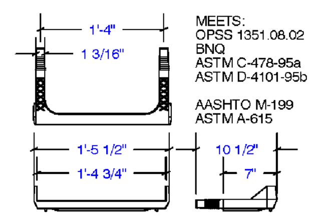
1. PIPE OPENINGS SHALL MAINTAIN A MINIMUM 1'-0" OF CLEARANCE FROM A VERTICAL EDGE OF THE STORMTRAP UNIT.
2. MAXIMUM OPENING SIZE TO BE DETERMINED BY UNIT HEIGHT. PREFERRED OPENING SIZE Ø36" OR LESS. ANY OPENING NEEDED THAT DOES NOT FIT THIS CRITERIA SHALL BE BROUGHT TO THE ATTENTION OF STORMTRAP FOR REVIEW.
3. CONNECTING PIPES SHALL BE INSTALLED WITH A 1'-0" CONCRETE COLLAR, AND A AGGREGATE CRADLE FOR AT LEAST ONE PIPE LENGTH, AS SHOWN. A STRUCTURAL GRADE CONCRETE OR GROUT WITH A MINIMUM 28 DAY COMPRESSIVE STRENGTH OF 3000 PSI SHALL BE USED.
4. THE ANNULAR SPACE BETWEEN THE PIPE AND THE HOLE SHALL BE FILLED WITH NON-SHRINK GROUT.

RECOMMENDED PIPE INSTALLATION INSTRUCTIONS

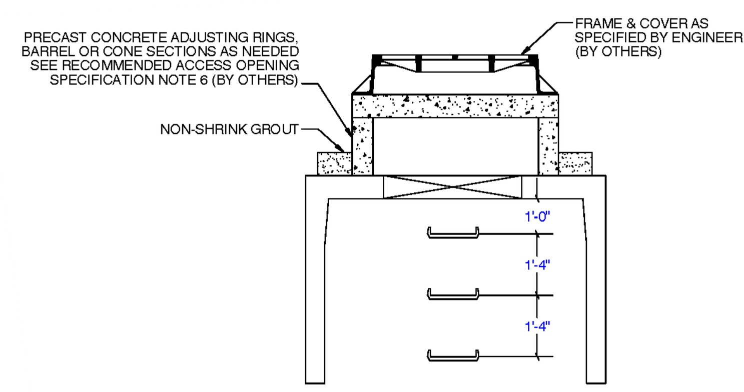
1. CLEAN AND LIGHTLY LUBRICATE ALL OF PIPE TO BE INSERTED INTO STORMTRAP.
2. IF PIPE IS CUT, CARE SHOULD BE TAKEN TO ALLOW NO SHARP EDGES. BEVEL AND LUBRICATE LEAD END OF PIPE.
3. ALIGN CENTER OF PIPE TO CORRECT ELEVATION AND INSERT INTO OPENING.



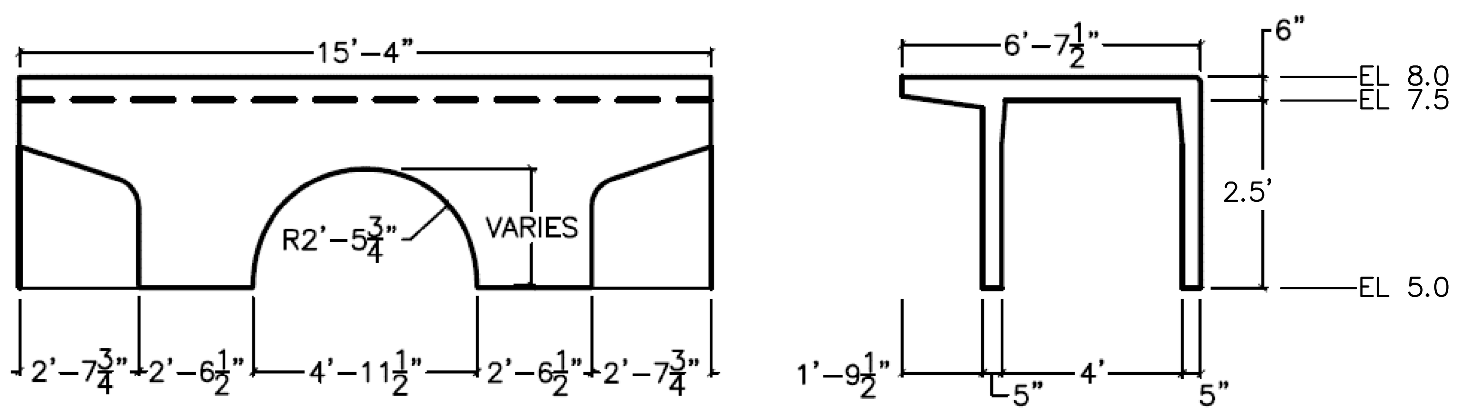
2'-6" SINGLETRAP



STEP DETAIL



RISER / STAIR DETAIL



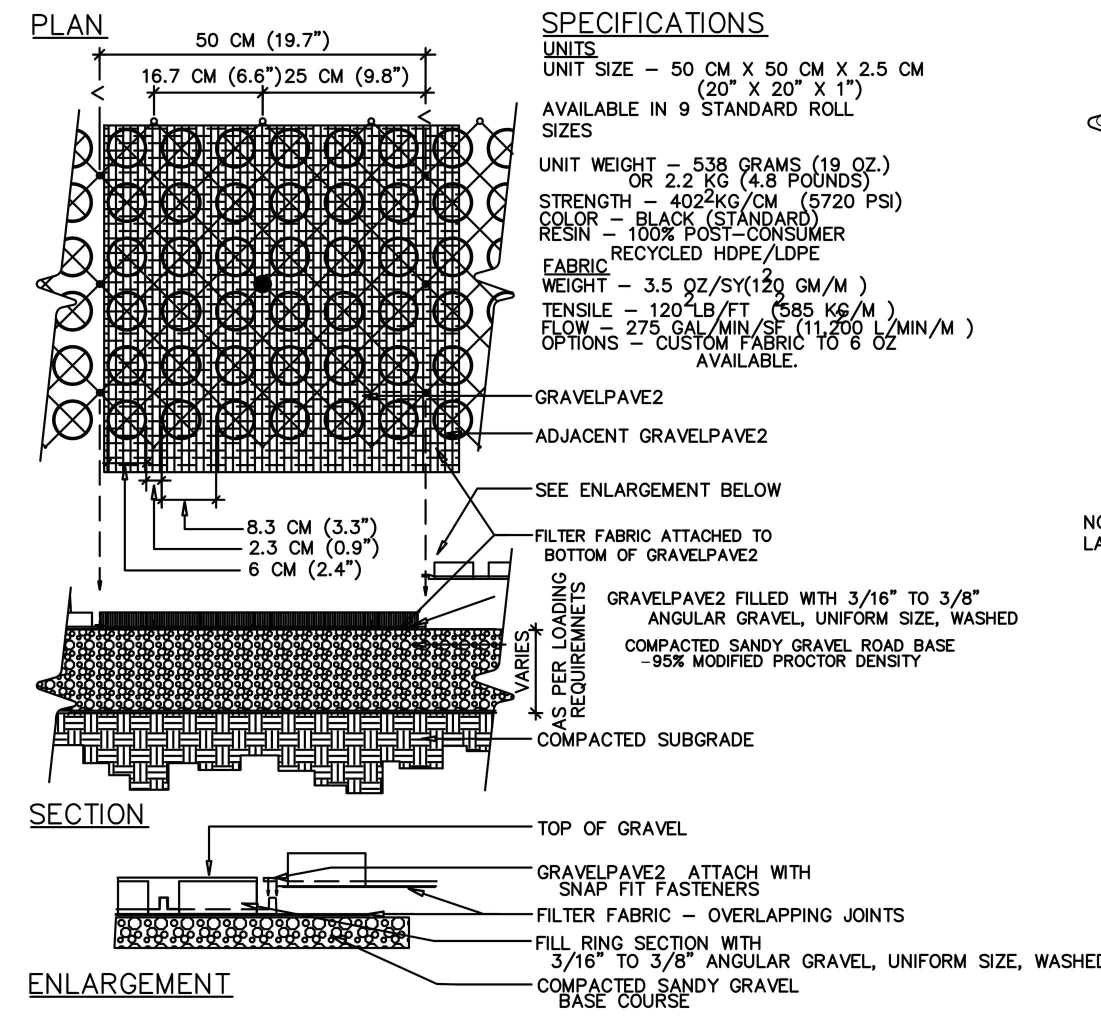
STORMTRAP SINGLE TRAP (SECTION VIEW)

RECOMMENDED ACCESS OPENING SPECIFICATION

1. TYPICAL ACCESS OPENINGS FOR THE STORMTRAP SYSTEM ARE 2'-0" IN DIAMETER. ACCESS OPENINGS LARGER THAN 2'-0" IN DIAMETER NEED TO BE APPROVED BY STORMTRAP. ALL OPENINGS MUST RETAIN AT LEAST 1'-0" OF CLEARANCE IN ALL DIRECTIONS FROM THE EDGE OF THE STORMTRAP UNITS.
2. PLASTIC COATED STEEL STEPS PRODUCED BY M.A. INDUSTRIES PART #PS3-PFC (SEE DETAIL TO THE RIGHT) ARE PROVIDED INSIDE ANY UNIT WHERE DEEMED NECESSARY. THE HIGHEST STEP IN THE UNIT IS TO BE PLACED A DISTANCE OF 1'-0" FROM THE INSIDE EDGE OF THE STORMTRAP UNITS. ALL ENSUING STEPS SHALL BE PLACED WITH A MAXIMUM DISTANCE OF 1'-4" BETWEEN THEM. STEPS MAY BE MOVED OR ALTERED TO AVOID OPENINGS OR OTHER IRREGULARITIES IN THE UNIT.
3. STORMTRAP LIFTING INSERTS MAY BE RELOCATED TO COINCIDE WITH THE ACCESS OPENING OR THE CENTER OF GRAVITY OF THE UNIT AS NEEDED.
4. STORMTRAP ACCESS OPENINGS MAY BE RELOCATED TO AVOID INTERFERENCE WITH INLET AND/OR OUTLET PIPE OPENINGS SO PLACEMENT OF STEPS IS ATTAINABLE.
5. ACCESS OPENINGS SHOULD BE LOCATED IN ORDER MEET THE APPROPRIATE MUNICIPAL REQUIREMENTS. STORMTRAP RECOMMENDS AT LEAST ONE ACCESS OPENING PER SYSTEM FOR ACCESS AND INSPECTION.
6. USE PRECAST ADJUSTING RINGS AS NEEDED TO MEET GRADE. STORMTRAP RECOMMENDS FOR COVER OVER 2' TO USE PRECAST BARREL OR CONE SECTIONS. (BY OTHERS)

UNDERGROUND INFILTRATION (STORMTRAP SINGLE TRAP OR APPROVED EQUAL)

SCALE: NONE



SPECIFICATIONS

UNITS
UNIT SIZE – 50 CM X 50 CM X 2.5 CM (20" X 20" X 1")
AVAILABLE IN 9 STANDARD ROLL SIZES

UNIT WEIGHT – 538 GRAMS (19 OZ.) OR 2.2 KG (4.8 POUNDS)
STRENGTH – 402 KG/CM^2 (5720 PSI)
COLOR – BLACK (STANDARD)
RESIN – 100% POST–CONSUMER RECYCLED HDPE/LDPE

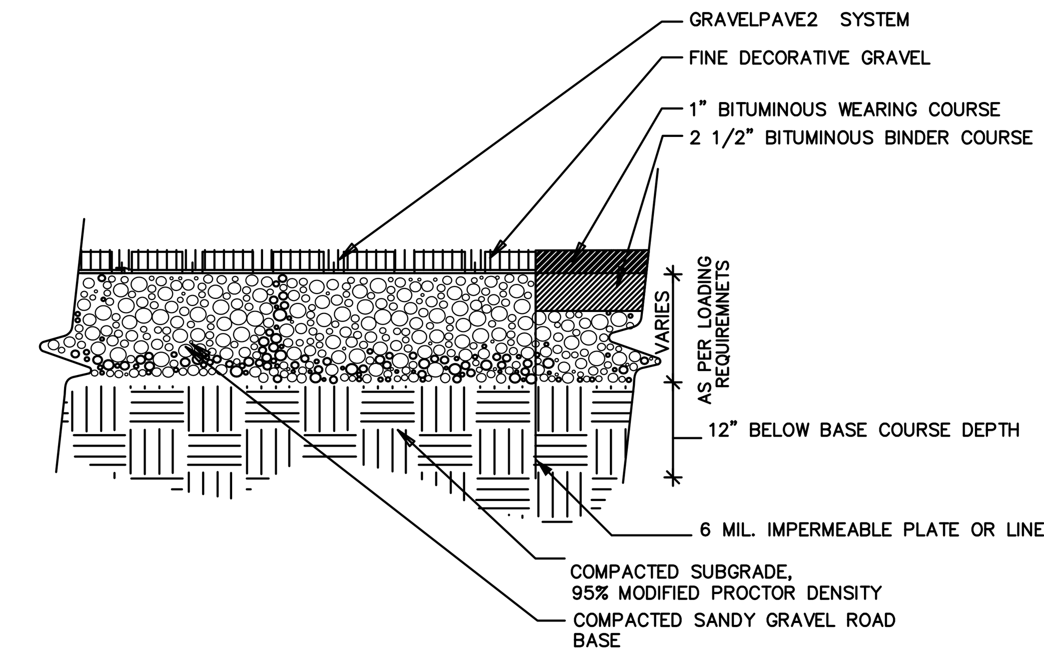
FABRIC
WEIGHT – 3.5 OZ/SY(120 GM/M^2)
TENSILE – 120 LB/FT^2 (585 KG/M^2)
FLOW – 275 GAL/MIN/SF (11,200 L/MIN/M^2)
OPTIONS – CUSTOM FABRIC TO 6 OZ AVAILABLE.

TYPICAL GRAVELPAVE2 DETAIL — 1 (1 OF 1)

NOT TO SCALE CHOOSE THIS PRODUCT FOR REINFORCING GRAVEL WEARING SURFACES

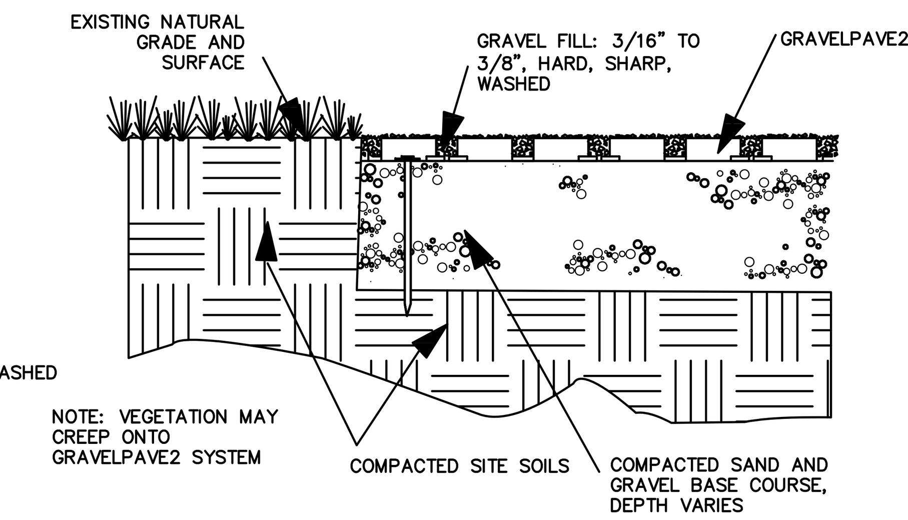
Invisible Structures, Inc.
Gvdet.dwg

1600 Jackson Street, SUITE 310
GOLDEN, COLORADO 80401
800-233-1510 OR 303-233-8383
FAX: 303-233-8282
Version 05/10



GRAVELPAVE2 AT ASPHALT EDGE

NOTE: GRASS/PLANT TYPES SHALL BE SPECIFIED BY A LANDSCAPE ARCHITECT OR LANDSCAPE DESIGNER



FLUSH, NATURAL (EXISTING) EDGING

ISSUED FOR PERMITTING
NOT FOR CONSTRUCTION

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JOB. NO: 23407.00
SHEET C–203

THORNDIKE PLACE
List of Requested Waivers

As required under 760 CMR 56.05(2)(h), the following is a list of Waivers to "Local Requirements and Regulations," including waivers from the Bylaws of the Town of Arlington (the "Bylaws") , including the Town of Arlington Zoning Bylaw, as amended (the "Zoning Bylaw"), and other Local Requirements and Regulations as defined under 760 CMR 56.02 of the Chapter 40B Regulations, including all local legislative, regulatory, or other actions which are more restrictive than state requirements, if any, including local zoning and wetlands ordinances, subdivision and board of health rules, and other local ordinances, codes, and regulations, in each case which are in effect on the date of the Project's application to the Board. In addition to the following list of requested Waivers listed below, the Applicant requests an exception from such provision or requirement of all Local Requirements and Regulations issued by a "Local Board" (defined under the Chapter 40B Regulations as means any local board or official, including, but not limited to any board of survey; board of health; planning board; conservation commission; historical commission; water, sewer, or other commission or district; fire, police, traffic, or other department; building inspector or similar official or board; city council, as well as all boards, regardless of their geographical jurisdiction or their source of authority [that is, including boards created by special acts of the legislature or by other legislative action] if such local board perform functions usually performed by locally created boards).

Pursuant to Chapter 40B rules described under 760 CMR 56.05(7), "[z]oning waivers are required solely from the "as-of-right" requirements of a zoning district where the project is located; there shall be no requirement to obtain waivers from the special permit requirements of the district." Accordingly, any waivers which reference special permit requirements are included only for illustration purposes.

This waiver list continues to be preliminary and, as such, will be revised within the Public Hearing. Prior to the Board's vote on the Comprehensive Permit application, a final waiver list shall be submitted and reflect waivers consistent with plans as revised within hearing process.

LIST OF WAIVERS/EXCEPTIONS

A. BY-LAWS OF THE TOWN OF ARLINGTON, MASSACHUSETTS (GENERAL BYLAWS)				
BY-LAW/REG.	TITLE	DESCRIPTION	REQUIRED	PROPOSED
Title III: Article I, Sections 1 and 2	Use of Streets for Construction or Demolition Materials	Work adjacent to public ways and use of ways to place building materials or rubbish, and related application and fee requirements.	Application, permits from Board of Public Works (or Town Engineer), bond and bond requirements.	Waiver, except that Applicant shall comply with all bonding requirements.
Title III: Article I, Section 20	Excavation in Streets and Sidewalks	Work in public ways, excavation and related application and fee requirements	Application, permits and fee.	Waiver of permit and 25% of fees.

Title V: Article 8 and Town Wetland Protection Regulations	Wetland Protection By-Law; Wetland Regulations of the Town of Arlington Conservation Commission (dated June 4, 2015)	Local Wetlands Bylaw and Related Regulations and Fees.	Procedures, jurisdictional requirements, applications, fees, costs, regulations, policies, and enforcement, consultant fees. Section 23: Subpart C: No activity within bordering land subject to flooding without written permission of Commission Subpart D: Compensatory flood storage to be at 2:1 ratio. Section 24: Provides vegetation in a resource area shall not be damaged, removed, extensively pruned without written approval and in-kind replacement. Section 25, Subpart D – work in outer 75 feet of AURA (Restricted Zone) to be subject to alternatives analysis.	Waived as may be necessary under Section 23; Section 24 and Section 25, Subpart D, to the extent that such may differ from Wetlands Protection Act requirements Project to be governed by a Wetlands Order of Conditions issued pursuant to the Massachusetts Wetlands Protection Act (MGL c. 131, s. 40) and State Wetlands Regulations at 310 CMR 10.00 Floodplain compensatory storage to be established at ratio of 2:1 – No waiver Replacement vegetation to be governed by landscaping plan included with Site Plans and governed by Comprehensive Permit. As depicted on Site Plans, small portion of exterior emergency access and limited area of subsurface parking within limited portion of outer AURA.. Waiver as to alternatives analysis.
Title V; Article 8, Section 16.B.11	Wetlands Consultant Fees	Consultant Fees		Waived

Title V: Article 15, Section 1-5	Stormwater Mitigation	Stormwater Management and permitting	Procedures, applications, Engineering Division review and approval, relief from DPW	Waived. . Stormwater will be managed in accordance with the MassDEP's Stormwater Policy and Technical Guidance, unless otherwise exempt. Stormwater to also be managed in accordance with a US EPA Stormwater Construction Permit for Massachusetts.
Title IX: Article 3, Sections 4A, 4B	Town Fees and Charges, Department of Community Safety and Office of Building Inspector.	Fees and charges.	Payment of fees related to fire safety, building permits, plan reviews, occupancy permits, plumbing permit, gas fitting, electrical	Waiver allowing for 25% reduction of fees (reflecting 25% of project as affordable).
Water Connection Fee Regulations	Water Privilege Fee	Fee for water connections		Waiver requested of 25% of fee (reflecting 25% of project as affordable).
Sewer Privilege Fee	Sewer Privilege Fee	Fee for connection to public sewer system		Waiver requested of 25% of fee (reflecting 25% of project as affordable).

B. TOWN OF ARLINGTON ZONING BYLAWS (AS AMENDED THROUGH APRIL 2015)				
BY-LAW/REG.	TITLE	DESCRIPTION	REQUIRED	PROPOSED
Article 2	Definitions	Various definitions.	Various definitions applying to provisions under bylaws.	Waived in its entirety to the extent definitions vary and/or conflict with MGL c. 40B and the Site Plans.
Article 4.02	Application	Application of Zoning Bylaw	Except as herein provided, provisions of the [Zoning] Bylaw shall apply to the erection, construction, reconstruction, alteration or use of buildings, structures, use of land.	Waived; erection and construction of multifamily residential dwelling together with accessory uses thereto, including without limitation accessory parking (surface and underground), play area, terraces, landscaping and management office to be governed by Comprehensive Permit Decision.
Article 5, Sec. 5.01	Use Regulations	Applicability	Buildings, structures or land shall be used only as set forth in Article 5.	Waived so that the use of buildings, structures or land for multifamily residential dwelling and accessory uses thereto shall be used in accordance with Comprehensive Permit decision pursuant to G.L.c.40B.
Article 5, Sections 5.03, 5.04	Use Regulations	Uses subject to other regulations and Table of Use Regulations	Table at Section 5.04 permits as of right uses for single-family detached and two family, duplex house. Other residential uses, including apartment house, permitted by special permit; requires special permit for other accessory use customarily incidental to a permitted principal use. .	Waived to allow 176-unit multifamily residential uses, open space and residential accessory uses (e.g., residential auto and bicycle parking, play area, terraces, landscaping, management office) and signage in PUD District, to be governed by Comprehensive Permit decision pursuant to G.L. c.40B.

TOWN OF ARLINGTON ZONING BYLAWS (AS AMENDED THROUGH APRIL 2015) (cont.)				
BY-LAW/REG.	TITLE	DESCRIPTION	REQUIRED	PROPOSED
ARTICLE 6 – GENERAL REGULATIONS				
Article 6, Section 6.00 – Table of Dimensional and Density Regulations	Dimensional and Density Regulations	Table of Dimensional and Density Regulations	Regulates minimum lot size, frontage; maximum floor area; maximum lot coverage; min. lot area, lot depth (front, side and rear); maximum heights, minimum landscaped areas and usable open space.	Waived to allow Project to be constructed in accordance with dimensional requirements of zoning ordinance in PUD district except as waived herein and depicted on approved plans described within Comprehensive Permit decision.

TOWN OF ARLINGTON ZONING BYLAWS (AS AMENDED THROUGH APRIL 2015) (cont.)				
BY-LAW/REG.	TITLE	DESCRIPTION	REQUIRED	PROPOSED
Article 6, Sections 6.01, 6.03(a) and Table of Dimensional and Density Regulations, generally and applicable to PUD District (p.61 of zoning bylaw), and Sections 6.13, 6.21, 6.28	General (Dimensional and Density) Regulations and Table; Reduced Height Limits in Height Buffer Area; Planned Unit Development Yards and Setbacks	Lot Areas and Separation of Lots; spacing of a residential building on the same lot with another principal building; in PUD district establishes a lower (40') building height on parts of lot within defined height area buffer, with greater height allowed by special permit; and sets out setbacks to street lines and front, rear, side lot lines	PUD dimensional requirements: • 200,000 min. lot size; • .80 max FAR; • Max height: 85' (Residential uses to be no more than 5 floors)' • Minimum open space requirement in PUD of 10% landscaped and 10% usable; • Front, Side Rear Yards – 25' setback.	- Lot size = 769,359 SF – no waiver - FAR = .25 – no waiver - Height <85'/ 4 floors + garage. – no waiver - 41.3% landscaped open space – no waiver - 10.6% usable open space – no waiver - First yard: 25' – no waiver - Side yard: 36' – no waiver - Rear yard – 20.5' – to be waived.
-	Buildings in Floodplains	Dimensional and density regulations together with additional regulations of Section 11.04	Includes regulations within Section 6 and Section 11.04	Waived to the extent not consistent with Site Plans
Article 6, Section 6.10	Sale or Lease of Lots in a Planned Unit Development	Upon completion of environmental design review, tracts of land of at least 30,000 sf may be leased or sold for development in accordance with PUD site plan	Requires tracts within PUD development to have principal building, offstreet parking, open space or plaza as required as result of environmental design review under Section 11.06 of Bylaw.	Waiver of provisions, consistent with waiver of Section 11.06 environmental design review process; project to be governed by Comprehensive Permit decision and incorporated plans therein

TOWN OF ARLINGTON ZONING BYLAWS (AS AMENDED THROUGH APRIL 2015) (cont.)				
BY-LAW/REG.	TITLE	DESCRIPTION	REQUIRED	PROPOSED
Article 6, Section 6.30	Open Space Regulations for Planned Unit Developments	Sets out minimum open space within PUD district for apartment uses	Minimum open space for apartments in PUD district is 10% landscaped/10% usable open space	41.3% landscaped open space – no waiver 10.6% usable open space – no waiver
ARTICLE 8 – OFF STREET PARKING AND LOADING				
Article 8, Section 8.12.a(3)	Parking/Loading space standards – Minimum access aisle widths	Establishes minimum aisle widths for off street parking spaces	Minimum 24' aisle width of 90 deg angle parking	No waiver
Article 8, Section 8.12(b)(3)	Parking/Loading space standards	Location of parking areas	Parking not to be within required front yard.	Waiver to allow for parking area off Dorothy Road as shown on Site Plans.
ARTICLE 10: ADMINISTRATION AND ENFORCEMENT				Waived. Project governed by Comprehensive Permit.
Article 10, Section 10.02	Permit Required	Permits issued only in compliance with zoning bylaw.	No permit shall be issued if the building, structure or lot as constructed or used would be in violation of any provision of the Bylaw	Waiver so that construction and use of buildings and land be in accordance with the Comprehensive Permit decision.
Article 10, Section 10.11	Special Permits	Special Permit process	Special Permit required under Bylaw for review by ZBA or ARB (under Section 11.06) to review applications for Special Permits, including set of findings at 10.11(a)(1) and includes a two-year time period to make use of special permit.	ZBA review to adhere to Chapter 40B and 760 CMR 56.00 review standards, provisions for lapse of permits and single board (ZBA) review for local permitting of Comprehensive Permit application.

TOWN OF ARLINGTON ZONING BYLAWS (AS AMENDED THROUGH APRIL 2015) (cont.)				
BY-LAW/REG.	TITLE	DESCRIPTION	REQUIRED	PROPOSED
Article 10, Section 10.12	Variances	Variance review process	ZBA is empowered to grant variances of Bylaw in accordance with Section 10 of Chapter 40A.	Waiver; ZBA review to adhere to Chapter 40B and 760 CMR 56.00 review standards and to issue waivers of local regulation, bylaws or rules.
ARTICLE 11 **SPECIAL REGULATIONS**				
Article 11, Section 11.04(a)-(g)	Floodplain District	Governing regulations and special permit review by ZBA/ARB	Permit required for specific uses and structures; seeks to require compliance with Sections 11.04 and 11.05 of Bylaw and Wetlands Protection Bylaw (Title V, Art. 8 of Town Bylaws), in addition to State Law (MGL 131, 40) and State Regulations (310 CR 10.00) and State Building Code. Establishes special permit process for new buildings or earth movement in floodplain.	Waiver for special permit process/environmental design review and waiver of application of local wetlands bylaw (Title 5 of Article 8), rules or regulations and Section 11.05 of Zoning Bylaw. Project to be governed by Comprehensive Permit.
Article 11, Section 11.05(b), (d), (e), (f)	Inland Wetland District	Permit required for specific uses and structures.	Special Permit required for specific uses and structures.	To extent portions of property are within district, waiver given as Project governed by Comprehensive Permit. (For informational purposes, per 40B waivers are not required for special permit uses).

TOWN OF ARLINGTON ZONING BYLAWS (AS AMENDED THROUGH APRIL 2015) (cont.)				
BY-LAW/REG.	TITLE	DESCRIPTION	REQUIRED	PROPOSED
Article 11, Section 11.06(b), Section 11.06(d)(1), (4), (5), (6), and 11.06(e) and 11.06(f)	Environmental Design Review	Environmental design review and standards for projects including six or more dwelling units (11.06(b)(1)(b) or use within a PUD (Section 11.06(b)(2).	Uses subject to Section 11.06(b) may be allowed subject to special permit upon application to ARB to include materials set out in Section 11.06(d) as well as certified land surveyor survey plan of land and corner points of lot to be marked by monument or other physical demarcation. Before special permit to issue, public hearing before ARB. Review standards as contained in Section 11.06(f).	Waiver of Environmental Design Review (EDR), special permit application submittal, standards, and hearings before ARB. Waiver to include waiver from adherence to EDR submittal requirements of Section 11.06(d) and review standards of Section 11.06(e)/(f). Applicant proposes to submit to ZBA within review of Comprehensive Permit application modeling for project; waiver of environmental impact statement; waiver of sign applications; signage to comply with zoning bylaw and are to be depicted on final approved site plans, with exception of temporary construction signage as approved by Building Official from time of commencement of project to completion of construction.. Project review to be accordance with public hearing process as established under MGL c.40B and its regulations at 760 CMR 56.00 et seq.; project to be governed by Comprehensive Permit decision.

TOWN OF ARLINGTON ZONING BYLAWS (AS AMENDED THROUGH APRIL 2015) (cont.)				
BY-LAW/REG.	TITLE	DESCRIPTION	REQUIRED	PROPOSED
Article 11, Section 11.07	Filling of Any Water or Wet Area	Filing submission requirements, review and standards within Environmental Design Review involving fill of water or wet areas of 500 cubic yards or greater or where area involved is >10,000 sq. ft. and approved under State WPA	Conditions on filing requirements and fill standards/limits.	Waiver to forego preparation of plans/documents for separate review. To the extent project requires submission of Notice of Intent under State WPA to the Arlington Conservation Commission; standards and criteria applicable are those contained in State Act and its regulations.
Article 11, Section 11.08	Affordable Housing Requirements	Affordable housing requirements for projects including six or more residential units under Section 1..06	Requires 15% of new residential units be Affordable Units (as defined in Zoning Bylaw, Section 11.08), or contribution to Affordable Housing Trust Fund, by allowance of ARB	Waiver to the extent Section 11.08 varies or is not consistent with Chapter 40B, its regulations and the rules and policies of DHCD and MassHousing. Applicant's project is subject to affordable housing requirements as contained in M.G.L. c.40B and its regulations under the New England Fund Program of Home Loan Bank of Boston, in accordance with Site Approval given by MassHousing and Regulatory Agreement approved by the State.

ZONING BOARD OF APPEALS OF TOWN OF ARLINGTON COMPREHENSIVE PERMIT REGULATIONS				
REGULATION	TITLE	DESCRIPTION	REQUIRED	PROPOSED
Section 3.1, 3.2	Application and Documentation	Application contents	Complete application filed upon submittal of documentation of Section 3.0	Waiver of certain submission requirements beyond the requirements of 760 CMR 56.00 at time of initial filing; additional documentation to be submitted to Board within public hearing process and review by peer review consultants.
Section 3.2.7	Preliminary Scaled Architectural Drawings	Preliminary Architectural	To be on scale of 1/8"=1"; include typical floor plans, typical elevations and sections; construction type and finish and signed by architect;	Waiver sought for scale of 1/8"= 1" for all architectural drawings, due to size of area plans scaled at 1/8" would be too large to be useful.
Section 3.2.11	List of Requested Exemptions	Local Bylaw waivers	List of Exemptions to contain location on plan, complete explanation as to economic impact of local rule or regulation	Waiver sought to extent local regulation seeks "complete explanation as to economic impact," as such request is inconsistent with MGL c.40B/760 CMR 56.05(7) (waivers may be sought as consistent with local needs; where town has less than 10% affordable housing, presumption that affordable housing need outweighs local concerns.)

Section 3.2.13	Impact Analysis of the Natural and Built Environment	Impact analysis to be prepared by wetland scientist, environmental scientist, hydrologist, professional engineer, soil scientist, botanist, hydrogeologist or other scientific professional	Impact analysis by professional to assess predevelopment conditions and post-development impacts water quantity/quality; recharge, open space/recreational land; wildlife habitat and wetland resources; species of special concern and historic/ cultural resources	Waiver for timing of filing impact analysis at initial filing and to be supplemented to the Board within the public hearing process as reflected in 9/25/20 Response Supplemental Completeness Review .
Section 3.2.15	Statement of Impact on Municipal Facilities and Services	Applicant to provide impact analysis	Detailed analyses of costs imposed on Town as well as anticipated tax and other revenue to be generated	Waiver of impact analysis at initial filing; Applicant agrees to timely provide the same within the public hearing process for review by Board and its consultant, as project may be further refined within public hearing process and process as reflected in 9/25/20 Response to Supplemental Completeness Review.

Mystic River
WATERSHED ASSOCIATION

Oct. 19, 2020

By Email: zba@town.arlington.ma.us

Dear Members of the Arlington Zoning Board of Appeals,

The Mystic River Watershed Association (MyRWA) has been following the plans for development of the Mugar Property since 2010. Our organization remains concerned that any development that occurs on the site is consistent with local and state wetland law, properly accounts for the floodplain, and does not degrade the local environment. This letter requests your attention to ensure an accurate wetland delineation is performed, that mitigation is required by the local wetland ordinance/bylaw and that the Committee is made aware of recent hydrologic modelling in the Mystic River watershed.

The Mystic River Watershed Association (MyRWA) is a non-profit organization dedicated to the preservation and enhancement of the Mystic River Watershed. The mission of MyRWA is to protect and restore the Mystic River, its tributaries, and watershed lands for the benefit of present and future generations and to celebrate the value, importance, and great beauty of these natural resources. This includes working to improve the water quality in the Mystic River and all of its tributaries.

The Mugar property is located within the sub-watershed for Alewife Brook, an impaired tributary to the Mystic River. Alewife Brook drains approximately 4,500 highly-urbanized acres, made up of 47-percent impervious cover in Arlington, Belmont, Cambridge, and Somerville. The Brook has consistently received a grade of D from the U.S. Environmental Protection Agency for its chronically poor water quality. Despite many challenges, MyRWA and its partners remain committed to improving the quality of the waterway and its surrounding floodplains, wetlands, and uplands.

The 17.7-acre Mugar property plays an important role in Arlington and the greater Mystic River Watershed by providing floodwater storage in the naturally pervious land and wetlands within its boundaries. Wetlands and floodplains such as those located on the Mugar property serve as natural sponges that not only store floodwater, but also filter pollutants and recharge groundwater, providing a slow release of groundwater to streams during dry weather. These functions are particularly important in this vulnerable, low-lying section of East Arlington, which already experiences flooding during storms. As one of the last undeveloped parcels in the impaired Alewife Brook sub-watershed, the Mugar property provides vital ecological services to the neighboring community and the Mystic River Watershed.

Current issues:

1. Wetland Delineation:_The Arlington Zoning Board of Appeals should request that the current

survey and wetland delineation work underway include the evaluation of soil profiles for hydric soils in the area of the proposed development or in areas where there is evidence found of excavation, dumping of fill or solid waste on site.

One of the challenges of a proper wetland delineation on the Mugar property is that the site has a history of disturbance. Materials, debris and soils have been moved and dumped from the period of construction of Rt. 2 to more recent disturbance. The Town's peer reviewer (Nover/Armstrong) identified such disturbance on site*:*

"The long dormant site has been altered by excavations and dumping of fill over the years. Our inspection found old stockpiles of earthen material, solid waste in the northwest area of the Site and other debris throughout."

The problem is that these areas, if formerly wetland areas, will not demonstrate the characteristics of wetland indicator plants. The Arlington Wetland Regulations (v. June 4, 2015) Section 21.B.3.c makes express requirement that areas of land that have been disturbed, filled or cut should be evaluated for the prior presence of wetland areas.

See Section 21.B.3.c.:

> *"Where an area has been disturbed (e.g., by cutting, filling, or cultivation), the boundary is the line within which there are indicators of saturated or inundated conditions sufficient to support a predominance of wetland indicator plants, a predominance of wetland indicator plants, or credible evidence from a competent source that the area supported, or would support under undisturbed conditions, a predominance of wetland indicator plants prior to the disturbance or characteristic of hydric soils."*

2. 100 year floodplain: Require project proponent request and evaluate results of updated hydrologic modelling from City of Cambridge to ensure up to date, calibrated modelling is used to inform the 100-year floodplain.

Section 4 of the Arlington Wetland Regulations (v. June 4, 2015) states:

LAND SUBJECT TO FLOODING OR INUNDATION - shall mean the land within the estimated maximum lateral extent of flood water which will theoretically result from the statistical 100-year frequency storm; said boundary shall be that determined by reference to the most recently available flood profile data prepared for Arlington within which the work is proposed under the National Flood Insurance Program ("NFIP"). ***Where NFIP data are unavailable or deemed by the Commission to be outdated or inaccurate or not reflecting current conditions, the boundary of said land shall be based on the maximum lateral extent of flood water which has been observed or recorded, or other evidence presented and considered by the Commission. (Bold mine)*** *Said land shall also include isolated areas which frequently or seasonably hold standing water; such areas may or may not be characterized by wetland vegetation or soil characteristics.*

The most recently presented plans from project proponents show the FEMA defined 100-year and 500-year floodplain. The FEMA floodplain is defined with a retroactive dataset that is backward looking in time and can be out of date with contemporary conditions. We would encourage the Arlington Zoning Board of Appeals and the Conservation Commission to have the proponent request updated modelling data from the City of Cambridge Infoworks Integrated Catchment Model (ICM). This model provides a recently calibrated snapshot of current and future flooding scenarios on the Alewife Brook and other areas of the freshwater Mystic. This Cambridge model is now the best available data on what determines the 100-yr flood elevation and land subject to floodwater. Appropriate contacts at the City of Cambridge are:

Cathy Watkins, City Engineer (kwatkins@cityofcambridgema.gov)
Catherine Woodbury, Stormwater Manager (cwoodbury@cityofcambridgema.gov)

3. Application of local regulation and mitigation. Ensure that local regulations are not waived and that a full 2:1 mitigation is required of this project. This is a critical requirement to offset the loss of wetlands as this parcel is developed. A 2:1 mitigation is a minimal requirement given the challenges of replicating a functioning wetland area and replacing it with a constructed version.

Referencing the Arlington Wetland Regulations (v. June 4, 2015) Section 21 E (2),

Projects involving Wetlands Filling and/or permanent Alterations shall meet the requirements of 310 C.M.R. 10.60(3) and 310 C.M.R. 10.55(4) and the following requirements of the Commission:
(a) The proposed replication area design must be submitted to the Commission for approval as part of the submittal of the project Notice of Intent.
(b) The replication area must be shown to sufficiently duplicate the functions and values of the wetland proposed to be altered.
(c) The area of the wetland replication shall be at a 2:1 ratio to that area of wetland loss.

Thank you for your consideration of these issues and the attention that the ZBA is focusing on this development. Please do not hesitate to reach out with any questions (patrick.herron@mysticriver.org).

Sincerely,

Patrick Herron
Executive Director

BSC GROUP
Transportation ▪ Energy ▪ Land Development

803 Summer Street
Boston, MA 02127

Tel: 617-896-4300

www.bscgroup.com

Sent Via Email

October 22, 2020

Christian Klein, Chair
Arlington Zoning Board of Appeals
51 Grove Street
Arlington, MA 02476

RE: Thorndike Place
Wetland Delineation

Chairman Klein:

In response to comments provided by the Arlington Conservation Commission and BETA Group, BSC Group wetland scientists have conducted a site visit on October 15, 2020 to re-evaluate the wetland delineation initially completed in January 2020. With the initial delineation completed in winter conditions, a few wetland flags were adjusted based on growing season conditions. The following information is included as attachments to this letter:

- Wetland Delineation Memorandum dated October 19, 2020
- MassDEP Bordering Vegetated Wetland Delineation Field Data Forms (5)
- Existing Environmental Resources Plan revised October 22, 2020

This information is also being transmitted electronically to the Conservation Commission and BETA Group. We also want to extend our offer to walk the site with BETA Group when the review the delineation. Please me call at 781-710-7280 or email me at jhession@bscgroup.com if you have any questions or require additional information.

Very truly yours,

BSC Group, Inc.

John Hession, P.E.
Director of Land Development

cc: zba@town.arlington.ma.us
Richard Vallarelli, ZBA
Emily Sullivan, Conservation
Susan Chapnick, Conservation Commission
Jenny Raitt, Planning and Community Development
Marta Nover and Todd Undzis, BETA
Stephanie Kiefer, Smolak & Vaughan
Gwen Noyes and Arthur Klipfel, Arlington Land Realty

MassDEP Bordering Vegetated Wetland (310 CMR 10.55) Delineation Field Data Form

Applicant: Thorndike Place Prepared by: BSC Group, Inc. (SMM & EPS) Project location: Isolated Area, behind houses DEP File #:

Check all that apply:

- ❑ Vegetation alone presumed adequate to delineate BVW boundary: fill out Section I only
- ❑ Vegetation and other indicators of hydrology used to delineate BVW boundary: fill out Sections I and II
- ❑ Method other than dominance test used (attach additional information)

Section I.

Vegetation	Observation Plot Number: 1 (Wetland)		Transect Number: 1	Date of Delineation: 10/15/2020
A. Sample Layer & Plant Species (by common/scientific name)	B. Percent Cover (or basal Area)	C. Percent Dominance	D. Dominant Plant (yes or no)	E. Wetland Indicator Category*
<u>Trees</u>				
Ailanthus altissima / Tree of Heaven	63%	52%	Yes	NI
**Acer rubrum*/ Red maple	38%	31%	Yes	FACW+
**Acer negundo*/ Box elder	10.5%	9%	No	FAC+
**Ulmus rubra*/ Slippery elm	10.5%	9%	No	FAC
Total Percent Cover: 122%				
<u>Shrubs/ Saplings</u>				
**Acer negundo*/ Box elder	10.5%	100%	Yes	FAC+
Total Percent Cover: 10.5%				
<u>Herbaceous</u>				
Fallopia japonica/ Japanese knotweed	63%	86%	Yes	FACU-
Alliaria petiolata/ Garlic mustard	10.5%	14%	No	FACU-
Total Percent Cover: 73.5%				
<u>Vines</u>				
Celastrus orbiculatus/ Asian bittersweet	10.5%	50.00%	Yes	FACU
Vitis labrusca/ Fox grape	10.5%	50.00%	Yes	FACU
Total Percent Cover: 21%				

* *Use an asterisk to mark wetland indicator plants: plant species listed in the Wetlands Protection Act (MGL c.131, s.40); plants in the genus Sphagnum; plants listed as FAC, FAC+, FACW-, FACW, FACW+, or OBL; or plants with physiological or morphological adaptations. If any plants are identified as wetland indicator plants due to physiological or morphological adaptations, describe the adaptation next to the asterisk.*

Vegetation conclusion:

Number of dominant wetland indicator plants: 2 Number of dominant non-wetland indicator plants: 3

Is the number of dominant wetland plants equal to or greater than the number of dominant non-wetland plants? yes no

If vegetation alone is presumed adequate to delineate the BVW boundary, submit this form with the Request for Determination of Applicability or Notice of Intent

Section II. Indicators of Hydrology

Hydric Soil Interpretation

1. Soil Survey

Is there a published soil survey for this site? yes no
title/date: WebSoil Survey/ 2020
map number: 655
soil type mapped: Udorthents, wet substratum
hydric soil inclusions: Yes

Are field observations consistent with soil survey? yes no
Remarks:

2. Soil Description

Horizon	Depth	Matrix Color	Mottles Color	Texture
Ap	0-14”	10YR 2/1 (60%)	-	Sandy loam
		10YR 2/2 (40%)	-	
B	14”+	2.5YR 8/4 (90%)	-	Sandy loam
		10YR 7/8 (10%)	-	

Remarks: Area previously disturbed

3. Other:

Conclusion: Is soil hydric? yes no

Other Indicators of Hydrology: (check all that apply & describe)

- ❑ Site Inundated: ______________________________
- ❑ Depth to free water in observation hole: _____________
- ❑ Depth to soil saturation in observation hole: ___________
- ❑ Water marks: ________________________________
- ❑ Drift lines: __________________________________
- ❑ Sediment Deposits: ____________________________
- ❑ Drainage patterns in BVW: _______________________
- ❑ Oxidized rhizospheres: __________________________
- ❑ Water-stained leaves: ___________________________
- ❑ Recorded Data (streams, lake, or tidal gauge; aerial photo; other):
- ❑ Other: _Buttressing of *Ailanthus altissima*

Vegetation and Hydrology Conclusion

	Yes	No
Number of wetland indicator plants ≥ # of non-wetland indicator plants		X
Wetland hydrology present:		
Hydric soil present	X	
Other indicators of hydrology present	X____	
Sample location is in a BVW		X

Submit this form with the Request for Determination of Applicability or Notice of Intent.

MassDEP Bordering Vegetated Wetland (310 CMR 10.55) Delineation Field Data Form

Applicant: Thorndike Place Prepared by: BSC Group, Inc. (SMM & EPS) Project location: Isolated Area, behind houses DEP File #:____________

Check all that apply:

- ❑ Vegetation alone presumed adequate to delineate BVW boundary: fill out Section I only
- ❑ Vegetation and other indicators of hydrology used to delineate BVW boundary: fill out Sections I and II
- ❑ Method other than dominance test used (attach additional information)

Section I.

Vegetation	Observation Plot Number: 2 (Upland)		Transect Number: 1	Date of Delineation: 10/15/2020
A. Sample Layer & Plant Species (by common/scientific name)	B. Percent Cover (or basal Area)	C. Percent Dominance	D. Dominant Plant (yes or no)	E. Wetland Indicator Category*
<u>Trees</u>				
**Acer negundo/* Box elder	85.5%	64%	Yes	FAC+
Ailanthus altissima/ Tree of Heaven	38%	28%	No	NI
Quercus alba/ Northern white oak	10.5%	8%	No	FACU-
Total Percent Cover: 134 %				
<u>Shrubs/ Saplings</u>				
**Acer negundo/* Box elder	63%	52%	Yes	FAC+
Rosa multiflora/ Multiflora rose	38%	31%	No	FACU
**Ulmus rubra/* Slippery elm	20.5%	17%	No	FAC
Total Percent Cover: 121.5%				
<u>Herbaceous</u>				
Alliaria petiolate/ Garlic mustard	85.5%	100%	Yes	FACU-
Total Percent Cover: 85.5%				
<u>Vines</u>				
Absent				
Total Percent Cover: 0%				

* *Use an asterisk to mark wetland indicator plants: plant species listed in the Wetlands Protection Act (MGL c.131, s.40); plants in the genus Sphagnum; plants listed as FAC, FAC+, FACW-, FACW, FACW+, or OBL; or plants with physiological or morphological adaptations. If any plants are identified as wetland indicator plants due to physiological or morphological adaptations, describe the adaptation next to the asterisk.*

Vegetation conclusion:

Number of dominant wetland indicator plants: 2

Number of dominant non-wetland indicator plants: 1

Is the number of dominant wetland plants equal to or greater than the number of dominant non-wetland plants? yes no

If vegetation alone is presumed adequate to delineate the BVW boundary, submit this form with the Request for Determination of Applicability or Notice of Intent

Section II. Indicators of Hydrology

Hydric Soil Interpretation

1. Soil Survey

Is there a published soil survey for this site? yes no
title/date: WebSoil Survey/ 2020
map number: 655
soil type mapped: Udorthents, wet substratum
hydric soil inclusions: Yes

Are field observations consistent with soil survey? yes no
Remarks:

2. Soil Description

Horizon	Depth	Matrix Color	Mottles Color	Texture
O	1-0”			
A	0-3”	10YR 2/2	-	Sandy loam
B	3-9”	10YR 3/3	-	Sandy loam

Remarks: Area previously disturbed

3. Other:

Conclusion: Is soil hydric? yes no

Other Indicators of Hydrology: (check all that apply & describe)

- ❑ Site Inundated: ___________________________________
- ❑ Depth to free water in observation hole: _______________
- ❑ Depth to soil saturation in observation hole: ____________
- ❑ Water marks: _____________________________________
- ❑ Drift lines: ____
- ❑ Sediment Deposits: _________________________________
- ❑ Drainage patterns in BVW: ___________________________
- ❑ Oxidized rhizospheres: ______________________________
- ❑ Water-stained leaves: _______________________________
- ❑ Recorded Data (streams, lake, or tidal gauge; aerial photo; other):
- ❑ Other: _

Vegetation and Hydrology Conclusion

	Yes	No
Number of wetland indicator plants ≥ # of non-wetland indicator plants	X	
Wetland hydrology present:		
Hydric soil present		X
Other indicators of hydrology present	____	X
Sample location is in a BVW		X no

Submit this form with the Request for Determination of Applicability or Notice of Intent.

MassDEP Bordering Vegetated Wetland (310 CMR 10.55) Delineation Field Data Form

Applicant: Thorndike Place Prepared by: BSC Group, Inc. (SMM & EPS) Project location: Arlington- Near flag D-18 DEP File #:

Check all that apply:

- ❑ Vegetation alone presumed adequate to delineate BVW boundary: fill out Section I only
- ❑ Vegetation and other indicators of hydrology used to delineate BVW boundary: fill out Sections I and II
- ❑ Method other than dominance test used (attach additional information)

Section I.

Vegetation	Observation Plot Number: 1 (Wetland)		Transect Number: 2	Date of Delineation: 10/15/2020
A. Sample Layer & Plant Species (by common/scientific name)	B. Percent Cover (or basal Area)	C. Percent Dominance	D. Dominant Plant (yes or no)	E. Wetland Indicator Category*
<u>Trees</u>				
**Acer negundo/* Boxelder	20.5%	32%	Yes	FAC+
**Acer saccharinum/* Silver maple	20.5%	32%	Yes	FACW
Populus tremulas/ Quaking aspen	20.5%	32%	No	FACU
Prunus serotina/ Black cherry	3%	5%	No	FACU
Total Percent Cover: 64.5%				
<u>Shrubs/ Saplings</u>				
**Rhamnus frangula/* Glossy buckthorn	20.5%	55%	Yes	FAC
**Acer saccharinum/* Silver maple	10.5%	28%	Yes	FACW
**Fraxinus pennsylvanica/* Green ash	3%	8%	No	FACW
Rubus strigosus/ Common red raspberry	3%	8%	No	FAC-
Total Percent Cover: 37%				
<u>Herbaceous</u>				
*Onoclea sensibilis/ Sensitive fern	85.5%	100%	Yes	FACW
Total Percent Cover: 89%				
<u>Vines</u>				
Absent				
Total Percent Cover: 0%				

* *Use an asterisk to mark wetland indicator plants: plant species listed in the Wetlands Protection Act (MGL c.131, s.40); plants in the genus Sphagnum; plants listed as FAC, FAC+, FACW-, FACW, FACW+, or OBL; or plants with physiological or morphological adaptations. If any plants are identified as wetland indicator plants due to physiological or morphological adaptations, describe the adaptation next to the asterisk.*

Vegetation conclusion:

Number of dominant wetland indicator plants: 4 Number of dominant non-wetland indicator plants: 0

Is the number of dominant wetland plants equal to or greater than the number of dominant non-wetland plants? yes no

If vegetation alone is presumed adequate to delineate the BVW boundary, submit this form with the Request for Determination of Applicability or Notice of Intent

Section II. Indicators of Hydrology

Hydric Soil Interpretation

1. Soil Survey

Is there a published soil survey for this site? yes no
title/date: WebSoil Survey/ 2020
map number: 51A
soil type mapped: Swansea muck
hydric soil inclusions: Yes

Are field observations consistent with soil survey? yes no
Remarks:

2. Soil Description

Horizon	Depth	Matrix Color	Mottles Color	Texture
Oe	0-0.5”			
A	0-1”	10YR2/1	-	Mucky modified SL
Ae	1-4”	10YR 4/2	5YR3/4 (5%)	Mucky modified sandy loam
Bg	4-14”	2.5YR 6/3	7.5YR 4/6 (12%)	sandy loam

Remarks:

3. Other:

Conclusion: Is soil hydric? yes no

Other Indicators of Hydrology: (check all that apply & describe)

- ❑ Site Inundated: ________________________________
- ❑ Depth to free water in observation hole: ______________
- ❑ Depth to soil saturation in observation hole: ___________
- ❑ Water marks: __________________________________
- ❑ Drift lines: ____________________________________
- ❑ Sediment Deposits: ______________________________
- ❑ Drainage patterns in BVW: ________________________
- ❑ Oxidized rhizospheres: ___________________________
- ❑ Water-stained leaves: ____________________________
- ❑ Recorded Data (streams, lake, or tidal gauge; aerial photo; other):
- ❑ Other: _

Vegetation and Hydrology Conclusion

	Yes	No
Number of wetland indicator plants ≥ # of non-wetland indicator plants	X	
Wetland hydrology present:		
Hydric soil present	X	
Other indicators of hydrology present		X____
Sample location is in a BVW	X	

Submit this form with the Request for Determination of Applicability or Notice of Intent.

MassDEP Bordering Vegetated Wetland (310 CMR 10.55) Delineation Field Data Form

Applicant: Thorndike Place Prepared by: BSC Group, Inc. (SMM & EPS) Project location: Arlington- Near flag D-18 DEP File #:_______________

Check all that apply:

- ❑ Vegetation alone presumed adequate to delineate BVW boundary: fill out Section I only
- ❑ Vegetation and other indicators of hydrology used to delineate BVW boundary: fill out Sections I and II
- ❑ Method other than dominance test used (attach additional information)

Section I.

Vegetation	Observation Plot Number: 2 (Upland)		Transect Number: 2	Date of Delineation: 10/15/2020
A. Sample Layer & Plant Species (by common/scientific name)	B. Percent Cover (or basal Area)	C. Percent Dominance	D. Dominant Plant (yes or no)	E. Wetland Indicator Category*
<u>Trees</u>				
Prunus serotina/ Black cherry	63%	75%	Yes	FACU
Ailanthus altissima/ Tree of Heaven	20.5%	25%	No	NI
Total Percent Cover: 83.5%				
<u>Shrubs/ Saplings</u>				
Rhus hirta/ Staghorn sumac	20.5%	49%	Yes	NI
Prunus serotina/ Black cherry	10.5%	25%	Yes	FACU
Rubus strigosus/ Common red raspberry	10.5%	25%	No	FAC-
Total Percent Cover: 41.5%				
<u>Herbaceous</u>				
Solidago canadensis/ Canada goldenrod	38%	65%	Yes	FACU
Phytolacca americana/ American pokeweed	20.5%	35%	No	FACU+
Total Percent Cover: 58.8%				
<u>Vines</u>				
Absent				
Total Percent Cover: 0%				

* *Use an asterisk to mark wetland indicator plants: plant species listed in the Wetlands Protection Act (MGL c.131, s.40); plants in the genus Sphagnum; plants listed as FAC, FAC+, FACW-, FACW, FACW+, or OBL; or plants with physiological or morphological adaptations. If any plants are identified as wetland indicator plants due to physiological or morphological adaptations, describe the adaptation next to the asterisk.*

Vegetation conclusion:

Number of dominant wetland indicator plants: 0 Number of dominant non-wetland indicator plants: 4

Is the number of dominant wetland plants equal to or greater than the number of dominant non-wetland plants? yes no

If vegetation alone is presumed adequate to delineate the BVW boundary, submit this form with the Request for Determination of Applicability or Notice of Intent

Section II. Indicators of Hydrology

Hydric Soil Interpretation

1. Soil Survey

Is there a published soil survey for this site? yes no
title/date: WebSoil Survey/ 2020
map number: 51A
soil type mapped: Swansea muck
hydric soil inclusions: Yes

Are field observations consistent with soil survey? yes no
Remarks:

2. Soil Description

Horizon	Depth	Matrix Color	Mottles Color	Texture
A	0-1"	10YR 2/2		
Bw_1	1-6"	10YR 3/3	-	Sandy loam
Bw_2	6-12+"	10YR 4/4	-	Sandy loam

Remarks:

3. Other:

Conclusion: Is soil hydric? yes no

Other Indicators of Hydrology: (check all that apply & describe)

- ❑ Site Inundated: ___________________________________
- ❑ Depth to free water in observation hole: _______________
- ❑ Depth to soil saturation in observation hole: ____________
- ❑ Water marks: _____________________________________
- ❑ Drift lines: _______________________________________
- ❑ Sediment Deposits: ________________________________
- ❑ Drainage patterns in BVW: ___________________________
- ❑ Oxidized rhizospheres: ______________________________
- ❑ Water-stained leaves: ______________________________
- ❑ Recorded Data (streams, lake, or tidal gauge; aerial photo; other):
- ❑ Other: _

Vegetation and Hydrology Conclusion

	Yes	No
Number of wetland indicator plants ≥ # of non-wetland indicator plants		X
Wetland hydrology present:		
Hydric soil present		X
Other indicators of hydrology present		X____
Sample location is in a BVW		X

form with the Request for Determination of Applicability or Notice of Intent.

MassDEP Bordering Vegetated Wetland (310 CMR 10.55) Delineation Field Data Form

Applicant: Thorndike Place Prepared by: BSC Group, Inc. (SMM & EPS) Project location: Arlington- Near flag C-14 DEP File #:

Check all that apply:

- ❑ Vegetation alone presumed adequate to delineate BVW boundary: fill out Section I only
- ❑ Vegetation and other indicators of hydrology used to delineate BVW boundary: fill out Sections I and II
- ❑ Method other than dominance test used (attach additional information)

Section I.

Vegetation	Observation Plot Number: 1 (Wetland)		Transect Number: 3	Date of Delineation: 10/15/2020
A. Sample Layer & Plant Species (by common/scientific name)	B. Percent Cover (or basal Area)	C. Percent Dominance	D. Dominant Plant (yes or no)	E. Wetland Indicator Category*
<u>Trees</u>				
**Populus deltoides/* Eastern cottonwood	20.5%	40%	Yes	FAC
Ailanthus altissima/ Tree of Heaven	20.5%	40%	Yes	NI
**Fraxinus pennsylvanica/* Green ash	10.5%	20%	Yes	FACW
Total Percent Cover: 51.5 %				
<u>Shrubs/ Saplings</u>				
Rhus hirta/ Staghorn sumac	20.5%	60%	Yes	NI
**Populus deltoides/* Eastern cottonwood	10.5%	31%	Yes	FAC
Rosa multiflora/ Multiflora rose	3%	9%	No	FACU
Total Percent Cover: 34%				
<u>Herbaceous</u>				
**Solidago patula/* Rough stem goldenrod	38%	53%	Yes	OBL
Phytolacca americana/ American pokeweed	20.5%	28%	Yes	FACU+
**Rubus hispidus/* Creeping dewberry	10.5%	15%	No	FACW
**Phragmites australis/* Common reed	3%	4%	No	FACW
Total Percent Cover: 72%				
<u>Vines</u>				
Absent				
Total Percent Cover: 0%				

* *Use an asterisk to mark wetland indicator plants: plant species listed in the Wetlands Protection Act (MGL c.131, s.40); plants in the genus Sphagnum; plants listed as FAC, FAC+, FACW-, FACW, FACW+, or OBL; or plants with physiological or morphological adaptations. If any plants are identified as wetland indicator plants due to physiological or morphological adaptations, describe the adaptation next to the asterisk.*

Vegetation conclusion:

Number of dominant wetland indicator plants: 4 Number of dominant non-wetland indicator plants: 1

Is the number of dominant wetland plants equal to or greater than the number of dominant non-wetland plants? yes no

If vegetation alone is presumed adequate to delineate the BVW boundary, submit this form with the Request for Determination of Applicability or Notice of Intent

Section II. Indicators of Hydrology

Hydric Soil Interpretation

1. Soil Survey

Is there a published soil survey for this site? yes no
title/date: WebSoil Survey/ 2020
map number: 655
soil type mapped: Udorthents, wet substratum
hydric soil inclusions: Yes

Are field observations consistent with soil survey? yes no
Remarks:

2. Soil Description

Horizon	Depth	Matrix Color	Mottles Color	Texture
A	0-1”	10YR 2/1	-	Sandy loam
Bc	1-14”+	10YR 4/2	Depletion: 7.5YR 4/6 (12%) 10YR 6/2 (10%)	Sandy loam

Remarks:

3. Other:

Conclusion: Is soil hydric? yes no

Other Indicators of Hydrology: (check all that apply & describe)

- ❑ Site Inundated: ________________________________
- ❑ Depth to free water in observation hole: ______________
- ❑ Depth to soil saturation in observation hole: ___________
- ❑ Water marks: __________________________________
- ❑ Drift lines: ____________________________________
- ❑ Sediment Deposits: ______________________________
- ❑ Drainage patterns in BVW: __Present__________________
- ❑ Oxidized rhizospheres: ___________________________
- ❑ Water-stained leaves: ____________________________
- ❑ Recorded Data (streams, lake, or tidal gauge; aerial photo; other):
- ❑ Other: _

Vegetation and Hydrology Conclusion

	Yes	No
Number of wetland indicator plants ≥ # of non-wetland indicator plants	X	
Wetland hydrology present:		
Hydric soil present	X	
Other indicators of hydrology present	X	
Sample location is in a BVW	X	

Submit this form with the Request for Determination of Applicability or Notice of Intent.

BSC GROUP

MEMORANDUM

33 WALDO STREET, WORCESTER, MA 01608 - www.bscgroup.com
TEL 508-792-4500 - 800-288-8123

To:	John Hession, BSC Group, Inc.	**Date:**	October 19, 2020
From:	Gillian Davies and Susan McArthur, BSC Group, Inc.	**Proj. No.**	23407.00
Re:	Wetland Delineation, Thorndike Place, Arlington, MA		

INTRODUCTION

On January 15 and on October 15 2020, BSC Group, Inc. (BSC) conducted a field delineation of wetland resource areas regulated under the *Massachusetts Wetlands Protection Act* (*WPA*) and associated *regulations* (*310 CMR 10.00 et al*) and the Town of Arlington *Wetlands Protection Bylaw (Article 8)* (*Bylaw*) and associated *regulations* (*Sections 1 through 34*) dated June 4, 2015, at the Thorndike Place/Mugar Property located off of Dorothy and Parker Roads. This primarily forested property is located between Route 2, a single-family residential neighborhood, and a local park. Site topography is relatively flat. Trash piles and debris, as well as a homeless encampment occur on the property.

ENVIRONMENTAL RESOURCE AREA MAPPING

BSC reviewed existing mapping of environmental resources for the project site. The majority of the property is located within the FEMA 100-year floodplain and part of the site appears to be located within the floodway associated with the Little River (a Letter of Map Revision (LOMR) may be needed), as indicated on the attached Environmental Resources Map. NRCS soils maps (Web Soil Survey) indicate that Udorthents, wet substratum, Urban land, wet substratum, and Swansea muck occur on the site. According to the Massachusetts Natural Heritage and Endangered Species Program (NHESP) and the MassGIS data layer for the Massachusetts Natural Heritage Atlas, no areas of Estimated or Priority Habitat for Rare Wildlife or Certified or Potential Vernal Pools exist on the project site. BSC also reviewed the USGS topographic map.

WETLAND RESOURCE AREA FIELD DELINEATION

In addition to reviewing relevant resource area mapping for the project site, BSC conducted an initial wetland field delineation on January 15, 2020. This wetland delineation was conducted in accordance with the MA *WPA regulations*, the Massachusetts Department of Environmental Protection handbook on *Delineating Bordering Vegetated Wetlands Under the Massachusetts Wetlands Protection Act* (March 1995), the *Bylaw regulations*, the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region (Version 2.0)* (January 2012), and the *Field Indicators for Identifying Hydric Soils in New England* (May, 2018). BSC evaluated onsite vegetation to determine areas where 50% or more of the vegetation qualify as wetland species according to the above-mentioned regulatory documents and according to wetland indicator status as described in the *State of Massachusetts 2016 Wetland Plant List* (http://wetland-plants.usace.army.mil/nwpl_static/data/DOC/lists_2016/States/pdf/MA_2016v1.pdf). In accordance with the above-mentioned soils guidance documents, BSC examined soils to determine where hydric soils occur, by auguring or digging a soil pit to evaluate the top 20 inches of soil for soil texture, color, horizon thickness and depth, and presence/absence of redoximorphic features. BSC also observed the site for evidence of wetland hydrology. Due to winter conditions (lack of growing season hydrology, lack of full suite of vegetation) a decision was made to re-evaluate the wetlands at the site during the growing season. Following the same methodology, the wetland delineation was re-evaluated on October 15, 2020 and a few of the wetland flags were readjusted to accommodate growing season conditions. Wetland flags C-10, C-15 through C-17, C-17A, were moved upgradient to include a pocket of spotted touch-me-not (*Impatiens capensis*), silver maple (*Acer saccharinum*), and green ash (*Fraxinus pennsylvanica*). In addition, wetland flag D-10 was removed and the wetland line was revised to connect D-9 to D-11 based on the presence of cinnamon fern and hydric soils. Wetland data sheets were also prepared (attached).

BSC marked the boundaries of four Bordering Vegetated Wetland (BVW) areas (Series A, B, C and D) with sequentially numbered pink surveyor's tape. Additionally, BSC reviewed conditions at two potential Isolated Vegetated Wetlands (IVW) (H and I Series) that had been identified and flagged during a previous delineation on the site. Two other IVWs (F and G Series) had also been identified during the previous wetland delineation. BSC did not observe a predominance of wetland vegetation in the previously identified IVW areas on January 15th, 2020. The data plots performed on October 15, 2020 confirm this finding (attached). One isolated area just west of the previously flagged isolated Wetland I on the north side of the property did demonstrate hydric soils (0 – 14" 10YR 2/2, then 14 – 20 10YR 4/3 with high chroma redox and loamy sand texture), but was vegetated with predominantly upland species (multiflora rose (*Rosa multiflora*), Japanese knotweed (*Fallopia japonica*), and garlic mustard (*Alliaria petiolate*).

Overall, BVW boundaries flagged on January 15, 2020 and readjusted on October 15, 2020 are similar to the boundaries flagged when wetlands were delineated previously in 2009. In some areas, the 2009 delineation extends upgradient of the BSC delineation, and in some areas the BSC delineation extends upgradient of the 2009 delineation. As the BSC delineation is the most recent, and wetland conditions can shift over time, BSC is of the opinion that this most recent delineation most accurately reflects conditions as they exist in the present .

BVW Series A and D are predominantly forested areas. BVW Series B is primarily forested with an area of herbaceous cover (predominantly common reed [*Phragmites australis*]), and BVW Series C is largely herbaceous common reed, with some forested area. Throughout the site, wetlands include the following tree species: red maple (*Acer rubrum*), box elder (*Acer negundo*), American elm (*Ulmus Americana*), white pine (*Pinus strobus*), ash (*Fraxinus sp*.), American Sycamore (*Plantanus occidentalis*), and black willow (*Salix nigra*). Shrub and sapling species include silky dogwood (*Swida amomum*), and box elder saplings. Herbaceous species include common reed, cinnamon fern (*Osmundastrum cinnamomeum*), sensitive fern (*Onoclea sensibilis*), and goldenrod (*Solidago sp*.), and vines include poison ivy (*Toxicodendron radicans*), bittersweet (*Celastrus sp*.), greenbriar (*Smilax sp*.) and wild grape (*Vitis sp*.). In upland locations, tree species include red oak (*Quercus rubra*), white pine, cottonwood (*Populus deltoides*), box elder, and red maple. Shrubs and saplings include white pine, barberry (*Berberis sp*.), brambles (*Rubus sp*.), and multiflora rose. Herbaceous species include upland grasses and goldenrod (*Solidago sp*.), and vines include bittersweet, wild grape, and greenbriar, and poison ivy.

REGULATORY REVIEW

The project site contains state and locally regulated BVW and associated 100-foot buffer zones. BSC notes that the local *Bylaw regulations* identify the 100-foot buffer zone as a regulated resource area, the Adjacent Upland Resource Area (AURA). Further, the *Bylaw regulations* establish a 25-foot "No-Disturbance Zone" where no activities or work is permitted. The *Bylaw regulations* also establish a 75-foot "Restricted Zone" where impacts should be avoided and reasonable alternatives pursued.

The Bylaw regulations define Land Subject to Flooding (LSTF), as noted in *Bylaw Section 4.B. Definition number 35* and *Section 23*. Section 23 specifies that, "Compensatory flood storage shall be at a 2:1 ratio, minimum, for each unit volume of flood storage lost at each elevation.

SUMMARY

BSC has conducted a wetland delineation at the Thorndike Place/Mugar Property that is similar in extent to the previous delineation conducted in 2009. BSC notes that the site is largely within floodplain or floodway.

cc: Marleigh Sullivan, BSC Group, Inc.
Ethan Sneesby, BSC Group, Inc.

STORMWATER REPORT

THORNDIKE PLACE
DOROTHY ROAD
ARLINGTON, MA

NOVEMBER 2020

Owner/Applicant:

ARLINGTON LAND REALTY LLC
84 Sherman Street, 2nd Floor
Cambridge, MA 02140

BSC Job Number: 23407.00

Prepared by:

BSC GROUP

803 Summer Street
Boston, MA 02127

TABLE OF CONTENTS

SECTION 1.0

PROJECT INFORMATION

1.01 PROJECT DESCRIPTION

Arlington Realty, LLC (The Applicant) is seeking to construct a new multi-family housing development in Arlington, Massachusetts, hereinafter referred to as "the Project." The total property area is approximately 17.66 acres and is located off of Dorothy Road near the intersection with Littlejohn Street. The project is bounded on the north by Dorothy Road, on the east by residential properties and Thorndike Field, and bounded on the south and west by Concord Turnpike (Route 2).

The Project consists of clearing and grubbing of the northwest section of the property and construction of one 3-4 story multi-family apartment building with a lower level parking garage, as well as surface parking, walkways, courtyards, a playground, utility services, and a stormwater management system. The building has a footprint of approximately 51,555 square feet.

The Project is designed to comply with the Massachusetts General Laws (M.G.L.) Chapter 40B, which allows developers to override certain aspects of municipal zoning bylaws by providing a certain percentage of affordable housing, as well as the Department of Environmental Protection's Stormwater Management Standards. There are wetland resource areas in the south, west and east portions of the property. The Project is concentrated in the northwest area of the property and minimizes impacts to the 100-foot wetland buffer zones, which are regulated by the Arlington Wetlands Bylaw as Adjacent Upland Resource Areas (AURA's). Part of the site is located within the 1% Chance Annual Flood as defined by FEMA which is regulated under the Wetlands Protection Act and the Arlington Wetlands Bylaw as Bordering Land Subject to Flooding (BLSF). Compensatory flood storage is proved at a 2:1 ratio as described in section 2.12 below.

1.02 PRE-DEVELOPMENT CONDITIONS

The existing site topography generally slopes southeast across the property towards the wetlands located on the property with slopes ranging from 0-15%. The current site is comprised of forest and the primary soil classification identified by the NRCS Web Soil Survey is udorthents (655), which accounts for the majority of the property and all of the project area. As such, the soils have been modeled as Hydrologic Soil Group C.

The existing site being largely undeveloped has no existing drainage facilities and the majority of the stormwater runoff is directed to the wetlands on the property. A small portion of the site discharges to the north to Dorothy Road.

1.03 POST-DEVELOPMENT CONDITIONS

The proposed stormwater management system has been designed in a manner that will exceed the provisions of the Department of Environmental Protection (DEP) Stormwater Management Standards for a new construction project. The design is also in general conformance the with Town of Arlington Zoning Bylaws.

Stormwater runoff from the building will be detained on the roof of the building, with larger, less frequent storms overflowing through roof drains to an underground infiltration system in the adjacent surface parking lot. Stormwater runoff from the small parking/drop-off area at the main entrance to the building will be collected via a trench drain, and runoff from the other surface parking area will be collected in a deep sump catch basin, both of which are conveyed through a water quality unit before being directed to the underground infiltration system. This underground infiltration system will overflow via a flared end section to the northwest. Based upon previous soil investigations on site by others, the estimated seasonal high groundwater elevation is approximately 3.0. As such the infiltration system has been set with a bottom elevation of 5.0 to provide the minimum 2-feet of clearance above groundwater.

Stormwater runoff from the driveway into the garage below the building will be collected via a trench drain and conveyed through a water quality unit before being directed to a second underground infiltration system located directly south of this area. No credit has been taken for recharge from this infiltration system as, due to grades of the driveway, insufficient clearance from estimated seasonal high groundwater exists. This infiltration system will overflow via a flared end section to the area directly south of the proposed building.

To provide emergency access to the sides and rear of the building, a reinforced grass access lane will be installed. A portion of this access lane will include a 6-foot wide, porous asphalt walkway to allow residents to have ADA/AAB accessible access the rear of the site including the play area. Both the reinforced grass and porous asphalt will allow stormwater runoff to freely infiltrate back to the ground and will result in negligible runoff.

Specifics of the project's compliance with the Stormwater Standards are discussed in detail in the following sections.

SECTION 2.0

DRAINAGE SUMMARY

2.01 Stormwater Standard 1 – New Stormwater Conveyances

Per Massachusetts Stormwater Management Standard #1, no new outfalls may discharge untreated stormwater directly to or cause erosion in wetlands or waters of the Commonwealth. No new untreated stormwater discharges are proposed. Rip-rap outlet protection sizing calculations are included in Section 6.0 of this Report.

2.02 Stormwater Standard 2 – Stormwater Runoff Rates

Watershed modeling was performed using HydroCAD Stormwater Modeling Software version 10.00, a computer aided design program that combines SCS runoff methodology with standard hydraulic calculations. A model of the site's hydrology was developed for both pre and post-development conditions to assess the effects of the proposed development on the project site and surrounding areas.

The stormwater management system for the project has been designed such that the post-development conditions result in no increase to peak runoff rates to the adjacent wetlands or the adjacent public street for the 2, 10, 25, 50, and 100-year, 24-hour storm events, as detailed in the table below.

Peak Flow Discharge Rates

Node 1S/1L – Flow to Wetlands

Storm Event	Pre-Development Peak Discharge Rate (cfs)	Post-Development Peak Discharge Rate (cfs)	Change in Peak Discharge Rate (cfs)
2-Year	2.1	1.6	-0.5
10-Year	5.4	4.2	-1.2
25-Year	8.3	6.2	-2.1
50-Year	11.3	8.2	-3.1
100-Year	14.9	12.6	-2.3

Node 2S/2L – Flow to Street

Storm Event	Pre-Development Peak Discharge Rate (cfs)	Post-Development Peak Discharge Rate (cfs)	Change in Peak Discharge Rate (cfs)
2-Year	0.2	0.2	0.0
10-Year	0.4	0.4	0.0
25-Year	0.6	0.6	0.0
50-Year	0.8	0.8	0.0
100-Year	1.1	1.0	-0.1

2.03 Stormwater Standard 3 – Groundwater Recharge

Groundwater recharge is provided on site via an underground structural infiltration system beneath the surface parking area to the west of the building. Overall, the project will result in no loss of annual recharge to groundwater as required by Standard 3. Refer to Section 6.0 of this Report for groundwater recharge information.

2.04 Stormwater Standard 4 – TSS Removal

As a new development, the Project stormwater management system will achieve a TSS removal greater than 80%. The proposed stormwater management system has been designed to provide treatment of runoff in order to reduce suspended solids prior to discharge off-site through the implementation of the following best management practices:

- Deep Sump Hooded Catch Basins
- Proprietary Hydrodynamic Separator
- Underground Stormwater Infiltration System

The water quality volume is defined as the runoff volume requiring TSS Removal for the site, and is equal to 0.5-inches of runoff over the total impervious area of the post-development site. The required water quality volume for the project is provided in Section 6.0 of this Report

The underground infiltration system has been sized to treat the required water quality volume and calculations are included in Section 6.0 of this Report.

A long-term pollution prevention plan complying with the requirements of Standard 4 is included in Section 4.0 of this Report.

2.05 Stormwater Standard 5 – Land Uses with Higher Potential Pollutant Loads

This standard is not applicable as the project site is not a land use with higher potential pollutant loads (LUHPPL).

2.06 Stormwater Standard 6 – Stormwater Discharges to a Critical Area

This standard is not applicable as runoff from the project site does not discharge to a critical area.

2.07 Stormwater Standard 7 – Redevelopment Projects

This project is a new development and therefore has been designed to fully comply with the Stormwater Management Standards.

2.08 Stormwater Standard 8 – Sedimentation and Erosion Control Plan

Erosion and sedimentation controls are shown on the Project Plans. Additionally, a Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan is included in Section 3.0 of this Report.

2.09 Stormwater Standard 9 – Long Term Operation and Maintenance Plan

A Long-Term Operation and Maintenance Plan is included in Section 4.0 of this Report.

2.10 Stormwater Standard 10 – Illicit Discharges

There are no known illicit discharges on the project site and none are proposed.

2.11 Conclusion

The project has been designed in accordance with DEP Stormwater Management Standards and the Town of Arlington Wetlands Protection Bylaw and Regulations. Through the construction of the aforementioned stormwater systems, the project will provide peak rate attenuation, TSS removal and groundwater recharge.

2.12 Compensatory Flood Storage

A portion of the project site is located within the 1% Chance Annual Flood as defined by FEMA, which is regulated under the Wetlands Protection Act and Arlington Wetlands Bylaw as Bordering Land Subject to Flooding (BLSF). In order to protect the values provided by BLSF and prevent downstream flooding impacts, the project is required to provide compensatory flood storage on a 1-foot incremental basis to match whatever is lost due to the project's development. Further, Arlington requires compensatory flood storage to be provided at a 2 to 1 ratio for any flood storage lost. In order to provide this compensatory flood storage, the project will minimize the area of BLSF impacted and regrade a portion of the project property southeast of the proposed building as shown on the Plans. A breakdown of the flood storage impacts and compensatory storage provided is shown below:

Elevations	Existing Incremental Available Flood Stoage (CU.FT.)	Incremental Available Flood Stoage with No Compensatory Storage (CU.FT.)	Incremental Flood Storage Change w/No Compensatory Storage (CU.FT.)	Proposed Incremental Compensatory Storage (CU.FT.)	Ratio of Compensatory Storage to Storage Lost
5.0 - 6.0	**67.0**	**0.0**	**-67.0**	**144.5**	**2.2**
6.0 - 6.8	**7,454.0**	**4,806.8**	**-2,647.2**	**5,990.0**	**2.3**

As shown above, the project will exceed the 2 to 1 ratio of compensatory flood storage for all flood storage lost due to the project development. In addition, as shown on the Plans, the proposed compensatory storage is hydrologically connected to the flood plain impacted by the project. Therefore, the project as proposed meets the applicable requirements for BLSF in both the Wetlands Protection Act and the Arlington Wetlands Bylaw and Regulations.

SECTION 3.0

CONSTRUCTION PERIOD POLLUTION PREVENTION AND EROSION AND SEDIMENTATION CONTROL PLAN

3.0 Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan

This Section specifies requirements and suggestions for implementation of a Stormwater Pollution Prevention Plan (SWPPP) for **Thorndike Place, in Arlington, Massachusetts**. The SWPPP shall be provided and maintained on-site by the Contractor(s) during all construction activities. The SWPPP shall be updated as required to reflect changes to construction activity.

The stormwater pollution prevention measures contained in the SWPPP shall be at least the minimum required by Local Regulations. The Contractor shall provide additional measures to prevent pollution from stormwater discharges in compliance with the National Pollution Discharge Elimination System (NPDES) Phase II permit requirements and all other local, state and federal requirements.

The SWPPP shall include provisions for, but not be limited to, the following:

1. Construction Trailers
2. Lay-down Areas
3. Equipment Storage Areas
4. Stockpile Areas
5. Disturbed Areas

The Contractor shall NOT begin construction without submitting evidence that a NPDES Notice of Intent (NOI) governing the discharge of stormwater from the construction site for the entire construction period has been filed **at least fourteen (14) days prior to construction**. It is the Contractor's responsibility to complete and file the NOI, unless otherwise determined by the project team.

The cost of any fines, construction delays and remedial actions resulting from the Contractor's failure to comply with all provisions of local regulations and Federal NPDES permit requirements shall be paid for by the Contractor at no additional cost to the Owner.

As a requirement of the EPA's NPDES permitting program, each Contractor and Subcontractor responsible for implementing and maintaining stormwater Best Management Practices shall execute a Contractor's Certification form.

Erosion and Sedimentation Control

The Contractor shall be solely responsible for erosion and sedimentation control at the site. The Contractor shall utilize a system of operations and all necessary erosion and sedimentation control measures, even if not specified herein or elsewhere, to minimize erosion damage at the site to prevent the migration of sediment into environmentally sensitive areas. Environmentally sensitive areas include all wetland resource areas within, and downstream of, the site, and those areas of the site that are not being altered.

Erosion and sedimentation control shall be in accordance with this Section, the design drawings, and the following:

- "National Pollutant Discharge Elimination System General Permit for Discharges from Construction Activities (EPA Construction General Permit February 16, 2017).
- Massachusetts Stormwater Management Policy Handbook issued by the Massachusetts Department of Environmental Protection, January 2008.
- Massachusetts Erosion and Sediment Control Guidelines for Urban and Suburban Areas, A Guide for Planners, Designers and Municipal Officials, March 1997.

The BMP's presented herein should be used as a guide for erosion and sedimentation control and are not intended to be considered specifications for construction. The most important BMP is maintaining a rapid construction process, resulting in prompt stabilization of surfaces, thereby reducing erosion potential. Given the primacy of rapid construction, these guidelines have been designed to allow construction to progress with essentially no hindrance by the erosion control methods prescribed. These guidelines have also been designed with sufficient flexibility to allow the Contractor to modify the suggested methods as required to suit seasonal, atmospheric, and site-specific physical constraints.

Another important BMP is the prevention of concentrated water flow. Sheet flow does not have the erosive potential of a concentrated rivulet. These guidelines recommend construction methods that allow localized erosion control and a system of construction, which inhibits the development of shallow concentrated flow. These BMP's shall be maintained throughout the construction process.

CONTACT INFORMATION AND RESPONSIBLE PARTIES

The following is a list of all project-associated parties:

Owner
Arlington Land Realty, LLC
84 Sherman Street, 2nd Floor
Cambridge, MA 02140

Contractor
To be determined

Environmental Consultant
BSC Group, Inc.
803 Summer Street
Boston, MA 02127

Contact: John Hession, P.E.
Phone: (617) 896–4300
Email: jhession@bscgroup.com

Qualified SWPPP Inspectors
To Be Determined

3.1 Procedural Conditions of the Construction General Permit (CGP)

The following list outlines the Stormwater Responsibilities for all construction operators working on the Project. The operators below agree through a cooperative agreement to abide by the following conditions throughout the duration of the construction project, effective the date of signature of the required SWPPP. These conditions apply to all operators on the project site.

The project is subject to EPA's NPDES General Permit through the CGP. The goal of this permit is to prevent the discharge of pollutants associated with construction activity from entering the existing and proposed storm drain system or surface waters.

All contractors/operators involved in clearing, grading and excavation construction activities must sign the appropriate certification statement required, which will remain with the SWPPP. The owner must also sign a certification, which is to remain with the SWPPP in accordance with the signatory requirements of the SWPPP.

Once the SWPPP is finalized, a signed copy, plus supporting documents, must be held at the project site during construction. A copy must remain available to EPA, State and Local agencies, and other interested parties during normal business hours.

The following items associated with this SWPPP must be posted in a prominent place at the construction site until final stabilization has been achieved:

- The completed/submitted NOI form
- Location where the public can view the SWPPP during normal business hours
- A copy of the signed/submitted NOI, permit number issued by the EPA and a copy of the current CGP.

Project specific SWPPP documents are not submitted to the US EPA unless the agency specifically requests a copy for review. SWPPP documents requested by a permitting authority, the permitee(s) will submit it in a timely manner.

EPA inspectors will be allowed free and unrestricted access to the project site and all related documentation and records kept under the conditions of the permit.

The permitee is expected to keep all BMP's and Stormwater controls operating correctly and maintained regularly.

Any additions to the project which will significantly change the anticipated discharges of pollutants, must be reported to the EPA. The EPA should also be notified in advance of any anticipated events of noncompliance. The permitee must also orally inform the EPA of any discharge, which may endanger health or the environment within 24 hours, with a written report following within 5 days.

In maintaining the SWPPP, all records and supporting documents will be compiled together in an orderly fashion. Inspection reports and amendments to the SWPPP must remain with the document. Federal regulations require permitee(s) to keep their Project Specific SWPPP and all reports and documents for at least three (3) years after the project is complete.

3.2 Existing Site and Soil Conditions

The total project area is approximately 17.66 acres and is located off of Dorothy Road. The project is bounded on the north by Dorothy Road, bounded on the east by residential properties, and bounded on the south and west by Concord Turnpike (Route 2).

The current site is comprised of forest and the primary soil classification identified by the NRCS Web Soil Survey is udorthents (655), which accounts for the majority of the property and all of the project area. As such, the soils have been modeled as Hydrologic Soil Group C.

3.3 Project Description and Intended Construction Sequence

The site is currently comprised of woods. The proposed activities will include the following major components:

- The construction of one (1) multi-family housing building with associated parking, driveways, and walkways,
- The construction of stormwater management systems, and
- Site grading, and utility installation.

The proposed project will disturb a total of approximately 138,233± S.F. (3.17± acres).

Soil disturbing activities will include site demolition, installing stabilized construction exits, installation of erosion and sedimentation controls, grading, storm drain inlets, stormwater management systems, utilities, building foundation, construction of site driveways and preparation for final landscaping. Please refer to Table 1 for the projects anticipated construction timetable. A description of BMP's associated with project timetable and construction-phasing elements is provided in this Erosion and Sediment Control Plan.

Table 1 – Anticipated Construction Timetable

Construction Phasing Activity	Anticipated Timetable
Grubbing and Stripping of Limits of Construction Phase	To be determined
Rough Site Grading and Site Utilities	To be determined
Utility Plan Construction	To be determined
Landscaping	To be determined

3.4 Potential Sources of Pollution

Any project site activities that have the potential to add pollutants to runoff are subject to the requirements of the SWPPP. Listed below are a description of potential sources of pollution from both sedimentation to Stormwater runoff, and pollutants from sources other than sedimentation.

Table 2 – Potential Sources of Sediment to Stormwater Runoff

Potential Source	Activities/Comments
Construction Site Entrance and Site Vehicles	Vehicles leaving the site can track soils onto public roadways. Site Vehicles can readily transport exposed soils throughout the site and off-site areas.
Grading Operations	Exposed soils have the potential for erosion and discharge of sediment to off-site areas.
Material Excavation, Relocation, and Stockpiling	Stockpiling of materials during excavation and relocation of soils can contribute to erosion and sedimentation. In addition, fugitive dust from stockpiled material, vehicle transport and site grading can be deposited in wetlands and waterway.
Landscaping Operations	Landscaping operations specifically associated with exposed soils can contribute to erosion and sedimentation. Hydroseeding, if not properly applied, can runoff to adjacent wetlands and waterways.

Table 3 – Potential Pollutants and Sources, other than Sediment to Stormwater Runoff

Potential Source	Activities/Comments
Staging Areas and Construction Vehicles	Vehicle refueling, minor equipment maintenance, sanitary facilities and hazardous waste storage
Materials Storage Area	General building materials, solvents, adhesives, paving materials, paints, aggregates, trash, etc.
Construction Activities	Construction, paving, curb/gutter installation, concrete pouring/mortar/stucco

3.5 Erosion and Sedimentation Control Best Management Practices

All construction activities will implement Best Management Practices (BMP's) in order to minimize overall site disturbance and impacts to the sites natural features. Please refer to the following sections for a detailed description of site specific BMP's. In addition, an Erosion and Sedimentation Control Plan is provided in the Site Plans.

3.6 Timetable and Construction Phasing

This section provides the Owner and Contractor with a suggested order of construction that shall minimize erosion and the transport of sediments. The individual objectives of the construction techniques described herein shall be considered an integral component of the project design intent of each project phase. The construction sequence is not intended to prescribe definitive construction methods and should not be interpreted as a construction specification document. However, the Contractor shall follow the general construction phase principles provided below:

- Protect and maintain existing vegetation wherever possible.
- Minimize the area of disturbance.
- To the extent possible, route unpolluted flows around disturbed areas.
- Install mitigation devices as early as possible.
- Minimize the time disturbed areas are left unstabilized.
- Maintain siltation control devices in proper condition.
- The contractor should use the suggested sequence and techniques as a general guide and modify the suggested methods and procedures as required to best suit seasonal, atmospheric, and site specific physical constraints for the purpose of minimizing the environmental impact of construction.

Demolition, Grubbing and Stripping of Limits of Construction Phase

- Install Temporary Erosion Control (TEC) devices as required to prevent sediment transport into resource areas.
- Place a ring of silt socks and/or haybales around stockpiles.
- Stabilize all exposed surfaces that will not be under immediate construction.
- Store and/or dispose all pavement and building demolition debris as indicated in accordance with all applicable local, state, and federal regulations.

Driveway Area Sub-Base Construction

- Install temporary culverts and diversion ditches and additional TEC devices as required by individual construction area constraints to direct potential runoff toward detention areas designated for the current construction phase.
- Compact gravel as work progresses to control erosion potential.
- Apply water to control air suspension of dust.
- Avoid creating an erosive condition due to over-watering.
- Install piped utility systems as required as work progresses, keeping all inlets sealed until all downstream drainage system components are functional.

Binder Construction

- Fine grade gravel base and install processed gravel to the design grades.
- Compact pavement base as work progresses.
- Install pavement binder coat starting from the downhill end of the site and work toward the top.

Finish Paving

- Repair and stabilize damaged side slopes.
- Clean inverts of drainage structures.
- Install final top coat of pavement.

Final Clean-up

- Clean inverts of culverts and catch basins.
- Remove sediment and debris from rip-rap outlet areas.
- Remove TEC devices only after permanent vegetation and erosion control has been fully established.

3.7 Site Stabilization

Grubbing Stripping and Grading

- Erosion control devices shall be in place as shown on the design plans before grading commences.
- Stripping shall be done in a manner, which will not concentrate runoff. If precipitation is expected, earthen berms shall be constructed around the area being stripped, with a silt sock, silt fence or haybale dike situated in an arc at the low point of the berm.
- If intense precipitation is anticipated, silt socks, haybales, dikes and /or silt fences shall be used as required to prevent erosion and sediment transport. The materials required shall be stored on site at all time.
- If water is required for soil compaction, it shall be added in a uniform manner that does not allow excess water to flow off the area being compacted.
- Dust shall be held at a minimum by sprinkling exposed soil with an appropriate amount of water.

Maintenance of Disturbed Surfaces

- Runoff shall be diverted from disturbed side slopes in both cut and fill.
- Mulching may be used for temporary stabilization.
- Silt sock, haybale or silt fences shall be set where required to trap products of erosion and shall be maintained on a continuing basis during the construction process.

Loaming and Seeding

- Loam shall not be placed unless it is to be seeded directly thereafter.
- All disturbed areas shall have a minimum of 4” of loam placed before seeded and mulched.
- Consideration shall be given to hydro-mulching, especially on slopes in excess of 3 to 1.
- Loamed and seeded slopes shall be protected from washout by mulching or other acceptable slope protection until vegetation begins to grow.

Stormwater Collection System Installation

- The Stormwater drainage system shall be installed from the downstream end up and in a manner which will not allow runoff from disturbed areas to enter pipes.
- Excavation for the drainage system shall not be left open when rainfall is expected overnight. If left open under other circumstances, pipe ends shall be closed by a staked board or by an equivalent method.
- All catch basin openings shall be covered by a silt bag between the grate and the frame or protected from sediment by silt fence surrounding the catch basin grate.

Completion of Paved Areas

- During the placement of sub-base and pavement, the entrance to the Stormwater drainage systems shall be sealed when rain is expected. When these entrances are closed, consideration must be given to the direction of run-off and measures shall be undertaken to minimize erosion and to provide for the collection of sediment.
- In some situations it may be necessary to keep catch basins open.

- Appropriate arrangements shall be made downstream to remove all sediment deposition.

Stabilization of Surfaces

- Stabilization of surfaces includes the placement of pavement, rip-rap, wood bark mulch and the establishment of vegetated surfaces.
- Upon completion of construction, all surfaces shall be stabilized even though it is apparent that future construction efforts will cause their disturbance.
- Vegetated cover shall be established during the proper growing season and shall be enhanced by soil adjustment for proper pH, nutrients and moisture content.
- Surfaces that are disturbed by erosion processes or vandalism shall be stabilized as soon as possible.
- Areas where construction activities have permanently or temporarily ceased shall be stabilized within 14 days from the last construction activity, except when construction activity will resume within 21 days (e.g., the total time period that construction activity is temporarily ceased is less than 21 days).
- Hydro-mulching of grass surfaces is recommended, especially if seeding of the surfaces is required outside the normal growing season.
- Hay mulch is an effective method of temporarily stabilizing surfaces, but only if it is properly secured by branches, weighted snow fences or weighted chicken wire.

3.8 Temporary Structural Erosion Control Measures

Temporary erosion control measures serve to minimize construction-associated impacts to wetland resource and undisturbed areas. Please refer to the following sections for a description of temporary erosion control measures implemented as part of the project and this sample SWPPP.

3.8.1 Silt Socks, Haybales, and Silt Fencing

The siltation barriers will demarcate the limit of work, form a work envelope and provide additional assurance that construction equipment will not enter the adjacent wetlands or undisturbed portions of the site. All barriers will remain in place until disturbed areas are stabilized.

3.8.2 Temporary Stormwater Diversion Swale

A temporary diversion swale is an effective practice for temporarily diverting stormwater flows and to reduce stormwater runoff velocities during storm events. The swale channel can be installed before infrastructure construction begins at the site, or as needed throughout the construction process. The diversion swale should be routinely compacted or seeded to minimize the amount of exposed soil.

3.8.3 Dewatering Basins

Dewatering may be required during stormwater system, foundation construction and utility installation. Should the need for dewatering arise, groundwater will be pumped directly into a temporary settling basin, which will act as a sediment trap during construction. All temporary settling basins will be located within close proximity of daily work activities. Prior to discharge, all groundwater will be treated by means of the settling basin or acceptable substitute. Discharges from sediment basins will be free of visible floating, suspended and settleable solids that would impair the functions of a wetland or degrade the chemical composition of the wetland resource area receiving ground or surface water flows and will be to the combined system.

3.8.4 Material Stockpiling Locations

Piping and trench excavate associated with the subsurface utility work will be contained with a single row of silt socks and/or haybales.

3.9 Permanent Structural Erosion Control Measures

Permanent erosion control measures serve to minimize post-construction impacts to wetland resource areas and undisturbed areas. Please refer to the Site Plans and Long-Term Operations and Maintenance Plan for a description of permanent erosion control measures implemented as part of the project and this SWPPP.

3.10 Good Housekeeping Best Management Practices

3.10.1 Material Handling and Waste Management

Solid waste generation during the construction period will be primarily construction debris. The debris will include scrap lumber (used forming and shoring pallets and other shipping containers), waste packaging materials (plastic sheeting and cardboard), scrap cable and wire, roll-off containers (or dumpsters) and will be removed by a contract hauler to a properly licensed landfill. The roll-off containers will be covered with a properly secured tarp before the hauler exits the site. In addition to construction debris, the construction work force will generate some amount of household-type wastes (food packing, soft drink containers, and other paper). Trash containers for these wastes will be located around the site and will be emptied regularly so as to prevent wind-blown litter. This waste will also be removed by a contract hauler.

All hazardous waste material such as oil filters, petroleum products, paint and equipment maintenance fluids will be stored in structurally sound and sealed shipping containers in the hazardous-materials storage area and segregated from other non-waste materials. Secondary containment will be provided for all materials in the hazardous materials storage area and will consist of commercially available spill pallets. Additionally, all hazardous materials will be disposed of in accordance with federal, state and municipal regulations.

Two temporary sanitary facilities (portable toilets) will be provided at the site in the combined staging area. The toilets will be away from a concentrated flow path and traffic flow and will have collection pans underneath as secondary treatment. All sanitary waste will be collected from an approved party at a minimum of three times per week.

3.10.2 Building Material Staging Areas

Construction equipment and maintenance materials will be stored at the combined staging area and materials storage areas. Silt fence will be installed around the perimeter to designate the staging and materials storage area. A watertight shipping container will be used to store hand tools, small parts and other construction materials.

Non-hazardous building materials such as packaging material (wood, plastic and glass) and construction scrap material (brick, wood, steel, metal scraps, and pine cuttings) will be stored in a separate covered storage facility adjacent to other stored materials. All hazardous-waste materials such as oil filters, petroleum products, paint and equipment maintenance fluids will be stored in structurally sound and sealed containers under cover within the hazardous materials storage area.

Large items such as framing materials and stockpiled lumber will be stored in the open storage area. Such materials will be elevated on wood blocks to minimize contact with runoff.

The combined storage areas are expected to remain clean, well-organized and equipped with ample cleaning supplies as appropriate for the materials being stored. Perimeter controls such as containment structures, covers and liners will be repaired or replaced as necessary to maintain proper function.

3.10.3 Designated Washout Areas

Designated temporary, below-ground concrete washout areas will be constructed, as required, to minimize the pollution potential associated with concrete, paint, stucco, mixers etc. Signs will, if required, be posted marking the location of the washout area to ensure that concrete equipment operators use the proper facility.

Concrete pours will not be conducted during or before an anticipated precipitation event. All excess concrete and concrete washout slurries from the concrete mixer trucks and chutes will be discharged to the washout area or hauled off-site for disposal.

3.10.4 Equipment/Vehicle Maintenance and Fueling Areas

Several types of vehicles and equipment will be used on-site throughout the project including graders, scrapers, excavators, loaders, paving equipment, rollers, trucks and trailers, backhoes and forklifts. All major equipment/vehicle fueling and maintenance will be performed off-site. A small, 20-gallon pickup bed fuel tank will be kept on-site in the combined staging area. When vehicle fueling must occur on-site, the fueling activity will occur in the staging area. Only minor equipment maintenance will occur on-site. All equipment fluids generated from maintenance activities will be disposed of into designated drums stored on spill pallets. Absorbent, spill-cleanup materials and spill kits will be available at the combined staging and materials storage area. Drip pans will be placed under all equipment receiving maintenance and vehicles and equipment parked overnight.

3.10.5 Equipment/Vehicle Wash down Area

All equipment and vehicle washing will be performed off-site.

3.10.6 Spill Prevention Plan

A spill containment kit will be kept on-site in the Contractor's trailer and/or the designated staging area throughout the duration of construction. Should there be an accidental release of petroleum product into a resource area, the appropriate agencies will be immediately notified.

3.10.7 Inspections

Maintenance of existing and proposed BMP's to address stormwater management facilities during construction is an on-going process. The purpose of the inspections is to observe all sources of stormwater or non-stormwater discharge as identified in the SWPPP as well as the status of the receiving waters and fulfill the requirements of the Order of Conditions. The following sections describe the appropriate inspection measures to adequately implement the project's SWPPP. A blank inspection form is provided at the end of this section. Completed inspection forms are to be maintained on site.

Inspection Personnel

The owner's appointed representative will be responsible for performing regular inspections of erosion controls and ordering repairs as necessary.

Inspection Frequency

Inspections will be performed by qualified personnel once every 7 days and within 24-hours after a storm event of greater than one-quarter inch, in accordance with the CGP. The inspections must be documented on the inspection form provided at the end of this section, and completed forms will be provided to the on-site supervisor and maintained at the Owner's office throughout the entire duration of construction.

Inspection Reporting

Each inspection report will summarize the scope of the inspection, name(s) and qualifications of personnel making the inspection, and major observations relating to the implementation of the SWPPP, including compliance and non-compliance items. Completed inspection reports will remain with the completed SWPPP on site.

3.10.8 Amendment Requirements

The final SWPPP is intended to be a working document that is utilized regularly on the construction site, and provides guidance to the Contractor. It must reflect changes made to the originally proposed plan and will be updated to include project specific activities and ensure that they are in compliance with the NPDES General Permit and state and local laws and regulations. It should be amended whenever there is a change in design, construction, operation or maintenance that affects discharge of pollutants. The following items should be addressed should an amendment to the SWPPP occur:

- Dates of certain construction activities such as major grading activities, clearing and initiation of and completion of stabilization measures should be recorded.
- Future amendments to the SWPPP will be recorded as required. As this SWPPP is amended, all amendments will be kept on site and made part of the SWPPP.
- Upon completion of site stabilization (completed as designed and/or 70% background vegetative cover), it can be documented and marked on the plans. Inspections are no longer required at this time.
- Inspections often identify areas not included in the original SWPPP, which will require the SWPPP to be amended. These updates should be made within seven days of being recognized by the inspector.

3.11 SWPPP Inspection and Maintenance Report

The following form is an example to be used for SWPPP Inspection Reporting.

Stormwater Construction Site Inspection and Maintenance Report

TO BE COMPLETED AT LEAST EVERY 7 DAYS AND WITHIN 24 HOURS OF A STORM EVENT OF AT LEAST 0.25 INCHES. AFTER SITE STABILIZATION, TO BE COMPLETED AT LEAST ONCE PER MONTH FOR THREE YEARS OR UNTIL A NOTICE OF TERMINATION IS FILED (IF APPLICABLE).

General Information			
Project Name	Thorndike Place		
NPDES Tracking No. (if applicable)		**Location**	Dorothy Road Arlington, MA
Date of Inspection		**Start/End Time**	
Inspector's Name(s)			
Inspector's Title(s)			
Inspector's Contact Information			
Inspector's Qualifications			
Describe present phase of construction			
Type of Inspection: ❑ Regular ❑ Pre-storm event ❑ During storm event ❑ Post-storm event			
Weather Information			
Has there been a storm event since the last inspection? ❑Yes ❑No **If yes, provide:** Storm Start Date & Time: Storm Duration (hrs): Approximate Amount of Precipitation (in):			
Weather at time of this inspection? ❑ Clear ❑Cloudy ❑ Rain ❑ Sleet ❑ Fog ❑ Snowing ❑ High Winds ❑ Other: Temperature:			
Have any discharges occurred since the last inspection? ❑Yes ❑No **If yes, describe:**			
Are there any discharges at the time of inspection? ❑Yes ❑No **If yes, describe:**			

Site-specific BMPs

- *Number the structural and non-structural BMPs identified in your SWPPP on your site map and list them below (add as many BMPs as necessary). Carry a copy of the numbered site map with you during your inspections. This list will ensure that you are inspecting all required BMPs at your site.*
- *Describe corrective actions initiated, date completed, and note the person that completed the work in the Corrective Action Log.*

	BMP	**BMP Installed?**	**BMP Maintenance Required?**	**Corrective Action Needed and Notes Action required by whom and when**
1	Catch Basin Protection	❑Yes ❑No	❑Yes ❑No	
2	Haybale & Silt Fencing	❑Yes ❑No	❑Yes ❑No	
3	Straw Wattles	❑Yes ❑No	❑Yes ❑No	
4	Construction Entrance	❑Yes ❑No	❑Yes ❑No	
5	Sediment Basins	❑Yes ❑No	❑Yes ❑No	
6	Dewatering Pit	❑Yes ❑No	❑Yes ❑No	
7		❑Yes ❑No	❑Yes ❑No	

Overall Site Issues
Below are some general site issues that should be assessed during inspections. Customize this list as needed for conditions at your site.

	BMP/activity	Implemented?	Maintenance Required?	Corrective Action Needed and Notes Action required by whom and when
1	Are all slopes and disturbed areas not actively being worked properly stabilized?	❑Yes ❑No	❑Yes ❑No	
2	Are natural resource areas (e.g., streams, wetlands, mature trees, etc.) protected with barriers or similar BMPs?	❑Yes ❑No	❑Yes ❑No	
3	Are perimeter controls and sediment barriers adequately installed (keyed into substrate) and maintained?	❑Yes ❑No	❑Yes ❑No	
4	Are discharge points and receiving waters free of any sediment deposits?	❑Yes ❑No	❑Yes ❑No	
5	Are storm drain inlets properly protected?	❑Yes ❑No	❑Yes ❑No	
6	Is the construction exit preventing sediment from being tracked into the street?	❑Yes ❑No	❑Yes ❑No	
7	Is trash/litter from work areas collected and placed in covered dumpsters?	❑Yes ❑No	❑Yes ❑No	
8	Are washout facilities (e.g., paint, stucco, concrete) available, clearly marked, and maintained?	❑Yes ❑No	❑Yes ❑No	
9	Are vehicle and equipment fueling, cleaning, and maintenance areas free of spills, leaks, or any other deleterious material?	❑Yes ❑No	❑Yes ❑No	Vehicle Maintenance not allowed on site
10	Are materials that are potential stormwater	❑Yes ❑No	❑Yes ❑No	

	BMP/activity	Implemented?	Maintenance Required?	Corrective Action Needed and Notes Action required by whom and when
	contaminants stored inside or under cover?			
11	Are non-stormwater discharges (e.g., wash water, dewatering) properly controlled?	❑Yes ❑No	❑Yes ❑No	
12	(Other)	❑Yes ❑No	❑Yes ❑No	

Non-Compliance

Describe any incidents of non-compliance not described above:

CERTIFICATION STATEMENT

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Print name and title: ____
(Qualified Person Performing the Inspection)

Signature:______________________________________ **Date:** ____________________

Print name and title: ____
(Contractor/Operator)

Signature:______________________________________ **Date:**____________________

SECTION 4.0

LONG-TERM POLLUTION PREVENTION & OPERATION AND MAINTENANCE PLAN

4.0 LONG-TERM POLLUTION PREVENTION & OPERATION AND MAINTENANCE PLAN

As required by Standard #4 of the Stormwater Management Policy, this Long-Term Pollution Prevention Plan has been developed for source control and pollution prevention at the site after construction.

MAINTENANCE RESPONSIBILITY

Ensuring that the provisions of the Long-Term Pollution Prevention Plan are followed will be the responsibility of The Applicant, Arlington Land Realty, LLC.

GOOD HOUSEKEEPING PRACTICES

The site to be kept clean of trash and debris at all times. Trash, junk, etc. is not to be left outside.

VEHICLE WASHING CONTROLS

The following BMP's, or equivalent measures, methods or practices are required if you are engaged in vehicle washing and/or steam cleaning:

> It is allowable to rinse down the body or a vehicle, including the bed of a truck, with just water without doing any wash water control BMP's.
>
> If you wash (with mild detergents) on an area that infiltrates water, such as gravel, grass, or loose soil, it is acceptable to let the wash water infiltrate as long as you only wash the body of vehicles.
>
> However, if you wash on a paved area and use detergents or other cleansers, or if you wash/rinse the engine compartment or the underside of vehicles, you must take the vehicles to a commercial vehicle wash.

REQUIREMENTS FOR ROUTINE INSPECTIONS AND MAINTENANCE OF STORMWATER BMPS

All stormwater BMPs are to be inspected and maintain as follows;

Haybales, Silt Fence, and other temporary measures

The temporary erosion control measures will be installed up gradient of any wetland resource area where any disturbance or alteration might otherwise allow for erosion or sedimentation. They will be regularly inspected to ensure that they are functioning adequately. Additional supplies of these temporary measures will be stockpiled on site for any immediate needs or routine replacement.

Deep Sump Hooded Catch Basins

Regular maintenance is essential. Catch basins remain effective at removing pollutants only if they are cleaned out frequently. Inspect or clean basins at least four times per year and at the end of the foliage and snow removal seasons. Sediments must also be removed four times per year or whenever the depth of the deposits in the catch basin sump is greater than or equal to one half the depth from the bottom of the invert of the lowest pipe in the basin.

Water Quality Treatment Units

The water quality treatment structures require periodic inspection and cleaning to maintain operation and function. Owners should have these units inspected on a semi-annual basis and after periods of intense precipitation. Inspections can be done by using a clear Plexiglas tube ("sludge judge") to extract a water column sample. When sediment accumulation reaches 15% of storage capacity, cleaning of the unit is required.

These water quality structures must and will be checked and cleaned immediately after petroleum spills; contact appropriate regulatory agencies.

Maintenance of these units should be done by a vacuum truck that will remove the water, sediment, debris, floating hydrocarbons and other materials in unit. Proper cleaning and disposal of the removed materials and liquid must be followed.

Underground Infiltration System

Maintenance is required for the proper operation of the underground infiltration system. Infiltration systems are prone to failure due to clogging if the upstream water quality units are not maintained. The use of pretreatment BMPs will minimize failure and maintenance requirements.

After construction, the infiltration system shall be inspected after every major storm for the first few months to ensure proper stabilization and function. Water levels in the access ports shall be recorded over several days to check the drainage of the systems. It is recommended that a log book be maintained showing the depth of water in the detention/infiltration systems at each observation in order to determine the rate at which the system dewaters after runoff producing storm events. Once the performance characteristics of the detention/infiltration have been verified, the monitoring schedule can be reduced to an annual basis, unless the performance data suggests that a more frequent schedule is required.

Preventive maintenance on the infiltration system shall be performed at least twice a year, and sediment shall be removed from any and all pretreatment and collection structures. Sediment shall be removed when deposits approach within six inches of the invert heights of connecting pipes between unit rows, or in sumped inlet structures. Ponded water inside the systems (as visible from the access ports) that remains after several days most likely indicates that the bottom of the system is clogged and will require cleaning or replacement.

The system is designed with a defined top portal area at the "down-flow" end of the chamber that can be cut out to accept up to a 10-inch diameter riser pipe. The 10-inch riser can be used as an observation well and as access for a vacuum truck tube for use in removing sediment. The "down flow" ends of the units have end walls that are closed on the bottom. The closed bottom functions like a coffer dam, with most of the sediment depositing prior to flowing into the next chamber, facilitating its removal through the riser pipe, which is positioned directly above this area.

Pipe Outlet Protection

The outlet protection should be checked at least annually and after every major storm. If the rip-rap has been displaced, undermined or damaged, it should be repaired immediately. The channel immediately below the outlet should be checked to see that erosion is not occurring. The downstream channel should be kept clear of obstructions such as fallen trees, debris, and sediment that could change flow patterns and/or tailwater depths on the pipes. Repairs must be carried out immediately to avoid additional damage to the outlet protection apron.

PROVISIONS FOR MAINTENANCE OF LAWNS, GARDENS AND OTHER LANDSCAPE AREAS

Suggested Maintenance Operations

A. Trees and Shrubs

Disease and Pest Management - Prevention of disease or infestation is the first step of Pest Management. A plant that is in overall good health is far less susceptible to disease. Good general landscape maintenance can reduce problems from disease.

Inspections of plant materials for signs of disease or infestation are to be performed monthly by the Landscape Maintenance Contractor's Certified Arborist. This is a critical step for early diagnosis. Trees and Shrubs that have been diagnosed to have a plant disease or an infestation of insect pests are to be treated promptly with an appropriate material by a licensed applicator.

Fertilization - Trees and shrubs live outside their natural environment and should be given proper care to maintain health and vigor. Fertilizing trees and shrubs provides the plants with nutrients needed to resist insect attack, to resist drought and to grow thicker foliage. Fertilizing of new and old trees may be done in one of three ways, in either the early spring or the late fall.

- Systemic Injection of new and existing trees on trees 2 inches or greater in diameter. You must be licensed to apply this method.

- Soil Injection – a liquid fertilizer with a product such as Arbor Green or Rapid Grow injected into the soil under the drip zone of a tree or shrub. Material must be used according to manufacturers' specifications to be effective. Outside contracting is recommended.
- Punch Bar Method – a dry fertilizer such as 10-10-10, may be used by punched holes in the drip zone of the tree 12-18" deep, two feet apart around the circumference, to the edge of the drip line. Three pounds of fertilizer should be used per diameter inch for trees with trunks six inches or more in diameter.
- Fertilizer of shrubs – use a fertilizer such as 10-10-10, broadcast over the planting area according to the manufacturers' rate and water in.
- All fertilization must be noted on daily maintenance log.

Watering - Trees and Shrubs will need supplemental watering to remain in vigorous health. All new plants need to be watered once a week in cool weather, twice a week during warm weather, and up to three times in a week during periods of extreme heat and drought. Trees and shrubs should be watered in such a manner as to totally saturate the soil in the root zone area. Over-watering or constant saturation of the soil must be avoided as this could lead to root rot and other disease problems. The use of a soil moisture meter can help you monitor the soil's water intake.

Plant Replacement - Unhealthy plants that may cause widespread infestation of other nearby plants shall be immediately removed from the site. Any vegetation removed from the site must be recorded and submitted with the daily maintenance log. The area shall be treated to prevent further infestation. The plant shall then be replaced with a healthy specimen of the same species and size. This work shall have a pre-established budget allowance for the year.

A spring inspection of all plant materials shall be performed to identify those plant materials that are not in vigorously healthy condition. Unhealthy plant materials shall be evaluated. If the problem is determined to be minor the plant material shall be given appropriate restorative care in accordance with this maintenance guideline until it is restored to a vigorously healthy condition. Unhealthy plant materials that do not respond to restorative care or are determined to be beyond saving shall be replaced with a healthy specimen of the same species and size. In the case of the necessity of replacing extremely large plant materials the Landscape Architect shall determine the size of the replacement plant.

Pruning - Proper pruning is the selective removal of branches without changing the plant's natural appearance, or habit of growth. All tree pruning is to be performed by a licensed Arborist. All branches that are dead, broken, scared or crossing should be removed. All cuts should be made at the collar and not cut flush with the base.

Pruning on the site shall be done for the following purposes;

- To maintain or reduce the size of a tree or shrub
- To remove dead, diseased or damaged branches
- To rejuvenate old shrubs and encourage new growth
- To stimulate future flower and fruit development
- To maximize the visibility of twig color
- To prevent damage and reduce hazards to people and properties

All shrubs are recommended to be pruned on an annual basis to prevent the shrub from becoming overgrown and eliminate the need for drastic pruning. There are several types of pruning for deciduous shrubs. Hand snips should be used to maintain a more natural look or hand shears can be used for a more formal appearance.

Winter Protection - All trees and shrubs are to be watered, fertilized, and mulched before the first frost. All stakes should be checked and ties adjusted. Damaged branches should be pruned.

Broadleaf and Coniferous Evergreen plant materials are to be sprayed with an anti-desiccant product to prevent winter burn. The application shall be repeated during a suitable mid-winter thaw.

Shrubs located in areas likely to be piled with snow during snow removal (but not designated as Snow Storage Areas) shall be marked by six-foot high poles with bright green banner flags. Stockpiles of snow are not to be located in these areas due to potential damage to the plant materials from both the weight of the snow and the snow melting chemicals.

At the fall landscape maintenance conference parameters will be discussed between the Landscape Maintenance Contractor and the snow removal contractor to assure minimal damage and loss of landscape amenities during the winter season.

Seasonal Clean Up - A thorough spring cleanup is to be performed. This includes the removal and replacement of dead or unhealthy plant materials and the cleanup of plant debris and any general debris that has accumulated over the winter season. Mulch is to be lightly raked to clean debris from the surface without removing any mulch. Twigs and debris are to be removed from the planting beds throughout the growing season.

Mulching - Planting beds shall be mulched with a treated shredded hardwood mulch free from dirt, debris, and insects. A sample of this mulch shall be given to the Owner for approval prior to installation.

Maintain a 2-3" maximum depth and keep free of weeds either by hand weeding or by the use of a pre-emergent weed control such as Treflan or Serfian. Seasonal re-mulching shall occur as necessary in the spring and the fall to maintain this minimum depth. When new mulch is added to the planting bed it shall be spread to create a total depth of no more than three inches. Edges should be maintained in a cleanly edged fashion.

Mulch shall not be placed directly against the trunk of any tree or shrub.

B. Groundcover and Perennials

Disease and Pest Management – Pesticides and herbicides should be applied only as problems occur, with the proper chemical applied only by a trained professional or in the case of pesticide, a Certified Pesticide Applicator. Plants should be monitored weekly and treated accordingly.

Fertilizer – The health of the plants can be maintained or improved, and their growth encouraged by an application of complete fertilizer. Apply a fertilizer such as 4-12-4 as growth becomes apparent and before mulching. Apply to all groundcover and perennial planting areas by hand and avoid letting the fertilizer come in contact with the foliage, or use a liquid fertilizer and apply by soaking the soil. Apply according to the manufacturers' specifications.

Fertilization shall stop at the end of July.

Water – Groundcovers and Perennials will need supplemental watering in order to become established, healthy plants. All new plants need to be watered once a week in cool weather, twice a week during warm weather, and up to three times in a week during periods of extreme heat and drought. Until established, groundcovers and perennials should be watered in such a manner as to totally saturate the soil in the root zone area, to a depth of 6 inches. Once established, perennials shall continue to be watered as necessary to maintain them in a vigorous healthy condition. Over-watering or constant saturation of the soil must be avoided as this could lead to root rot and other disease problems. The use of a soil moisture meter can help you monitor the soil's water intake.

On-site water shall be furnished by the Owner. Hose and other watering equipment shall be furnished by the Landscape Maintenance Contractor.

Replacement – Any unhealthy plant/s that may cause widespread infestation of other nearby plants shall be immediately removed from the site. Any vegetation removed from the site must be recorded and submitted with the landscape maintenance log. The area shall be treated to prevent further infestation. The plant/s shall then be replaced with healthy specimen/s of the same species and size. Old Forge shall have a pre-established budget allowance for this type of replacement, each year.

Plant material that is damaged as a result of other landscape maintenance activities, such as mowing, shall be replaced with healthy specimens of the same species and size, at no additional cost to the owner.

Deadheading – Perennials shall be checked on a weekly basis and dead-headed once flowers have faded or as necessary based on plant type and duration of flower. Spent flowers can be pinched off with the thumb and forefinger. Continue to remove all faded flowers until Fall. All associated debris shall be removed from site daily.

Staking – Upright-growing perennials need support especially when in flower. Use of bamboo stakes, galvanized wire hoops or mesh may be necessary for their support. Supports should be put in place before they have become too difficult to handle. The supports should not be taller than the mature height of the perennial plant.

Division of Perennials – Two or three-year-old perennials are easily divided in the spring if more plants are needed. To divide, cut out the entire section of plant to be divided, including roots. The larger divisions (those with three or more shoots), can be set out immediately in their permanent location, where they can be expected to bloom the same season. Smaller divisions are best planted in an out-of-the-way planting bed until the following autumn or spring, when they can be moved to their permanent location.

Weeding – All planting beds should be kept weed-free. Weed either by hand or with a pre-emergent herbicide such as Treflen used according to manufacturers' specifications. Manual weeding is to be used in combination with the use of spot applications of herbicides. Both live and dead weeds are to be pulled and removed from the site.

All herbicide applications shall be documented in the Landscape Maintenance Log. The actual product label or the manufacturer's product specification sheet for the specific product shall also be included in the Log.

Only personnel with appropriate applicator licenses shall supervise and/or perform the application of pesticide products requiring a license.

Winterizing – Perennial gardens should be cleaned-up when growth ceases in the fall. Remove foliage of plants that normally die down to the ground. Divide and replant over-grown clumps.

C. Lawn Areas - Turf Systems

Mowing – Proper mowing is an integral part of any good turf maintenance program. Without it, the finest in fertilization, watering and other vital maintenance practices would be completely ineffective. Proper mowing will help control dicot weeds; help the turf survive during periods of extreme heat, and gain strength and vigor to resist disease and other infestations.

Mowing height – The proper mowing height will vary somewhat according to the type of grass. The most common type of seed & sod lawns contain a mixture of bluegrass, fine fescue and perennial rye, which should be mowed at 2-3 inches.

Mowing frequency – The basic rule of thumb for mowing frequency is to never remove more than 1/3 of the grass blade in one mowing. Example: if you want to mow your turf at 2 inches, you should cut it when it reaches 3 inches. Removing more than ½ of the grass plant at a time can put the plant into shock, thus making it more susceptible to stress disease and weed infestation.

Mowing frequency will vary with the growing season and should be set by the plant height and not a set date. It will often be necessary to mow twice a week during periods of surge growth to help maintain plant health and color. Mowing should be cut back during periods of stress.

Grass clippings should be removed whenever they are thick enough to layer the turf. The return of clippings to the soil actually adds nutrients and helps retain moisture. Heavily clumped grass clippings are a sign of infrequent mowing, calling for an adjustment in the mowing schedule.

When mowing any area, try to alternate mowing patterns. This tends to keep grass blades more erect and assures an even cut. A dull mower will cause color loss due to tearing of the turf plant, and since mowing will ultimately determine the appearance of any turf area there is an absolute necessity for a clean sharp cut.

Weed & Pest Control and Fertilizing- In order to maintain turf grass health, vigor color, and nutrients, fertilizer must be added to the soil. Recommendations for fertilization of lawn areas are as follows; fertilize at the rate of one (1) pound of nitrogen per thousand square feet, per year is optimum. Fertilizer should be a balanced slow release, sulfur coated type fertilizer.

Weed Control - All turf areas will require some weed control, for both weed grasses and dicot weeds. Weeds should be treated at the appropriate time and with a material labeled for the target weed. Please refer to the fertilizer weed and pest schedule for timing.

Pest Control - All turf areas will require some pest control. Pests should be treated at the appropriate time with a material labeled for the target pest. Please refer to the fertilizer, weed and pest schedule for timing.

Lime - A common cause for an unhealthy lawn is acidic soil. When the pH is below the neutral range (between 6-7) vital plant nutrients become fixed in the soil and cannot be absorbed by the grass plant. Lime corrects an acid soil condition, supplies calcium for plant growth and improves air and water circulation. Limestone applied at the rate of 50 lbs. per thousand square feet will adjust the soil pH one point over a period of 6-9 months.

D. Fertilizer, Weed & Pest Control Schedule – Turf Systems

Spring - (April)	Fertilize one (1) pound of nitrogen per 1,000 square feet Pre-emergent weed grass control Broadleaf weed control
Late Spring - (June)	Fertilize one (1) pound of nitrogen per 1,000 square feet Pre-emergent weed grass control Broadleaf weed control Insect Control (if needed)
*Summer - (August)	Fertilize one (1) pound of nitrogen per 1,000 square feet Broadleaf weed control (if needed) Insect Control (if needed)
Fall - (September)	Fertilize one (1) pound of nitrogen per 1,000 square feet

*Omit if area is not to be irrigated

Lawn Maintenance Task Schedule

MARCH (Weather permitting)

- Clean up winter debris, sand, leaves, trash etc.
- Re-edge mulch beds, maintain at 2-3” maximum.
- Fertilize plants
- Aerate and thatch turf (conditions permitting)

APRIL

- Reseed or sod all areas needing attention.
- Fertilize and weed control
- Lime
- Start mowing when grass reaches 2-1/2”, mow to 2”

MAY

- Mow turf to 2-2-1/2”
- Weed as necessary.
- Check for disease and pest problems in both turf and plants.

JUNE
- Mow turf to 2-1/2” – 3”
- Fertilize and weed control.
- Weed
- Check for disease and pest problems in both turf and plants, treat as necessary.

PROVISIONS FOR SOLID WASTE MANAGEMENT (SITE TRASH)

Trash will be placed in on-site dumpsters and the Owner will make provisions for its regular and timely removal.

SNOW DISPOSAL AND PLOWING PLANS

The purpose of the snow and snowmelt management plan is to provide guidelines regarding snow disposal site selection, site preparation and maintenance that are acceptable to the Department of Environmental Protection. For the areas that require snow removal, snow storage onsite will largely be accomplished by using pervious areas along the shoulder of the roadway and development as windrowed by plows.

- Avoid dumping of snow into any water body, including rivers, ponds, or wetlands. In addition to water quality impacts and flooding, snow disposed of in open water can cause navigational hazards when it freezes into ice blocks.
- Avoid disposing of snow on top of storm drain catch basins or in stormwater basins. Snow combined with sand and debris may block a storm drainage system, causing localized flooding. A high volume of sand, sediment, and litter released from melting snow also may be quickly transported through the system into surface water.
- In significant storm events, the melting or off-site trucking of snow may be implemented. These activities shall be conducted in accordance with all local, state and federal regulations.

WINTER ROAD SALT AND/OR SAND USE AND STORAGE RESTRICTIONS

The applicant will be responsible for sanding and salting the site. No storage on site.

STREET SWEEPING SCHEDULES

There are three types of sweepers: Mechanical, Regenerative Air, and Vacuum Filter.

1) Mechanical: Mechanical sweepers use brooms or rotary brushes to scour the pavement.
2) Regenerative Air: These sweepers blow air onto the road or parking lot surface, causing fines to rise where they are vacuumed.
3) Vacuum filter: These sweepers remove fines along roads. Two general types of vacuum filter sweepers are available - wet and dry. The dry type uses a broom in combination with the vacuum. The wet type uses water for dust suppression

Regardless of the type chosen, the efficiency of street sweeping is increased when sweepers are operated in tandem.

This project has not included street sweeping as part of the TSS removal calculations. However, it is recommended that street sweeping of the parking areas occur four times a year, including once after the spring snow melt.

Reuse and Disposal of Street Sweepings

Once removed from paved surfaces, the sweepings must be handled and disposed of properly. Mass DEP’s Bureau of Waste Prevention has issued a written policy regarding the reuse and disposal of street sweepings. These sweepings are regulated as a solid waste, and can be used in three ways:

- In one of the ways already approved by Mass DEP (e.g., daily cover in a landfill, additive to compost, fill in a public way)

- If approved under a Beneficial Use Determination
- Disposed in a landfill

TRAINING OF STAFF OR PERSONNEL INVOLVED WITH IMPLEMENTING LONG-TERM POLLUTION PREVENTION PLAN

The Long-Term Pollution Prevention Plan is to be implemented by property owner of the site. Trained and, if required, licensed Professionals are to be hired by the owner as applicable to implement the Long-Term Pollution Prevention Plan.

LIST OF EMERGENCY CONTACTS FOR IMPLEMENTING LONG-TERM POLLUTION PREVENTION PLAN

The applicant will be required to implement the Long-Term Pollution Prevention Plan and will create and maintain a list of emergency contacts.

POST CONSTRUCTION PHASE INSPECTION SCHEDULE AND EVALUATION CHECKLIST

Inspection Date	Inspector	BMP Inspected	Inspection Frequency Requirements	Comments	Recommendation	Follow-up Inspection Required (yes/no)
		Catch Basin	Four times a year			
		Water Quality Units	Four times a year			
		Infiltration System	Twice a year			
		Pipe Outlet Protection	Once a year			

1. Refer to the Massachusetts Stormwater Handbook Volume Two: Stormwater Technical Handbook (February 2008) for recommendations regarding frequency for inspections and maintenance of specific BMP's

2. Inspections to be conducted by a qualified professional such as an environmental scientist or civil engineer.

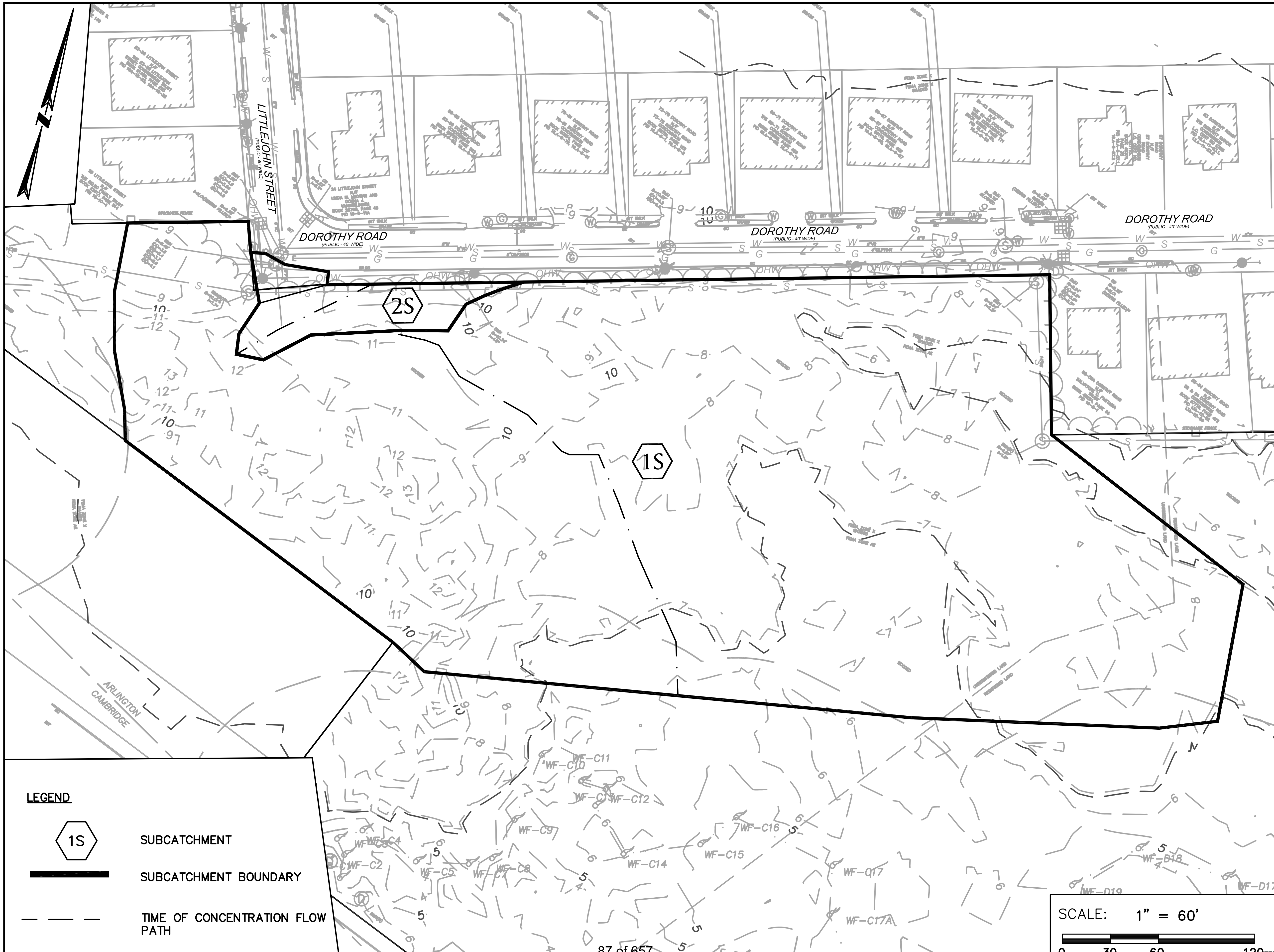
3. Limited or no use of sodium chloride salts, fertilizers or pesticides recommended.

4. <u>Other Notes</u>: (Include deviations from Conservation Commission Approvals, Planning Board Approvals and Approved Plans)

SECTION 5.0

HYDROLOGY CALCULATIONS

5.01 EXISTING WATERSHED PLAN



LEGEND

1S	SUBCATCHMENT
	SUBCATCHMENT BOUNDARY
	TIME OF CONCENTRATION FLOW PATH

SCALE: 1" = 60'

0 30 60 120FEET

THORNDIKE PLACE

DOROTHY ROAD

ARLINGTON
MASSACHUSETTS
(MIDDLESEX COUNTY)

EXISTING WATERSHED PLAN

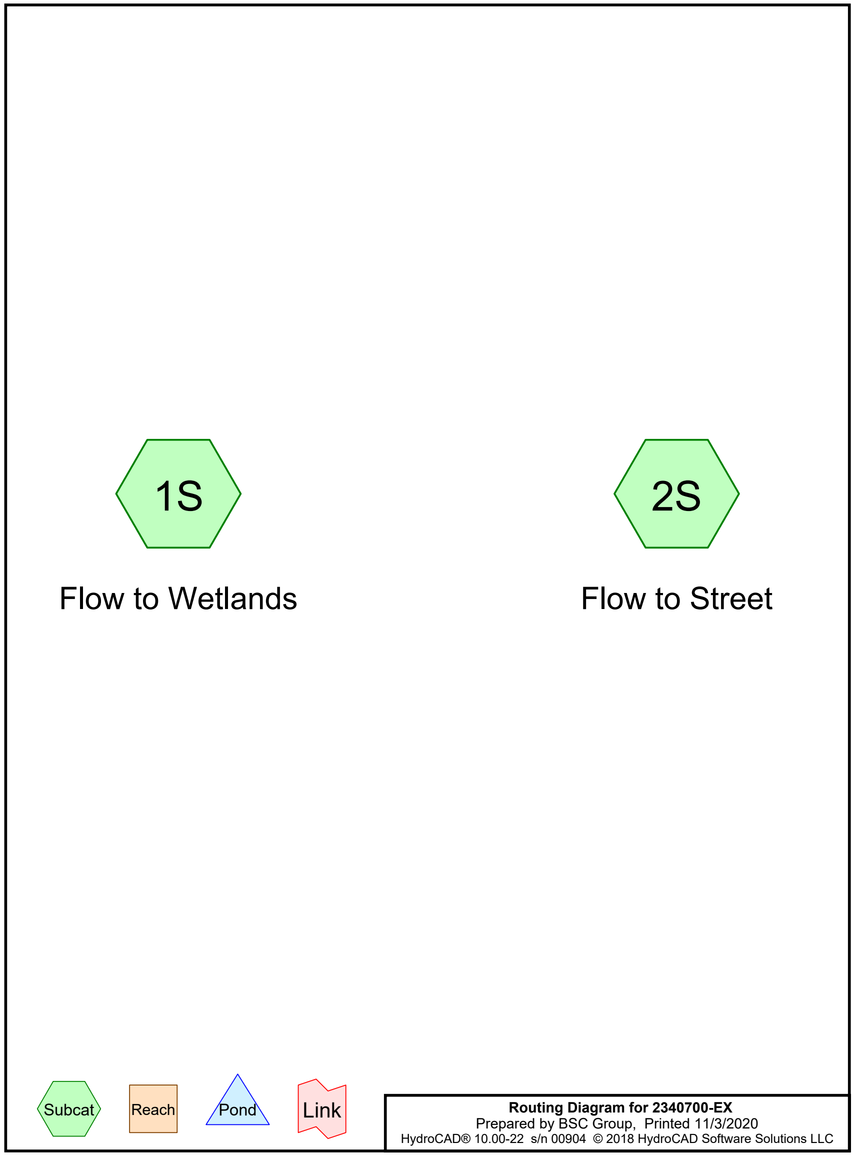
NOVEMBER 3, 2020

PREPARED FOR:
ARLINGTON LAND REALTY
84 SHERMAN STREET
CAMBRIDGE, MA

BSC GROUP
803 Summer Street
Boston, Massachusetts
02127
617 896 4300

Job No.: 23407.00 Date: 11/3/2020
Scale: 1" = 60' Revised:
Dwg No: EXW
File: C\DRAINAGE DESIGN\2340700-EXW

5.02 EXISTING HYDROLOGY CALCULATIONS (HYDROCAD™ PRINTOUTS)



Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.021	98	Paved parking, HSG C (2S)
3.534	70	Woods, Good, HSG C (1S, 2S)
3.555	**70**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
3.555	HSG C	1S, 2S
0.000	HSG D	
0.000	Other	
3.555		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.021	0.000	0.000	0.021	Paved parking	2S
0.000	0.000	3.534	0.000	0.000	3.534	Woods, Good	1S, 2S
0.000	**0.000**	**3.555**	**0.000**	**0.000**	**3.555**	**TOTAL AREA**	

Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Flow to Wetlands Runoff Area=147,900 sf 0.00% Impervious Runoff Depth>0.84"
Flow Length=310' Tc=17.5 min CN=70 Runoff=2.1 cfs 0.238 af

Subcatchment 2S: Flow to Street Runoff Area=6,954 sf 13.30% Impervious Runoff Depth>1.06"
Flow Length=95' Tc=6.0 min CN=74 Runoff=0.2 cfs 0.014 af

Total Runoff Area = 3.555 ac Runoff Volume = 0.252 af Average Runoff Depth = 0.85"
99.40% Pervious = 3.534 ac 0.60% Impervious = 0.021 ac

Summary for Subcatchment 1S: Flow to Wetlands

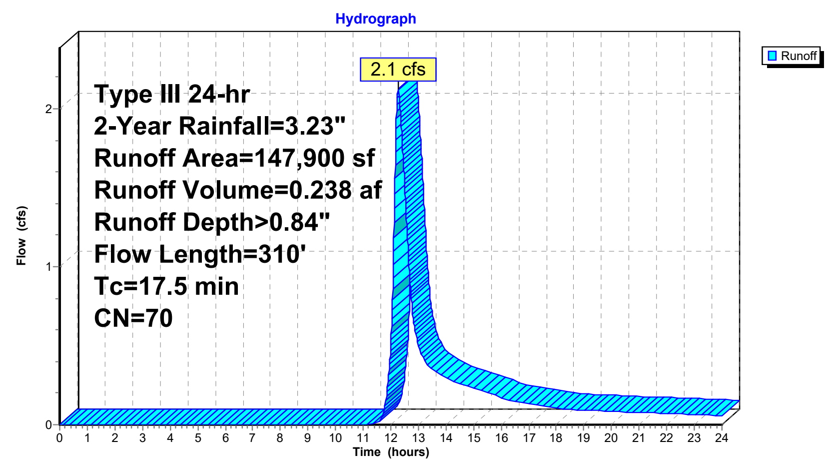
Runoff = 2.1 cfs @ 12.27 hrs, Volume= 0.238 af, Depth> 0.84"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.23"

Area (sf)	CN	Description
147,900	70	Woods, Good, HSG C
147,900		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.4	50	0.0240	0.07		**Sheet Flow, A to B** Woods: Light underbrush n= 0.400 P2= 3.23"
6.1	260	0.0200	0.71		**Shallow Concentrated Flow, B to C** Woodland Kv= 5.0 fps
17.5	310	Total			

Subcatchment 1S: Flow to Wetlands



Summary for Subcatchment 2S: Flow to Street

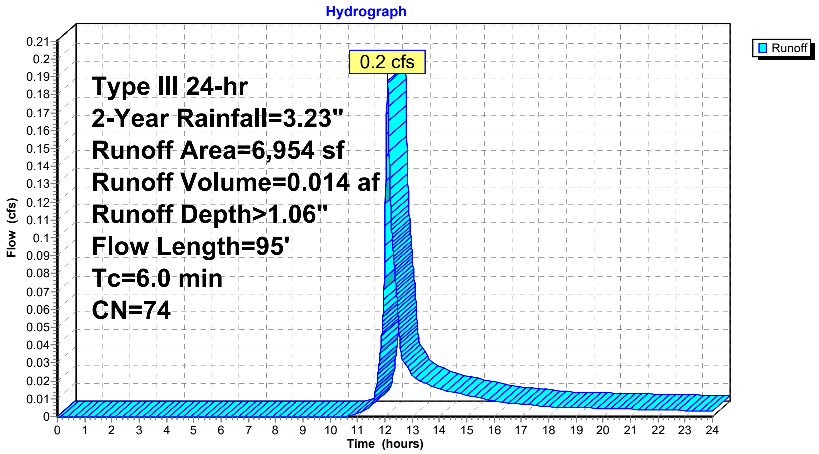
Runoff = 0.2 cfs @ 12.10 hrs, Volume= 0.014 af, Depth> 1.06"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.23"

Area (sf)	CN	Description
6,029	70	Woods, Good, HSG C
925	98	Paved parking, HSG C
6,954	74	Weighted Average
6,029		86.70% Pervious Area
925		13.30% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.5	20	0.0750	0.10		**Sheet Flow, A to B** Woods: Light underbrush n= 0.400 P2= 3.23"
1.8	75	0.0200	0.71		**Shallow Concentrated Flow, B to C** Woodland Kv= 5.0 fps
5.3	95	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 2S: Flow to Street



Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Flow to Wetlands Runoff Area=147,900 sf 0.00% Impervious Runoff Depth>1.95"
Flow Length=310' Tc=17.5 min CN=70 Runoff=5.4 cfs 0.553 af

Subcatchment 2S: Flow to Street Runoff Area=6,954 sf 13.30% Impervious Runoff Depth>2.28"
Flow Length=95' Tc=6.0 min CN=74 Runoff=0.4 cfs 0.030 af

Total Runoff Area = 3.555 ac Runoff Volume = 0.583 af Average Runoff Depth = 1.97"
99.40% Pervious = 3.534 ac 0.60% Impervious = 0.021 ac

Summary for Subcatchment 1S: Flow to Wetlands

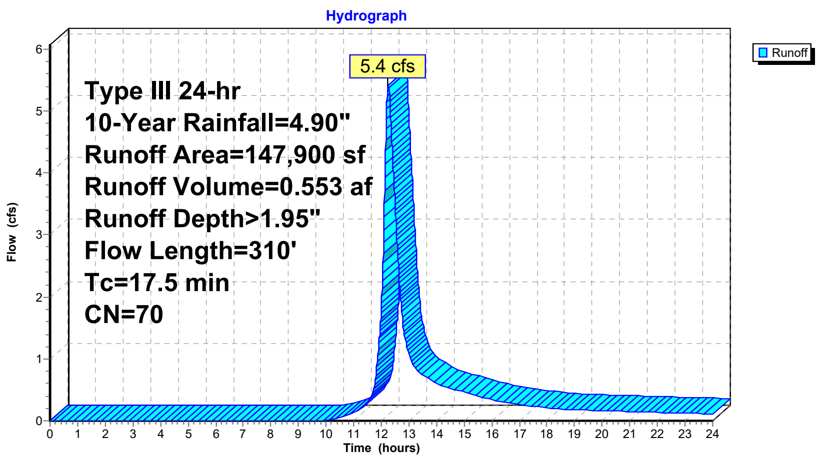
Runoff = 5.4 cfs @ 12.25 hrs, Volume= 0.553 af, Depth> 1.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.90"

Area (sf)	CN	Description
147,900	70	Woods, Good, HSG C
147,900		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.4	50	0.0240	0.07		**Sheet Flow, A to B** Woods: Light underbrush n= 0.400 P2= 3.23"
6.1	260	0.0200	0.71		**Shallow Concentrated Flow, B to C** Woodland Kv= 5.0 fps
17.5	310	Total			

Subcatchment 1S: Flow to Wetlands



Summary for Subcatchment 2S: Flow to Street

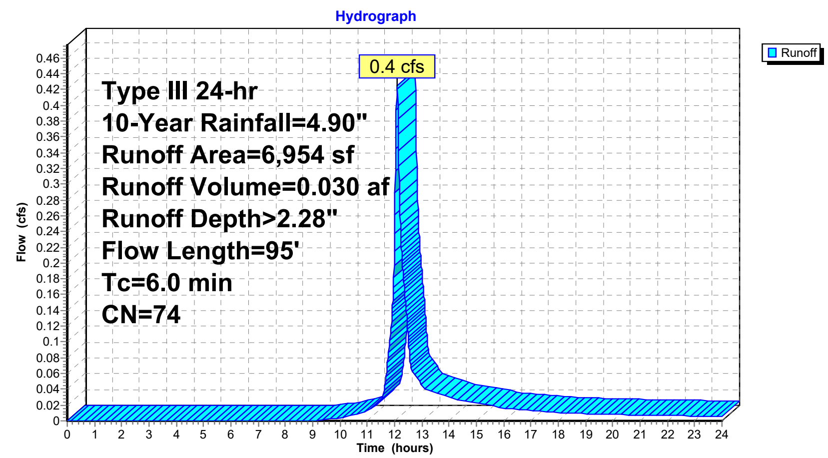
Runoff = 0.4 cfs @ 12.09 hrs, Volume= 0.030 af, Depth> 2.28"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.90"

Area (sf)	CN	Description
6,029	70	Woods, Good, HSG C
925	98	Paved parking, HSG C
6,954	74	Weighted Average
6,029		86.70% Pervious Area
925		13.30% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.5	20	0.0750	0.10		**Sheet Flow, A to B** Woods: Light underbrush n= 0.400 P2= 3.23"
1.8	75	0.0200	0.71		**Shallow Concentrated Flow, B to C** Woodland Kv= 5.0 fps
5.3	95	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 2S: Flow to Street



Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Flow to Wetlands Runoff Area=147,900 sf 0.00% Impervious Runoff Depth>2.95"
Flow Length=310' Tc=17.5 min CN=70 Runoff=8.3 cfs 0.836 af

Subcatchment 2S: Flow to Street Runoff Area=6,954 sf 13.30% Impervious Runoff Depth>3.35"
Flow Length=95' Tc=6.0 min CN=74 Runoff=0.6 cfs 0.045 af

Total Runoff Area = 3.555 ac Runoff Volume = 0.880 af Average Runoff Depth = 2.97"
99.40% Pervious = 3.534 ac 0.60% Impervious = 0.021 ac

Summary for Subcatchment 1S: Flow to Wetlands

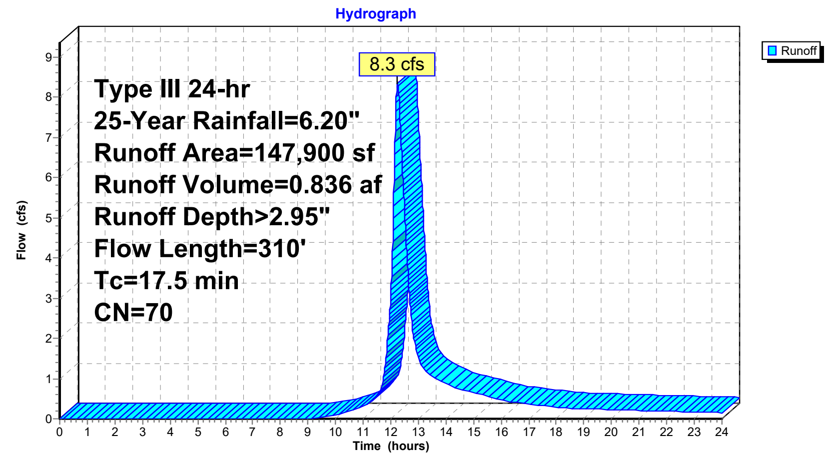
Runoff = 8.3 cfs @ 12.24 hrs, Volume= 0.836 af, Depth> 2.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.20"

Area (sf)	CN	Description
147,900	70	Woods, Good, HSG C
147,900		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.4	50	0.0240	0.07		**Sheet Flow, A to B** Woods: Light underbrush n= 0.400 P2= 3.23"
6.1	260	0.0200	0.71		**Shallow Concentrated Flow, B to C** Woodland Kv= 5.0 fps
17.5	310	Total			

Subcatchment 1S: Flow to Wetlands



Summary for Subcatchment 2S: Flow to Street

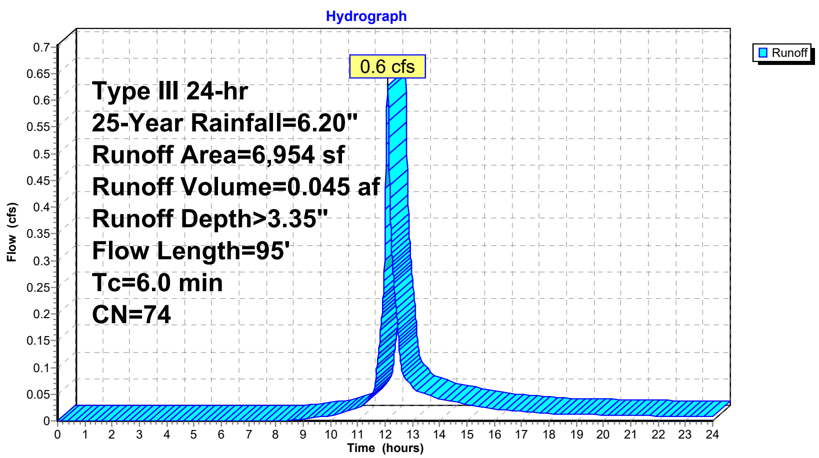
Runoff = 0.6 cfs @ 12.09 hrs, Volume= 0.045 af, Depth> 3.35"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.20"

Area (sf)	CN	Description
6,029	70	Woods, Good, HSG C
925	98	Paved parking, HSG C
6,954	74	Weighted Average
6,029		86.70% Pervious Area
925		13.30% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.5	20	0.0750	0.10		**Sheet Flow, A to B** Woods: Light underbrush n= 0.400 P2= 3.23"
1.8	75	0.0200	0.71		**Shallow Concentrated Flow, B to C** Woodland Kv= 5.0 fps
5.3	95	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 2S: Flow to Street



Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Flow to Wetlands Runoff Area=147,900 sf 0.00% Impervious Runoff Depth>3.96"
Flow Length=310' Tc=17.5 min CN=70 Runoff=11.3 cfs 1.122 af

Subcatchment 2S: Flow to Street Runoff Area=6,954 sf 13.30% Impervious Runoff Depth>4.41"
Flow Length=95' Tc=6.0 min CN=74 Runoff=0.8 cfs 0.059 af

Total Runoff Area = 3.555 ac Runoff Volume = 1.180 af Average Runoff Depth = 3.98"
99.40% Pervious = 3.534 ac 0.60% Impervious = 0.021 ac

Summary for Subcatchment 1S: Flow to Wetlands

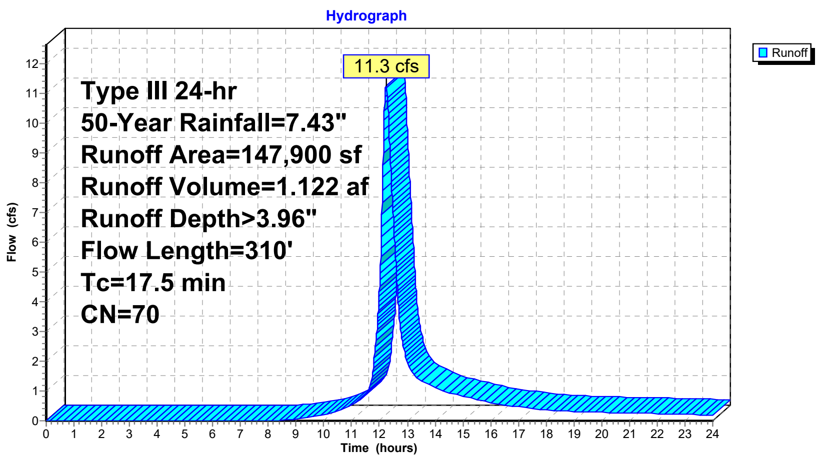
Runoff = 11.3 cfs @ 12.24 hrs, Volume= 1.122 af, Depth> 3.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-Year Rainfall=7.43"

Area (sf)	CN	Description
147,900	70	Woods, Good, HSG C
147,900		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.4	50	0.0240	0.07		**Sheet Flow, A to B** Woods: Light underbrush n= 0.400 P2= 3.23"
6.1	260	0.0200	0.71		**Shallow Concentrated Flow, B to C** Woodland Kv= 5.0 fps
17.5	310	Total			

Subcatchment 1S: Flow to Wetlands



Summary for Subcatchment 2S: Flow to Street

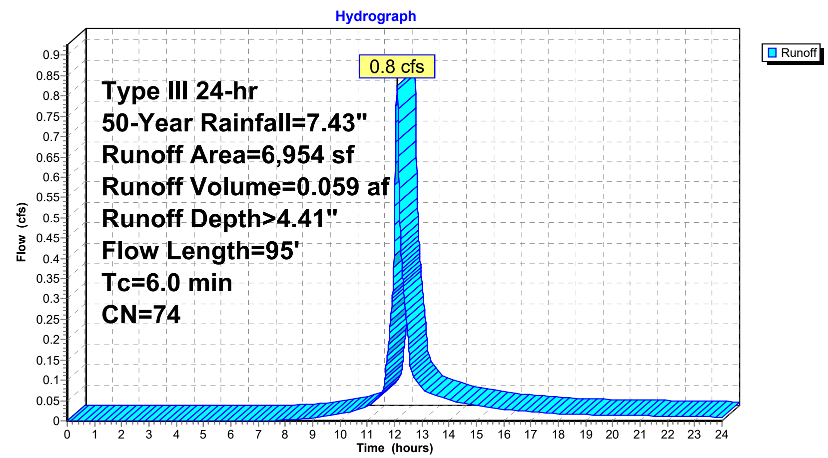
Runoff = 0.8 cfs @ 12.09 hrs, Volume= 0.059 af, Depth> 4.41"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-Year Rainfall=7.43"

Area (sf)	CN	Description
6,029	70	Woods, Good, HSG C
925	98	Paved parking, HSG C
6,954	74	Weighted Average
6,029		86.70% Pervious Area
925		13.30% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.5	20	0.0750	0.10		**Sheet Flow, A to B** Woods: Light underbrush n= 0.400 P2= 3.23"
1.8	75	0.0200	0.71		**Shallow Concentrated Flow, B to C** Woodland Kv= 5.0 fps
5.3	95	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 2S: Flow to Street



Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Flow to Wetlands Runoff Area=147,900 sf 0.00% Impervious Runoff Depth>5.22"
Flow Length=310' Tc=17.5 min CN=70 Runoff=14.9 cfs 1.477 af

Subcatchment 2S: Flow to Street Runoff Area=6,954 sf 13.30% Impervious Runoff Depth>5.72"
Flow Length=95' Tc=6.0 min CN=74 Runoff=1.1 cfs 0.076 af

Total Runoff Area = 3.555 ac Runoff Volume = 1.553 af Average Runoff Depth = 5.24"
99.40% Pervious = 3.534 ac 0.60% Impervious = 0.021 ac

Summary for Subcatchment 1S: Flow to Wetlands

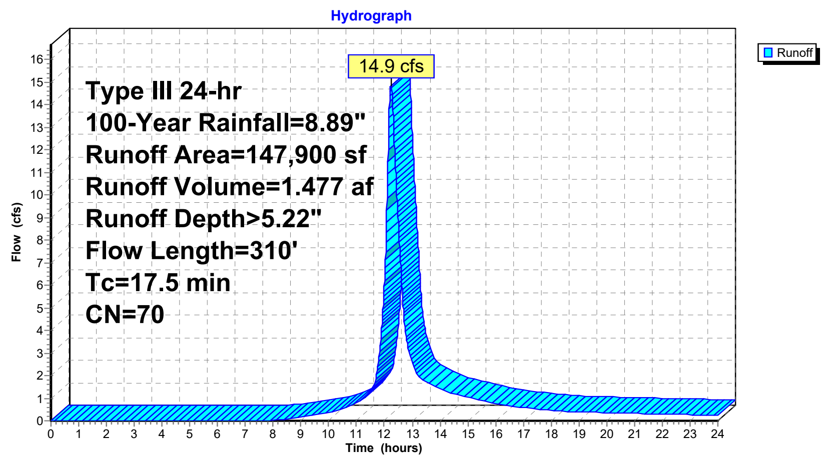
Runoff = 14.9 cfs @ 12.23 hrs, Volume= 1.477 af, Depth> 5.22"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.89"

Area (sf)	CN	Description
147,900	70	Woods, Good, HSG C
147,900		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.4	50	0.0240	0.07		**Sheet Flow, A to B** Woods: Light underbrush n= 0.400 P2= 3.23"
6.1	260	0.0200	0.71		**Shallow Concentrated Flow, B to C** Woodland Kv= 5.0 fps
17.5	310	Total			

Subcatchment 1S: Flow to Wetlands



Summary for Subcatchment 2S: Flow to Street

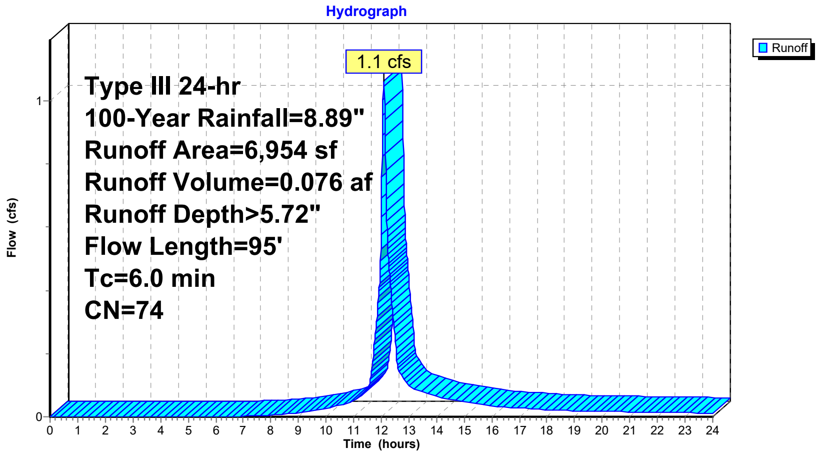
Runoff = 1.1 cfs @ 12.09 hrs, Volume= 0.076 af, Depth> 5.72"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.89"

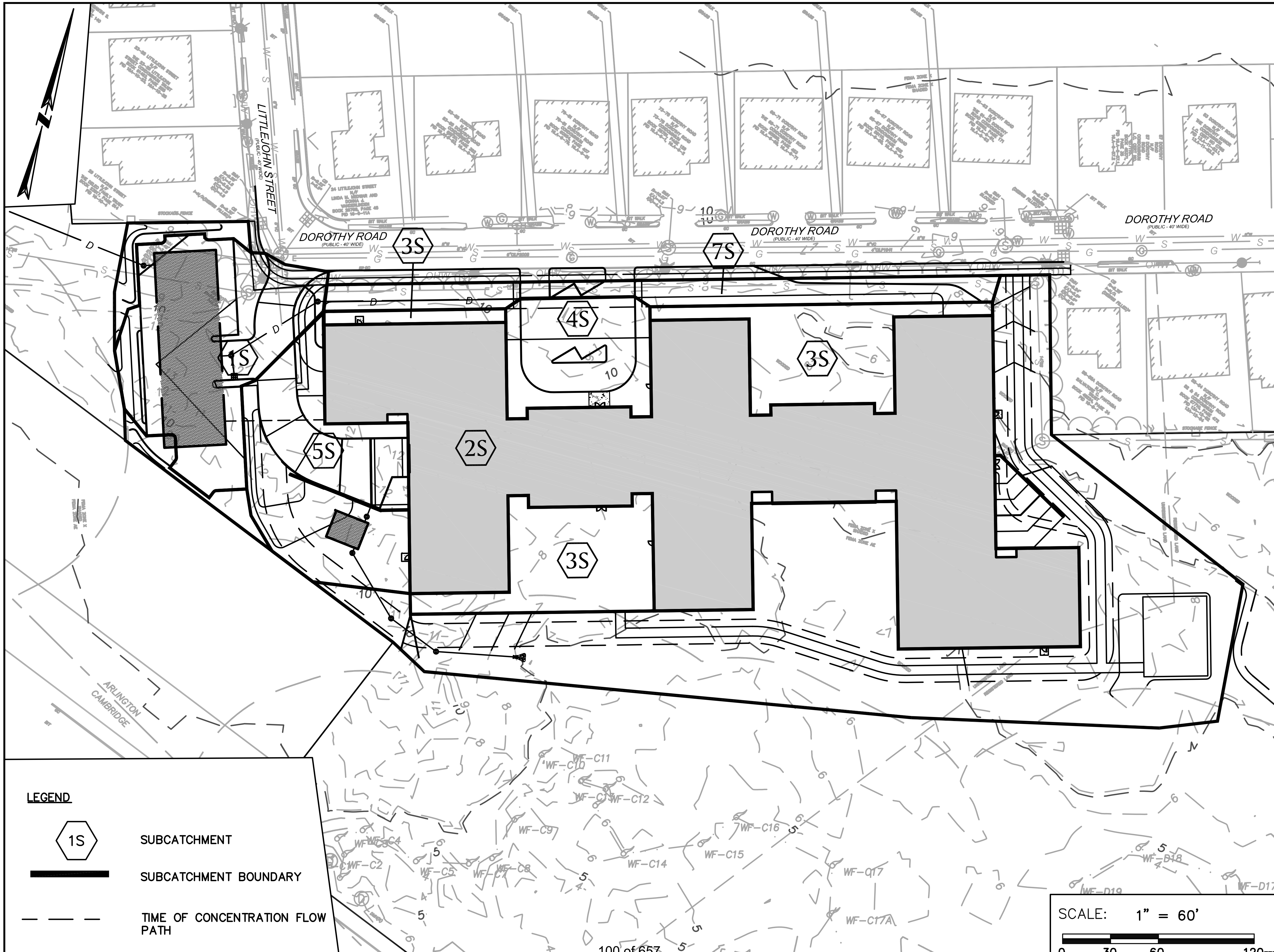
Area (sf)	CN	Description
6,029	70	Woods, Good, HSG C
925	98	Paved parking, HSG C
6,954	74	Weighted Average
6,029		86.70% Pervious Area
925		13.30% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.5	20	0.0750	0.10		**Sheet Flow, A to B** Woods: Light underbrush n= 0.400 P2= 3.23"
1.8	75	0.0200	0.71		**Shallow Concentrated Flow, B to C** Woodland Kv= 5.0 fps
5.3	95	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 2S: Flow to Street



5.03 PROPOSED WATERSHED PLAN



THORNDIKE PLACE

DOROTHY ROAD

ARLINGTON
MASSACHUSETTS
(MIDDLESEX COUNTY)

PROPOSED WATERSHED PLAN

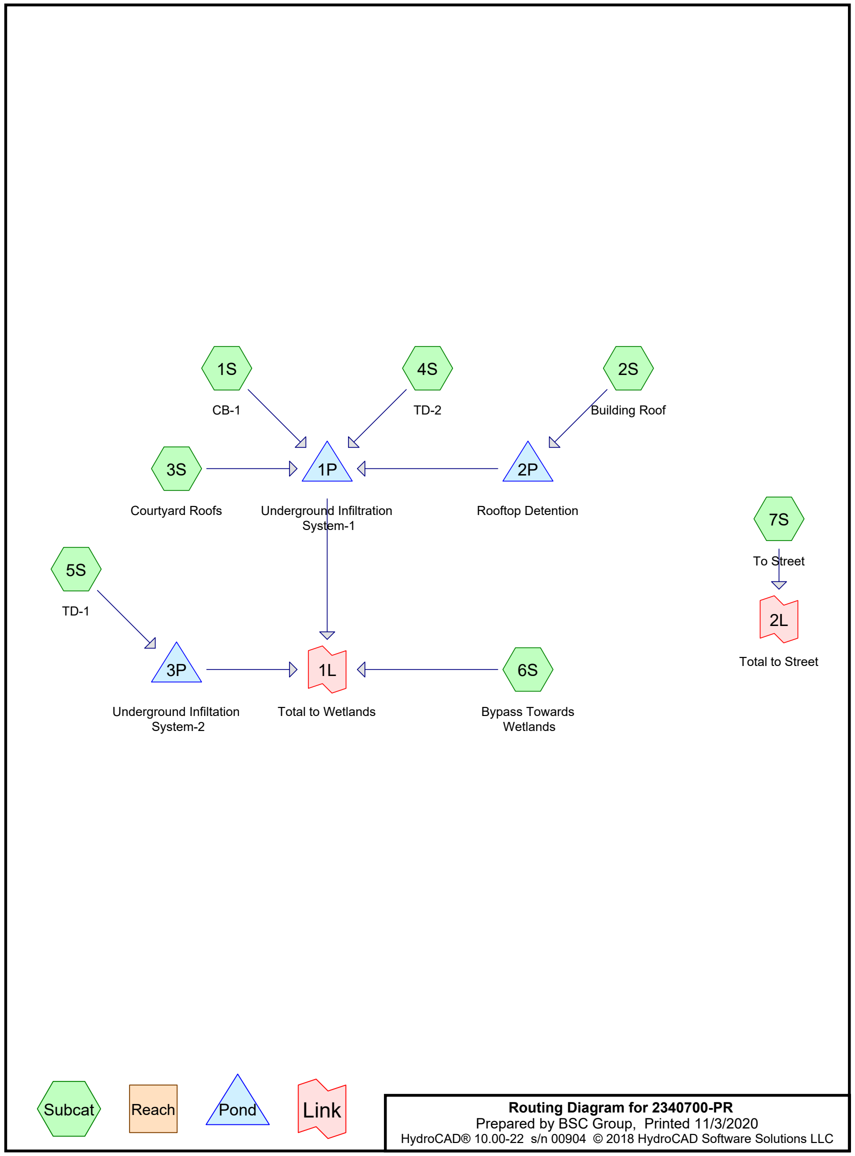
NOVEMBER 3, 2020

PREPARED FOR:
ARLINGTON LAND REALTY
84 SHERMAN STREET
CAMBRIDGE, MA

BSC GROUP
803 Summer Street
Boston, Massachusetts
02127
617 896 4300

Job No.: 23407.00
Date: 11/3/2020
Scale: 1" = 60'
Revised:
Dwg No: PRW
File: C\DRAINAGE DESIGN\2340700-PRW

5.04 PROPOSED HYDROLOGY CALCULATIONS (HYDROCAD™ PRINTOUTS)



Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
1.369	74	>75% Grass cover, Good, HSG C (1S, 5S, 6S, 7S)
0.479	98	Paved parking, HSG C (1S, 4S, 5S, 7S)
1.552	98	Roofs, HSG C (2S, 3S, 5S)
0.155	70	Woods, Good, HSG C (6S)
3.555	**88**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
3.555	HSG C	1S, 2S, 3S, 4S, 5S, 6S, 7S
0.000	HSG D	
0.000	Other	
3.555		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	1.369	0.000	0.000	1.369	>75% Grass cover, Good	1S, 5S, 6S, 7S
0.000	0.000	0.479	0.000	0.000	0.479	Paved parking	1S, 4S, 5S, 7S
0.000	0.000	1.552	0.000	0.000	1.552	Roofs	2S, 3S, 5S
0.000	0.000	0.155	0.000	0.000	0.155	Woods, Good	6S
0.000	**0.000**	**3.555**	**0.000**	**0.000**	**3.555**	**TOTAL AREA**	

Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: CB-1 Runoff Area=13,149 sf 83.09% Impervious Runoff Depth>2.57"
Tc=6.0 min CN=94 Runoff=0.9 cfs 0.065 af

Subcatchment 2S: Building Roof Runoff Area=51,814 sf 100.00% Impervious Runoff Depth>2.99"
Tc=6.0 min CN=98 Runoff=3.7 cfs 0.297 af

Subcatchment 3S: Courtyard Roofs Runoff Area=14,820 sf 100.00% Impervious Runoff Depth>2.99"
Tc=6.0 min CN=98 Runoff=1.1 cfs 0.085 af

Subcatchment 4S: TD-2 Runoff Area=6,330 sf 100.00% Impervious Runoff Depth>2.99"
Tc=6.0 min CN=98 Runoff=0.5 cfs 0.036 af

Subcatchment 5S: TD-1 Runoff Area=11,872 sf 34.45% Impervious Runoff Depth>1.56"
Tc=6.0 min CN=82 Runoff=0.5 cfs 0.035 af

Subcatchment 6S: Bypass Towards Runoff Area=50,395 sf 0.00% Impervious Runoff Depth>1.00"
Tc=0.0 min CN=73 Runoff=1.6 cfs 0.097 af

Subcatchment 7S: To Street Runoff Area=6,474 sf 7.57% Impervious Runoff Depth>1.17"
Tc=6.0 min CN=76 Runoff=0.2 cfs 0.015 af

Pond 1P: Underground Infiltration System-1 Peak Elev=6.51' Storage=6,223 cf Inflow=2.4 cfs 0.186 af
Discarded=0.0 cfs 0.044 af Primary=0.0 cfs 0.000 af Outflow=0.0 cfs 0.044 af

Pond 2P: Rooftop Detention Peak Elev=57.34' Storage=12,931 cf Inflow=3.7 cfs 0.297 af
12.0" Round Culvert n=0.013 L=10.0' S=0.0200 '/' Outflow=0.0 cfs 0.000 af

Pond 3P: Underground Infiltation System-2 Peak Elev=8.40' Storage=449 cf Inflow=0.5 cfs 0.035 af
12.0" Round Culvert n=0.013 L=44.0' S=0.0050 '/' Outflow=0.5 cfs 0.025 af

Link 1L: Total to Wetlands Inflow=1.6 cfs 0.122 af
Primary=1.6 cfs 0.122 af

Link 2L: Total to Street Inflow=0.2 cfs 0.015 af
Primary=0.2 cfs 0.015 af

Total Runoff Area = 3.555 ac Runoff Volume = 0.629 af Average Runoff Depth = 2.12"
42.87% Pervious = 1.524 ac 57.13% Impervious = 2.031 ac

Summary for Subcatchment 1S: CB-1

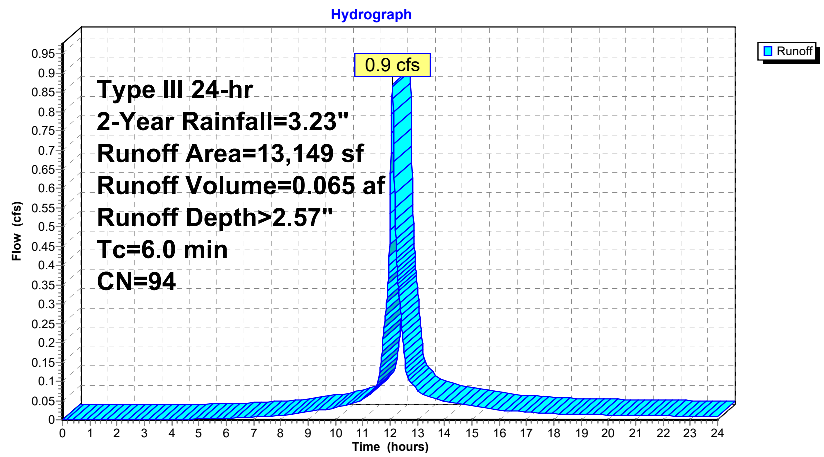
Runoff = 0.9 cfs @ 12.08 hrs, Volume= 0.065 af, Depth> 2.57"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.23"

Area (sf)	CN	Description
10,925	98	Paved parking, HSG C
2,224	74	>75% Grass cover, Good, HSG C
13,149	94	Weighted Average
2,224		16.91% Pervious Area
10,925		83.09% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Min. Tc**

Subcatchment 1S: CB-1



Summary for Subcatchment 2S: Building Roof

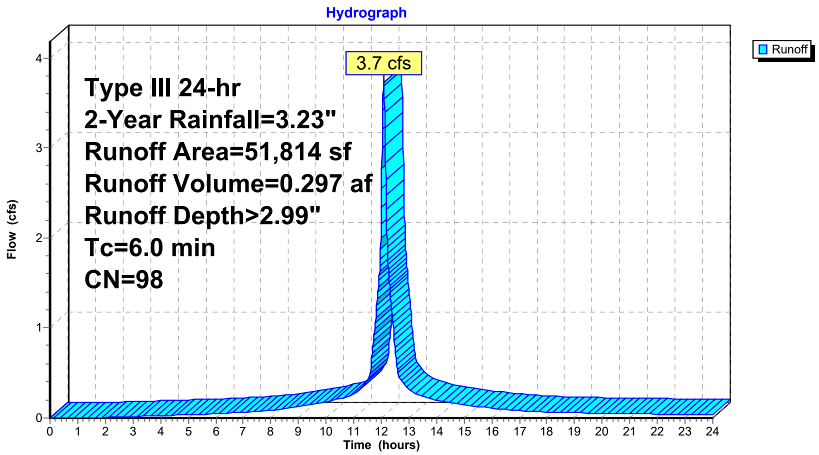
Runoff = 3.7 cfs @ 12.08 hrs, Volume= 0.297 af, Depth> 2.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.23"

Area (sf)	CN	Description
51,814	98	Roofs, HSG C
51,814		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Min. Tc**

Subcatchment 2S: Building Roof



Summary for Subcatchment 3S: Courtyard Roofs

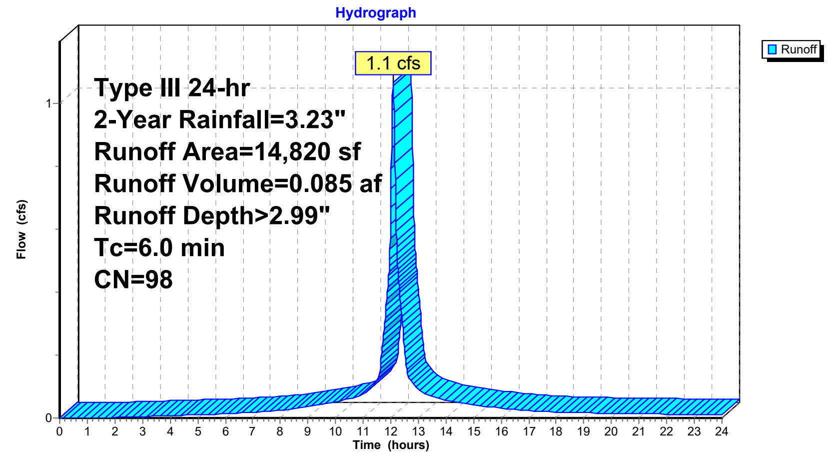
Runoff = 1.1 cfs @ 12.08 hrs, Volume= 0.085 af, Depth> 2.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.23"

Area (sf)	CN	Description
14,820	98	Roofs, HSG C
14,820		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Min. Tc**

Subcatchment 3S: Courtyard Roofs



Summary for Subcatchment 4S: TD-2

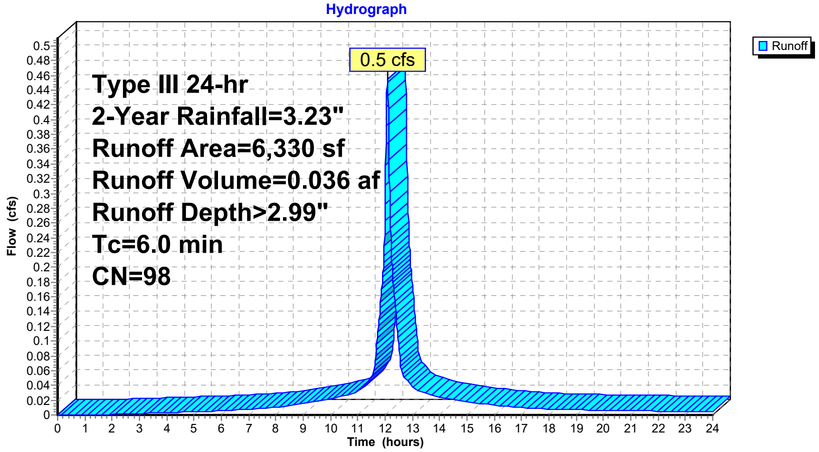
Runoff = 0.5 cfs @ 12.08 hrs, Volume= 0.036 af, Depth> 2.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.23"

Area (sf)	CN	Description
6,330	98	Paved parking, HSG C
6,330		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Min. Tc**

Subcatchment 4S: TD-2



Summary for Subcatchment 5S: TD-1

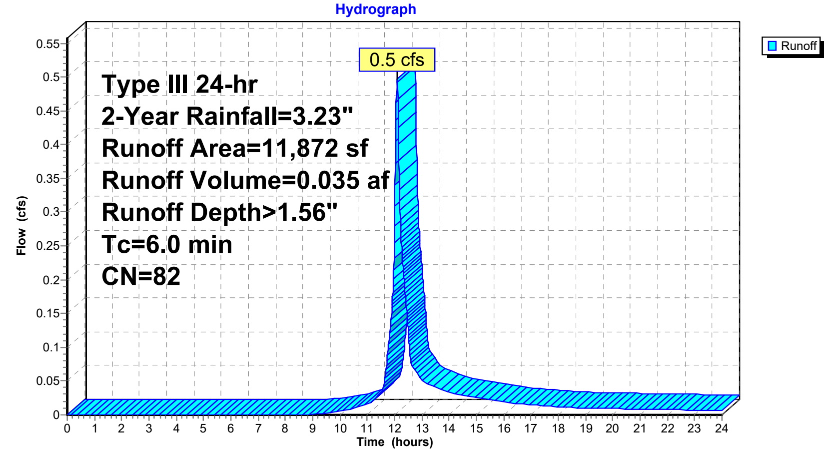
Runoff = 0.5 cfs @ 12.09 hrs, Volume= 0.035 af, Depth> 1.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.23"

Area (sf)	CN	Description
980	98	Roofs, HSG C
3,110	98	Paved parking, HSG C
7,782	74	>75% Grass cover, Good, HSG C
11,872	82	Weighted Average
7,782		65.55% Pervious Area
4,090		34.45% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Min. Tc**

Subcatchment 5S: TD-1



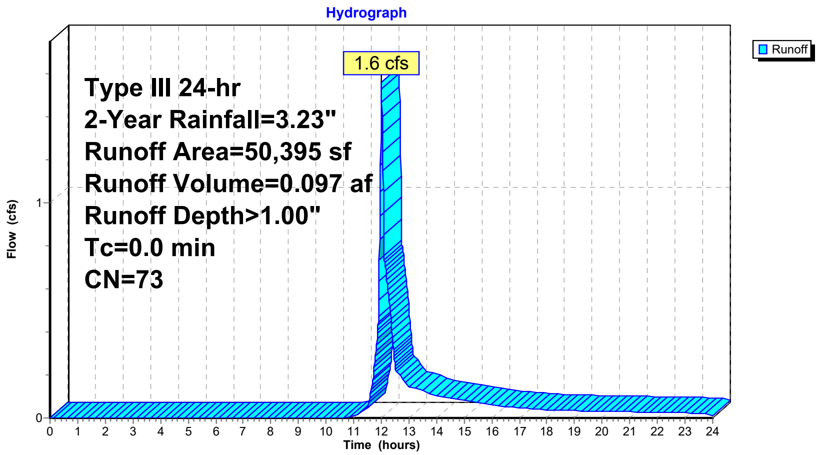
Summary for Subcatchment 6S: Bypass Towards Wetlands

Runoff = 1.6 cfs @ 12.00 hrs, Volume= 0.097 af, Depth> 1.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.23"

Area (sf)	CN	Description
6,751	70	Woods, Good, HSG C
43,644	74	>75% Grass cover, Good, HSG C
50,395	73	Weighted Average
50,395		100.00% Pervious Area

Subcatchment 6S: Bypass Towards Wetlands



Summary for Subcatchment 7S: To Street

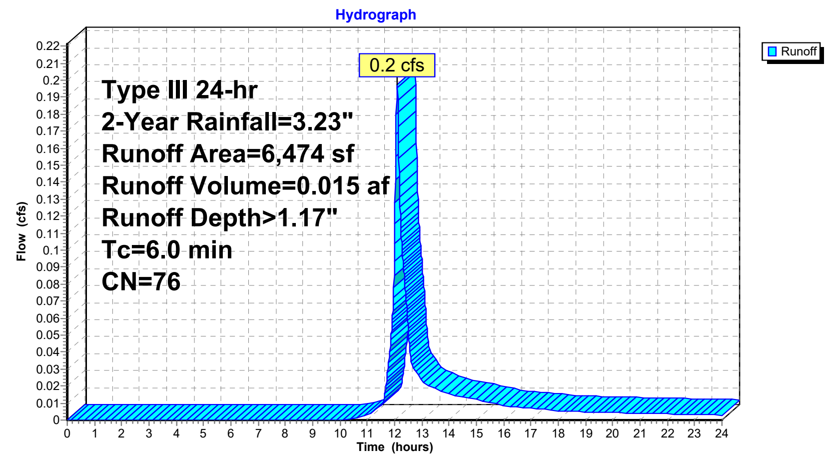
Runoff = 0.2 cfs @ 12.09 hrs, Volume= 0.015 af, Depth> 1.17"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.23"

Area (sf)	CN	Description
490	98	Paved parking, HSG C
5,984	74	>75% Grass cover, Good, HSG C
6,474	76	Weighted Average
5,984		92.43% Pervious Area
490		7.57% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Min. Tc**

Subcatchment 7S: To Street



Summary for Pond 1P: Underground Infiltration System-1

Inflow Area = 1.977 ac, 97.42% Impervious, Inflow Depth > 1.13" for 2-Year event
Inflow = 2.4 cfs @ 12.08 hrs, Volume= 0.186 af
Outflow = 0.0 cfs @ 8.21 hrs, Volume= 0.044 af, Atten= 99%, Lag= 0.0 min
Discarded = 0.0 cfs @ 8.21 hrs, Volume= 0.044 af
Primary = 0.0 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 4
Peak Elev= 6.51' @ 21.34 hrs Surf.Area= 4,692 sf Storage= 6,223 cf

Plug-Flow detention time= 329.0 min calculated for 0.044 af (24% of inflow)
Center-of-Mass det. time= 126.7 min (893.0 - 766.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	5.00'	0 cf	**38.75'W x 121.08'L x 3.00'H Field A**
			14,076 cf Overall - 14,076 cf Embedded = 0 cf x 40.0% Voids
#2A	5.00'	10,260 cf	**StormTrap ST2 SingleTrap 2-6** x 21 Inside #1
			Inside= 101.7"W x 30.0"H => 18.82 sf x 15.40'L = 289.8 cf
			Outside= 101.7"W x 36.0"H => 25.44 sf x 15.40'L = 391.6 cf
			3 Rows of 7 Chambers
			25.44' x 107.77' Core + 6.66' Border = 38.75' x 121.08' System
#3	5.00'	141 cf	**6.00'D x 5.00'H OCS-1**-Impervious
		10,401 cf	Total Available Storage

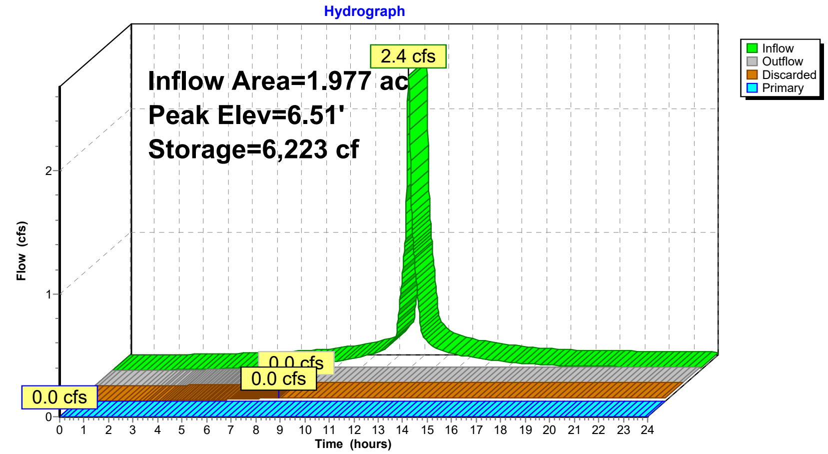
Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	5.00'	**0.270 in/hr Exfiltration over Surface area**
#2	Primary	7.20'	**15.0" Round Culvert**
			L= 130.0' CPP, square edge headwall, Ke= 0.500
			Inlet / Outlet Invert= 7.20' / 6.55' S= 0.0050 '/' Cc= 0.900
			n= 0.013, Flow Area= 1.23 sf

Discarded OutFlow Max=0.0 cfs @ 8.21 hrs HW=5.05' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.0 cfs)

Primary OutFlow Max=0.0 cfs @ 0.00 hrs HW=5.00' (Free Discharge)
└─**2=Culvert** (Controls 0.0 cfs)

Pond 1P: Underground Infiltration System-1



Summary for Pond 2P: Rooftop Detention

Inflow Area = 1.189 ac,100.00% Impervious, Inflow Depth > 2.99" for 2-Year event
Inflow = 3.7 cfs @ 12.08 hrs, Volume= 0.297 af
Outflow = 0.0 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.0 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 57.34' @ 24.00 hrs Surf.Area= 38,000 sf Storage= 12,931 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

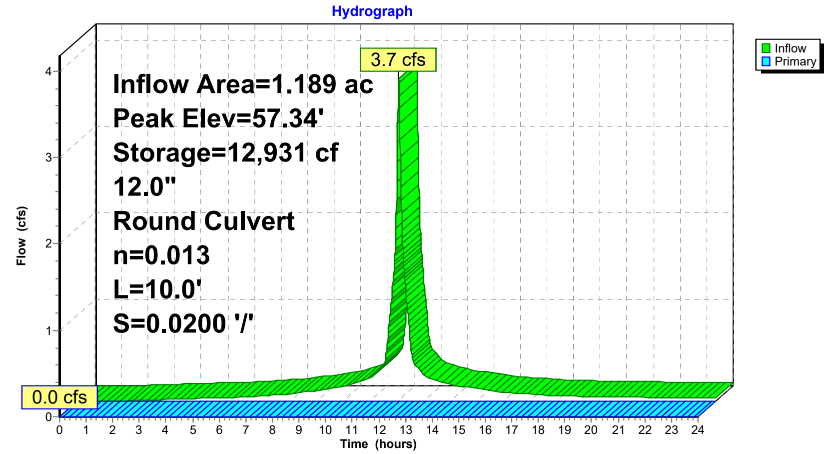
Volume	Invert	Avail.Storage	Storage Description
#1	57.00'	38,000 cf	**Rooftop Detention (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
57.00	38,000	0	0
58.00	38,000	38,000	38,000

Device	Routing	Invert	Outlet Devices
#1	Primary	58.00'	**12.0" Round Roof Drain** L= 10.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 58.00' / 57.80' S= 0.0200 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf

Primary OutFlow Max=0.0 cfs @ 0.00 hrs HW=57.00' (Free Discharge)
└─**1=Roof Drain** (Controls 0.0 cfs)

Pond 2P: Rooftop Detention



Summary for Pond 3P: Underground Infiltation System-2

Inflow Area =	0.273 ac, 34.45% Impervious, Inflow Depth > 1.56" for 2-Year event		
Inflow =	0.5 cfs @ 12.09 hrs,	Volume=	0.035 af
Outflow =	0.5 cfs @ 12.12 hrs,	Volume=	0.025 af, Atten= 0%, Lag= 2.0 min
Primary =	0.5 cfs @ 12.12 hrs,	Volume=	0.025 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 8.40' @ 12.12 hrs Surf.Area= 388 sf Storage= 449 cf

Plug-Flow detention time= 150.1 min calculated for 0.025 af (71% of inflow)
Center-of-Mass det. time= 54.0 min (889.0 - 835.0)

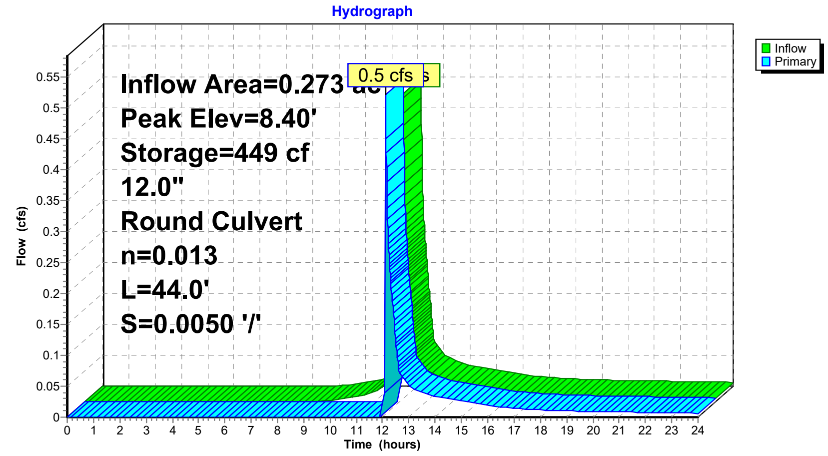
Volume	Invert	Avail.Storage	Storage Description
#1A	3.00'	204 cf	**21.50'W x 17.44'L x 1.83'H Field A** 687 cf Overall - 177 cf Embedded = 511 cf x 40.0% Voids
#2A	3.00'	177 cf	**ADS_StormTech SC-310 +Cap** x 12 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap 6 Rows of 2 Chambers
#3	3.00'	75 cf	**4.00'D x 6.00'H OCS**
		457 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	8.00'	**12.0" Round Culvert** L= 44.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 8.00' / 7.78' S= 0.0050 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf

Primary OutFlow Max=0.5 cfs @ 12.12 hrs HW=8.40' (Free Discharge)
└**1=Culvert** (Barrel Controls 0.5 cfs @ 2.33 fps)

Pond 3P: Underground Infiltation System-2

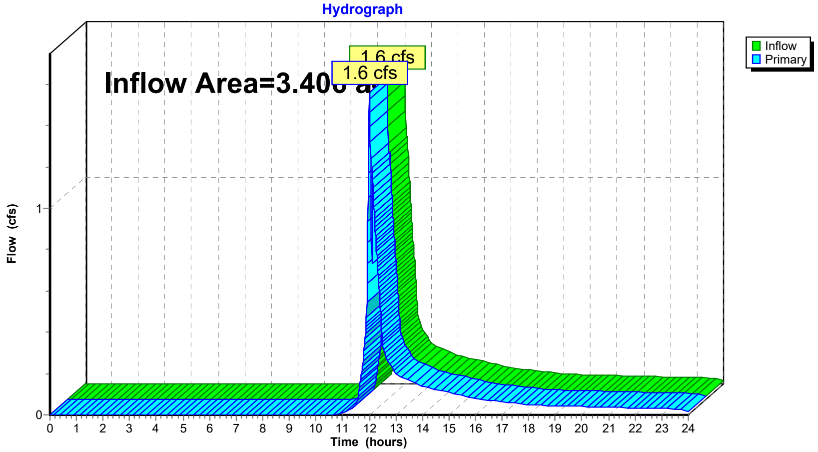


Summary for Link 1L: Total to Wetlands

Inflow Area = 3.406 ac, 59.29% Impervious, Inflow Depth > 0.43" for 2-Year event
Inflow = 1.6 cfs @ 12.00 hrs, Volume= 0.122 af
Primary = 1.6 cfs @ 12.00 hrs, Volume= 0.122 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Link 1L: Total to Wetlands

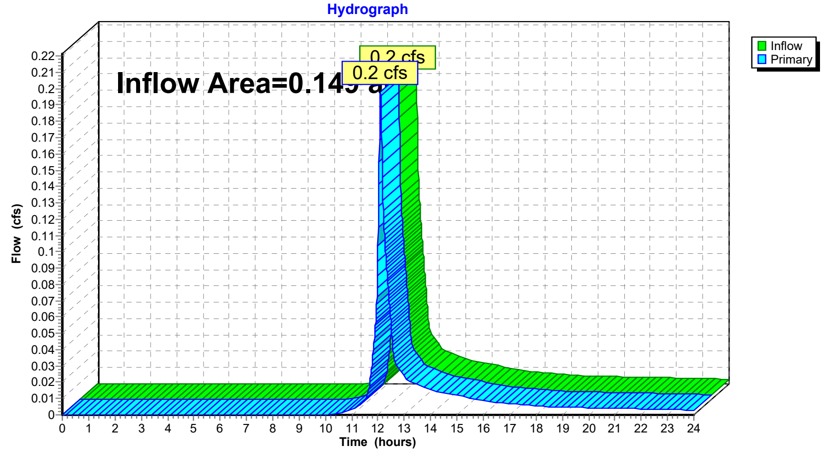


Summary for Link 2L: Total to Street

Inflow Area = 0.149 ac, 7.57% Impervious, Inflow Depth > 1.17" for 2-Year event
Inflow = 0.2 cfs @ 12.09 hrs, Volume= 0.015 af
Primary = 0.2 cfs @ 12.09 hrs, Volume= 0.015 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Link 2L: Total to Street



Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: CB-1 Runoff Area=13,149 sf 83.09% Impervious Runoff Depth>4.21"
Tc=6.0 min CN=94 Runoff=1.4 cfs 0.106 af

Subcatchment 2S: Building Roof Runoff Area=51,814 sf 100.00% Impervious Runoff Depth>4.66"
Tc=6.0 min CN=98 Runoff=5.7 cfs 0.462 af

Subcatchment 3S: Courtyard Roofs Runoff Area=14,820 sf 100.00% Impervious Runoff Depth>4.66"
Tc=6.0 min CN=98 Runoff=1.6 cfs 0.132 af

Subcatchment 4S: TD-2 Runoff Area=6,330 sf 100.00% Impervious Runoff Depth>4.66"
Tc=6.0 min CN=98 Runoff=0.7 cfs 0.056 af

Subcatchment 5S: TD-1 Runoff Area=11,872 sf 34.45% Impervious Runoff Depth>2.99"
Tc=6.0 min CN=82 Runoff=1.0 cfs 0.068 af

Subcatchment 6S: Bypass Towards Runoff Area=50,395 sf 0.00% Impervious Runoff Depth>2.20"
Tc=0.0 min CN=73 Runoff=3.6 cfs 0.212 af

Subcatchment 7S: To Street Runoff Area=6,474 sf 7.57% Impervious Runoff Depth>2.45"
Tc=6.0 min CN=76 Runoff=0.4 cfs 0.030 af

Pond 1P: Underground Infiltration System-1 Peak Elev=7.34' Storage=9,685 cf Inflow=3.7 cfs 0.294 af
Discarded=0.0 cfs 0.048 af Primary=0.1 cfs 0.032 af Outflow=0.1 cfs 0.080 af

Pond 2P: Rooftop Detention Peak Elev=57.53' Storage=20,119 cf Inflow=5.7 cfs 0.462 af
12.0" Round Culvert n=0.013 L=10.0' S=0.0200 '/' Outflow=0.0 cfs 0.000 af

Pond 3P: Underground Infiltation System-2 Peak Elev=8.60' Storage=451 cf Inflow=1.0 cfs 0.068 af
12.0" Round Culvert n=0.013 L=44.0' S=0.0050 '/' Outflow=1.0 cfs 0.058 af

Link 1L: Total to Wetlands Inflow=4.2 cfs 0.302 af
Primary=4.2 cfs 0.302 af

Link 2L: Total to Street Inflow=0.4 cfs 0.030 af
Primary=0.4 cfs 0.030 af

Total Runoff Area = 3.555 ac Runoff Volume = 1.067 af Average Runoff Depth = 3.60"
42.87% Pervious = 1.524 ac 57.13% Impervious = 2.031 ac

Summary for Subcatchment 1S: CB-1

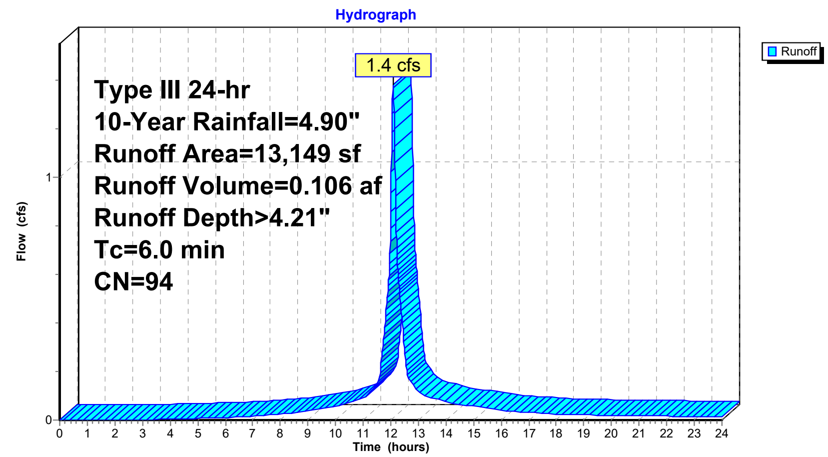
Runoff = 1.4 cfs @ 12.08 hrs, Volume= 0.106 af, Depth> 4.21"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.90"

Area (sf)	CN	Description
10,925	98	Paved parking, HSG C
2,224	74	>75% Grass cover, Good, HSG C
13,149	94	Weighted Average
2,224		16.91% Pervious Area
10,925		83.09% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Min. Tc**

Subcatchment 1S: CB-1



Summary for Subcatchment 2S: Building Roof

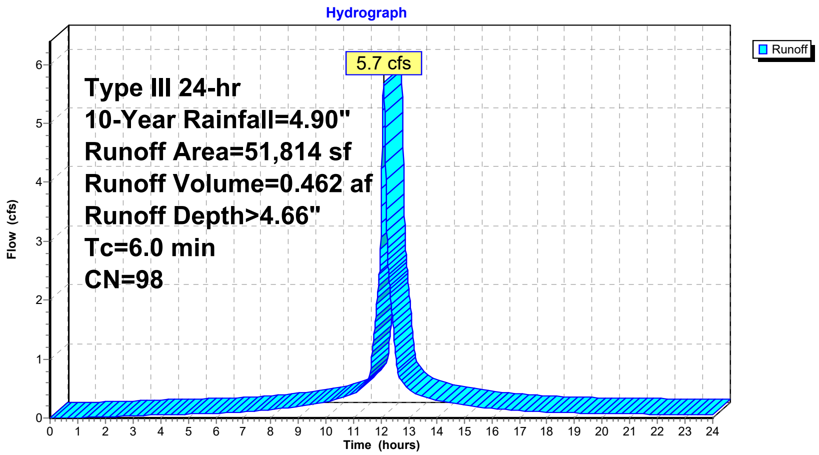
Runoff = 5.7 cfs @ 12.08 hrs, Volume= 0.462 af, Depth> 4.66"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.90"

Area (sf)	CN	Description
51,814	98	Roofs, HSG C
51,814		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Min. Tc

Subcatchment 2S: Building Roof



Summary for Subcatchment 3S: Courtyard Roofs

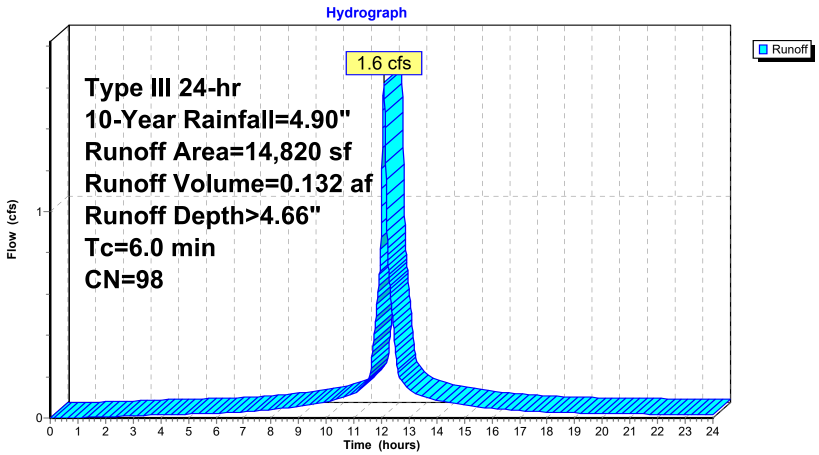
Runoff = 1.6 cfs @ 12.08 hrs, Volume= 0.132 af, Depth> 4.66"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.90"

Area (sf)	CN	Description
14,820	98	Roofs, HSG C
14,820		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Min. Tc

Subcatchment 3S: Courtyard Roofs



Summary for Subcatchment 4S: TD-2

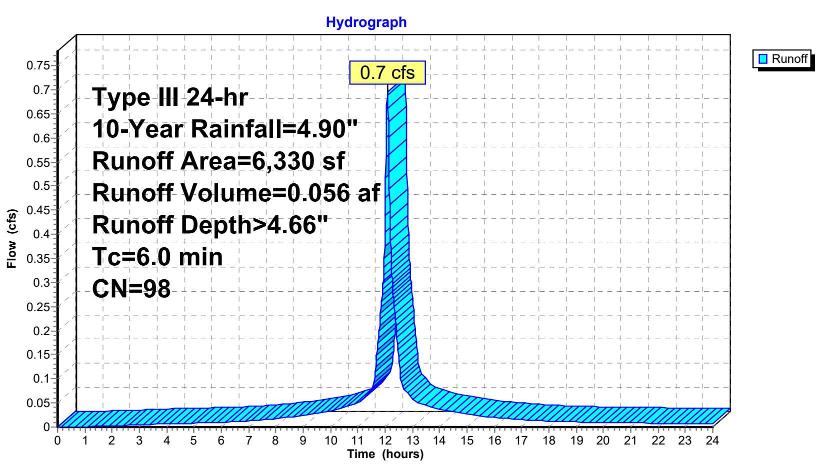
Runoff = 0.7 cfs @ 12.08 hrs, Volume= 0.056 af, Depth> 4.66"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.90"

Area (sf)	CN	Description
6,330	98	Paved parking, HSG C
6,330		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Min. Tc**

Subcatchment 4S: TD-2



Summary for Subcatchment 5S: TD-1

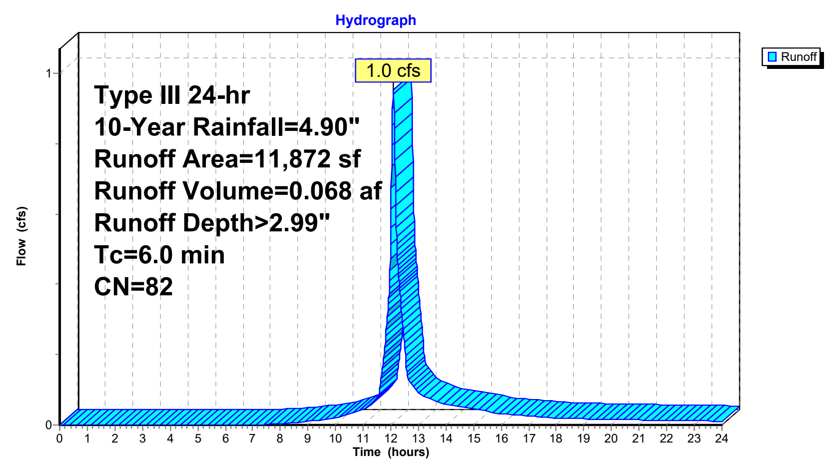
Runoff = 1.0 cfs @ 12.09 hrs, Volume= 0.068 af, Depth> 2.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.90"

Area (sf)	CN	Description
980	98	Roofs, HSG C
3,110	98	Paved parking, HSG C
7,782	74	>75% Grass cover, Good, HSG C
11,872	82	Weighted Average
7,782		65.55% Pervious Area
4,090		34.45% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Min. Tc**

Subcatchment 5S: TD-1



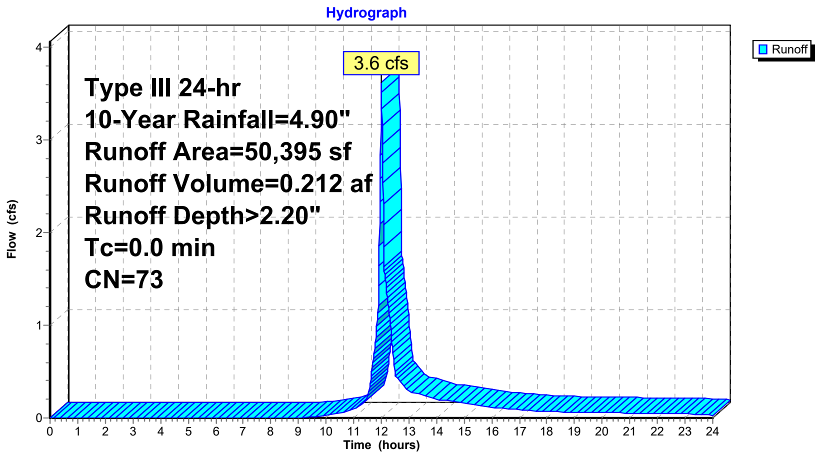
Summary for Subcatchment 6S: Bypass Towards Wetlands

Runoff = 3.6 cfs @ 12.00 hrs, Volume= 0.212 af, Depth> 2.20"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.90"

Area (sf)	CN	Description
6,751	70	Woods, Good, HSG C
43,644	74	>75% Grass cover, Good, HSG C
50,395	73	Weighted Average
50,395		100.00% Pervious Area

Subcatchment 6S: Bypass Towards Wetlands



Summary for Subcatchment 7S: To Street

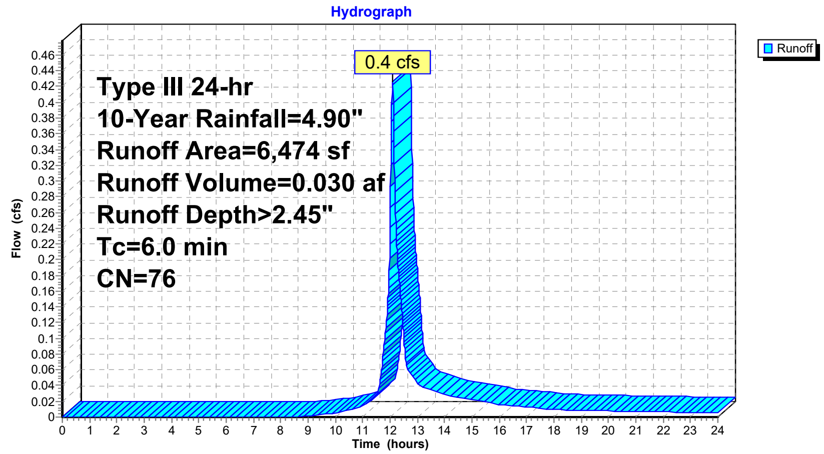
Runoff = 0.4 cfs @ 12.09 hrs, Volume= 0.030 af, Depth> 2.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.90"

Area (sf)	CN	Description
490	98	Paved parking, HSG C
5,984	74	>75% Grass cover, Good, HSG C
6,474	76	Weighted Average
5,984		92.43% Pervious Area
490		7.57% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Min. Tc**

Subcatchment 7S: To Street



Summary for Pond 1P: Underground Infiltration System-1

Inflow Area = 1.977 ac, 97.42% Impervious, Inflow Depth > 1.79" for 10-Year event
Inflow = 3.7 cfs @ 12.08 hrs, Volume= 0.294 af
Outflow = 0.1 cfs @ 16.13 hrs, Volume= 0.080 af, Atten= 97%, Lag= 243.0 min
Discarded = 0.0 cfs @ 6.28 hrs, Volume= 0.048 af
Primary = 0.1 cfs @ 16.13 hrs, Volume= 0.032 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 4
Peak Elev= 7.34' @ 16.13 hrs Surf.Area= 4,692 sf Storage= 9,685 cf

Plug-Flow detention time= 382.7 min calculated for 0.080 af (27% of inflow)
Center-of-Mass det. time= 185.0 min (942.1 - 757.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	5.00'	0 cf	**38.75'W x 121.08'L x 3.00'H Field A** 14,076 cf Overall - 14,076 cf Embedded = 0 cf x 40.0% Voids
#2A	5.00'	10,260 cf	**StormTrap ST2 SingleTrap 2-6** x 21 Inside #1 Inside= 101.7"W x 30.0"H => 18.82 sf x 15.40'L = 289.8 cf Outside= 101.7"W x 36.0"H => 25.44 sf x 15.40'L = 391.6 cf 3 Rows of 7 Chambers 25.44' x 107.77' Core + 6.66' Border = 38.75' x 121.08' System
#3	5.00'	141 cf	**6.00'D x 5.00'H OCS-1**-Impervious
		10,401 cf	Total Available Storage

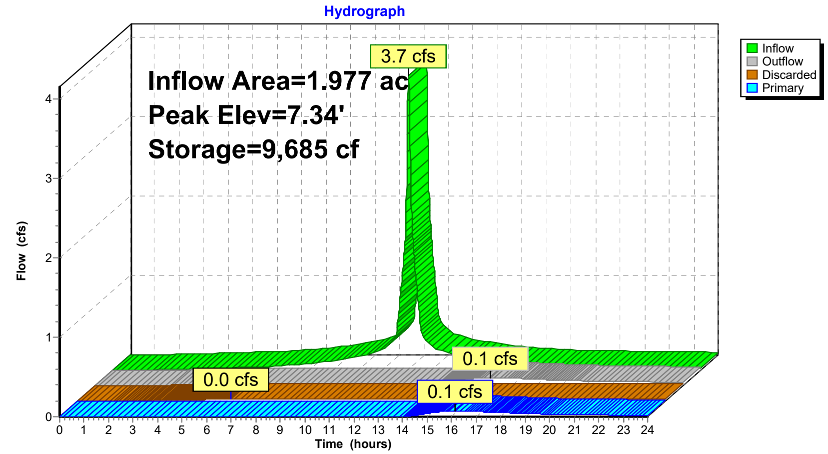
Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	5.00'	**0.270 in/hr Exfiltration over Surface area**
#2	Primary	7.20'	**15.0" Round Culvert** L= 130.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 7.20' / 6.55' S= 0.0050 '/' Cc= 0.900 n= 0.013, Flow Area= 1.23 sf

Discarded OutFlow Max=0.0 cfs @ 6.28 hrs HW=5.05' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.0 cfs)

Primary OutFlow Max=0.1 cfs @ 16.13 hrs HW=7.34' (Free Discharge)
└─**2=Culvert** (Barrel Controls 0.1 cfs @ 1.35 fps)

Pond 1P: Underground Infiltration System-1



Summary for Pond 2P: Rooftop Detention

Inflow Area = 1.189 ac,100.00% Impervious, Inflow Depth > 4.66" for 10-Year event
Inflow = 5.7 cfs @ 12.08 hrs, Volume= 0.462 af
Outflow = 0.0 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.0 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 57.53' @ 24.00 hrs Surf.Area= 38,000 sf Storage= 20,119 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

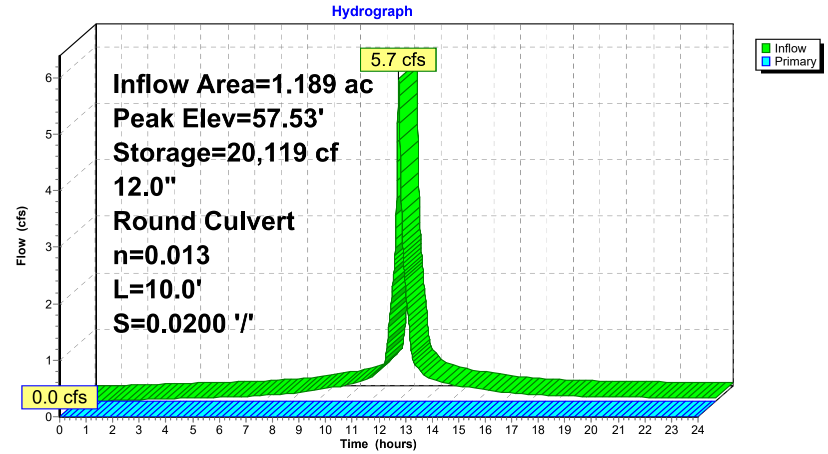
Volume	Invert	Avail.Storage	Storage Description
#1	57.00'	38,000 cf	**Rooftop Detention (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
57.00	38,000	0	0
58.00	38,000	38,000	38,000

Device	Routing	Invert	Outlet Devices
#1	Primary	58.00'	**12.0" Round Roof Drain** L= 10.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 58.00' / 57.80' S= 0.0200 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf

Primary OutFlow Max=0.0 cfs @ 0.00 hrs HW=57.00' (Free Discharge)
└─**1=Roof Drain** (Controls 0.0 cfs)

Pond 2P: Rooftop Detention



Summary for Pond 3P: Underground Infiltation System-2

Inflow Area = 0.273 ac, 34.45% Impervious, Inflow Depth > 2.99" for 10-Year event
Inflow = 1.0 cfs @ 12.09 hrs, Volume= 0.068 af
Outflow = 1.0 cfs @ 12.09 hrs, Volume= 0.058 af, Atten= 0%, Lag= 0.1 min
Primary = 1.0 cfs @ 12.09 hrs, Volume= 0.058 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 8.60' @ 12.09 hrs Surf.Area= 388 sf Storage= 451 cf

Plug-Flow detention time= 93.6 min calculated for 0.058 af (85% of inflow)
Center-of-Mass det. time= 29.4 min (845.9 - 816.4)

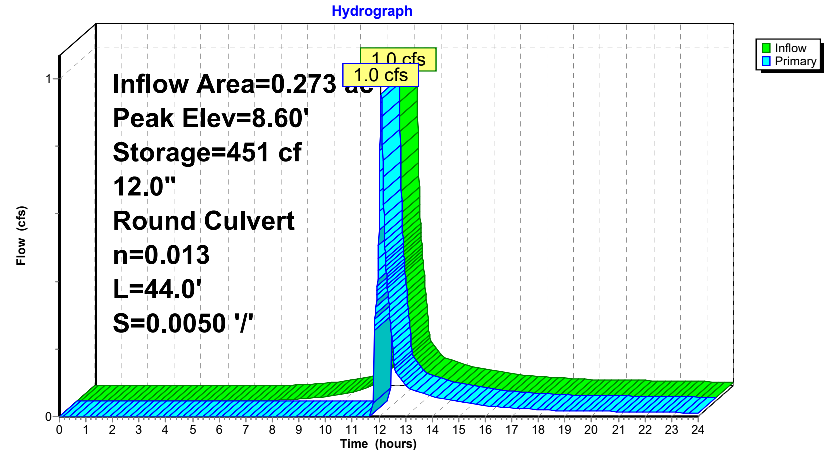
Volume	Invert	Avail.Storage	Storage Description
#1A	3.00'	204 cf	**21.50'W x 17.44'L x 1.83'H Field A** 687 cf Overall - 177 cf Embedded = 511 cf x 40.0% Voids
#2A	3.00'	177 cf	**ADS_StormTech SC-310 +Cap** x 12 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap 6 Rows of 2 Chambers
#3	3.00'	75 cf	**4.00'D x 6.00'H OCS**
		457 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	8.00'	**12.0" Round Culvert** L= 44.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 8.00' / 7.78' S= 0.0050 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf

Primary OutFlow Max=1.0 cfs @ 12.09 hrs HW=8.60' (Free Discharge)
└─**1=Culvert** (Barrel Controls 1.0 cfs @ 2.80 fps)

Pond 3P: Underground Infiltation System-2

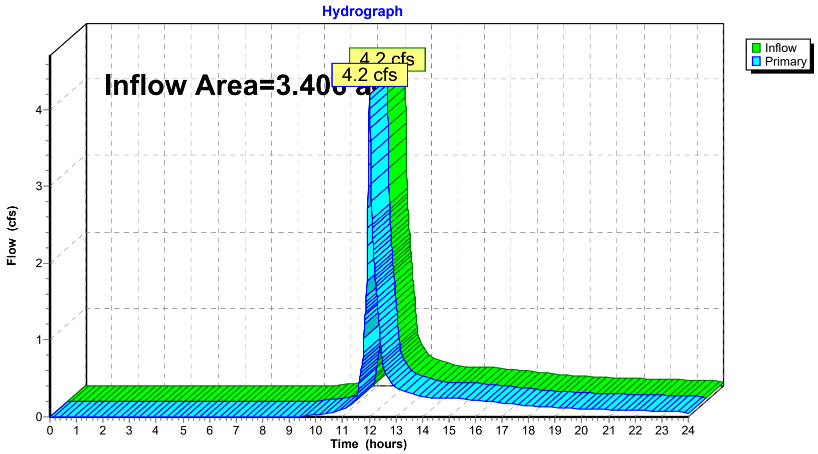


Summary for Link 1L: Total to Wetlands

Inflow Area = 3.406 ac, 59.29% Impervious, Inflow Depth > 1.06" for 10-Year event
Inflow = 4.2 cfs @ 12.00 hrs, Volume= 0.302 af
Primary = 4.2 cfs @ 12.00 hrs, Volume= 0.302 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Link 1L: Total to Wetlands

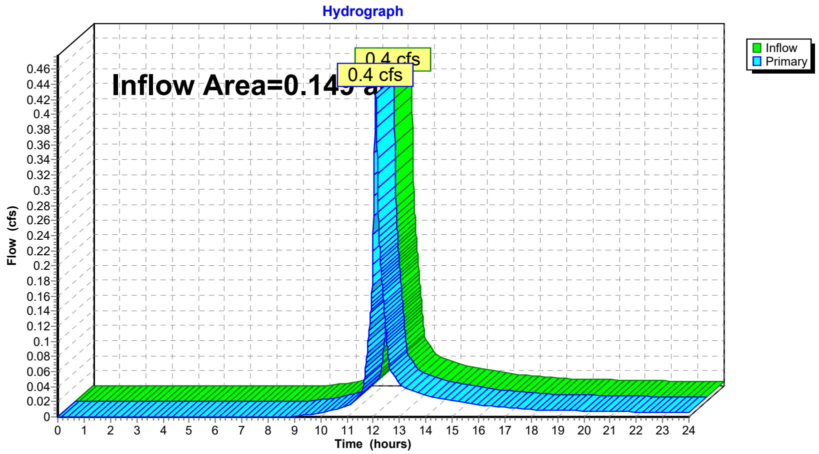


Summary for Link 2L: Total to Street

Inflow Area = 0.149 ac, 7.57% Impervious, Inflow Depth > 2.45" for 10-Year event
Inflow = 0.4 cfs @ 12.09 hrs, Volume= 0.030 af
Primary = 0.4 cfs @ 12.09 hrs, Volume= 0.030 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Link 2L: Total to Street



Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: CB-1 Runoff Area=13,149 sf 83.09% Impervious Runoff Depth>5.49"
Tc=6.0 min CN=94 Runoff=1.8 cfs 0.138 af

Subcatchment 2S: Building Roof Runoff Area=51,814 sf 100.00% Impervious Runoff Depth>5.96"
Tc=6.0 min CN=98 Runoff=7.2 cfs 0.590 af

Subcatchment 3S: Courtyard Roofs Runoff Area=14,820 sf 100.00% Impervious Runoff Depth>5.96"
Tc=6.0 min CN=98 Runoff=2.1 cfs 0.169 af

Subcatchment 4S: TD-2 Runoff Area=6,330 sf 100.00% Impervious Runoff Depth>5.96"
Tc=6.0 min CN=98 Runoff=0.9 cfs 0.072 af

Subcatchment 5S: TD-1 Runoff Area=11,872 sf 34.45% Impervious Runoff Depth>4.17"
Tc=6.0 min CN=82 Runoff=1.3 cfs 0.095 af

Subcatchment 6S: Bypass Towards Runoff Area=50,395 sf 0.00% Impervious Runoff Depth>3.26"
Tc=0.0 min CN=73 Runoff=5.4 cfs 0.314 af

Subcatchment 7S: To Street Runoff Area=6,474 sf 7.57% Impervious Runoff Depth>3.55"
Tc=6.0 min CN=76 Runoff=0.6 cfs 0.044 af

Pond 1P: Underground Infiltration System-1 Peak Elev=7.56' Storage=10,332 cf Inflow=4.7 cfs 0.379 af
Discarded=0.0 cfs 0.050 af Primary=0.5 cfs 0.112 af Outflow=0.5 cfs 0.163 af

Pond 2P: Rooftop Detention Peak Elev=57.68' Storage=25,720 cf Inflow=7.2 cfs 0.590 af
12.0" Round Culvert n=0.013 L=10.0' S=0.0200 '/' Outflow=0.0 cfs 0.000 af

Pond 3P: Underground Infiltation System-2 Peak Elev=8.72' Storage=453 cf Inflow=1.3 cfs 0.095 af
12.0" Round Culvert n=0.013 L=44.0' S=0.0050 '/' Outflow=1.3 cfs 0.084 af

Link 1L: Total to Wetlands Inflow=6.2 cfs 0.511 af
Primary=6.2 cfs 0.511 af

Link 2L: Total to Street Inflow=0.6 cfs 0.044 af
Primary=0.6 cfs 0.044 af

Total Runoff Area = 3.555 ac Runoff Volume = 1.422 af Average Runoff Depth = 4.80"
42.87% Pervious = 1.524 ac 57.13% Impervious = 2.031 ac

Summary for Subcatchment 1S: CB-1

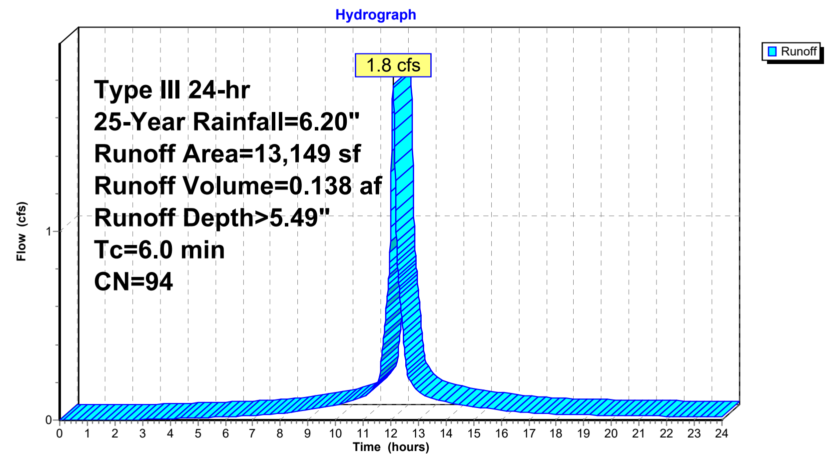
Runoff = 1.8 cfs @ 12.08 hrs, Volume= 0.138 af, Depth> 5.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.20"

Area (sf)	CN	Description
10,925	98	Paved parking, HSG C
2,224	74	>75% Grass cover, Good, HSG C
13,149	94	Weighted Average
2,224		16.91% Pervious Area
10,925		83.09% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Min. Tc**

Subcatchment 1S: CB-1



Summary for Subcatchment 2S: Building Roof

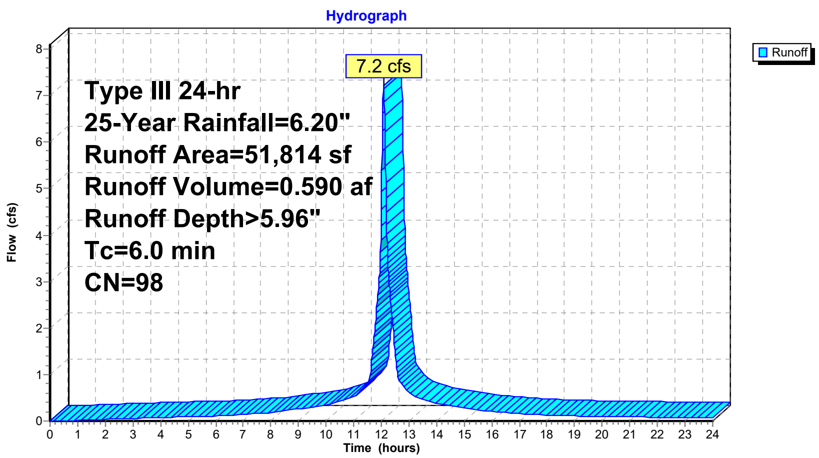
Runoff = 7.2 cfs @ 12.08 hrs, Volume= 0.590 af, Depth> 5.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.20"

Area (sf)	CN	Description
51,814	98	Roofs, HSG C
51,814		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Min. Tc**

Subcatchment 2S: Building Roof



Summary for Subcatchment 3S: Courtyard Roofs

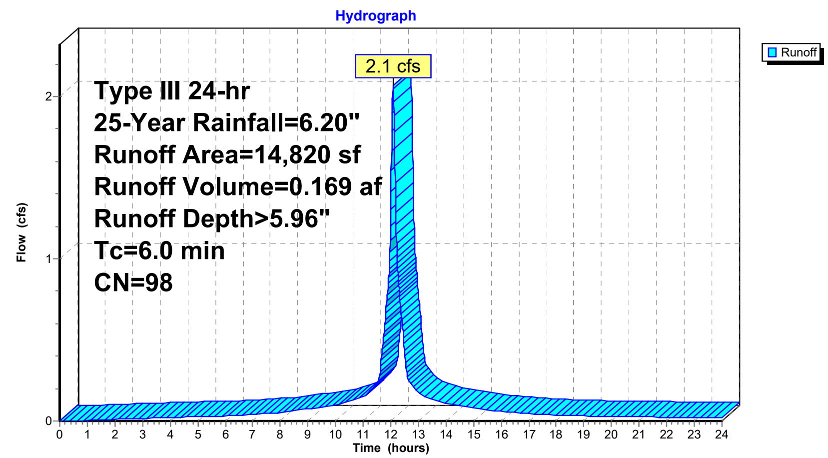
Runoff = 2.1 cfs @ 12.08 hrs, Volume= 0.169 af, Depth> 5.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.20"

Area (sf)	CN	Description
14,820	98	Roofs, HSG C
14,820		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Min. Tc**

Subcatchment 3S: Courtyard Roofs



Summary for Subcatchment 4S: TD-2

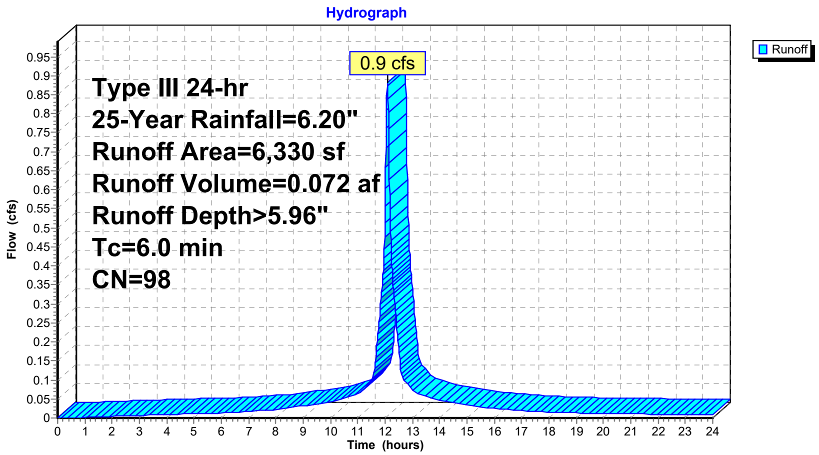
Runoff = 0.9 cfs @ 12.08 hrs, Volume= 0.072 af, Depth> 5.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.20"

Area (sf)	CN	Description
6,330	98	Paved parking, HSG C
6,330		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Min. Tc**

Subcatchment 4S: TD-2



Summary for Subcatchment 5S: TD-1

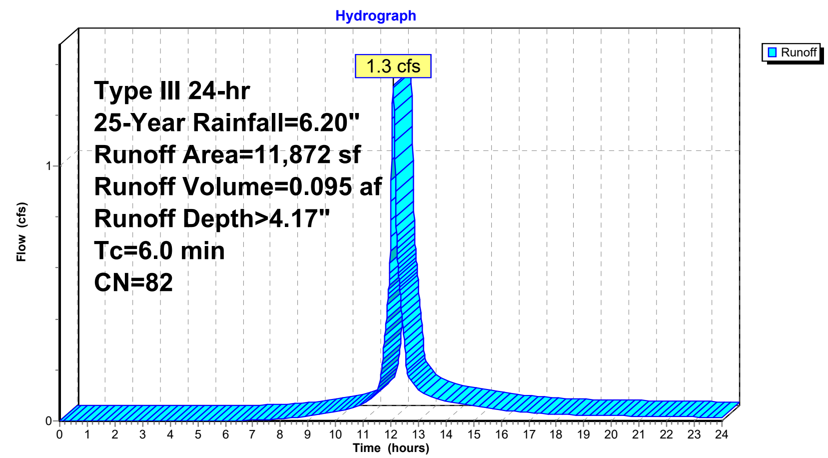
Runoff = 1.3 cfs @ 12.09 hrs, Volume= 0.095 af, Depth> 4.17"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.20"

Area (sf)	CN	Description
980	98	Roofs, HSG C
3,110	98	Paved parking, HSG C
7,782	74	>75% Grass cover, Good, HSG C
11,872	82	Weighted Average
7,782		65.55% Pervious Area
4,090		34.45% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Min. Tc**

Subcatchment 5S: TD-1



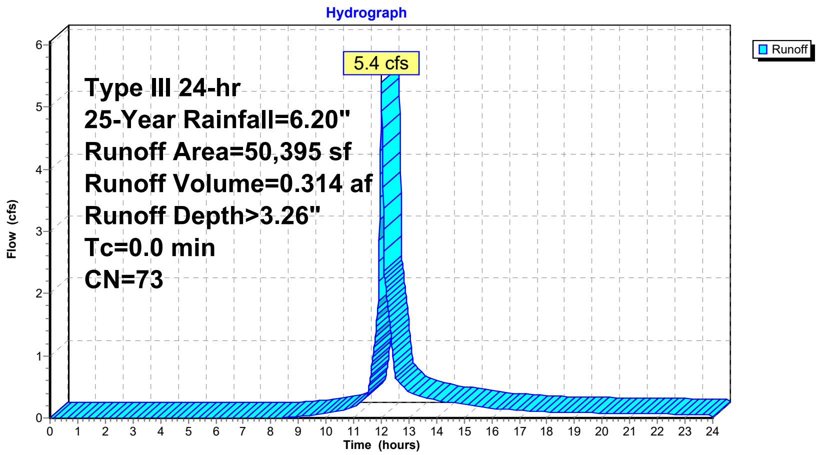
Summary for Subcatchment 6S: Bypass Towards Wetlands

Runoff = 5.4 cfs @ 12.00 hrs, Volume= 0.314 af, Depth> 3.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.20"

Area (sf)	CN	Description
6,751	70	Woods, Good, HSG C
43,644	74	>75% Grass cover, Good, HSG C
50,395	73	Weighted Average
50,395		100.00% Pervious Area

Subcatchment 6S: Bypass Towards Wetlands



Summary for Subcatchment 7S: To Street

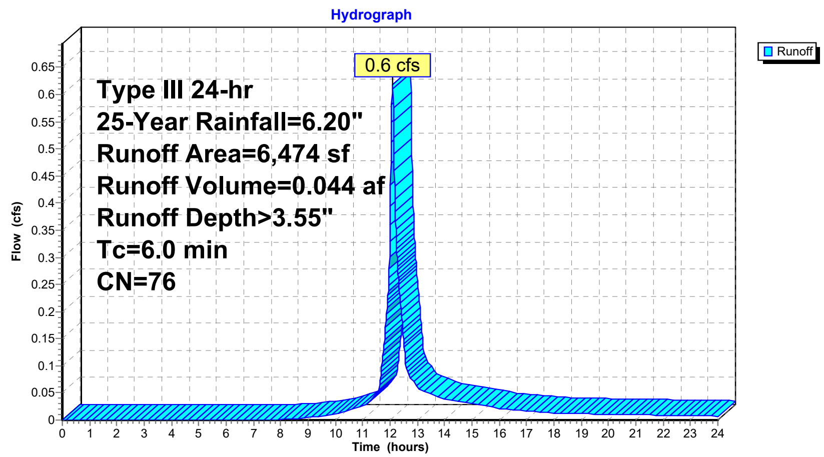
Runoff = 0.6 cfs @ 12.09 hrs, Volume= 0.044 af, Depth> 3.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.20"

Area (sf)	CN	Description
490	98	Paved parking, HSG C
5,984	74	>75% Grass cover, Good, HSG C
6,474	76	Weighted Average
5,984		92.43% Pervious Area
490		7.57% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Min. Tc**

Subcatchment 7S: To Street



Summary for Pond 1P: Underground Infiltration System-1

Inflow Area = 1.977 ac, 97.42% Impervious, Inflow Depth > 2.30" for 25-Year event
Inflow = 4.7 cfs @ 12.08 hrs, Volume= 0.379 af
Outflow = 0.5 cfs @ 12.79 hrs, Volume= 0.163 af, Atten= 90%, Lag= 42.2 min
Discarded = 0.0 cfs @ 5.04 hrs, Volume= 0.050 af
Primary = 0.5 cfs @ 12.79 hrs, Volume= 0.112 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 4
Peak Elev= 7.56' @ 12.79 hrs Surf.Area= 4,692 sf Storage= 10,332 cf

Plug-Flow detention time= 293.3 min calculated for 0.163 af (43% of inflow)
Center-of-Mass det. time= 149.9 min (902.4 - 752.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	5.00'	0 cf	**38.75'W x 121.08'L x 3.00'H Field A** 14,076 cf Overall - 14,076 cf Embedded = 0 cf x 40.0% Voids
#2A	5.00'	10,260 cf	**StormTrap ST2 SingleTrap 2-6** x 21 Inside #1 Inside= 101.7"W x 30.0"H => 18.82 sf x 15.40'L = 289.8 cf Outside= 101.7"W x 36.0"H => 25.44 sf x 15.40'L = 391.6 cf 3 Rows of 7 Chambers 25.44' x 107.77' Core + 6.66' Border = 38.75' x 121.08' System
#3	5.00'	141 cf	**6.00'D x 5.00'H OCS-1**-Impervious
		10,401 cf	Total Available Storage

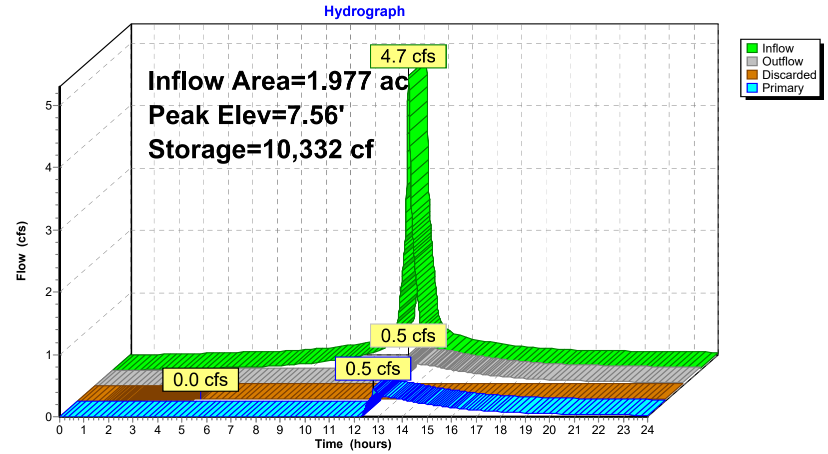
Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	5.00'	**0.270 in/hr Exfiltration over Surface area**
#2	Primary	7.20'	**15.0" Round Culvert** L= 130.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 7.20' / 6.55' S= 0.0050 '/' Cc= 0.900 n= 0.013, Flow Area= 1.23 sf

Discarded OutFlow Max=0.0 cfs @ 5.04 hrs HW=5.05' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.0 cfs)

Primary OutFlow Max=0.5 cfs @ 12.79 hrs HW=7.56' (Free Discharge)
└─**2=Culvert** (Barrel Controls 0.5 cfs @ 2.34 fps)

Pond 1P: Underground Infiltration System-1



Summary for Pond 2P: Rooftop Detention

Inflow Area = 1.189 ac,100.00% Impervious, Inflow Depth > 5.96" for 25-Year event
Inflow = 7.2 cfs @ 12.08 hrs, Volume= 0.590 af
Outflow = 0.0 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.0 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 57.68' @ 24.00 hrs Surf.Area= 38,000 sf Storage= 25,720 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

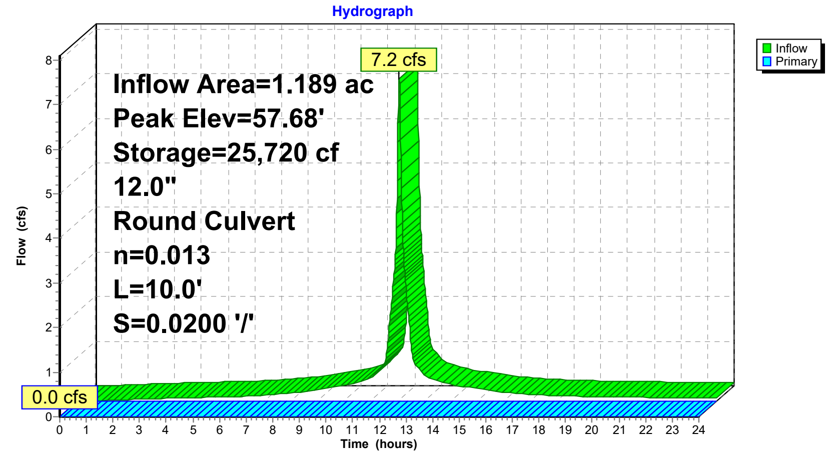
Volume	Invert	Avail.Storage	Storage Description
#1	57.00'	38,000 cf	**Rooftop Detention (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
57.00	38,000	0	0
58.00	38,000	38,000	38,000

Device	Routing	Invert	Outlet Devices
#1	Primary	58.00'	**12.0" Round Roof Drain** L= 10.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 58.00' / 57.80' S= 0.0200 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf

Primary OutFlow Max=0.0 cfs @ 0.00 hrs HW=57.00' (Free Discharge)
└─**1=Roof Drain** (Controls 0.0 cfs)

Pond 2P: Rooftop Detention



Summary for Pond 3P: Underground Infiltation System-2

Inflow Area = 0.273 ac, 34.45% Impervious, Inflow Depth > 4.17" for 25-Year event
Inflow = 1.3 cfs @ 12.09 hrs, Volume= 0.095 af
Outflow = 1.3 cfs @ 12.09 hrs, Volume= 0.084 af, Atten= 0%, Lag= 0.1 min
Primary = 1.3 cfs @ 12.09 hrs, Volume= 0.084 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 8.72' @ 12.09 hrs Surf.Area= 388 sf Storage= 453 cf

Plug-Flow detention time= 75.4 min calculated for 0.084 af (89% of inflow)
Center-of-Mass det. time= 24.6 min (831.6 - 807.0)

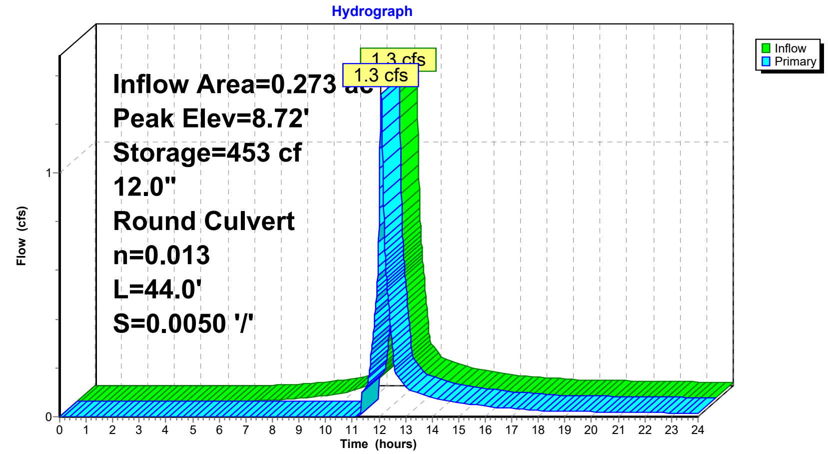
Volume	Invert	Avail.Storage	Storage Description
#1A	3.00'	204 cf	**21.50'W x 17.44'L x 1.83'H Field A** 687 cf Overall - 177 cf Embedded = 511 cf x 40.0% Voids
#2A	3.00'	177 cf	**ADS_StormTech SC-310 +Cap** x 12 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap 6 Rows of 2 Chambers
#3	3.00'	75 cf	**4.00'D x 6.00'H OCS**
		457 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	8.00'	**12.0" Round Culvert** L= 44.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 8.00' / 7.78' S= 0.0050 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf

Primary OutFlow Max=1.3 cfs @ 12.09 hrs HW=8.72' (Free Discharge)
└─**1=Culvert** (Barrel Controls 1.3 cfs @ 3.04 fps)

Pond 3P: Underground Infiltation System-2

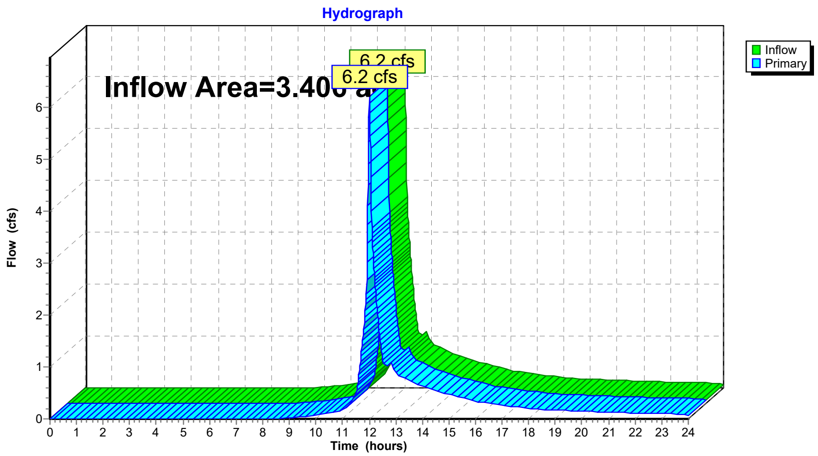


Summary for Link 1L: Total to Wetlands

Inflow Area = 3.406 ac, 59.29% Impervious, Inflow Depth > 1.80" for 25-Year event
Inflow = 6.2 cfs @ 12.00 hrs, Volume= 0.511 af
Primary = 6.2 cfs @ 12.00 hrs, Volume= 0.511 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Link 1L: Total to Wetlands

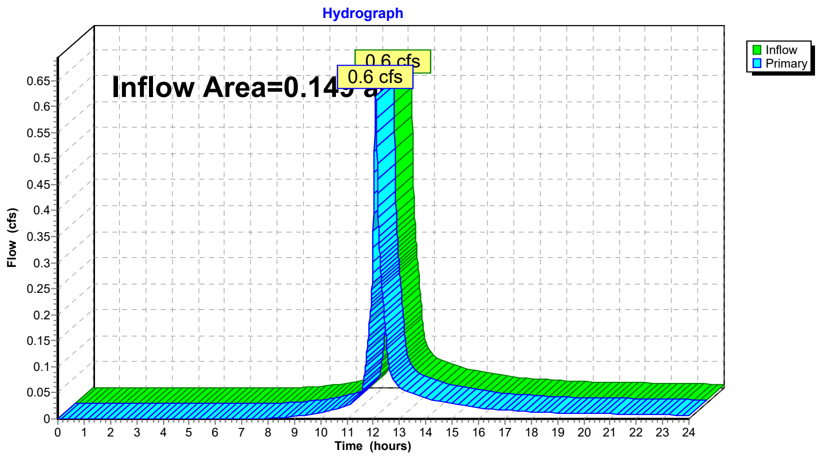


Summary for Link 2L: Total to Street

Inflow Area = 0.149 ac, 7.57% Impervious, Inflow Depth > 3.55" for 25-Year event
Inflow = 0.6 cfs @ 12.09 hrs, Volume= 0.044 af
Primary = 0.6 cfs @ 12.09 hrs, Volume= 0.044 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Link 2L: Total to Street



Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: CB-1 Runoff Area=13,149 sf 83.09% Impervious Runoff Depth>6.71"
Tc=6.0 min CN=94 Runoff=2.2 cfs 0.169 af

Subcatchment 2S: Building Roof Runoff Area=51,814 sf 100.00% Impervious Runoff Depth>7.19"
Tc=6.0 min CN=98 Runoff=8.7 cfs 0.712 af

Subcatchment 3S: Courtyard Roofs Runoff Area=14,820 sf 100.00% Impervious Runoff Depth>7.19"
Tc=6.0 min CN=98 Runoff=2.5 cfs 0.204 af

Subcatchment 4S: TD-2 Runoff Area=6,330 sf 100.00% Impervious Runoff Depth>7.19"
Tc=6.0 min CN=98 Runoff=1.1 cfs 0.087 af

Subcatchment 5S: TD-1 Runoff Area=11,872 sf 34.45% Impervious Runoff Depth>5.32"
Tc=6.0 min CN=82 Runoff=1.7 cfs 0.121 af

Subcatchment 6S: Bypass Towards Runoff Area=50,395 sf 0.00% Impervious Runoff Depth>4.31"
Tc=0.0 min CN=73 Runoff=7.2 cfs 0.415 af

Subcatchment 7S: To Street Runoff Area=6,474 sf 7.57% Impervious Runoff Depth>4.64"
Tc=6.0 min CN=76 Runoff=0.8 cfs 0.057 af

Pond 1P: Underground Infiltration System-1 Peak Elev=8.28' Storage=10,352 cf Inflow=5.7 cfs 0.460 af
Discarded=0.0 cfs 0.051 af Primary=3.1 cfs 0.190 af Outflow=3.2 cfs 0.241 af

Pond 2P: Rooftop Detention Peak Elev=57.82' Storage=31,022 cf Inflow=8.7 cfs 0.712 af
12.0" Round Culvert n=0.013 L=10.0' S=0.0200 '/' Outflow=0.0 cfs 0.000 af

Pond 3P: Underground Infiltation System-2 Peak Elev=8.84' Storage=454 cf Inflow=1.7 cfs 0.121 af
12.0" Round Culvert n=0.013 L=44.0' S=0.0050 '/' Outflow=1.7 cfs 0.111 af

Link 1L: Total to Wetlands Inflow=8.2 cfs 0.716 af
Primary=8.2 cfs 0.716 af

Link 2L: Total to Street Inflow=0.8 cfs 0.057 af
Primary=0.8 cfs 0.057 af

Total Runoff Area = 3.555 ac Runoff Volume = 1.765 af Average Runoff Depth = 5.96"
42.87% Pervious = 1.524 ac 57.13% Impervious = 2.031 ac

Summary for Subcatchment 1S: CB-1

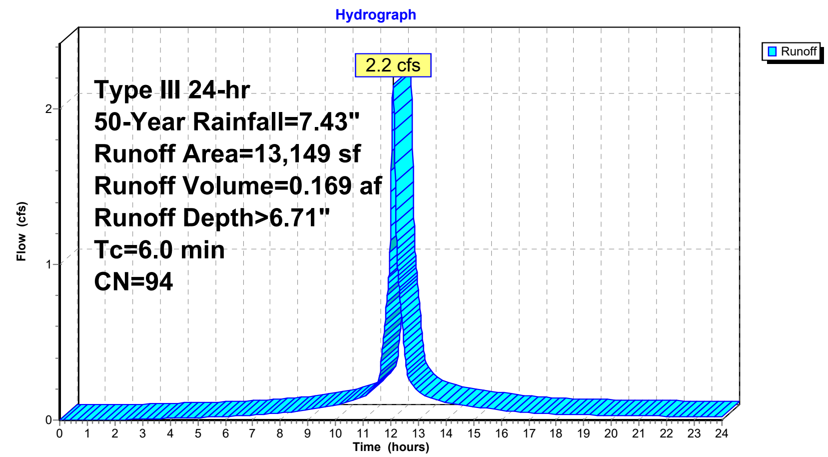
Runoff = 2.2 cfs @ 12.08 hrs, Volume= 0.169 af, Depth> 6.71"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-Year Rainfall=7.43"

Area (sf)	CN	Description
10,925	98	Paved parking, HSG C
2,224	74	>75% Grass cover, Good, HSG C
13,149	94	Weighted Average
2,224		16.91% Pervious Area
10,925		83.09% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Min. Tc**

Subcatchment 1S: CB-1



Summary for Subcatchment 2S: Building Roof

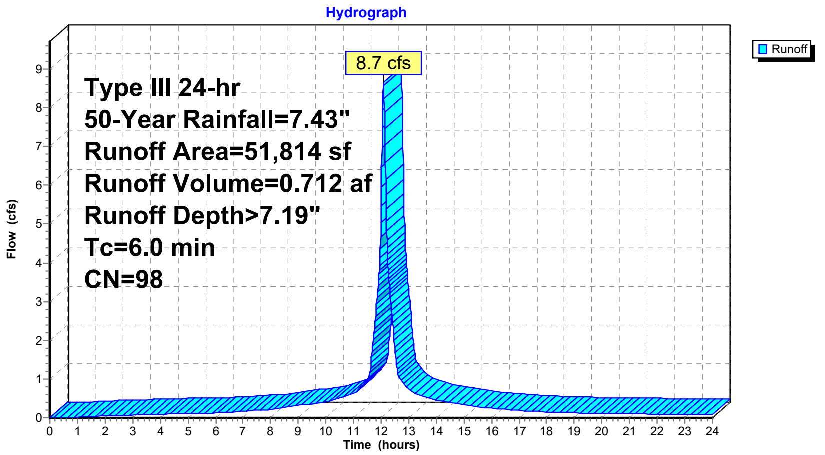
Runoff = 8.7 cfs @ 12.08 hrs, Volume= 0.712 af, Depth> 7.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-Year Rainfall=7.43"

Area (sf)	CN	Description
51,814	98	Roofs, HSG C
51,814		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Min. Tc**

Subcatchment 2S: Building Roof



Summary for Subcatchment 3S: Courtyard Roofs

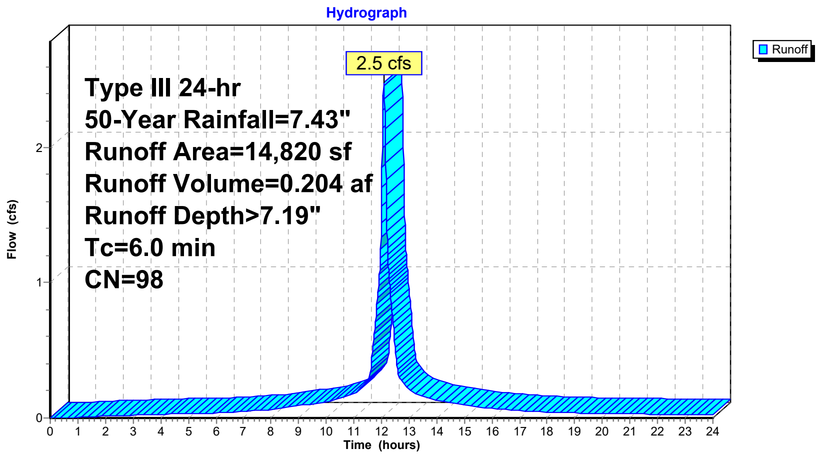
Runoff = 2.5 cfs @ 12.08 hrs, Volume= 0.204 af, Depth> 7.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-Year Rainfall=7.43"

Area (sf)	CN	Description
14,820	98	Roofs, HSG C
14,820		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Min. Tc**

Subcatchment 3S: Courtyard Roofs



Summary for Subcatchment 4S: TD-2

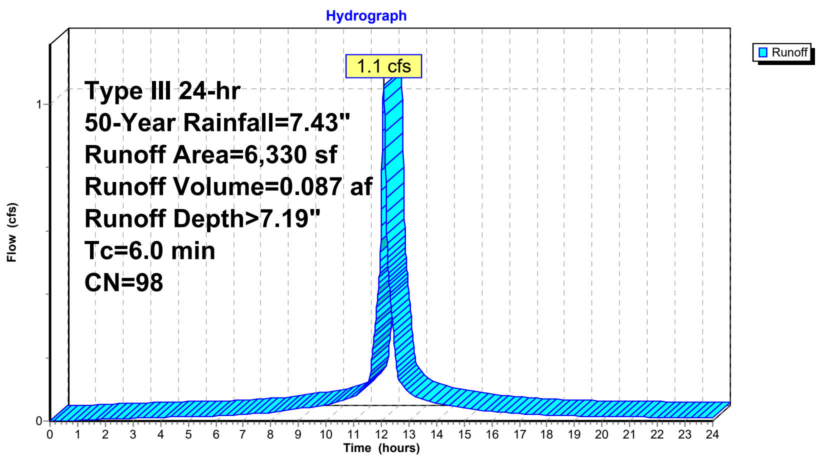
Runoff = 1.1 cfs @ 12.08 hrs, Volume= 0.087 af, Depth> 7.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-Year Rainfall=7.43"

Area (sf)	CN	Description
6,330	98	Paved parking, HSG C
6,330		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Min. Tc**

Subcatchment 4S: TD-2



Summary for Subcatchment 5S: TD-1

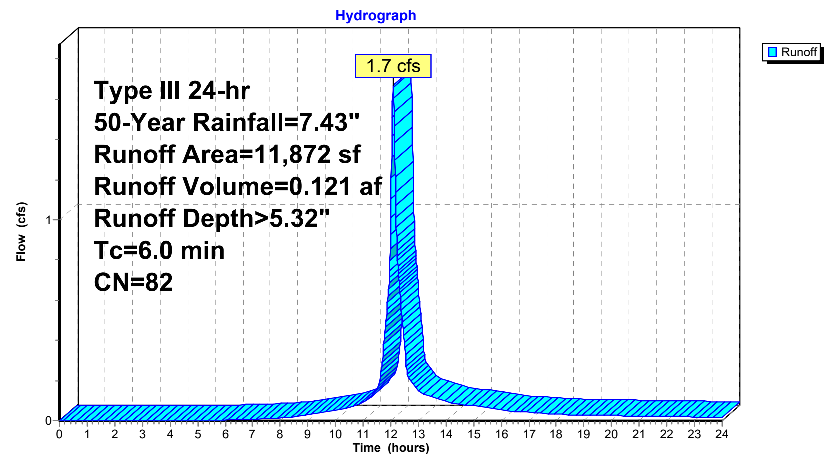
Runoff = 1.7 cfs @ 12.09 hrs, Volume= 0.121 af, Depth> 5.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-Year Rainfall=7.43"

Area (sf)	CN	Description
980	98	Roofs, HSG C
3,110	98	Paved parking, HSG C
7,782	74	>75% Grass cover, Good, HSG C
11,872	82	Weighted Average
7,782		65.55% Pervious Area
4,090		34.45% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Min. Tc**

Subcatchment 5S: TD-1



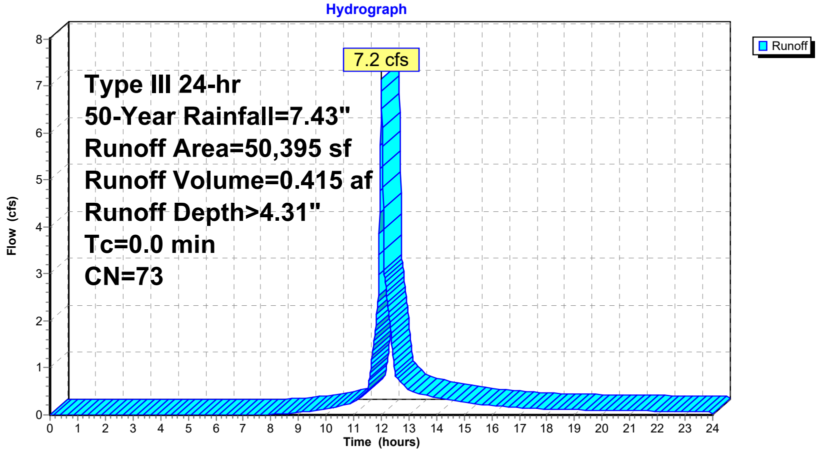
Summary for Subcatchment 6S: Bypass Towards Wetlands

Runoff = 7.2 cfs @ 12.00 hrs, Volume= 0.415 af, Depth> 4.31"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-Year Rainfall=7.43"

Area (sf)	CN	Description
6,751	70	Woods, Good, HSG C
43,644	74	>75% Grass cover, Good, HSG C
50,395	73	Weighted Average
50,395		100.00% Pervious Area

Subcatchment 6S: Bypass Towards Wetlands



Summary for Subcatchment 7S: To Street

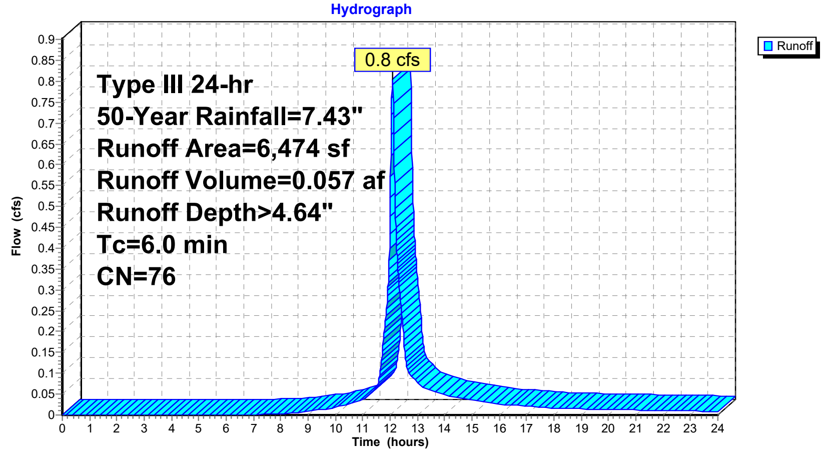
Runoff = 0.8 cfs @ 12.09 hrs, Volume= 0.057 af, Depth> 4.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-Year Rainfall=7.43"

Area (sf)	CN	Description
490	98	Paved parking, HSG C
5,984	74	>75% Grass cover, Good, HSG C
6,474	76	Weighted Average
5,984		92.43% Pervious Area
490		7.57% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Min. Tc**

Subcatchment 7S: To Street



Summary for Pond 1P: Underground Infiltration System-1

Inflow Area = 1.977 ac, 97.42% Impervious, Inflow Depth > 2.79" for 50-Year event
Inflow = 5.7 cfs @ 12.08 hrs, Volume= 0.460 af
Outflow = 3.2 cfs @ 12.22 hrs, Volume= 0.241 af, Atten= 44%, Lag= 8.5 min
Discarded = 0.0 cfs @ 4.23 hrs, Volume= 0.051 af
Primary = 3.1 cfs @ 12.22 hrs, Volume= 0.190 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 4
Peak Elev= 8.28' @ 12.22 hrs Surf.Area= 4,692 sf Storage= 10,352 cf

Plug-Flow detention time= 243.1 min calculated for 0.241 af (53% of inflow)
Center-of-Mass det. time= 119.7 min (869.0 - 749.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	5.00'	0 cf	**38.75'W x 121.08'L x 3.00'H Field A** 14,076 cf Overall - 14,076 cf Embedded = 0 cf x 40.0% Voids
#2A	5.00'	10,260 cf	**StormTrap ST2 SingleTrap 2-6** x 21 Inside #1 Inside= 101.7"W x 30.0"H => 18.82 sf x 15.40'L = 289.8 cf Outside= 101.7"W x 36.0"H => 25.44 sf x 15.40'L = 391.6 cf 3 Rows of 7 Chambers 25.44' x 107.77' Core + 6.66' Border = 38.75' x 121.08' System
#3	5.00'	141 cf	**6.00'D x 5.00'H OCS-1**-Impervious
		10,401 cf	Total Available Storage

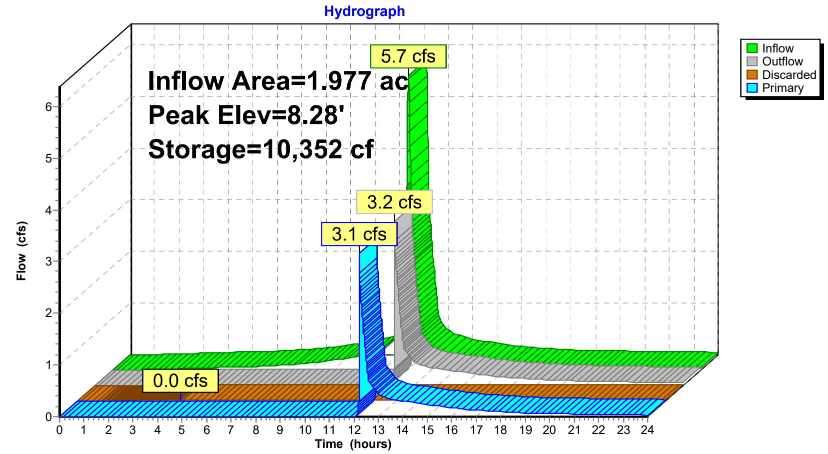
Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	5.00'	**0.270 in/hr Exfiltration over Surface area**
#2	Primary	7.20'	**15.0" Round Culvert** L= 130.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 7.20' / 6.55' S= 0.0050 '/' Cc= 0.900 n= 0.013, Flow Area= 1.23 sf

Discarded OutFlow Max=0.0 cfs @ 4.23 hrs HW=5.05' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.0 cfs)

Primary OutFlow Max=2.8 cfs @ 12.22 hrs HW=8.19' (Free Discharge)
└─**2=Culvert** (Barrel Controls 2.8 cfs @ 3.73 fps)

Pond 1P: Underground Infiltration System-1



Summary for Pond 2P: Rooftop Detention

Inflow Area = 1.189 ac,100.00% Impervious, Inflow Depth > 7.19" for 50-Year event
Inflow = 8.7 cfs @ 12.08 hrs, Volume= 0.712 af
Outflow = 0.0 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.0 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 57.82' @ 24.00 hrs Surf.Area= 38,000 sf Storage= 31,022 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

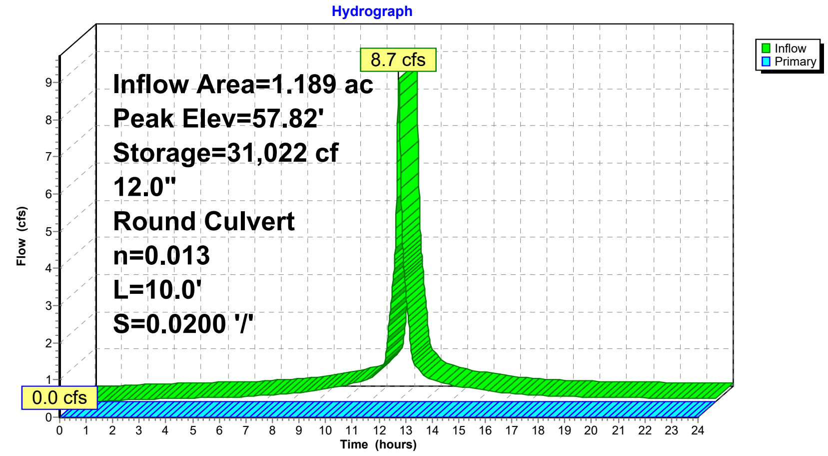
Volume	Invert	Avail.Storage	Storage Description
#1	57.00'	38,000 cf	**Rooftop Detention (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
57.00	38,000	0	0
58.00	38,000	38,000	38,000

Device	Routing	Invert	Outlet Devices
#1	Primary	58.00'	**12.0" Round Roof Drain** L= 10.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 58.00' / 57.80' S= 0.0200 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf

Primary OutFlow Max=0.0 cfs @ 0.00 hrs HW=57.00' (Free Discharge)
└─**1=Roof Drain** (Controls 0.0 cfs)

Pond 2P: Rooftop Detention



Summary for Pond 3P: Underground Infiltation System-2

Inflow Area = 0.273 ac, 34.45% Impervious, Inflow Depth > 5.32" for 50-Year event
Inflow = 1.7 cfs @ 12.09 hrs, Volume= 0.121 af
Outflow = 1.7 cfs @ 12.09 hrs, Volume= 0.111 af, Atten= 0%, Lag= 0.1 min
Primary = 1.7 cfs @ 12.09 hrs, Volume= 0.111 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 8.84' @ 12.09 hrs Surf.Area= 388 sf Storage= 454 cf

Plug-Flow detention time= 64.4 min calculated for 0.110 af (92% of inflow)
Center-of-Mass det. time= 22.0 min (822.2 - 800.2)

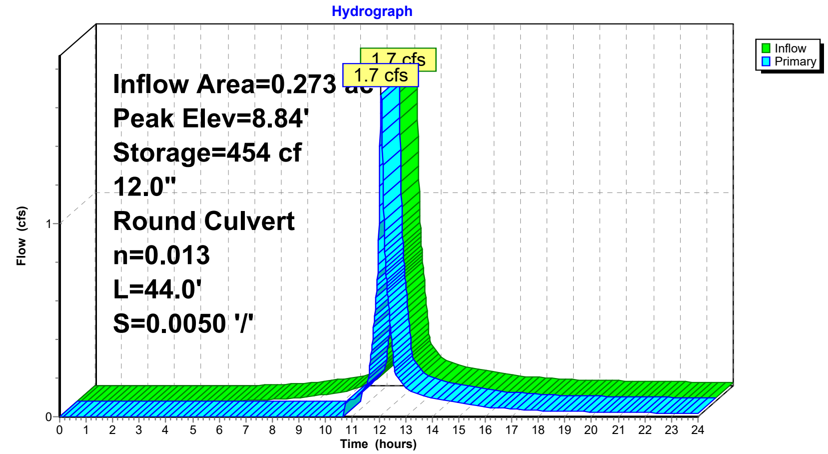
Volume	Invert	Avail.Storage	Storage Description
#1A	3.00'	204 cf	**21.50'W x 17.44'L x 1.83'H Field A**
			687 cf Overall - 177 cf Embedded = 511 cf x 40.0% Voids
#2A	3.00'	177 cf	**ADS_StormTech SC-310 +Cap** x 12 Inside #1
			Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf
			Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap
			6 Rows of 2 Chambers
#3	3.00'	75 cf	**4.00'D x 6.00'H OCS**
		457 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	8.00'	**12.0" Round Culvert**
			L= 44.0' CPP, square edge headwall, Ke= 0.500
			Inlet / Outlet Invert= 8.00' / 7.78' S= 0.0050 '/' Cc= 0.900
			n= 0.013, Flow Area= 0.79 sf

Primary OutFlow Max=1.7 cfs @ 12.09 hrs HW=8.83' (Free Discharge)
└─**1=Culvert** (Barrel Controls 1.7 cfs @ 3.22 fps)

Pond 3P: Underground Infiltation System-2

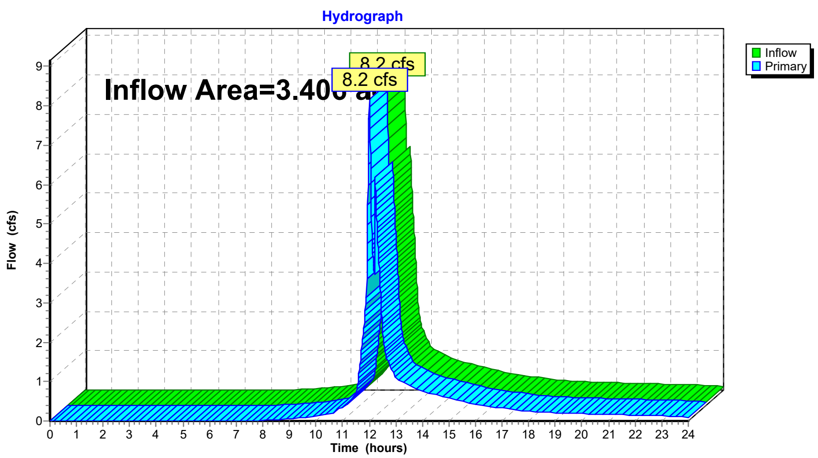


Summary for Link 1L: Total to Wetlands

Inflow Area = 3.406 ac, 59.29% Impervious, Inflow Depth > 2.52" for 50-Year event
Inflow = 8.2 cfs @ 12.00 hrs, Volume= 0.716 af
Primary = 8.2 cfs @ 12.00 hrs, Volume= 0.716 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Link 1L: Total to Wetlands

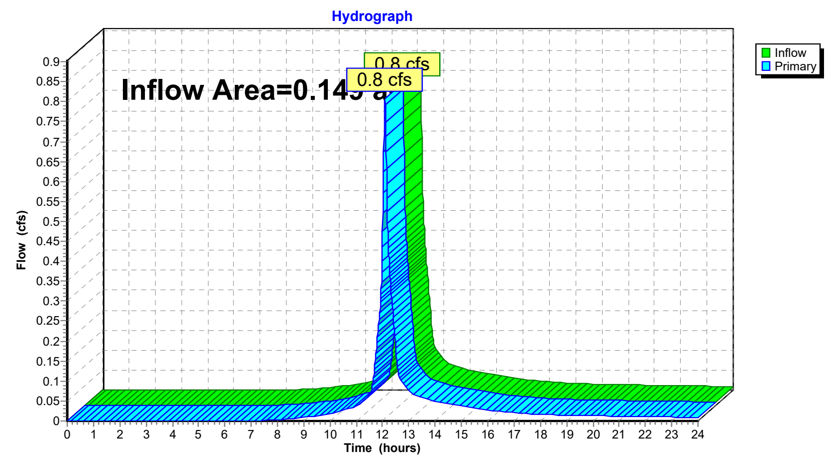


Summary for Link 2L: Total to Street

Inflow Area = 0.149 ac, 7.57% Impervious, Inflow Depth > 4.64" for 50-Year event
Inflow = 0.8 cfs @ 12.09 hrs, Volume= 0.057 af
Primary = 0.8 cfs @ 12.09 hrs, Volume= 0.057 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Link 2L: Total to Street



Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: CB-1 Runoff Area=13,149 sf 83.09% Impervious Runoff Depth>8.16"
Tc=6.0 min CN=94 Runoff=2.6 cfs 0.205 af

Subcatchment 2S: Building Roof Runoff Area=51,814 sf 100.00% Impervious Runoff Depth>8.64"
Tc=6.0 min CN=98 Runoff=10.4 cfs 0.857 af

Subcatchment 3S: Courtyard Roofs Runoff Area=14,820 sf 100.00% Impervious Runoff Depth>8.64"
Tc=6.0 min CN=98 Runoff=3.0 cfs 0.245 af

Subcatchment 4S: TD-2 Runoff Area=6,330 sf 100.00% Impervious Runoff Depth>8.64"
Tc=6.0 min CN=98 Runoff=1.3 cfs 0.105 af

Subcatchment 5S: TD-1 Runoff Area=11,872 sf 34.45% Impervious Runoff Depth>6.70"
Tc=6.0 min CN=82 Runoff=2.1 cfs 0.152 af

Subcatchment 6S: Bypass Towards Runoff Area=50,395 sf 0.00% Impervious Runoff Depth>5.61"
Tc=0.0 min CN=73 Runoff=9.3 cfs 0.540 af

Subcatchment 7S: To Street Runoff Area=6,474 sf 7.57% Impervious Runoff Depth>5.97"
Tc=6.0 min CN=76 Runoff=1.0 cfs 0.074 af

Pond 1P: Underground Infiltration System-1 Peak Elev=9.88' Storage=10,398 cf Inflow=6.8 cfs 0.555 af
Discarded=0.0 cfs 0.053 af Primary=6.6 cfs 0.284 af Outflow=6.6 cfs 0.336 af

Pond 2P: Rooftop Detention Peak Elev=57.98' Storage=37,318 cf Inflow=10.4 cfs 0.857 af
12.0" Round Culvert n=0.013 L=10.0' S=0.0200 '/' Outflow=0.0 cfs 0.000 af

Pond 3P: Underground Infiltation System-2 Peak Elev=8.97' Storage=456 cf Inflow=2.1 cfs 0.152 af
12.0" Round Culvert n=0.013 L=44.0' S=0.0050 '/' Outflow=2.1 cfs 0.142 af

Link 1L: Total to Wetlands Inflow=12.6 cfs 0.966 af
Primary=12.6 cfs 0.966 af

Link 2L: Total to Street Inflow=1.0 cfs 0.074 af
Primary=1.0 cfs 0.074 af

Total Runoff Area = 3.555 ac Runoff Volume = 2.178 af Average Runoff Depth = 7.35"
42.87% Pervious = 1.524 ac 57.13% Impervious = 2.031 ac

Summary for Subcatchment 1S: CB-1

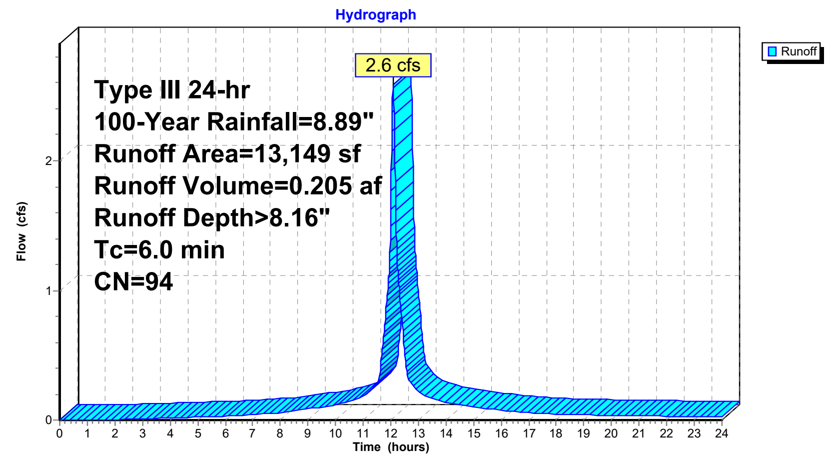
Runoff = 2.6 cfs @ 12.08 hrs, Volume= 0.205 af, Depth> 8.16"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.89"

Area (sf)	CN	Description
10,925	98	Paved parking, HSG C
2,224	74	>75% Grass cover, Good, HSG C
13,149	94	Weighted Average
2,224		16.91% Pervious Area
10,925		83.09% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Min. Tc**

Subcatchment 1S: CB-1



Summary for Subcatchment 2S: Building Roof

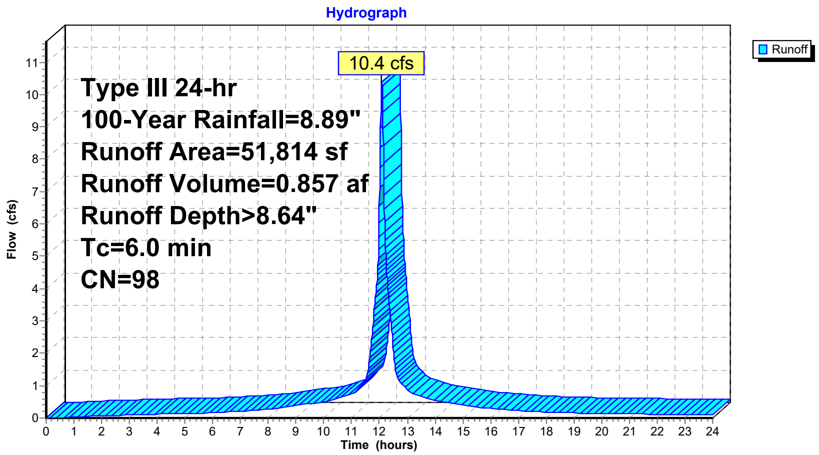
Runoff = 10.4 cfs @ 12.08 hrs, Volume= 0.857 af, Depth> 8.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.89"

Area (sf)	CN	Description
51,814	98	Roofs, HSG C
51,814		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Min. Tc**

Subcatchment 2S: Building Roof



Summary for Subcatchment 3S: Courtyard Roofs

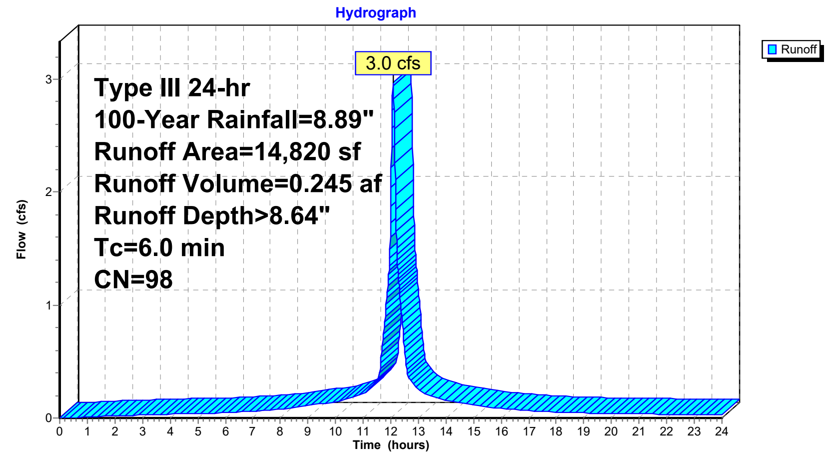
Runoff = 3.0 cfs @ 12.08 hrs, Volume= 0.245 af, Depth> 8.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.89"

Area (sf)	CN	Description
14,820	98	Roofs, HSG C
14,820		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Min. Tc**

Subcatchment 3S: Courtyard Roofs



Summary for Subcatchment 4S: TD-2

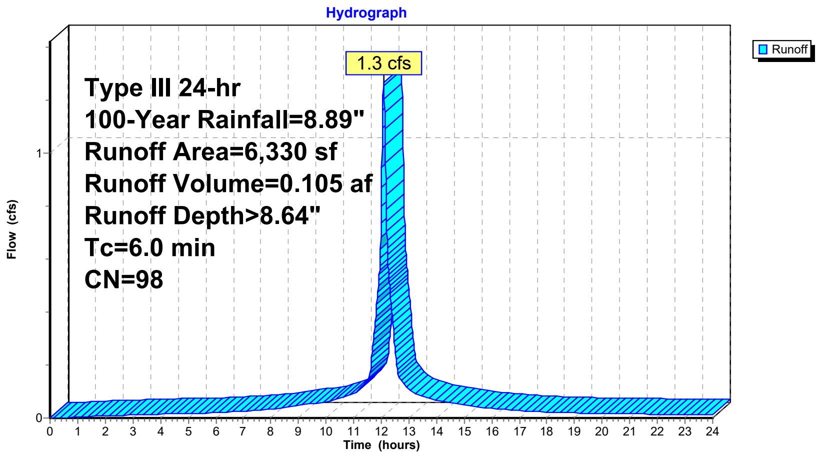
Runoff = 1.3 cfs @ 12.08 hrs, Volume= 0.105 af, Depth> 8.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.89"

Area (sf)	CN	Description
6,330	98	Paved parking, HSG C
6,330		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Min. Tc**

Subcatchment 4S: TD-2



Summary for Subcatchment 5S: TD-1

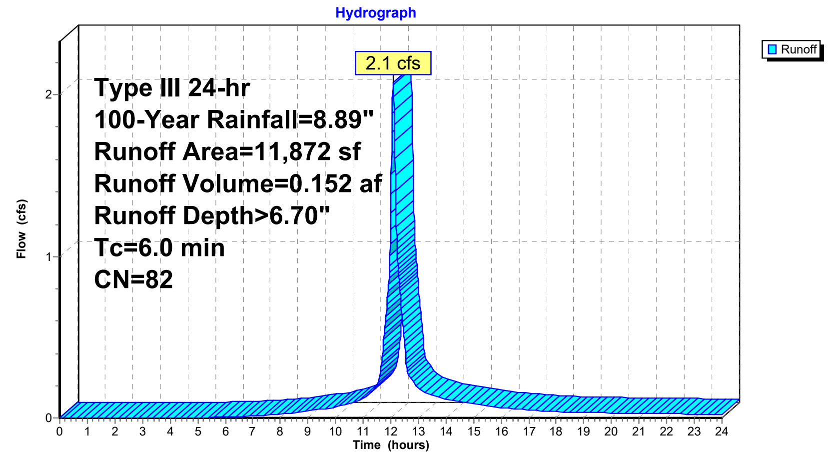
Runoff = 2.1 cfs @ 12.09 hrs, Volume= 0.152 af, Depth> 6.70"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.89"

Area (sf)	CN	Description
980	98	Roofs, HSG C
3,110	98	Paved parking, HSG C
7,782	74	>75% Grass cover, Good, HSG C
11,872	82	Weighted Average
7,782		65.55% Pervious Area
4,090		34.45% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Min. Tc**

Subcatchment 5S: TD-1



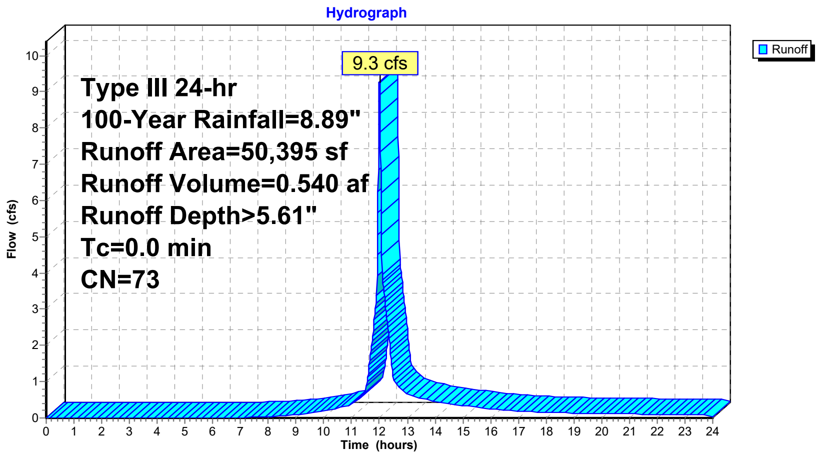
Summary for Subcatchment 6S: Bypass Towards Wetlands

Runoff = 9.3 cfs @ 12.00 hrs, Volume= 0.540 af, Depth> 5.61"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.89"

Area (sf)	CN	Description
6,751	70	Woods, Good, HSG C
43,644	74	>75% Grass cover, Good, HSG C
50,395	73	Weighted Average
50,395		100.00% Pervious Area

Subcatchment 6S: Bypass Towards Wetlands



Summary for Subcatchment 7S: To Street

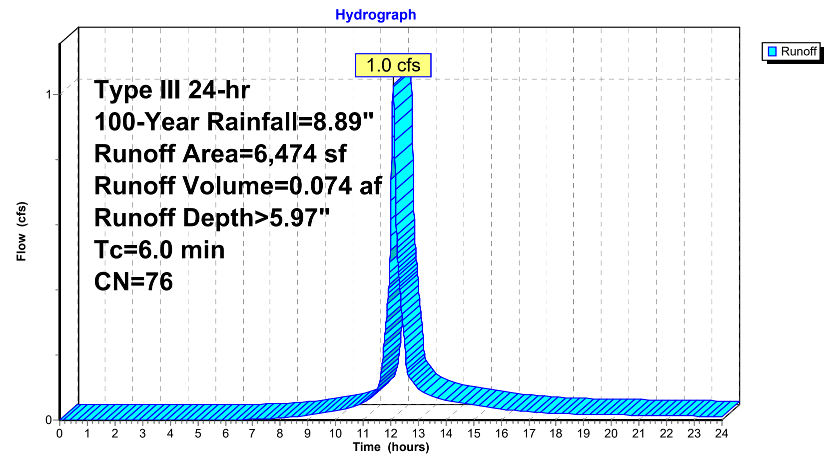
Runoff = 1.0 cfs @ 12.09 hrs, Volume= 0.074 af, Depth> 5.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.89"

Area (sf)	CN	Description
490	98	Paved parking, HSG C
5,984	74	>75% Grass cover, Good, HSG C
6,474	76	Weighted Average
5,984		92.43% Pervious Area
490		7.57% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Min. Tc**

Subcatchment 7S: To Street



Summary for Pond 1P: Underground Infiltration System-1

Inflow Area = 1.977 ac, 97.42% Impervious, Inflow Depth > 3.37" for 100-Year event
Inflow = 6.8 cfs @ 12.08 hrs, Volume= 0.555 af
Outflow = 6.6 cfs @ 12.10 hrs, Volume= 0.336 af, Atten= 3%, Lag= 1.0 min
Discarded = 0.0 cfs @ 3.54 hrs, Volume= 0.053 af
Primary = 6.6 cfs @ 12.10 hrs, Volume= 0.284 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 4
Peak Elev= 9.88' @ 12.10 hrs Surf.Area= 4,692 sf Storage= 10,398 cf

Plug-Flow detention time= 211.4 min calculated for 0.336 af (61% of inflow)
Center-of-Mass det. time= 101.5 min (847.9 - 746.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	5.00'	0 cf	**38.75'W x 121.08'L x 3.00'H Field A** 14,076 cf Overall - 14,076 cf Embedded = 0 cf x 40.0% Voids
#2A	5.00'	10,260 cf	**StormTrap ST2 SingleTrap 2-6** x 21 Inside #1 Inside= 101.7"W x 30.0"H => 18.82 sf x 15.40'L = 289.8 cf Outside= 101.7"W x 36.0"H => 25.44 sf x 15.40'L = 391.6 cf 3 Rows of 7 Chambers 25.44' x 107.77' Core + 6.66' Border = 38.75' x 121.08' System
#3	5.00'	141 cf	**6.00'D x 5.00'H OCS-1**-Impervious
		10,401 cf	Total Available Storage

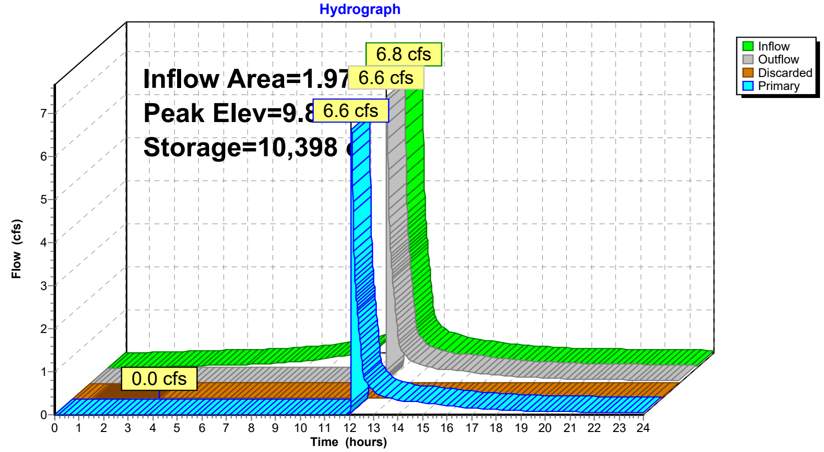
Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	5.00'	**0.270 in/hr Exfiltration over Surface area**
#2	Primary	7.20'	**15.0" Round Culvert** L= 130.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 7.20' / 6.55' S= 0.0050 '/' Cc= 0.900 n= 0.013, Flow Area= 1.23 sf

Discarded OutFlow Max=0.0 cfs @ 3.54 hrs HW=5.05' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.0 cfs)

Primary OutFlow Max=6.6 cfs @ 12.10 hrs HW=9.85' (Free Discharge)
└**2=Culvert** (Barrel Controls 6.6 cfs @ 5.39 fps)

Pond 1P: Underground Infiltration System-1



Summary for Pond 2P: Rooftop Detention

Inflow Area = 1.189 ac,100.00% Impervious, Inflow Depth > 8.64" for 100-Year event
Inflow = 10.4 cfs @ 12.08 hrs, Volume= 0.857 af
Outflow = 0.0 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.0 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 57.98' @ 24.00 hrs Surf.Area= 38,000 sf Storage= 37,318 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

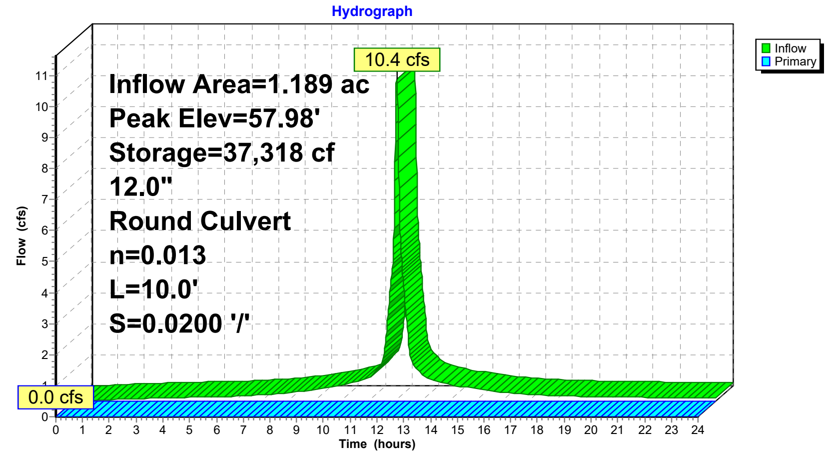
Volume	Invert	Avail.Storage	Storage Description
#1	57.00'	38,000 cf	**Rooftop Detention (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
57.00	38,000	0	0
58.00	38,000	38,000	38,000

Device	Routing	Invert	Outlet Devices
#1	Primary	58.00'	**12.0" Round Roof Drain** L= 10.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 58.00' / 57.80' S= 0.0200 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf

Primary OutFlow Max=0.0 cfs @ 0.00 hrs HW=57.00' (Free Discharge)
└─**1=Roof Drain** (Controls 0.0 cfs)

Pond 2P: Rooftop Detention



Summary for Pond 3P: Underground Infiltation System-2

Inflow Area = 0.273 ac, 34.45% Impervious, Inflow Depth > 6.70" for 100-Year event
Inflow = 2.1 cfs @ 12.09 hrs, Volume= 0.152 af
Outflow = 2.1 cfs @ 12.09 hrs, Volume= 0.142 af, Atten= 0%, Lag= 0.1 min
Primary = 2.1 cfs @ 12.09 hrs, Volume= 0.142 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 8.97' @ 12.09 hrs Surf.Area= 388 sf Storage= 456 cf

Plug-Flow detention time= 55.3 min calculated for 0.142 af (93% of inflow)
Center-of-Mass det. time= 19.8 min (813.5 - 793.7)

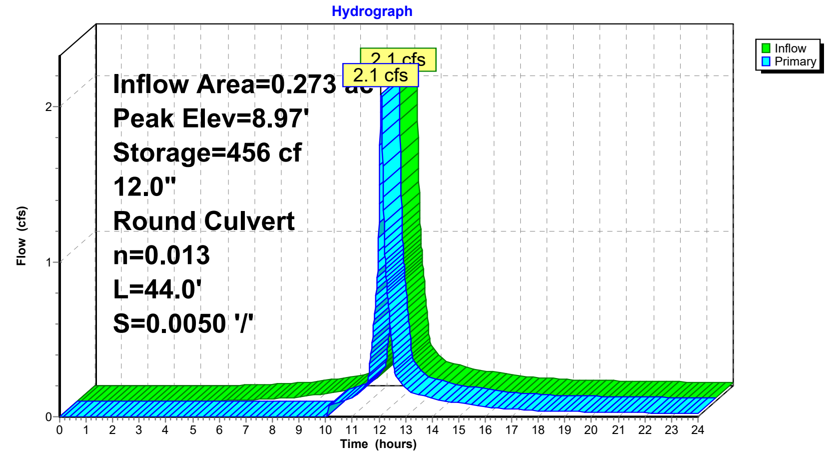
Volume	Invert	Avail.Storage	Storage Description
#1A	3.00'	204 cf	**21.50'W x 17.44'L x 1.83'H Field A** 687 cf Overall - 177 cf Embedded = 511 cf x 40.0% Voids
#2A	3.00'	177 cf	**ADS_StormTech SC-310 +Cap** x 12 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap 6 Rows of 2 Chambers
#3	3.00'	75 cf	**4.00'D x 6.00'H OCS**
		457 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	8.00'	**12.0" Round Culvert** L= 44.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 8.00' / 7.78' S= 0.0050 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf

Primary OutFlow Max=2.1 cfs @ 12.09 hrs HW=8.97' (Free Discharge)
└**1=Culvert** (Barrel Controls 2.1 cfs @ 3.39 fps)

Pond 3P: Underground Infiltation System-2

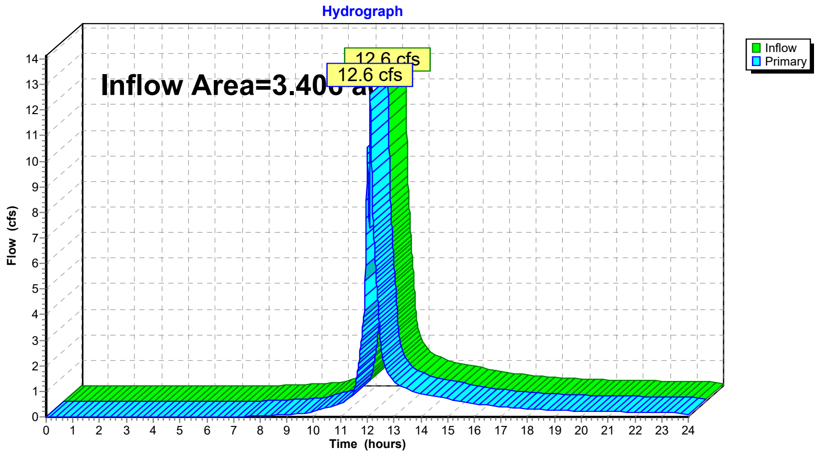


Summary for Link 1L: Total to Wetlands

Inflow Area = 3.406 ac, 59.29% Impervious, Inflow Depth > 3.40" for 100-Year event
Inflow = 12.6 cfs @ 12.10 hrs, Volume= 0.966 af
Primary = 12.6 cfs @ 12.10 hrs, Volume= 0.966 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Link 1L: Total to Wetlands

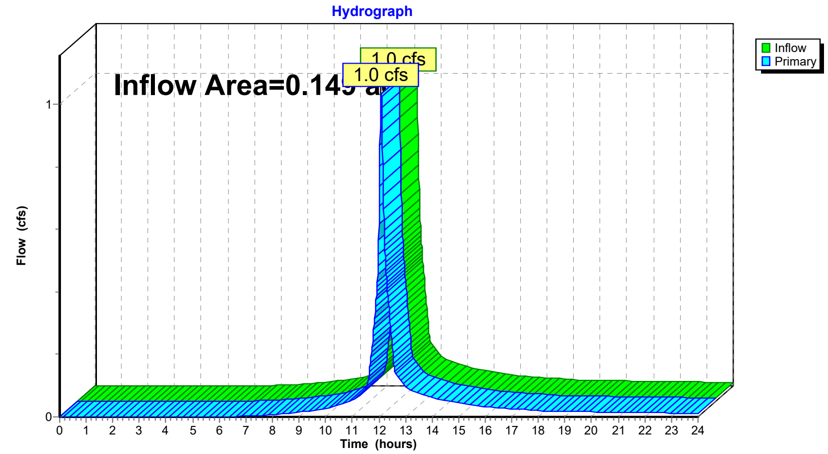


Summary for Link 2L: Total to Street

Inflow Area = 0.149 ac, 7.57% Impervious, Inflow Depth > 5.97" for 100-Year event
Inflow = 1.0 cfs @ 12.09 hrs, Volume= 0.074 af
Primary = 1.0 cfs @ 12.09 hrs, Volume= 0.074 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Link 2L: Total to Street



SECTION 6.0

ADDITIONAL DRAINAGE CALCULATIONS

6.01 TSS Removal Calculations

TSS Removal Calculation Worksheet

Location: Thorndike Place, Arlington, MA

Project: 23407.00

Prepared By: D. Rinaldi
Date: 11/02/20

AREA 1 - CB-1

Total Impervious Area, Acres= 0.251

A	B	C	D	E
BMP	TSS Removal Rate	Starting TSS Load*	Amount Removed (BxC)	Remaining Load (C-D)
Deep Sump and Hooded Catchbasins	0.25	1.00	0.25	0.75
Hydrodynamic Separator	0.7	0.75	0.53	0.23
Infiltration Basin	0.8	0.23	0.18	0.05

TSS Removal = 0.96

AREA 2 - TD-1

Total Impervious Area, Acres= 0.094

A	B	C	D	E
BMP	TSS Removal Rate	Starting TSS Load*	Amount Removed (BxC)	Remaining Load (C-D)
Hydrodynamic Separator	0.7	1.00	0.70	0.30

TSS Removal = 0.70

AREA 3 - TD-2

Total Impervious Area, Acres= 0.145

A	B	C	D	E
BMP	TSS Removal Rate	Starting TSS Load*	Amount Removed (BxC)	Remaining Load (C-D)
Hydrodynamic Separator	0.7	1.00	0.70	0.30
Infiltration Basin	0.8	0.30	0.24	0.06

TSS Removal = 0.94

AREA 4 - Bypass to Street

Total Impervious Area, Acres= 0.011

A	B	C	D	E
BMP	TSS Removal Rate	Starting TSS Load*	Amount Removed (BxC)	Remaining Load (C-D)
		1.00		

TSS Removal =

Weighted Annual Average TSS Removal Rate

[TSS Removal-1 (Area-1) + TSS Revoval-2 (Area-2)+ ….] / [Area-1 + Area-2 + ...] = 0.88

Project Site TSS Removal = 0.88

6.02 GROUNDWATER RECHARGE VOLUME CALCULATIONS

Required Recharge Volume

Rv = F x Impervious Area

Where:

Rv = Recharge Volume

F=Target Depth Factor associated with each Hydrologic Soil Group

(F=0.25-inch for Soil Type C)

Impervious Area = Proposed Pavement and Rooftop area on-site

$$Rv = \left(\frac{0.25in}{12}\right)(88{,}469sft) =$$

Rv = 1,844 cf (required recharge volume)

As not all impervious surfaces are directed to an infiltration BMP, an adjusted Required Volume must be provided. The adjusted Required Volume (Rva) is calculated as:

$$Rva = \frac{Total\ Imp.Area}{Imp.Area\ to\ BMP}\ (\mathrm{Rv}) =$$

$$Rva = \left(\frac{88{,}469sft}{83{,}889sft}\right)(1{,}844cf) =$$

$$Rva = 1{,}945\ cf$$

Storage Provided

- Underground Infiltration System-1 = 9,084 cubic feet provided.
  Refer to the HydroCAD calculations provided for more information.

Summary for Pond 1P: Underground Infiltration System-1

Inflow Area = 1.977 ac, 97.42% Impervious, Inflow Depth > 1.55" for Rv event
Inflow = 3.2 cfs @ 12.08 hrs, Volume= 0.255 af
Outflow = 0.0 cfs @ 6.92 hrs, Volume= 0.047 af, Atten= 99%, Lag= 0.0 min
Discarded = 0.0 cfs @ 6.92 hrs, Volume= 0.047 af
Primary = 0.0 cfs @ 0.00 hrs, Volume= 0.000 af

9,084 cu.ft. storage below outlet exceeds required recharge volume

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 4
Peak Elev= 7.20' @ 23.95 hrs Surf.Area= 4,692 sf Storage= 9,084 cf

Plug-Flow detention time= 349.3 min calculated for 0.047 af (18% of inflow)
Center-of-Mass det. time= 98.5 min (858.3 - 759.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	5.00'	0 cf	**38.75'W x 121.08'L x 3.00'H Field A** 14,076 cf Overall - 14,076 cf Embedded = 0 cf x 40.0% Voids
#2A	5.00'	10,260 cf	**StormTrap ST2 SingleTrap 2-6** x 21 Inside #1 Inside= 101.7"W x 30.0"H => 18.82 sf x 15.40'L = 289.8 cf Outside= 101.7"W x 36.0"H => 25.44 sf x 15.40'L = 391.6 cf 3 Rows of 7 Chambers 25.44' x 107.77' Core + 6.66' Border = 38.75' x 121.08' System
#3	5.00'	141 cf	**6.00'D x 5.00'H OCS-1**-Impervious
		10,401 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	5.00'	**0.270 in/hr Exfiltration over Surface area**
#2	Primary	7.20'	**15.0" Round Culvert** L= 130.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 7.20' / 6.55' S= 0.0050 '/' Cc= 0.900 n= 0.013, Flow Area= 1.23 sf

Discarded OutFlow Max=0.0 cfs @ 6.92 hrs HW=5.05' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.0 cfs)

Primary OutFlow Max=0.0 cfs @ 0.00 hrs HW=5.00' (Free Discharge)
└─**2=Culvert** (Controls 0.0 cfs)

6.03 Water Quality Volume Calculations

Water Quality Volume Calculation

V_{WQ} = (D_{WQ}/12 inches/foot) * (A_{IMP} square feet)

V_{WQ} = Required Water Quality Volume (in cubic feet)
D_{WQ} = Water Quality Depth: **0.5-inch**
A_{IMP} = Total Impervious Area (in acres) used for driveways, parking, etc.

Underground Infiltration Systems and Bio-Retention Areas

A_{IMP} = 88,469 sq.ft.

V_{WQ} = (1 inches/12 inches/foot) * (88,469 sq.ft.)

V_{WQ} = 7,372 cubic feet (required volume), provided volume = 9,084 cubic feet (refer to the HydroCAD calculations provided in groundwater recharge section)

6.04 Rip-Rap Outlet Protection Sizing

OUTLET PROTECTION SIZING

Project No.	83669.00	**Calc By**	EAD
Subject	Outlet Protection Sizing Calcs	**Date**	11/2/2020
Location	Arlington, MA	**Checked by**	DRR
		Date	11/3/2020

FES-1

Q=Design Discharge, (ft^3/s) = 6.6 cfs

D=Culvert Diameter, (ft) = 1.25 ft

TW=Tailwater Depth, (ft) = 0.5 ft, (0.4xD for unknow tailwater, or enter known tailwater)

(Tailwater depth is to be limited to between 0.4D and 1.0D)

Riprap Rock Sizing

$$D_{50} = 0.2D\left[\frac{Q}{\sqrt{g}D^{2.5}}\right]^{4/3}\left[\frac{D}{TW}\right]$$

g=32.2 fps

D_{50} = median rock size, ft

$$D_{50} = 0.28 \left|\frac{6.60}{9.91}\right|^{(4/3)} \left|\frac{1.25}{0.50}\right| = 0.41 \text{ ft}$$

= **4.88 inches**

Table 1 : Riprap Classes and Apron Dimensions

Class	D_{50} (in)	Apron Length	Apron Depth	
1	**5**	**4D**	**$3.5D_{50}$**	**Use Class 1**
2	6	4D	$3.5D_{50}$	
3	10	5D	$3.3D_{50}$	
4	14	6D	$2.2D_{50}$	
5	20	7D	$2.0D_{50}$	
6	22	8D	$2.0D_{50}$	

Apron Dimensions

Length, L=5D = **6 ft**

Depth=3.3D_{50} = **16.50 Inches**

Width=3D+(2/3)L = **7.92 ft** (at apron end)

Riprap Rock Sizing Gradation

Given Size	Size of Stone, inches		
100	**8**	to	**10**
85	**7**	to	**9**
50	**5**	to	**8**
15	**3**	to	**7**

Reference Note: Sizing based in accordance with HEC #14 as required by MassHighway Design Manual

OUTLET PROTECTION SIZING

BSC GROUP

Project No. 83669.00
Subject Outlet Protection Sizing Calcs
Location Arlington, MA

Calc By EAD
Date 11/2/2020
Checked by DRR
Date 11/3/2020

FES-2

Q=Design Discharge, (ft^3/s) = 2.1 cfs
D=Culvert Diameter, (ft) = 1.00 ft
TW=Tailwater Depth, (ft) = 0.4 ft, (0.4xD for unknow tailwater, or enter known tailwater)
(Tailwater depth is to be limited to between 0.4D and 1.0D)

Riprap Rock Sizing

$$D_{50}= 0.2D\left[\frac{Q}{\sqrt{g}D^{2.5}}\right]^{4/3}\left[\frac{D}{TW}\right]$$

g=32.2 fps
D_{50} = median rock size, ft

$$D_{50}= 0.28\left|\frac{2.10}{5.67}\right|^{(4/3)}\left|\frac{1.00}{0.40}\right| = 0.19 \text{ ft}$$

= **2.23 inches**

Table 1 : Riprap Classes and Apron Dimensions

Class	D_{50} (in)	Apron Length	Apron Depth	
1	**5**	**4D**	**3.5D_{50}**	**Use Class 1**
2	6	4D	3.5D_{50}	
3	10	5D	3.3D_{50}	
4	14	6D	2.2D_{50}	
5	20	7D	2.0D_{50}	
6	22	8D	2.0D_{50}	

Apron Dimensions

Length, L=5D = **5 ft**
Depth=3.3D_{50} = **16.50 Inches**
Width=3D+(2/3)L = **6.33 ft** (at apron end)

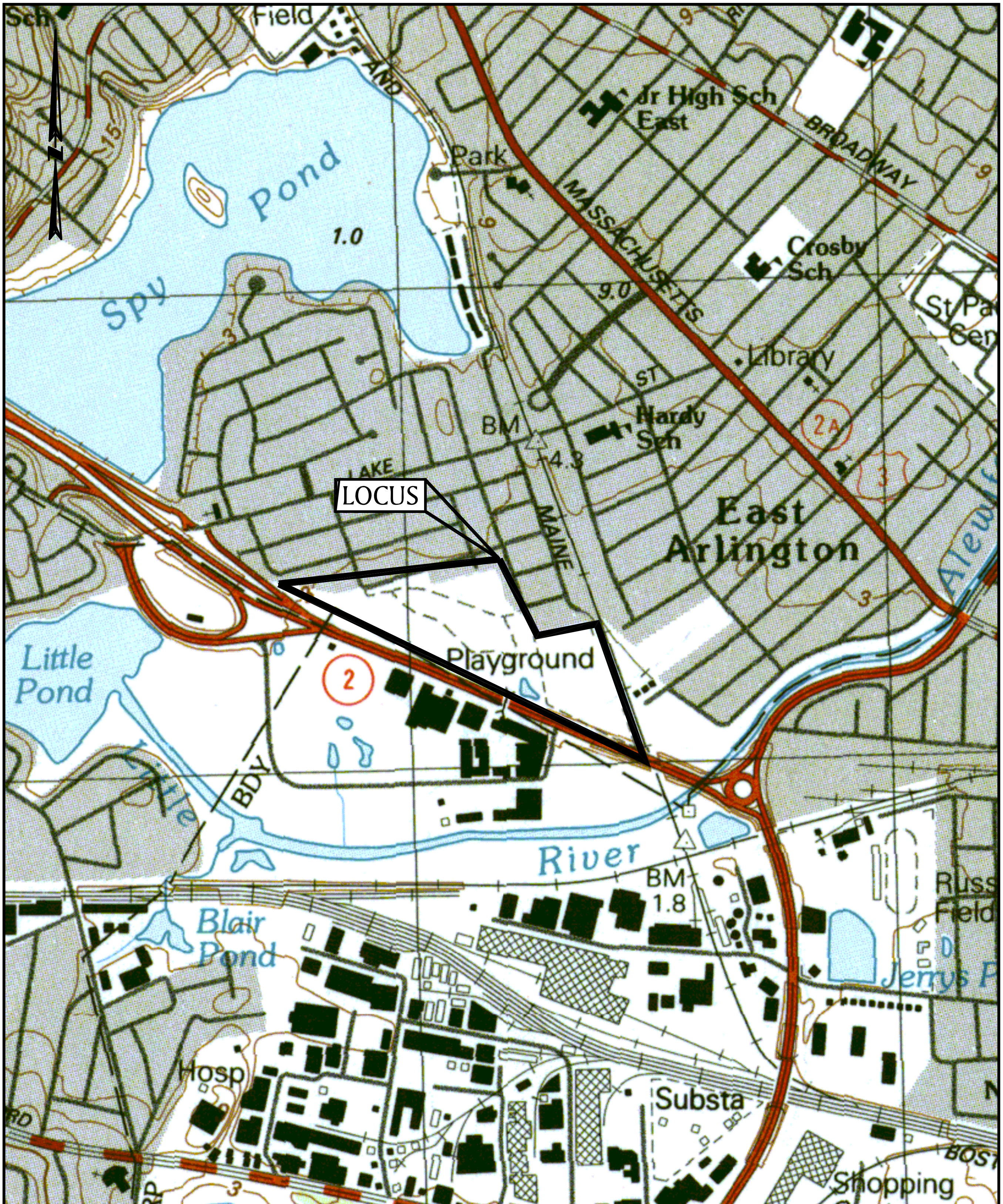
Riprap Rock Sizing Gradation

Given Size	Size of Stone, inches		
100	**8**	to	**10**
85	**7**	to	**9**
50	**5**	to	**8**
15	**3**	to	**7**

Reference Note: Sizing based in accordance with HEC #14 as required by MassHighway Design Manual

APPENDIX A

USGS LOCUS MAP



PREPARED FOR:

ARLINGTON LAND REALTY, LLC
84 SHERMAN ST, 2ND FLOOR
CAMBRIDGE, MA 02140

USGS LOCUS MAP

THORNDIKE PLACE
DOROTHY ROAD
ARLINGTON, MA

BSC GROUP
803 Summer Street
Boston, Massachusetts
02127
617 896 4300

Job No.: 23407.00
Date: 11/3/2020
Scale: 1"=1,000'
Revised:
Dwg. No:
Figure: 1 OF 1

File: 2340700\C\Drainage\2340700-EX WATERSHED

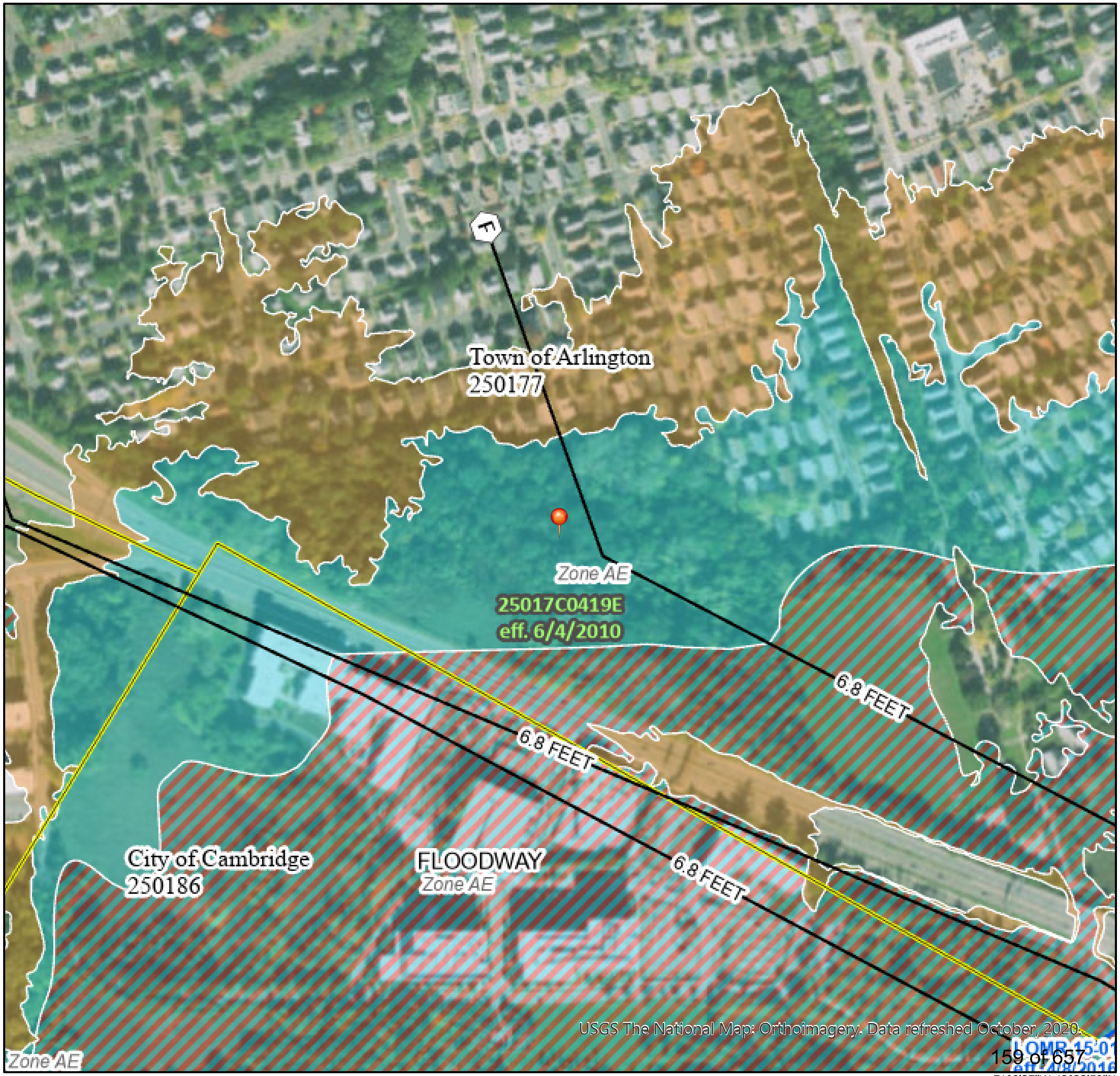
APPENDIX B

FEMA MAP

National Flood Hazard Layer FIRMette

FEMA

71°9'15"W 42°24'17"N



71°8'37"W 42°23'50"N

Feet
0 250 500 1,000 1,500 2,000

1:6,000

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN — Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- B 20.2 / 17.5 — Cross Sections with 1% Annual Chance Water Surface Elevation
- 8 — Coastal Transect
- 513 — Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 11/2/2020 at 3:34 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

APPENDIX C

WEB SOIL SURVEY

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for

Middlesex County, Massachusetts

November 2, 2020

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Soil Map

Map Scale: 1:4,500 if printed on A landscape (11" x 8.5") sheet.

Meters: 0, 50, 100, 200, 300

Feet: 0, 200, 400, 800, 1200

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 19N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:25,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Middlesex County, Massachusetts
Survey Area Data: Version 20, Jun 9, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Sep 11, 2019—Oct 5, 2019

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
51A	Swansea muck, 0 to 1 percent slopes	4.3	4.6%
52A	Freetown muck, 0 to 1 percent slopes	10.4	11.2%
603	Urban land, wet substratum	32.1	34.5%
626B	Merrimac-Urban land complex, 0 to 8 percent slopes	14.3	15.4%
655	Udorthents, wet substratum	31.9	34.3%
Totals for Area of Interest		**92.9**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Middlesex County, Massachusetts

51A—Swansea muck, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: 2trl2
Elevation: 0 to 1,140 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Swansea and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Swansea

Setting

Landform: Swamps, bogs
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Highly decomposed organic material over loose sandy and gravelly glaciofluvial deposits

Typical profile

Oa1 - 0 to 24 inches: muck
Oa2 - 24 to 34 inches: muck
Cg - 34 to 79 inches: coarse sand

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: Rare
Frequency of ponding: Frequent
Available water capacity: Very high (about 16.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8w
Hydrologic Soil Group: B/D
Ecological site: F144AY043MA - Acidic Organic Wetlands
Hydric soil rating: Yes

Minor Components

Freetown

Percent of map unit: 10 percent
Landform: Bogs, swamps

Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Whitman

Percent of map unit: 5 percent
Landform: Depressions, drainageways
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Scarboro

Percent of map unit: 5 percent
Landform: Drainageways, depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope, tread, dip
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

52A—Freetown muck, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: 2t2q9
Elevation: 0 to 1,110 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Freetown and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Freetown

Setting

Landform: Depressions, depressions, bogs, marshes, kettles, swamps
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Highly decomposed organic material

Typical profile

Oe - 0 to 2 inches: mucky peat
Oa - 2 to 79 inches: muck

Properties and qualities

Slope: 0 to 1 percent
Surface area covered with cobbles, stones or boulders: 0.0 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: Rare
Frequency of ponding: Frequent
Available water capacity: Very high (about 19.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 5w
Hydrologic Soil Group: B/D
Ecological site: F144AY043MA - Acidic Organic Wetlands
Hydric soil rating: Yes

Minor Components

Swansea

Percent of map unit: 5 percent
Landform: Kettles, depressions, depressions, marshes, swamps, bogs
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Scarboro

Percent of map unit: 5 percent
Landform: Depressions, drainageways
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope, tread, dip
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Whitman

Percent of map unit: 5 percent
Landform: Depressions, drainageways
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

603—Urban land, wet substratum

Map Unit Setting

National map unit symbol: 9951
Mean annual precipitation: 32 to 50 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 110 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition

Urban land: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Urban Land

Setting

Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Excavated and filled land over alluvium and/or marine deposits

Minor Components

Udorthents, loamy

Percent of map unit: 10 percent
Hydric soil rating: No

Rock outcrop

Percent of map unit: 5 percent
Landform: Ledges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Head slope
Down-slope shape: Concave
Across-slope shape: Concave

626B—Merrimac-Urban land complex, 0 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2tyr9
Elevation: 0 to 820 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F

Frost-free period: 140 to 250 days
Farmland classification: Not prime farmland

Map Unit Composition

Merrimac and similar soils: 45 percent
Urban land: 40 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Merrimac

Setting

Landform: Eskers, moraines, outwash terraces, outwash plains, kames
Landform position (two-dimensional): Backslope, footslope, summit, shoulder
Landform position (three-dimensional): Side slope, crest, riser, tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy glaciofluvial deposits derived from granite, schist, and gneiss over sandy and gravelly glaciofluvial deposits derived from granite, schist, and gneiss

Typical profile

Ap - 0 to 10 inches: fine sandy loam
Bw1 - 10 to 22 inches: fine sandy loam
Bw2 - 22 to 26 inches: stratified gravel to gravelly loamy sand
2C - 26 to 65 inches: stratified gravel to very gravelly sand

Properties and qualities

Slope: 0 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (1.42 to 99.90 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 2 percent
Maximum salinity: Nonsaline (0.0 to 1.4 mmhos/cm)
Sodium adsorption ratio, maximum: 1.0
Available water capacity: Low (about 4.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: A
Ecological site: F144AY022MA - Dry Outwash
Hydric soil rating: No

Description of Urban Land

Typical profile

M - 0 to 10 inches: cemented material

Properties and qualities

Slope: 0 to 8 percent
Depth to restrictive feature: 0 inches to manufactured layer

Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Available water capacity: Very low (about 0.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydrologic Soil Group: D
Hydric soil rating: Unranked

Minor Components

Windsor

Percent of map unit: 5 percent
Landform: Dunes, outwash terraces, deltas, outwash plains
Landform position (three-dimensional): Tread, riser
Down-slope shape: Convex, linear
Across-slope shape: Convex, linear
Hydric soil rating: No

Sudbury

Percent of map unit: 5 percent
Landform: Outwash plains, terraces, deltas
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Hinckley

Percent of map unit: 5 percent
Landform: Eskers, kames, deltas, outwash plains
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Nose slope, side slope, crest, head slope, rise
Down-slope shape: Convex
Across-slope shape: Convex, linear
Hydric soil rating: No

655—Udorthents, wet substratum

Map Unit Setting

National map unit symbol: vr1n
Elevation: 0 to 3,000 feet
Mean annual precipitation: 32 to 54 inches
Mean annual air temperature: 43 to 54 degrees F
Frost-free period: 110 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Udorthents, wet substratum, and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Udorthents, Wet Substratum

Setting

Parent material: Loamy alluvium and/or sandy glaciofluvial deposits and/or loamy glaciolacustrine deposits and/or loamy marine deposits and/or loamy basal till and/or loamy lodgment till

Properties and qualities

Slope: 0 to 8 percent
Depth to restrictive feature: More than 80 inches
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None

Minor Components

Urban land

Percent of map unit: 8 percent
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear
Across-slope shape: Linear

Freetown

Percent of map unit: 4 percent
Landform: Depressions, bogs
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Swansea

Percent of map unit: 3 percent
Landform: Bogs, depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

References

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

National Research Council. 1995. Wetlands: Characteristics and boundaries.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_054262

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service, U.S. Department of Agriculture Handbook 436. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053577

Soil Survey Staff. 2010. Keys to soil taxonomy. 11th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053580

Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.

United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.

United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053374

United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelprdb1043084

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053624

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052290.pdf

SMOLAK & VAUGHAN LLP
ATTORNEYS AT LAW

To: Arlington Zoning Board of Appeals

Fr: Stephanie Kiefer, Smolak & Vaughan, LLP

Date: November 3, 2020

Re: Thorndike Place, ZBA Docket No.

<u>Statement of Demonstration of Compliance with Arlington's Master Plan, Housing Production Plan, and Open Space and Recreation Plan</u>

This memorandum is submitted on behalf of Arlington Land Realty, LLC ("ALR") in further support of its proposed Comprehensive Permit Application pending before the Board. Within ALR's Comprehensive Permit Application, an initial statement was provided regarding the Applicant's proposal and its consistency with sustainable development principles, including the Project's consistency with the Arlington Master Plan and Housing Production Plan. *See* Application, Sections I.C and IV.G. As indicated in our September 25, 2020 Supplemental Response to Completeness Review Memo and in light of the recent project design change, as presented to the Board at its October 13 public hearing, we are pleased to provide this update, identifying the relevant provisions within Arlington's Master Plan, Housing Production Plan and Open Space and Recreation Plan and demonstrating the Project's furtherance of such goals set out in these municipal plans.

<u>CONSISTENCY WITH ARLINGTON'S MASTER PLAN</u>

The 2015 Master Plan establishes a number of Key Findings, Recommendations and Goals under topical categories of land use, traffic and circulation, housing, natural resources and open space, public facilities and services. Notably, the Thorndike Place 40B project is responsive to the Town's recommendations and otherwise advances a number of the very goals that the Town has identified within the Master Plan.

I. <u>ALR's Thorndike Place 40B Notably Advances Salient Affordable Housing Key Findings, Policies and Recommendations Described Within the Master Plan.</u>

As described in the Master Plan, Key Finding 8 succinctly states although Arlington has had some success in creating affordable housing (limited to 140 units from 2000-2015), "despite efforts by the Town, the HCA and the Arlington Housing Authority (AHA), **Arlington has lost some of its traditional affordability**." [Master Plan, p.8]. According to the Town's website, as of 2018, the percentage of Arlington's Subsidized Housing Inventory ("SHI") remains stagnant at 5.6%, well below the state 10% statutory goal. According to DHCD records, as of 2020, Arlington has 1,122 SHI units. The municipal website states that in the nearly two decade period (2000-2018), Arlington has increased its percent of affordable housing by only .1%.

- **Arlington Has Lost Some its Traditional Affordability [Finding 8, Master Plan, P.8]**

The Master Plan points out the need for housing all demographics, including families, elderly and households with low and or moderate incomes. "The US Census Bureau estimates that 32% of all households in Arlington spend more than 30 percent of their gross income on housing… *Moreover, half of Arlington's lower income homeowners are severely cost burdened, i.e., households that spend over 50 percent of their income on housing*…." [Master Plan, p.84 (emphasis supplied)]. The Master Plan also documents that 44% of Arlington renters have low or moderate incomes *and almost 80 percent are housing cost burdened*. " [*Id.* (emphasis supplied)]. Further, the Master Plan cautions that the rising housing costs in Arlington "make it more difficult to preserve the social mix that many people characterize as one of [Arlington's] strengths." [Master Plan., p.87].

In response to this serious deficit in affordable housing, the Thorndike Place 40B development will create 176 rental units available to families, individuals, seniors as well as individuals, including low or moderate income individuals, families and seniors. The creation of this multifamily housing project not only addresses the affordable housing need in Arlington, but it also provides greater housing choice to those individuals who either may be downsizing and/or unable to enter into the ownership housing market at this time. Moreover, 44 units at Thorndike Place will be set aside as permanently affordable to low and moderate income families. Because Thorndike Place is a 40B rental housing development, however, *all 176 units* will be counted towards Arlington's SHI unit count. The addition of 176 units will increase the amount of Arlington's SHI housing by close to one percent (i.e., approximately .85%). Upon certification of its Housing Production Plan, Arlington could then avail itself of a one year "safe harbor" under 760 CMR 56.03 for newly proposed 40B projects.

- **The Master Plan Identifies the Mugar Site As One of Two Possible Vacant Parcels Available to Address the Municipal Housing Need. [Master Plan, p.87].**

The Master Plan identifies "Issues and Opportunities" to address Arlington's affordable housing need. In particular, the Master Plan specifically notes that Arlington generally has a lack of vacant land available for new housing construction. [Master Plan, p.87]. The Master Plan identifies two possible undeveloped areas in the town as possible housing sites: a) the Mugar site and b) a 6.4 acre site abutting Poets' Corner. [*Id*.].[1]

As to the Mugar site, the Master Plan implicitly recognizes that under the existing zoning designation (Planned Unit Development), the site is appropriate for housing, but notes that a large portion of the property is within the flood zone. [Master Plan, p.88].

In response, the Thorndike Place proposed project, as revised, is notably consistent with the Master Plan's recognition of the Mugar site as an affordable housing site "opportunity." In fact, since the Housing Appeal's Committee's favorable ruling on the GLAM challenge, which returned the ALR 40B project to the ZBA for review, the Applicant's engineers at BSC Group have fully surveyed the property and located the current FEMA floodplain as it exists on the site.

[1] As to Poets' Corner site, the Master Plan recognizes that its higher value may be for non-residential development given its highway proximity.

While a large floodplain area does exist on the 17+ acre site, the north/northwesterly portion of the site is completely outside of the floodplain. The large size of the Mugar site allows for both goals of the creation of affordable housing and the protection of floodplain to coexist.

The revised project design mindfully reduces the total building footprint by: a) eliminating the 6 townhouse buildings along Dorothy Road; and b) reducing the footprint of the multifamily building and shifting it to the north and west, predominantly outside the floodplain. As revised, the multifamily building presents very limited impact within the floodplain, i.e., limited portions of the easterly side of the building in two shallow fingers of floodplain. While the Master Plan has noted the lack of vacant parcels to create housing, and has expressly identified the Mugar land as one such parcel, Applicant's revised 40B project plan demonstrates the ability to both make productive use of this site for housing purposes and to otherwise leave the majority of the site undeveloped.

- **Thorndike Place Advances Two of the Four Master Plan's Housing "Goals and Policies": (a) Creating Housing Variety for a Range of Incomes, Family Size and Needs and (b) Encouragement of Sustainable Construction.**

The Master Plan identifies four "Goals and Policies" with respect to housing:

1) Encourage mixed use development that includes affordable housing;
2) Provide a variety of housing options for a range of incomes, ages, family sizes and needs;
3) Preserve the "streetcar suburb" character; and
4) Encourage sustainable construction/renovation of new and existing structures.

[Master Plan. p.10].

In response, the Thorndike Place 40B project proposal advances two of the Master Plans' stated "Goals and Policies." The proposed project advances the municipal goal of providing a variety of housing options for various sectors of the population. Also, the proposed project will advance sustainable construction and development of the site, addressing multiple municipal goals of preserving valuable floodplain and responding to the long overdue need for affordable rental housing options in Arlington.

(i) <u>The Thorndike Place Project Provides A Variety Of Housing Options For A Range Of Incomes, Ages, Family Sizes And Needs. [Master Plan, p.10].</u>

Thorndike Place is proposed to consist of 176 rental units, consisting of a mix of studio, one-, two-, and three-bedroom units. The range of unit sizes will appeal to single adults, families as well as Arlington's aging population and/or empty nesters. The broad appeal of Thorndike Place is based not only on its full suite of unit sizes, but also its proximity to public transportation, to nearby shopping and to the Minuteman Bike Path and other outdoor recreation areas. The proximity to the Alewife MBTA Station allows for both working adults and retired adults an affordable housing option with nearby access to public transportation without undue reliance on automobiles. The Alewife Station serves the Red Line as well as a number of MBTA bus routes, including Route 62, Route 67, Route 76, Route 79, Route 84, Route 350 and Route

351. In addition, due to the proximity of the Minuteman Bike Path, the residents have multi-modal options, including walkable access, bicycles, subway and bus.

Consistent with 40B requirements, the Project will include 25% of the project (44 units) as available to low and moderate income residents. Because the development is a rental development, the Town will be able to include all 176 units as eligible SHI units. In practical terms, the increase in affordable housing units is greater than .5% of the total housing units and will allow the Town to have its HPP certified and to avail itself of a 40B "safe harbor" under 760 CMR 56.04(4)(f).

(ii) <u>Thorndike Place Encourages/Utilizes Sustainable Construction Practices</u>.

Consistent with the Master Plan's housing goal of encouraging sustainable construction, Thorndike Place promotes such a goal on multiple levels. First, Thorndike Place is sustainably planned and engineered. As stated previously, the majority of the 17+ acre site will remain open, undeveloped and will be restricted from development in the future by use of a conservation restriction or similar land conservation mechanism. Aside from the very important goal of increasing affordable housing stock and housing diversity in Arlington, the ability for the Town to secure a permanent protection for the majority of the Mugar site is significant.

Second, and with respect to the developed portion of the site, the Applicant has established a sustainable and low impact development. The revised project design keeps the amount of impervious surface largely limited to the building and the access drive and small surface parking area in the northwest corner. Further, the building construction will use modular GreenStaxx units. The modular design and building system reduces and/or repurposes construction waste, uses green materials and relies upon residential sustainable design standards (LEED) as the benchmark. Typical construction impacts are dramatically reduced through the use of the state-of-the-art modular system. Further, the proposed building proposes the use of blue roofs, i.e., water detention on the roof which decreases impacts in storm events and flooding risks. Rooftop water detention can also keep the building cooler in warmer months, reducing the need for air conditioning and thereby reducing electricity consumption.

- **Thorndike Place Builds Upon the Master Plan's Housing Recommendations That "Arlington Plan for Affordable Housing." [Master Plan, pp. 13, 88].**

Two of the Master Plan's "Key Recommendations" specifically address compliance with Chapter 40B and the need to increase affordable housing consistent with a Housing Production Plan. [Master Plan, Housing Recommendations 1 and 2, p.13]. Housing Recommendation 1 is to "create an affordable housing plan." [*Id.*]. Implicit in the creation of a housing plan, the municipality must effectuate the plan. As discussed below, Arlington had set a target of increasing affordable housing by roughly 100 units per year. Although in the years since its adoption, the Town has fallen far short of that goal, the Thorndike Place project notably advances the HPP's goal of creating affordable housing; giving the Town greater control to plan for future housing and allowing for the Town to reach a safe harbor milestone. Housing Recommendation 2 is that the Town allocate its resources to both meet local needs and the State's requirements under Chapter 40B. [*Id.*].

Page 88 of the Master Plan includes limited "recommendations" for the Town vis-a-via housing and residential development. The first of those recommendations is to "plan for affordable housing." Embedded within that recommendation of the 2015 Master Plan was for the Town to implement a Housing Production Plan ("HPP"). The following year, in late 2016, Arlington's HPP was approved by the DHCD. Notwithstanding the existence of the HPP, on a practical level, Arlington has made extremely limited progress in advancing the creation of affordable housing in the four years since the HPP was created and the Town remains well below the state threshold of 10% affordable housing. Arlington has only 5.6% affordable housing.

In response, the Thorndike Place project advances the Master Plan's recommendation that the Town plan for affordable housing, as it puts into effect the very goals of the HPP (discussed below). According to the DHCD's SHI inventory of Arlington's total 19,881 housing units, only 5.6% are SHI housing units. ALR's 40B project proposal will increase the number of SHI units by 176 units, which is more than the number of affordable units added by the town during the period from 2000-2014. Likewise, with 176 new SHI units, Arlington could seek certification of its HPP and upon such certification, avail itself of a one year "safe harbor" during which Arlington can focus upon other project sites it desires for inclusion of additional affordable housing.

- **The Town Should Study and Plan for Increasing the Supply of Over-55 Active Senior Market Rate housing and Affordable/Subsidized Housing to Meet Arlington's Population Trends.** [Master Plan, Housing Recommendation 5, p. 13].

In response, while Thorndike Place is not specifically targeted as an over-55 senior market rate housing and affordable housing development, the Project provides an attractive choice for the 55+ senior market, seeking either affordable housing and/or market rate housing. Thorndike Place provides a variety of unit sizes, studios, one-bedrooms, two-bedrooms and some three-bedrooms perfectly sized for empty-nesters and located within proximity to public transportation as well as an existing network of bike and walking paths (Minuteman Bike Path and Alewife Greenery Bike Path).

II. Master Plan Goals For Land Use Include Encouraging Development That Enhances the Quality of Arlington's Natural Resources and Build Environment. [Master Plan, p.29].

- **"Wherever possible, Arlington should seek to direct new development to existing assets, near transit in order to reduce auto dependency and near existing services and infrastructure." [Master Plan, p.37].**

In response, Thorndike Place is positioned to take advantage of existing assets, notably including the proximity to bus and subway service at nearby Alewife Station as well as the proximity to the Minuteman Bike Path. The ALR site is within .6 miles from the MBTA Alewife/Red Line Station. It is also within two-tenths of a mile from several fixed bus route stops (e.g. Bus lines #76, #62, #351, #67 and #84 and within four-tenths of a mile from bus stops for the #77, #79 and #350 bus lines. Bus line #78 is one half mile from the Site). The site is uniquely located near the Town's existing bike path and near a number of public transportation options to reduce auto dependency. The site is likewise conveniently located less than a mile from nearby shopping, restaurants and services at Alewife as well as to outdoor recreation (Alewife Brook Reservation, Minuteman Bike Path, Thorndike Field).

In addition to the Project's ability to take advantage of the existing multimodal transportation network, the Developer has proposed a project which reduces the area of land development to a single multifamily building and would provide for permanent protection for over 11 acres of lands that have been identified as a priority for preservation. [Master Plan, p.44]. The 40B project strikes the appropriate balance of addressing the municipality's pressing need for affordable rental housing together with the desire to preserve those portions of the site it deems to be valuable from a natural resources perspective.

III. <u>Arlington Master Plan Recommendations for Natural Resources and Open Space Include Pursuit of Strategies to Preserve Open Space and Manage Floodplains</u>.

- **The Town Should Continue Pursuit of Resolution of Mugar Land, Including Partial Development of the Land. [Master Plan, Natural Resources/Open Space Recommendation 3, p.144].**

The Master Plan details limited efforts over the past 20 years to protect, at least in part, the ALR property. The private land, while a priority for the Town in terms of protection, has also been identified as viable undeveloped land for residential housing [Master Plan, p.87]. As a pragmatic approach, the Master Plan recommends specifically for the Mugar site that the Town should continue to pursue resolution of the land, "either for partial development or open space protection." [Master Plan, p. 144, Natural Resources and Open Space Recommendation 3].

In response, the Thorndike Place 40B project advances both of the alternate recommendations set out in the Master Plan. Specifically, upland portions of the site would be developed for the multifamily housing and the balance of the property (more than 11 acres) would be set aside as permanently protected open space. The thoughtful balance to achieve both the property owner's rights to make use of a portion of its land and the ability to permanently protect open space for which the Town has long-sought to protect creates a win-win scenario.

The Thorndike Place 40B Project proposal directly provides a viable strategy to allow the municipality the ability to ensure that open spaces are preserved and floodplains managed The project is ideally located to allow the residents convenient access to the nearby Minuteman Bikeway as well as to the Alewife Brook Reservation, Thorndike Field and the Alewife MTBA Station, all of which are easily accessible by foot or bike. The proposed project also limits the project size and allows for the overwhelming majority of the site to be preserved as open space. As recommended by the Master Plan, the partial development of the site allows the property owner the ability to make use of its land while also preserving the more environmentally sensitive lands in perpetuity

- **The Master Plan's Recommendation for Sustainable Planning and Engineering Approaches is Reflected in ALR's 40B Proposed Affordable Housing. [Master Plan, p. 144, Natural Resources and Open Space Recommendation 5]**

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In response, the revised project design for Thorndike Place is premised upon minimizing impact to natural resource areas, such as floodplain and wetlands buffer, and providing quality housing that relies upon a minimal development footprint. The proposed density of Thorndike Place is such that less than a third of the total land area will be developed and the remaining two-thirds can remain as protected open space. Aside from the very important goal of increasing affordable housing stock and housing diversity in Arlington, the ability for the Town to secure a permanent protection for the majority of the Mugar site is significant.

With respect to the developed portion of the site, the amount of impervious surface is largely limited to the building and the access drive and small surface parking area. Plantings to the rear of the developed portion of the site will be vegetated with native vegetation to provide an aesthetically pleasing transition to the wetland resource area and buffer thereto in the southern portion of the site. The building construction will use modular GreenStaxx units. The modular design and building system reduces and/or repurposes construction waste, uses green materials and relies upon residential sustainable design standards as the benchmark. Typical construction impacts are dramatically reduced through the use of the state-of-the art modular system. Further, the proposed building proposes the use of blue roofing, i.e., water detention on the roof which decreases impacts in storm events and flooding risks. Blue roof design can also keep the building cooler in warmer months, reducing the need for air conditioning and thereby reducing electricity consumption.

- **The Master Plan's Recommendation 7 for Natural Resources and Open Space Suggests the Town Consider Measures to Encourage Development Projects That Respect and Enhance Adjacent Open Space and Natural Areas. [Master Plan, p.145].**

The Master Plan recognizes that recent development projects, such as the former Symmes hospital site, resulted in protection of woodlands and new public parks, demonstrating that economic development "can go hand in hand with natural resource protections." [Master Plan, p.145.]

In response, ALR's Thorndike Place similarly presents an ability for creation of affordable housing on a portion of the ALR site, with the balance of the site to be protected in perpetuity consistent with the recommendation of encouraging development that respects and enhances adjacent open spaces. Once again, the Master Plan recognizes that achievement of its multiple objectives are not exclusive of one another. The Thorndike Place proposal similarly is designed to achieve smart housing, that is transit-oriented, available to tenants of varying economic levels, ages and needs and to also provide the much-desired permanent protection on the majority of the ALR property. The Applicant's proposal advances the Town's recognized principle that development and natural resource protection can go hand in hand.

CONSISTENCY WITH ARLINGTON'S HOUSING PRODUCTION PLAN

In late 2016, the Town of Arlington received approval on its Housing Production Plan (HPP) from the Department of Housing and Community Development (DHCD), as effective October 6, 2016[2]. Despite its adoption of the HPP, since 2016 the Town has not notably advanced affordable housing production in accordance with the HPP's announced objectives[3].

As stated in Table 16 of the HPP, Arlington's Affordable Housing Production Goals involve an additional 100 SHI state-certified units for each year from 2016-2021. At the time of the adoption of the HPP, Arlington SHI inventory was 1,121 units (5.64%). As noted on the Town's website, the Town's affordable housing stock currently represents 5.6% of total housing units.

Within the HPP's comprehensive needs assessment, the Town found that:

a) More than one out of every four households in Arlington (25%) have low incomes (Executive Summary, p.5[4]);
b) Very few rental units on the market are available to lower income households (Executive Summary, p.6); and
c) A need for updated housing as one out of every two homes in Arlington was constructed prior to 1939 (Executive Summary, p.6). As noted, such older homes lack heat and energy efficiency, may not be in compliance with current health, safety and building codes, and may otherwise contained lead based paint or other environmental hazards. Id.

Likewise, the need for apartment housing was also highlighted; in the period from 2000-2014, the Town of Arlington experienced approximately 1,460 rental unit conversions to condominiums, thereby depleting the supply of rental housing. Id.

Arlington's HPP sets out the very serious nature of its affordable housing need. Between the period of 1997 to 2016, the amount of affordable housing had only increased 1.21% (from 4.43% to 5.64%). The majority of the increase appears to have occurred between 1997 and 2000; according to the Town's website, in the period from 2000-2014, affordable housing only increased by .1%. Likewise, since the DHCD's approval of Arlington's HPP, there has been notably little progress in increasing the supply of affordable housing in Arlington.

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[2] The HPP postdates the Applicant's Comprehensive Permit Application.
[3] In fact, the Town may have decreased the number of affordable units since the time of ALR's 40B Application filed on September 1, 2016.
[4] As described within the Affordable Housing "Key Findings", at Page 31 of the HPP, the percentage of low income households is even higher, noting that one-third of Arlington households are low income, with rates especially high among elderly unrelated households. The same "Key Findings" concludes that more than one-third of all households are "cost burdened," meaning that those households pay more than 30% of annual income toward housing.

The HPP identifies the following housing "priorities" over the five years (2016-2021):

- *Expand housing supply* – the tight housing market/demand for housing results in increases in rents and sale prices, further adversely impacting low to moderate income persons. [HPP, p.56]. According to MAPC projections through 2020, several hundred additional units could be added to the housing supply to meet demand/prevent inflated sales/rental prices. *Id.*
- *Diversify the housing supply* – The senior housing population is expected to grow, requiring housing that is in proximity to services, physically accessible and convenient to needs. [HPP . 56]. According to the HPP, while the number of affordable units is slightly over 1,000 units, there are more than 5,000 potentially eligible households, many of which are elderly. *Id*. Smaller households and senior households need smaller units so they are not over-housed, which in turn creates maintenance and cost challenges. *Id*. Also, more than one-third of Arlington households are cost burdened, indicating the need for more housing at multiple price points. *Id*.
- *Update Existing Housing Stock* – one out of every two units were constructed prior to 1939. [HPP, p.56]. Of the rental housing, from 2000-2014, 1,460 rental units were converted to condominiums, resulting in a deficit of rental units and driving up of prices for rental units. *Id*.

In response, the Thorndike Place's Multifamily Housing proposal affirmatively addresses Arlington's prioritized needs as described within the HPP.

a) Thorndike Place will expand housing supply: the total project is 176 units of which 25% (44 units) will remain in perpetuity for lease to low to moderate income households.[5] As part of the 40B requirements, a fair housing and marketing plan will be in place and eligible tenants are required to confirm their income eligibility on an annual basis. The monitoring of affordability likewise addresses another issue described in the Master Plan, i.e., that there is "mismatch" in existing housing whereby persons with higher incomes are living in housing that is affordable to low and moderate income persons. Here, the programmatic controls required by a 40B project, ensure that the affordable units are inhabited by persons with the qualifying income (80% AMI).
b) Thorndike Place will diversify the housing stock. Based on the findings of the HPP, there is a very real need for i) rental housing; ii) senior housing/empty nester housing; iii) transit-oriented housing. ALR's 40B project directly responds to each of these current shortcomings in Arlington housing supply. The proposed building is considered mid-rise (3-4 floors), and has elevator access, making it an ideal housing choice for older or mobility impaired residents. The older rental housing stock in Arlington largely prevents seniors from living in anything other than a ground floor unit. Also, while it is expected that the residents will rely on public transportation for most purposes, to the extent that residents will use cars, the majority of the parking is

[5] Arlington's HPP notes that of its affordable housing units, 254 (slightly less than 20% of current affordable housing) could expire by 2059 (and some much sooner). HPP, p.65.

in below-ground parking, which ensures that older residents can access their vehicles in winter months without walking distances across icy surfaces and /or have cars needlessly idling for long period to melt snow on windows.

c) Unlike the older housing stock (which is stated to represent more than ½ of the housing), Thorndike Place will be constructed with weather-tight construction, energy efficient appliances and finishes, safe interior finishes (i.e., no asbestos), and with thoughtful amenities, such as internal bike parking, outdoor community grilling and terrace space, onsite management and a community room.

The Thorndike Place 40B project will advance not only the amount of affordable and market rate rental housing options in Arlington, by 176 units, but it will also provide Arlington with recent progress toward meeting its HPP's affordable housing goals and therefore allow it to avail itself of a safe harbor under Chapter 40B in the immediate future. While the Town has adopted an HPP, the Town has not over the past four (4) years advanced its goals and objectives. Because the Thorndike Project is a rental development, the entire unit count (176 units) will be counted as SHI units. Once certified by DHCD, the Town will be able to avail itself of the safe harbor under 40B.

HPP Goal 1 – Produce More, Diverse Housing to Address Documented Local Need. [HPP, p.57]

.

Response: With respect to certain goals set out in the HPP, the Town's first identified goal is for Arlington to "produce more, diverse housing for extremely-low to middle income households. The Table 16 affordable housing goals propose an annual increase of 100 units for each year until 2021. Within the HAC litigation, the Town reported only 1,061 SHI units in 2018, which would mean a decrease of affordable units from 2016. Assuming the Town's representations to have been correct, Arlington is well below its annual production goals. Under the HPP, Arlington should have 1,525 SHI housing units by 2020.

Unlike a series of small, two to four-unit rental projects, the Thorndike Place proposal not only would provide 176 eligible SHI units for the Town to make progress on the statutory 10% affordable housing goal, but it also directly provides for the type of diversity in housing that is sought by the Town. Thorndike Place presents an opportunity for seniors, smaller families, single-member households and low to moderate income as well as mixed income individuals and families to reside with close proximity to public transportation, services, amenities and to remain connected to other Arlington's neighborhoods via the bike path.

HPP Goal 3 – Integrate Affordable Units In a Broader Range of Housing Types Into the Fabric of Arlington's Existing Neighborhoods Through Redevelopment of Certain Underutilized Properties and Reuse of Existing Buildings. [HPP. p.58].

The HPP notes that mixed income development should not be confined to commercial centers, but should also be distributed throughout town to support socioeconomic diversity of Arlington's neighborhoods.

Response: Thorndike Place presents a unique opportunity to create such desired socioeconomic diversity in East Arlington, in a traditionally residential neighborhood. While the proposal does not seek to reuse existing buildings, ALR's proposal will breathe life into land that, while possessing some natural resource value, has been misused and underused over the years. By developing a portion of the site for a dynamic multifamily development, affordable units will be integrated into this neighborhood as well as the Thorndike Place community. As the number of affordable units (44) within the project will remain a constant, all units will be developed to the same standards and there is no artificial distinction between housing quality for the various socioeconomic residents. Similarly, the proposal to incorporate open space restrictions on the undeveloped areas of the property will cement the status of that portion of the property as protected open space.

HPP Goal 4 – Foster an Aging Supporting Community Via Housing Choices That Enable Older Adults to Thrive in Arlington as They Age.

Response: Thorndike Place provides Arlington's senior population a choice of living accommodations to be responsive to smaller household size. Given the proximity of public transport (subway and bus), services and amenities are easily accessible without reliance on driving. Long-term Arlington residents can remain members of the community, without staying in a home that has outgrown the seniors' living needs and/or income.

In summary, Arlington's HPP was intended to address the outstanding needs of the community concerning housing supply and demand, the lack of housing options for persons, especially those who are income burdened and the need to prevent a decline in Arlington's historic tradition of being a diverse community and open to all socioeconomic parts of society. Thorndike Place addresses those very needs and provides rental housing options that, to date, have been largely lacking in Arlington.

CONSISTENCY WITH ARLINGTON'S OPEN SPACE AND RECREATION PLAN (2015-2022)

Arlington's open spaces and recreational facilities are set out in the Open Space and Recreation Plan ("OSRP").[OSRP, p.72]. The OSRP recognizes that since 2007, the "most significant changes" in open space acreage since 2007 have arisen in relation to the protections on privately held lands: the former Symmes Hospital site and Elizabeth Island. *Id*. At Symmes, 8.5 acres of the 18-acre site are protected as park and/or woodland under conservation restrictions; the land is owned by the development company[6].

While the Mugar Site is identified within the OSRP as an "Open Space and Recreational Facility," the property is not currently owned by the Town, nor does the Town hold any conservation restriction on the property. [*See* OSRP, p.72]. The OSRP also notes that the Town

[6] Within that proposal, the developer obtained approval for 164 rental units and 12 condominiums (Arlington 360). Despite the number of allowable units, the Town only obtained 26 affordable units and less than half of the site was protected. The 2-acre Elizabeth Island is protected and owned by the Arlington Land Trust.

has not been able to identify a viable path to preserve any portion of the Mugar site, including a prior town vote to acquire the land. OSRP, p. 89].

THE THORNDIKE PLACE PROPOSAL ADVANCES OSRP GOALS. [OSRP, pp.122-123]

As stated within the OSRP's Goals and Objectives [OSRP, pp122-123], the first stated goal is to acquire ecologically valuable land or ensure protection through conservation restrictions or other means. ALR's 40B proposal includes protecting a portion of its lands via a conservation restriction or similar mechanism. The Town could achieve desired protection over the designated area without otherwise outright purchasing the land and instead, use municipal staff and funding resources to otherwise achieve OSRP goals and objectives.

The OSRP's third goal is to coordinate and strengthen local and regional planning and management of open spaces with various Town Departments. [OSRP, p.123]. Here too, the ZBA in working with ALR can forge a path to address Arlington's outstanding housing needs (affordable housing/diversity of housing choices/transit-oriented housing/low impact housing) while simultaneously advancing the Town's Open Space priorities. As noted, Arlington has sought a path for the protection of the floodplain and natural resources at the Mugar site for well over twenty years; the ALR 40B project responsibly identifies upland development and protection for the more sensitive areas of the site.

Response: ALR's Thorndike Place proposal provides a path to advance Arlington's desire to formalize protection on the majority of the site to ensure that the vast majority of wetland resource areas and floodplain on the site remain protected open space. Not only would such protections ensure that no future development on the protected lands occur, but it would also allow the Town to serve as a steward of such restricted area.

THE THORNDIKE PLACE PROPOSAL IS CONSISTENT WITH THE OSRP ACTION PLAN/OPEN SPACE AND RECREATIONAL PRIORITIES. [OSRP, pp.124-225].

The OSRP prioritizes protection of ecologically valuable land "such as the Mugar property… that could be lost as open space." [OSRP, p.124].

Response: While the Mugar property is casually referenced as ecologically valuable land, the real context is that the floodplain and wetland resource areas are desired for protection. The upland portions of the site, to the north and northwest of the site are not floodplain and instead are currently overgrown areas tucked adjacent to a densely developed residential area. That portion of the Mugar site to the north and northwest can be developed, as proposed by Applicant, to blend into the residential neighborhood. The majority of the site, to the east and southeast, abutting Route 2, can properly be protected. The Applicant, the Town and its community can work together toward a path to steward the undeveloped lands, as such stewardship models may exist with other protected areas, such as the private lands at the former Symmes Hospital.

BSC GROUP
Transportation ▪ Energy ▪ Land Development

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Boston, MA 02127

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Sent Via Email

November 3, 2020

Christian Klein, Chair
Arlington Zoning Board of Appeals
51 Grove Street
Arlington, MA 02476

RE: Thorndike Place
Supplemental Application Materials

Chairman Klein:

As identified in the Supplemental Response to Completeness Review Memo dated September 25, 2020, on behalf of the Applicant, BSC is submitting the following revised and supplemental Thorndike Place Comprehensive Permit application materials for review in advance of the next scheduled public hearing on November 24, 2020:

- Report on Existing Conditions (Section 3.2.6 of Arlington Comprehensive Permit Regulations)
- Architectural Drawings
  - 3D Perspective View (1 sheet)
  - Floor Plans (4 sheets) - Garage, Ground Floor, Typical 2nd/3rd, and 4th Floor
  - Exterior Elevations (3 sheets) showing all building sides with Material Legend and Type of Construction
  - Courtyard Section (1 sheet)
- Site Plans revised November 3, 2020 reflecting new building program presented at the October 13, 2020 public hearing
- Stormwater Report
- Wildlife Habitat and Vegetation Evaluation
- Updated waiver request list
- Statement of Compliance with Arlington's Master Plan, Housing Production Plan, and Open Space and Recreation Plan

Under separate cover, the Applicant is submitting the requested replenishment of the Peer Review Fees to Mary Musyznski, Department of Planning and Community Development as you have requested.

The above supplemental materials are provided in addition to the supplemental wetland delineation information provided on October 22, 2020 and as summarized below:

- Wetland Delineation Memorandum dated October 19, 2020
- MassDEP Bordering Vegetated Wetland Delineation Field Data Forms (5)
- Existing Environmental Resources Plan revised October 22, 2020

This information is also being transmitted electronically to the Conservation Commission and BETA Group. Please let us know if any hard copies are required. Our team is available to meet with BETA Group to present the supplemental materials. Please me call at 781-710-7280 or email me at jhession@bscgroup.com if you have any questions or require additional information.

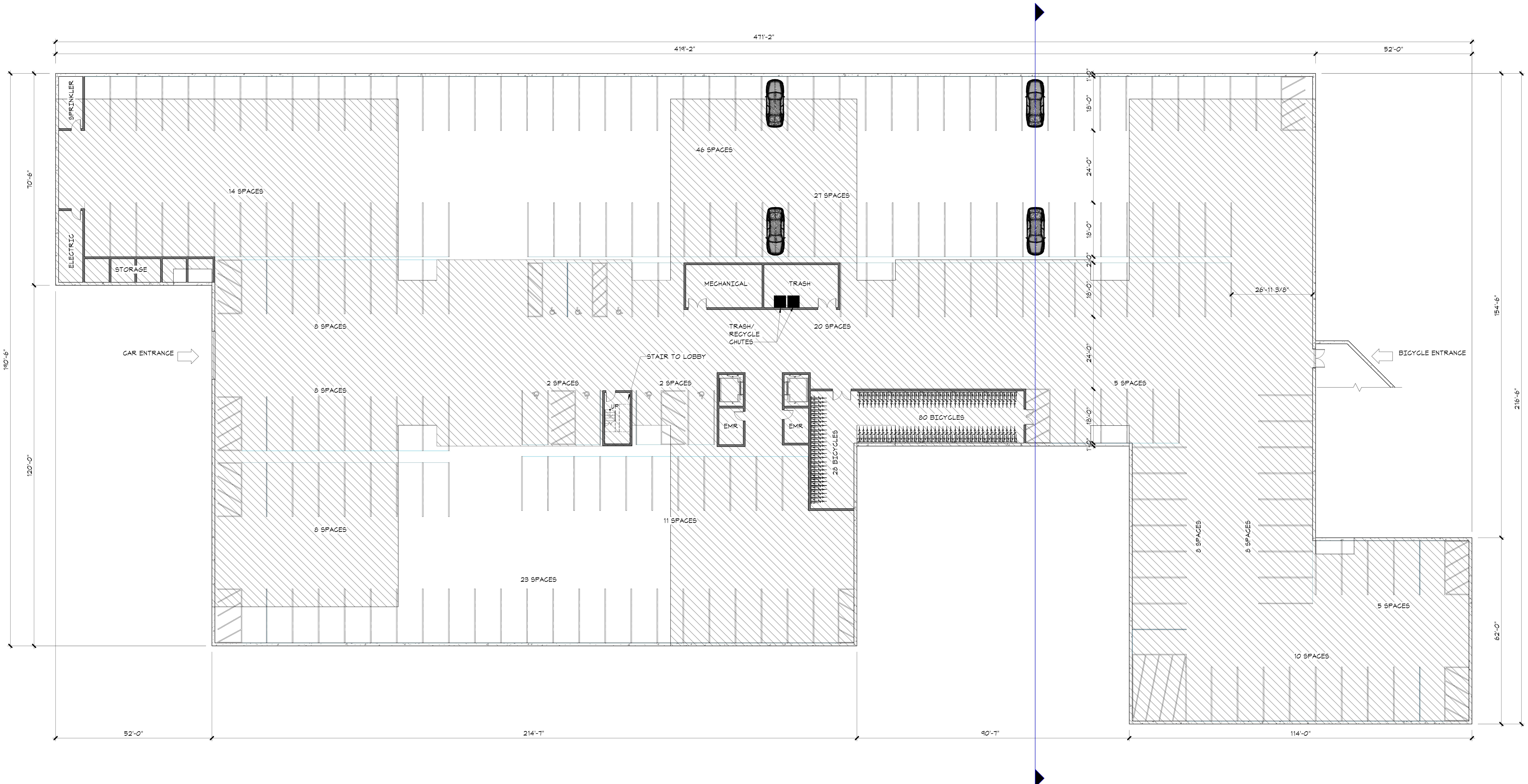
Very truly yours,

BSC Group, Inc.

John Hession, P.E.
Director of Land Development

cc: zba@town.arlington.ma.us
Richard Vallarelli, ZBA
Emily Sullivan, Conservation
Susan Chapnick, Conservation Commission
Jenny Raitt, Planning and Community Development
Marta Nover and Todd Undzis, BETA
Stephanie Kiefer, Smolak & Vaughan
Gwen Noyes and Arthur Klipfel, Arlington Land Realty


THORNDIKE APARTMENTS
3D VISUALIZATION
DOROTHY ROAD LOOKING WEST
NOVEMBER 3, 2020
green STAXX
Bruce
Ronayne
Hamilton
Architects



TOTAL: 205 SPACES
GARAGE: 72,428 SF

GARAGE PLAN

0 4' 8' 16'

THORNDIKE APARTMENTS

ARLINGTON, MA.

11/3/20

ARCHITECTURE
LAND PLANNING
INTERIOR DESIGN
3D VISUALIZATION

833 TURNPIKE ROAD P.O. BOX 104
NEW IPSWICH NEW HAMPSHIRE 03071

green STAXX

BRUCE RONAYNE HAMILTON ARCHITECTS

176 TOTAL UNITS
GROUND FLOOR: 51,497 SF

GROUND FLOOR PLAN

0 4' 8' 16'

green STAXX

THORNDIKE APARTMENTS

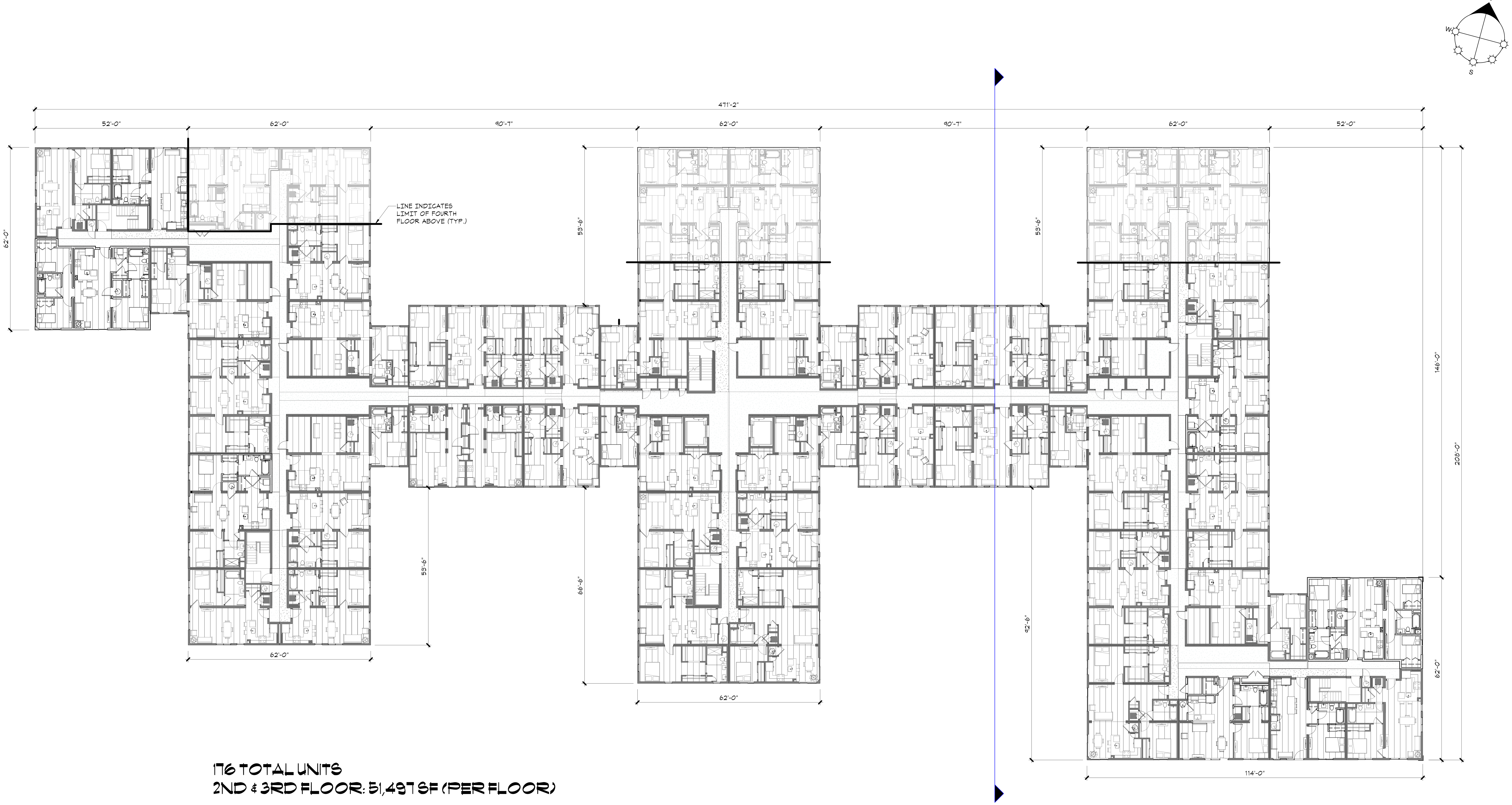
ARLINGTON, MA.

11/3/20

ARCHITECTURE
LAND PLANNING
INTERIOR DESIGN
3D VISUALIZATION

833 TURNPIKE ROAD P.O. BOX 104
NEW IPSWICH NEW HAMPSHIRE 03071

BRUCE RONAYNE HAMILTON ARCHITECTS



176 TOTAL UNITS
2ND & 3RD FLOOR: 51,497 SF (PER FLOOR)

TYPICAL FLOOR PLAN

0 4' 8' 16'

green STAXX

THORNDIKE APARTMENTS

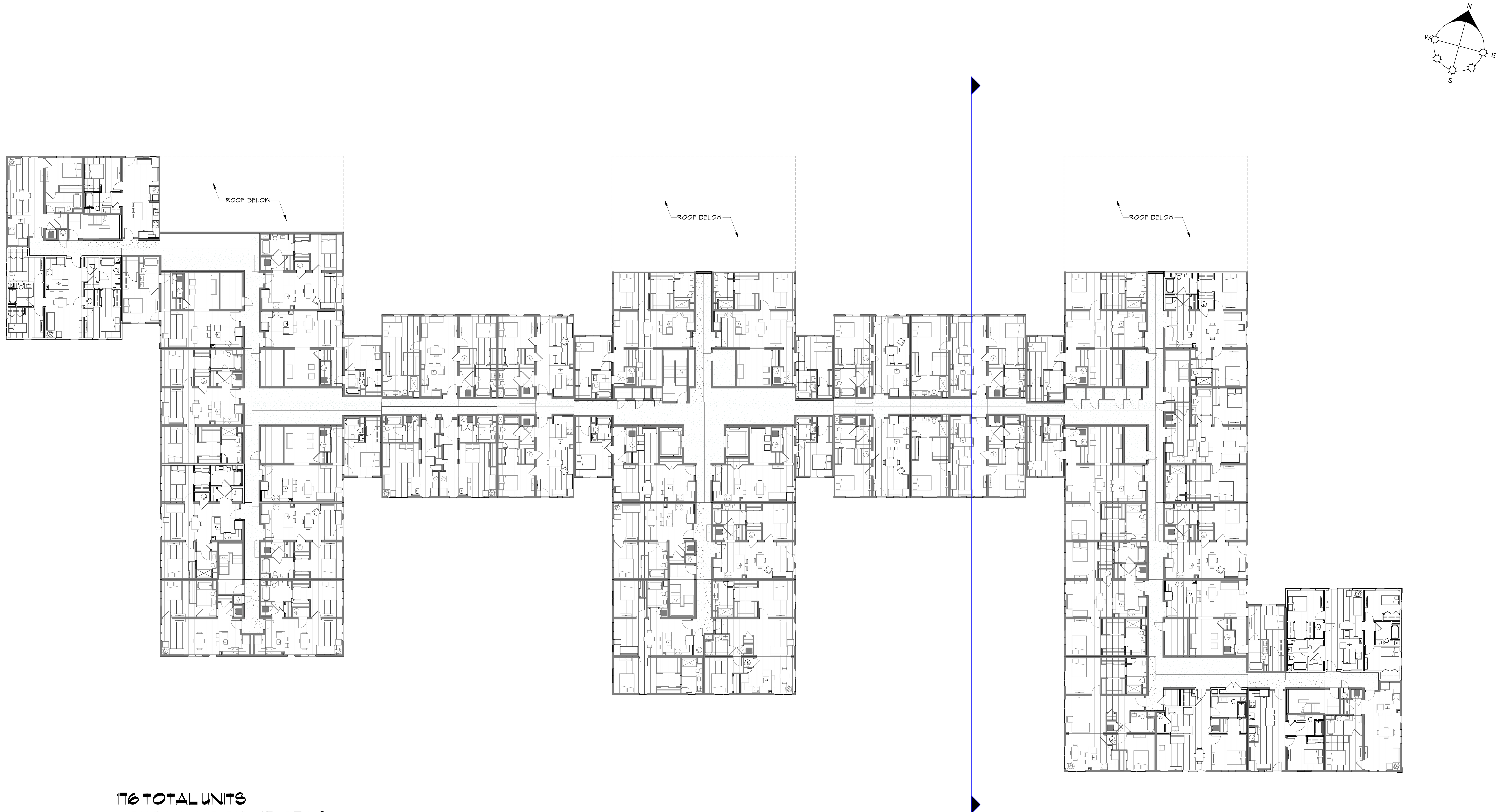
ARLINGTON, MA.

11/3/20

ARCHITECTURE
LAND PLANNING
INTERIOR DESIGN
3D VISUALIZATION

833 TURNPIKE ROAD P.O. BOX 104
NEW IPSWICH NEW HAMPSHIRE 03071

BRUCE RONAYNE HAMILTON ARCHITECTS



176 TOTAL UNITS
FOURTH FLOOR: 45,076 SF

FOURTH FLOOR PLAN

0 4' 8' 16'

THORNDIKE APARTMENTS

ARLINGTON, MA.

11/3/20

ARCHITECTURE
LAND PLANNING
INTERIOR DESIGN
3D VISUALIZATION
833 TURNPIKE ROAD P.O. BOX 104
NEW IPSWICH NEW HAMPSHIRE 03071

green STAXX

BRUCE RONAYNE HAMILTON ARCHITECTS

WEST ELEVATION

1/8" = 1'-0"

EAST ELEVATION

1/8" = 1'-0"

MATERIAL LEGEND

- A — CEMENTITIOUS HORIZONTAL SIDING, COLOR BY ARCHITECT
- B1 — CEMENTITIOUS PANEL ACCENT SIDING, COLOR BY ARCHITECT
- B2 — CEMENTITIOUS PANEL ACCENT SIDING, COLOR BY ARCHITECT
- B3 — HORIZONTAL ACCENT SIDING, COLOR BY ARCH
- B4 — PANEL JOINT
- C — COMPOSITE TRIMS, COLOR BY ARCHITECT
- D — INSULATED WINDOW & DOOR UNIT, WITH OPERABLE PANELS AS INDICATED
- E — JULIET BALCONY
- F — CONCRETE FOUNDATION WALL W/ PARGE COATING STUCCO FINISH, COLOR BY ARCHITECT
- G — VERTICAL BATTEN SIDING
- H — AWNING WITH CABLE ROD SUPPORTS
- J — ENTRANCE DOORS
- K — OVERHEAD DOOR

EAST / WEST ELEVATION

0 2' 4' 8'

NOTE: BUILDING CONSTRUCTION TYPE

1-STORY UNDERGROUND PARKING

PER IBC 2015, SECTION 510.2 "HORIZONTAL BUILDING SEPARATION ALLOWABLE", A BUILDING OF USE TYPE S-1(PARKING GARAGE PER) AND TYPE 1A CONSTRUCTION AND PROTECTED THROUGHOUT BY AN AUTOMATIC SPRINKLER SYSTEM AND SEPARATED FROM CONSTRUCTION ABOVE BY A HORIZONTAL ASSEMBLY WITH A 3 HOUR FIRE RESISTANCE RATING IS ALLOWED TO BE CONSIDERED A SEPARATE BUILDING.

4-STORY RESIDENTIAL APARTMENTS

PER IBC 2015, TABLE 504.4 "ALLOWABLE NUMBER OF STORIES ABOVE GRADE PLANE", A BUILDING OF USE TYPE R-2 AND TYPE 5A CONSTRUCTION AND PROTECTED THROUGHOUT BY AN AUTOMATIC SPRINKLER SYSTEM IS ALLOWED TO BE 4 STORIES.
PER TABLE 504.4 "ALLOWABLE NUMBER OF STORIES ABOVE GRADE PLANE", A BUILDING OF USE TYPE R-2 AND TYPE 5A CONSTRUCTION AND PROTECTED THROUGHOUT BY AN AUTOMATIC SPRINKLER SYSTEM IS ALLOWED TO BE 4 STORIES.

THORNDIKE APARTMENTS

ARLINGTON, MA.

11/3/20

ARCHITECTURE
LAND PLANNING
INTERIOR DESIGN
3D VISUALIZATION

REGISTERED ARCHITECT ARTHUR A. KLIPFEL BOSTON, MASS. No. 3032 COMMONWEALTH OF MASSACHUSETTS

green STAXX

BRUCE RONAYNE HAMILTON ARCHITECTS

833 TURNPIKE ROAD P.O. BOX 104
NEW IPSWICH NEW HAMPSHIRE 03071

NORTH ELEVATION - WEST END

1/8" = 1'-0"

NORTH ELEVATION - EAST END

1/8" = 1'-0"

MATERIAL LEGEND

A	CEMENTITIOUS HORIZONTAL SIDING, COLOR BY ARCHITECT	D	INSULATED WINDOW & DOOR UNIT, WITH OPERABLE PANELS AS INDICATED
B1	CEMENTITIOUS PANEL ACCENT SIDING, COLOR BY ARCHITECT	E	JULIET BALCONY
B2	CEMENTITIOUS PANEL ACCENT SIDING, COLOR BY ARCHITECT	F	CONCRETE FOUNDATION WALL W/ PARGE COATING STUCCO FINISH, COLOR BY ARCHITECT
B3	HORIZONTAL ACCENT SIDING, COLOR BY ARCH	G	VERTICAL BATTEN SIDING
B4	PANEL JOINT	H	AWNING WITH CABLE ROD SUPPORTS
C	COMPOSITE TRIMS, COLOR BY ARCHITECT	J	ENTRANCE DOORS
		K	OVERHEAD DOOR

NORTH ELEVATION

0 4' 8' 16'

NOTE: BUILDING CONSTRUCTION TYPE

1-STORY UNDERGROUND PARKING
PER IBC 2015, SECTION 510.2 "HORIZONTAL BUILDING SEPARATION ALLOWABLE", A BUILDING OF USE TYPE S-1(PARKING GARAGE PER) AND TYPE 1A CONSTRUCTION AND PROTECTED THROUGHOUT BY AN AUTOMATIC SPRINKLER SYSTEM AND SEPARATED FROM CONSTRUCTION ABOVE BY A HORIZONTAL ASSEMBLY WITH A 3 HOUR FIRE RESISTANCE RATING IS ALLOWED TO BE CONSIDERED A SEPARATE BUILDING.

4-STORY RESIDENTIAL APARTMENTS
PER IBC 2015, TABLE 504.4 "ALLOWABLE NUMBER OF STORIES ABOVE GRADE PLANE", A BUILDING OF USE TYPE R-2 AND TYPE 5A CONSTRUCTION AND PROTECTED THROUGHOUT BY AN AUTOMATIC SPRINKLER SYSTEM IS ALLOWED TO BE 4 STORIES.
PER TABLE 504.4 "ALLOWABLE NUMBER OF STORIES ABOVE GRADE PLANE", A BUILDING OF USE TYPE R-2 AND TYPE 5A CONSTRUCTION AND PROTECTED THROUGHOUT BY AN AUTOMATIC SPRINKLER SYSTEM IS ALLOWED TO BE 4 STORIES.

THORNDIKE APARTMENTS

ARLINGTON, MA.

11/3/20

ARCHITECTURE
LAND PLANNING
INTERIOR DESIGN
3D VISUALIZATION

REGISTERED ARCHITECT
ARTHUR A. KLIPFEL
BOSTON, MASS.
No. 3092
COMMONWEALTH OF MASSACHUSETTS

green STAXX

BRUCE RONAYNE HAMILTON ARCHITECTS

833 TURNPIKE ROAD P.O. BOX 104
NEW IPSWICH NEW HAMPSHIRE 03071

SOUTH ELEVATION - EAST END
1/8" = 1'-0"

SOUTH ELEVATION - WEST END
1/8" = 1'-0"

MATERIAL LEGEND

A	CEMENTITIOUS HORIZONTAL SIDING, COLOR BY ARCHITECT
B1	CEMENTITIOUS PANEL ACCENT SIDING, COLOR BY ARCHITECT
B2	CEMENTITIOUS PANEL ACCENT SIDING, COLOR BY ARCHITECT
B3	HORIZONTAL ACCENT SIDING, COLOR BY ARCH
B4	PANEL JOINT
C	COMPOSITE TRIMS, COLOR BY ARCHITECT
D	INSULATED WINDOW & DOOR UNIT, WITH OPERABLE PANELS AS INDICATED
E	JULIET BALCONY
F	CONCRETE FOUNDATION WALL W/ PARGE COATING STUCCO FINISH, COLOR BY ARCHITECT
G	VERTICAL BATTEN SIDING
H	AWNING WITH CABLE ROD SUPPORTS
J	ENTRANCE DOORS
K	OVERHEAD DOOR

SOUTH ELEVATION

0 2' 4' 8'

NOTE: BUILDING CONSTRUCTION TYPE

1-STORY UNDERGROUND PARKING
PER IBC 2015, SECTION 510.2 "HORIZONTAL BUILDING SEPARATION ALLOWABLE", A BUILDING OF USE TYPE S-1(PARKING GARAGE PER) AND TYPE 1A CONSTRUCTION AND PROTECTED THROUGHOUT BY AN AUTOMATIC SPRINKLER SYSTEM AND SEPARATED FROM CONSTRUCTION ABOVE BY A HORIZONTAL ASSEMBLY WITH A 3 HOUR FIRE RESISTANCE RATING IS ALLOWED TO BE CONSIDERED A SEPARATE BUILDING.

4-STORY RESIDENTIAL APARTMENTS
PER IBC 2015, TABLE 504.4 "ALLOWABLE NUMBER OF STORIES ABOVE GRADE PLANE", A BUILDING OF USE TYPE R-2 AND TYPE 5A CONSTRUCTION AND PROTECTED THROUGHOUT BY AN AUTOMATIC SPRINKLER SYSTEM IS ALLOWED TO BE 4 STORIES.
PER TABLE 504.4 "ALLOWABLE NUMBER OF STORIES ABOVE GRADE PLANE", A BUILDING OF USE TYPE R-2 AND TYPE 5A CONSTRUCTION AND PROTECTED THROUGHOUT BY AN AUTOMATIC SPRINKLER SYSTEM IS ALLOWED TO BE 4 STORIES.

THORNDIKE APARTMENTS

ARLINGTON, MA.

11/3/20

REGISTERED ARCHITECT
ARTHUR A. KLIPFEL
BOSTON, MASS.
No. 3092
COMMONWEALTH OF MASSACHUSETTS

ARCHITECTURE
LAND PLANNING
INTERIOR DESIGN
3D VISUALIZATION

green STAXX

BRUCE RONAYNE HAMILTON ARCHITECTS

833 TURNPIKE ROAD P.O. BOX 104
NEW IPSWICH NEW HAMPSHIRE 03071

SCHEMATIC BUILDING SECTION

0 2' 4' 8'

THORNDIKE APARTMENTS

ARLINGTON, MA.

11/3/20

ARCHITECTURE
LAND PLANNING
INTERIOR DESIGN
3D VISUALIZATION

833 TURNPIKE ROAD P.O. BOX 104
NEW IPSWICH NEW HAMPSHIRE 03071

green STAXX

BRUCE
RONAYNE
HAMILTON
ARCHITECTS

TOWN OF ARLINGTON

MASSACHUSETTS

CONSERVATION COMMISSION

November 20, 2020

Zoning Board of Appeals
Town of Arlington
730 Massachusetts Avenue
Arlington, MA 02474

RE: Thorndike Place – Application for Comprehensive Permit
Fourth Set of Comments from Conservation Commission
Applicant's November 2020 revised submittals & October 2020 Wetland Delineation

Dear Chairman Klein and Members of the Board:

The Arlington Conservation Commission (hereinafter "ACC") provides this fourth set of comments to the ZBA, this time addressing the information Arlington Land Realty LLC (the "Applicant") provided on October 22, 2020 (Wetland Delineation) and November 3, 2020 (revised submittals) in support of its Comprehensive Permit Application, filed with the Town on or about August 31, 2016 and supplemented in March 2020, September 2020, October 2020, and November 2020. The ACC provided initial comments to the ZBA on the Application by letter dated September 26, 2016, a second set of comments on July 9, 2020 based on the March 2020 submittals, and a third set of comments on October 9, 2020 based on the September 2020 submittals.

The ACC reviewed and comments here on the following documents provided by BSC Group (Applicant's engineer):

1. ZBA Transmittal - Wetland Delineation 2020-10-22.pdf
2. Thorndike Place Wetland Delineation Memo_REVISED_10-19-2020_gtd.pdf
3. Wetland Delineation Field Data Forms.pdf *(MassDEP Bordering Vegetated Wetland Forms)*
4. 2340700-CONSTRAINTS w Updated Wetlands.pdf *(Existing Environmental Resources Plan)*
5. ZBA Transmittal_Supplemental ApplicationMaterials 2020-11-03.pdf
6. Report on Existing Site Conditions_Nov.2020 (00176278xBC4F6).pdf
7. 2020-11-03 Stormwater Report.pdf
8. Compliance with OS-Master Plan Statement (00176275xBC4F6).pdf
9. WaiverList_Nov.2020.update (00176301xBC4F6).pdf
10. 2020-11-03 Thorndike Place Plan Set
11. Thorndike-Arc-Binder-sm (002).pdf *(Thorndike buildings & elevations, Nov. 2020)*
12. 06082020ZoningBoardofAppea.pdf *(Wildlife Habitat and Vegetation Evaluation, Nov. 2020)*

General Comments

The ACC is pleased that the supplemental materials are responsive to many of our prior comments, including the project now proposing a 2:1 compensatory flood storage ratio (creating 2 cubic feet of new flood storage for each cubic foot of flood storage lost), an important requirement of the ACC's wetland regulation to protect the ability of the 100-year floodplain to hold flood waters.

The ACC's prior comments concerning the value of the wetland resources, vegetation replacement, floodplain, and stormwater impacts are not reiterated herein and are still valid.

Issue #1. Wetlands Delineation

BSC performed an updated Wetland Delineation in October 2020 and provided the required supporting MassDEP field forms as requested by the ACC.

- The BSC Group provided the updated Wetland Delineation and supporting field forms (dated October 15, 2020) for the site that now will enable BETA Group to review the delineations.
- Existing Environmental Resources Plan Sheet C-100 shows the BSC Wetland Delineation.
- The two isolated wetlands previously shown on site plans have been eliminated based on the October 2020 wetland delineation.

<u>Recommended Action</u>:

ACC understands that BETA Group has performed a review of BSC's wetland boundary delineations and will advise on whether it agrees with this updated delineation.

Issue #2. Floodplain & Compensatory Flood Storage

BSC provided floodplain delineations and flood plain storage information requested by the ACC:

- The 100-yr floodplain is identified as elevation 6.8 as depicted on Existing Conditions and Existing Environmental Resources Plans (Sheets V-100 and C-100). The Applicant uses this elevation to delineate the wetland resource area called Bordering Land Subject to Flooding.

- Compensatory storage is proposed 2:1 at two elevations.

- Proposed compensatory flood storage location is in the north central portion of site, east of the proposed buildings and play ground, and outside of the mapped 100-year floodplain as depicted on Sheet C-101 & C-105. BSC materials (the Wildlife Habitat evaluation) also indicated that an alternative compensatory storage location at the site of the existing homeless encampment was considered.

- Proposed plantings or restoration of the compensatory flood storage location after it is created is not discussed in proposal – only grading of area discussed.

Other Considerations:

- The Climate Ready Boston project and the City of Cambridge's Climate Change Vulnerability Assessment (CCVA Report) assess projected flooding in the Mystic River Basin. Their studies and models point to changes in flood magnitude and frequency in the years 2050 or 2070 and beyond. These studies evaluate sea level rise and storm surges and project that larger storm surges will increase the likelihood that the Amelia Earhart Dam will be overtopped or circumvented, reversing the flow of water in the Mystic Basin and preventing freshwater from advancing downstream, thus increasing the flooding vulnerability of upstream communities. The increased vulnerability of the area surrounding Alewife Brook should be considered as part of the impact analysis on the natural and built environment required under the ZBA regulations, given the large size of the building footprint and the loss of open space/buffer resulting from development.

<u>Recommended Actions</u>:

1. ACC recommends that BETA Group verify flood storage volume lost and compensatory flood storage proposed.
2. ACC recommends that the Applicant address why the alternative location for the Compensatory Flood Storage area in the area of the current homeless encampment is not preferable (or also used to supplement flood storage). As documented in the Wildlife Habitat Evaluation, it is less suitable for wildlife habitat.
3. ACC recommends that BETA Group evaluate the efficacy of the proposed compensatory flood storage location (s) to act as flood mitigation into the future, taking into consideration potential climate change impacts as required by the Comprehensive Permit under ZBA.
4. ACC recommends that the ZBA require the Applicant to provide a floodplain restoration plan for the proposed compensatory flood storage area of the site to mitigate for the negative environmental impacts of the vegetation removal and grading to create the compensatory flood storage area.
5. ACC recommends that BETA Group consider climate change impacts, in concert with BSC and in consideration of data available for Arlington in the Massachusetts Coastal Flood Risk Model (MC-FRM, communication from Woods Hole Group) and information generated by Cambridge's Climate Change Vulnerability Assessment to propose even more robust mitigation for building in the floodplain or immediately adjacent to it, considering that the base flood elevation/extent of flooding in the area is projected to rise in the coming decades.

Issue #3. Stormwater Management

BSC provided a Stormwater Report that includes results of computer modeling using HydroCAD software as requested by the ACC.

- An infiltration unit for groundwater recharge is provided, located beneath surface parking area at west of building. Indicates no loss of annual recharge. A second infiltration unit is also proposed near the building area.

- The infiltration system has been designed with a bottom elevation of 5.0 feet to provide a minimum 2-foot elevation above the groundwater table. BSC's report also indicates that the estimated groundwater elevation is based on soil investigations by others.
- Porous walkways are proposed instead of traditional impervious walkways.
- Total Suspended Solids or "TSS" removal is calculated to be greater than 80% by using deep sump catch basins, hydrodynamic separator, and an underground infiltration system.
- Watershed modeling performed using HydroCAD Stormwater software – tables of peak flow discharge rates provided for 2, 10, 25, 50, and 100-year, 24-hour storm events. Post-development conditions indicate no increase to peak runoff rates.
- The source of the precipitation data used in the HydroCAD Stormwater software to calculate stormwater flows is not stated.

Other Considerations:

- There are ongoing efforts by MassDEP to update/align the Wetland Protection Act Stormwater requirements and Stormwater Management Handbook to align these with the MS4 requirements. MassDEP is now recommending TSS removal of 90% for new development.
- Whereas ACC previously recommended that the stormwater analysis use NOAA Atlas 14, ACC has since been further informed by ongoing efforts of MassDEP to update/align the Wetland Protection Act stormwater requirements and Stormwater Management Handbook to align these with the 2016 EPA Municipal Separate Storm Sewer System (MS4) requirements, to which Arlington must adhere. MassDEP is now recommending that NOAA + (NOAA Plus) for precipitation values be used. Others are recommending NOAA++. The rainfall data presented in BSC Stormwater report are lower than the NOAA+ and NOAA++ data for Dorothy Road, Arlington, MA as projected by *NOAA Atlas 14 Point Precipitation Frequency Estimates* at: https://hdsc.nws.noaa.gov/hdsc/pfds/pfds_map_cont.html?bkmrk=ma

Recommended Actions:

ACC understands that BETA Group is reviewing the efficacy of the stormwater management design presented by BSC. Based on the results of BETA Group's evaluation, the following recommended actions are relevant to consider either for the current design or for a re-design of the stormwater management plan.

1. ACC recommends that the Applicant update its Stormwater Report to reflect the new minimum standards now recommended by the MassDEP Stormwater Advisory Committee, including use of NOAA+ at a minimum, 90% TSS removal, and revised recharge guidance. While ACC is aware that formal revisions to MassDEP regulations will not occur until next year, it is within the spirit of the State Executive Order 569, State Hazard Mitigation and Climate Adaption Plan, and Arlington's Comprehensive Permit Regulations to conservatively design a stormwater management system so that climate change and hazard mitigation are taken into account.
2. ACC recommends that existing groundwater elevations be verified, particularly if soil investigations on which the groundwater elevations are estimated are old or outdated.

3. ACC recommends that the Applicant further evaluate green infrastructure measures to increase the adaptive capacity and resiliency of stormwater management infrastructure.

4. ACC recommends that BETA Group consider climate change flooding impacts using NOAA + and NOAA++ precipitation rates to be resilient/protective for future extreme storms, consistent with the MassDEP Stormwater Advisory Committee recommendations.

Issue #4. Evaluation of Wildlife Habitat & Vegetation

BSC provided a comprehensive Wildlife Habitat and Vegetation Evaluation report supported with field survey notes, as requested by the ACC.

- The evaluation was performed using a desktop review and on-site field survey, supported by field notes. The report indicates that "Much of the site is characterized by a diverse, mature forest canopy with dense understory vegetation."

- Undesirable invasive plants are numerous in the understory as herbaceous vegetation (e.g., Garlic Mustard).

- Field survey performed for locations within the AURA, floodplain, and possible compensatory storage locations.

- There are large, desirable native trees in the canopy including Silver Maple, Cottonwood, and Red Maple, among others. The report stated that there were numerous large trees, "many of which are near or in excess of 30" DBH." BSC did not conduct an inventory of these trees; however, they stated "they were present at five (5) of the eight (8) survey plots."

- A significant feature noted was extensive amount of downed woody debris; which can be "particularly valuable to small mammals, reptiles and amphibians."

- No vernal pool habitat noted on site.

- This urban forest does have connectivity to Spy Pond and the Alewife Brook Reservation; therefore, it is not entirely isolated though dense development surrounds the parcel.

- Wildlife typical of urban forests were evident including birds and small mammals and coyote.

<u>Recommended Action</u>:

ACC understands that BETA Group is reviewing the Wildlife Habitat & Vegetation report and will advise on whether it agrees with this report and conclusions.

1. ACC recommends that the ZBA require the Applicant quantify the numbers and types of trees (including species and DBH) that will be removed during construction in the AURA so that the ACC and BETA Group can evaluate the planting plan as mitigation for loss of canopy, wildlife habitat, and climate change resilience attributes.

Issue #5. Conservation Restriction for Undeveloped Lands of the Mugar Parcel

- The Existing Conditions memo indicates that "The Applicant has proposed that the environmentally sensitive portions of the site be protected by a conservation restriction or other appropriate land conservation mechanism."
- The Compliance with Open Space memo states that "The Applicant, the Town and its community can work together toward a path to steward the undeveloped lands, as such stewardship models may exist with other protected areas, such as the private lands at the former Symmes Hospital."

Recommended Action:

1. ACC recommends that the ZBA work with the ACC, the Arlington Land Trust, the Arlington Open Space Committee and other Town officials to propose an appropriate conservation and stewardship mechanism for the proposed undeveloped portions of the site that are protected resource areas under the Town Bylaw and implementing Wetlands regulations.

Conclusion

Once the Applicant and the BETA Group complete the recommended tasks, the ZBA will have much, if not all, of the information needed to determine whether the proposed project complies with the Arlington Wetlands Protection Bylaw and June 4, 2015 Wetland Regulations and the anticipated MassDEP Stormwater revisions.

We hope the ZBA finds the above comments helpful. Please contact us should you have questions. I and other ACC members plan on attending the ZBA's hearing on the Application on November 24, 2020.

Very truly yours,

Susan

Susan Chapnick, Chair
Arlington Conservation Commission

Transportation Impact Assessment

Thorndike Place
Arlington, Massachusetts

Prepared for:

Arlington Land Realty, LLC
Cambridge, Massachusetts

November 2020

Prepared by:

Vanasse & Associates inc
Transportation Engineers & Planners

35 New England Business Center Drive
Suite 140
Andover, MA 01810

TRANSPORTATION IMPACT ASSESSMENT

THORNDIKE PLACE
ARLINGTON, MASSACHUSETTS

Prepared for:

Arlington Land Realty, LLC
84 Sherman Street
Cambridge, MA 02138

November 2020

Prepared by:

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CONTENTS

CONTENTS (CONTINUED)

FIGURES

TABLES

EXECUTIVE SUMMARY

DESCRIPTION OF PROJECT

Vanasse & Associates, Inc. (VAI) has prepared this Transportation Impact Assessment (TIA) to identify traffic impacts associated with a proposed Thorndike Place residential development to be located on the Mugar Parcel in Arlington, Massachusetts (the "Project"). The purpose of this TIA is to review existing and future traffic conditions in the vicinity of the site, determine the traffic impacts from the proposed Project at key intersections expected to experience increased traffic levels from the Project, and review the need for improvements to mitigate the Project's traffic impact.

PROPOSED PROJECT

The site is bounded by Dorothy Road to the north, Burch Street to the east, and Route 2 to the west and south. The Project consists of constructing a building containing 176 residential units. Parking will be provided on-site for 239 vehicles. A parking garage below the units will provide 204 spaces while 8 spaces are provided in the courtyard. The remaining 27 spaces will be provided via a surface parking lot on-site. Approximately 144 bicycle parking spaces will be provided in the garage. Access to the site is proposed via one full-access driveway onto Dorothy Road at the intersection with Littlejohn Street.

EXISTING CONDITIONS

A comprehensive field inventory was conducted to collect existing roadway geometrics, operating characteristics, speed limits, and sight distances, as well as land use information. Traffic volumes were obtained for the intersections expected to receive the traffic impact from the Project. These are listed below:

- Route 2 at Route 16
- Lake Street at Route 2 eastbound On/Off-ramps
- Lake Street at Route 2 westbound On/Off -ramps
- Lake Street at Wilson Avenue
- Lake Street at Littlejohn Street
- Lake Street at Homestead Road

- Lake Street at Burch Street and Alfred Road
- Lake Street at Margaret Street and Lakehill Avenue
- Lake Street at Brooks Avenue
- Massachusetts Avenue at Lake Street

2020 BASELINE TRAFFIC VOLUMES CONDITIONS

In order to develop 2020 Baseline traffic-volume conditions, the historic data obtained required adjustment for passage of time, while the new data collected required adjustment due to the effects of the COVID-19 pandemic. The counts conducted in 2020 were done in the month of September. Therefore, for practicality it was determined the other existing data should be corrected to September 2020 conditions. The 2014 counts were conducted in March 2014 and therefore were seasonally adjusted to September 2014 volumes using traffic count data from the Massachusetts Department of Transportation (MassDOT) permanent count station ID 4065[1] located on I-95 south of the ramp to Route 2 eastbound. Using the same permanent count station, the September 2014 volumes were grown to September 2016 volumes. The September 2016 volumes were subsequently grown to September 2019 using the same count station data. The 2019 data collected by VAI were conducted in May 2019 and were adjusted to September 2019 using the permanent count station information. The traffic volumes were then representative of September 2019 volumes. These volumes were then grown by 0.5 percent to raise them from 2019 to 2020 conditions. The next step was to develop a COVID-19 correction factor to apply to the counts conducted in September 2020. These factors were calculated comparing the August 2019 counts to the August 2020 counts from the permanent count station. Even with the COVID-19 correction factor, the counted September 2020 volumes were significantly lower than the derived September 2020 volumes. To correct for the difference, the networks were balanced upwards along Lake Street, and traffic volumes from specific developments that were occupied after 2014 but before 2020 were added to develop the 2020 Baseline traffic volumes.

FUTURE CONDITIONS

Traffic volumes within the study area were projected to 2027, which reflects a seven-year planning horizon consistent with State traffic study guidelines. These conditions incorporate traffic growth due to general background traffic increases as well as development projects currently being proposed/permitted or under construction and expected to generate traffic in the future. This condition is referred to as the No-Build condition.

PROJECT-GENERATED TRAFFIC

The Project is expected to generate 430 vehicle trips on an average weekday (two-way, 24-hour volume), with 27 vehicle trips (7 entering and 20 exiting) expected during the weekday morning peak hour. During the weekday evening peak hour, the Project is expected to generate 33 vehicle trips (20 entering and 13 exiting).

The projected vehicle trips were distributed onto area roadways based on existing travel patterns and U.S. Census Journey-to-Work data for Arlington. Traffic-volume increases due to the Project

[1]MassDOT Transportation Data Management System; Location ID 4065; Located on I-95 south of ramp to Route 2 eastbound.

were shown to range from 0.1 to 0.8 percent during peak hours and are expected to be less during other hours of the day.

TRAFFIC OPERATIONS ANALYSIS

In future conditions, operations are generally preserved with minor but manageable increases to delay on the various approaches. The addition of Project-related traffic to the study area roadways and intersections is not anticipated to significantly impact traffic operations within the study area over No-Build conditions.

RECOMMENDATIONS AND CONCLUSION

Bluebikes Station

- Subject to receiving the necessary approvals from the Town, the Project will commit to providing a large (23 dock) Bluebikes station in the vicinity of the existing Bluebikes station at Thorndike Field. This will serve to accommodate demand for Bluebikes in this area adjacent to the Minuteman Bikeway.

Site Recommendations

- The existing vegetation on the site frontage should be removed to provide adequate sight distance at the proposed site driveway location.

- The site driveway onto Dorothy Road should be placed under STOP-sign control with painted STOP-bars on the driveway at the STOP-sign location.

- At the vicinity of the site driveway, any new landscaping or building features should not exceed 24 inches in height or should be placed out of the lines of sight for motorists exiting the site and for those approaching the driveway on Dorothy Road.

Transportation Demand Management Measures

- Designate an on-site employee as the site's Transportation Coordinator to oversee marketing and promoting of transportation options at the site.

- Provide new residents transportation information packets with information on getting around Arlington sustainably.

- Provide Transitscreen installation in the building lobby which depicts accurate real-time information for area transit, Bluebikes stations, and Uber/Lyft services in the area.

- The property management team will provide information on available pedestrian and bicycle facilities in the vicinity of the Project site. This information will be posted in a centralized location.

- The property management team will investigate joining either the 128 Business Council or the Alewife Transportation Management Association (TMA). Either TMA could provide a ridematching program among residents of the Project and employers of the area.

The Project is expected to produce a minor increase in traffic volume in the vicinity of the site and minor but manageable increases in delay to various movements within the study area. No changes to critical movement levels of service occur as a result of the addition of Project volumes under 2027 Build conditions. The level of service does go from D to E during the weekday morning peak hour under 2027 Build conditions at the intersection of Lake Street with Brooks Avenue but the average delay only increases 1 second from 35 to 36 seconds.

The proposed addition of a large Bluebikes station adjacent to the existing station at Thorndike Field will help to alleviate demand for Bluebikes in this area, adjacent to the Minuteman Bikeway. This in combination with the proposal to include 144 sheltered bike parking spaces will encourage the use of bicycling as a sustainable commuting measure over the use of personal vehicles. Based on the above, VAI has concluded that the Project can be safely accommodated with minimal impact on the area road network.

INTRODUCTION

VAI has prepared this TIA in order to identify the traffic impacts associated with the proposed Thorndike Place residential development to be located on the Mugar Parcel in Arlington, Massachusetts. This report identifies and analyzes existing and future traffic conditions both with and without the Project and reviews access requirements, potential off-site improvements, and safety considerations.

STUDY METHODOLOGY

This study was prepared in coordination with the Town of Arlington and in accordance with the State guidelines for TIAs; and was conducted in three distinct stages.

The first stage involved an assessment of existing conditions in the study area and included an inventory of roadway geometry, observations of traffic flow, and collection of peak-period traffic counts.

In the second stage of the study, future traffic conditions were projected and analyzed. Specific travel demand forecasts for the Project were assessed along with future traffic demands due to expected traffic growth independent of the Project. A seven-year time horizon was selected for these analyses consistent with State guidelines for the preparation of TIAs. The traffic analysis conducted in stage two identifies projected future roadway capacity, traffic safety, and site access issues.

The third stage of the study presents and evaluates measures to address traffic and safety issues, if any are necessary, based on the results from stage two of the study.

EXISTING CONDITIONS

A comprehensive field inventory of existing conditions within the study area was conducted in September 2020. The field investigation consisted of an inventory of existing roadway geometrics; and operating characteristics; as well as posted speed limits, and land use information within the study area. The study area for the Project contains the major roadways which provide access to the Project, as well as the intersections which are expected to accommodate the majority of Project-related traffic. The study area is listed below and graphically depicted in Figure 1.

- Route 2 at Route 16
- Lake Street at Route 2 eastbound On/Off-ramps
- Lake Street at Route 2 westbound On/Off-ramps
- Lake Street at Wilson Avenue
- Lake Street at Littlejohn Street
- Lake Street at Homestead Road
- Lake Street at Burch Street and Alfred Road
- Lake Street at Margaret Street and Lakehill Avenue
- Lake Street at Minuteman Commuter Bikeway
- Lake Street at Brooks Avenue
- Massachusetts Avenue at Lake Street

The following describes the study area roadways and intersections which are also shown in Figure 2 which summarizes existing lane use, travel lane widths, and sidewalk and crosswalk locations at the study area intersections.

GEOMETRY

Roadways

Lake Street

Lake Street is classified as an urban minor arterial roadway under the jurisdiction of the Town of Arlington. Lake Street runs in a general east-west alignment from Pleasant Street to Massachusetts Avenue. Direction of travel of Lake Street is separated by a double-yellow centerline. The land use along Lake Street generally consist of residential properties.

Figure 1

Site Location Map

Vanasse & Associates inc

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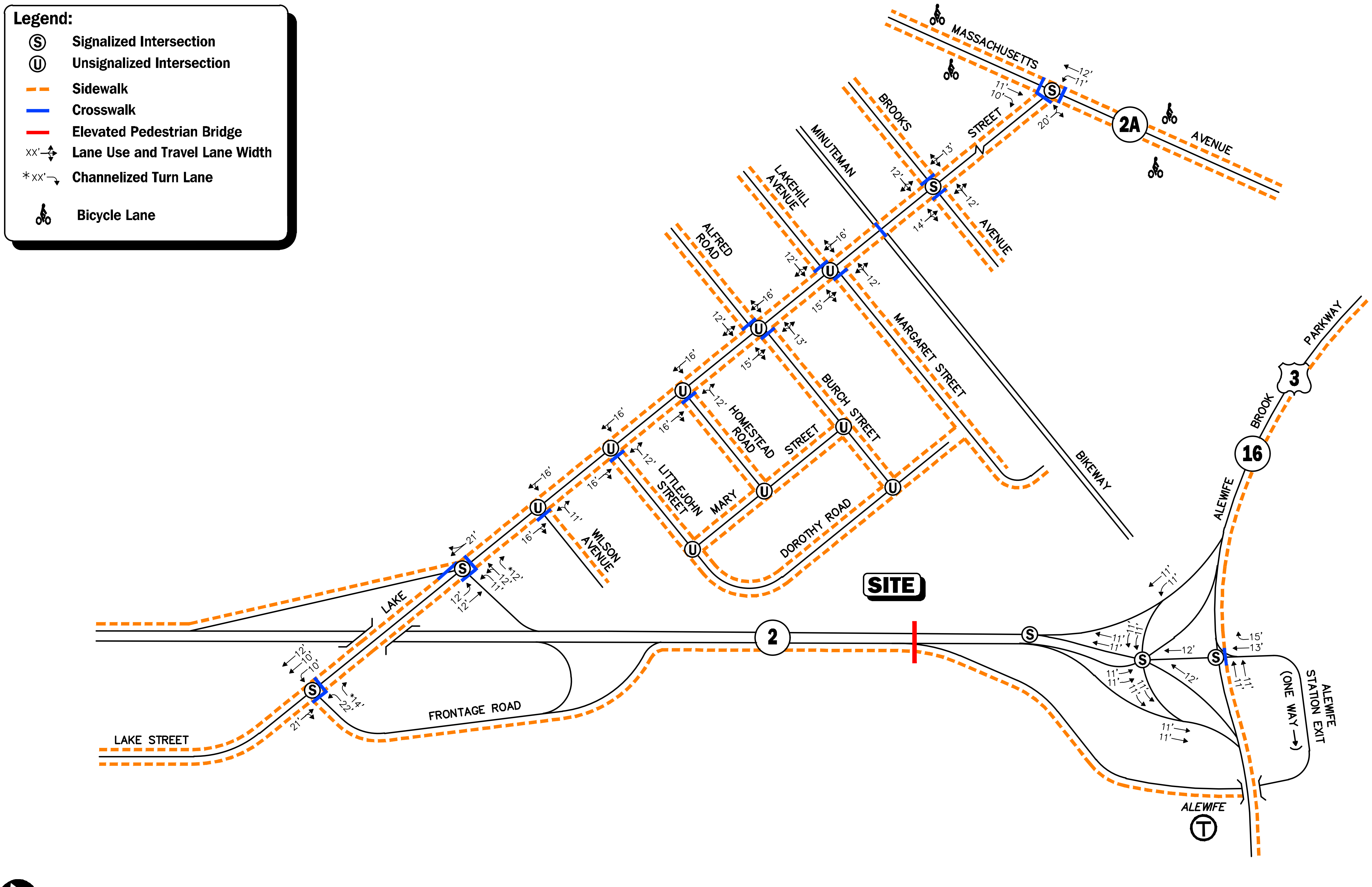

Figure 2

Existing Intersection Lane Use, Travel Lane Width, and Pedestrian Facilities

Vanasse & Associates inc

Intersections

Route 2 at Route 16

Route 2 meets Route 16 to form four separate signalized intersections. Direction of travel on Route 2 is median divided while direction of travel of Route 16 is separated by a double-yellow centerline. Illumination is provided via streetlights mounted on metal poles. Land use in the vicinity of this intersection consists of the Alewife train station, wooded areas, and some office/research and development (R&D) space. This intersection is under the jurisdiction of the MassDOT.

Lake Street at Route 2 Eastbound On/Off-Ramps

Lake Street is intersected by the Route 2 eastbound on/off-ramps from the south to form this three-way intersection under traffic signal control. Direction of travel on the ramps is separated by a raised median while a faded double-yellow centerline separates direction of travel on Lake Street. Illumination is provided via streetlights mounted on metal poles. Land use in the vicinity of this intersection consists of residential properties and wooded areas. This intersection is under the jurisdiction of the Town of Arlington.

Lake Street at Route 2 Westbound On/Off-Ramps

Lake Street is intersected by the Route 2 westbound off-ramp from the south and the Route 2 west-bound on-ramp from the north to form this four-way intersection under traffic signal control. Direction of travel on Lake Street is separated by a faded double-yellow centerline. Illumination is provided via streetlights mounted on wooden utility poles and metal poles. Land use in the vicinity of this intersection consists of residential properties and wooded areas. This intersection is under the jurisdiction of the Town of Arlington.

Lake Street at Wilson Avenue

Lake Street is intersected by Wilson Avenue from the south to form this three-way intersection under STOP-sign control. Wilson Avenue is signed to discourage entering movements from Lake Street from 7:00 to 9:00 AM and 4:00 to 7:00 PM Monday through Friday. Direction of travel on Lake Street is separated by a faded double-yellow centerline. Illumination is provided via street-lights mounted on wooden utility poles. Land use in the vicinity of this intersection consists of residential properties. This intersection is under the jurisdiction of the Town of Arlington.

Lake Street at Littlejohn Street

Lake Street is intersected by Littlejohn Street from the south to form this three-way intersection under STOP-sign control. Littlejohn Street is signed to discourage entering movements from Lake Street from 7:00 to 9:00 AM and 4:00 to 7:00 PM Monday through Friday. Direction of travel on Lake Street is separated by a faded double-yellow centerline. Illumination is provided via street-lights mounted on wooden utility poles. Land use in the vicinity of this intersection consists of residential properties. This intersection is under the jurisdiction of the Town of Arlington.

Lake Street at Homestead Road

Lake Street is intersected by Homestead Road from the south to form this three-way intersection under STOP-sign control. Homestead Road is signed to discourage entering movements from Lake Street from 7:00 to 9:00 AM and 4:00 to 7:00 PM Monday through Friday. Direction of travel on

Lake Street is separated by a faded double-yellow centerline. Illumination is provided via streetlights mounted on wooden utility poles. Land use in the vicinity of this intersection consists of residential properties. This intersection is under the jurisdiction of the Town of Arlington.

Lake Street at Burch Street and Alfred Road

Lake Street is intersected by the Burch Street from the south and Alfred Street from the north to form this skewed four-way intersection under STOP-sign control. Direction of travel on Lake Street is separated by a faded double-yellow centerline. Burch Street and Alfred Street allow two-way travel. Illumination is provided via streetlights mounted on wooden utility poles. Land use in the vicinity of this intersection consists of residential properties. This intersection is under the jurisdiction of the Town of Arlington.

Lake Street at Margaret Street and Lakehill Avenue

Lake Street is intersected by Lakehill Avenue from the north and Margaret Street from the south to form this skewed four-way intersection under STOP-sign control. Lakehill Avenue and Margaret Street have signs indicating NO ACCESS TO MASS AVE. Direction of travel on Lake Street is separated by a faded double-yellow centerline. Lakehill Avenue and Margaret Street both allow two-way travel. Illumination is provided via streetlights mounted on wooden utility poles. Land use in the vicinity of this intersection consists of residential properties. This intersection is under the jurisdiction of the Town of Arlington.

Lake Street at Minuteman Commuter Bikeway

Lake Street is intersected by the Minuteman Commuter Bikeway from the north and south to form this four-way intersection with the Bikeway currently under STOP-sign control. At the time of data collection in September 2020, this intersection was under construction to be signalized. Direction of travel on Lake Street is separated by a faded double-yellow centerline. Direction of travel on the Minuteman Commuter Bikeway is separated by a faded single-yellow centerline. Illumination is provided via streetlights mounted on wooden utility poles. Land use in the vicinity of this intersection consists of residential properties. This intersection is under the jurisdiction of the Town of Arlington.

Lake Street at Brooks Avenue

Lake Street is intersected by Brooks Avenue from the north and south to form this four-way intersection under traffic signal control. Direction of travel on Lake Street is separated by a faded double-yellow centerline. Brooks Avenue allows two-way travel. Illumination is provided via streetlights mounted on wooden utility poles. Land use in the vicinity of this intersection consists of residential properties. This intersection is under the jurisdiction of the Town of Arlington.

Massachusetts Avenue at Lake Street

Massachusetts Avenue is intersected by the Lake Street from the west to form this three-way intersection under traffic signal control. Direction of travel on Massachusetts Avenue is separated by a double-yellow centerline. Direction of travel on Lake Street is separated by a faded double-yellow centerline. Illumination is provided via streetlights mounted on wooden utility poles. Land use in the vicinity of this intersection consists of commercial properties. This intersection is under the jurisdiction of the Town of Arlington.

EXISTING TRAFFIC V OLUMES

Due to the COVID-19 pandemic, traffic volumes, pedestrian crossing volumes, and bicycle volumes were obtained from multiple sources. Data was obtained from the original April 2014 *Traffic Impact and Access Study*[2] conducted for the Project, the January 2017 *Transportation Impact Study*[3] conducted by VAI for a nearby project in Cambridge, data collected by VAI in May 2019 for another nearby project in Cambridge, data collected by the East Arlington Livable Street Coalition and the Eco Counter on the Minuteman Commuter Bikeway, and September 2020 counts conducted by VAI for the Project.

Traffic-Volume Adjustments

In order to develop 2020 Baseline traffic-volume conditions, the historic data obtained required adjustment for passage of time, while the new data collected required adjustment due to the effects of the COVID-19 pandemic. The counts conducted in 2020 were done in the month of September. Therefore, for practicality it was determined the other data should be corrected to September 2020 conditions. The 2014 counts were conducted in March 2014 and therefore were seasonally adjusted to September 2014 volumes using traffic count data from MassDOT permanent count station ID 4065[4] located on I-95 south of the ramp to Route 2 eastbound. Using the same permanent count station, the September 2014 volumes were grown to September 2016 volumes. The September 2016 volumes were subsequently grown to September 2019 using the same count station data. The 2019 data collected by VAI were collected in May 2019 and were adjusted to September 2019 using the permanent count station information. The traffic volumes were then representative of September 2019 volumes. These volumes were then grown by 0.5 percent to raise them from 2019 to 2020 conditions. The next step was to develop a COVID-19 correction factor to apply to the counts conducted in September 2020. These factors were calculated comparing the August 2019 counts to the August 2020 counts from the permanent count station. Even with the COVID-19 correction factor, the counted September 2020 volumes were significantly lower than the derived September 2020 volumes. To correct for the difference, the networks were balanced upwards along Lake Street.

In addition to the general growth in the area from 2014 to 2020, there were a number of specific developments mentioned for inclusion in the 2020 Baseline volumes. These developments were occupied after the 2014 counts but before the 2020 counts.

Vox on Two – This 227-unit residential development is located at 223, 225, and 231 Concord Turnpike (Route 2) in Cambridge, Massachusetts. Access to the site is through a right-turn only entrance driveway and one right-turn only exit driveway onto Route 2 eastbound. Volumes for this development were obtained from the *Transportation Impact Study*[5] conducted in 2010 and added to the 2020 baseline conditions.

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[2]*Traffic Impact and Access Study – Mugar Parcel 40B Residential Development;* MDM Transportation Consultants, Inc.; April 2014.

[3]*Transportation Impact Study – Proposed Residence at Alewife Station – Cambridge, Massachusetts;* Vanasse & Associates, Inc.; January 2017.

[4]MassDOT Transportation Data Management System; Location ID 4065; Located on I-95 south of ramp to Route 2 eastbound.

[5]*Transportation Impact Study – Proposed Residence at Alewife Station – Cambridge, Massachusetts;* Vanasse & Associates, Inc.; December 2010.

Residence at Alewife Station – This 320-unit residential development is located at 195-211 Concord Turnpike (Route 2) in Cambridge, Massachusetts. Access to the site is through a right-turn only entrance driveway and one right-turn only exit driveway onto Route 2 eastbound. Volumes for this development were obtained from the Transportation Impact Study[6] conducted in 2017 and added to the 2020 baseline conditions.

Belmont Highlands – This 300-unit residential development is located off Acorn Park Drive in Belmont, Massachusetts. Access to the site is through three driveways that intersect with Acorn Park Drive. Volumes for this development were obtained from the Traffic Impact and Access Study[7] conducted in 2007 and added to the 2020 baseline conditions.

Discovery Park Hotel – This 150-room hotel is located at Cambridge Discovery Park Drive in Cambridge, Massachusetts. Access to the site is through a driveway that intersects with Acorn Park Drive. Volumes for this development were obtained from the Memorandum[8] conducted in 2013 and added to the 2020 baseline conditions.

This practice was discussed and confirmed with BETA Group, the Town's traffic peer review consultant for the Project. The 2020 Baseline traffic volumes on Lake Street are summarized in Table 1.

Table 1
2020 BASELINE ROADWAY TRAFFIC-VOLUME SUMMARY

	Weekday Morning Peak Hour		Weekday Evening Peak Hour	
Location	Volume (vph)[a]	Predominant Flow	Volume (vph)	Predominant Flow
Lake Street, west of Burch Street	1,662	66% WB	1,351	59% EB

[a]Two-way peak-hour volume expressed in vehicles per hour.
EB = eastbound; WB = westbound.

As can be seen in Table 1, Lake Street was found to accommodate approximately 1,662 vehicles per hour (vph) during the weekday morning peak hour and 1,351 vph during the weekday evening peak hour under 2020 Baseline conditions. During the weekday morning peak hour, 66 percent of the traffic is traveling westbound and during the weekday evening peak hour 59 percent of the traffic is traveling eastbound. The existing traffic volumes for all the study area intersections are graphically depicted in Figure 3 and Figure 4 for the weekday morning and weekday evening peak hours, respectively.

[6]*Transportation Impact Study – Proposed Residences at Alewife Station – Cambridge, Massachusetts;* Vanasse & Associates, Inc.; January 2017.
[7]*Traffic Impact and Access Study – Proposed Residential Development – Belmont, Massachusetts;* Vanasse & Associates, Inc.; March 2007.
[8]*Memorandum – Building 600 – Proposed 150-Room Hotel – Cambridge, Massachusetts;* Vanasse & Associates, Inc.; September 27, 2013.

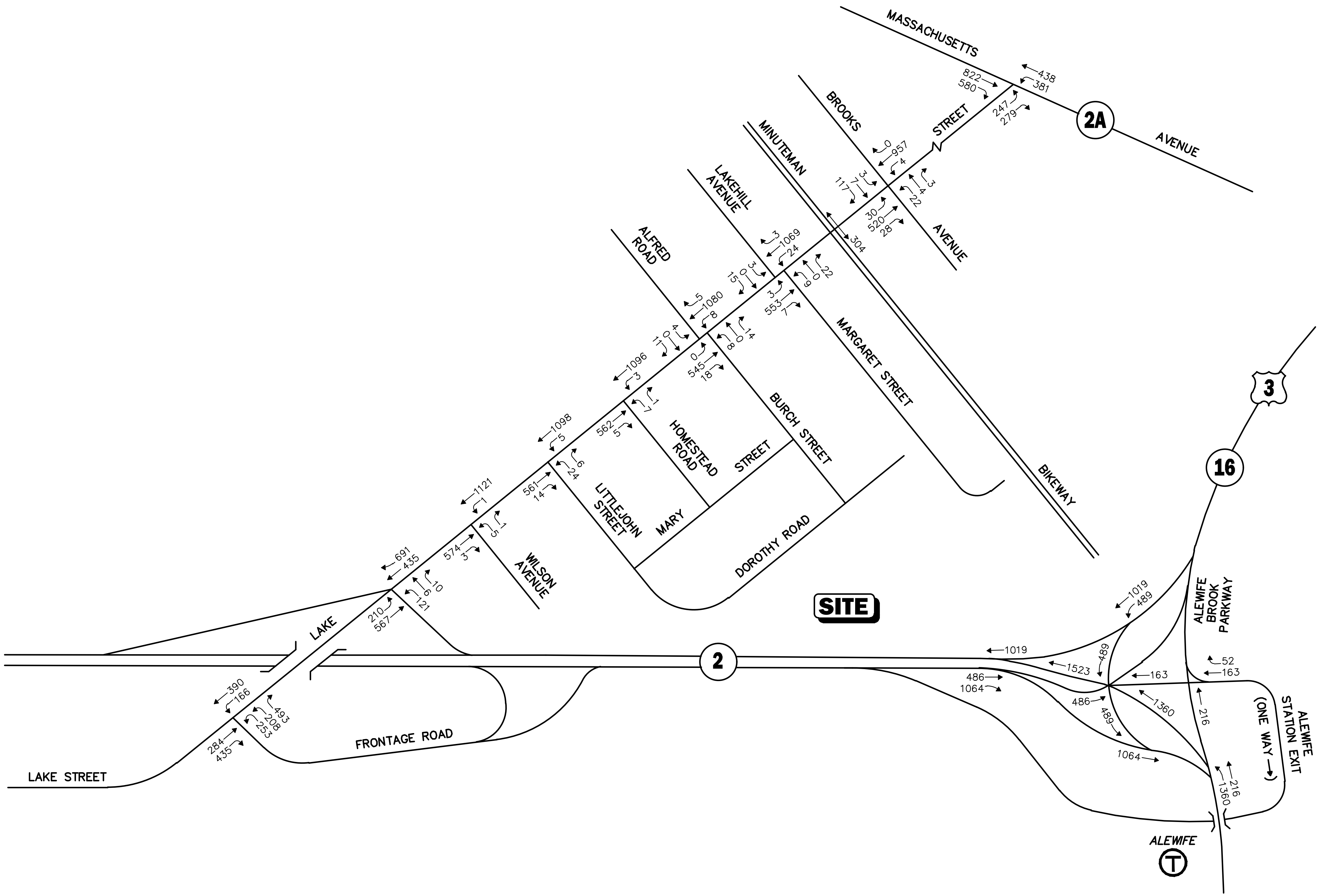
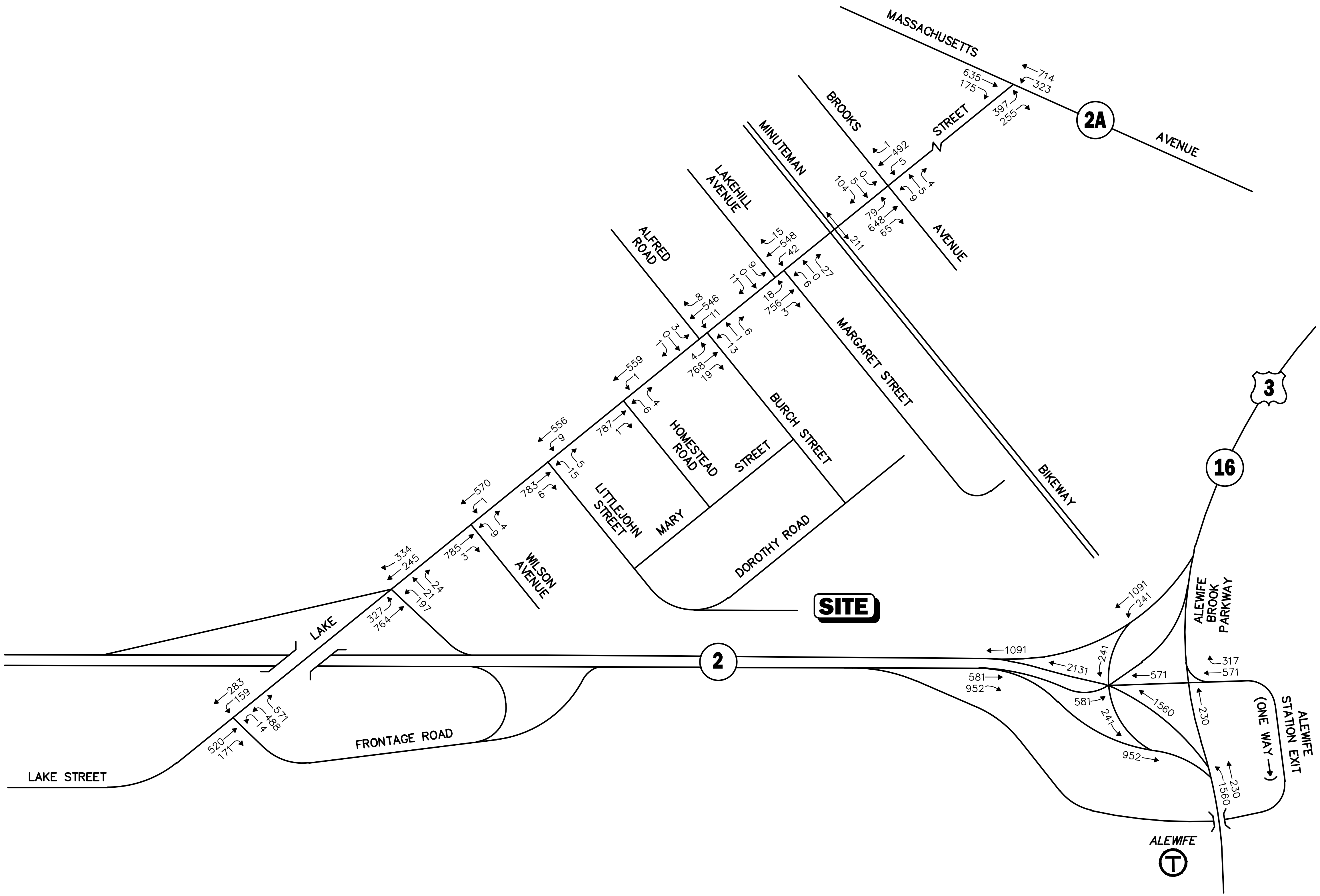


Figure 3

2020 Baseline
Weekday Morning
Peak Hour Traffic Volumes

Vanasse & Associates inc



Note: Imbalances exist due to numerous curb cuts and side streets that are not shown.

Not To Scale

Figure 4

2020 Baseline
Weekday Evening
Peak Hour Traffic Volumes

Vanasse & Associates inc

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PEDESTRIAN AND BICYCLE FACILITIES

A comprehensive field inventory of pedestrian and bicycle facilities within the study area was undertaken in September 2020. The field inventory consisted of a review of the location of side-walks and pedestrian crossing locations along the study roadways and at the study intersections, as well as the location of bicycle facilities. Generally, sidewalks are provided along both sides of the study area roadway. Exceptions include Alewife Brook Parkway (Route 16) that only provides a sidewalk on the east side of the road throughout the study area, Route 2 which only provides a sidewalk on the south side of the roadway, and Wilson Avenue which only provides a sidewalk on the east side of the roadway. Crosswalks are provided across the Alewife Station Access Road, across the Route 2 ramps at Lake Street, across Lake Street at the Route 2 ramps, across all side streets off of Lake Street, and across all the approaches to the intersection of Massachusetts Avenue with Lake Street. The Minuteman Commuter Bikeway crosses Lake Street between Margaret Street and Brooks Avenue. The bikeway runs from Bedford to Cambridge and provides direct access to Alewife Station.

THORNDIKE PARK

The Arlington Recreation Department was contacted to determine the uses of Thorndike Field located at the terminus of Margaret Street. There are multiple fields used for soccer and lacrosse and a dog park. The fields are open from April to November. From April through June, the fields are open from 3:00 PM to dusk on weekdays and from 9:00 AM to dusk on Saturdays and Sundays. Based on estimates from the Recreation Department, typical usage during peak hours for the field is approximately five teams at a time with 15 members per team, or 75 people, plus approximately 10 people at the dog park, or 85 people. From July through August, the fields are used for summer camps that are operated from 8:30 AM to 3:30 PM. The camps typically have between 50 and 100 children per session. From 6:00 PM to dusk the fields are used by adult soccer league teams which typically have about 24 players per game. From September to November the fields are again used for soccer but not lacrosse. The fields are open from 3:00 PM to dusk during weekdays and 9:00 AM to dusk on Saturday and Sunday. Activity is typically 75 percent of the spring activity so the peak hour generates approximately 64 people. To the extent that activity was underway at the field during the times that traffic counts were conducted, the trips generated by the field during the peak commuting periods are included in the counts.

All school uses accessing the fields are directed to use Varnum Street. The parking lot provides 65 parking spaces. Typically, when the parking lot capacity is exceeded people park at Hardy Elementary School and walk to the field. Currently, no sport tournaments are held at the fields.

PUBLIC TRANSPORTATION

Public transportation services are provided within the study area by the Massachusetts Bay Transportation Authority (MBTA) for fixed-route bus and rapid transit services. Table 2 summarizes the characteristics of these services. Schedules and fare information for the fixed-route bus and rapid transit services are provided in the Appendix.

Table 2
PUBLIC TRANSPORTATION SERVICES

			Weekday		Saturday		Sunday	
Service	Stop Closest to Site	Distance from Site	Hours of Operation	Headway (minutes)	Hours of Operation	Headway (minutes)	Hours of Operation	Headway (minutes)
Bus: Route 67: Turkey Hill – Alewife Station	West Service Road at Lake Street	0.3 mi. northwest	5:53 AM – 8:32 PM	25-50	**No Weekend Service**			
Bus: Route 77: Arlington Heights to Harvard Station	Mass Ave at Lake Street	0.7 mi. northeast	4:48 AM – 1:25 AM	9-20	4:48 AM – 1:26 AM	10-17	6:00 AM – 1:25 AM	10-20
Bus: Route 79: Arlington Heights – Alewife Station	Mass Ave at Lake Street	0.7 mi. northeast	6:35 AM – 7:24 PM	5-50	**No Weekend Service**			
Bus: Route 350: North Burlington – Alewife Station	Mass Ave at Lake Street	0.7 mi. northeast	5:53 AM – 11:08 PM	15-56	6:25 AM – 11:10 PM	40-60	7:05 AM – 7:35 PM	55-90
Rapid Transit: Red Line	Alewife Station	0.8 mi. southwest	5:16 AM – 12:30 AM	5-9	5:16 AM – 12:30 AM	12-16	6:00 AM – 12:30 AM	12-16

MOTOR VEHICLE CRASH DATA

Motor vehicle crash information for the study area intersections was provided by the MassDOT Safety Management/Traffic Operations Unit for the most recent five-year period available (2013 through 2017) in order to examine motor vehicle crash trends occurring within the study area. The data is summarized by intersection, type, weather condition, lighting condition, pavement condition, and severity.

As can be seen in Table 3, no fatalities were reported over the five-year period reviewed. The crash rates for the intersections were observed to be lower than the MassDOT District 4 crash rates for unsignalized and signalized intersections. The intersection of Route 2 with Route 16 experienced the most crashes in the five-year review period with 88, or an average of 17.6 crashes per year. The majority of the crashes were rear-end crashes (48 out of 88) which is consistent with the types of crashes expected at highly congested intersections. Few crashes occur along Lake Street from the Route 2 ramps through Margaret Street.

A number of crashes occurred at the intersection of Lake Street with the Minuteman Commuter Bikeway. A total of 18 crashes occurred at this intersection over the five-year review period with 8 rear-end crashes, 4 pedestrian crashes, and 3 bicyclist crashes. These types of crashes are expected at a highly congested crossing with a mixed-use path under unsignalized control. This intersection is under construction and will provide a signalized crossing which should increase safety.

The intersection of Lake Street at Brooks Avenue is also highly congested. Approximately 7 of the 11 crashes over the five-year review period were rear-end collisions. The intersection of Massachusetts Avenue with Lake Street experienced 22 crashes over the five-year review period averaging 4.4 crashes pear year. Half of the crashes were sideswipe collisions (11 out of 22). Massachusetts Avenue has parking on both sides which often leads to more sideswipe collisions.

Table 3
MOTOR VEHICLE CRASH DATA SUMMARY

Scenario	Route 2 at Route 16	Lake Street at Route 2 EB On/Off-Ramps	Lake Street at Route 2 WB On/Off-Ramps	Lake Street at Wilson Avenue	Lake Street at Littlejohn Street	Lake Street at Homestead Road
Year:						
2013	21	0	2	0	0	0
2014	22	3	0	1	1	0
2015	23	0	1	1	2	0
2016	16	0	1	0	1	0
2017	6	2	1	0	0	1
Total	88	5	5	2	4	1
Average[a]	17.6	1.0	1.0	0.4	0.8	0.2
Crash Rate[b]	0.71	0.10	0.12	0.07	0.13	0.03
Significant[c]	No	No	No	No	No	No
Type:						
Angle	21	1	0	1	2	0
Rear-End	48	0	1	1	0	0
Head-On	0	0	0	0	1	0
Sideswipe	13	1	1	0	0	1
Fixed Object	6	3	1	0	0	0
Pedestrian	0	0	0	0	0	0
Bicyclist	0	0	1	0	1	0
Unknown/Other	0	0	1	0	0	0
Total	88	5	5	2	4	1
Weather Conditions:						
Clear	64	3	5	1	4	0
Cloudy/Rain	16	0	0	1	0	1
Snow/Ice	2	1	0	0	0	0
Fog	0	0	0	0	0	0
Unknown/Other	6	1	0	0	0	0
Total	88	5	5	2	4	1
Lighting Conditions:						
Daylight	58	3	4	2	3	1
Dawn/Dusk	3	0	0	0	0	0
Dark (lit)	24	2	1	0	1	0
Dark (unlit)	3	0	0	0	0	0
Unknown/Other	0	0	0	0	0	0
Total	88	5	5	2	4	1
Pavement Conditions:						
Dry	75	3	4	2	4	0
Wet	11	0	1	0	0	1
Snow/Ice	2	2	0	0	0	0
Unknown/Other	0	0	0	0	0	0
Total	88	5	5	2	4	1
Severity:						
Property Damage Only	67	5	1	2	2	1
Personal Injury	20	0	2	0	2	0
Fatality	0	0	0	0	0	0
Unknown/Other	1	0	2	0	0	0
Total	88	5	5	2	4	1

*See notes at end of table.

Table 3 Continued
MOTOR VEHICLE CRASH DATA SUMMARY

Scenario	Lake Street at Burch Street & Alfred Road	Lake Street at Margaret Street & Lakehill Avenue	Lake Street at Minuteman Bikeway	Lake Street at Brooks Avenue	Mass Ave at Lake Street
Year:					
2013	2	2	1	3	3
2014	0	1	5	4	3
2015	0	0	3	1	9
2016	0	2	6	1	2
2017	1	2	3	2	5
Total	3	7	18	11	22
Average[a]	0.6	1.4	3.6	2.2	4.4
Crash Rate[b]	0.10	0.22	0.50	0.35	0.40
Significant[c]	No	No	No	No	No
Type:					
Angle	1	2	2	1	4
Rear-End	1	2	8	7	6
Head-On	0	1	0	1	0
Sideswipe	1	2	1	1	11
Fixed Object	0	0	0	1	1
Pedestrian	0	0	4	0	0
Bicyclist	0	0	3	0	0
Unknown/Other	0	0	0	0	0
Total	3	7	18	11	22
Weather Conditions:					
Clear	1	3	15	8	12
Cloudy/Rain	2	4	2	1	10
Snow/Ice	0	0	0	2	0
Fog	0	0	0	0	0
Unknown/Other	0	0	1	0	0
Total	3	7	18	11	22
Lighting Conditions:					
Daylight	2	6	16	9	18
Dawn/Dusk	1	0	0	0	1
Dark (lit)	0	1	1	2	3
Dark (unlit)	0	0	0	0	0
Unknown/Other	0	0	1	0	0
Total	3	7	18	11	22
Pavement Conditions:					
Dry	2	5	14	8	20
Wet	1	2	2	1	2
Snow/Ice	0	0	1	2	0
Unknown/Other	0	0	1	0	0
Total	3	7	18	11	22
Severity:					
Property Damage Only	2	3	11	8	16
Personal Injury	0	1	4	0	1
Fatality	0	0	0	0	0
Unknown/Other	1	3	3	3	5
Total	3	7	18	11	22

[a]Average number of crashes over five-year period.
[b]Crash rate per million entering vehicles (mev).
[c]Significant if crash rate > 0.73 for signalized intersections or > 0.57 for unsignalized intersections (MassDOT District 4 rates).
Source: MassDOT Crash Data, 2013 through 2017.

FUTURE CONDITIONS

To determine the impact of site-generated traffic volumes on the roadway network under future conditions, baseline traffic volumes in the study area were projected to the year 2027. Traffic volumes on the roadway network at that time, in the absence of the Project (that is, the No-Build condition), would include existing traffic, new traffic due to general background traffic growth, and traffic related to specific development by others expected to be completed by 2027. Inclusion of these factors resulted in the development of 2027 No-Build traffic volumes. Anticipated site-generated traffic volumes were then superimposed upon these No-Build traffic-flow networks to develop the 2027 Build traffic-volume conditions.

FUTURE TRAFFIC GROWTH

Traffic growth on area roadways is a function of the expected land development impacting the study area. Several methods are used to estimate this growth. A procedure frequently employed estimates an annual percentage increase in traffic growth and applies that percentage to all existing traffic volumes under study. The drawback to such a procedure is that some turning volumes may actually grow at either a higher or a lower rate at particular intersections.

In addition, we identified the location and type of planned development affecting the study area, estimated the traffic to be generated by that development, and assigned it to the area roadway network. This produces a more realistic estimate of growth for local traffic. However, the drawback of this procedure is that the potential growth in population and development external to the study area would not be accounted for in the traffic projections.

To provide a conservative analysis framework, both procedures were used in this TIA.

General Background Growth

Traffic-volume data compiled by MassDOT from permanent count stations and historic traffic counts in the area were reviewed in order to determine general background traffic growth trends. Based on a review of this data and other area traffic studies, it was determined that the traffic volumes are fluctuating in the area. The average annual percent change was determined to be approximately -0.15 percent. To be conservative, a 0.5 percent per year compounded annual background traffic growth rate was used to account for future traffic growth including presently unforeseen development within the study area.

Specific Development by Others

The Town of Arlington was contacted in order to determine if there are any planned or approved specific development projects within the area that would have an impact on future traffic volumes at the study intersections. Based on these discussions the Hardy School Expansion and Buildings 400/500 at Discovery Park were identified for inclusion in this assessment.

Hardy School Expansion – The Hardy Elementary School located at 52 Lake Street began construction a three-story, six-classroom expansion in 2018. The construction is complete but enrollment in the school has remained generally the same since 2017 with approximately 450 students according to the Massachusetts Department of Elementary and Secondary Education (MDESE).[9] The MDESE indicates that the school has approximately 15 students per teacher. To calculate the expected number of trips due to the expansion, the average number of students per teacher (15) was multiplied by the number of new classrooms (6). Therefore, the expansion is assumed to increase student enrolment by 90 students. It is assumed that 60 percent of the new trips will be driving trips and 40 percent will be walking trips. Trip-generation statistics published by the Institute of Transportation Engineers (ITE)[10] for Land Use Code (LUC) 520, *Elementary School* were used to determine the number of trips associated with an increase of 90 students and these volumes were added to the future condition networks.

Discovery Park Buildings 400/500 – Buildings 400 and 500 at Discovery Park in Cambridge, Massachusetts are permitted for 278,000 square feet (sf) of office/R&D space. Access to the buildings is provided via the existing driveway off Acorn Park Drive. Since no traffic study was developed specifically for this component of Discovery Park, traffic volumes were obtained from initial traffic studies developed for that project and added to the future condition networks.

Planned Roadway Improvements

The Town of Arlington was contacted in order to determine if there are any planned roadway improvement projects expected to be completed within the study area in the seven-year planning horizon. Based on these discussions, no roadway improvement projects are planned within the study area beyond general maintenance except for the signalization of the intersection of Lake Streets with the Minuteman Commuter Bikeway.

Signalization of Lake Street at Minuteman Commuter Bikeway – The intersection of Lake Street with the Minuteman Commuter Bikeway was under construction to be signalized at the time data was collected. Therefore, under future conditions this intersection was assumed to be signalized and coordinated with the signal at the intersection of Lake Street with Brooks Avenue as reflected on design plans provided by the Town of Arlington.

No-Build Traffic Volumes

The 2026 No-Build peak-hour traffic-volume networks were developed by applying the 0.5 percent per year compounded annual background traffic growth rate to the 2020 peak-hour traffic volumes and incorporating traffic projections from the identified background developments. The resulting 2027 No-Build weekday morning and weekday evening peak-hour traffic-volume networks are shown on Figure 5 and Figure 6, respectively.

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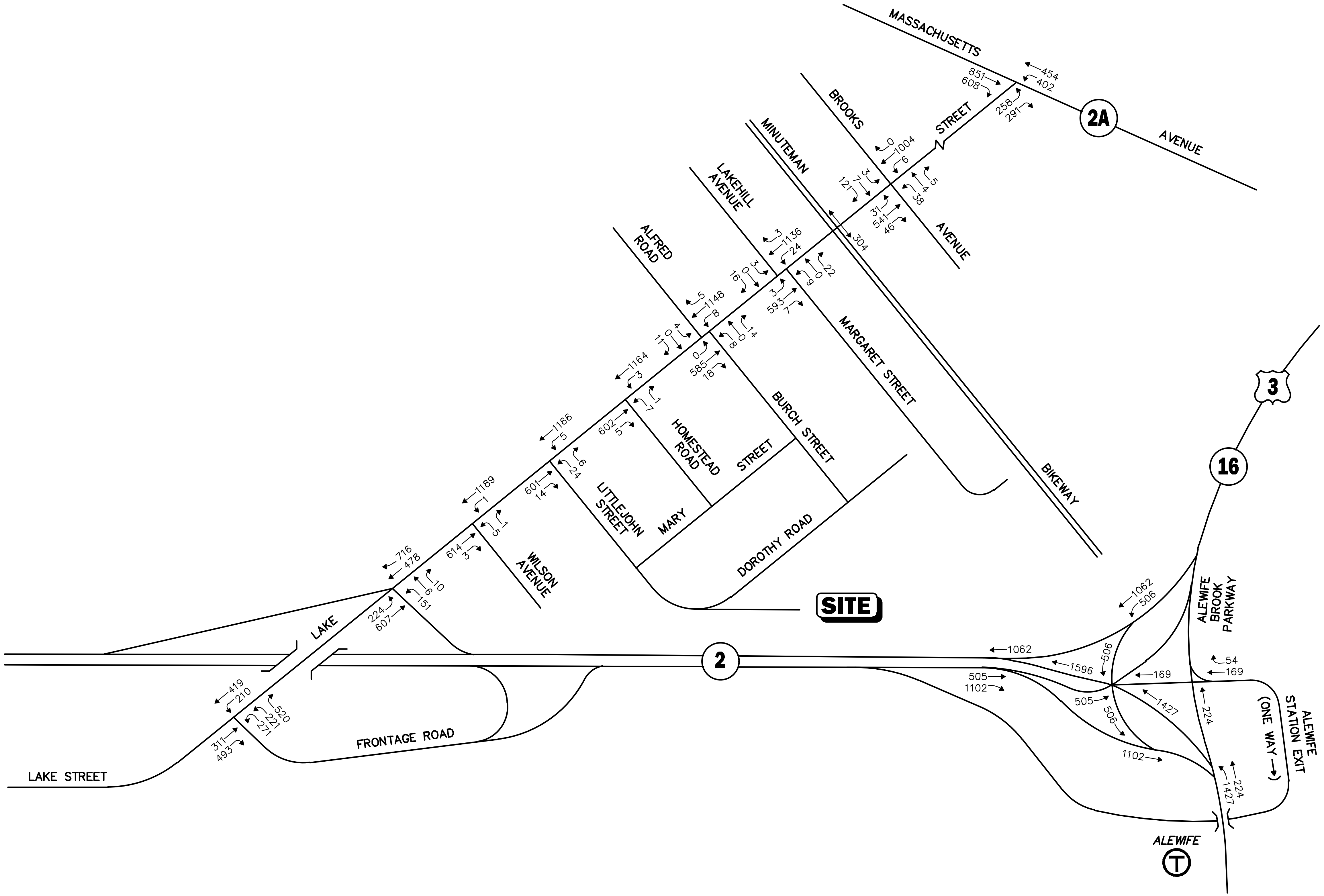
[9] *Massachusetts Department of Elementary and Secondary Education - Massachusetts School and District Profiles*; 2020; profiles.doe.mass.edu/general/general.aspx?topNavID=1.

[10] *Trip Generation,* Tenth Edition; Institute of Transportation Engineers; Washington, DC; 2017.



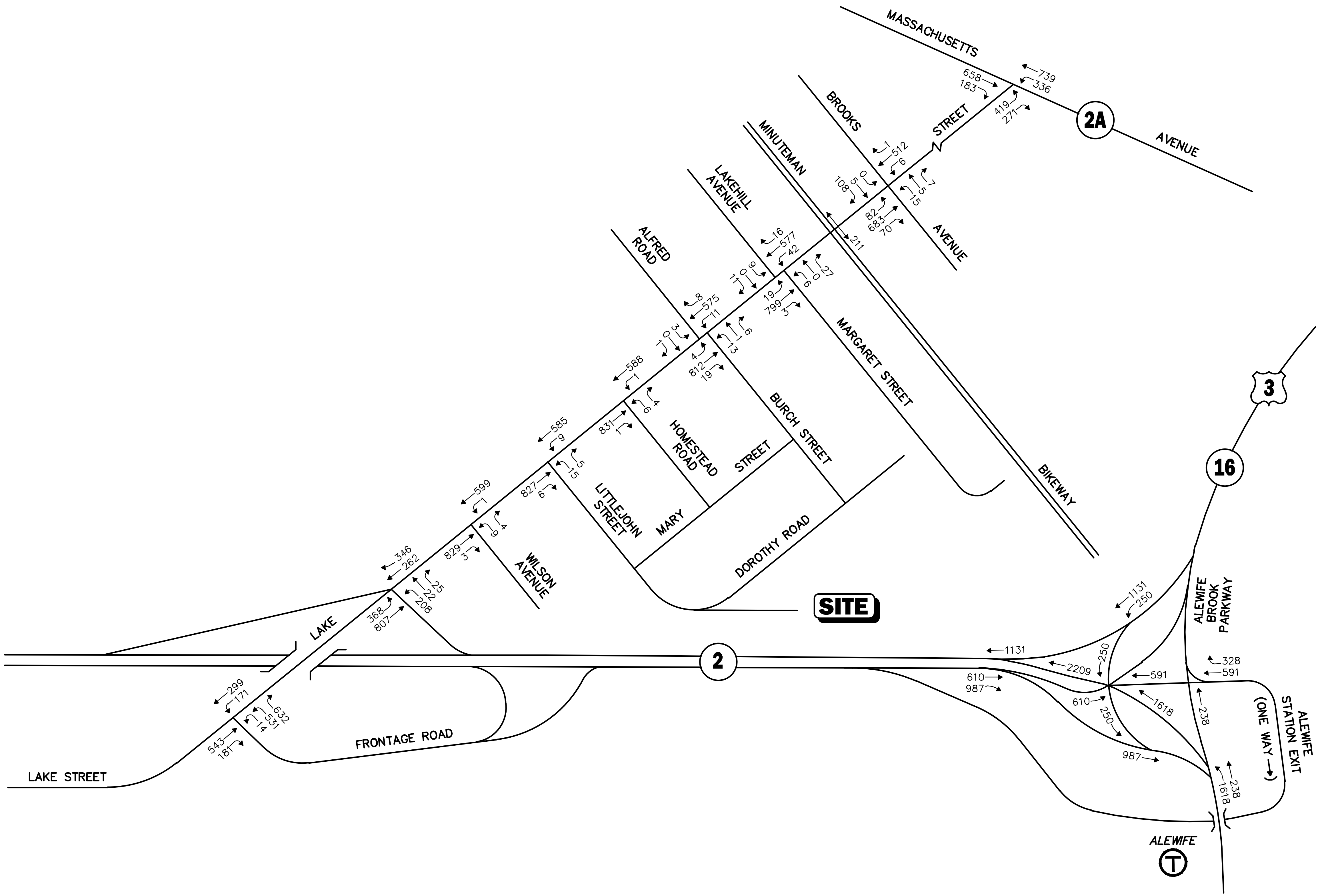
Note: Imbalances exist due to numerous curb cuts and side streets that are not shown.

Not To Scale

Figure 5

2027 No-Build Weekday Morning Peak Hour Traffic Volumes

Vanasse & Associates inc



Note: Imbalances exist due to numerous curb cuts and side streets that are not shown.

Not To Scale

Figure 6

2027 No-Build
Weekday Evening
Peak Hour Traffic Volumes

Vanasse & Associates inc

PROJECT-GENERATED TRAFFIC

The Project entails constructing 176 residential units to be located on the Mugar Parcel in Arlington, Massachusetts. In order to develop the traffic characteristics of the proposed Project, trip-generation statistics published by the ITE for LUC 221, *Multifamily Housing (Mid-Rise)* were used in conjunction with mode split data from a traffic monitoring report prepared for the[11] report for the Vox on Two residential development located at 223 Concord Turnpike.

Vox on Two Mode Split Data

Mode split data from the Vox on Two residential development was used in trip-generation calculations. Vox on Two is located at 223 Concord Turnpike in Cambridge, Massachusetts. The Project is anticipated to have similar commuting characteristics as the Vox on Two site as they are in close proximity with one another, have similar access to transit and sustainable transportation facilities, and are likely to appeal to the same demographic tenant base. The Vox on Two 2019 mode split characteristics are provided in Table 4.

Table 4
VOX ON TWO: 2019 MODE SPLIT[a]

Mode	Percent
Single Occupancy Vehicle	39
High Occupancy Vehicle	6
Transit	35
Bike	5
Walk	14
Other	1
TOTAL	100

[a]From Vox on Two 2019 PTDM Report filed with the City of Cambridge Community Development Department.

Site-Generated Trips by Mode

The Vox on Two mode split data was then applied to the ITE trip-generation projections for LUC 221 to determine the site-generated trips by mode. A summary of the expected site-generated trips by mode is provided in Table 5.

[11]2019 *Parking and Transportation Demand Management* (PTDM) *Report;* Vox on Two; Cambridge, MA; 2019.

Table 5
PROJECT TRIP GENERATION SUMMARY

Time Period/ Directional Distribution	ITE Project Vehicle Trips[a]	Project Person Trips[b]	SOV Trips 39%	HOV Trips 6%	Transit Trips 35%	Bike Trips 5%	Walk Trips 14%	Other Trips 1%	Total Project Vehicle Trips[c]
Weekday Daily	958	1,082	422	64	378	54	152	12	430
Weekday Morning Peak Hour:									
Entering	16	18	7	1	6	1	3	0	7
Exiting	44	50	20	3	18	2	7	0	20
Total	60	68	27	4	24	3	10	0	27
Weekday Evening Peak Hour:									
Entering	46	52	20	3	18	3	7	1	20
Exiting	30	34	13	2	12	2	5	0	13
Total	76	86	33	5	30	5	12	1	33

[a]Based on ITE LUC 221, Multifamily Housing (Mid-Rise); 176 units.
[b]ITE vehicle trips multiplied by VOR from American Community Survey 2018 5-year estimates for Census Tract 3561; VOR = 1.13
[c]SOV+HOV persons trips divided by VOR from American Community Survey 2018 5-year estimates for Census Tract 3561; VOR = 1.13

As can be seen in Table 5, the Project is expected to generate 430 vehicle trips on an average weekday (two-way, 24-hour volume), with 27 vehicle trips (7 entering and 20 exiting) expected during the weekday morning peak hour. During the weekday evening peak hour, the Project is expected to generate 33 vehicle trips (20 entering and 13 exiting). Transit, bike, and walking trips are expected to generate 37 weekday morning person trips and 47 weekday evening person trips.

TRIP DISTRIBUTION AND ASSIGNMENT

The Project trip distribution was based on a review of existing travel patterns at the study area intersections and Journey-to-Work data for Arlington obtained from the United States Census Bureau.[12] The trip distribution for the Project is summarized in Table 6 and graphically depicted on Figure 7. The weekday morning and weekday evening peak-hour traffic volumes expected to be generated by the Project were assigned on the study area roadway network as shown on Figure 8 and Figure 9, respectively.

[12]*2011-2015 5-Year American Community Survey;* U.S. Census Bureau; 2019.

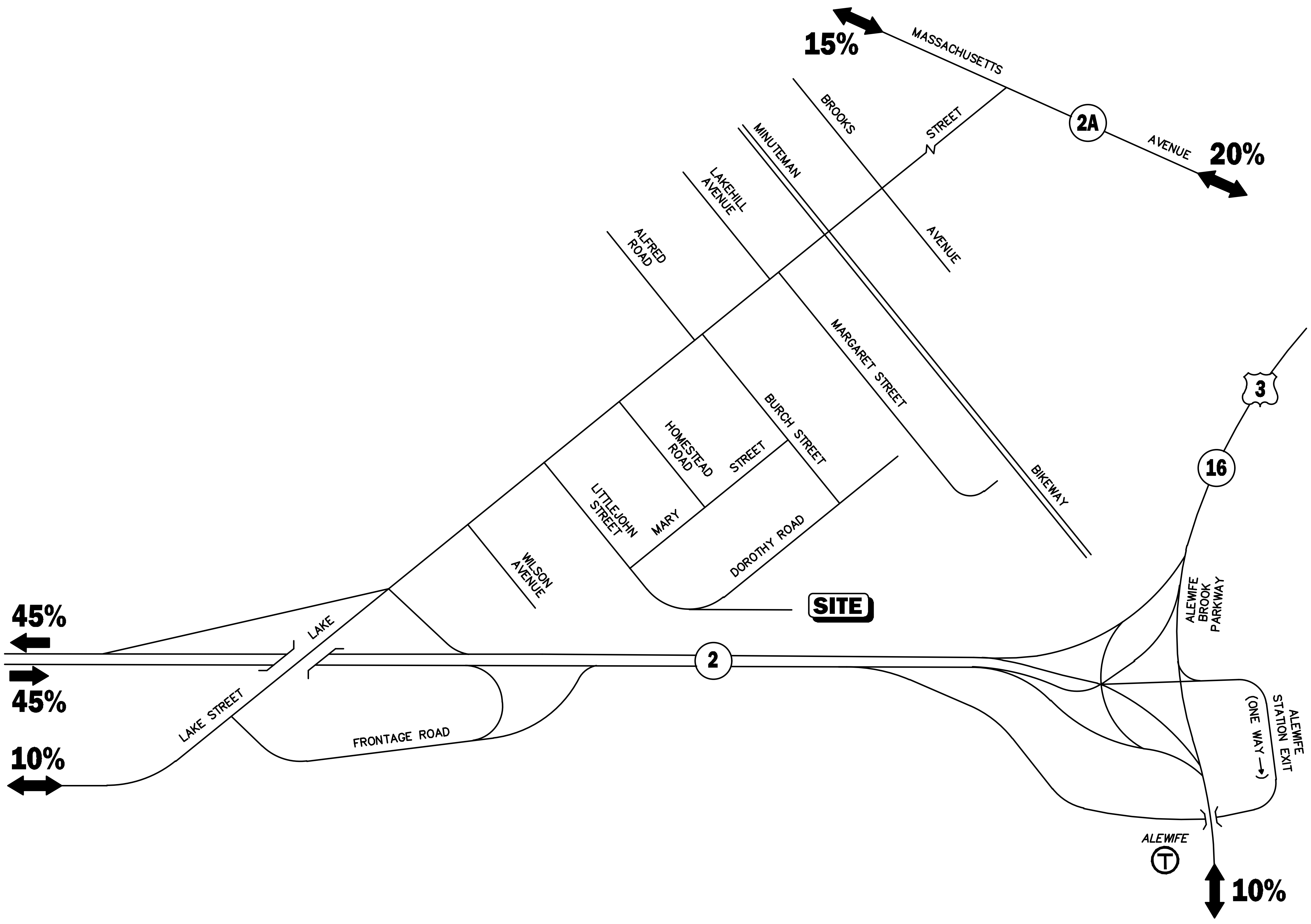


Figure 7

Trip Distribution Map

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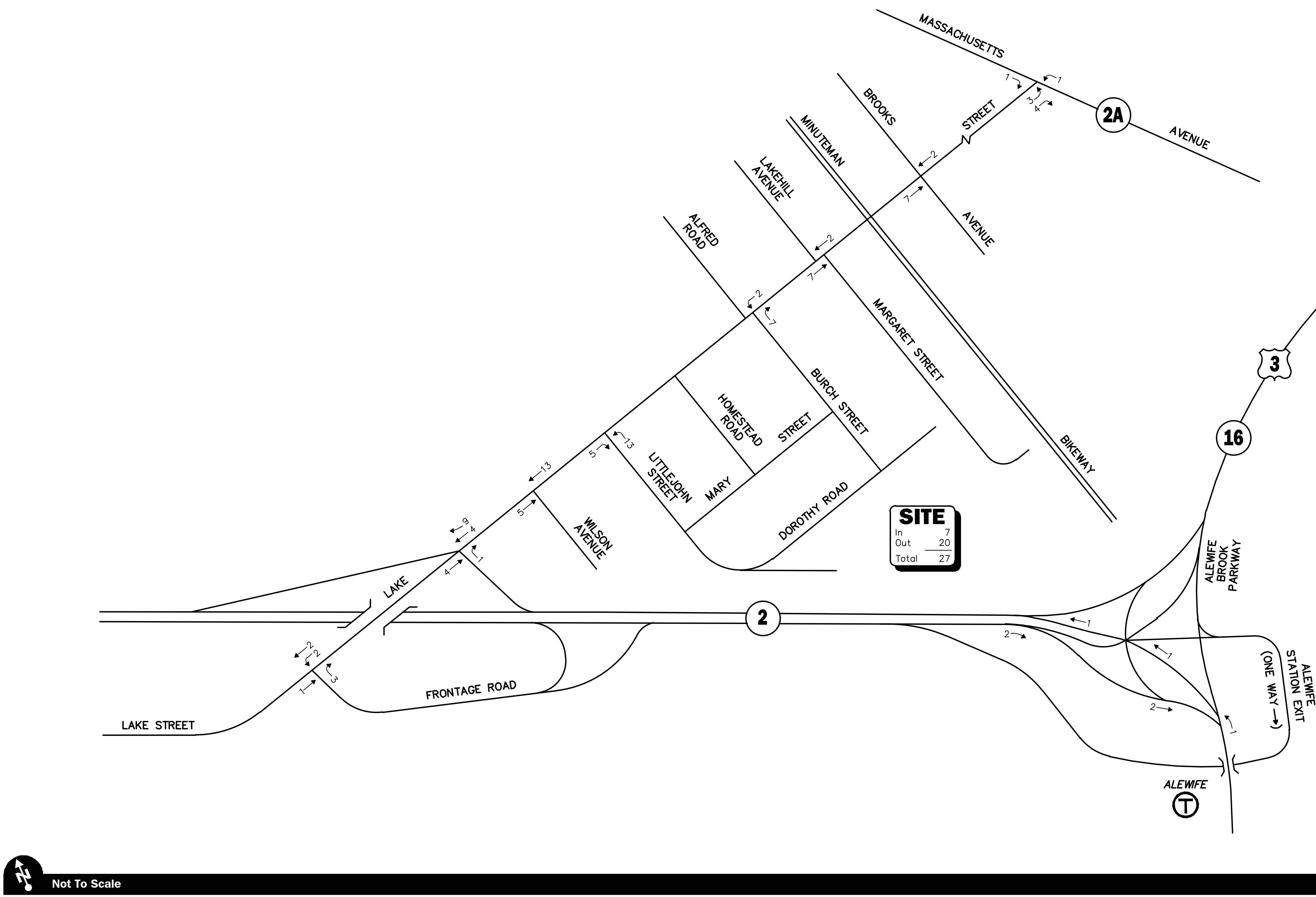

Figure 8

Site Generated
Weekday Morning
Peak Hour Traffic Volumes

Vanasse & Associates inc

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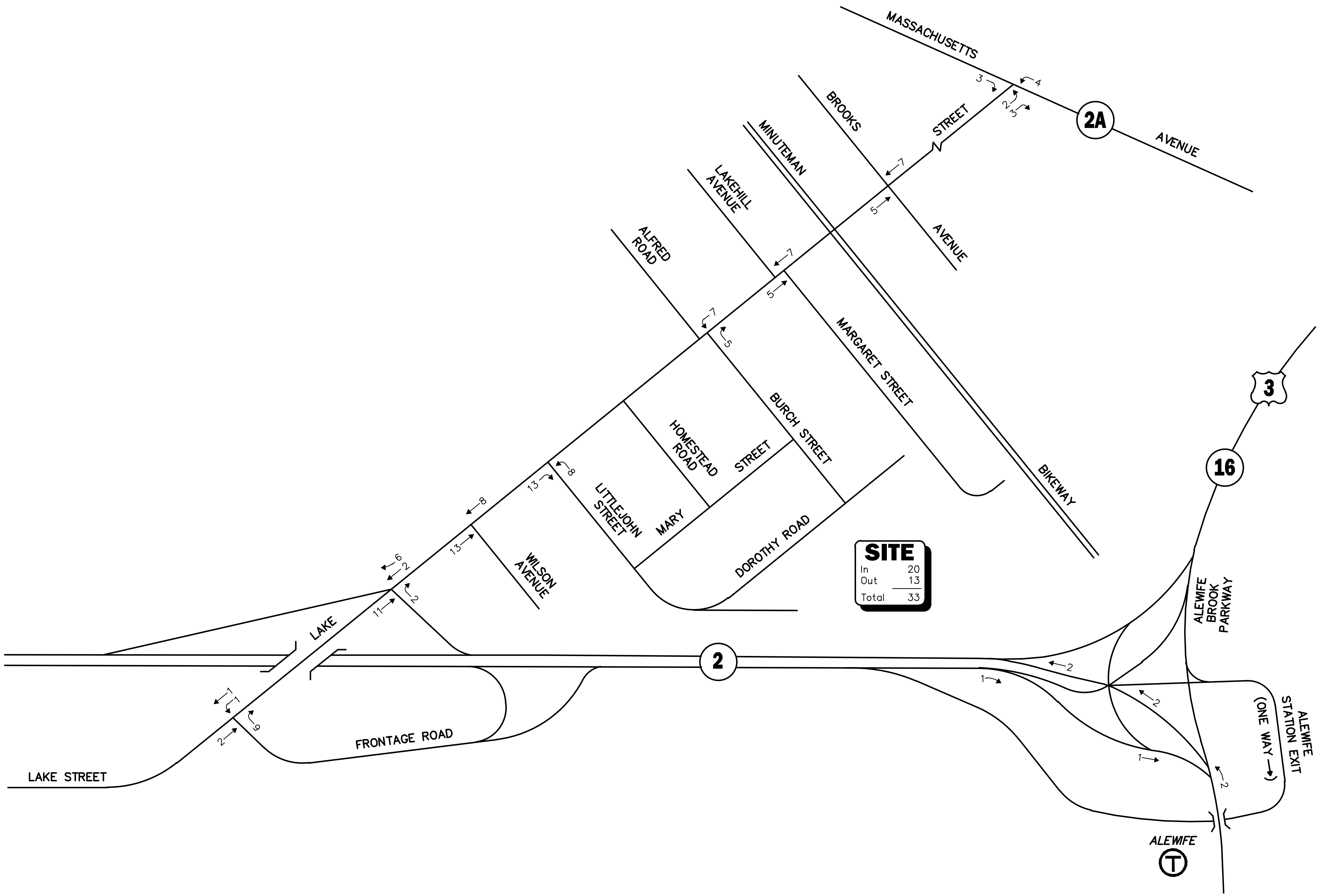

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Figure 9

Site Generated Weekday Evening Peak Hour Traffic Volumes

Vanasse & Associates inc

Table 6
TRIP-DISTRIBUTION SUMMARY

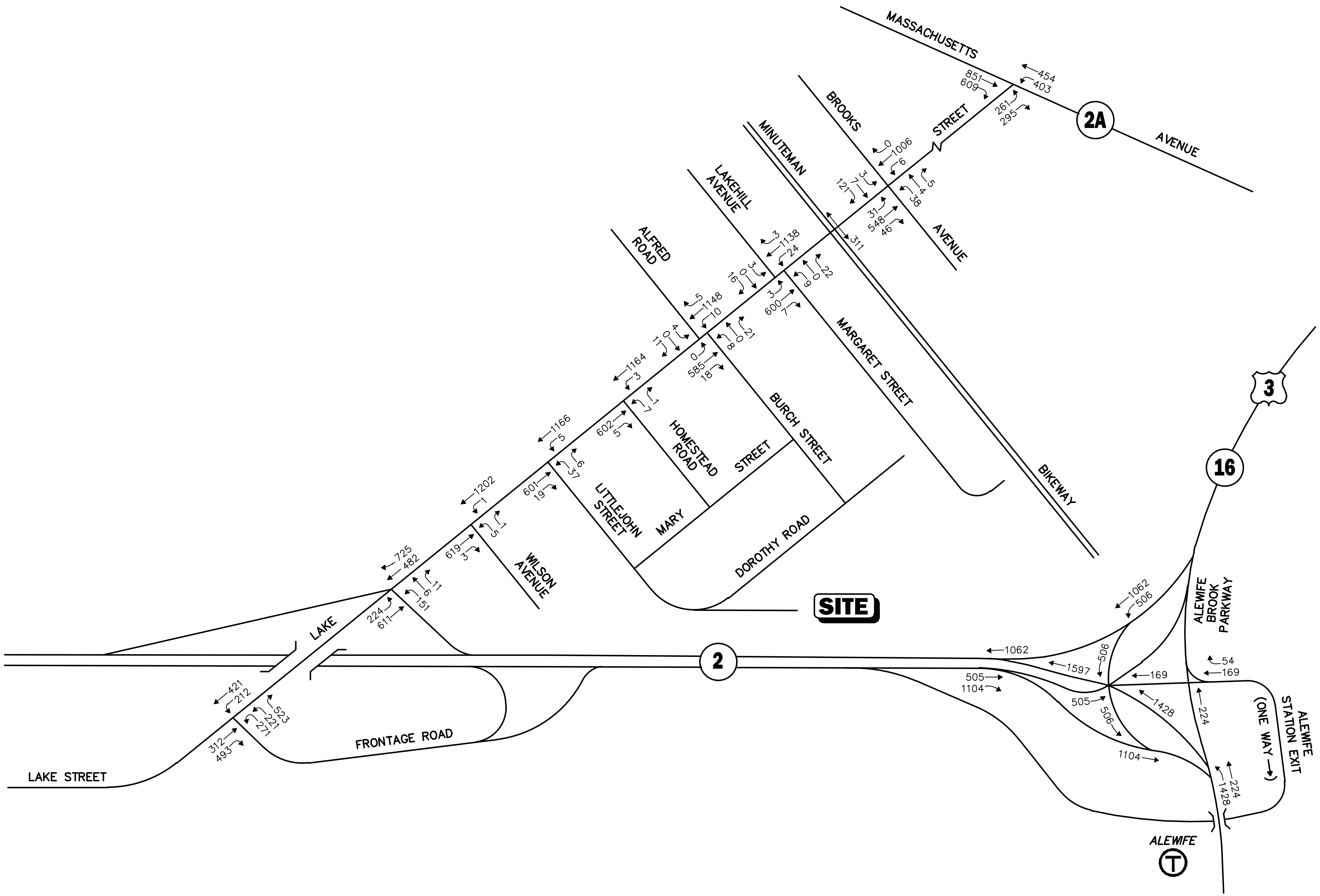
Roadway	Direction (To/From)	Percentage of Site Traffic
Route 2	West	45
Lake Street	West	10
Massachusetts Avenue	North	15
Massachusetts Avenue	South	20
Alewife Brook Parkway	South	10
TOTAL		100

FUTURE TRAFFIC VOLUMES – BUILD CONDITION

The 2027 Build condition networks consist of the 2027 No-Build traffic volumes with the anticipated site-generated traffic added to them. The 2027 Build weekday morning and weekday evening peak-hour traffic-volume networks are graphically depicted on Figure 10 and Figure 11, respectively.

A summary of peak-hour projected traffic-volume increases external to the study area that is the subject of this assessment is shown in Table 7. These volumes are based on the expected increases from the Project.

As shown in Table 7, Project-related traffic-volume increases external to the study area relative to 2027 No-Build conditions are anticipated to range from 0.1 to 0.8 percent during the peak periods.



Note: Imbalances exist due to numerous curb cuts and side streets that are not shown.

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Figure 10

2027 Build
Weekday Morning
Peak Hour Traffic Volumes

Vanasse & Associates inc

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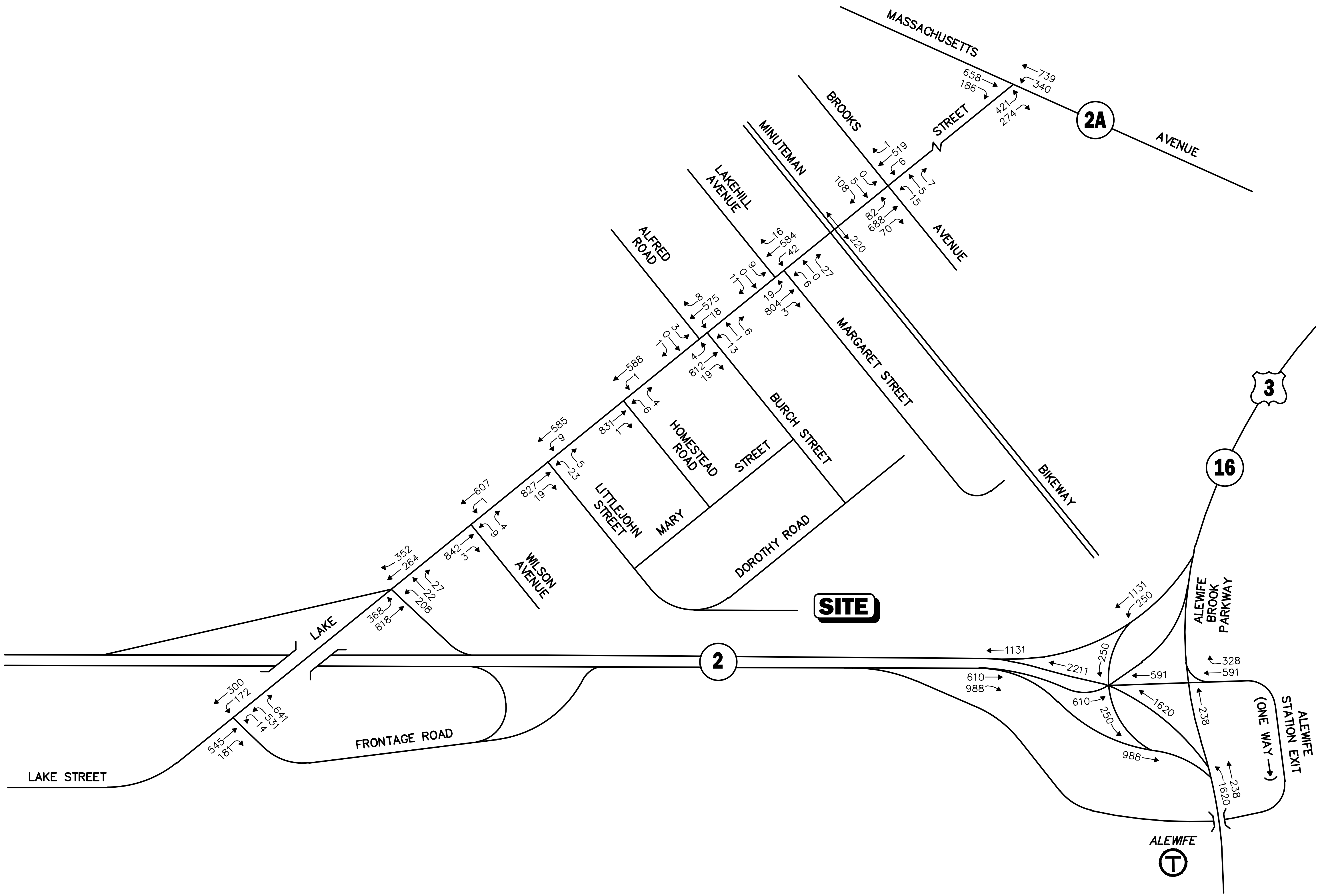


Note: Imbalances exist due to numerous curb cuts and side streets that are not shown.

Not To Scale

Figure 11

2027 Build
Weekday Evening
Peak Hour Traffic Volumes

Vanasse & Associates inc

Table 7
PEAK-HOUR TRAFFIC-VOLUME INCREASES[a]

Location/Peak Hour	2027 No-Build	2027 Build	Traffic-Volume Increase Over No-Build	Percent Increase Over No-Build
Route 2, west of Lake Street:				
Weekday Morning	1,958	1,970	12	0.6
Weekday Evening	1,913	1,928	15	0.8
Lake Street, west of Route 2 EB On/Off-Ramps:				
Weekday Morning	1,444	1,447	3	0.2
Weekday Evening	1,554	1,557	3	0.2
Massachusetts Avenue, north of Lake Street:				
Weekday Morning	2,171	2,175	4	0.2
Weekday Evening	1,999	2,004	5	0.3
Massachusetts Avenue, south of Lake Street:				
Weekday Morning	1,998	2,003	5	0.3
Weekday Evening	2,004	2,011	7	0.3
Alewife Brook Parkway, south of Route 2:				
Weekday Morning	3,259	3,262	3	0.1
Weekday Evening	3,093	3,096	3	0.1

[a]Two-way traffic total.

PARKING ANALYSIS

A parking analysis for the proposed development was conducted utilizing parking ratio requirements from the Town of Arlington Zoning Bylaw. Table 8 summarizes the parking analysis.

Table 8
PARKING ANALYSIS

Room Type	Number of Units	Required Rate	Required Spaces
Studio	11	1 space/unit	11
1-bedroom	87	1.15 spaces/unit	101
2-bedroom	58	1.5 spaces/unit	87
3-bedroom	20	2 spaces/unit	40
Total	176	--	239
		Spaces Provided	239

As can be seen from Table 8, the site is required to provide 239 parking spaces for the proposed 176 units. Accordingly, the Project proposes to construct 239 spaces onsite. This results in a ratio of 1.36 spaces per unit, which is generally consistent with data from the ITE *Parking Generation Manual*.[13] The ITE indicates that parking demand for this size development would be accommodated with a rate of 1.31 spaces per unit. Therefore, it is anticipated that adequate parking will be provided on site for the Project.

Both the Vox on Two and the recently completed Tempo apartment developments in Cambridge have been constructed with a parking ratio of 1 space per unit. In addition, based on the monitoring report, approximately 14 percent of Vox residents do not have any vehicles and therefore do not need any parking. Since the Project is in a similar location as the Vox on Two development with similar access to the Alewife MBTA Station and arguably better access to the Minuteman Bikeway, it is expected that similar parking usage will be the case for the Project.

In addition, the Project will also provide 144 bike parking spaces. These spaces will be located in the garage and as such will provide sheltered secure bike storage, which is typically viewed as critical to encouraging the use of this sustainable form of transportation. It is anticipated that with the bike parking on site, the proposed mitigation (identified later in this report), and the site's close proximity to the Minuteman Bikeway, the Project will appeal to an active resident demographic that is more focused on sustainable transportation than personal vehicle use.

[13] *Parking Generation Manual, 5th Edition*; ITE; Washington, D.C.; January 2019.

TRAFFIC OPERATIONS ANALYSIS

Measuring existing and future traffic volumes quantifies traffic flow within the study area. To assess quality of flow, roadway capacity and vehicle queue analyses were conducted under Existing, No-Build, and Build traffic-volume conditions. Capacity analyses provide an indication of how well the roadway facilities serve the traffic demands placed upon them, with vehicle queue analyses providing a secondary measure of the operational characteristics of an intersection or section of roadway under study.

METHODOLOGY

Levels of Service

A primary result of capacity analyses is the assignment of level of service to traffic facilities under various traffic-flow conditions.[14] The concept of level of service is defined as a qualitative measure describing operational conditions within a traffic stream and their perception by motorists and/or passengers. A level-of-service definition provides an index to quality of traffic flow in terms of such factors as speed, travel time, freedom to maneuver, traffic interruptions, comfort, convenience, and safety.

Six levels of service are defined for each type of facility. They are given letter designations from A to F, with level-of-service (LOS) A representing the best operating conditions and LOS F representing congested or constrained operating conditions.

Since the level of service of a traffic facility is a function of the traffic flows placed upon it, such a facility may operate at a wide range of levels of service, depending on the time of day, day of week, or period of year.

[14]The capacity analysis methodology is based on the concepts and procedures presented in the *Highway Capacity Manual 6th Edition;* Transportation Research Board; Washington, DC; 2016.

Unsignalized Intersections

The six levels of service for unsignalized intersections may be described as follows:

- *LOS A* represents a condition with little or no control delay to minor street traffic.
- *LOS B* represents a condition with short control delays to minor street traffic.
- *LOS C* represents a condition with average control delays to minor street traffic.
- *LOS D* represents a condition with long control delays to minor street traffic.
- *LOS E* represents operating conditions at or near capacity level, with very long control delays to minor street traffic.
- *LOS F* represents a condition where minor street demand volume exceeds capacity of an approach lane, with extreme control delays resulting.

The levels of service of unsignalized intersections are determined by application of a procedure described in the *Highway Capacity Manual 6th Edition.*[15] Level of service is measured in terms of average control delay. Mathematically, control delay is a function of the capacity and degree of saturation of the lane group and/or approach under study and is a quantification of motorist delay associated with traffic control devices such as traffic signals and STOP signs. Control delay includes the effects of initial deceleration delay approaching a STOP sign, stopped delay, queue move-up time, and final acceleration delay from a stopped condition. Definitions for level of service at unsignalized intersections are also given in the *Highway Capacity Manual 6th Edition*. Table 9 summarizes the relationship between level of service and average control delay for two-way stop controlled and all-way stop controlled intersections.

Table 9
LEVEL-OF-SERVICE CRITERIA FOR UNSIGNALIZED INTERSECTIONS[a]

Level-Of-Service by Volume-to-Capacity Ratio		Average Control Delay (Seconds Per Vehicle)
v/c ≤ 1.0	v/c > 1.0	
A	F	≤10.0
B	F	10.1 to 15.0
C	F	15.1 to 25.0
D	F	25.1 to 35.0
E	F	35.1 to 50.0
F	F	>50.0

[a]Source: *Highway Capacity Manual 6th Edition*; Transportation Research Board; Washington, DC; 2016; page 20-6.

[15]*Highway Capacity Manual 6th Edition*; Transportation Research Board; Washington, DC; 2016.

Signalized Intersections

The six levels of service for signalized intersections may be described as follows:

- *LOS A* describes operations with very low control delay; most vehicles do not stop at all.

- *LOS B* describes operations with relatively low control delay. However, more vehicles stop than LOS A.

- *LOS C* describes operations with higher control delays. Individual cycle failures may begin to appear. The number of vehicles stopping is significant at this level, although many still pass through the intersection without stopping.

- *LOS D* describes operations with control delay in the range where the influence of congestion becomes more noticeable. Many vehicles stop and individual cycle failures are noticeable.

- *LOS E* describes operations with high control delay values. Individual cycle failures are frequent occurrences.

- *LOS F* describes operations with high control delay values that often occur with oversaturation. Poor progression and long cycle lengths may also be major contributing causes to such delay levels.

Levels of service for signalized intersections are calculated using the operational analysis methodology of the *Highway Capacity Manual 6th Edition*. This method assesses the effects of signal type, timing, phasing, and progression; vehicle mix; and geometrics on delay. Level-of-service designations are based on the criterion of control or signal delay per vehicle. Control or signal delay is a measure of driver discomfort, frustration, and fuel consumption, and includes initial deceleration delay approaching the traffic signal, queue move-up time, stopped delay, and final acceleration delay. Table 10 summarizes the relationship between level of service and control delay. The tabulated control delay criterion may be applied in assigning level-of-service designations to individual lane groups, to individual intersection approaches, or to entire intersections.

Table 10
LEVEL-OF-SERVICE CRITERIA
FOR SIGNALIZED INTERSECTIONS[a]

Level-of-Service by Volume-to-Capacity Ratio		Average Control Delay (Seconds Per Vehicle)
v/c ≤ 1.0	v/c > 1.0	
A	F	≤10.0
B	F	10.1 to 20.0
C	F	20.1 to 35.0
D	F	35.1 to 55.0
E	F	55.1 to 80.0
F	F	>80.0

[a]Source: *Highway Capacity Manual 6th Edition*; Transportation Research Board; Washington, DC; 2016; page 19-16.

ANALYSIS RESULTS

Level-of-service analyses were conducted for 2020 Baseline, 2027 No-Build, and 2027 Build conditions for the study area intersections. The results of the intersection capacity analysis within the study area are described below, with a tabular summary provided in Table 11 and Table 12.

Unsignalized Intersection Analysis Results

Lake Street at Wilson Avenue

Under all existing and future conditions, the critical movement at this intersection operates at LOS F during the weekday morning and at LOS E during the weekday evening peak hour.

Lake Street at Littlejohn Street

Under all existing and future conditions, the critical movement at this intersection operates at LOS F during the weekday morning peak hour. During the weekday evening peak hour, the critical movement at this intersection operates at LOS D under 2020 Baseline conditions and LOS E during 2027 No-Build and 2027 Build conditions.

Lake Street at Homestead Road

Under all existing and future conditions, the critical movement at this intersection operates at LOS F during the weekday morning and at LOS D during the weekday evening peak hour.

Lake Street at Burch Street and Alfred Road

The critical movements at this intersection operate at LOS E under the 2020 Baseline conditions during both the weekday morning and weekday evening peak hours. Under the 2027 No-Build condition the northbound movement operates at LOS F while the southbound movement operates at LOS E during both the weekday morning and weekday evening peak hours. Under the 2027 Build condition critical movements operate at LOS E during the weekday morning peak hour. The level of service remains unchanged during the weekday evening peak hour under 2027 Build conditions. The weekday morning peak hour level of service improves during the 2027 Build condition because project trips were added to the northbound right-turn movement which reduced the average delay for the approach.

Lake Street at Margaret Street and Lakehill Avenue

Under 2020 Baseline and 2027 No-Build conditions, the critical movements at this intersection operate at LOS F or better during the weekday morning and weekday evening peak hours. No changes to level of service occur as a result of the addition of Project volumes under 2027 Build conditions.

Dorothy Road/Littlejohn Street at Site Driveway

Under 2027 Build conditions, the critical movement at this intersection operates at LOS A during the weekday morning and weekday evening peak hours.

Table 11
UNSIGNALIZED INTERSECTION CAPACITY ANALYSIS SUMMARY

Intersection/	2020 Baseline				2027 No-Build				2027 Build			
Critical Movement/Peak Hour	V/C[a]	Delay[b]	LOS[c]	Queue[d]	V/C	Delay	LOS	Queue	V/C	Delay	LOS	Queue
Lake Street at Wilson Avenue:												
Weekday Morning:												
Wilson Avenue NB LT/RT	0.11	>50	F	10	0.13	>50	F	10	0.14	>50	F	13
Weekday Evening:												
Wilson Avenue NB LT/RT	0.13	36	E	10	0.14	40	E	13	0.15	41	E	13
Lake Street at Littlejohn Street:												
Weekday Morning:												
Littlejohn Street NB LT/RT	0.47	>50	F	50	0.56	>50	F	60	0.86	>50	F	103
Weekday Evening:												
Littlejohn Street NB LT/RT	0.18	35	D	15	0.20	39	E	18	0.30	46	E	30
Lake Street at Homestead Road:												
Weekday Morning:												
Homestead Road NB LT/RT	0.13	>50	F	10	0.16	>50	F	13	0.16	>50	F	13
Weekday Evening:												
Homestead Road NB LT/RT	0.08	28	D	8	0.09	31	D	8	0.09	31	D	8
Lake Street at Burch Street and Alfred Road:												
Weekday Morning:												
Burch Street NB LT/TH/RT	0.23	43	E	20	0.27	>50	F	25	0.30	47	E	30
Alfred Road SB LT/TH/RT	0.13	38	E	10	0.15	44	E	13	0.16	46	E	13
Weekday Evening:												
Burch Street NB LT/TH/RT	0.24	47	E	23	0.27	>50	F	25	0.30	51	F	30
Alfred Road SB LT/TH/RT	0.05	41	E	5	0.06	47	E	5	0.06	50	E	5
Lake Street at Margaret Street and Lakehill Avenue:												
Weekday Morning:												
Margaret Street NB LT/TH/RT	0.67	>50	F	73	0.80	>50	F	83	0.84	>50	F	88
Lakehill Avenue SB LT/TH/RT	0.16	34	D	15	0.20	40	E	18	0.20	40	E	18
Weekday Evening:												
Margaret Street NB LT/TH/RT	0.47	>50	F	50	0.54	>50	F	58	0.54	>50	F	58
Lakehill Avenue SB LT/TH/RT	0.26	>50	F	23	0.31	>50	F	28	0.31	>50	F	30
Dorothy Road/Littlejohn Street at Site Driveway:												
Weekday Morning:												
Site Driveway NB TH/RT	**Intersection constructed under 2027 Build conditions**								0.02	9	A	3
Weekday Evening:												
Site Driveway NB TH/RT									0.01	9	A	0

[a]Volume to capacity ratio.
[b]Delay in seconds per vehicle.
[c]Level of service.
[d]95th percentile queue length in feet.
NB = northbound; SB = southbound; EB = eastbound; WB = westbound; LT = left-turning movements; TH = through movements; RT = right-turning movements.

Signalized Intersection Analysis Results

Route 2 at Route 16

Signal 1

Under 2020 Baseline and 2027 No-Build conditions, this intersection operates at an overall LOS D or better during both the weekday morning and weekday evening peak hours. No changes to overall level of service occur as a result of the addition of Project volumes under 2027 Build conditions.

Signal 2

Under 2020 Baseline and 2027 No-Build conditions, this intersection operates at an overall LOS E during the weekday morning and overall LOS F during the weekday evening peak hours. No changes to overall level of service occur as a result of the addition of Project volumes under 2027 Build conditions.

Signal 3

Under 2020 Baseline and 2027 No-Build conditions, this intersection operates at an overall LOS C or better during both the weekday morning and weekday evening peak hours. No changes to overall level of service occur as a result of the addition of Project volumes under 2027 Build conditions.

Signal 4

Under 2020 Baseline and 2027 No-Build conditions, this intersection operates at an overall LOS A during both the weekday morning and weekday evening peak hours. No changes to overall level of service occur as a result of the addition of Project volumes under 2027 Build conditions.

Lake Street at Route 2 Eastbound On/Off-Ramps

Under 2020 Baseline and 2027 No-Build conditions, this intersection operates at an overall LOS D or better during both the weekday morning and weekday evening peak hours. No changes to overall level of service occur as a result of the addition of Project volumes under 2027 Build conditions.

Lake Street at Route 2 Westbound On/Off-Ramps

Under 2020 Baseline and 2027 No-Build conditions, this intersection operates at an overall LOS D or better during both the weekday morning and weekday evening peak hours. No changes to overall level of service occur as a result of the addition of Project volumes under 2027 Build conditions.

Lake Street at Minuteman Commuter Bikeway

Though this intersection is currently unsignalized, it was modeled in Synchro as signalized under Existing conditions to provide a consistent basis for analysis. Under 2027 No-Build and 2027 Build conditions the signal is coordinated with the signal at the intersection of Lake Street with Brooks Avenue. Under 2020 Baseline conditions, this intersection operates at an overall LOS D during the weekday morning and an overall LOS A during the weekday evening peak hour. Under 2027 No-Build conditions, when the signal is coordinated with the Brooks Avenue intersection, this intersection operates at an overall LOS C during the weekday morning peak hour and an overall

LOS B during the weekday evening peak hour. No changes to overall levels of service occur as a result of the addition of Project volumes under 2027 Build conditions.

Lake Street at Brooks Avenue

Under 2020 Baseline and 2027 No-Build conditions, this intersection operates at an overall LOS D or better during both the weekday morning and weekday evening peak hours. No changes to overall levels of service occur as a result of the addition of Project volumes under 2027 Build conditions during the weekday evening peak hour. The level of service changes from D to E during the weekday morning peak hour under 2027 Build conditions but the average delay only increases 1 second from 35 to 36 seconds.

Massachusetts Avenue at Lake Street

Under 2020 Baseline and 2027 No-Build conditions, this intersection operates at an overall LOS F or better during both the weekday morning and weekday evening peak hours. No changes to overall levels of service occur as a result of the addition of Project volumes under 2027 Build conditions.

Table 12
SIGNALIZED INTERSECTION CAPACITY ANALYSIS SUMMARY

Intersection/ Critical Movement/Peak Hour	2020 Baseline V/C[a]	Delay[b]	LOS[c]	Queue[d] 50th/95th	2027 No-Build V/C	Delay	LOS	Queue 50th/95th	2027 Build V/C	Delay	LOS	Queue 50th/95th
ROUTE 2 AT ROUTE 16 (4 SIGNALS)												
Signal 1: Route 2 WB at Route 16 SB:												
Weekday Morning:												
Route 2 EB LT	0.81	8	A	41/40	0.85	10	B	43/40	0.85	10	B	43/40
Route 2 SB RT	0.98	53	D	502/613	1.02	63	E	581/659	1.02	63	E	581/659
Overall	--	**27**	**C**	--	--	**32**	**C**	--	--	**32**	**C**	--
Weekday Evening:												
Route 2 WB TH	1.04	31	C	656/52	1.08	48	D	702/57	1.08	49	D	704/56
Route 16 SB RT	0.91	42	D	442/606	0.95	47	D	472/644	0.95	47	D	472/644
Overall	--	**35**	**C**	--	--	**48**	**D**	--	--	**48**	**D**	--
Signal 2: Route 2 EB at Route 16 NB/SB/Alewife Station Access Road:												
Weekday Morning:												
Route 2 EB LT	0.89	67	E	197/291	0.92	72	E	206/308	0.92	72	E	206/308
Alewife Station Access Road WB TH	0.25	17	B	82/134	0.26	17	B	86/138	0.26	17	B	86/138
Route 16 NB LT	1.04	69	E	665/804	1.09	>80	F	728/868	1.09	>80	F	730/868
Route 16 SB TH	0.70	46	D	213/259	0.72	47	D	223/269	0.72	47	D	223/269
Overall	--	**61**	**E**	--	--	**73**	**E**	--	--	**73**	**E**	--
Weekday Evening:												
Route 2 EB LT	1.14	>80	F	300/418	1.19	>80	F	326/446	1.19	>80	F	326/446
Alewife Station Access Road WB TH	0.82	29	C	399/578	0.85	33	C	422/639	0.85	33	C	422/639
Route 16 NB LT	1.10	89	F	741/880	1.14	>80	F	792/931	1.14	>80	F	794/933
Route 16 SB TH	0.30	38	D	81/119	0.31	38	D	84/123	0.31	38	D	84/123
Overall	--	**>80**	**F**	--	--	**>80**	**F**	--	--	**>80**	**F**	--
Signal 3: Route 16 NB/SB at Alewife Station Access Road:												
Weekday Morning:												
Alewife Station Access Road WB TH	0.17	8	A	48/78	0.17	9	A	50/81	0.17	9	A	50/81
Alewife Station Access Road WB RT	0.06	8	A	15/30	0.07	8	A	15/31	0.07	8	A	15/31
Route 16 NB TH	0.30	38	D	80/117	0.32	38	D	83/121	0.32	38	D	83/121
Overall	--	**23**	**C**	--	--	**23**	**C**	--	--	**23**	**C**	--
Weekday Evening:												
Alewife Station Access Road WB TH	0.54	15	B	227/320	0.56	16	B	239/337	0.56	16	B	239/337
Alewife Station Access Road WB RT	0.35	10	B	106/159	0.36	11	B	110/165	0.36	11	B	110/165
Route 16 NB TH	0.29	38	D	78/115	0.30	38	D	81/119	0.30	38	D	81/119
Overall	--	**18**	**B**	--	--	**19**	**B**	--	--	**19**	**B**	--

See notes at end of table.

Table 12 (Continued)
SIGNALIZED INTERSECTION CAPACITY ANALYSIS SUMMARY

Intersection/ Critical Movement/Peak Hour	2020 Baseline V/C[a]	2020 Baseline Delay[b]	2020 Baseline LOS[c]	2020 Baseline Queue[d] 50th/95th	2027 No-Build V/C	2027 No-Build Delay	2027 No-Build LOS	2027 No-Build Queue 50th/95th	2027 Build V/C	2027 Build Delay	2027 Build LOS	2027 Build Queue 50th/95th
Signal 4: Route 2 EB at Route 16 SB:												
Weekday Morning:												
Route 2 EB RT	0.50	11	B	209/258	0.52	12	B	220/272	0.52	12	B	221/272
Route 16 SB TH	0.59	3	A	5/0	0.62	4	A	5/0	0.62	4	A	5/0
Overall	--	**9**	**A**	--	--	**9**	**A**	--	--	**9**	**A**	--
Weekday Evening:												
Route 2 EB RT	0.48	11	B	198/245	0.50	11	B	209/255	0.50	11	B	210/258
Route 16 SB TH	0.25	1	A	0/0	0.26	1	A	0/1	0.26	1	A	0/1
Overall	--	**9**	**A**	--	--	**10**	**A**	--	--	**10**	**A**	--
LAKE STREET AT ROUTE 2 EB ON/OFF-RAMPS:												
Weekday Morning:												
Lake Street EB TH	0.59	25	C	95/176	0.64	28	C	118/204	0.65	28	C	119/205
Lake Street EB RT	0.26	0	A	0/0	0.30	0	A	0/0	0.30	0	A	0/0
Lake Street WB LT	0.56	28	C	62/116	0.58	27	C	83/151	0.58	27	C	84/152
Lake Street WB TH	0.25	7	A	39/53	0.25	7	A	42/57	0.25	7	A	43/57
Route 2 EB Off-Ramp NB LT	0.89	44	D	167/400	1.04	79	E	234/482	1.04	>80	F	236/482
Route 2 EB Off-Ramp NB RT	0.70	12	B	36/191	0.78	17	B	54/243	0.78	17	B	55/246
Overall	--	**18**	**B**	--	--	**26**	**C**	--	--	**27**	**C**	--
Weekday Evening:												
Lake Street EB TH	0.73	26	C	196/335	0.75	27	C	214/360	0.75	27	C	215/361
Lake Street EB RT	0.11	0	A	0/0	0.12	0	A	0/0	0.12	0	A	0/0
Lake Street WB LT	0.59	35	C	71/142	0.61	36	D	79/156	0.61	36	D	80/157
Lake Street WB TH	0.15	5	A	26/37	0.16	5	A	27/40	0.16	5	A	27/40
Route 2 EB Off-Ramp NB LT	1.08	>80	F	253/556	>1.20	>80	F	314/633	>1.20	>80	F	315/634
Route 2 EB Off-Ramp NB RT	0.81	19	B	57/279	0.90	28	C	90/362	0.90	29	C	92/367
Overall	--	**35**	**C**	--	--	**49**	**D**	--	--	**49**	**D**	--

See notes at end of table.

Table 12 (Continued)
SIGNALIZED INTERSECTION CAPACITY ANALYSIS SUMMARY

Intersection/ Critical Movement/Peak Hour	2020 Baseline V/C[a]	Delay[b]	LOS[c]	Queue[d] 50th/95th	2027 No-Build V/C	Delay	LOS	Queue 50th/95th	2027 Build V/C	Delay	LOS	Queue 50th/95th
Lake Street at Route 2 WB On/Off-Ramps:												
Weekday Morning:												
Lake Street EB LT	0.73	38	D	81/164	0.77	41	D	88/179	0.77	41	D	88/179
Lake Street EB TH	0.65	14	B	150/238	0.69	15	B	167/265	0.70	15	B	168/268
Lake Street WB TH	0.96	57	E	168/335	1.05	>80	F	214/378	1.06	>80	F	217/381
Lake Street WB RT	0.96	34	C	80/314	1.03	51	D	135/357	1.04	55	D	169/364
Route 2 WB Off-Ramp NB LT	0.18	18	B	22/47	0.23	19	B	28/56	0.23	19	B	28/56
Route 2 WB Off-Ramp NB LT/TH	0.19	18	B	23/48	0.22	19	B	28/55	0.22	19	B	28/55
Route 2 WB Off-Ramp NB RT	0.02	0	A	0/0	0.02	0	A	0/0	0.02	0	A	0/0
Overall	--	**32**	**C**	--	--	**44**	**D**	--	--	**45**	**D**	--
Weekday Evening:												
Lake Street EB LT	1.04	>80	F	155/289	1.18	>80	F	191/331	1.19	>80	F	191/331
Lake Street EB TH	0.89	27	C	246/461	0.93	32	C	274/502	0.94	34	C	281/513
Lake Street WB TH	0.62	27	C	84/149	0.64	27	C	90/160	0.64	27	C	91/161
Lake Street WB RT	0.58	7	A	0/55	0.59	7	A	0/56	0.59	7	A	0/57
Route 2 WB Off-Ramp NB LT	0.25	19	B	33/72	0.27	19	B	35/75	0.27	19	B	35/75
Route 2 WB Off-Ramp NB LT/TH	0.24	19	B	34/72	0.26	19	B	36/76	0.26	19	B	36/76
Route 2 WB Off-Ramp NB RT	0.04	0	A	0/0	0.04	0	A	0/0	0.05	0	A	0/0
Overall	--	**33**	**C**	--	--	**44**	**D**	--	--	**45**	**D**	--
Lake Street at Minuteman Commuter Bikeway:												
Weekday Morning:												
Lake Street EB TH	0.54	8	A	101/149	0.59	15	B	245/378	0.60	15	B	249/384
Lake Street WB TH	0.84	65	E	232/517	0.92	44	D	121/405	0.92	44	D	122/427
Overall	--	**43**	**D**	--	--	**33**	**C**	--	--	**33**	**C**	--
Weekday Evening:												
Lake Street EB LT/TH/RT	0.66	9	**A**	170/251	0.75	16	B	326/460	0.76	16	**B**	339/477
Lake Street WB LT/TH/RT	0.41	8	**A**	86/141	0.47	4	A	53/98	0.48	4	**A**	53/98
Overall	--	**9**	**A**	--	--	**11**	**B**	--	--	**11**	**B**	--
Lake Street at Brooks Avenue:												
Weekday Morning:												
Lake Street EB LT/TH/RT	0.59	19	B	55/408	0.62	4	A	9/3	0.62	4	A	8/3
Lake Street WB LT/TH/RT	0.98	38	D	147/772	0.99	63	E	618/1013	0.99	64	E	621/1017
Brooks Avenue NB LT/TH/RT	0.18	19	B	6/28	0.57	58	E	32/59	0.57	58	E	32/59
Brooks Avenue SB LT/TH/RT	0.42	9	A	2/35	0.47	14	B	7/41	0.47	14	B	7/41
Overall	--	**29**	**C**	--	--	**40**	**D**	--	--	**40**	**D**	--
Weekday Evening:												
Lake Street EB LT/TH/RT	0.85	71	E	97/636	0.82	8	A	33/38	0.83	8	A	29/57
Lake Street WB LT/TH/RT	0.50	10	B	43/286	0.47	10	A	147/234	0.48	10	A	150/237
Brooks Avenue NB LT/TH/RT	0.10	18	B	4/20	0.46	49	D	14/36	0.46	49	D	14/36
Brooks Avenue SB LT/TH/RT	0.38	9	A	1/30	0.55	16	B	3/37	0.55	16	B	3/37
Overall	--	**44**	**D**	--	--	**10**	**B**	--	--	**10**	**B**	--

See notes at end of table.

Table 12 (Continued)
SIGNALIZED INTERSECTION CAPACITY ANALYSIS SUMMARY

Intersection/ Critical Movement/Peak Hour	2020 Baseline V/C[a]	Delay[b]	LOS[c]	Queue[d] 50th/95th	2027 No-Build V/C	Delay	LOS	Queue 50th/95th	2027 Build V/C	Delay	LOS	Queue 50th/95th
MASSACHUSETTS AVENUE AT LAKE STREET:												
Weekday Morning:												
Lake Street EB LT/RT	1.12	>80	F	306/659	1.17	>80	F	335/698	1.18	>80	F	343/709
Massachusetts Avenue NB LT	>1.20	>80	F	211/512	>1.20	>80	F	250/559	>1.20	>80	F	251/562
Massachusetts Avenue NB TH	0.49	18	B	133/317	0.51	18	B	140/332	0.51	18	B	140/332
Massachusetts Avenue SB TH	0.75	32	C	198/371	0.77	33	C	208/409	0.77	33	C	208/409
Massachusetts Avenue SB RT	0.96	48	D	213/561	1.00	59	E	237/604	1.00	57	E	237/606
Overall	--	**76**	**E**	--	--	**91**	**F**	--	--	**>80**	**F**	--
Weekday Evening:												
Lake Street EB LT/RT	>1.20	>80	F	498/887	>1.20	>80	F	546/949	>1.20	>80	F	551/955
Massachusetts Avenue NB LT	0.96	58	E	89/359	1.02	75	E	93/393	1.04	79	E	95/402
Massachusetts Avenue NB TH	0.80	28	C	278/702	0.83	30	C	294/740	0.83	30	C	294/740
Massachusetts Avenue SB TH	0.58	28	C	142/265	0.60	28	C	148/277	0.60	28	C	148/277
Massachusetts Avenue SB RT	0.33	16	B	37/113	0.34	16	B	40/119	0.35	16	B	40/121
Overall	--	**>80**	**F**	--	--	**>80**	**F**	--	--	**>80**	**F**	--

[a]Volume to capacity ratio.
[b]Average stopped delay per vehicle (in seconds).
[c]Level-of-service.
[d]Queue length in feet.

RECOMMENDATIONS AND CONCLUSIONS

RECOMMENDATIONS

The traffic assessment contained herein indicates that the Project will not have substantial impacts at the study area intersections and Project-related traffic increases are expected to be between 0.1 percent and 0.8 percent during the peak hours depending on location. VAI recommends the following:

Bluebikes Station

- Subject to receiving the necessary approvals from the Town, the Project will commit to providing a large (23 dock) Bluebikes station in the vicinity of the existing Bluebikes station at Thorndike Field. This will serve to accommodate demand for Bluebikes in this heavily traveled bike corridor adjacent to the Minuteman Bikeway.

Site Recommendations

- The existing vegetation on the site frontage should be removed to provide adequate sight distance at the proposed site driveway location.

- The site driveway onto Dorothy Road should be placed under STOP-sign control, with painted STOP bars on the driveway at the STOP-sign location.

- At the site driveway, any new landscaping or building features should not exceed 24 inches in height or should be placed out of the lines of sight for motorists exiting the site and for those approaching the driveways on Dorothy Road.

Transportation Demand Management Measures

- Designate an on-site employee as the site's Transportation Coordinator to oversee marketing and promoting of transportation options at the site.

- Provide new residents transportation information packets with information on getting around Arlington sustainably.

- Provide Transitscreen installation in the building lobby which depicts accurate real-time information for area transit, Bluebikes stations, and Uber/Lyft services in the area.

- The property management team will provide information on available pedestrian and bicycle facilities in the vicinity of the Project site. This information will be posted in a centralized location.

- The property management team will investigate joining either the 128 Business Council or the Alewife TMA. Either TMA could provide a ridematching program among residents of the Project and employers of the area.

CONCLUSIONS

VAI has completed a transportation assessment of the potential impacts on the surrounding transportation infrastructure associated with the proposed Thorndike Place residential development to be located on the Mugar Parcel in Arlington, Massachusetts. The following specific areas have been evaluated as they relate to the Project: i) access requirements; ii) potential off-site improvements; and iii) safety considerations; under existing and future conditions, both with and without the Project.

The Project is expected to produce a minor increase in traffic volumes in the vicinity of the site and minor but manageable increases in delays to various movements within the study area. No changes to critical movement levels of service occur as a result of the addition of Project volumes under 2027 Build conditions. The level of service does go from D to E during the weekday morning peak hour under 2027 Build conditions at the intersection of Lake Street with Brooks Avenue but the average delay only increases 1 second from 35 to 36 seconds.

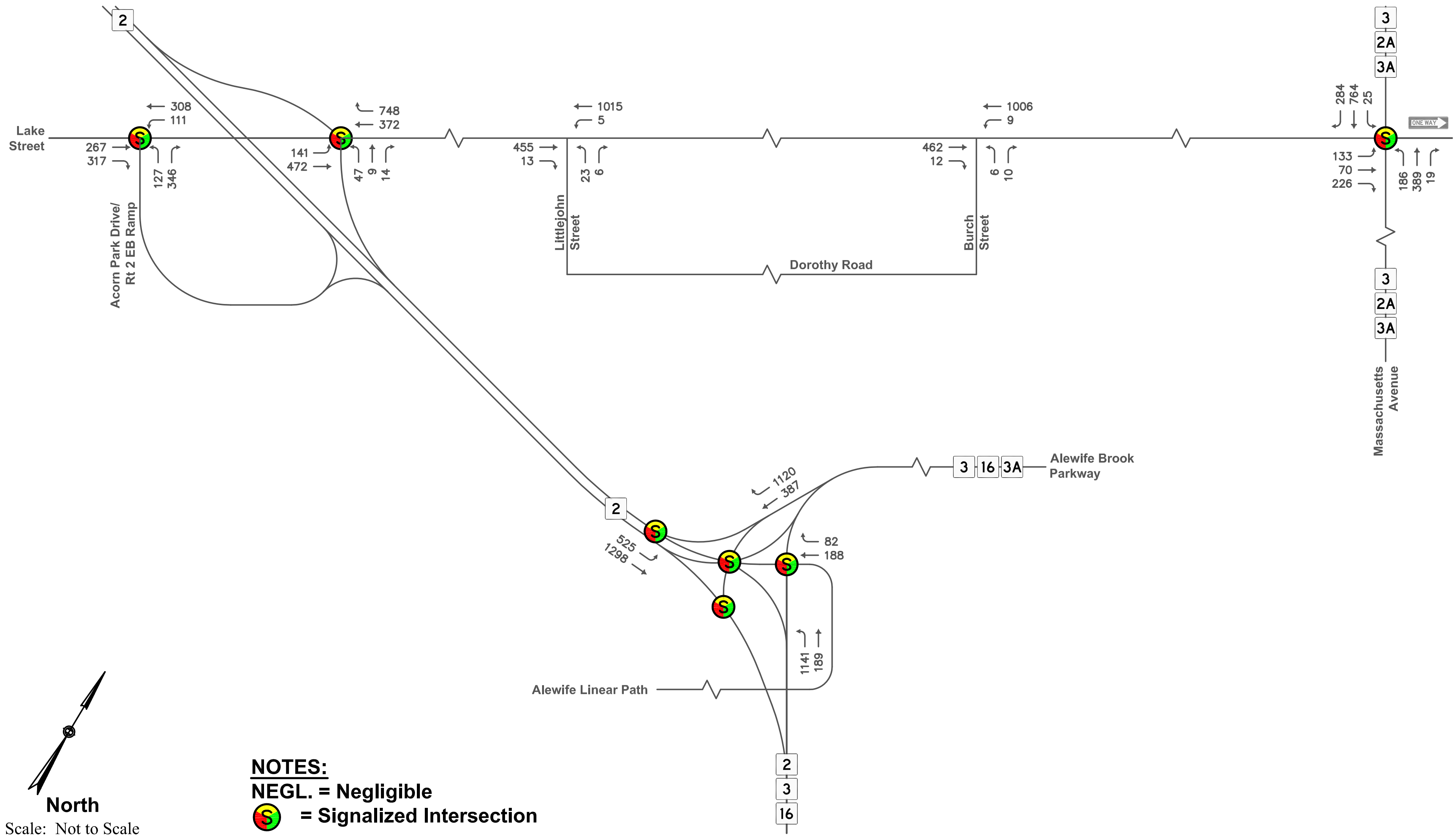
The proposed addition of a large Bluebikes station adjacent to the existing station at Thorndike Field will help to alleviate demand for Bluebikes in this area, adjacent to the Minuteman Bikeway. This in combination with the proposal to include 144 sheltered bike parking spaces will encourage the use of bicycling as a sustainable commuting measure over the use of personal vehicles.

Based on the above, VAI has concluded that the Project can be safely accommodated with minimal impact on the area road network.

APPENDIX

TRAFFIC COUNT DATA
MINUTEMAN COMMUTER BIKEWAY DATA
SEASONAL ADJUSTMENT DATA
COVID-19 ADJUSTMENT DATA
PUBLIC TRANSPORTATION SCHEDULES
MOTOR VEHICLE CRASH DATA
GROWTH RATE DATA
TRIP GENERATION CALCULATIONS
JOURNEY TO WORK DATA
CAPACITY ANALYSIS

TRAFFIC COUNT DATA



Scale: Not to Scale

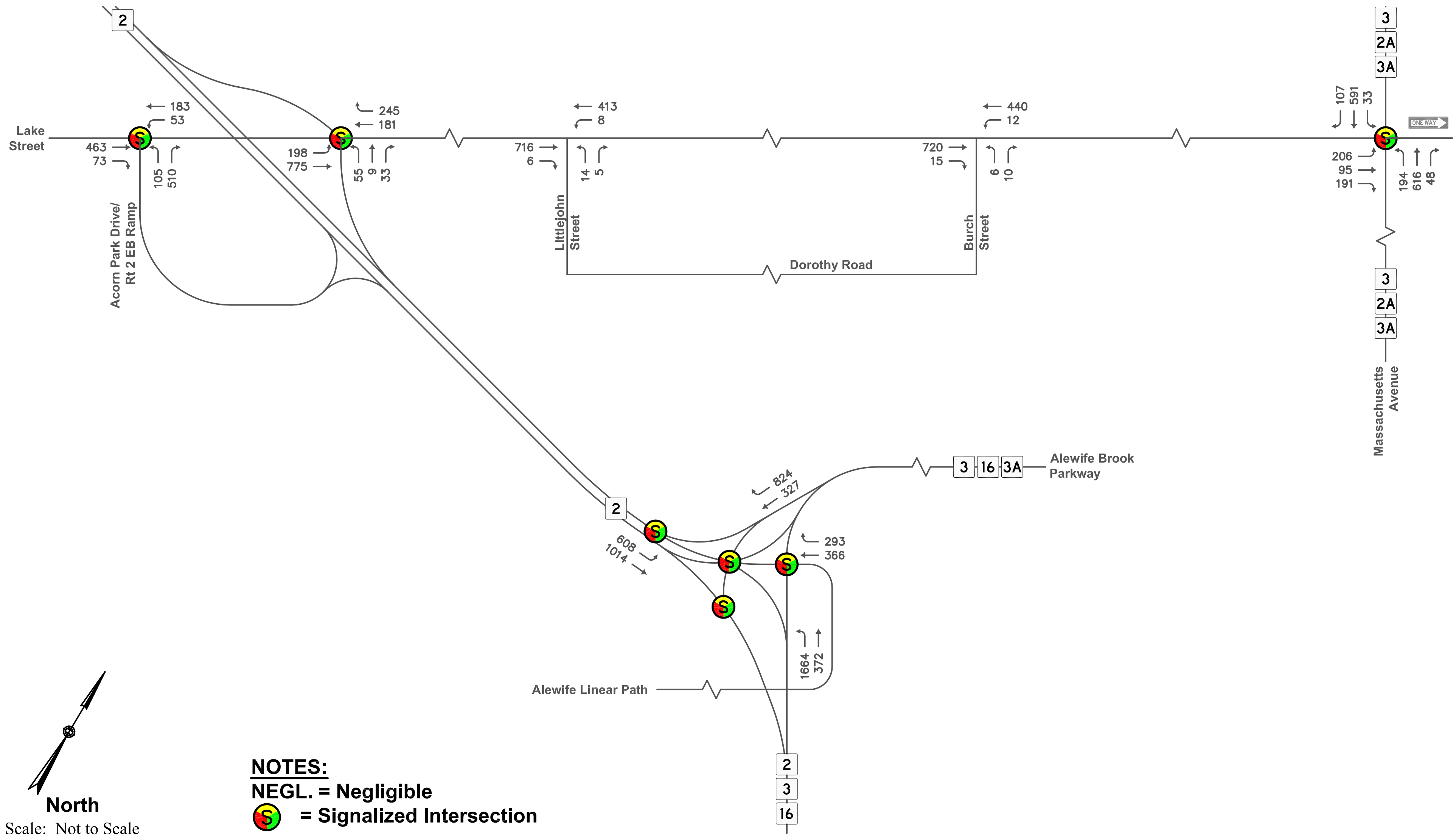
NOTES:
NEGL. = Negligible
= Signalized Intersection

MDM TRANSPORTATION CONSULTANTS, INC.
Planners & Engineers

Figure 3

2014 Existing Conditions
Weekday Morning Peak Hour Traffic Volumes

Date: February 2014
Dwg No. 754 TIAS.dwg



MDM TRANSPORTATION CONSULTANTS, INC.
Planners & Engineers

Figure 4

2014 Existing Conditions
Weekday Evening Peak Hour Traffic Volumes

Date: February 2014
Dwg No. 754 TIAS.dwg

Accurate Counts
978-664-2565

N/S Street : Lake Street
E/W Street : Frontage Road
City/State : Cambridge, MA
Weather : Clear

File Name : 7277A002
Site Code : 7277A002
Start Date : 9/14/2016
Page No : 1

Groups Printed- Cars - Trucks - Buses

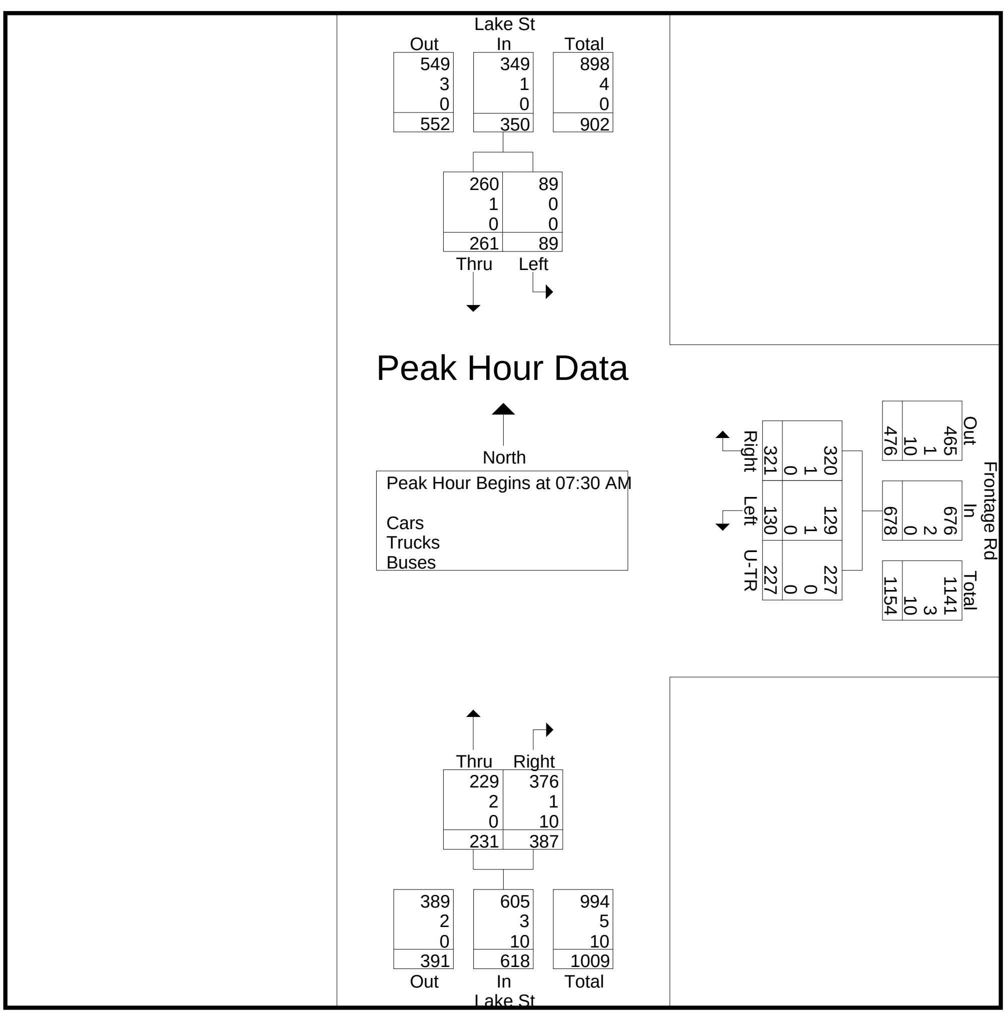
	Lake St From North		Frontage Rd From East			Lake St From South		
Start Time	Left	Thru	Left	Right	U-TR	Thru	Right	Int. Total
07:30 AM	21	58	24	102	60	63	75	403
07:45 AM	19	67	36	83	63	48	95	411
Total	40	125	60	185	123	111	170	814
08:00 AM	19	62	33	64	46	59	108	391
08:15 AM	30	74	37	72	58	61	109	441
08:30 AM	25	72	33	86	44	65	77	402
08:45 AM	28	65	30	75	50	44	70	362
Total	102	273	133	297	198	229	364	1596
09:00 AM	25	70	35	92	50	57	49	378
09:15 AM	17	71	21	85	19	41	29	283
Grand Total	184	539	249	659	390	438	612	3071
Apprch %	25.4	74.6	19.2	50.8	30	41.7	58.3	
Total %	6	17.6	8.1	21.5	12.7	14.3	19.9	
Cars	183	537	248	658	390	435	589	3040
% Cars	99.5	99.6	99.6	99.8	100	99.3	96.2	99
Trucks	1	2	1	1	0	3	2	10
% Trucks	0.5	0.4	0.4	0.2	0	0.7	0.3	0.3
Buses	0	0	0	0	0	0	21	21
% Buses	0	0	0	0	0	0	3.4	0.7

Accurate Counts
978-664-2565

N/S Street : Lake Street
E/W Street : Frontage Road
City/State : Cambridge, MA
Weather : Clear

File Name : 7277A002
Site Code : 7277A002
Start Date : 9/14/2016
Page No : 2

	Lake St From North			Frontage Rd From East				Lake St From South			
Start Time	Left	Thru	App. Total	Left	Right	U-TR	App. Total	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:30 AM to 09:15 AM - Peak 1 of 1											
Peak Hour for Entire Intersection Begins at 07:30 AM											
07:30 AM	21	58	79	24	102	60	186	63	75	138	403
07:45 AM	19	67	86	36	83	63	182	48	95	143	411
08:00 AM	19	62	81	33	64	46	143	59	108	167	391
08:15 AM	30	74	104	37	72	58	167	61	109	170	441
Total Volume	89	261	350	130	321	227	678	231	387	618	1646
% App. Total	25.4	74.6		19.2	47.3	33.5		37.4	62.6		
PHF	.742	.882	.841	.878	.787	.901	.911	.917	.888	.909	.933
Cars	89	260	349	129	320	227	676	229	376	605	1630
% Cars	100	99.6	99.7	99.2	99.7	100	99.7	99.1	97.2	97.9	99.0
Trucks	0	1	1	1	1	0	2	2	1	3	6
% Trucks	0	0.4	0.3	0.8	0.3	0	0.3	0.9	0.3	0.5	0.4
Buses	0	0	0	0	0	0	0	0	10	10	10
% Buses	0	0	0	0	0	0	0	0	2.6	1.6	0.6



Accurate Counts
978-664-2565

N/S Street : Lake Street
E/W Street : Frontage Road
City/State : Cambridge, MA
Weather : Clear

File Name : 7277A002
Site Code : 7277A002
Start Date : 9/14/2016
Page No : 1

Groups Printed- Trucks

	Lake St From North		Frontage Rd From East			Lake St From South		
Start Time	Left	Thru	Left	Right	U-TR	Thru	Right	Int. Total
07:30 AM	0	1	0	0	0	0	0	1
07:45 AM	0	0	0	0	0	0	1	1
Total	0	1	0	0	0	0	1	2
08:00 AM	0	0	0	0	0	0	0	0
08:15 AM	0	0	1	1	0	2	0	4
08:30 AM	0	1	0	0	0	1	0	2
08:45 AM	0	0	0	0	0	0	0	0
Total	0	1	1	1	0	3	0	6
09:00 AM	1	0	0	0	0	0	1	2
09:15 AM	0	0	0	0	0	0	0	0
Grand Total	1	2	1	1	0	3	2	10
Apprch %	33.3	66.7	50	50	0	60	40	
Total %	10	20	10	10	0	30	20	

Accurate Counts
978-664-2565

N/S Street : Lake Street
E/W Street : Frontage Road
City/State : Cambridge, MA
Weather : Clear

File Name : 7277A002
Site Code : 7277A002
Start Date : 9/14/2016
Page No : 1

Groups Printed- Buses

	Lake St From North		Frontage Rd From East			Lake St From South		
Start Time	Left	Thru	Left	Right	U-TR	Thru	Right	Int. Total
07:30 AM	0	0	0	0	0	0	3	3
07:45 AM	0	0	0	0	0	0	3	3
Total	0	0	0	0	0	0	6	6
08:00 AM	0	0	0	0	0	0	3	3
08:15 AM	0	0	0	0	0	0	1	1
08:30 AM	0	0	0	0	0	0	3	3
08:45 AM	0	0	0	0	0	0	3	3
Total	0	0	0	0	0	0	10	10
09:00 AM	0	0	0	0	0	0	3	3
09:15 AM	0	0	0	0	0	0	2	2
Grand Total	0	0	0	0	0	0	21	21
Apprch %	0	0	0	0	0	0	100	
Total %	0	0	0	0	0	0	100	

Accurate Counts
978-664-2565

N/S Street : Lake Street
E/W Street : Frontage Road
City/State : Cambridge, MA
Weather : Clear

File Name : 7277A002
Site Code : 7277A002
Start Date : 9/14/2016
Page No : 1

Groups Printed- Bikes Peds

	Lake St From North			Frontage Rd From East			Lake St From South					
Start Time	Left	Thru	Peds	Left	Right	Peds	Thru	Right	Peds	Exclu. Total	Inclu. Total	Int. Total
07:30 AM	0	1	2	2	1	2	1	2	0	4	7	11
07:45 AM	0	1	0	0	0	3	0	0	0	3	1	4
Total	0	2	2	2	1	5	1	2	0	7	8	15
08:00 AM	0	0	0	0	0	0	0	1	0	0	1	1
08:15 AM	0	0	2	1	0	1	0	0	0	3	1	4
08:30 AM	0	1	0	0	0	0	0	0	0	0	1	1
08:45 AM	0	1	0	0	0	0	2	0	0	0	3	3
Total	0	2	2	1	0	1	2	1	0	3	6	9
09:00 AM	0	1	0	0	0	0	0	1	0	0	2	2
09:15 AM	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	5	4	3	1	6	3	4	0	10	16	26
Apprch %	0	100		75	25		42.9	57.1				
Total %	0	31.2		18.8	6.2		18.8	25		38.5	61.5	

Accurate Counts
978-664-2565

N/S Street : Lake Street
E/W Street : Frontage Road
City/State : Cambridge, MA
Weather : Clear

File Name : 7277A002
Site Code : 7277A002
Start Date : 9/14/2016
Page No : 1

Groups Printed- Cars - Trucks - Buses

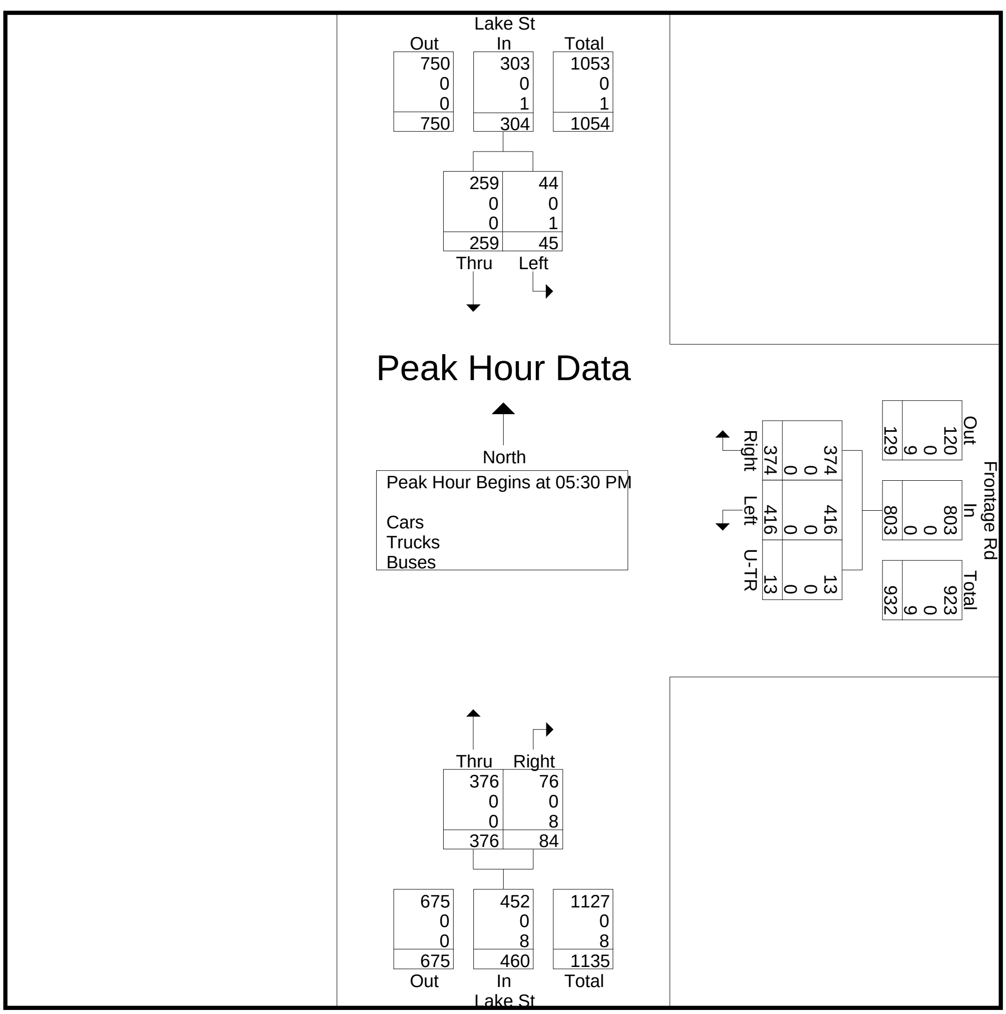
	Lake St From North		Frontage Rd From East			Lake St From South		
Start Time	Left	Thru	Left	Right	U-TR	Thru	Right	Int. Total
04:30 PM	11	60	23	127	0	109	11	341
04:45 PM	9	49	24	140	0	80	14	316
Total	20	109	47	267	0	189	25	657
05:00 PM	8	49	40	127	1	89	22	336
05:15 PM	9	58	87	94	0	97	14	359
05:30 PM	10	64	118	82	1	95	26	396
05:45 PM	17	70	94	112	4	102	18	417
Total	44	241	339	415	6	383	80	1508
06:00 PM	8	60	104	91	2	74	22	361
06:15 PM	10	65	100	89	6	105	18	393
Grand Total	82	475	590	862	14	751	145	2919
Apprch %	14.7	85.3	40.2	58.8	1	83.8	16.2	
Total %	2.8	16.3	20.2	29.5	0.5	25.7	5	
Cars	81	474	590	862	14	751	132	2904
% Cars	98.8	99.8	100	100	100	100	91	99.5
Trucks	0	0	0	0	0	0	0	0
% Trucks	0	0	0	0	0	0	0	0
Buses	1	1	0	0	0	0	13	15
% Buses	1.2	0.2	0	0	0	0	9	0.5

Accurate Counts
978-664-2565

N/S Street : Lake Street
E/W Street : Frontage Road
City/State : Cambridge, MA
Weather : Clear

File Name : 7277A002
Site Code : 7277A002
Start Date : 9/14/2016
Page No : 2

	Lake St From North			Frontage Rd From East				Lake St From South			
Start Time	Left	Thru	App. Total	Left	Right	U-TR	App. Total	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:30 PM to 06:15 PM - Peak 1 of 1											
Peak Hour for Entire Intersection Begins at 05:30 PM											
05:30 PM	10	64	74	118	82	1	201	95	26	121	396
05:45 PM	17	70	87	94	112	4	210	102	18	120	417
06:00 PM	8	60	68	104	91	2	197	74	22	96	361
06:15 PM	10	65	75	100	89	6	195	105	18	123	393
Total Volume	45	259	304	416	374	13	803	376	84	460	1567
% App. Total	14.8	85.2		51.8	46.6	1.6		81.7	18.3		
PHF	.662	.925	.874	.881	.835	.542	.956	.895	.808	.935	.939
Cars	44	259	303	416	374	13	803	376	76	452	1558
% Cars	97.8	100	99.7	100	100	100	100	100	90.5	98.3	99.4
Trucks	0	0	0	0	0	0	0	0	0	0	0
% Trucks	0	0	0	0	0	0	0	0	0	0	0
Buses	1	0	1	0	0	0	0	0	8	8	9
% Buses	2.2	0	0.3	0	0	0	0	0	9.5	1.7	0.6



Accurate Counts
978-664-2565

N/S Street : Lake Street
E/W Street : Frontage Road
City/State : Cambridge, MA
Weather : Clear

File Name : 7277A002
Site Code : 7277A002
Start Date : 9/14/2016
Page No : 1

Groups Printed- Trucks

	Lake St From North		Frontage Rd From East			Lake St From South		
Start Time	Left	Thru	Left	Right	U-TR	Thru	Right	Int. Total
04:30 PM	0	0	0	0	0	0	0	0
04:45 PM	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0
05:00 PM	0	0	0	0	0	0	0	0
05:15 PM	0	0	0	0	0	0	0	0
05:30 PM	0	0	0	0	0	0	0	0
05:45 PM	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0
06:00 PM	0	0	0	0	0	0	0	0
06:15 PM	0	0	0	0	0	0	0	0
Grand Total	0	0	0	0	0	0	0	0
Apprch %	0	0	0	0	0	0	0	
Total %								

Accurate Counts
978-664-2565

N/S Street : Lake Street
E/W Street : Frontage Road
City/State : Cambridge, MA
Weather : Clear

File Name : 7277A002
Site Code : 7277A002
Start Date : 9/14/2016
Page No : 1

Groups Printed- Buses

	Lake St From North		Frontage Rd From East			Lake St From South		
Start Time	Left	Thru	Left	Right	U-TR	Thru	Right	Int. Total
04:30 PM	0	0	0	0	0	0	1	1
04:45 PM	0	1	0	0	0	0	3	4
Total	0	1	0	0	0	0	4	5
05:00 PM	0	0	0	0	0	0	1	1
05:15 PM	0	0	0	0	0	0	0	0
05:30 PM	1	0	0	0	0	0	2	3
05:45 PM	0	0	0	0	0	0	2	2
Total	1	0	0	0	0	0	5	6
06:00 PM	0	0	0	0	0	0	3	3
06:15 PM	0	0	0	0	0	0	1	1
Grand Total	1	1	0	0	0	0	13	15
Apprch %	50	50	0	0	0	0	100	
Total %	6.7	6.7	0	0	0	0	86.7	

Accurate Counts
978-664-2565

N/S Street : Lake Street
E/W Street : Frontage Road
City/State : Cambridge, MA
Weather : Clear

File Name : 7277A002
Site Code : 7277A002
Start Date : 9/14/2016
Page No : 1

Groups Printed- Bikes Peds

	Lake St From North			Frontage Rd From East			Lake St From South					
Start Time	Left	Thru	Peds	Left	Right	Peds	Thru	Right	Peds	Exclu. Total	Inclu. Total	Int. Total
04:30 PM	0	0	0	0	0	0	0	0	0	0	0	0
04:45 PM	0	0	0	0	0	0	2	0	0	0	2	2
Total	0	0	0	0	0	0	2	0	0	0	2	2
05:00 PM	0	0	0	0	1	0	0	0	0	0	1	1
05:15 PM	0	0	0	0	0	0	0	0	0	0	0	0
05:30 PM	0	2	0	0	0	0	2	1	0	0	5	5
05:45 PM	0	1	1	0	0	1	1	0	0	2	2	4
Total	0	3	1	0	1	1	3	1	0	2	8	10
06:00 PM	0	0	0	0	0	1	2	1	0	1	3	4
06:15 PM	0	0	1	1	0	1	0	0	0	2	1	3
Grand Total	0	3	2	1	1	3	7	2	0	5	14	19
Apprch %	0	100		50	50		77.8	22.2				
Total %	0	21.4		7.1	7.1		50	14.3		26.3	73.7	

5

Accurate Counts

978-664-2565

N/S Street : Lake Street
E/W Street : Route 2 WB Ramps
City/State : Cambridge, MA
Weather : Cloudy

File Name : 7277A001
Site Code : 7277A001
Start Date : 9/27/2016
Page No : 1

Groups Printed- Cars - Trucks - Buses

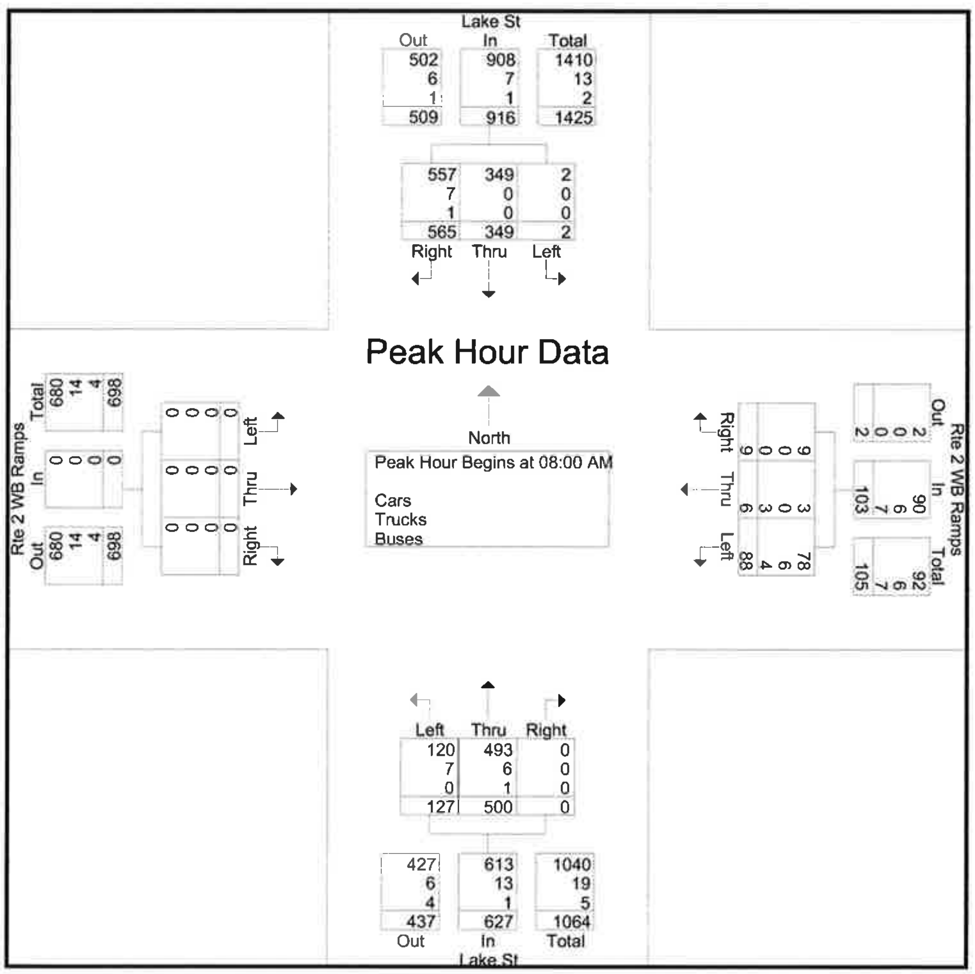
	Lake St From North			Rte 2 WB Ramps From East			Lake St From South			Rte 2 WB Ramps From West			
Start Time	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Int. Total
07:30 AM	0	78	222	16	2	3	32	124	0	0	0	0	477
07:45 AM	0	68	170	13	2	2	27	95	0	0	0	0	377
Total	0	146	392	29	4	5	59	219	0	0	0	0	854
08:00 AM	0	73	137	16	1	3	37	89	0	0	0	0	356
08:15 AM	1	81	137	28	3	1	33	122	0	0	0	0	406
08:30 AM	0	99	150	23	1	1	31	148	0	0	0	0	453
08:45 AM	1	96	141	21	1	4	26	141	0	0	0	0	431
Total	2	349	565	88	6	9	127	500	0	0	0	0	1646
09:00 AM	0	88	109	23	1	1	21	103	0	0	0	0	346
09:15 AM	0	74	93	18	2	2	17	110	0	0	0	0	316
Grand Total	2	657	1159	158	13	17	224	932	0	0	0	0	3162
Apprch %	0.1	36.1	63.8	84	6.9	9	19.4	80.6	0	0	0	0	
Total %	0.1	20.8	36.7	5	0.4	0.5	7.1	29.5	0	0	0	0	
Cars	2	654	1147	142	6	17	210	916	0	0	0	0	3094
% Cars	100	99.5	99	89.9	46.2	100	93.8	98.3	0	0	0	0	97.8
Trucks	0	3	11	10	0	0	14	14	0	0	0	0	52
% Trucks	0	0.5	0.9	6.3	0	0	6.2	1.5	0	0	0	0	1.6
Buses	0	0	1	6	7	0	0	2	0	0	0	0	16
% Buses	0	0	0.1	3.8	53.8	0	0	0.2	0	0	0	0	0.5

Accurate Counts
978-664-2565

N/S Street : Lake Street
E/W Street : Route 2 WB Ramps
City/State : Cambridge, MA
Weather : Cloudy

File Name : 7277A001
Site Code : 7277A001
Start Date : 9/27/2016
Page No : 2

	Lake St From North				Rte 2 WB Ramps From East				Lake St From South				Rte 2 WB Ramps From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:30 AM to 09:15 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 08:00 AM																	
08:00 AM	0	73	137	210	16	1	3	20	37	89	0	126	0	0	0	0	356
08:15 AM	1	81	137	219	28	3	1	32	33	122	0	155	0	0	0	0	406
08:30 AM	0	99	150	249	23	1	1	25	31	148	0	179	0	0	0	0	453
08:45 AM	1	96	141	238	21	1	4	26	26	141	0	167	0	0	0	0	431
Total Volume	2	349	565	916	88	6	9	103	127	500	0	627	0	0	0	0	1646
% App. Total	0.2	38.1	61.7		85.4	5.8	8.7		20.3	79.7	0		0	0	0		
PHF	.500	.881	.942	.920	.786	.500	.563	.805	.858	.845	.000	.876	.000	.000	.000	.000	.908
Cars	2	349	557	908	78	3	9	90	120	493	0	613	0	0	0	0	1611
% Cars	100	100	98.6	99.1	88.6	50.0	100	87.4	94.5	98.6	0	97.8	0	0	0	0	97.9
Trucks	0	0	7	7	6	0	0	6	7	6	0	13	0	0	0	0	26
% Trucks	0	0	1.2	0.8	6.8	0	0	5.8	5.5	1.2	0	2.1	0	0	0	0	1.6
Buses	0	0	1	1	4	3	0	7	0	1	0	1	0	0	0	0	9
% Buses	0	0	0.2	0.1	4.5	50.0	0	6.8	0	0.2	0	0.2	0	0	0	0	0.5



Accurate Counts
978-664-2565

N/S Street : Lake Street
E/W Street : Route 2 WB Ramps
City/State : Cambridge, MA
Weather : Cloudy

File Name : 7277A001
Site Code : 7277A001
Start Date : 9/27/2016
Page No : 1

Groups Printed- Bikes Peds

	Lake St From North				Rte 2 WB Ramps From East				Lake St From South				Rte 2 WB Ramps From West						
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Exclu. Total	Inclu. Total	Int. Total
07:30 AM	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	10	10	1	11
07:45 AM	0	1	1	0	0	0	0	1	0	0	0	0	0	0	0	8	9	2	11
Total	0	1	2	0	0	0	0	1	0	0	0	0	0	0	0	18	19	3	22
08:00 AM	0	0	0	0	0	0	0	1	0	1	0	0	1	0	0	0	1	2	3
08:15 AM	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
08:30 AM	0	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	4	0	4
08:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	2	0	0	0	2	0	1	0	1	1	0	0	1	6	2	8
09:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	1	2	2	0	0	0	3	0	1	0	1	1	0	0	19	25	5	30
Apprch %	0	33.3	66.7		0	0	0		0	100	0		100	0	0				
Total %	0	20	40		0	0	0		0	20	0		20	0	0		83.3	16.7	

Accurate Counts
978-664-2565

N/S Street : Lake Street
E/W Street : Route 2 WB Ramps
City/State : Cambridge, MA
Weather : Cloudy

File Name : 7277A001
Site Code : 7277A001
Start Date : 9/27/2016
Page No : 1

Groups Printed- Cars - Trucks - Buses

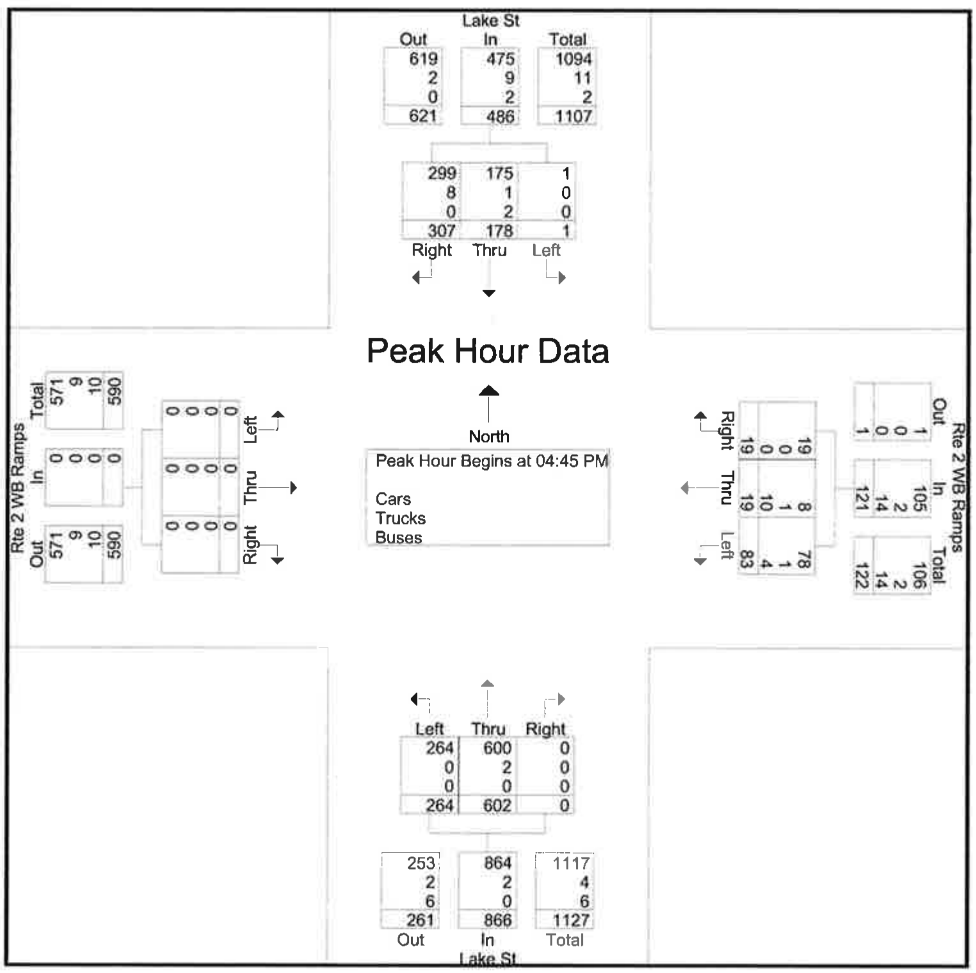
	Lake St From North			Rte 2 WB Ramps From East			Lake St From South			Rte 2 WB Ramps From West			
Start Time	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Int. Total
04:30 PM	0	37	44	14	2	8	46	160	0	0	0	0	311
04:45 PM	0	41	62	21	3	7	56	163	0	0	0	0	353
Total	0	78	106	35	5	15	102	323	0	0	0	0	664
05:00 PM	0	41	83	27	3	2	62	185	0	0	0	0	403
05:15 PM	0	37	88	15	7	5	74	148	0	0	0	0	374
05:30 PM	1	59	74	20	6	5	72	106	0	0	0	0	343
05:45 PM	0	36	80	16	2	9	56	116	0	0	0	0	315
Total	1	173	325	78	18	21	264	555	0	0	0	0	1435
06:00 PM	0	53	75	18	2	6	74	136	0	0	0	0	364
06:15 PM	0	51	73	16	3	6	63	130	0	0	0	0	342
Grand Total	1	355	579	147	28	48	503	1144	0	0	0	0	2805
Apprch %	0.1	38	61.9	65.9	12.6	21.5	30.5	69.5	0	0	0	0	
Total %	0	12.7	20.6	5.2	1	1.7	17.9	40.8	0	0	0	0	
Cars	1	349	565	139	12	48	503	1140	0	0	0	0	2757
% Cars	100	98.3	97.6	94.6	42.9	100	100	99.7	0	0	0	0	98.3
Trucks	0	3	14	1	1	0	0	2	0	0	0	0	21
% Trucks	0	0.8	2.4	0.7	3.6	0	0	0.2	0	0	0	0	0.7
Buses	0	3	0	7	15	0	0	2	0	0	0	0	27
% Buses	0	0.8	0	4.8	53.6	0	0	0.2	0	0	0	0	1

Accurate Counts
978-664-2565

N/S Street : Lake Street
E/W Street : Route 2 WB Ramps
City/State : Cambridge, MA
Weather : Cloudy

File Name : 7277A001
Site Code : 7277A001
Start Date : 9/27/2016
Page No : 2

	Lake St From North				Rte 2 WB Ramps From East				Lake St From South				Rte 2 WB Ramps From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:30 PM to 06:15 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:45 PM																	
04:45 PM	0	41	62	103	21	3	7	31	56	163	0	219	0	0	0	0	353
05:00 PM	0	41	83	124	27	3	2	32	62	185	0	247	0	0	0	0	403
05:15 PM	0	37	88	125	15	7	5	27	74	148	0	222	0	0	0	0	374
05:30 PM	1	59	74	134	20	6	5	31	72	106	0	178	0	0	0	0	343
Total Volume	1	178	307	486	83	19	19	121	264	602	0	866	0	0	0	0	1473
% App. Total	0.2	36.6	63.2		68.6	15.7	15.7		30.5	69.5	0		0	0	0		
PHF	.250	.754	.872	.907	.769	.679	.679	.945	.892	.814	.000	.877	.000	.000	.000	.000	.914
Cars	1	175	299	475	78	8	19	105	264	600	0	864	0	0	0	0	1444
% Cars	100	98.3	97.4	97.7	94.0	42.1	100	86.8	100	99.7	0	99.8	0	0	0	0	98.0
Trucks	0	1	8	9	1	1	0	2	0	2	0	2	0	0	0	0	13
% Trucks	0	0.6	2.6	1.9	1.2	5.3	0	1.7	0	0.3	0	0.2	0	0	0	0	0.9
Buses	0	2	0	2	4	10	0	14	0	0	0	0	0	0	0	0	16
% Buses	0	1.1	0	0.4	4.8	52.6	0	11.6	0	0	0	0	0	0	0	0	1.1



Accurate Counts
978-664-2565

N/S Street : Lake Street
E/W Street : Route 2 WB Ramps
City/State : Cambridge, MA
Weather : Cloudy

File Name : 7277A001
Site Code : 7277A001
Start Date : 9/27/2016
Page No : 1

Groups Printed- Bikes Peds

	Lake St From North				Rte 2 WB Ramps From East				Lake St From South				Rte 2 WB Ramps From West						
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Exclu. Total	Inclu. Total	Int. Total
04:30 PM	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	5	5	2	7
04:45 PM	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	9	10	0	10
Total	0	0	1	0	0	0	0	1	0	1	0	0	0	0	0	14	15	2	17
05:00 PM	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	4	4	2	6
05:15 PM	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	7	9	0	9
05:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16	16	0	16
05:45 PM	0	0	0	1	0	0	0	2	0	2	0	0	0	0	0	6	9	2	11
Total	0	0	1	3	0	0	0	2	0	3	0	0	0	0	0	33	38	4	42
06:00 PM	0	1	0	1	0	0	0	1	0	2	0	0	0	0	0	5	7	3	10
06:15 PM	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	23	23	2	25
Grand Total	0	2	3	4	0	0	0	4	0	6	0	0	0	0	0	75	83	11	94
Apprch %	0	40	60		0	0	0		0	100	0		0	0	0				
Total %	0	18.2	27.3		0	0	0		0	54.5	0		0	0	0		88.3	11.7	

Accurate Counts

978-664-2565

N/S Street : Alewife Brook Parkway
E/W Street: Route 2 / Access Rd
City/State : Cambridge, MA
Weather : Clear

File Name : 80840014
Site Code : 80840014
Start Date : 5/8/2019
Page No : 1

Groups Printed- Cars - Trucks

	Alewife Brook Pkwy From North			Station Access Rd From East			Alewife Brook Pkwy From South			Route 2 From West			
Start Time	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Int. Total
07:30 AM	0	89	243	0	48	9	370	65	0	92	0	269	1185
07:45 AM	0	160	269	0	35	13	344	53	0	133	0	231	1238
Total	0	249	512	0	83	22	714	118	0	225	0	500	2423
08:00 AM	0	78	225	0	38	12	321	55	0	127	0	258	1114
08:15 AM	0	165	281	0	43	11	313	44	0	102	0	279	1238
08:30 AM	0	101	223	0	31	10	301	40	0	139	0	267	1112
08:45 AM	0	103	237	0	37	16	247	37	0	116	0	279	1072
Total	0	447	966	0	149	49	1182	176	0	484	0	1083	4536
09:00 AM	0	89	214	0	34	15	306	82	0	110	0	201	1051
09:15 AM	0	111	215	0	40	35	267	64	0	127	0	284	1143
Grand Total	0	896	1907	0	306	121	2469	440	0	946	0	2068	9153
Apprch %	0	32	68	0	71.7	28.3	84.9	15.1	0	31.4	0	68.6	
Total %	0	9.8	20.8	0	3.3	1.3	27	4.8	0	10.3	0	22.6	
Cars	0	879	1888	0	290	114	2420	431	0	936	0	2034	8992
% Cars	0	98.1	99	0	94.8	94.2	98	98	0	98.9	0	98.4	98.2
Trucks	0	17	19	0	16	7	49	9	0	10	0	34	161
% Trucks	0	1.9	1	0	5.2	5.8	2	2	0	1.1	0	1.6	1.8

N/S Street : Alewife Brook Parkway
E/W Street: Route 2 / Access Rd
City/State : Cambridge, MA
Weather : Clear

File Name : 80840014
Site Code : 80840014
Start Date : 5/8/2019
Page No : 2

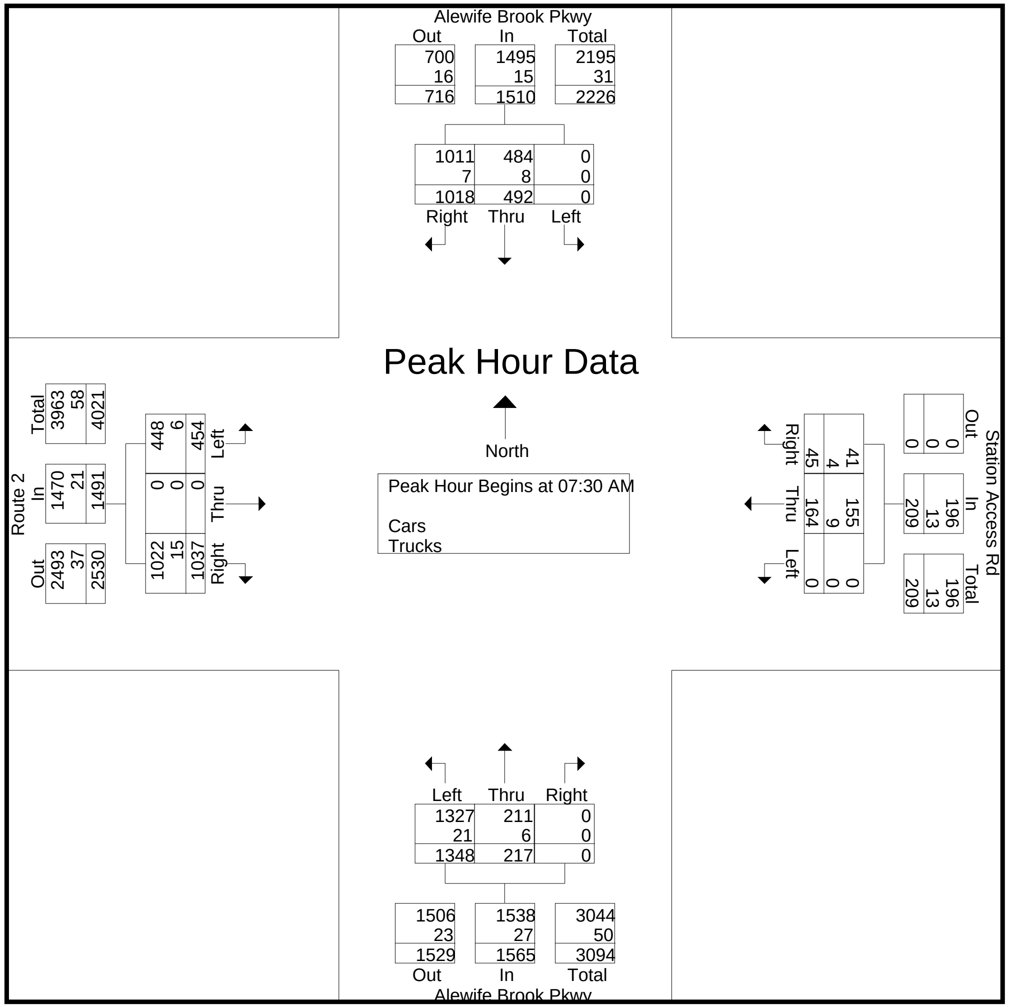
	Alewife Brook Pkwy From North				Station Access Rd From East				Alewife Brook Pkwy From South				Route 2 From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:30 AM to 09:15 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:30 AM																	
07:30 AM	0	89	243	332	0	**48**	9	**57**	**370**	**65**	0	**435**	92	0	269	361	1185
07:45 AM	0	160	269	429	0	35	**13**	48	344	53	0	397	**133**	0	231	364	**1238**
08:00 AM	0	78	225	303	0	38	12	50	321	55	0	376	127	0	258	**385**	1114
08:15 AM	0	**165**	**281**	**446**	0	43	11	54	313	44	0	357	102	0	**279**	381	1238
Total Volume	0	492	1018	1510	0	164	45	209	1348	217	0	1565	454	0	1037	1491	4775
% App. Total	0	32.6	67.4		0	78.5	21.5		86.1	13.9	0		30.4	0	69.6		
PHF	.000	.745	.906	.846	.000	.854	.865	.917	.911	.835	.000	.899	.853	.000	.929	.968	.964
Cars	0	484	1011	1495	0	155	41	196	1327	211	0	1538	448	0	1022	1470	4699
% Cars	0	98.4	99.3	99.0	0	94.5	91.1	93.8	98.4	97.2	0	98.3	98.7	0	98.6	98.6	98.4
Trucks	0	8	7	15	0	9	4	13	21	6	0	27	6	0	15	21	76
% Trucks	0	1.6	0.7	1.0	0	5.5	8.9	6.2	1.6	2.8	0	1.7	1.3	0	1.4	1.4	1.6

Accurate Counts

978-664-2565

N/S Street : Alewife Brook Parkway
E/W Street: Route 2 / Access Rd
City/State : Cambridge, MA
Weather : Clear

File Name : 80840014
Site Code : 80840014
Start Date : 5/8/2019
Page No : 3



Peak Hour Analysis From 07:30 AM to 09:15 AM - Peak 1 of 1

Peak Hour for Each Approach Begins at:

	07:30 AM				08:30 AM				07:30 AM				08:00 AM			
+0 mins.	0	89	243	332	0	31	10	41	**370**	**65**	0	**435**	127	0	258	385
+15 mins.	0	160	269	429	0	37	16	53	344	53	0	397	102	0	**279**	381
+30 mins.	0	78	225	303	0	34	15	49	321	55	0	376	**139**	0	267	**406**
+45 mins.	0	**165**	**281**	**446**	0	**40**	**35**	**75**	313	44	0	357	116	0	279	395
Total Volume	0	492	1018	1510	0	142	76	218	1348	217	0	1565	484	0	1083	1567

Accurate Counts
978-664-2565

N/S Street : Alewife Brook Parkway
E/W Street: Route 2 / Access Rd
City/State : Cambridge, MA
Weather : Clear

File Name : 80840014
Site Code : 80840014
Start Date : 5/8/2019
Page No : 9

Groups Printed- Trucks

	Alewife Brook Pkwy From North			Station Access Rd From East			Alewife Brook Pkwy From South			Route 2 From West			
Start Time	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Int. Total
07:30 AM	0	1	1	0	4	1	2	3	0	1	0	3	16
07:45 AM	0	3	1	0	1	1	8	1	0	1	0	4	20
Total	0	4	2	0	5	2	10	4	0	2	0	7	36
08:00 AM	0	3	3	0	1	0	6	1	0	1	0	6	21
08:15 AM	0	1	2	0	3	2	5	1	0	3	0	2	19
08:30 AM	0	2	6	0	2	2	5	0	0	1	0	3	21
08:45 AM	0	1	0	0	1	1	5	0	0	1	0	3	12
Total	0	7	11	0	7	5	21	2	0	6	0	14	73
09:00 AM	0	2	3	0	3	0	9	2	0	1	0	3	23
09:15 AM	0	4	3	0	1	0	9	1	0	1	0	10	29
Grand Total	0	17	19	0	16	7	49	9	0	10	0	34	161
Apprch %	0	47.2	52.8	0	69.6	30.4	84.5	15.5	0	22.7	0	77.3	
Total %	0	10.6	11.8	0	9.9	4.3	30.4	5.6	0	6.2	0	21.1	

Accurate Counts
978-664-2565

N/S Street : Alewife Brook Parkway
E/W Street: Route 2 / Access Rd
City/State : Cambridge, MA
Weather : Clear

File Name : 80840014
Site Code : 80840014
Start Date : 5/8/2019
Page No : 13

Groups Printed- Bikes Peds

	Alewife Brook Pkwy From North				Station Access Rd From East				Alewife Brook Pkwy From South				Route 2 From West						
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Exclu. Total	Inclu. Total	Int. Total
07:30 AM	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	1
07:45 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	1	0	0	0	0	0	0	0	0	1	0	1
08:00 AM	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
08:30 AM	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
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:15 AM	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	2	0	2
Grand Total	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	3	0	3
Apprch %	0	0	0		0	0	0		0	0	0		0	0	0				
Total %																	100	0	

Accurate Counts
978-664-2565

N/S Street : Alewife Brook Parkway
E/W Street: Route 2 / Access Rd
City/State : Cambridge, MA
Weather : Clear

File Name : 80840014
Site Code : 80840014
Start Date : 5/8/2019
Page No : 1

Groups Printed- Cars - Trucks

	Alewife Brook Pkwy From North			Station Access Rd From East			Alewife Brook Pkwy From South			Route 2 From West			
Start Time	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Int. Total
04:30 PM	0	54	267	0	76	68	375	63	0	120	0	223	1246
04:45 PM	0	58	258	0	136	73	375	71	0	151	0	271	1393
Total	0	112	525	0	212	141	750	134	0	271	0	494	2639
05:00 PM	0	65	270	0	132	82	372	56	0	132	0	204	1313
05:15 PM	0	48	282	0	159	75	371	61	0	139	0	212	1347
05:30 PM	0	71	260	0	147	87	386	43	0	144	0	257	1395
05:45 PM	0	64	242	0	122	57	371	53	0	144	0	226	1279
Total	0	248	1054	0	560	301	1500	213	0	559	0	899	5334
06:00 PM	0	62	253	0	140	68	367	45	0	151	0	269	1355
06:15 PM	0	67	245	0	153	45	382	45	0	155	0	179	1271
Grand Total	0	489	2077	0	1065	555	2999	437	0	1136	0	1841	10599
Apprch %	0	19.1	80.9	0	65.7	34.3	87.3	12.7	0	38.2	0	61.8	
Total %	0	4.6	19.6	0	10	5.2	28.3	4.1	0	10.7	0	17.4	
Cars	0	478	2071	0	1062	552	2965	427	0	1134	0	1836	10525
% Cars	0	97.8	99.7	0	99.7	99.5	98.9	97.7	0	99.8	0	99.7	99.3
Trucks	0	11	6	0	3	3	34	10	0	2	0	5	74
% Trucks	0	2.2	0.3	0	0.3	0.5	1.1	2.3	0	0.2	0	0.3	0.7

Accurate Counts
978-664-2565

N/S Street : Alewife Brook Parkway
E/W Street: Route 2 / Access Rd
City/State : Cambridge, MA
Weather : Clear

File Name : 80840014
Site Code : 80840014
Start Date : 5/8/2019
Page No : 2

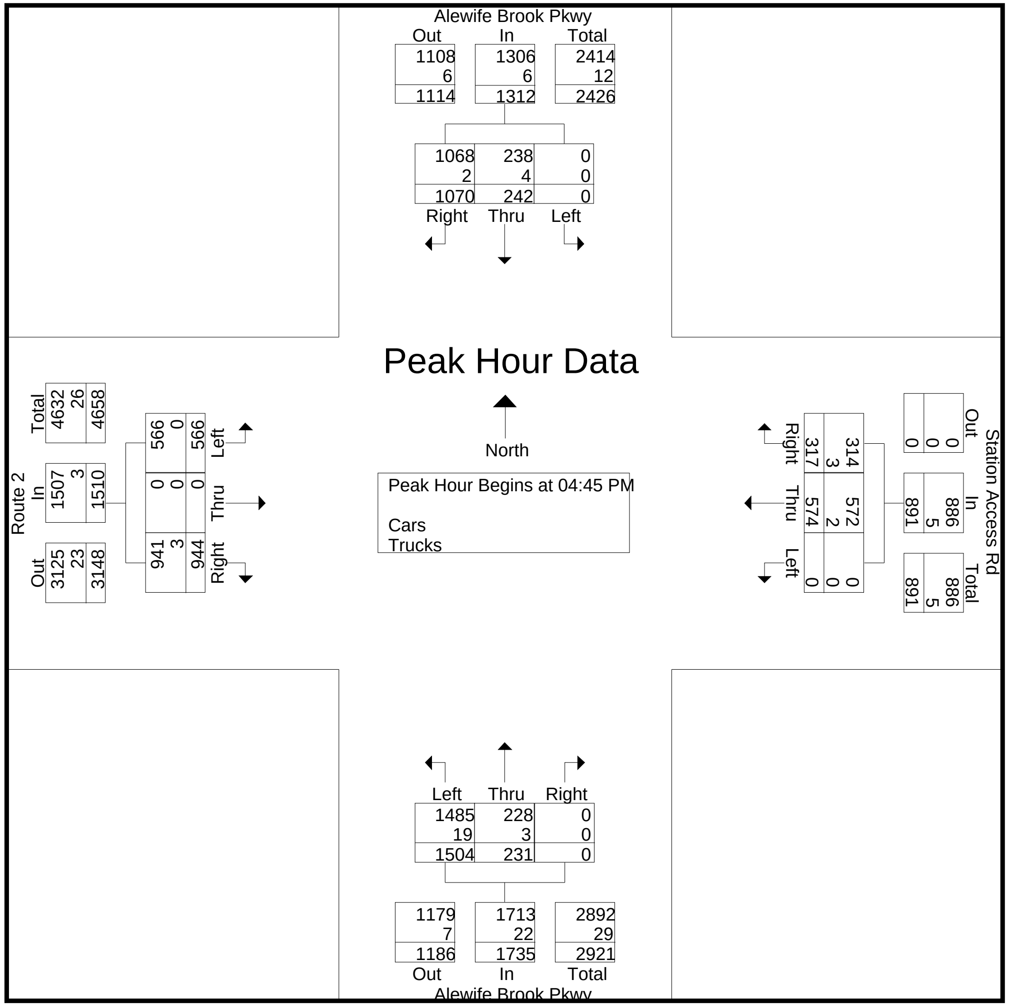
	Alewife Brook Pkwy From North				Station Access Rd From East				Alewife Brook Pkwy From South				Route 2 From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:30 PM to 06:15 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:45 PM																	
04:45 PM	0	58	258	316	0	136	73	209	375	**71**	0	**446**	**151**	0	**271**	**422**	1393
05:00 PM	0	65	270	**335**	0	132	82	214	372	56	0	428	132	0	204	336	1313
05:15 PM	0	48	**282**	330	0	**159**	75	**234**	371	61	0	432	139	0	212	351	1347
05:30 PM	0	**71**	260	331	0	147	**87**	234	**386**	43	0	429	144	0	257	401	**1395**
Total Volume	0	242	1070	1312	0	574	317	891	1504	231	0	1735	566	0	944	1510	5448
% App. Total	0	18.4	81.6		0	64.4	35.6		86.7	13.3	0		37.5	0	62.5		
PHF	.000	.852	.949	.979	.000	.903	.911	.952	.974	.813	.000	.973	.937	.000	.871	.895	.976
Cars	0	238	1068	1306	0	572	314	886	1485	228	0	1713	566	0	941	1507	5412
% Cars	0	98.3	99.8	99.5	0	99.7	99.1	99.4	98.7	98.7	0	98.7	100	0	99.7	99.8	99.3
Trucks	0	4	2	6	0	2	3	5	19	3	0	22	0	0	3	3	36
% Trucks	0	1.7	0.2	0.5	0	0.3	0.9	0.6	1.3	1.3	0	1.3	0	0	0.3	0.2	0.7

Accurate Counts

978-664-2565

N/S Street : Alewife Brook Parkway
E/W Street: Route 2 / Access Rd
City/State : Cambridge, MA
Weather : Clear

File Name : 80840014
Site Code : 80840014
Start Date : 5/8/2019
Page No : 3



Peak Hour Analysis From 04:30 PM to 06:15 PM - Peak 1 of 1

Peak Hour for Each Approach Begins at:

	04:45 PM				04:45 PM				04:30 PM				05:15 PM			
+0 mins.	0	58	258	316	0	136	73	209	**375**	63	0	438	139	0	212	351
+15 mins.	0	65	270	**335**	0	132	82	214	375	**71**	0	**446**	144	0	257	401
+30 mins.	0	48	**282**	330	0	**159**	75	**234**	372	56	0	428	144	0	226	370
+45 mins.	0	**71**	260	331	0	147	**87**	234	371	61	0	432	**151**	0	**269**	**420**
Total Volume	0	242	1070	1312	0	574	317	891	1493	251	0	1744	578	0	964	1542

N/S Street : Alewife Brook Parkway
E/W Street: Route 2 / Access Rd
City/State : Cambridge, MA
Weather : Clear

File Name : 80840014
Site Code : 80840014
Start Date : 5/8/2019
Page No : 9

Groups Printed- Trucks

	Alewife Brook Pkwy From North			Station Access Rd From East			Alewife Brook Pkwy From South			Route 2 From West			
Start Time	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Int. Total
04:30 PM	0	2	2	0	0	0	4	1	0	0	0	1	10
04:45 PM	0	0	1	0	1	1	7	1	0	0	0	0	11
Total	0	2	3	0	1	1	11	2	0	0	0	1	21
05:00 PM	0	2	0	0	0	0	4	1	0	0	0	1	8
05:15 PM	0	2	0	0	0	1	4	1	0	0	0	2	10
05:30 PM	0	0	1	0	1	1	4	0	0	0	0	0	7
05:45 PM	0	1	1	0	1	0	4	3	0	1	0	0	11
Total	0	5	2	0	2	2	16	5	0	1	0	3	36
06:00 PM	0	3	0	0	0	0	4	1	0	1	0	0	9
06:15 PM	0	1	1	0	0	0	3	2	0	0	0	1	8
Grand Total	0	11	6	0	3	3	34	10	0	2	0	5	74
Apprch %	0	64.7	35.3	0	50	50	77.3	22.7	0	28.6	0	71.4	
Total %	0	14.9	8.1	0	4.1	4.1	45.9	13.5	0	2.7	0	6.8	

N/S Street : Alewife Brook Parkway
E/W Street: Route 2 / Access Rd
City/State : Cambridge, MA
Weather : Clear

File Name : 80840014
Site Code : 80840014
Start Date : 5/8/2019
Page No : 13

Groups Printed- Bikes Peds

	Alewife Brook Pkwy From North				Station Access Rd From East				Alewife Brook Pkwy From South				Route 2 From West						
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Exclu. Total	Inclu. Total	Int. Total
04:30 PM	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
Total	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
05:15 PM	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	1	3	0	3
05:30 PM	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
Total	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	1	3	0	3
06:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
06:15 PM	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	1
Grand Total	0	0	0	0	0	0	0	1	0	1	0	1	0	0	0	1	3	1	4
Apprch %	0	0	0		0	0	0		0	100	0		0	0	0				
Total %	0	0	0		0	0	0		0	100	0		0	0	0		75	25	

Accurate Counts
978-664-2565

N/S Street : Wilson Street
E/W Street : Lake Street
City/State : Arlington, MA
Weather : Cloudy

File Name : 84510001
Site Code : 84510001
Start Date : 9/10/2020
Page No : 1

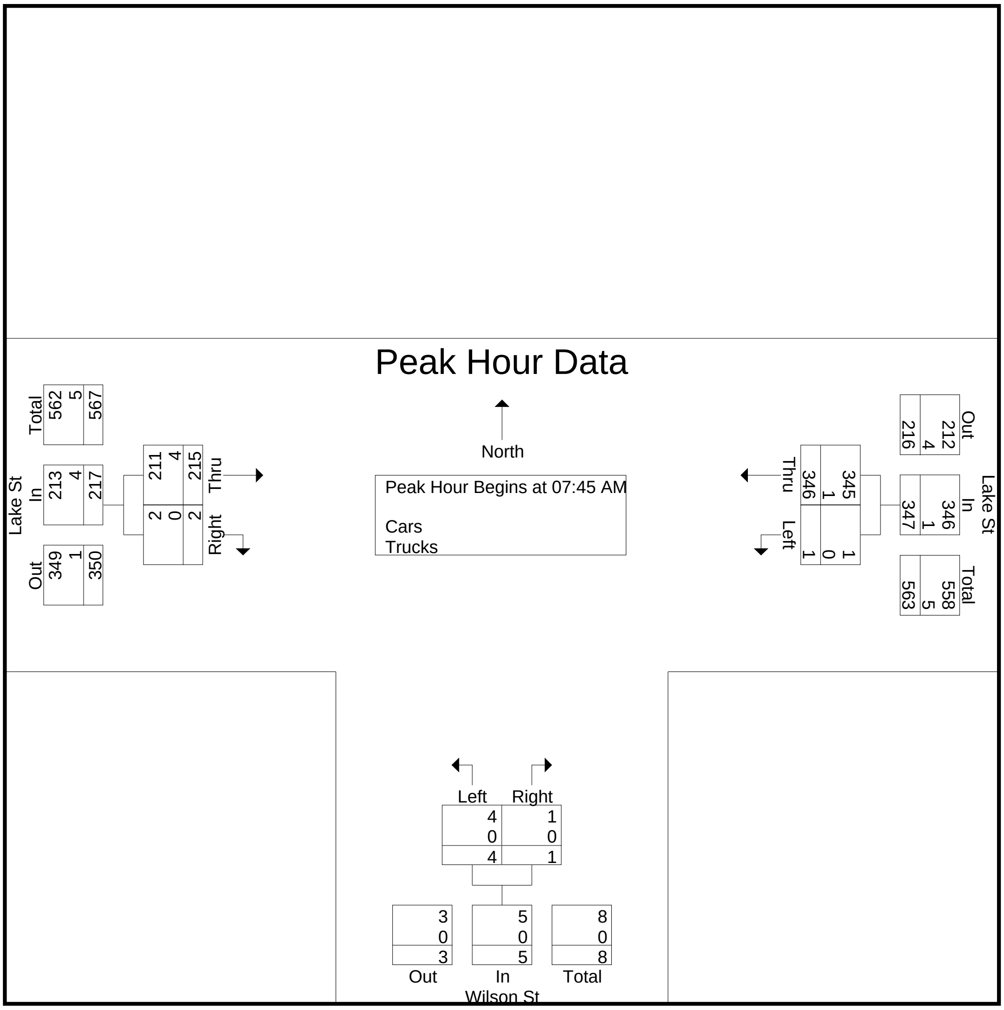
Groups Printed- Cars - Trucks

	Lake St From East		Wilson St From South		Lake St From West		
Start Time	Left	Thru	Left	Right	Thru	Right	Int. Total
07:00 AM	0	59	2	0	37	1	99
07:15 AM	0	69	1	0	43	0	113
07:30 AM	0	86	0	2	38	0	126
07:45 AM	0	100	0	0	50	0	150
Total	0	314	3	2	168	1	488
08:00 AM	1	77	1	0	44	1	124
08:15 AM	0	87	2	1	72	1	163
08:30 AM	0	82	1	0	49	0	132
08:45 AM	0	70	5	0	62	0	137
Total	1	316	9	1	227	2	556
Grand Total	1	630	12	3	395	3	1044
Apprch %	0.2	99.8	80	20	99.2	0.8	
Total %	0.1	60.3	1.1	0.3	37.8	0.3	
Cars	1	628	12	3	388	3	1035
% Cars	100	99.7	100	100	98.2	100	99.1
Trucks	0	2	0	0	7	0	9
% Trucks	0	0.3	0	0	1.8	0	0.9

	Lake St From East			Wilson St From South			Lake St From West			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 07:45 AM										
07:45 AM	0	**100**	**100**	0	0	0	50	0	50	150
08:00 AM	**1**	77	78	1	0	1	44	**1**	45	124
08:15 AM	0	87	87	**2**	**1**	**3**	**72**	1	**73**	**163**
08:30 AM	0	82	82	1	0	1	49	0	49	132
Total Volume	1	346	347	4	1	5	215	2	217	569
% App. Total	0.3	99.7		80	20		99.1	0.9		
PHF	.250	.865	.868	.500	.250	.417	.747	.500	.743	.873
Cars	1	345	346	4	1	5	211	2	213	564
% Cars	100	99.7	99.7	100	100	100	98.1	100	98.2	99.1
Trucks	0	1	1	0	0	0	4	0	4	5
% Trucks	0	0.3	0.3	0	0	0	1.9	0	1.8	0.9

N/S Street : Wilson Street
E/W Street : Lake Street
City/State : Arlington, MA
Weather : Cloudy

File Name : 84510001
Site Code : 84510001
Start Date : 9/10/2020
Page No : 2



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	07:30 AM			08:00 AM			08:00 AM		
+0 mins.	0	86	86	1	0	1	44	**1**	45
+15 mins.	0	**100**	**100**	2	**1**	3	**72**	1	**73**
+30 mins.	**1**	77	78	1	0	1	49	0	49
+45 mins.	0	87	87	**5**	0	**5**	62	0	62
Total Volume	1	350	351	9	1	10	227	2	229
% App. Total	0.3	99.7		90	10		99.1	0.9	
PHF	.250	.875	.878	.450	.250	.500	.788	.500	.784
Cars	1	349	350	9	1	10	223	2	225
% Cars	100	99.7	99.7	100	100	100	98.2	100	98.3
Trucks	0	1	1	0	0	0	4	0	4
% Trucks	0	0.3	0.3	0	0	0	1.8	0	1.7

N/S Street : Wilson Street
E/W Street : Lake Street
City/State : Arlington, MA
Weather : Cloudy

File Name : 84510001
Site Code : 84510001
Start Date : 9/10/2020
Page No : 7

Groups Printed- Trucks

	Lake St From East		Wilson St From South		Lake St From West		
Start Time	Left	Thru	Left	Right	Thru	Right	Int. Total
07:00 AM	0	0	0	0	0	0	0
07:15 AM	0	1	0	0	2	0	3
07:30 AM	0	0	0	0	0	0	0
07:45 AM	0	1	0	0	1	0	2
Total	0	2	0	0	3	0	5
08:00 AM	0	0	0	0	0	0	0
08:15 AM	0	0	0	0	3	0	3
08:30 AM	0	0	0	0	0	0	0
08:45 AM	0	0	0	0	1	0	1
Total	0	0	0	0	4	0	4
Grand Total	0	2	0	0	7	0	9
Apprch %	0	100	0	0	100	0	
Total %	0	22.2	0	0	77.8	0	

	Lake St From East			Wilson St From South			Lake St From West			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 07:00 AM										
07:00 AM	0	0	0	0	0	0	0	0	0	0
07:15 AM	0	**1**	**1**	0	0	0	**2**	0	**2**	**3**
07:30 AM	0	0	0	0	0	0	0	0	0	0
07:45 AM	0	1	1	0	0	0	1	0	1	2
Total Volume	0	2	2	0	0	0	3	0	3	5
% App. Total	0	100		0	0		100	0		
PHF	.000	.500	.500	.000	.000	.000	.375	.000	.375	.417

N/S Street : Wilson Street
E/W Street : Lake Street
City/State : Arlington, MA
Weather : Cloudy

File Name : 84510001
Site Code : 84510001
Start Date : 9/10/2020
Page No : 10

Groups Printed- Bikes Peds

	Lake St From East			Wilson St From South			Lake St From West					
Start Time	Left	Thru	Peds	Left	Right	Peds	Thru	Right	Peds	Exclu. Total	Inclu. Total	Int. Total
07:00 AM	0	0	1	0	0	0	0	0	0	1	0	1
07:15 AM	0	0	0	0	0	2	1	0	0	2	1	3
07:30 AM	0	2	1	0	0	2	1	0	0	3	3	6
07:45 AM	0	1	0	1	0	4	0	0	0	4	2	6
Total	0	3	2	1	0	8	2	0	0	10	6	16
08:00 AM	0	3	1	0	0	0	1	0	0	1	4	5
08:15 AM	0	0	2	0	0	1	0	1	1	4	1	5
08:30 AM	0	0	0	0	0	1	1	0	0	1	1	2
08:45 AM	0	1	1	0	0	0	0	0	0	1	1	2
Total	0	4	4	0	0	2	2	1	1	7	7	14
Grand Total	0	7	6	1	0	10	4	1	1	17	13	30
Apprch %	0	100		100	0		80	20				
Total %	0	53.8		7.7	0		30.8	7.7		56.7	43.3	

	Lake St From East			Wilson St From South			Lake St From West			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 07:15 AM										
07:15 AM	0	0	0	0	0	0	**1**	0	**1**	1
07:30 AM	0	2	2	0	0	0	1	0	1	3
07:45 AM	0	1	1	**1**	0	**1**	0	0	0	2
08:00 AM	0	**3**	**3**	0	0	0	1	0	1	**4**
Total Volume	0	6	6	1	0	1	3	0	3	10
% App. Total	0	100		100	0		100	0		
PHF	.000	.500	.500	.250	.000	.250	.750	.000	.750	.625

N/S Street : Wilson Street
E/W Street : Lake Street
City/State : Arlington, MA
Weather : Cloudy

File Name : 84510001
Site Code : 84510001
Start Date : 9/10/2020
Page No : 1

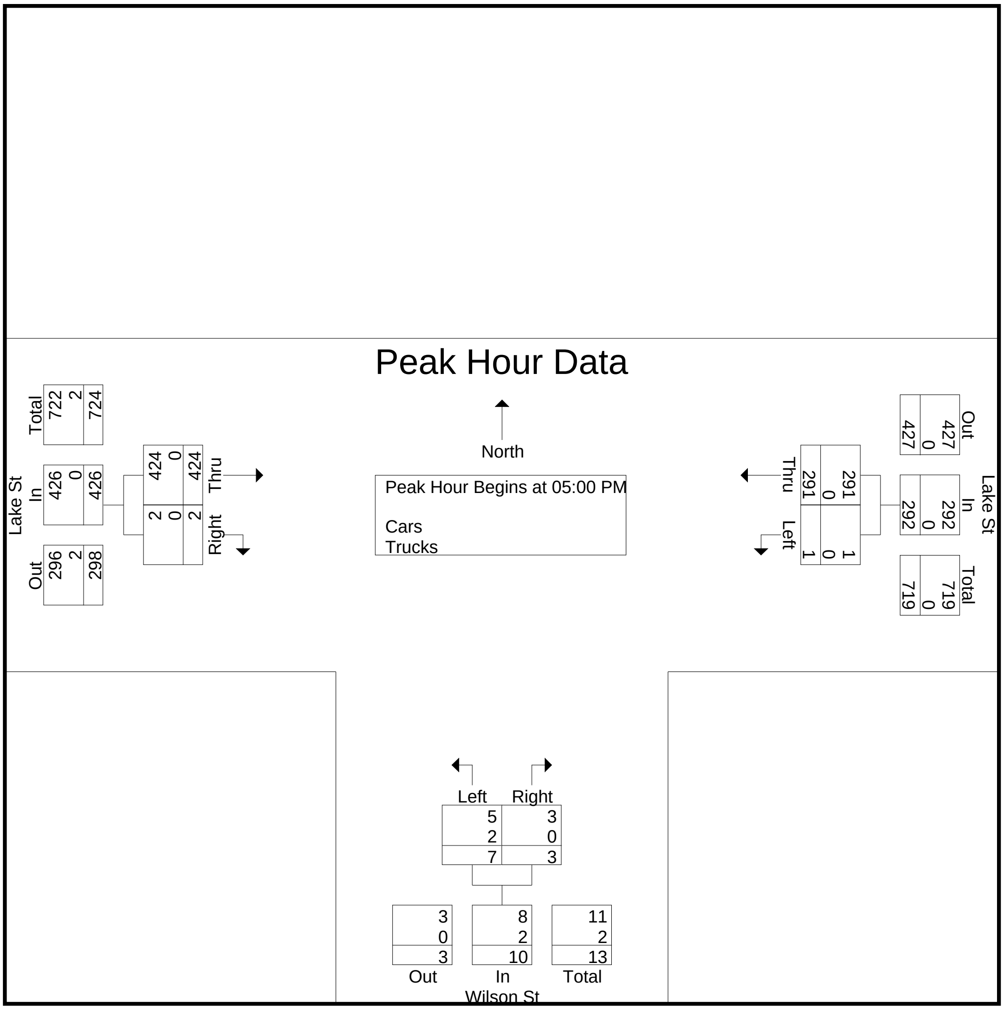
Groups Printed- Cars - Trucks

	Lake St From East		Wilson St From South		Lake St From West		
Start Time	Left	Thru	Left	Right	Thru	Right	Int. Total
04:00 PM	0	62	0	1	147	1	211
04:15 PM	0	59	0	0	101	0	160
04:30 PM	0	71	1	1	101	0	174
04:45 PM	0	59	2	0	98	0	159
Total	0	251	3	2	447	1	704
05:00 PM	1	76	0	0	129	0	206
05:15 PM	0	71	2	0	106	1	180
05:30 PM	0	66	0	2	103	1	172
05:45 PM	0	78	5	1	86	0	170
Total	1	291	7	3	424	2	728
Grand Total	1	542	10	5	871	3	1432
Apprch %	0.2	99.8	66.7	33.3	99.7	0.3	
Total %	0.1	37.8	0.7	0.3	60.8	0.2	
Cars	1	540	8	5	871	3	1428
% Cars	100	99.6	80	100	100	100	99.7
Trucks	0	2	2	0	0	0	4
% Trucks	0	0.4	20	0	0	0	0.3

	Lake St From East			Wilson St From South			Lake St From West			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 05:00 PM										
05:00 PM	**1**	76	77	0	0	0	**129**	0	**129**	**206**
05:15 PM	0	71	71	2	0	2	106	**1**	107	180
05:30 PM	0	66	66	0	**2**	2	103	1	104	172
05:45 PM	0	**78**	**78**	**5**	1	**6**	86	0	86	170
Total Volume	1	291	292	7	3	10	424	2	426	728
% App. Total	0.3	99.7		70	30		99.5	0.5		
PHF	.250	.933	.936	.350	.375	.417	.822	.500	.826	.883
Cars	1	291	292	5	3	8	424	2	426	726
% Cars	100	100	100	71.4	100	80.0	100	100	100	99.7
Trucks	0	0	0	2	0	2	0	0	0	2
% Trucks	0	0	0	28.6	0	20.0	0	0	0	0.3

N/S Street : Wilson Street
E/W Street : Lake Street
City/State : Arlington, MA
Weather : Cloudy

File Name : 84510001
Site Code : 84510001
Start Date : 9/10/2020
Page No : 2



Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	05:00 PM			05:00 PM			04:00 PM		
+0 mins.	**1**	76	77	0	0	0	**147**	**1**	**148**
+15 mins.	0	71	71	2	0	2	101	0	101
+30 mins.	0	66	66	0	**2**	2	101	0	101
+45 mins.	0	**78**	**78**	**5**	1	**6**	98	0	98
Total Volume	1	291	292	7	3	10	447	1	448
% App. Total	0.3	99.7		70	30		99.8	0.2	
PHF	.250	.933	.936	.350	.375	.417	.760	.250	.757
Cars	1	291	292	5	3	8	447	1	448
% Cars	100	100	100	71.4	100	80	100	100	100
Trucks	0	0	0	2	0	2	0	0	0
% Trucks	0	0	0	28.6	0	20	0	0	0

Accurate Counts
978-664-2565

N/S Street : Wilson Street
E/W Street : Lake Street
City/State : Arlington, MA
Weather : Cloudy

File Name : 84510001
Site Code : 84510001
Start Date : 9/10/2020
Page No : 7

Groups Printed- Trucks

	Lake St From East		Wilson St From South		Lake St From West		
Start Time	Left	Thru	Left	Right	Thru	Right	Int. Total
04:00 PM	0	0	0	0	0	0	0
04:15 PM	0	2	0	0	0	0	2
04:30 PM	0	0	0	0	0	0	0
04:45 PM	0	0	0	0	0	0	0
Total	0	2	0	0	0	0	2
05:00 PM	0	0	0	0	0	0	0
05:15 PM	0	0	0	0	0	0	0
05:30 PM	0	0	0	0	0	0	0
05:45 PM	0	0	2	0	0	0	2
Total	0	0	2	0	0	0	2
Grand Total	0	2	2	0	0	0	4
Apprch %	0	100	100	0	0	0	
Total %	0	50	50	0	0	0	

	Lake St From East			Wilson St From South			Lake St From West			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 04:00 PM										
04:00 PM	0	0	0	0	0	0	0	0	0	0
04:15 PM	0	**2**	**2**	0	0	0	0	0	0	**2**
04:30 PM	0	0	0	0	0	0	0	0	0	0
04:45 PM	0	0	0	0	0	0	0	0	0	0
Total Volume	0	2	2	0	0	0	0	0	0	2
% App. Total	0	100		0	0		0	0		
PHF	.000	.250	.250	.000	.000	.000	.000	.000	.000	.250

N/S Street : Wilson Street
E/W Street : Lake Street
City/State : Arlington, MA
Weather : Cloudy

File Name : 84510001
Site Code : 84510001
Start Date : 9/10/2020
Page No : 10

Groups Printed- Bikes Peds

	Lake St From East			Wilson St From South			Lake St From West					
Start Time	Left	Thru	Peds	Left	Right	Peds	Thru	Right	Peds	Exclu. Total	Inclu. Total	Int. Total
04:00 PM	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
04:30 PM	0	4	3	0	0	1	0	1	0	4	5	9
04:45 PM	0	0	1	0	0	2	0	2	0	3	2	5
Total	0	4	4	0	0	3	0	3	0	7	7	14
05:00 PM	0	0	0	0	0	1	1	0	0	1	1	2
05:15 PM	0	0	0	0	0	1	0	0	0	1	0	1
05:30 PM	0	1	0	0	0	0	6	1	0	0	8	8
05:45 PM	0	2	0	0	0	4	0	0	0	4	2	6
Total	0	3	0	0	0	6	7	1	0	6	11	17
Grand Total	0	7	4	0	0	9	7	4	0	13	18	31
Apprch %	0	100		0	0		63.6	36.4				
Total %	0	38.9		0	0		38.9	22.2		41.9	58.1	

	Lake St From East			Wilson St From South			Lake St From West			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 04:45 PM										
04:45 PM	0	0	0	0	0	0	0	**2**	2	2
05:00 PM	0	0	0	0	0	0	1	0	1	1
05:15 PM	0	0	0	0	0	0	0	0	0	0
05:30 PM	0	**1**	**1**	0	0	0	**6**	1	**7**	**8**
Total Volume	0	1	1	0	0	0	7	3	10	11
% App. Total	0	100		0	0		70	30		
PHF	.000	.250	.250	.000	.000	.000	.292	.375	.357	.344

Accurate Counts
978-664-2565

N/S Street : Homestead Road
E/W Street : Lake Street
City/State : Arlington, MA
Weather : Cloudy

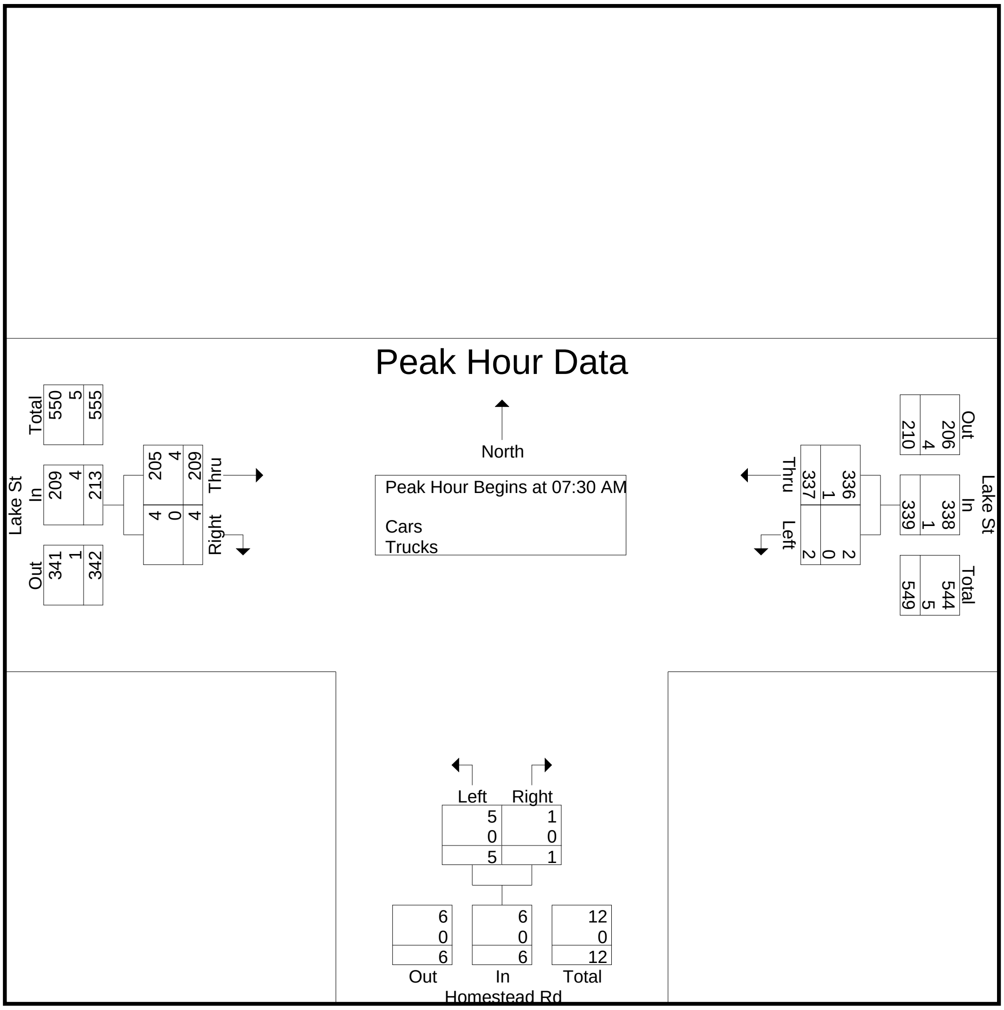
File Name : 84510002
Site Code : 84510002
Start Date : 9/10/2020
Page No : 1

Groups Printed- Cars - Trucks

	Lake St From East		Homestead Rd From South		Lake St From West		
Start Time	Left	Thru	Left	Right	Thru	Right	Int. Total
07:00 AM	0	59	1	0	39	0	99
07:15 AM	0	63	1	0	39	1	104
07:30 AM	0	91	1	1	41	1	135
07:45 AM	1	89	1	0	48	2	141
Total	1	302	4	1	167	4	479
08:00 AM	0	78	1	0	46	1	126
08:15 AM	1	79	2	0	74	0	156
08:30 AM	0	73	0	0	54	1	128
08:45 AM	0	71	0	0	59	2	132
Total	1	301	3	0	233	4	542
Grand Total	2	603	7	1	400	8	1021
Apprch %	0.3	99.7	87.5	12.5	98	2	
Total %	0.2	59.1	0.7	0.1	39.2	0.8	
Cars	2	601	7	1	394	7	1012
% Cars	100	99.7	100	100	98.5	87.5	99.1
Trucks	0	2	0	0	6	1	9
% Trucks	0	0.3	0	0	1.5	12.5	0.9

	Lake St From East			Homestead Rd From South			Lake St From West			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 07:30 AM										
07:30 AM	0	**91**	**91**	1	**1**	**2**	41	1	42	135
07:45 AM	**1**	89	90	1	0	1	48	**2**	50	141
08:00 AM	0	78	78	1	0	1	46	1	47	126
08:15 AM	1	79	80	**2**	0	2	**74**	0	**74**	**156**
Total Volume	2	337	339	5	1	6	209	4	213	558
% App. Total	0.6	99.4		83.3	16.7		98.1	1.9		
PHF	.500	.926	.931	.625	.250	.750	.706	.500	.720	.894
Cars	2	336	338	5	1	6	205	4	209	553
% Cars	100	99.7	99.7	100	100	100	98.1	100	98.1	99.1
Trucks	0	1	1	0	0	0	4	0	4	5
% Trucks	0	0.3	0.3	0	0	0	1.9	0	1.9	0.9

N/S Street	: Homestead Road	File Name	: 84510002
E/W Street	: Lake Street	Site Code	: 84510002
City/State	: Arlington, MA	Start Date	: 9/10/2020
Weather	: Cloudy	Page No	: 2



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	07:30 AM			07:30 AM			08:00 AM		
+0 mins.	0	**91**	**91**	1	**1**	**2**	46	1	47
+15 mins.	**1**	89	90	1	0	1	**74**	0	**74**
+30 mins.	0	78	78	1	0	1	54	1	55
+45 mins.	1	79	80	**2**	0	2	59	**2**	61
Total Volume	2	337	339	5	1	6	233	4	237
% App. Total	0.6	99.4		83.3	16.7		98.3	1.7	
PHF	.500	.926	.931	.625	.250	.750	.787	.500	.801
Cars	2	336	338	5	1	6	230	3	233
% Cars	100	99.7	99.7	100	100	100	98.7	75	98.3
Trucks	0	1	1	0	0	0	3	1	4
% Trucks	0	0.3	0.3	0	0	0	1.3	25	1.7

Accurate Counts
978-664-2565

N/S Street : Homestead Road
E/W Street : Lake Street
City/State : Arlington, MA
Weather : Cloudy

File Name : 84510002
Site Code : 84510002
Start Date : 9/10/2020
Page No : 7

Groups Printed- Trucks

	Lake St From East		Homestead Rd From South		Lake St From West		
Start Time	Left	Thru	Left	Right	Thru	Right	Int. Total
07:00 AM	0	0	0	0	0	0	0
07:15 AM	0	1	0	0	2	0	3
07:30 AM	0	0	0	0	0	0	0
07:45 AM	0	1	0	0	1	0	2
Total	0	2	0	0	3	0	5
08:00 AM	0	0	0	0	0	0	0
08:15 AM	0	0	0	0	3	0	3
08:30 AM	0	0	0	0	0	0	0
08:45 AM	0	0	0	0	0	1	1
Total	0	0	0	0	3	1	4
Grand Total	0	2	0	0	6	1	9
Apprch %	0	100	0	0	85.7	14.3	
Total %	0	22.2	0	0	66.7	11.1	

	Lake St From East			Homestead Rd From South			Lake St From West			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 07:00 AM										
07:00 AM	0	0	0	0	0	0	0	0	0	0
07:15 AM	0	**1**	**1**	0	0	0	**2**	0	**2**	**3**
07:30 AM	0	0	0	0	0	0	0	0	0	0
07:45 AM	0	1	1	0	0	0	1	0	1	2
Total Volume	0	2	2	0	0	0	3	0	3	5
% App. Total	0	100		0	0		100	0		
PHF	.000	.500	.500	.000	.000	.000	.375	.000	.375	.417

N/S Street : Homestead Road
E/W Street : Lake Street
City/State : Arlington, MA
Weather : Cloudy

File Name : 84510002
Site Code : 84510002
Start Date : 9/10/2020
Page No : 10

Groups Printed- Bikes Peds

	Lake St From East			Homestead Rd From South			Lake St From West					
Start Time	Left	Thru	Peds	Left	Right	Peds	Thru	Right	Peds	Exclu. Total	Inclu. Total	Int. Total
07:00 AM	0	0	1	0	0	2	0	0	0	3	0	3
07:15 AM	0	0	0	0	0	3	0	0	1	4	0	4
07:30 AM	0	3	0	0	0	3	2	0	0	3	5	8
07:45 AM	0	1	1	0	0	4	0	0	0	5	1	6
Total	0	4	2	0	0	12	2	0	1	15	6	21
08:00 AM	0	2	1	0	0	1	1	0	0	2	3	5
08:15 AM	0	0	0	0	0	3	0	0	0	3	0	3
08:30 AM	0	0	0	0	0	0	1	0	0	0	1	1
08:45 AM	0	2	0	0	0	1	0	0	0	1	2	3
Total	0	4	1	0	0	5	2	0	0	6	6	12
Grand Total	0	8	3	0	0	17	4	0	1	21	12	33
Apprch %	0	100		0	0		100	0				
Total %	0	66.7		0	0		33.3	0		63.6	36.4	

	Lake St From East			Homestead Rd From South			Lake St From West			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 07:15 AM										
07:15 AM	0	0	0	0	0	0	0	0	0	0
07:30 AM	0	**3**	**3**	0	0	0	**2**	0	**2**	**5**
07:45 AM	0	1	1	0	0	0	0	0	0	1
08:00 AM	0	2	2	0	0	0	1	0	1	3
Total Volume	0	6	6	0	0	0	3	0	3	9
% App. Total	0	100		0	0		100	0		
PHF	.000	.500	.500	.000	.000	.000	.375	.000	.375	.450

Accurate Counts
978-664-2565

N/S Street : Homestead Road
E/W Street : Lake Street
City/State : Arlington, MA
Weather : Cloudy

File Name : 84510002
Site Code : 84510002
Start Date : 9/10/2020
Page No : 1

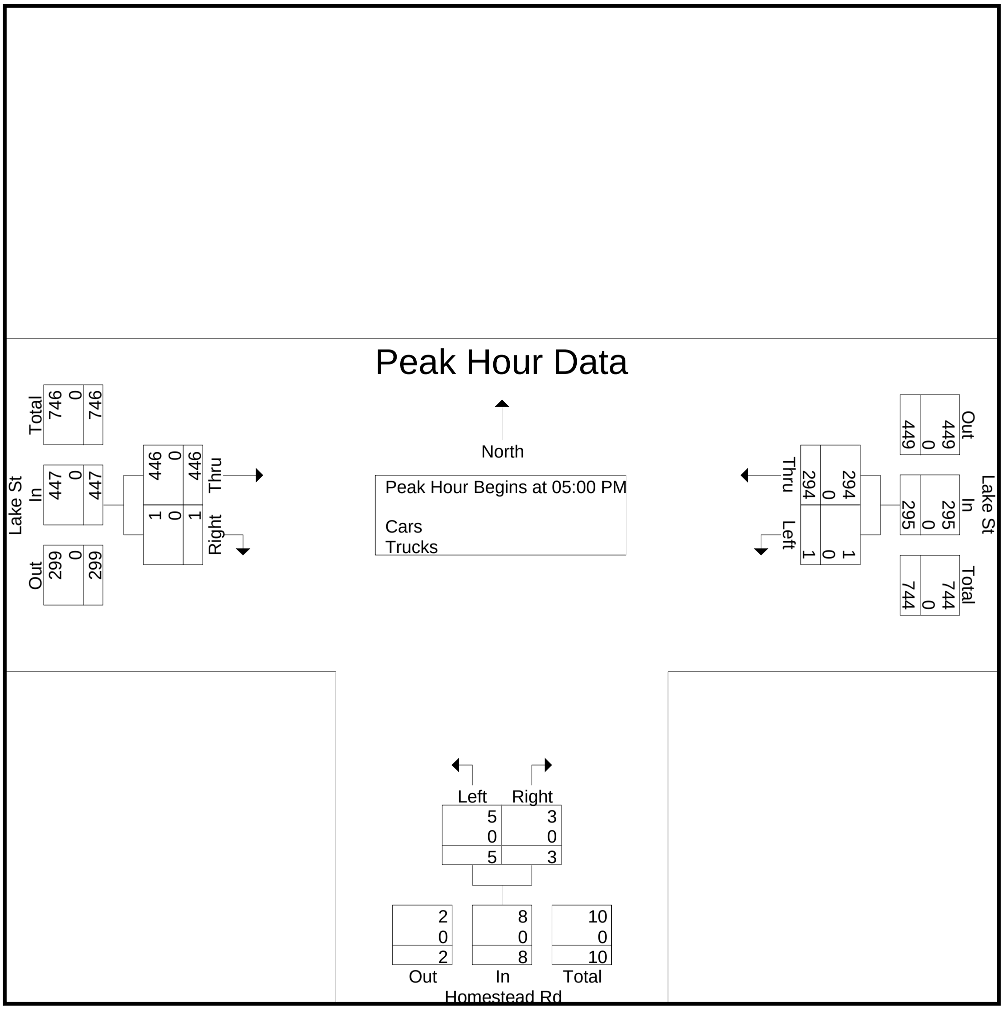
Groups Printed- Cars - Trucks

	Lake St From East		Homestead Rd From South		Lake St From West		
Start Time	Left	Thru	Left	Right	Thru	Right	Int. Total
04:00 PM	0	63	1	0	142	2	208
04:15 PM	1	60	1	0	95	1	158
04:30 PM	0	72	0	0	102	1	175
04:45 PM	0	58	1	0	100	1	160
Total	1	253	3	0	439	5	701
05:00 PM	0	74	1	0	128	0	203
05:15 PM	1	69	2	2	113	0	187
05:30 PM	0	68	2	1	108	1	180
05:45 PM	0	83	0	0	97	0	180
Total	1	294	5	3	446	1	750
Grand Total	2	547	8	3	885	6	1451
Apprch %	0.4	99.6	72.7	27.3	99.3	0.7	
Total %	0.1	37.7	0.6	0.2	61	0.4	
Cars	2	545	8	3	885	6	1449
% Cars	100	99.6	100	100	100	100	99.9
Trucks	0	2	0	0	0	0	2
% Trucks	0	0.4	0	0	0	0	0.1

	Lake St From East			Homestead Rd From South			Lake St From West			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 05:00 PM										
05:00 PM	0	74	74	1	0	1	**128**	0	**128**	**203**
05:15 PM	**1**	69	70	**2**	**2**	**4**	113	0	113	187
05:30 PM	0	68	68	2	1	3	108	**1**	109	180
05:45 PM	0	**83**	**83**	0	0	0	97	0	97	180
Total Volume	1	294	295	5	3	8	446	1	447	750
% App. Total	0.3	99.7		62.5	37.5		99.8	0.2		
PHF	.250	.886	.889	.625	.375	.500	.871	.250	.873	.924
Cars	1	294	295	5	3	8	446	1	447	750
% Cars	100	100	100	100	100	100	100	100	100	100
Trucks	0	0	0	0	0	0	0	0	0	0
% Trucks	0	0	0	0	0	0	0	0	0	0

N/S Street : Homestead Road
E/W Street : Lake Street
City/State : Arlington, MA
Weather : Cloudy

File Name : 84510002
Site Code : 84510002
Start Date : 9/10/2020
Page No : 2



Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	05:00 PM			04:45 PM			04:45 PM		
+0 mins.	0	74	74	1	0	1	100	**1**	101
+15 mins.	**1**	69	70	1	0	1	**128**	0	**128**
+30 mins.	0	68	68	**2**	**2**	**4**	113	0	113
+45 mins.	0	**83**	**83**	2	1	3	108	1	109
Total Volume	1	294	295	6	3	9	449	2	451
% App. Total	0.3	99.7		66.7	33.3		99.6	0.4	
PHF	.250	.886	.889	.750	.375	.563	.877	.500	.881
Cars	1	294	295	6	3	9	449	2	451
% Cars	100	100	100	100	100	100	100	100	100
Trucks	0	0	0	0	0	0	0	0	0
% Trucks	0	0	0	0	0	0	0	0	0

Accurate Counts

978-664-2565

N/S Street : Homestead Road
E/W Street : Lake Street
City/State : Arlington, MA
Weather : Cloudy

File Name : 84510002
Site Code : 84510002
Start Date : 9/10/2020
Page No : 7

Groups Printed- Trucks

	Lake St From East		Homestead Rd From South		Lake St From West		
Start Time	Left	Thru	Left	Right	Thru	Right	Int. Total
04:00 PM	0	0	0	0	0	0	0
04:15 PM	0	2	0	0	0	0	2
04:30 PM	0	0	0	0	0	0	0
04:45 PM	0	0	0	0	0	0	0
Total	0	2	0	0	0	0	2
05:00 PM	0	0	0	0	0	0	0
05:15 PM	0	0	0	0	0	0	0
05:30 PM	0	0	0	0	0	0	0
05:45 PM	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0
Grand Total	0	2	0	0	0	0	2
Apprch %	0	100	0	0	0	0	
Total %	0	100	0	0	0	0	

	Lake St From East			Homestead Rd From South			Lake St From West			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 04:00 PM										
04:00 PM	0	0	0	0	0	0	0	0	0	0
04:15 PM	0	**2**	**2**	0	0	0	0	0	0	**2**
04:30 PM	0	0	0	0	0	0	0	0	0	0
04:45 PM	0	0	0	0	0	0	0	0	0	0
Total Volume	0	2	2	0	0	0	0	0	0	2
% App. Total	0	100		0	0		0	0		
PHF	.000	.250	.250	.000	.000	.000	.000	.000	.000	.250

N/S Street : Homestead Road
E/W Street : Lake Street
City/State : Arlington, MA
Weather : Cloudy

File Name : 84510002
Site Code : 84510002
Start Date : 9/10/2020
Page No : 10

Groups Printed- Bikes Peds

	Lake St From East			Homestead Rd From South			Lake St From West					
Start Time	Left	Thru	Peds	Left	Right	Peds	Thru	Right	Peds	Exclu. Total	Inclu. Total	Int. Total
04:00 PM	0	0	0	0	0	3	0	0	0	3	0	3
04:15 PM	0	1	0	0	0	0	0	0	0	0	1	1
04:30 PM	0	4	0	0	0	2	0	0	0	2	4	6
04:45 PM	0	0	0	0	0	1	0	0	0	1	0	1
Total	0	5	0	0	0	6	0	0	0	6	5	11
05:00 PM	0	1	0	0	0	2	4	0	0	2	5	7
05:15 PM	0	0	0	0	0	1	0	0	0	1	0	1
05:30 PM	0	1	0	0	0	0	1	0	0	0	2	2
05:45 PM	0	2	0	0	0	3	2	0	0	3	4	7
Total	0	4	0	0	0	6	7	0	0	6	11	17
Grand Total	0	9	0	0	0	12	7	0	0	12	16	28
Apprch %	0	100		0	0		100	0				
Total %	0	56.2		0	0		43.8	0		42.9	57.1	

	Lake St From East			Homestead Rd From South			Lake St From West			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 05:00 PM										
05:00 PM	0	1	1	0	0	0	**4**	0	**4**	**5**
05:15 PM	0	0	0	0	0	0	0	0	0	0
05:30 PM	0	1	1	0	0	0	1	0	1	2
05:45 PM	0	**2**	**2**	0	0	0	2	0	2	4
Total Volume	0	4	4	0	0	0	7	0	7	11
% App. Total	0	100		0	0		100	0		
PHF	.000	.500	.500	.000	.000	.000	.438	.000	.438	.550

Accurate Counts
978-664-2565

N/S Street : Alfred Rd / Burch St
E/W Street : Lake Street
City/State : Arlington, MA
Weather : Cloudy

File Name : 84510003
Site Code : 84510003
Start Date : 9/10/2020
Page No : 1

Groups Printed- Cars - Trucks

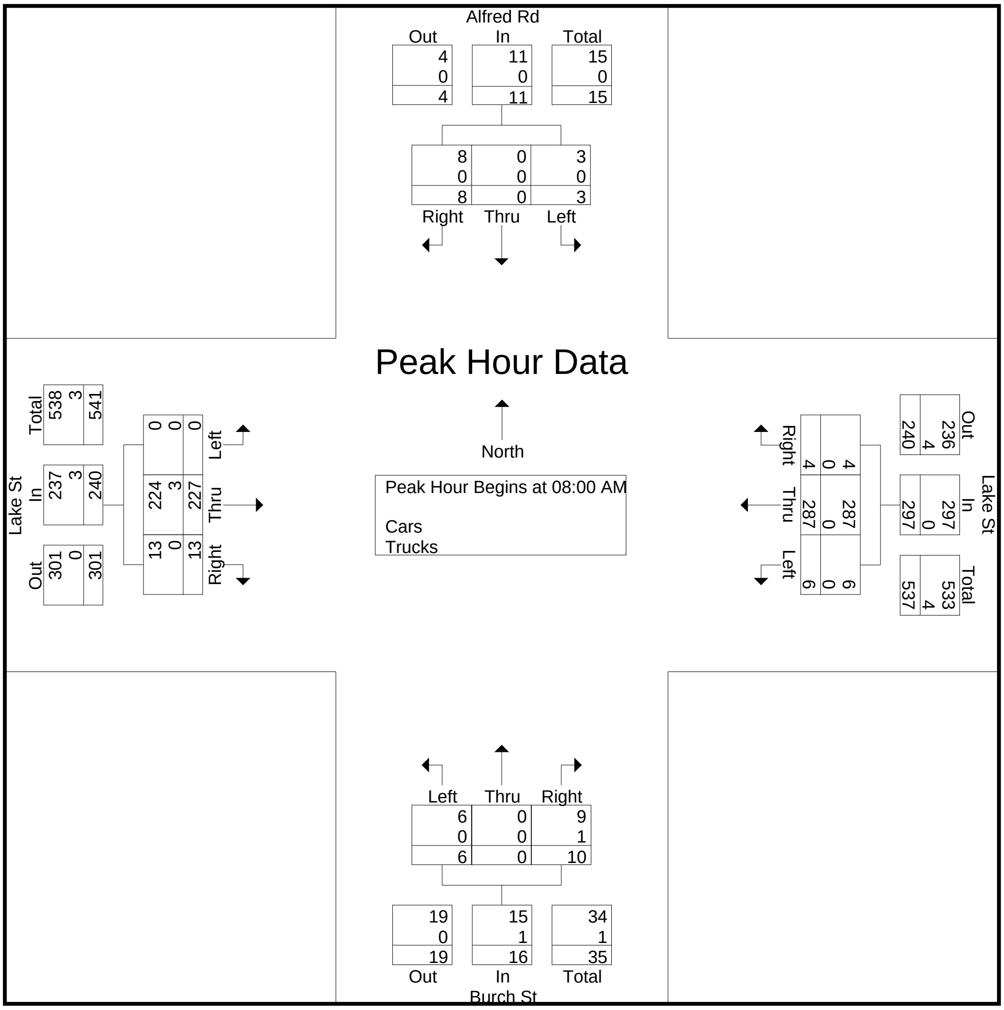
	Alfred Rd From North				Lake St From East				Burch St From South				Lake St From West						
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Exclu. Total	Inclu. Total	Int. Total
07:00 AM	1	0	1	0	0	53	2	0	4	0	0	0	0	39	1	0	0	101	101
07:15 AM	1	0	2	0	1	57	0	0	3	0	0	0	0	40	1	0	0	105	105
07:30 AM	2	0	2	0	0	82	0	0	3	0	2	0	0	40	0	0	0	131	131
07:45 AM	0	0	2	0	1	83	2	0	0	0	2	0	0	50	1	0	0	141	141
Total	4	0	7	0	2	275	4	0	10	0	4	0	0	169	3	0	0	478	478
08:00 AM	0	0	2	0	0	73	0	0	3	0	2	0	0	46	1	0	0	127	127
08:15 AM	0	0	3	0	1	74	2	0	1	0	3	0	0	70	6	0	0	160	160
08:30 AM	0	0	3	0	0	69	2	0	1	0	1	0	0	57	1	0	0	134	134
08:45 AM	3	0	0	0	5	71	0	0	1	0	4	0	0	54	5	0	0	143	143
Total	3	0	8	0	6	287	4	0	6	0	10	0	0	227	13	0	0	564	564
Grand Total	7	0	15	0	8	562	8	0	16	0	14	0	0	396	16	0	0	1042	1042
Apprch %	31.8	0	68.2		1.4	97.2	1.4		53.3	0	46.7		0	96.1	3.9				
Total %	0.7	0	1.4		0.8	53.9	0.8		1.5	0	1.3		0	38	1.5		0	100	
Cars	7	0	15		8	561	8		16	0	13		0	390	16		0	0	1034
% Cars	100	0	100	0	100	99.8	100	0	100	0	92.9	0	0	98.5	100	0	0	0	99.2
Trucks	0	0	0		0	1	0		0	0	1		0	6	0		0	0	8
% Trucks	0	0	0	0	0	0.2	0	0	0	0	7.1	0	0	1.5	0	0	0	0	0.8

	Alfred Rd From North				Lake St From East				Burch St From South				Lake St From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 08:00 AM																	
08:00 AM	0	0	2	2	0	73	0	73	**3**	0	2	**5**	0	46	1	47	127
08:15 AM	0	0	**3**	**3**	1	**74**	**2**	**77**	1	0	3	4	0	**70**	**6**	**76**	**160**
08:30 AM	0	0	3	3	0	69	2	71	1	0	1	2	0	57	1	58	134
08:45 AM	**3**	0	0	3	**5**	71	0	76	1	0	**4**	5	0	54	5	59	143
Total Volume	3	0	8	11	6	287	4	297	6	0	10	16	0	227	13	240	564
% App. Total	27.3	0	72.7		2	96.6	1.3		37.5	0	62.5		0	94.6	5.4		
PHF	.250	.000	.667	.917	.300	.970	.500	.964	.500	.000	.625	.800	.000	.811	.542	.789	.881
Cars	3	0	8	11	6	287	4	297	6	0	9	15	0	224	13	237	560
% Cars	100	0	100	100	100	100	100	100	100	0	90.0	93.8	0	98.7	100	98.8	99.3
Trucks	0	0	0	0	0	0	0	0	0	0	1	1	0	3	0	3	4
% Trucks	0	0	0	0	0	0	0	0	0	0	10.0	6.3	0	1.3	0	1.3	0.7

Accurate Counts
978-664-2565

N/S Street : Alfred Rd / Burch St
E/W Street : Lake Street
City/State : Arlington, MA
Weather : Cloudy

File Name : 84510003
Site Code : 84510003
Start Date : 9/10/2020
Page No : 2



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	07:00 AM				07:30 AM				07:30 AM				08:00 AM			
+0 mins.	1	0	1	2	0	82	0	82	**3**	0	2	**5**	0	46	1	47
+15 mins.	1	0	**2**	3	**1**	**83**	**2**	**86**	0	0	2	2	0	**70**	**6**	**76**
+30 mins.	**2**	0	2	**4**	0	73	0	73	3	0	2	5	0	57	1	58
+45 mins.	0	0	2	2	1	74	2	77	1	0	**3**	4	0	54	5	59
Total Volume	4	0	7	11	2	312	4	318	7	0	9	16	0	227	13	240
% App. Total	36.4	0	63.6		0.6	98.1	1.3		43.8	0	56.2		0	94.6	5.4	
PHF	.500	.000	.875	.688	.500	.940	.500	.924	.583	.000	.750	.800	.000	.811	.542	.789
Cars	4	0	7	11	2	312	4	318	7	0	9	16	0	224	13	237
% Cars	100	0	100	100	100	100	100	100	100	0	100	100	0	98.7	100	98.8
Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	3
% Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	1.3	0	1.2

N/S Street : Alfred Rd / Burch St
E/W Street : Lake Street
City/State : Arlington, MA
Weather : Cloudy

File Name : 84510003
Site Code : 84510003
Start Date : 9/10/2020
Page No : 7

Groups Printed- Trucks

	Alfred Rd From North				Lake St From East				Burch St From South				Lake St From West						
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Exclu. Total	Inclu. Total	Int. Total
07:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1
07:15 AM	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	2	2
07:30 AM	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	1	0	0	0	1	1
Total	0	0	0	0	0	1	0	0	0	0	0	0	0	3	0	0	0	4	4
08:00 AM	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	3	0	0	0	3	3
08:30 AM	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	1	0	0	0	0	0	0	1	1
Total	0	0	0	0	0	0	0	0	0	0	1	0	0	3	0	0	0	4	4
Grand Total	0	0	0	0	0	1	0	0	0	0	1	0	0	6	0	0	0	8	8
Apprch %	0	0	0		0	100	0		0	0	100		0	100	0				
Total %	0	0	0		0	12.5	0		0	0	12.5		0	75	0		0	100	

	Alfred Rd From North				Lake St From East				Burch St From South				Lake St From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:00 AM																	
07:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	**1**	0	**1**	1
07:15 AM	0	0	0	0	0	**1**	0	**1**	0	0	0	0	0	1	0	1	**2**
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	0	1	0	1	1
Total Volume	0	0	0	0	0	1	0	1	0	0	0	0	0	3	0	3	4
% App. Total	0	0	0		0	100	0		0	0	0		0	100	0		
PHF	.000	.000	.000	.000	.000	.250	.000	.250	.000	.000	.000	.000	.000	.750	.000	.750	.500

Accurate Counts

978-664-2565

N/S Street : Alfred Rd / Burch St
E/W Street : Lake Street
City/State : Arlington, MA
Weather : Cloudy

File Name : 84510003
Site Code : 84510003
Start Date : 9/10/2020
Page No : 10

Groups Printed- Bikes Peds

	Alfred Rd From North				Lake St From East				Burch St From South				Lake St From West						
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Exclu. Total	Inclu. Total	Int. Total
07:00 AM	0	0	0	5	0	0	0	1	0	0	0	2	0	0	0	0	8	0	8
07:15 AM	0	0	0	7	0	1	0	1	0	0	0	0	0	0	0	0	8	1	9
07:30 AM	0	0	0	6	0	2	0	1	0	0	0	2	0	4	0	0	9	6	15
07:45 AM	0	1	0	7	0	1	0	1	0	0	0	4	0	0	0	0	12	2	14
Total	0	1	0	25	0	4	0	4	0	0	0	8	0	4	0	0	37	9	46
08:00 AM	0	0	0	14	0	2	0	1	0	0	0	0	0	1	0	2	17	3	20
08:15 AM	0	0	0	7	0	1	0	0	0	0	0	2	0	0	0	1	10	1	11
08:30 AM	0	1	0	4	0	0	0	0	0	0	0	1	0	1	0	0	5	2	7
08:45 AM	1	0	0	2	0	3	0	0	0	0	0	2	0	1	0	0	4	5	9
Total	1	1	0	27	0	6	0	1	0	0	0	5	0	3	0	3	36	11	47
Grand Total	1	2	0	52	0	10	0	5	0	0	0	13	0	7	0	3	73	20	93
Apprch %	33.3	66.7	0		0	100	0		0	0	0		0	100	0				
Total %	5	10	0		0	50	0		0	0	0		0	35	0		78.5	21.5	

	Alfred Rd From North				Lake St From East				Burch St From South				Lake St From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:15 AM																	
07:15 AM	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	1
07:30 AM	0	0	0	0	0	**2**	0	**2**	0	0	0	0	0	**4**	0	**4**	**6**
07:45 AM	0	**1**	0	**1**	0	1	0	1	0	0	0	0	0	0	0	0	2
08:00 AM	0	0	0	0	0	2	0	2	0	0	0	0	0	1	0	1	3
Total Volume	0	1	0	1	0	6	0	6	0	0	0	0	0	5	0	5	12
% App. Total	0	100	0		0	100	0		0	0	0		0	100	0		
PHF	.000	.250	.000	.250	.000	.750	.000	.750	.000	.000	.000	.000	.000	.313	.000	.313	.500

N/S Street : Alfred Rd / Burch St
E/W Street : Lake Street
City/State : Arlington, MA
Weather : Cloudy

File Name : 84510003
Site Code : 84510003
Start Date : 9/10/2020
Page No : 1

Groups Printed- Cars - Trucks

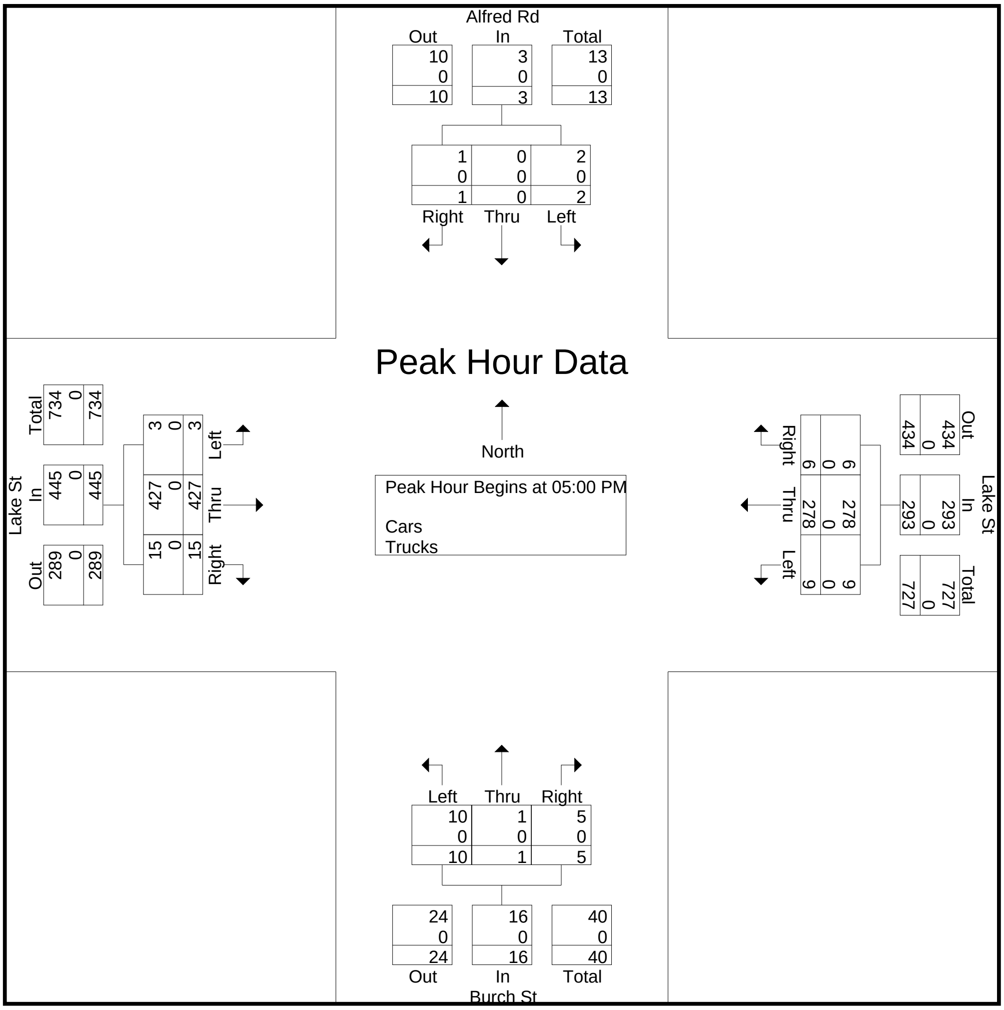
	Alfred Rd From North				Lake St From East				Burch St From South				Lake St From West						
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Exclu. Total	Inclu. Total	Int. Total
04:00 PM	2	0	0	0	2	64	2	0	1	0	2	0	1	132	4	0	0	210	210
04:15 PM	0	0	0	0	2	56	3	0	2	1	2	0	0	91	6	0	0	163	163
04:30 PM	0	0	1	0	4	67	0	0	2	0	0	0	0	104	2	0	0	180	180
04:45 PM	3	0	1	0	2	59	3	0	3	0	0	0	1	93	5	0	0	170	170
Total	5	0	2	0	10	246	8	0	8	1	4	0	2	420	17	0	0	723	723
05:00 PM	0	0	0	0	0	68	2	0	4	0	3	0	0	129	1	0	0	207	207
05:15 PM	0	0	1	0	2	65	3	0	1	0	1	0	3	109	3	0	0	188	188
05:30 PM	2	0	0	0	3	64	1	0	2	1	0	0	0	105	4	0	0	182	182
05:45 PM	0	0	0	0	4	81	0	0	3	0	1	0	0	84	7	0	0	180	180
Total	2	0	1	0	9	278	6	0	10	1	5	0	3	427	15	0	0	757	757
Grand Total	7	0	3	0	19	524	14	0	18	2	9	0	5	847	32	0	0	1480	1480
Apprch %	70	0	30		3.4	94.1	2.5		62.1	6.9	31		0.6	95.8	3.6				
Total %	0.5	0	0.2		1.3	35.4	0.9		1.2	0.1	0.6		0.3	57.2	2.2		0	100	
Cars	7	0	3		19	522	14		18	2	9		5	847	32		0	0	1478
% Cars	100	0	100	0	100	99.6	100	0	100	100	100	0	100	100	100	0	0	0	99.9
Trucks	0	0	0		0	2	0		0	0	0		0	0	0		0	0	2
% Trucks	0	0	0	0	0	0.4	0	0	0	0	0	0	0	0	0	0	0	0	0.1

	Alfred Rd From North				Lake St From East				Burch St From South				Lake St From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 05:00 PM																	
05:00 PM	0	0	0	0	0	68	2	70	**4**	0	**3**	**7**	0	**129**	1	**130**	**207**
05:15 PM	0	0	**1**	1	2	65	**3**	70	1	0	1	2	**3**	109	3	115	188
05:30 PM	**2**	0	0	**2**	3	64	1	68	2	**1**	0	3	0	105	4	109	182
05:45 PM	0	0	0	0	**4**	**81**	0	**85**	3	0	1	4	0	84	**7**	91	180
Total Volume	2	0	1	3	9	278	6	293	10	1	5	16	3	427	15	445	757
% App. Total	66.7	0	33.3		3.1	94.9	2		62.5	6.2	31.2		0.7	96	3.4		
PHF	.250	.000	.250	.375	.563	.858	.500	.862	.625	.250	.417	.571	.250	.828	.536	.856	.914
Cars	2	0	1	3	9	278	6	293	10	1	5	16	3	427	15	445	757
% Cars	100	0	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Accurate Counts
978-664-2565

N/S Street : Alfred Rd / Burch St
E/W Street : Lake Street
City/State : Arlington, MA
Weather : Cloudy

File Name : 84510003
Site Code : 84510003
Start Date : 9/10/2020
Page No : 2



Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	04:00 PM				05:00 PM				04:15 PM				04:45 PM			
+0 mins.	2	0	0	2	0	68	2	70	2	**1**	2	5	1	93	**5**	99
+15 mins.	0	0	0	0	2	65	**3**	70	2	0	0	2	0	**129**	1	**130**
+30 mins.	0	0	**1**	1	3	64	1	68	3	0	0	3	**3**	109	3	115
+45 mins.	**3**	0	1	**4**	**4**	**81**	0	**85**	**4**	0	**3**	**7**	0	105	4	109
Total Volume	5	0	2	7	9	278	6	293	11	1	5	17	4	436	13	453
% App. Total	71.4	0	28.6		3.1	94.9	2		64.7	5.9	29.4		0.9	96.2	2.9	
PHF	.417	.000	.500	.438	.563	.858	.500	.862	.688	.250	.417	.607	.333	.845	.650	.871
Cars	5	0	2	7	9	278	6	293	11	1	5	17	4	436	13	453
% Cars	100	0	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Accurate Counts
978-664-2565

N/S Street : Alfred Rd / Burch St
E/W Street : Lake Street
City/State : Arlington, MA
Weather : Cloudy

File Name : 84510003
Site Code : 84510003
Start Date : 9/10/2020
Page No : 7

Groups Printed- Trucks

	Alfred Rd From North				Lake St From East				Burch St From South				Lake St From West						
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Exclu. Total	Inclu. Total	Int. Total
04:00 PM	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	1
04:15 PM	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	1
04:30 PM	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
Total	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	2	2
05:00 PM	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
05:30 PM	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
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	2	0	0	0	0	0	0	0	0	0	0	0	2	2
Apprch %	0	0	0		0	100	0		0	0	0		0	0	0				
Total %	0	0	0		0	100	0		0	0	0		0	0	0		0	100	

	Alfred Rd From North				Lake St From East				Burch St From South				Lake St From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:00 PM																	
04:00 PM	0	0	0	0	0	**1**	0	**1**	0	0	0	0	0	0	0	0	**1**
04:15 PM	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	1
04:30 PM	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
Total Volume	0	0	0	0	0	2	0	2	0	0	0	0	0	0	0	0	2
% App. Total	0	0	0		0	100	0		0	0	0		0	0	0		
PHF	.000	.000	.000	.000	.000	.500	.000	.500	.000	.000	.000	.000	.000	.000	.000	.000	.500

N/S Street : Alfred Rd / Burch St
E/W Street : Lake Street
City/State : Arlington, MA
Weather : Cloudy

File Name : 84510003
Site Code : 84510003
Start Date : 9/10/2020
Page No : 10

Groups Printed- Bikes Peds

	Alfred Rd From North				Lake St From East				Burch St From South				Lake St From West						
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Exclu. Total	Inclu. Total	Int. Total
04:00 PM	0	0	0	2	0	1	0	0	0	0	0	1	0	0	0	0	3	1	4
04:15 PM	0	0	0	3	0	1	0	1	0	0	0	1	0	0	0	0	5	1	6
04:30 PM	2	0	0	3	0	0	0	1	0	0	0	2	0	0	0	0	6	2	8
04:45 PM	0	0	0	8	0	1	0	0	0	0	0	1	0	0	0	0	9	1	10
Total	2	0	0	16	0	3	0	2	0	0	0	5	0	0	0	0	23	5	28
05:00 PM	0	0	0	1	0	1	0	0	0	0	0	0	0	3	0	0	1	4	5
05:15 PM	0	0	0	1	0	0	3	1	0	0	0	1	0	1	0	0	3	4	7
05:30 PM	0	0	0	2	0	2	0	0	0	0	0	1	0	1	0	0	3	3	6
05:45 PM	0	0	0	2	0	2	0	0	0	0	0	3	0	2	0	0	5	4	9
Total	0	0	0	6	0	5	3	1	0	0	0	5	0	7	0	0	12	15	27
Grand Total	2	0	0	22	0	8	3	3	0	0	0	10	0	7	0	0	35	20	55
Apprch %	100	0	0		0	72.7	27.3		0	0	0		0	100	0				
Total %	10	0	0		0	40	15		0	0	0		0	35	0		63.6	36.4	

	Alfred Rd From North				Lake St From East				Burch St From South				Lake St From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 05:00 PM																	
05:00 PM	0	0	0	0	0	1	0	1	0	0	0	0	0	**3**	0	**3**	**4**
05:15 PM	0	0	0	0	0	0	**3**	**3**	0	0	0	0	0	1	0	1	4
05:30 PM	0	0	0	0	0	**2**	0	2	0	0	0	0	0	1	0	1	3
05:45 PM	0	0	0	0	0	2	0	2	0	0	0	0	0	2	0	2	4
Total Volume	0	0	0	0	0	5	3	8	0	0	0	0	0	7	0	7	15
% App. Total	0	0	0		0	62.5	37.5		0	0	0		0	100	0		
PHF	.000	.000	.000	.000	.000	.625	.250	.667	.000	.000	.000	.000	.000	.583	.000	.583	.938

N/S Street : Lakehill Ave / Margaret St
E/W Street : Lake Street
City/State : Arlington, MA
Weather : Cloudy

File Name : 84510004
Site Code : 84510004
Start Date : 9/10/2020
Page No : 1

Groups Printed- Cars - Trucks

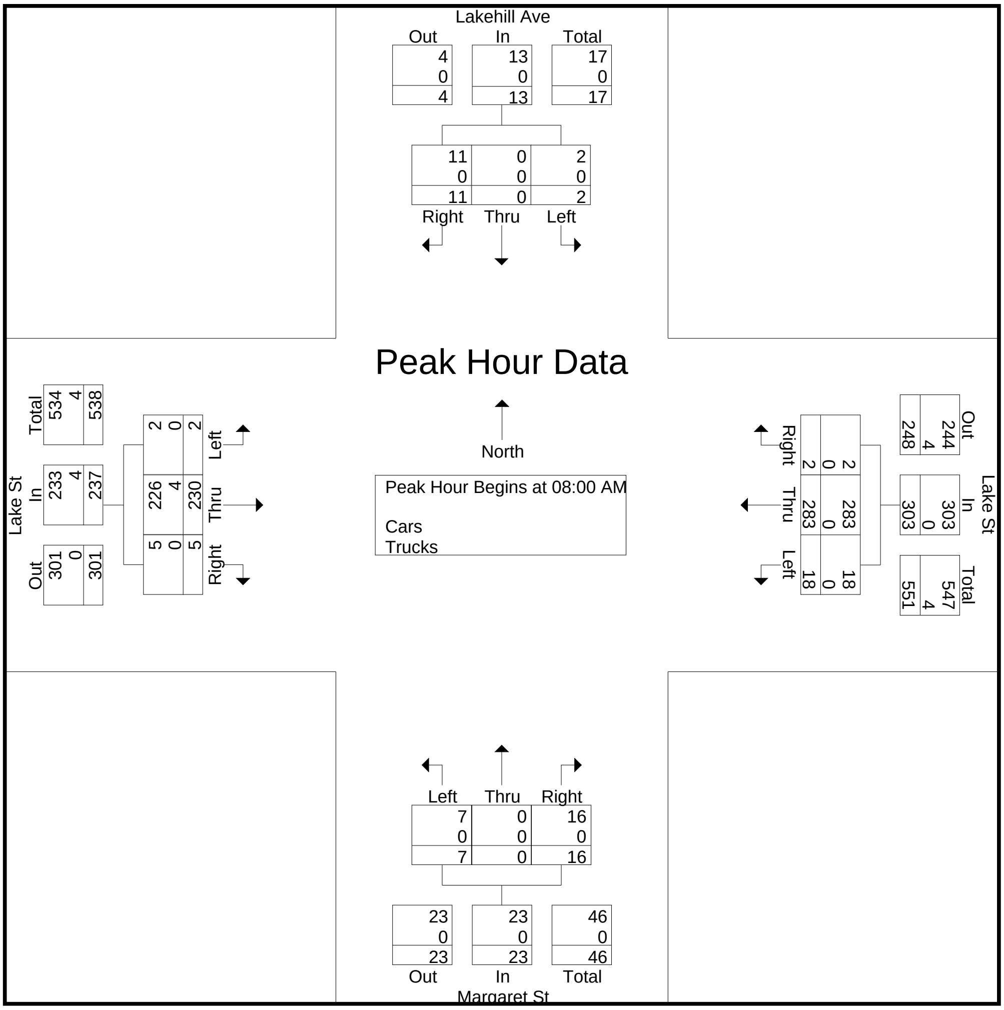
	Lakehill Ave From North			Lake St From East			Margaret St From South			Lake St From West			
Start Time	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Int. Total
07:00 AM	0	0	1	2	56	0	1	0	5	1	38	0	104
07:15 AM	0	0	4	4	52	0	1	0	2	0	41	0	104
07:30 AM	2	0	5	2	76	1	0	0	3	1	46	0	136
07:45 AM	0	0	1	2	86	0	0	0	3	1	50	1	144
Total	2	0	11	10	270	1	2	0	13	3	175	1	488
08:00 AM	0	0	2	6	70	0	2	0	4	0	49	0	133
08:15 AM	0	0	2	3	75	0	2	0	2	0	69	2	155
08:30 AM	0	0	4	6	65	0	2	0	7	1	55	2	142
08:45 AM	2	0	3	3	73	2	1	0	3	1	57	1	146
Total	2	0	11	18	283	2	7	0	16	2	230	5	576
Grand Total	4	0	22	28	553	3	9	0	29	5	405	6	1064
Apprch %	15.4	0	84.6	4.8	94.7	0.5	23.7	0	76.3	1.2	97.4	1.4	
Total %	0.4	0	2.1	2.6	52	0.3	0.8	0	2.7	0.5	38.1	0.6	
Cars	4	0	22	28	552	3	9	0	29	5	398	6	1056
% Cars	100	0	100	100	99.8	100	100	0	100	100	98.3	100	99.2
Trucks	0	0	0	0	1	0	0	0	0	0	7	0	8
% Trucks	0	0	0	0	0.2	0	0	0	0	0	1.7	0	0.8

	Lakehill Ave From North				Lake St From East				Margaret St From South				Lake St From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 08:00 AM																	
08:00 AM	0	0	2	2	**6**	70	0	76	**2**	0	4	6	0	49	0	49	133
08:15 AM	0	0	2	2	3	**75**	0	**78**	2	0	2	4	0	**69**	**2**	**71**	**155**
08:30 AM	0	0	**4**	4	6	65	0	71	2	0	**7**	**9**	**1**	55	2	58	142
08:45 AM	**2**	0	3	**5**	3	73	**2**	78	1	0	3	4	1	57	1	59	146
Total Volume	2	0	11	13	18	283	2	303	7	0	16	23	2	230	5	237	576
% App. Total	15.4	0	84.6		5.9	93.4	0.7		30.4	0	69.6		0.8	97	2.1		
PHF	.250	.000	.688	.650	.750	.943	.250	.971	.875	.000	.571	.639	.500	.833	.625	.835	.929
Cars	2	0	11	13	18	283	2	303	7	0	16	23	2	226	5	233	572
% Cars	100	0	100	100	100	100	100	100	100	0	100	100	100	98.3	100	98.3	99.3
Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	4	4
% Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	1.7	0	1.7	0.7

Accurate Counts
978-664-2565

N/S Street : Lakehill Ave / Margaret St
E/W Street : Lake Street
City/State : Arlington, MA
Weather : Cloudy

File Name : 84510004
Site Code : 84510004
Start Date : 9/10/2020
Page No : 2



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	07:15 AM				07:30 AM				08:00 AM				08:00 AM			
+0 mins.	0	0	4	4	2	76	**1**	79	**2**	0	4	6	0	49	0	49
+15 mins.	**2**	0	**5**	**7**	2	**86**	0	**88**	2	0	2	4	0	**69**	**2**	**71**
+30 mins.	0	0	1	1	**6**	70	0	76	2	0	**7**	**9**	**1**	55	2	58
+45 mins.	0	0	2	2	3	75	0	78	1	0	3	4	1	57	1	59
Total Volume	2	0	12	14	13	307	1	321	7	0	16	23	2	230	5	237
% App. Total	14.3	0	85.7		4	95.6	0.3		30.4	0	69.6		0.8	97	2.1	
PHF	.250	.000	.600	.500	.542	.892	.250	.912	.875	.000	.571	.639	.500	.833	.625	.835
Cars	2	0	12	14	13	307	1	321	7	0	16	23	2	226	5	233
% Cars	100	0	100	100	100	100	100	100	100	0	100	100	100	98.3	100	98.3
Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	4
% Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	1.7	0	1.7

N/S Street : Lakehill Ave / Margaret St
E/W Street : Lake Street
City/State : Arlington, MA
Weather : Cloudy

File Name : 84510004
Site Code : 84510004
Start Date : 9/10/2020
Page No : 7

Groups Printed- Trucks

	Lakehill Ave From North			Lake St From East			Margaret St From South			Lake St From West			
Start Time	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Int. Total
07:00 AM	0	0	0	0	0	0	0	0	0	0	1	0	1
07:15 AM	0	0	0	0	1	0	0	0	0	0	1	0	2
07:30 AM	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	1	0	1
Total	0	0	0	0	1	0	0	0	0	0	3	0	4
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	3	0	3
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	1	0	1
Total	0	0	0	0	0	0	0	0	0	0	4	0	4
Grand Total	0	0	0	0	1	0	0	0	0	0	7	0	8
Apprch %	0	0	0	0	100	0	0	0	0	0	100	0	
Total %	0	0	0	0	12.5	0	0	0	0	0	87.5	0	

	Lakehill Ave From North				Lake St From East				Margaret St From South				Lake St From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:00 AM																	
07:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	**1**	0	**1**	1
07:15 AM	0	0	0	0	0	**1**	0	**1**	0	0	0	0	0	1	0	1	**2**
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	0	1	0	1	1
Total Volume	0	0	0	0	0	1	0	1	0	0	0	0	0	3	0	3	4
% App. Total	0	0	0		0	100	0		0	0	0		0	100	0		
PHF	.000	.000	.000	.000	.000	.250	.000	.250	.000	.000	.000	.000	.000	.750	.000	.750	.500

Accurate Counts
978-664-2565

N/S Street : Lakehill Ave / Margaret St
E/W Street : Lake Street
City/State : Arlington, MA
Weather : Cloudy

File Name : 84510004
Site Code : 84510004
Start Date : 9/10/2020
Page No : 10

Groups Printed- Bikes Peds

	Lakehill Ave From North				Lake St From East				Margaret St From South				Lake St From West						
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Exclu. Total	Inclu. Total	Int. Total
07:00 AM	0	0	0	5	0	0	0	0	0	0	1	4	0	1	0	0	9	2	11
07:15 AM	0	0	0	5	0	1	0	0	0	0	0	1	0	0	0	0	6	1	7
07:30 AM	0	0	0	9	0	2	0	0	0	0	0	1	1	1	0	2	12	4	16
07:45 AM	0	0	0	7	0	1	0	1	0	0	1	5	0	2	0	3	16	4	20
Total	0	0	0	26	0	4	0	1	0	0	2	11	1	4	0	5	43	11	54
08:00 AM	0	0	0	13	0	2	0	1	0	0	1	0	0	1	0	1	15	4	19
08:15 AM	0	1	0	9	0	1	0	0	0	0	1	1	0	0	0	0	10	3	13
08:30 AM	0	0	0	4	0	0	0	0	0	0	1	1	0	2	0	1	6	3	9
08:45 AM	0	0	0	1	0	2	0	1	0	0	0	1	0	2	0	0	3	4	7
Total	0	1	0	27	0	5	0	2	0	0	3	3	0	5	0	2	34	14	48
Grand Total	0	1	0	53	0	9	0	3	0	0	5	14	1	9	0	7	77	25	102
Apprch %	0	100	0		0	100	0		0	0	100		10	90	0				
Total %	0	4	0		0	36	0		0	0	20		4	36	0		75.5	24.5	

	Lakehill Ave From North				Lake St From East				Margaret St From South				Lake St From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:30 AM																	
07:30 AM	0	0	0	0	0	**2**	0	**2**	0	0	0	0	**1**	1	0	**2**	**4**
07:45 AM	0	0	0	0	0	1	0	1	0	0	**1**	**1**	0	**2**	0	2	4
08:00 AM	0	0	0	0	0	2	0	2	0	0	1	1	0	1	0	1	4
08:15 AM	0	**1**	0	**1**	0	1	0	1	0	0	1	1	0	0	0	0	3
Total Volume	0	1	0	1	0	6	0	6	0	0	3	3	1	4	0	5	15
% App. Total	0	100	0		0	100	0		0	0	100		20	80	0		
PHF	.000	.250	.000	.250	.000	.750	.000	.750	.000	.000	.750	.750	.250	.500	.000	.625	.938

Accurate Counts
978-664-2565

N/S Street : Lakehill Ave / Margaret St
E/W Street : Lake Street
City/State : Arlington, MA
Weather : Cloudy

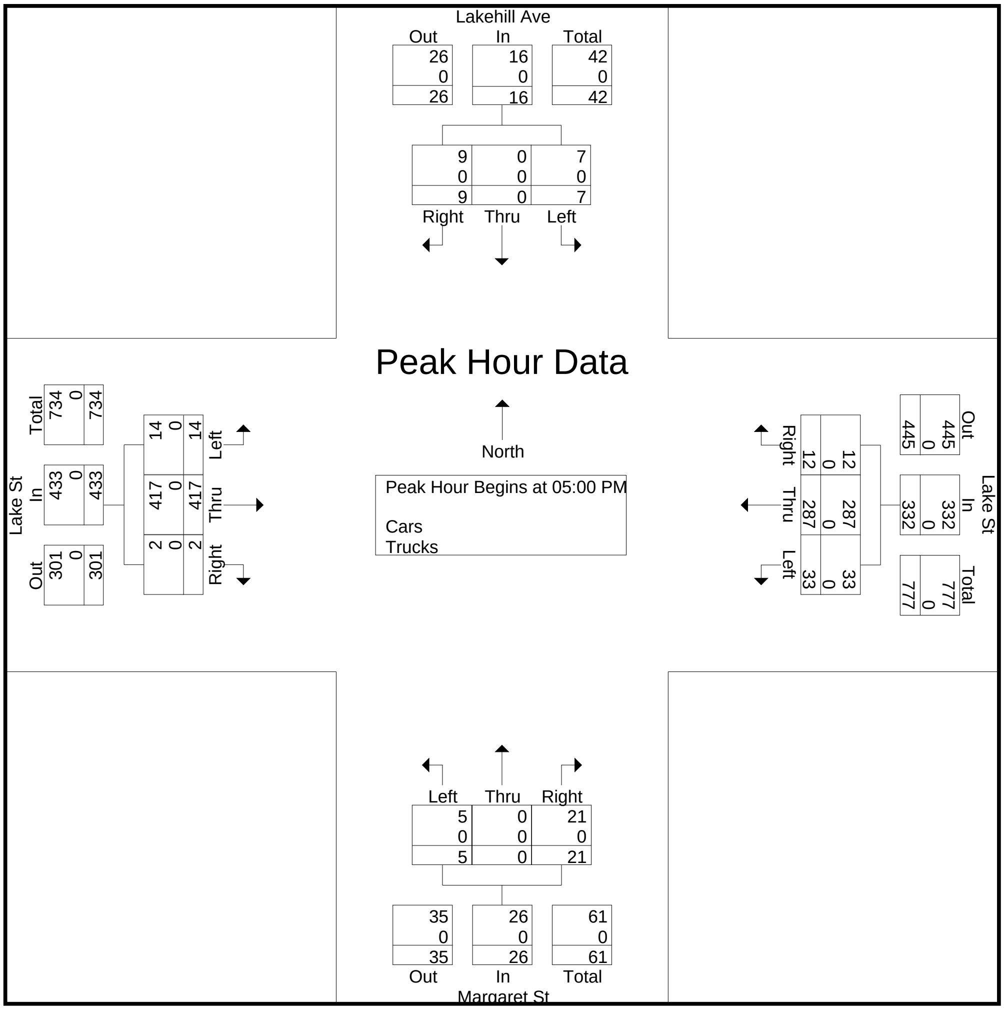
File Name : 84510004
Site Code : 84510004
Start Date : 9/10/2020
Page No : 1

Groups Printed- Cars - Trucks

	Lakehill Ave From North			Lake St From East			Margaret St From South			Lake St From West			
Start Time	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Int. Total
04:00 PM	2	0	1	2	64	2	1	0	3	1	134	0	210
04:15 PM	0	0	2	9	58	2	1	0	4	2	88	3	169
04:30 PM	1	0	5	11	67	4	1	0	4	0	102	2	197
04:45 PM	4	0	6	8	57	5	1	0	4	2	93	2	182
Total	7	0	14	30	246	13	4	0	15	5	417	7	758
05:00 PM	2	0	1	3	72	1	0	0	5	5	126	0	215
05:15 PM	2	0	2	3	73	1	1	0	4	4	106	1	197
05:30 PM	2	0	2	13	64	8	2	0	6	3	103	0	203
05:45 PM	1	0	4	14	78	2	2	0	6	2	82	1	192
Total	7	0	9	33	287	12	5	0	21	14	417	2	807
Grand Total	14	0	23	63	533	25	9	0	36	19	834	9	1565
Apprch %	37.8	0	62.2	10.1	85.8	4	20	0	80	2.2	96.8	1	
Total %	0.9	0	1.5	4	34.1	1.6	0.6	0	2.3	1.2	53.3	0.6	
Cars	14	0	23	63	531	25	9	0	36	19	834	9	1563
% Cars	100	0	100	100	99.6	100	100	0	100	100	100	100	99.9
Trucks	0	0	0	0	2	0	0	0	0	0	0	0	2
% Trucks	0	0	0	0	0.4	0	0	0	0	0	0	0	0.1

	Lakehill Ave From North				Lake St From East				Margaret St From South				Lake St From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 05:00 PM																	
05:00 PM	**2**	0	1	3	3	72	1	76	0	0	5	5	**5**	**126**	0	**131**	**215**
05:15 PM	2	0	2	4	3	73	1	77	1	0	4	5	4	106	**1**	111	197
05:30 PM	2	0	2	4	13	64	**8**	85	**2**	0	**6**	**8**	3	103	0	106	203
05:45 PM	1	0	**4**	**5**	**14**	**78**	2	**94**	2	0	6	8	2	82	1	85	192
Total Volume	7	0	9	16	33	287	12	332	5	0	21	26	14	417	2	433	807
% App. Total	43.8	0	56.2		9.9	86.4	3.6		19.2	0	80.8		3.2	96.3	0.5		
PHF	.875	.000	.563	.800	.589	.920	.375	.883	.625	.000	.875	.813	.700	.827	.500	.826	.938
Cars	7	0	9	16	33	287	12	332	5	0	21	26	14	417	2	433	807
% Cars	100	0	100	100	100	100	100	100	100	0	100	100	100	100	100	100	100
Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

N/S Street : Lakehill Ave / Margaret St		File Name : 84510004	
E/W Street : Lake Street		Site Code : 84510004	
City/State : Arlington, MA		Start Date : 9/10/2020	
Weather : Cloudy		Page No : 2	



Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	04:30 PM				05:00 PM				05:00 PM				04:45 PM			
+0 mins.	1	0	5	6	3	72	1	76	0	0	5	5	2	93	**2**	97
+15 mins.	**4**	0	**6**	**10**	3	73	1	77	1	0	4	5	**5**	**126**	0	**131**
+30 mins.	2	0	1	3	13	64	**8**	85	**2**	0	**6**	**8**	4	106	1	111
+45 mins.	2	0	2	4	**14**	**78**	2	**94**	2	0	6	8	3	103	0	106
Total Volume	9	0	14	23	33	287	12	332	5	0	21	26	14	428	3	445
% App. Total	39.1	0	60.9		9.9	86.4	3.6		19.2	0	80.8		3.1	96.2	0.7	
PHF	.563	.000	.583	.575	.589	.920	.375	.883	.625	.000	.875	.813	.700	.849	.375	.849
Cars	9	0	14	23	33	287	12	332	5	0	21	26	14	428	3	445
% Cars	100	0	100	100	100	100	100	100	100	0	100	100	100	100	100	100
Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Accurate Counts
978-664-2565

N/S Street : Lakehill Ave / Margaret St
E/W Street : Lake Street
City/State : Arlington, MA
Weather : Cloudy

File Name : 84510004
Site Code : 84510004
Start Date : 9/10/2020
Page No : 7

Groups Printed- Trucks

	Lakehill Ave From North			Lake St From East			Margaret St From South			Lake St From West			
Start Time	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Int. Total
04:00 PM	0	0	0	0	1	0	0	0	0	0	0	0	1
04:15 PM	0	0	0	0	1	0	0	0	0	0	0	0	1
04:30 PM	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
Total	0	0	0	0	2	0	0	0	0	0	0	0	2
05:00 PM	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
05:30 PM	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
Total	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	0	0	2	0	0	0	0	0	0	0	2
Apprch %	0	0	0	0	100	0	0	0	0	0	0	0	
Total %	0	0	0	0	100	0	0	0	0	0	0	0	

	Lakehill Ave From North				Lake St From East				Margaret St From South				Lake St From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:00 PM																	
04:00 PM	0	0	0	0	0	**1**	0	**1**	0	0	0	0	0	0	0	0	**1**
04:15 PM	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	1
04:30 PM	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
Total Volume	0	0	0	0	0	2	0	2	0	0	0	0	0	0	0	0	2
% App. Total	0	0	0		0	100	0		0	0	0		0	0	0		
PHF	.000	.000	.000	.000	.000	.500	.000	.500	.000	.000	.000	.000	.000	.000	.000	.000	.500

Accurate Counts

978-664-2565

N/S Street : Lakehill Ave / Margaret St
E/W Street : Lake Street
City/State : Arlington, MA
Weather : Cloudy

File Name : 84510004
Site Code : 84510004
Start Date : 9/10/2020
Page No : 10

Groups Printed- Bikes Peds

	Lakehill Ave From North				Lake St From East				Margaret St From South				Lake St From West						
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Exclu. Total	Inclu. Total	Int. Total
04:00 PM	0	0	0	3	0	0	0	0	1	0	0	1	0	0	0	0	4	1	5
04:15 PM	0	0	0	5	0	1	0	0	0	0	0	1	0	0	0	0	6	1	7
04:30 PM	0	0	0	5	0	0	0	1	0	0	0	2	0	1	0	0	8	1	9
04:45 PM	0	0	0	6	0	0	0	0	0	0	3	0	0	0	0	0	6	3	9
Total	0	0	0	19	0	1	0	1	1	0	3	4	0	1	0	0	24	6	30
05:00 PM	0	0	0	0	2	1	0	0	0	0	0	1	0	4	0	0	1	7	8
05:15 PM	0	0	2	2	0	0	0	1	0	0	0	0	0	0	0	0	3	2	5
05:30 PM	0	0	0	5	0	2	0	0	0	0	1	0	0	1	0	0	5	4	9
05:45 PM	0	0	0	5	1	2	0	2	0	0	0	2	0	2	0	0	9	5	14
Total	0	0	2	12	3	5	0	3	0	0	1	3	0	7	0	0	18	18	36
Grand Total	0	0	2	31	3	6	0	4	1	0	4	7	0	8	0	0	42	24	66
Apprch %	0	0	100		33.3	66.7	0		20	0	80		0	100	0				
Total %	0	0	8.3		12.5	25	0		4.2	0	16.7		0	33.3	0		63.6	36.4	

	Lakehill Ave From North				Lake St From East				Margaret St From South				Lake St From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 05:00 PM																	
05:00 PM	0	0	0	0	**2**	1	0	**3**	0	0	0	0	0	**4**	0	**4**	**7**
05:15 PM	0	0	**2**	**2**	0	0	0	0	0	0	0	0	0	0	0	0	2
05:30 PM	0	0	0	0	0	**2**	0	2	0	0	**1**	**1**	0	1	0	1	4
05:45 PM	0	0	0	0	1	2	0	3	0	0	0	0	0	2	0	2	5
Total Volume	0	0	2	2	3	5	0	8	0	0	1	1	0	7	0	7	18
% App. Total	0	0	100		37.5	62.5	0		0	0	100		0	100	0		
PHF	.000	.000	.250	.250	.375	.625	.000	.667	.000	.000	.250	.250	.000	.438	.000	.438	.643

MINUTEMAN COMMUTER BIKEWAY DATA

Location	Month	Year	AM/PM	Total on Bikes	Total on Foot	Total Trail Users	
Minuteman at Dog Park	Sept		AM				
		2019		615	884	1535	566.6734
			PM				
		2019		555	745	1359	417.3708
Minuteman at Dog Park	Feb		AM				
		2019		271	697	986	
			PM				
		2019		218	563	801	
Minuteman at Lake St	Feb		AM				
		2019		235	140	364	0.37
			PM				
		2019		147	93	246	0.31

July 1 2019 to October 31 2019
Minuteman Bikeway at Swan Place
Pedestrian + Bicycle Volume

Peak Hour	8-9 AM	294
Peak Period	7-9 AM	548
Peak Hour/Peak Period		0.54
Peak Hour	5-6 PM	270
Peak Period	5-7 PM	534
Peak Hour/Peak Period		0.51

Year	Peak Hour	Lake Street Ped/Bike Volume
2020	AM	304
	PM	211

SEASONAL ADJUSTMENT DATA

Station **4065**

	Monthly Volume Recorded Volume	Active Days Counted	Average Daily Volume	Relation to Average Month	March to September Relation
January	3382369	24	140932	0.844	
February	3358292	22	152650	0.914	
March	5093243	29	175629	1.052	0.973
April	4822590	28	172235	1.032	
May	5753246	30	191775	1.149	
June	5040562	28	180020	1.078	
July	4859583	30	161986	0.970	
August	5151326	30	171711	1.028	
September	4956663	29	170919	1.024	
October	5150660	30	171689	1.028	
November	4509218	28	161044	0.964	
December	4192605	29	144573	0.866	
	56270357	337	166974	1.000	

Average Month Daily Volume 166974

Station 4065

Month	Year	Average Daily Volume
May	2019	186499
September	2019	184606

May 2019 to September 2019	0.990

Station 4065

Month	Year	Average Daily Volume
September	2014	168063
September	2016	170919
September	2019	184606

September 2014 to September 2016	1.017
September 2016 to September 2019	1.080

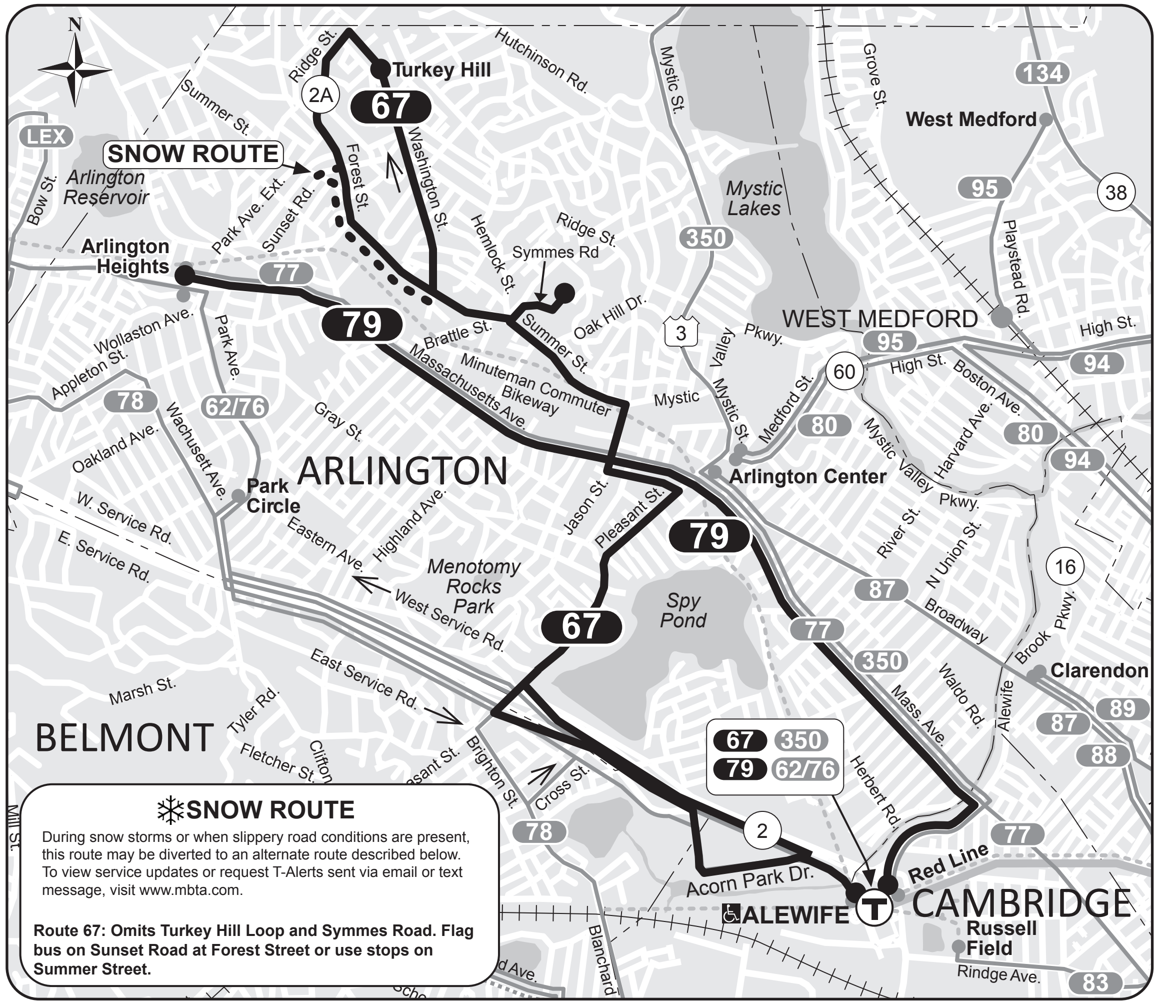
COVID-19 ADJUSTMENT DATA

Station 4065

	0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00	ADT
Aug-19	1615	955	683	752	1405	4627	8620	10798	11160	11372	11521	11661	11786	11803	11986	11885	12013	12024	11143	8610	6609	5129	3946	2806	184909
Aug-20	966	612	465	532	1058	3350	6542	7951	8177	8435	9121	9764	10188	10457	11218	10996	10246	9802	7890	6063	4697	3376	2474	1686	146067
19/20	1.67	1.56	1.47	1.41	1.33	1.38	1.32	1.36	1.36	1.35	1.26	1.19	1.16	1.13	1.07	1.08	1.17	1.23	1.41	1.42	1.41	1.52	1.59	1.66	
									Adjust Avg of 7-10									**Adjust Avg of 16-19**					**Adjust By ADT**		**Adjust by Avg Hourly**
									1.357									1.2705					1.266		1.35

PUBLIC TRANSPORTATION SCHEDULES

Route 67 Turkey Hill - Alewife Station
Route 79 Arlington Heights - Alewife Station



❄SNOW ROUTE

During snow storms or when slippery road conditions are present, this route may be diverted to an alternate route described below. To view service updates or request T-Alerts sent via email or text message, visit www.mbta.com.

Route 67: Omits Turkey Hill Loop and Symmes Road. Flag bus on Sunset Road at Forest Street or use stops on Summer Street.

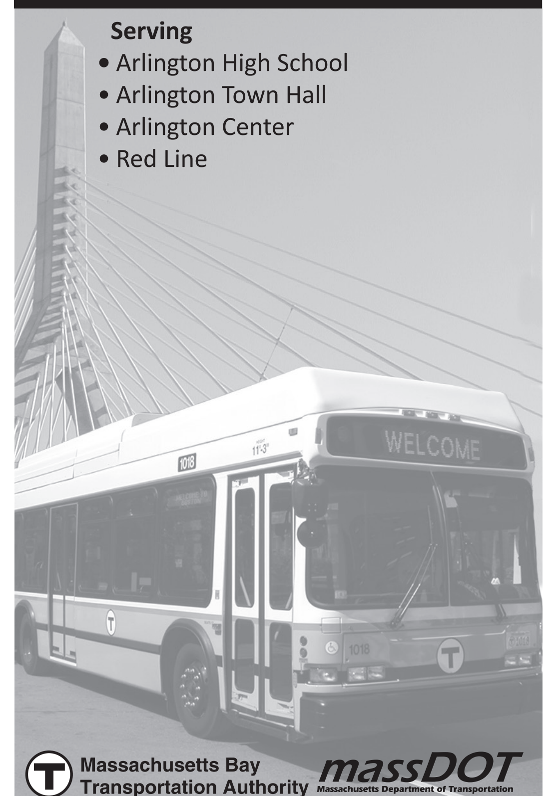
Schedule Change

67•79

Effective August 30, 2020

67 Turkey Hill-Alewife Station

79 Arlington Heights-Alewife Station



Serving
- Arlington High School
- Arlington Town Hall
- Arlington Center
- Red Line

Massachusetts Bay Transportation Authority
massDOT Massachusetts Department of Transportation

Information 617-222-3200 • 1-800-392-6100
(TTY) 617-222-5146 • www.mbta.com

67 Weekday

Inbound			Outbound		
Leave Turkey Hill	Arrive Arlington Center	Arrive Alewife Station	Leave Alewife Station	Arrive Arlington Center	Arrive Turkey Hill
6:18A	6:23A	6:32A	5:53A	6:00A	6:15A
6:52	6:57	7:07	6:26	6:33	6:48
7:22	7:29	7:43	6:59	7:06	7:21
7:49	7:56	8:10	7:24	7:31	7:47
8:17	8:24	8:39	7:53	8:00	8:16
8:45	8:50	9:03	8:23	8:30	8:44
9:12	9:17	9:27	8:49	8:56	9:10
10:02	10:07	10:17	9:39	9:46	10:00
10:52	10:57	11:07	10:29	10:36	10:50
11:42	11:47	11:56	11:19	11:26	11:40
12:32P	**12:37P**	**12:46P**	**12:09P**	**12:16P**	**12:30P**
1:22	**1:27**	**1:36**	**12:59**	**1:06**	**1:20**
2:12	**2:17**	**2:26**	**1:48**	**1:55**	**2:10**
3:02	**3:07**	**3:16**	**2:38**	**2:47**	**3:02**
3:52	**3:57**	**4:06**	**3:27**	**3:36**	**3:51**
4:42	**4:47**	**4:56**	**4:17**	**4:26**	**4:41**
5:10	**5:16**	**5:26**	**4:44**	**4:55**	**5:10**
5:37	**5:43**	**5:53**	**5:11**	**5:22**	**5:37**
6:05	**6:11**	**6:21**	**5:38**	**5:49**	**6:04**
6:32	**6:36**	**6:45**	**6:05**	**6:16**	**6:31**
6:57	**7:01**	**7:10**	**6:33**	**6:41**	**6:56**
7:37	**7:41**	**7:49**	**7:15**	**7:23**	**7:37**
8:20	**8:24**	**8:32**	**7:58**	**8:05**	**8:18**

Service Note: Route 67
Serves Symmes Road OUTBOUND ONLY.

Route 67
Turkey Hill-Alewife Station

79 Weekday

Inbound

Leave Arlington Heights	Arrive Arlington Center	Arrive Alewife Station
6:35A	6:41A	6:55A
7:00	7:06	7:20
7:30	7:39	7:59
8:00	8:06	8:24
8:30	8:36	8:54
9:00	9:05	9:20
9:50	9:55	10:06
2:20P	**2:26P**	**2:39P**
s 3:05	**3:11**	**3:25**
s 3:15	**3:21**	**3:34**
3:20	**3:26**	**3:39**
s 3:25	**3:30**	**3:41**
3:40	**3:46**	**3:59**
4:00	**4:06**	**4:19**
4:20	**4:26**	**4:39**
4:40	**4:46**	**4:59**
5:00	**5:06**	**5:20**
5:20	**5:26**	**5:40**
5:45	**5:51**	**6:05**
6:05	**6:11**	**6:25**
6:45	**6:51**	**7:02**

Outbound

Leave Alewife Station	Arrive Arlington Center	Arrive Arlington Heights
7:02A	7:09A	7:19A
7:30	7:38	7:52
8:10	8:16	8:26
8:35	8:41	8:51
9:30	9:36	9:46
2:00P	**2:06P**	**2:16P**
2:45	**2:52**	**3:05**
3:10	**3:17**	**3:28**
3:30	**3:37**	**3:48**
3:50	**3:57**	**4:09**
4:10	**4:22**	**4:34**
4:30	**4:42**	**4:54**
4:50	**5:02**	**5:14**
5:10	**5:24**	**5:36**
5:30	**5:44**	**5:56**
5:50	**6:03**	**6:14**
6:15	**6:27**	**6:38**
6:35	**6:47**	**6:58**
7:05	**7:13**	**7:24**

s - Leaves from Massachusetts Avenue at Appleton Street and does NOT run during school vacation

Route 79
Arlington Heights-Alewife Station

No service on weekends.

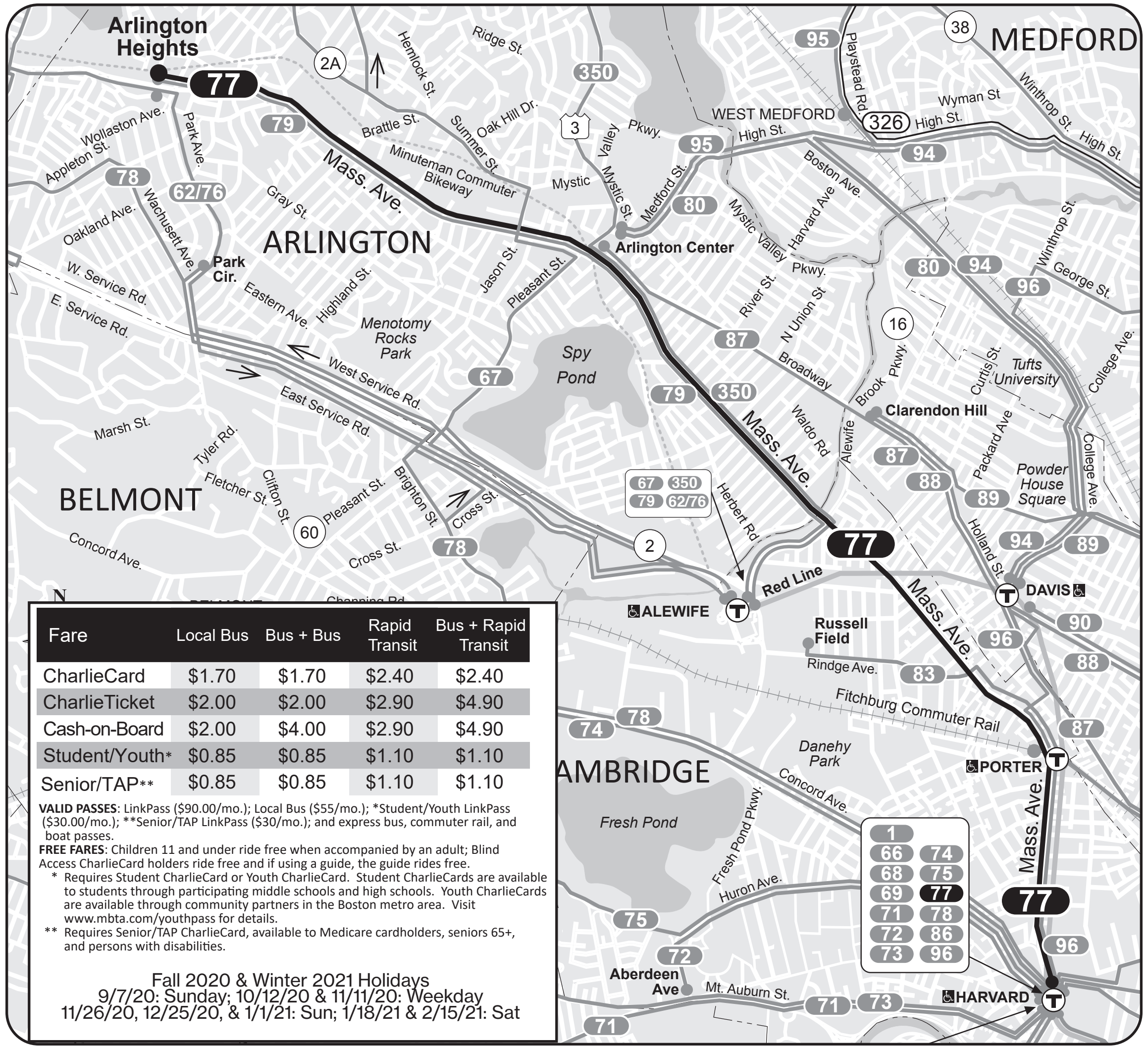
All buses are accessible to persons with disabilities

Fare	Local Bus	Bus + Bus	Rapid Transit	Bus + Rapid Transit
CharlieCard	$1.70	$1.70	$2.40	$2.40
CharlieTicket	$2.00	$2.00	$2.90	$4.90
Cash-on-Board	$2.00	$4.00	$2.90	$4.90
Student/Youth*	$0.85	$0.85	$1.10	$1.10
Senior/TAP**	$0.85	$0.85	$1.10	$1.10

VALID PASSES: LinkPass ($90.00/mo.); Local Bus ($55/mo.); *Student/Youth LinkPass ($30.00/mo.); **Senior/TAP LinkPass ($30/mo.); and express bus, commuter rail, and boat passes.
FREE FARES: Children 11 and under ride free when accompanied by an adult; Blind Access CharlieCard holders ride free and if using a guide, the guide rides free.
* Requires Student CharlieCard or Youth CharlieCard. Student CharlieCards are available to students through participating middle schools and high schools. Youth CharlieCards are available through community partners in the Boston metro area. Visit www.mbta.com/youthpass for details.
** Requires Senior/TAP CharlieCard, available to Medicare cardholders, seniors 65+, and persons with disabilities.

Fall 2020 & Winter 2021 Holidays
9/7/20: Sunday; 10/12/20 & 11/11/20: Weekday
11/26/20, 12/25/20, & 1/1/21: Sun; 1/18/21 & 2/15/21: Sat

Route 77 Arlington Heights - Harvard Station



Fare	Local Bus	Bus + Bus	Rapid Transit	Bus + Rapid Transit
CharlieCard	$1.70	$1.70	$2.40	$2.40
CharlieTicket	$2.00	$2.00	$2.90	$4.90
Cash-on-Board	$2.00	$4.00	$2.90	$4.90
Student/Youth*	$0.85	$0.85	$1.10	$1.10
Senior/TAP**	$0.85	$0.85	$1.10	$1.10

VALID PASSES: LinkPass ($90.00/mo.); Local Bus ($55/mo.); *Student/Youth LinkPass ($30.00/mo.); **Senior/TAP LinkPass ($30/mo.); and express bus, commuter rail, and boat passes.

FREE FARES: Children 11 and under ride free when accompanied by an adult; Blind Access CharlieCard holders ride free and if using a guide, the guide rides free.

* Requires Student CharlieCard or Youth CharlieCard. Student CharlieCards are available to students through participating middle schools and high schools. Youth CharlieCards are available through community partners in the Boston metro area. Visit www.mbta.com/youthpass for details.

** Requires Senior/TAP CharlieCard, available to Medicare cardholders, seniors 65+, and persons with disabilities.

Fall 2020 & Winter 2021 Holidays
9/7/20: Sunday; 10/12/20 & 11/11/20: Weekday
11/26/20, 12/25/20, & 1/1/21: Sun; 1/18/21 & 2/15/21: Sat

77

Effective August 30, 2020

Arlington Heights-Harvard Station

Serving
- Porter Station
- Arlington High School
- Arlington Center
- Harvard University
- Eliot Street
- Red Line
- Fitchburg Commuter Rail

Massachusetts Bay Transportation Authority

massDOT Massachusetts Department of Transportation

Information 617-222-3200 • 1-800-392-6100
(TTY) 617-222-5146 • www.mbta.com

77 Weekday

Inbound

Leave Arlington Heights	Arrive Arlington Center	Lv/Arrive North Camb.	Arrive Harvard Square
4:48A	4:54A	5:01A	5:12A
5:00	5:06	5:13	5:24
5:12	5:18	5:25	5:36
5:23	5:29	5:36	5:47
5:34	5:40	5:47	5:58
Every	*10 Mins.*	*or*	*Less*
10:15	10:23	10:34	10:51
10:25	10:33	10:44	11:01
10:34	10:42	10:53	11:10
10:43	10:51	11:02	11:19
10:52	11:00	11:11	11:28
11:01	11:09	11:20	11:37
11:11	11:19	11:30	11:47
11:20	11:28	11:39	11:56
11:29	11:37	11:48	**12:06P**
11:38	11:46	11:57	**12:15**
11:47	11:56	**12:07P**	**12:25**
11:56	**12:05P**	**12:16**	**12:34**
12:05P	**12:14**	**12:25**	**12:43**
12:14	**12:23**	**12:34**	**12:52**
Every	***11 Mins.***	***or***	***Less***
4:01	**4:10**	**4:22**	**4:38**
4:11	**4:20**	**4:32**	**4:49**
4:21	**4:30**	**4:42**	**5:01**
4:31	**4:40**	**4:53**	**5:12**
4:41	**4:50**	**5:04**	**5:23**
4:51	**5:00**	**5:14**	**5:33**
5:01	**5:10**	**5:24**	**5:43**
5:11	**5:20**	**5:34**	**5:53**
5:21	**5:30**	**5:44**	**6:03**
5:31	**5:40**	**5:54**	**6:13**
5:41	**5:50**	**6:04**	**6:23**
5:50	**5:59**	**6:13**	**6:32**
6:00	**6:09**	**6:23**	**6:42**
6:10	**6:19**	**6:33**	**6:52**
Every	***10 Minutes***		***Until***
8:50	**8:56**	**9:05**	**9:20**
9:00	**9:06**	**9:15**	**9:30**
9:10	**9:16**	**9:25**	**9:40**
9:21	**9:27**	**9:36**	**9:51**
9:32	**9:38**	**9:47**	**10:02**
9:43	**9:49**	**9:58**	**10:13**
9:54	**10:00**	**10:09**	**10:24**
10:05	**10:11**	**10:20**	**10:34**
10:16	**10:22**	**10:30**	**10:43**
10:27	**10:33**	**10:40**	**10:53**
10:38	**10:43**	**10:50**	**11:03**
10:50	**10:55**	**11:02**	**11:15**
11:02	**11:07**	**11:14**	**11:27**
11:14	**11:19**	**11:26**	**11:39**
11:26	**11:31**	**11:38**	**11:51**
11:38	**11:43**	**11:50**	12:03A
11:50	**11:55**	12:02A	12:15
12:02A	12:07A	12:14	12:27
12:17	12:22	12:29	12:42
12:32	12:37	12:44	12:57

Outbound

Leave Harvard Station	Arrive North Camb.	Arrive Arlington Center	Arrive Arlington Heights
5:11A	5:19A	5:24A	5:29A
5:21	5:29	5:34	5:39
5:32	5:40	5:45	5:50
5:43	5:51	5:56	6:01
5:54	6:02	6:08	6:13
6:05	6:15	6:21	6:26
6:18	6:28	6:34	6:39
6:31	6:41	6:47	6:52
6:42	6:52	6:58	7:08
6:51	7:02	7:12	7:23
7:00	7:12	7:22	7:33
7:09	7:21	7:31	7:42
Every	*10 Mins.*	*or*	*Less*
11:19	11:30	11:38	11:47
11:28	11:39	11:47	11:56
11:37	11:48	11:56	**12:06P**
11:46	11:57	**12:05P**	**12:15**
11:55	**12:08P**	**12:17**	**12:27**
12:05P	**12:17**	**12:26**	**12:36**
Every	***10 Mins.***	***or***	***Less***
4:14	**4:30**	**4:46**	**4:58**
4:24	**4:43**	**4:59**	**5:11**
4:34	**4:53**	**5:09**	**5:21**
4:44	**5:03**	**5:19**	**5:31**
4:54	**5:13**	**5:29**	**5:41**
5:04	**5:23**	**5:39**	**5:51**
5:14	**5:33**	**5:49**	**6:01**
5:24	**5:43**	**5:59**	**6:11**
5:34	**5:53**	**6:09**	**6:21**
5:44	**6:03**	**6:19**	**6:30**
5:54	**6:13**	**6:29**	**6:36**
6:04	**6:23**	**6:37**	**6:44**
6:14	**6:31**	**6:42**	**6:49**
6:23	**6:36**	**6:47**	**6:54**
6:32	**6:44**	**6:55**	**7:02**
6:41	**6:53**	**7:04**	**7:11**
6:50	**7:02**	**7:13**	**7:20**
6:59	**7:11**	**7:22**	**7:29**
7:08	**7:20**	**7:31**	**7:38**
7:17	**7:29**	**7:40**	**7:47**
7:26	**7:38**	**7:49**	**7:56**
7:35	**7:47**	**7:58**	**8:05**
Every	***11 Mins.***	***or***	***Less***
10:38	**10:49**	**10:56**	**11:03**
10:50	**11:01**	**11:08**	**11:15**
11:02	**11:13**	**11:18**	**11:23**
11:13	**11:23**	**11:28**	**11:33**
11:24	**11:34**	**11:39**	**11:44**
11:35	**11:45**	**11:50**	**11:55**
11:46	**11:56**	12:01A	12:06A
11:57	12:07A	12:12	12:17
12:08A	12:18	12:23	12:28
12:19	12:29	12:34	12:39
12:30	12:40	12:45	12:50
12:45	12:55	1:00	1:05
w 1:05	1:15	1:20	1:25

77 Saturday

Inbound

Leave Arlington Heights	Arrive Arlington Center	Lv/Arrive North Camb.	Arrive Harvard Square
4:48A	4:52A	4:59A	5:09A
5:03	5:07	5:14	5:24
5:18	5:22	5:29	5:39
5:33	5:37	5:44	5:54
5:48	5:52	5:59	6:10
6:03	6:09	6:16	6:27
6:18	6:24	6:31	6:42
Every	*14 Mins.*	*Until*	
7:15	7:22	7:31	7:45
7:31	7:38	7:47	8:01
7:47	7:54	8:03	8:17
8:02	8:09	8:18	8:32
8:17	8:24	8:33	8:47
8:32	8:39	8:48	9:02
8:45	8:52	9:01	9:15
8:57	9:04	9:13	9:27
9:09	9:16	9:25	9:39
9:21	9:28	9:37	9:51
9:33	9:40	9:49	10:03
9:45	9:52	10:01	10:15
9:56	10:03	10:12	10:26
10:07	10:14	10:23	10:38
10:18	10:25	10:35	10:52
10:29	10:37	10:48	11:05
10:40	10:48	10:59	11:16
10:51	10:59	11:10	11:27
11:02	11:10	11:21	11:38
Every	*11 Mins.*	*Until*	
11:56	**12:04P**	**12:15P**	**12:32P**
12:06P	**12:14**	**12:25**	**12:42**
Every	***12 Mins.***	***or***	***Less***
6:34	**6:41**	**6:51**	**7:09**
6:47	**6:54**	**7:04**	**7:21**
7:00	**7:06**	**7:16**	**7:33**
7:15	**7:21**	**7:31**	**7:48**
7:30	**7:36**	**7:46**	**8:03**
7:45	**7:51**	**8:01**	**8:17**
8:00	**8:05**	**8:14**	**8:30**
8:15	**8:20**	**8:29**	**8:45**
8:30	**8:35**	**8:44**	**9:00**
8:45	**8:50**	**8:59**	**9:15**
9:00	**9:05**	**9:14**	**9:30**
9:15	**9:20**	**9:29**	**9:45**
9:31	**9:36**	**9:45**	**10:01**
9:48	**9:53**	**10:02**	**10:18**
10:05	**10:10**	**10:19**	**10:35**
10:22	**10:27**	**10:35**	**10:51**
10:39	**10:44**	**10:52**	**11:08**
Every	***17 Mins.***	***or***	***Less***
12:00M	12:04A	12:11A	12:25A
12:15	12:19	12:26	12:40
12:30	12:34	12:41	12:55

Outbound

Leave Harvard Station	Arrive North Camb.	Arrive Arlington Center	Arrive Arlington Heights
5:18A	5:27A	5:32A	5:38A
5:33	5:42	5:47	5:53
5:48	5:57	6:02	6:08
6:03	6:12	6:17	6:23
Every	*15 Minutes*		*Until*
7:33	7:43	7:50	7:58
7:48	7:58	8:05	8:13
8:01	8:11	8:18	8:26
8:14	8:24	8:31	8:39
8:28	8:38	8:45	8:53
Every	*14 Mins.*	*Until*	
9:37	9:48	9:56	10:04
9:50	10:01	10:09	10:17
10:03	10:14	10:22	10:30
10:15	10:26	10:34	10:42
10:26	10:38	10:46	10:54
10:37	10:49	10:57	11:05
10:49	11:01	11:09	11:17
11:00	11:12	11:20	11:28
11:12	11:24	11:33	11:42
11:24	11:36	11:45	11:54
11:35	11:47	11:56	**12:05P**
11:47	11:59	**12:08P**	**12:17**
11:58	**12:10P**	**12:19**	**12:28**
12:09P	**12:21**	**12:30**	**12:39**
Every	***12 Mins.***	***or***	***Less***
6:55	**7:07**	**7:15**	**7:23**
7:07	**7:19**	**7:27**	**7:35**
7:19	**7:31**	**7:39**	**7:47**
7:31	**7:43**	**7:51**	**7:59**
7:44	**7:56**	**8:04**	**8:12**
7:57	**8:09**	**8:17**	**8:25**
8:10	**8:22**	**8:30**	**8:37**
8:25	**8:36**	**8:43**	**8:50**
8:40	**8:51**	**8:58**	**9:05**
8:55	**9:06**	**9:13**	**9:20**
9:10	**9:21**	**9:28**	**9:35**
9:25	**9:36**	**9:43**	**9:50**
9:40	**9:51**	**9:58**	**10:05**
9:55	**10:06**	**10:13**	**10:20**
10:10	**10:21**	**10:28**	**10:35**
10:26	**10:37**	**10:44**	**10:51**
10:42	**10:53**	**11:00**	**11:07**
10:58	**11:09**	**11:16**	**11:23**
11:14	**11:25**	**11:32**	**11:38**
11:30	**11:40**	**11:47**	**11:53**
11:46	**11:56**	12:03A	12:09A
12:02A	12:12A	12:19	12:25
12:18	12:28	12:35	12:41
12:35	12:45	12:52	12:58
12:50	1:00	1:05	1:11
w 1:05	1:15	1:20	1:26

w - Waits for last train to arrive at Harvard Station.

All buses are accessible to persons with disabilities

77 Sunday

Inbound

Leave Arlington Heights	Arrive Arlington Center	Arrive Harvard Square
6:00A	6:04A	6:22A
6:20	6:24	6:42
6:40	6:44	7:03
7:00	7:04	7:23
7:20	7:24	7:43
7:40	7:44	8:03
7:55	7:59	8:20
8:10	8:14	8:38
8:25	8:29	8:54
8:40	8:45	9:10
8:57	9:02	9:27
9:14	9:19	9:44
9:30	9:35	10:00
Every	*17 Mins.*	*or Less*
11:49	11:55	**12:25P**
12:05P	**12:11P**	**12:41**
Every	***17 Mins.***	***or Less***
6:20	**6:25**	**6:49**
6:34	**6:38**	**7:02**
6:47	**6:51**	**7:15**
7:01	**7:05**	**7:29**
7:16	**7:20**	**7:44**
7:32	**7:36**	**8:00**
7:48	**7:52**	**8:16**
8:05	**8:09**	**8:32**
8:22	**8:26**	**8:50**
8:39	**8:43**	**9:06**
8:55	**8:59**	**9:22**
9:12	**9:16**	**9:39**
9:28	**9:32**	**9:55**
9:44	**9:48**	**10:11**
10:00	**10:04**	**10:27**
10:15	**10:19**	**10:41**
10:32	**10:35**	**10:55**
10:48	**10:51**	**11:11**
11:04	**11:07**	**11:27**
11:17	**11:20**	**11:40**
11:35	**11:38**	**11:58**
11:55	**11:58**	12:18A
12:15A	12:18A	12:38
12:35	12:38	12:58

Outbound

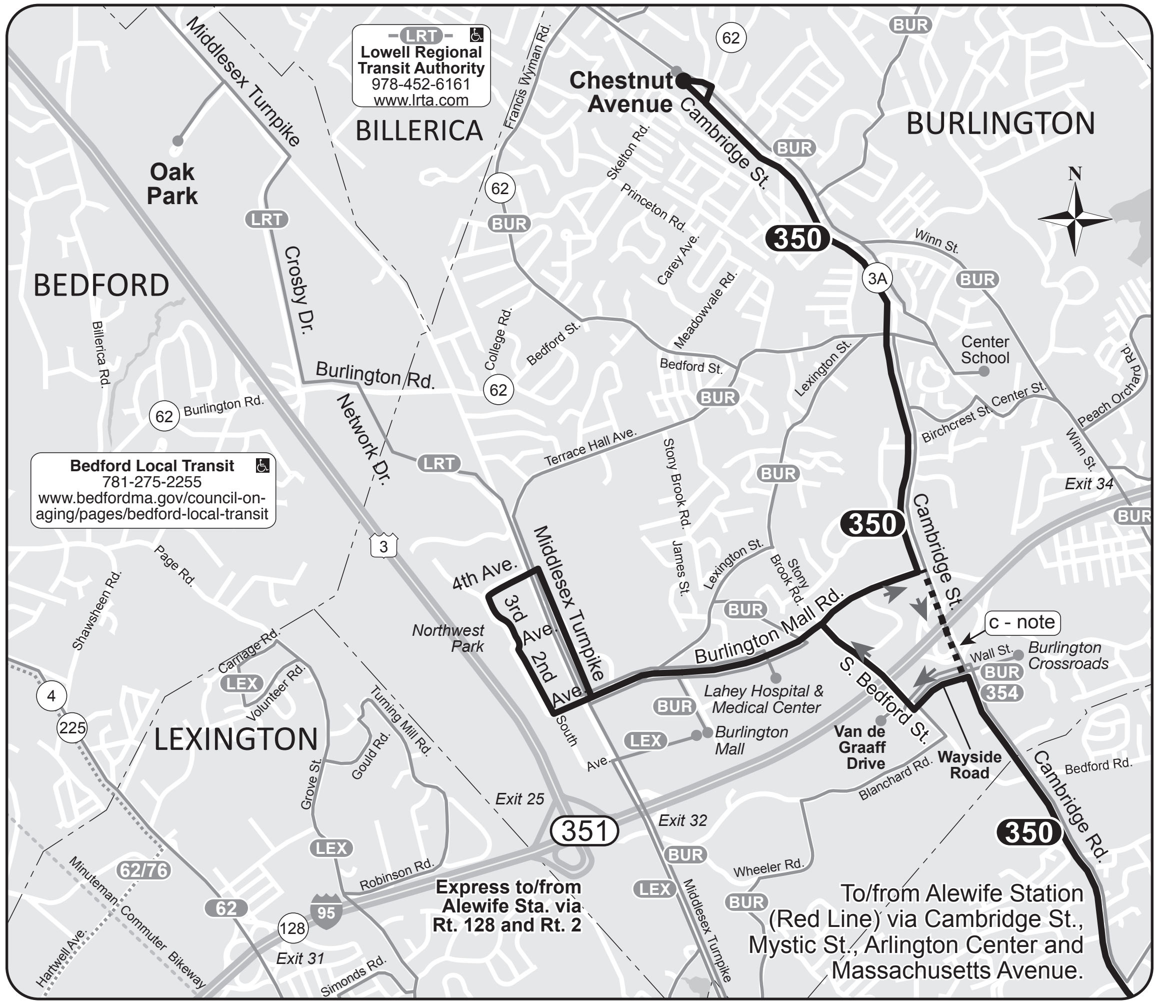
Leave Harvard Station	Arrive Arlington Center	Arrive Arlington Heights
6:25A	6:39A	6:45A
6:44	6:58	7:04
7:04	7:18	7:24
7:24	7:38	7:44
7:44	7:58	8:05
8:04	8:23	8:30
8:24	8:43	8:50
8:44	9:03	9:11
9:04	9:24	9:32
9:24	9:44	9:52
9:44	10:04	10:12
10:04	10:24	10:32
Every	*15 Mins.*	*or Less*
11:46	**12:08P**	**12:17P**
12:01P	**12:23P**	**12:32P**
Every	***15 Mins.***	***or Less***
7:08	**7:28**	**7:36**
7:21	**7:41**	**7:49**
7:36	**7:56**	**8:04**
7:51	**8:11**	**8:19**
8:07	**8:27**	**8:35**
8:23	**8:43**	**8:51**
8:38	**8:58**	**9:06**
8:54	**9:14**	**9:22**
9:10	**9:30**	**9:37**
9:25	**9:42**	**9:49**
9:40	**9:57**	**10:04**
9:54	**10:11**	**10:18**
10:09	**10:26**	**10:33**
10:22	**10:39**	**10:46**
10:36	**10:53**	**11:00**
10:49	**11:06**	**11:13**
11:02	**11:19**	**11:26**
11:15	**11:32**	**11:37**
11:30	**11:45**	**11:50**
11:45	12:00M	12:05A
12:00M	12:15A	12:20
12:10A	12:25	12:30
12:25	12:40	12:45
12:45	1:00	1:05
w 1:05	1:20	1:25

Harvard Busway construction note:

Route 77 won't serve Harvard Busway during this time. Inbound service will not serve Harvard Station Busway during this time. Passengers wishing to access Harvard Station are advised to disembark at the temporary bus stop located on Brattle St @ Palmer St. Outbound service is unaffected, and will continue to board passengers in the Harvard Station Busway.

Fares and holidays on map side.

Route 350 North Burlington - Alewife Station
Route 351 Bedford Woods Dr - Alewife Station



Service/Schedule Change

350•351

Effective August 30, 2020

350 North Burlington-Alewife Station

351 Bedford Woods Dr - Alewife Station

Serving
- Burlington Mall
- Oak Park
- Northwest Park
- Red Line
- Lahey Hospital & Medical Center
- Four Corners
- Arlington Center

Massachusetts Bay Transportation Authority

massDOT Massachusetts Department of Transportation

Information 617-222-3200 • 1-800-392-6100
(TTY) 617-222-5146 • www.mbta.com

350 & 351 Weekday

Inbound

Leave Chestnut & Cambridge	Arrive Burlington Mall Road	Arrive Woburn/ Burl. Line	Arrive Arlington Center	Arrive Alewife Station
6:00A	.....	6:05A	6:19A	6:31A
.....	.....	.....	6:23	6:32
6:20	.....	6:25	6:42	7:02
6:38	.....	6:45	7:04	7:24
6:53	.....	7:00	7:19	7:41
7:15	.....	7:22	7:41	8:03
7:35	.....	7:44	8:03	8:25
7:55	.....	8:04	8:23	8:45
8:20	8:35A	8:42	9:03	9:13
8:40	8:55	9:02	9:19	9:29
9:00	9:14	9:21	9:38	9:48
9:20	9:34	9:41	9:58	10:09
10:00	10:14	10:21	10:38	10:49
10:40	10:54	11:01	11:18	11:29
11:20	11:34	11:41	11:58	**12:09P**
12:00N	**12:14P**	**12:21P**	**12:38P**	**12:49**
12:40	**12:54**	**1:02**	**1:19**	**1:30**
1:20	**1:34**	**1:42**	**1:59**	**2:10**
2:00	**2:14**	**2:22**	**2:39**	**2:50**
2:40	**2:54**	**3:03**	**3:21**	**3:32**
3:25	**3:40**	**3:50**	**4:08**	**4:19**
3:45	**4:00**	**4:10**	**4:28**	**4:39**
4:10	**4:25**	**4:35**	**4:53**	**5:07**
4:30	**4:45**	**4:55**	**5:16**	**5:32**
4:45	**5:00**	**5:10**	**5:32**	**5:48**
5:10	**5:25**	**5:35**	**5:57**	**6:10**
5:35	**5:50**	**6:00**	**6:21**	**6:34**
5:55	**6:10**	**6:18**	**6:37**	**6:50**
6:15	**6:30**	**6:37**	**6:52**	**7:05**
6:35	**6:49**	**6:56**	**7:11**	**7:24**
6:55	**7:09**	**7:16**	**7:31**	**7:41**
7:45	**7:59**	**8:05**	**8:18**	**8:28**
8:35	**8:49**	**8:55**	**9:08**	**9:18**
9:30	**9:44**	**9:50**	**10:03**	**10:13**
10:25	**10:39**	**10:45**	**10:58**	**11:08**

Outbound

Leave Alewife Station	Arrive Arlington Center	Arrive Woburn/ Burl. Line	Arrive Burlington Mall Road	Arrive Chestnut & Cambridge
b 5:53	6:00	.....	.....	.....
b 6:16	6:22	6:39	6:50	7:08
b 6:36	6:42	6:59	7:09	7:25
b 6:56	7:02	7:17	7:27	7:43
7:16	7:22	7:37	7:47	8:03
7:36	7:43	8:02	8:11	8:31
7:56	8:03	8:22	8:31	8:51
8:16	8:23	8:42	8:51	9:11
8:56	9:03	9:22	9:31	9:49
9:36	9:42	9:59	10:08	10:26
10:16	10:22	10:39	10:48	11:06
10:56	11:02	11:19	11:28	11:46
11:36	11:42	11:59	**12:08P**	**12:26P**
12:16P	**12:22P**	**12:39P**	**12:48**	**1:06**
12:56	**1:02**	**1:19**	**1:28**	**1:46**
1:36	**1:42**	**1:59**	**2:07**	**2:24**
2:16	**2:26**	**2:45**	**2:53**	**3:12**
2:41	**2:51**	**3:09**	**3:18**	**3:37**
3:05	**3:13**	**3:31**	**3:40**	**3:59**
3:30	**3:38**	**3:56**	**4:05**	**4:27**
3:55	**4:03**	**4:22**	**4:31**	**4:53**
4:25	**4:35**	**4:54**	**5:03**	**5:25**
4:55	**5:08**	**5:28**	**.....**	**5:43**
5:20	**5:33**	**5:53**	**.....**	**6:08**
5:40	**5:53**	**6:13**	**.....**	**6:28**
6:00	**6:13**	**6:33**	**.....**	**6:48**
6:20	**6:33**	**6:53**	**.....**	**7:08**
6:42	**6:51**	**7:06**	**7:15**	**7:37**
7:05	**7:14**	**7:29**	**7:38**	**8:00**
7:35	**7:44**	**7:59**	**8:07**	**8:23**
8:31	**8:39**	**8:54**	**9:02**	**9:17**
9:25	**9:33**	**9:48**	**9:56**	**10:11**
10:20	**10:32**	**10:50**	**.....**	**11:05**

Route 351 indicated by shaded areas

ROUTE 350 FARES

Fare	Local Bus	Bus + Bus	Rapid Transit	Bus + Rapid Transit
CharlieCard	$1.70	$1.70	$2.40	$2.40
CharlieTicket	$2.00	$2.00	$2.90	$4.90
Cash-on-Board	$2.00	$4.00	$2.90	$4.90
Student/Youth*	$0.85	$0.85	$1.10	$1.10
Senior/TAP**	$0.85	$0.85	$1.10	$1.10

VALID PASSES: LinkPass ($90.00/mo.); Local Bus ($55/mo.); *Student/Youth LinkPass ($30.00/mo.); **Senior/TAP LinkPass ($30/mo.); and express bus, commuter rail, and boat passes.

FREE FARES: Children 11 and under ride free when accompanied by an adult; Blind Access CharlieCard holders ride free and if using a guide, the guide rides free.

* Requires Student CharlieCard or Youth CharlieCard. Student CharlieCards are available to students through participating middle schools and high schools. Youth CharlieCards are available through community partners in the Boston metro area. Visit www.mbta.com/youthpass for details.

** Requires Senior/TAP CharlieCard, available to Medicare cardholders, seniors 65+, and persons with disabilities.

ROUTE 351 FARES

Fare	Local Bus	Inner Express	Inner Express + Local Bus	Inner Express + Subway
CharlieCard	$1.70	$4.25	$4.25	$4.25
CharlieTicket	$2.00	$5.25	$7.25	$8.15
Cash-on-Board	$2.00	$5.25	$7.25	$8.15
Student/Youth*	$0.85	$2.10	$2.10	$2.10
Senior/TAP**	$0.85	$2.10	$2.10	$2.10

VALID PASSES on 441/442: LinkPass ($90.00/mo.); Local Bus ($55/mo.); *Student/Youth LinkPass ($30.00/mo.); **Senior/TAP LinkPass ($30/mo.); and express bus, commuter rail, and boat passes.

VALID PASSES on 448/449: Inner Express Bus ($136.00/mo.); Outer Express Bus ($168/mo.), commuter rail zone 1 or higher, and boat passes.

FREE FARES: Children 11 and under ride free when accompanied by an adult; Blind Access CharlieCard holders ride free and if using a guide, the guide rides free.

* Requires Student CharlieCard or Youth CharlieCard. Student CharlieCards are available to students through participating middle schools and high schools. Youth CharlieCards are available through community partners in the Boston metro area. Visit www.mbta.com/youthpass for details.

** Requires Senior/TAP CharlieCard, available to Medicare cardholders, seniors 65+,

350 Saturday

Inbound

Leave Chestnut & Cambridge	Arrive Burlington Mall Road	Arrive Alewife Station
7:10A	.....	7:38A
7:50	.....	8:18
8:30	8:45A	9:14
9:30	9:45	10:17
10:30	10:46	11:19
11:30	11:46	**12:21P**
12:30P	**12:46P**	**1:25**
1:30	**1:46**	**2:25**
2:30	**2:46**	**3:21**
3:30	**3:46**	**4:21**
4:30	**4:46**	**5:20**
5:30	**5:46**	**6:17**
6:25	**6:41**	**7:10**
7:20	**7:35**	**8:04**
8:10	**8:25**	**8:54**
9:00	**9:15**	**9:44**
9:50	**10:05**	**10:34**

Outbound

Leave Alewife Station	Arrive Burlington Mall Road	Arrive Chestnut & Cambridge
6:25A	6:51A	7:05A
7:05	7:31	7:45
7:45	8:11	8:25
8:30	8:59	9:18
9:30	10:01	10:22
10:30	11:01	11:22
11:30	**12:01P**	**12:21P**
12:30P	**1:02**	**1:22**
1:30	**2:02**	**2:22**
2:30	**3:02**	**3:22**
3:30	**4:01**	**4:19**
4:30	**4:58**	**5:16**
5:30	**5:55**	**6:13**
6:25	**6:50**	**7:08**
7:15	**7:40**	**7:58**
8:10	**8:33**	**8:52**
9:00	**9:23**	**9:42**
9:50	**.....**	**10:20**
10:40	**.....**	**11:10**

350 Sunday

Inbound

Leave Chestnut & Cambridge	Arrive Burlington Mall Road	Arrive Alewife Station
7:55A	.....	8:24A
9:20	.....	9:52
10:50	.....	11:22
12:20P	**12:34P**	**1:06P**
1:15	**1:29**	**2:00**
2:10	**2:24**	**2:56**
3:05	**3:19**	**3:53**
4:00	**4:14**	**4:50**
4:55	**5:09**	**5:42**
5:50	**6:04**	**6:37**
6:50	**7:04**	**7:35**

Outbound

Leave Alewife Station	Arrive Burlington Mall Road	Arrive Chestnut & Cambridge
7:05A	7:31A	7:49A
8:30	8:57	9:16
9:55	10:24	10:43
11:25	11:54	**12:13P**
12:20P	**12:49P**	**1:08**
1:15	**1:45**	**2:04**
2:10	**2:38**	**2:57**
3:05	**3:33**	**3:52**
4:00	**4:28**	**4:47**
4:55	**5:23**	**5:42**
5:50	**6:18**	**6:37**
6:50	**.....**	**7:26**

Fall 2020 & Winter 2021 Holidays
9/7/20: Sunday; 10/12/20 & 11/11/20: Weekday
11/26/20, 12/25/20, & 1/1/21: Sun; 1/18/21 & 2/15/21: Sat

NOTE:
Route 351 Alewife service operates via Berth 8

Route 351 may be limited or suspended. Visit mbta.com for latest updates.

All buses are accessible to persons with disabilities

b - Omits Northwest Park

Route 350
North Burlington-Alewife Station

Route 351
Bedford Woods Dr - Alewife Station

Fares

PRICE PER TRIP	Local Bus	Bus + Bus	Rapid Transit	Bus + Rapid Transit
CharlieCard	$1.70	$1.70	$2.40	$2.40
CharlieTicket	$2.00	$2.00	$2.90	$4.90***
Cash-on-Board	$2.00	$4.00	$2.90	$4.90***
Student/Youth*	$0.85	$0.85	$1.10	$1.10
Senior/TAP**	$0.85	$0.85	$1.10	$1.10
UNLIMITED TRIP PASSES				
1-Day	$12.75	$12.75	$12.75	$12.75
7-Day	$22.50	$22.50	$22.50	$22.50
Monthly	$55.00	$55.00	$90.00	$90.00
Senior/TAP Monthly	$30.00/month for unlimited travel on Local Bus and Rapid Transit			

VALID PASSES: LinkPass ($84.50/mo.); Student /Youth LinkPass* ($30/mo.) ; Senior/TAP LinkPass* ($30/mo.); and express bus, commuter rail, and boat passes.

FREE FARES: Children 11 and under ride free when accompanied by an adult; Blind Access CharlieCard holders ride free: if using a guide, the guide rides free

* Requires Student CharlieCard or Youth CharlieCard. Student CharlieCards are available to students through participating middle schools and high schools. Youth CharlieCards are available through community partners in the Boston metro area. Visit www.mbta.com/youthpass for details.

** Requires Senior/TAP CharlieCard, available to Medicare cardholders, seniors 65+, and persons with disabilities.

*** For Silver Line SL4 or SL5 pay $2.75. Also see "transfers."

TRANSFERS

If paying with a CharlieTicket or CharlieCard, discounted transfers that are available are automatic — just use the same ticket or card throughout your trip. If paying with cash onboard a vehicle, free transfers are only allowed between rapid transit lines and inside paid platform areas at gated stations.

SCHEDULES

Schedules are available at the following stations: Park Street, Airport, Malden, Harvard, Haymarket (Green Line Level), Back Bay and Downtown Crossing (Orange Line Level) or see station personnel. Schedules also available at the Transportation Building (10 Park Plaza), 45 High St, and online at mbta.com.

For real-time subway and bus tracking, download the Transit app on any smartphone.

Rapid Transit

Effective August 30, 2020

Massachusetts Bay Transportation Authority

massDOT Massachusetts Department of Transportation

Information 617-222-3200 • 1-800-392-6100 (TTY) 617-222-5146 • www.mbta.com

Rapid Transit Line	Weekday First Trip	Weekday Peak	Weekday Off Peak	Weekday Last Trip	Saturday First Trip	Saturday Arriving Every	Saturday Last Trip	Sunday First Trip	Sunday Arriving Every	Sunday Last Trip
Red Line										
Alewife	5:24 AM	9	12-16	12:20 AM	5:24 AM	12-16	12:20 AM	6:08AM	12-16	12:20 AM
Braintree	5:08 AM	mins	mins	12:17 AM	5:09 AM	mins	12:17 AM	6:00AM	mins	12:17 AM
Alewife	5:16 AM	9	12-16	w 12:27 AM	5:16 AM	12-16	w 12:27 AM	6:00AM	12-16	w 12:27 AM
Ashmont	5:16 AM	mins	mins	w 12:30 AM	5:16 AM	mins	w 12:30 AM	6:00AM	mins	w 12:30 AM
"M" Ashmont	5:17 AM	5	8-12 Day	w 1:05 AM	5:15 AM	8-12 Day	w 1:05 AM	6:03AM	8-12 Day	w 1:05 AM
Mattapan	5:05 AM	mins	26 Late	12:53 AM	5:05 AM	26 Early/Late	12:53 AM	5:51AM	26 Early/Late	12:53 AM
Blue Line										
Wonderland	5:13 AM	5	9-13	12:28 AM	5:25 AM	9-13	12:28 AM	5:58AM	9-13	12:28 AM
Orient Heights	5:14 AM	mins	mins	12:33 AM	5:13 AM	mins	12:33 AM	6:03AM	mins	12:33 AM
Bowdoin	5:30 AM			w 1:00 AM	5:29 AM		w 1:00 AM	6:21AM		w 1:00 AM
Orange Line										
Oak Grove	5:16 AM	6	9-11	w 12:30 AM	5:16 AM	9-11	w 12:30 AM	6:00AM	9-11	w 12:30 AM
Forest Hills	5:16 AM	mins	mins	w 12:28 AM	5:16 AM	mins	w 12:28 AM	6:00AM	mins	w 12:28 AM
Green Line*										
B Boston College	5:01 AM	5-6	7-9	12:10 AM	4:45 AM [2]	7-8	12:09 AM	5:20AM [2]	9	12:10 AM
Park Street	5:45 AM	mins	mins	w 12:52 AM	5:40 AM	mins	w 12:52 AM	6:12AM	mins	w 12:52 AM
C Cleveland Circle	4:57 AM [1]	6-8	9-11	12:07 AM	4:50 AM [2]	9-10	12:10 AM	5:30AM [2]	10	12:10 AM
North Station	5:48 AM	mins	mins	w 12:46 AM	5:30 AM	mins	w 12:46 AM	6:06AM	mins	w 12:46 AM
D Riverside	4:56 AM	6	8-11	12:05 AM	4:55 AM	8-9	12:02 AM	5:25AM	11-12	12:05 AM
Government Ctr.	5:45 AM	mins	mins	w 12:49 AM	5:38 AM	mins	w 12:49 AM	6:10AM	mins	w 12:49 AM
E Lechmere*	5:00 AM [4]	6-7	8-10	12:30 AM	5:01 AM	10	12:30 AM	5:35AM	12	12:30 AM
Heath Street	5:45 AM	mins	mins	12:47 AM [3]	5:39 AM	mins	12:47 AM [3]	6:15AM	mins	12:47 AM [3]
Silver Line										
SL1 Logan Airport	5:38 AM	7-12	10-12	f 1:03 AM	5:48 AM	10-12	1:15 AM	5:50AM	10-12	f 1:12 AM
South Station	5:40 AM	mins	mins	w 1:02 AM	5:45 AM	mins	w 12:59 AM	6:12AM	mins	w 1:00 AM
SL2 Design Center	6:07 AM	6	14-16	12:37 AM	6:03 AM	14-16	12:35 AM	6:51AM	14-16	12:51 AM
South Station	5:44 AM	mins	mins	12:50 AM	5:47 AM	mins	12:45 AM	6:35AM	mins	12:36 AM
SL3 Chelsea Station	4:55 AM	6-11	8-13	f 1:05 AM	5:30 AM	8-13	1:22 AM	6:26AM	8-13	f 1:25 AM
South Station	4:20 AM	mins	mins	w 12:35 AM	4:56 AM	mins	w 12:55 AM	5:53AM	mins	w 12:55 AM
SL4 Nubian Station	5:20 AM	6-11	6-11	12:20 AM	5:23 AM	13-20	12:20 AM	6:02AM	13-20	12:20 AM
South Station	5:38 AM	mins	mins	12:37 AM	5:40 AM	mins	12:40 AM	6:20AM	mins	12:40 AM
SL5 Nubian Station	5:15 AM	11-14	13-20	12:51 AM	5:19 AM	6-11	12:43 AM	6:00AM	6-11	12:25 AM
Downtown Xing	5:32 AM	mins	mins	w 1:07 AM	5:34 AM	mins	w 1:00 AM	6:16AM	mins	w 12:47 AM

Peak Service:
Weekdays 7 AM - 9 AM, 4 PM - 6:30 PM

Green Line Notes:

New and ongoing infrastucture projects may result in diversions on some branches at various times.

See GL service changes at mbta.com/GLwork

View service alerts at mbta.com/alerts

* E trains start/end at North Station for Green Line Extension work – shuttles provided between North Station and Lechmere.

More: mbta.com/GLEwork

1 - The first two C train AM northbound trips run through to Lechmere Station on weekdays.

2 - The first B and second C train AM northbound trips run through to Lechmere Station on weekends.

3 - On weekdays the 12:27 AM trip (weekends the 12:32 AM trip) from Heath St is the last connecting train to other lines downtown. The 12:37AM and 12:47AM trips (weekends the 12:47AM trip) from Heath St. runs in service to Lechmere with no guaranteed connections.

4 - Early morning service from Lechmere to Riverside departs Lechmere at 5:00 AM.

f - After exiting Ted Williams Tunnel bus will only service World Trade Center and South Station stops.

w - Last trips wait at some stations, primarily in the Downtown area, for connecting service. Departure times are approximate.

Fall 2020 & Winter 2021 Holidays
9/7/20: Sunday; 10/12/20 & 11/11/20: Weekday
11/26/20, 12/25/20, & 1/1/21: Sun; 1/18/21 & 2/15/21: Sat

MOTOR VEHICLE CRASH DATA

MassHighway

CRASH RATE WORKSHEET

CITY/TOWN : Arlington   COUNT DATE : 2020

DISTRICT : 4   UNSIGNALIZED : [ ]   SIGNALIZED : X

MHD USE ONLY

Source # [ ]

~ INTERSECTION DATA ~

MAJOR STREET : Route 2

MINOR STREET(S) : Route 16

ST # [ ]

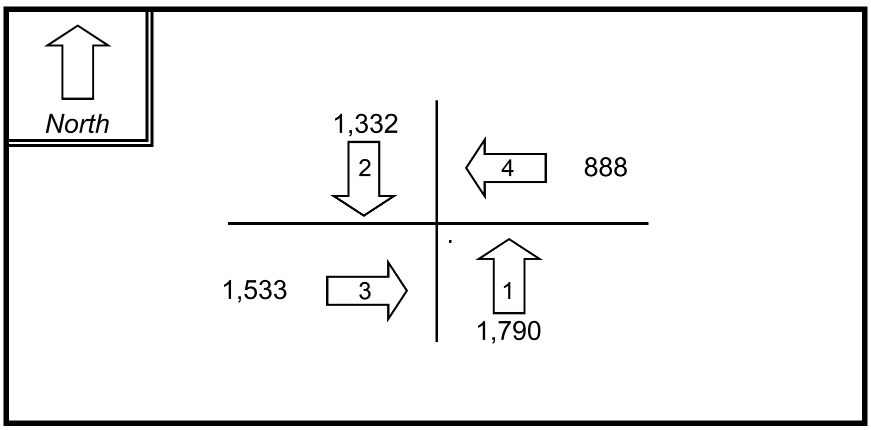
ST # [ ]

ST # [ ]

ST # [ ]

ST # [ ]

INTERSECTION DIAGRAM
(Label Approaches)



INTERSECTION REF # [ ]

Peak Hour Volumes

APPROACH :	1	2	3	4	5	Total Entering Vehicles
DIRECTION :	NB	SB	EB	WB		
VOLUMES (PM) :	1,790	1,332	1,533	888		**5,543**

" K " FACTOR : **0.082**   APPROACH ADT : **67,598**   **ADT** = TOTAL VOL/"K" FACT.

TOTAL # OF ACCIDENTS : 88   # OF YEARS : 5   AVERAGE # OF ACCIDENTS (**A**) : **17.60**

CRASH RATE CALCULATION : **0.71**   RATE = $\frac{(A * 1{,}000{,}000)}{(ADT * 365)}$

Comments : Accident Rate for District 4 signalized intersections = 0.73
Accident Rate for District 4 unsignalized intersections = 0.57

MassHighway

CRASH RATE WORKSHEET

CITY/TOWN : Arlington　　COUNT DATE : 2020

DISTRICT : 4　　UNSIGNALIZED : 　　SIGNALIZED : X

MHD USE ONLY

Source #

~ INTERSECTION DATA ~

MAJOR STREET : Lake Street　　ST #

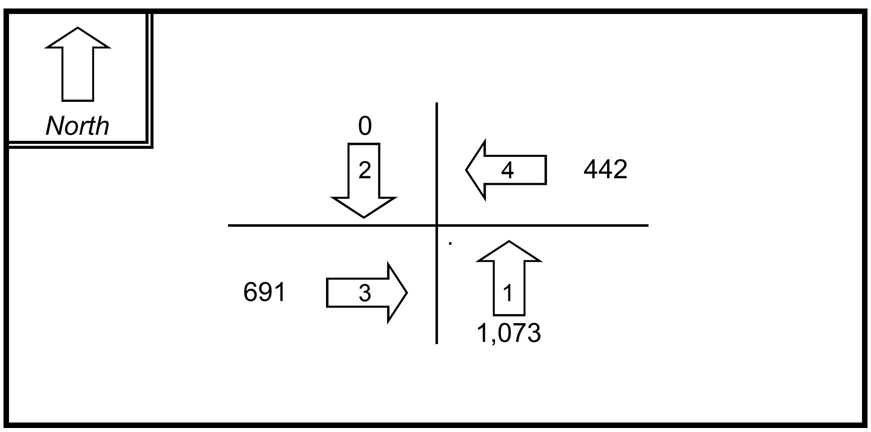
MINOR STREET(S) : Route 2 EB On/Off Ramps　　ST #

ST #

ST #

ST #

INTERSECTION DIAGRAM
(Label Approaches)



INTERSECTION REF #

Peak Hour Volumes

APPROACH :	**1**	**2**	**3**	**4**	**5**	**Total Entering Vehicles**
DIRECTION :	NB	SB	EB	WB		
VOLUMES (PM) :	1,073		691	442		**2,206**

" K " FACTOR : **0.082**　　APPROACH ADT : **26,902**　　**ADT** = TOTAL VOL/"K" FACT.

TOTAL # OF ACCIDENTS : 5　　# OF YEARS : 5　　AVERAGE # OF ACCIDENTS (**A**) : **1.00**

CRASH RATE CALCULATION : 0.10　　RATE = $\frac{(A * 1,000,000)}{(ADT * 365)}$

Comments : Accident Rate for District 4 signalized intersections = 0.73

Accident Rate for District 4 unsignalized intersections = 0.57

MassHighway

CRASH RATE WORKSHEET

CITY/TOWN : Arlington COUNT DATE : 2020

DISTRICT : 4 UNSIGNALIZED : SIGNALIZED : X

MHD USE ONLY

Source #

~ INTERSECTION DATA ~

MAJOR STREET : Lake Street

MINOR STREET(S) : Route 2 EB On/Off Ramps

ST #

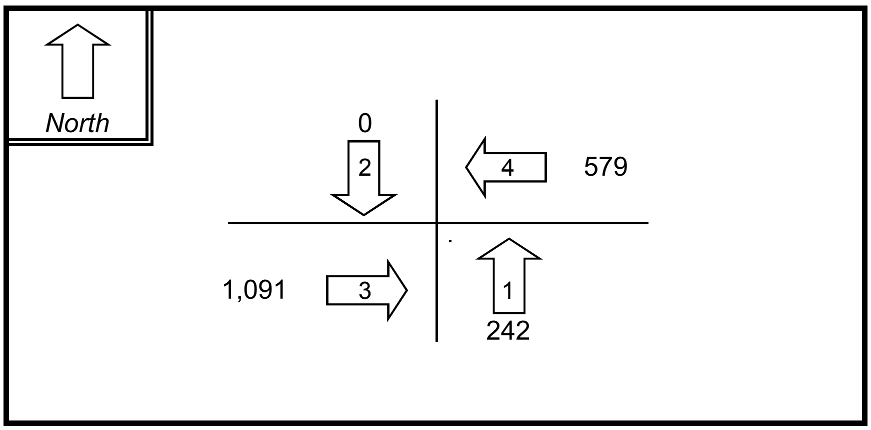
ST #

ST #

ST #

ST #

INTERSECTION DIAGRAM
(Label Approaches)



INTERSECTION REF #

Peak Hour Volumes

APPROACH :	**1**	**2**	**3**	**4**	**5**	**Total Entering Vehicles**
DIRECTION :	NB	SB	EB	WB		
VOLUMES (PM) :	242		1,091	579		**1,912**

" K " FACTOR : **0.082** APPROACH ADT : **23,317** **ADT** = TOTAL VOL/"K" FACT.

TOTAL # OF ACCIDENTS : 5 # OF YEARS : 5 AVERAGE # OF ACCIDENTS (**A**) : **1.00**

CRASH RATE CALCULATION : **0.12** RATE = $\frac{(A * 1,000,000)}{(ADT * 365)}$

Comments : Accident Rate for District 4 signalized intersections = 0.73
Accident Rate for District 4 unsignalized intersections = 0.57

MassHighway

CRASH RATE WORKSHEET

CITY/TOWN : Arlington COUNT DATE : 2020

DISTRICT : 4 UNSIGNALIZED : X SIGNALIZED :

MHD USE ONLY

Source #

~ INTERSECTION DATA ~

MAJOR STREET : Lake Street

MINOR STREET(S) : Wlison Avenue

ST #

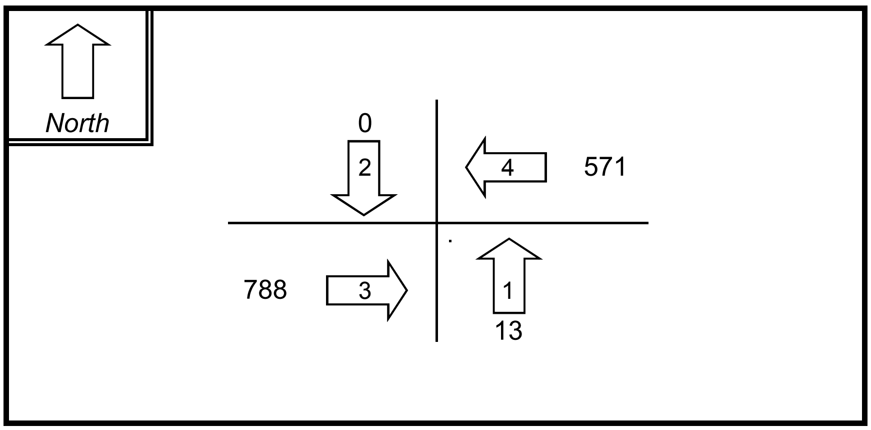
ST #

ST #

ST #

ST #

INTERSECTION DIAGRAM (Label Approaches)



INTERSECTION REF #

Peak Hour Volumes

APPROACH :	**1**	**2**	**3**	**4**	**5**	**Total Entering Vehicles**
DIRECTION :	NB	SB	EB	WB		
VOLUMES (PM) :	13		788	571		**1,372**

" K " FACTOR : **0.082** APPROACH ADT : **16,732** **ADT** = TOTAL VOL/"K" FACT.

TOTAL # OF ACCIDENTS :	2	# OF YEARS :	5	AVERAGE # OF ACCIDENTS (**A**) :	**0.40**

CRASH RATE CALCULATION : **0.07** RATE = $\frac{(A * 1{,}000{,}000)}{(ADT * 365)}$

Comments : Accident Rate for District 4 signalized intersections = 0.73

Accident Rate for District 4 unsignalized intersections = 0.57

MassHighway

CRASH RATE WORKSHEET

CITY/TOWN : Arlington COUNT DATE : 2020

DISTRICT : 4 UNSIGNALIZED : X SIGNALIZED :

MHD USE ONLY

Source #

~ INTERSECTION DATA ~

MAJOR STREET : Lake Street

MINOR STREET(S) : Littlejohn Street

ST #

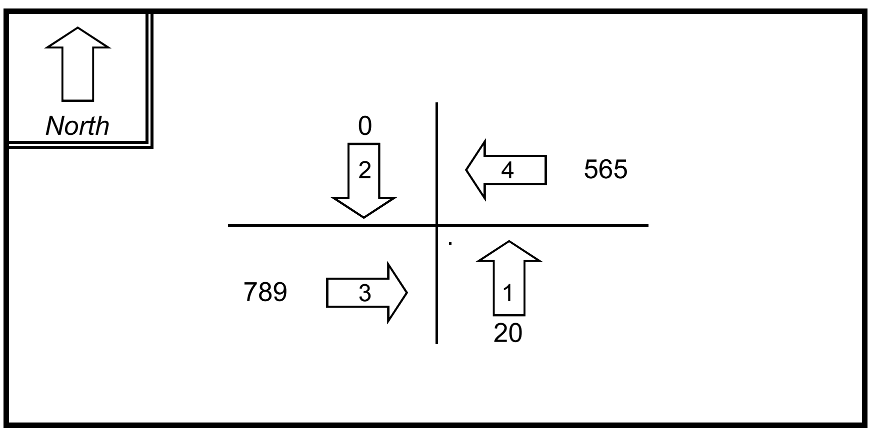
ST #

ST #

ST #

ST #

INTERSECTION DIAGRAM (Label Approaches)



INTERSECTION REF #

Peak Hour Volumes

APPROACH :	**1**	**2**	**3**	**4**	**5**	**Total Entering Vehicles**
DIRECTION :	NB	SB	EB	WB		
VOLUMES (PM) :	20		789	565		**1,374**

" K " FACTOR : **0.082** APPROACH ADT : **16,756** **ADT** = TOTAL VOL/"K" FACT.

TOTAL # OF ACCIDENTS : 4 # OF YEARS : 5 AVERAGE # OF ACCIDENTS (**A**) : **0.80**

CRASH RATE CALCULATION : 0.13 RATE = $\frac{(A * 1,000,000)}{(ADT * 365)}$

Comments : Accident Rate for District 4 signalized intersections = 0.73

Accident Rate for District 4 unsignalized intersections = 0.57

MassHighway

CRASH RATE WORKSHEET

CITY/TOWN : Arlington COUNT DATE : 2020

DISTRICT : 4 UNSIGNALIZED : X SIGNALIZED :

MHD USE ONLY

Source #

~ INTERSECTION DATA ~

MAJOR STREET : Lake Street

MINOR STREET(S) : Homestead Road

ST #

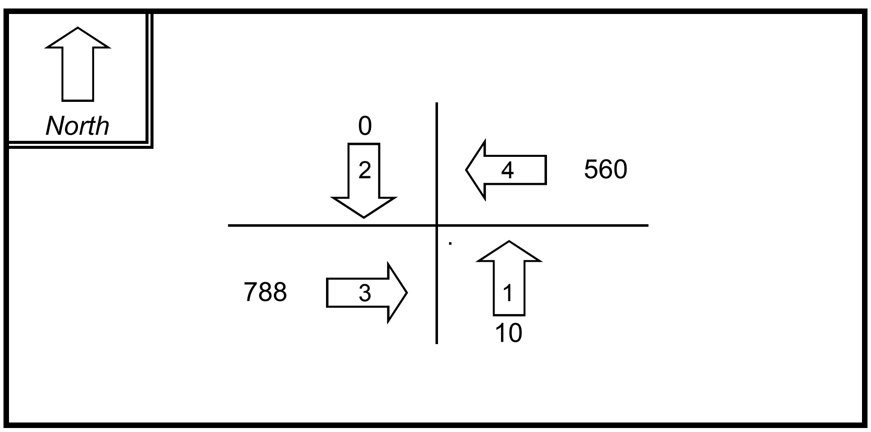
ST #

ST #

ST #

ST #

INTERSECTION DIAGRAM
(Label Approaches)



INTERSECTION REF #

Peak Hour Volumes

APPROACH :	1	2	3	4	5	Total Entering Vehicles
DIRECTION :	NB	SB	EB	WB		
VOLUMES (PM) :	10		788	560		**1,358**

" K " FACTOR : **0.082** APPROACH ADT : **16,561** **ADT** = TOTAL VOL/"K" FACT.

TOTAL # OF ACCIDENTS : 1 # OF YEARS : 5 AVERAGE # OF ACCIDENTS (**A**) : **0.20**

CRASH RATE CALCULATION : **0.03** RATE = $\frac{(A * 1{,}000{,}000)}{(ADT * 365)}$

Comments : Accident Rate for District 4 signalized intersections = 0.73
Accident Rate for District 4 unsignalized intersections = 0.57

MassHighway

CRASH RATE WORKSHEET

CITY/TOWN : Arlington COUNT DATE : 2020 *MHD USE ONLY*

DISTRICT : 4 UNSIGNALIZED : X SIGNALIZED : Source #

~ INTERSECTION DATA ~

MAJOR STREET : Lake Street ST #

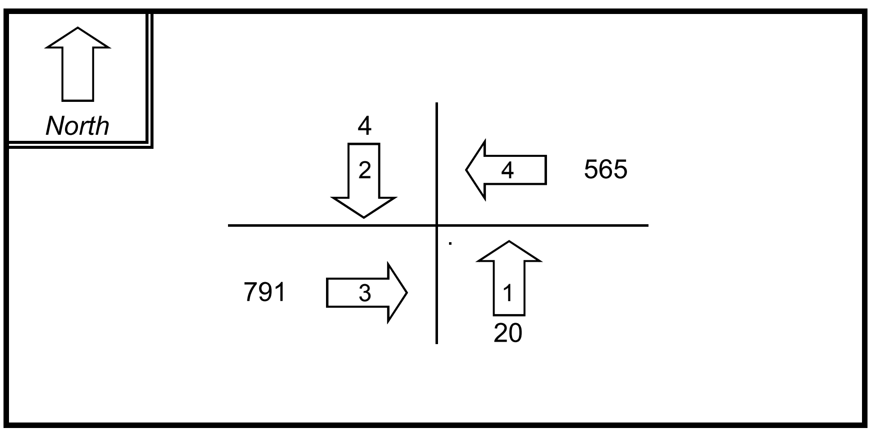
MINOR STREET(S) : Burch Street ST #

Alfred Road ST #

ST #

ST #

INTERSECTION DIAGRAM (Label Approaches)



INTERSECTION REF #

Peak Hour Volumes

APPROACH :	**1**	**2**	**3**	**4**	**5**	**Total Entering Vehicles**
DIRECTION :	NB	SB	EB	WB		
VOLUMES (PM) :	20	4	791	565		**1,380**

" K " FACTOR : **0.082** APPROACH ADT : **16,829** **ADT** = TOTAL VOL/"K" FACT.

TOTAL # OF ACCIDENTS : 3 # OF YEARS : 5 AVERAGE # OF ACCIDENTS (**A**) : **0.60**

CRASH RATE CALCULATION : 0.10 RATE = $\frac{(A * 1{,}000{,}000)}{(ADT * 365)}$

Comments : Accident Rate for District 4 signalized intersections = 0.73

Accident Rate for District 4 unsignalized intersections = 0.57

MassHighway

CRASH RATE WORKSHEET

CITY/TOWN : Arlington COUNT DATE : 2020

DISTRICT : 4 UNSIGNALIZED : X SIGNALIZED :

MHD USE ONLY

Source #

~ INTERSECTION DATA ~

MAJOR STREET : Lake Street

MINOR STREET(S) : Margaret Street

Lakehill Avenue

ST #

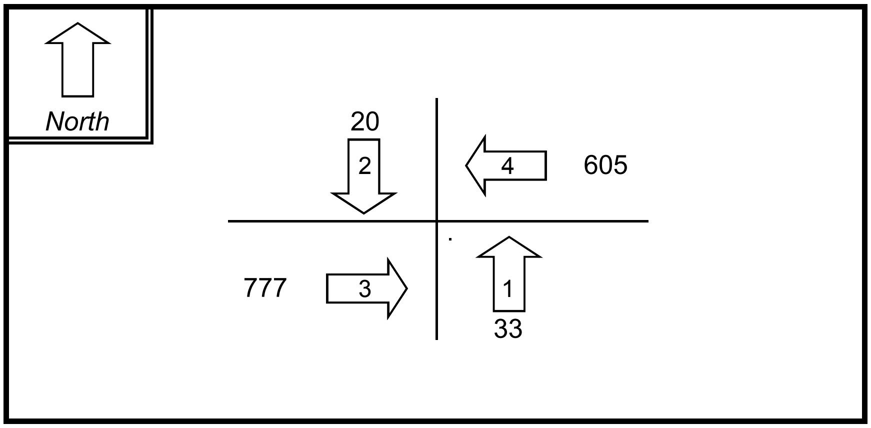
ST #

ST #

ST #

ST #

INTERSECTION DIAGRAM (Label Approaches)



INTERSECTION REF #

Peak Hour Volumes

APPROACH :	1	2	3	4	5	Total Entering Vehicles
DIRECTION :	NB	SB	EB	WB		
VOLUMES (PM) :	33	20	777	605		1,435

" K " FACTOR : 0.082 APPROACH ADT : 17,500 **ADT** = TOTAL VOL/"K" FACT.

TOTAL # OF ACCIDENTS : 7 # OF YEARS : 5 AVERAGE # OF ACCIDENTS (**A**) : 1.40

CRASH RATE CALCULATION : 0.22 RATE = $\frac{(A * 1{,}000{,}000)}{(ADT * 365)}$

Comments : Accident Rate for District 4 signalized intersections = 0.73

Accident Rate for District 4 unsignalized intersections = 0.57

MassHighway

CRASH RATE WORKSHEET

CITY/TOWN : Arlington COUNT DATE : 2020

DISTRICT : 4 UNSIGNALIZED : X SIGNALIZED :

MHD USE ONLY

Source #

~ INTERSECTION DATA ~

MAJOR STREET : Lake Street

MINOR STREET(S) : Minuteman Commuter Bikeway

ST #

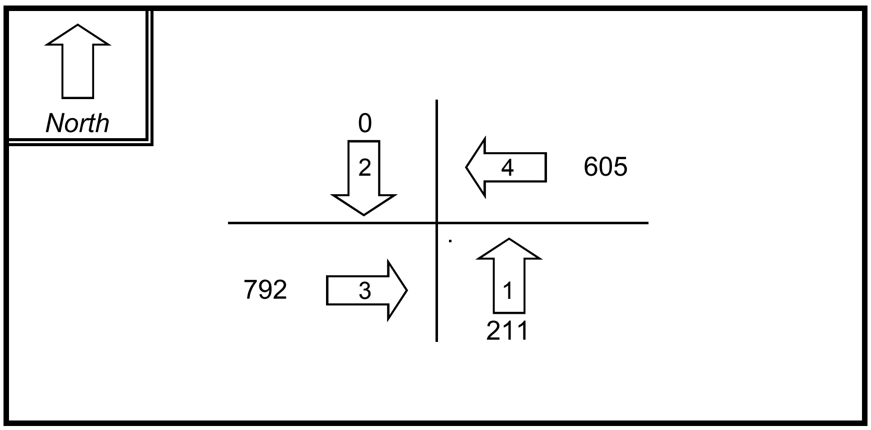
ST #

ST #

ST #

ST #

INTERSECTION DIAGRAM (Label Approaches)



INTERSECTION REF #

Peak Hour Volumes

APPROACH :	1	2	3	4	5	Total Entering Vehicles
DIRECTION :	NB	SB	EB	WB		
VOLUMES (PM) :	211		792	605		**1,608**

" K " FACTOR : **0.082** APPROACH ADT : **19,610** **ADT** = TOTAL VOL/"K" FACT.

TOTAL # OF ACCIDENTS : 18 # OF YEARS : 5 AVERAGE # OF ACCIDENTS (**A**) : **3.60**

CRASH RATE CALCULATION : 0.50

RATE = $\frac{(A * 1{,}000{,}000)}{(ADT * 365)}$

Comments : Accident Rate for District 4 signalized intersections = 0.73

Accident Rate for District 4 unsignalized intersections = 0.57

MassHighway

CRASH RATE WORKSHEET

CITY/TOWN : Arlington   COUNT DATE : 2020

DISTRICT : 4   UNSIGNALIZED :   SIGNALIZED : X

MHD USE ONLY

Source #

~ INTERSECTION DATA ~

MAJOR STREET : Lake Street   ST #

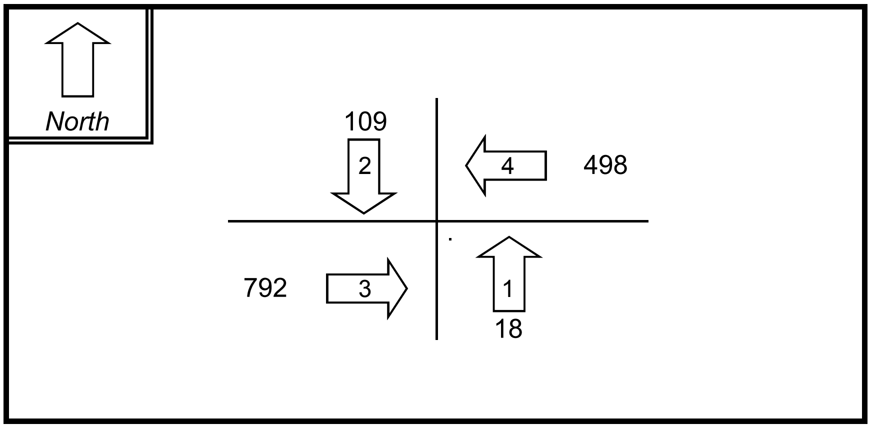
MINOR STREET(S) : Brooks Avenue   ST #

ST #

ST #

ST #

INTERSECTION DIAGRAM (Label Approaches)



INTERSECTION REF #

Peak Hour Volumes

APPROACH :	**1**	**2**	**3**	**4**	**5**	**Total Entering Vehicles**
DIRECTION :	NB	SB	EB	WB		
VOLUMES (PM) :	18	109	792	498		**1,417**

" K " FACTOR : **0.082**   APPROACH ADT : **17,280**   **ADT** = TOTAL VOL/"K" FACT.

TOTAL # OF ACCIDENTS : 11   # OF YEARS : 5   AVERAGE # OF ACCIDENTS (**A**) : **2.20**

CRASH RATE CALCULATION : 0.35   RATE = $\frac{(A * 1,000,000)}{(ADT * 365)}$

Comments : Accident Rate for District 4 signalized intersections = 0.73

Accident Rate for District 4 unsignalized intersections = 0.57

MassHighway

CRASH RATE WORKSHEET

MHD USE ONLY

CITY/TOWN : Arlington COUNT DATE : 2020

DISTRICT : 4 UNSIGNALIZED : SIGNALIZED : X

Source #

~ INTERSECTION DATA ~

MAJOR STREET : Massachusetts Avenue ST #

MINOR STREET(S) : Lake Street ST #

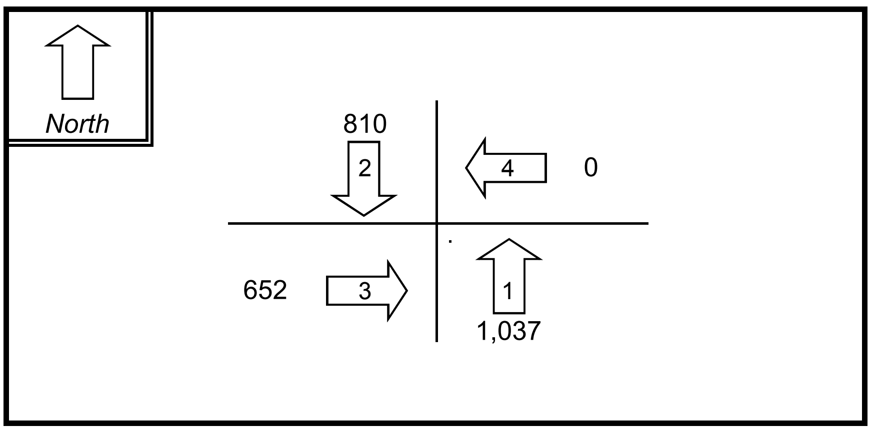
ST #

ST #

ST #

INTERSECTION DIAGRAM

(Label Approaches)



INTERSECTION REF #

Peak Hour Volumes

APPROACH :	**1**	**2**	**3**	**4**	**5**	**Total Entering Vehicles**
DIRECTION :	NB	SB	EB	WB		
VOLUMES (PM) :	1,037	810	652			**2,499**

" K " FACTOR : **0.082** APPROACH ADT : **30,476** **ADT** = TOTAL VOL/"K" FACT.

TOTAL # OF ACCIDENTS : 22 # OF YEARS : 5 AVERAGE # OF ACCIDENTS (**A**) : **4.40**

CRASH RATE CALCULATION : **0.40** RATE = $\frac{(A * 1{,}000{,}000)}{(ADT * 365)}$

Comments : Accident Rate for District 4 signalized intersections = 0.73

Accident Rate for District 4 unsignalized intersections = 0.57

MassDOT Crash Report for Lake Street at Brooks Avenue in Arlington MA 2013-2017

Crash Date	Crash Severity	Crash Time	Number of Vehicles	Driver Contributing Circumstances (All Drivers)	Light Conditions	Manner of Collision	Road Surface Condition	Vehicle Actions Prior to Crash (All Vehicles)	Vehicle Travel Directions (All Vehicles)	Weather Conditions	Street Number	Roadway	Near Intersection Roadway
03/04/2013	Property damage only (none injured)	4:47 PM	2		Daylight	Rear-end	Dry	V1: Slowing or stopped in traffic / V2: Travelling straight ahead	V1: N / V2: N	Clear		BROOKS AVE / LAKE ST	
08/08/2013	Not Reported	6:18 PM	2	D1: (No improper driving),(No improper driving) / D2: (Followed too closely),(Followed too closely)	Daylight	Rear-end	Dry	V1: Slowing or stopped in traffic / V2: Travelling straight ahead	V1: N / V2: N	Clear/Clear		BROOKS AVE / LAKE ST	
09/23/2013	Property damage only (none injured)	9:18 AM	3	D1: (Followed too closely),(Other improper action) / D2: (No improper driving) / D3: (No improper driving)	Daylight	Rear-end	Dry	V1: Travelling straight ahead / V2: Slowing or stopped in traffic / V3: Slowing or stopped in traffic	V1: S / V2: S / V3: S	Clear		LAKE ST. / BROOKS AVE.	
02/05/2014	Property damage only (none injured)	2:26 PM	2	D1: (Followed too closely),(Disregarded traffic signs, signals, road markings) / D2: (No improper driving)	Daylight	Rear-end	Snow	V1: Travelling straight ahead / V2: Slowing or stopped in traffic	V1: N / V2: N	Snow/Sleet, hail (freezing rain or drizzle)	64	LAKE ST.	BROOKS AVENUE
02/18/2014	Not Reported	2:02 PM	2	D1: (No improper driving) / D2: (No improper driving)	Daylight	Angle	Snow	V1: Slowing or stopped in traffic / V2: Turning right	V1: W / V2: N	Snow		BROOKS AVE / LAKE STREET	
03/19/2014	Property damage only (none injured)	7:49 AM	2	D1: (Followed too closely),(Inattention) / D2: (No improper driving)	Daylight	Rear-end	Dry	V1: Travelling straight ahead / V2: Slowing or stopped in traffic	V1: S / V2: S	Clear	67	LAKE ST	BROOKS AVENUE
10/06/2014	Property damage only (none injured)	7:58 PM	2	D1: (No improper driving) / D2: (Followed too closely),(Inattention)	Dark - lighted roadway	Rear-end	Dry	V1: Slowing or stopped in traffic / V2: Travelling straight ahead	V1: N / V2: N	Clear		LAKE ST. / BROOKS AVE.	
03/23/2015	Property damage only (none injured)	11:16 AM	1	D1: (Over-correcting/over-steering)	Daylight	Single vehicle crash	Dry	V1: Turning right	V1: S	Clear		BROOKS AVENUE / LAKE STREET	
09/05/2016	Property damage only (none injured)	5:23 PM	2	D1: (Inattention),(Other improper action)	Daylight	Rear-end	Dry	V1: Slowing or stopped in traffic / V2: Backing	V1: E / V2: E	Clear		BROOKS AVE / LAKE STREET	
11/06/2017	Property damage only (none injured)	5:13 PM	2		Dark - lighted roadway	Head-on	Wet	V1: Turning left / V2: Travelling straight ahead	V1: N / V2: S	Rain/Cloudy		BROOKS AVE / LAKE ST	
11/08/2017	Not Reported	2:21 PM	1	D1: (Unknown)	Daylight	Sideswipe, same direction	Dry	V1: Travelling straight ahead	V1: S	Clear/Clear		BROOKS AVENUE / LAKE STREET	

MassDOT Crash Report for Lake Street at Burch Street-Alfred Road in Arlington MA 2013-2017

Crash Date	Crash Severity	Crash Time	Number of Vehicles	Driver Contributing Circumstances (All Drivers)	Light Conditions	Manner of Collision	Road Surface Condition	Vehicle Actions Prior to Crash (All Vehicles)	Vehicle Travel Directions (All Vehicles)	Weather Conditions	Street Number	Roadway
07/25/2013	Property damage only (none injured)	7:24 AM	2	D1: (No improper driving) / D2: (Followed too closely)	Daylight	Rear-end	Dry	V1: Slowing or stopped in traffic / V2: Travelling straight ahead	V1: S / V2: S	Cloudy	102	LAKE ST
09/03/2013	Not Reported	7:11 PM	2	D1: (Failed to yield right of way) / D2: (No improper driving)	Dusk	Angle	Dry	V1: Turning left / V2: Slowing or stopped in traffic	V1: E / V2: W	Clear		BURCH ST / LAKE ST
03/27/2017	Property damage only (none injured)	9:20 AM	2	D1: (Failure to keep in proper lane or running off road) / D2: (No improper driving)	Daylight	Sideswipe, same direction	Wet	V1: Overtaking/passing / V2: Travelling straight ahead	V1: N / V2: N	Rain/Cloudy		BURCH STREET / LAKE STREET

MassDOT Crash Report for Lake Street at Homestead Road in Arlington MA 2013-2017

Crash Date	Crash Severity	Crash Time	Number of Vehicles	Driver Contributing Circumstances (All Drivers)	Light Conditions	Manner of Collision	Road Surface Condition	Vehicle Actions Prior to Crash (All Vehicles)	Vehicle Travel Directions (All Vehicles)	Weather Conditions	Street Number	Roadway
11/06/2017	Property damage only (none injured)	2:41 PM	2		Daylight	Sideswipe, same direction	Wet	V1: Overtaking/passing / V2: Slowing or stopped in traffic	V1: N / V2: N	Cloudy		HOMESTEAD ROAD / LAKE STREET

MassDOT Crash Report for Lake Street at Littlejohn Street in Arlington MA 2013-2017

Crash Date	Crash Severity	Crash Time	Number of Vehicles	Driver Contributing Circumstances (All Drivers)	Light Conditions	Manner of Collision	Road Surface Condition	Vehicle Actions Prior to Crash (All Vehicles)	Vehicle Travel Directions (All Vehicles)	Weather Conditions	Street Number	Roadway
09/09/2014	Property damage only (none injured)	7:39 AM	2	D1: (Unknown) / D2: (Inattention)	Daylight	Angle	Dry	V1: Travelling straight ahead / V2: Turning left	V1: S / V2: S	Clear/Clear		LITTLE JOHN STREET / LAKE STREET
06/13/2015	Non-fatal injury	9:03 PM	2	D1: (No improper driving) / D2: (Inattention)	Dark - lighted roadway	Head-on	Dry	V1: Parked / V2: Travelling straight ahead	V1: Not Reported / V2: N	Clear	148	LAKE STREET
09/19/2015	Non-fatal injury	4:55 PM	1	D1: (No improper driving)	Daylight	Angle	Dry	V1: Turning left	V1: S	Clear		LAKE ST / LITTLEJOHN ST
04/13/2016	Property damage only (none injured)	8:21 AM	2	D1: (Inattention),(Failed to yield right of way)	Daylight	Angle	Dry	V1: Travelling straight ahead / V2: Travelling straight ahead	V1: W / V2: N	Clear		LAKE STREET / LITTLEJOHN STREET

MassDOT Crash Report for Lake Street at Margaret Street at Lakehill Avenue in Arlington MA 2013-2017

Crash Date	Crash Severity	Crash Time	Number of Vehicles	Driver Contributing Circumstances (All Drivers)	Light Conditions	Manner of Collision	Road Surface Condition	Vehicle Actions Prior to Crash (All Vehicles)	Vehicle Travel Directions (All Vehicles)	Weather Conditions	Street Number	Roadway
04/25/2013	Property damage only (none injured)	8:22 AM	2	D1: (Inattention),(Followed too closely) / D2: (No improper driving)	Daylight	Rear-end	Wet	V1: Turning right / V2: Slowing or stopped in traffic	V1: N / V2: N	Cloudy		LAKE ST / MARGARET ST
05/04/2013	Property damage only (none injured)	8:55 AM	2	D1: (No improper driving)	Daylight	Sideswipe, same direction	Dry	V1: Travelling straight ahead / V2: Parked	V1: W / V2: Reported but invalid	Clear		LAKE ST / MARGARET ST
05/09/2014	Not Reported	9:47 PM	2	D1: (No improper driving) / D2: (Disregarded traffic signs, signals, road markings),(Failed to yield right of way)	Dark - lighted roadway	Angle	Dry	V1: Travelling straight ahead / V2: Entering traffic lane	V1: N / V2: W	Clear	81	LAKE ST
02/10/2016	Property damage only (none injured)	8:37 AM	2		Daylight	Angle	Wet	V1: Travelling straight ahead / V2: Travelling straight ahead	V1: E / V2: N	Cloudy/Snow		LAKE ST / LAKEHILL AVE. / MARGARET ST.
09/01/2016	Not Reported	4:08 PM	2		Daylight	Head-on	Dry	V1: Turning left / V2: Travelling straight ahead	V1: S / V2: N	Cloudy		LAKE ST / MARGARET ST
08/08/2017	Not Reported	6:18 PM	2		Daylight	Sideswipe, same direction	Dry	V1: Turning left / V2: Travelling straight ahead	V1: W / V2: W	Clear		LAKE ST / MARGARET ST
09/16/2017	Non-fatal injury	11:24 AM	3		Daylight	Rear-end	Dry	V1: Travelling straight ahead / V2: Slowing or stopped in traffic / V3: Slowing or stopped in traffic	V1: S / V2: S / V3: S	Cloudy		LAKEHILL AVE / LAKE ST

MassDOT Crash Report for Lake Street at Minuteman Commuter Bikeway in Arlington MA 2013-2017

Crash Date	Crash Severity	Crash Time	Number of Vehicles	Driver Contributing Circumstances (All Drivers)	Light Conditions	Manner of Collision	Road Surface Condition	Vehicle Actions Prior to Crash (All Vehicles)	Vehicle Travel Directions (All Vehicles)	Weather Conditions	Street Number	Roadway	Near Intersection Roadway
08/23/2013	Property damage only (none injured)	11:04 AM	1	D1: (Failed to yield right of way)	Daylight	Pedestrian	Dry	V1: Travelling straight ahead	V1: N	Cloudy		LAKE STREET	MARGARET STREET
07/23/2014	Property damage only (none injured)	8:28 AM	1	D1: (No improper driving),(No improper driving)	Daylight	Angle	Dry	V1: Travelling straight ahead	V1: N	Clear/Clear	72	LAKE ST	BIKE PATH
09/30/2014	Property damage only (none injured)	3:44 PM	1	D1: (No improper driving)	Not reported	Pedestrian	Not reported	V1: Slowing or stopped in traffic	V1: S	Not Reported		LAKE STREET	
02/13/2015	Not Reported	4:26 PM	1	D1: (No improper driving),(No improper driving)	Daylight	Pedestrian	Snow	V1: Slowing or stopped in traffic	V1: S	Clear/Clear		/ LAKE STREET	
10/04/2015	Property damage only (none injured)	2:11 PM	2	D1: (No improper driving) / D2: (Followed too closely)	Daylight	Rear-end	Dry	V1: Slowing or stopped in traffic / V2: Travelling straight ahead	V1: S / V2: S	Clear		LAKE STREET	
05/11/2016	Non-fatal injury	6:26 AM	1	D1: (No improper driving)	Daylight	Sideswipe, opposite direction	Dry	V1: Travelling straight ahead	V1: N	Clear		LAKE STREET / MINUTEMAN COMMUTER BIKEWAY	
05/25/2016	Property damage only (none injured)	3:05 PM	2	D1: (Inattention),(Followed too closely) / D2: (No improper driving)	Daylight	Rear-end	Dry	V1: Travelling straight ahead / V2: Slowing or stopped in traffic	V1: S / V2: S	Clear	75	LAKE ST	
06/06/2016	Property damage only (none injured)	9:52 AM	3		Daylight	Rear-end	Dry	V1: Slowing or stopped in traffic / V2: Travelling straight ahead / V3: Travelling straight ahead	V1: S / V2: S / V3: S	Clear	74	LAKE ST	
09/13/2016	Property damage only (none injured)	10:07 AM	2		Daylight	Angle	Dry	V1: Backing / V2: Parked	V1: W / V2: S	Clear	68	LAKE ST	
01/25/2017	Not Reported	11:52 AM	1		Daylight	Bicyclist	Dry	V1: Travelling straight ahead	V1: S	Clear		/ / LAKE STREET	LAKEHILL AVENUE
10/10/2017	Property damage only (none injured)	6:48 PM	3		Dark - lighted roadway	Rear-end	Dry	V1: Slowing or stopped in traffic / V2: Slowing or stopped in traffic / V3: Travelling straight ahead	V1: S / V2: S / V3: S	Clear		LAKE STREET	
12/27/2016	Non-fatal injury	11:54 AM	1	D1: (No improper driving)	Daylight	Pedestrian	Wet	V1: Travelling straight ahead	V1: N	Clear		LAKE STREET	MARGARET STREET
08/24/2017	Property damage only (none injured)	7:27 AM	2	D1: (No improper driving) / D2: (Failed to yield right of way)	Daylight	Bicyclist	Dry	V1: Travelling straight ahead / V2: Travelling straight ahead	V1: N / V2: Not Reported	Clear		LAKE STREET	
06/23/2014	Property damage only (none injured)	6:07 PM	1	D1: (No improper driving)	Daylight	Bicyclist	Dry	V1: Travelling straight ahead	V1: S	Clear		LAKE STREET / BIKE PATH	
11/08/2014	Non-fatal injury	10:49 AM	3	D1: (Inattention),(Unknown) / D2: (No improper driving) / D3: (No improper driving)	Daylight	Rear-end	Dry	V1: Travelling straight ahead / V2: Slowing or stopped in traffic / V3: Slowing or stopped in traffic	V1: S / V2: S / V3: S	Clear	73	LAKE ST.	MINUTEMAN TRAIL
10/29/2016	Property damage only (none injured)	2:40 PM	3	D1: (Inattention),(Distracted) / D2: (No improper driving) / D3: (No improper driving)	Daylight	Rear-end	Dry	V1: Travelling straight ahead / V2: Slowing or stopped in traffic / V3: Slowing or stopped in traffic	V1: S / V2: S / V3: S	Clear	71	LAKE ST	MINUTEMAN TRAIL BIKE PATH
10/22/2014	Non-fatal injury	12:51 PM	2	D1: (Distracted) / D2: (No improper driving),(No improper driving)	Daylight	Rear-end	Wet	V1: Travelling straight ahead / V2: Slowing or stopped in traffic	V1: S / V2: S	Rain/Cloudy	71	LAKE STREET	
09/15/2015	Not Reported	3:55 PM	2	D1: (Operating defective equipment) / D2: (No improper driving)	Daylight	Rear-end	Dry	V1: Slowing or stopped in traffic / V2: Travelling straight ahead	V1: S / V2: S	Clear	71	LAKE ST	

MassDOT Crash Report for Lake Street at Route 2 EB On-Off Ramps in Arlington MA 2013-2017

Crash Date	Crash Severity	Crash Time	Number of Vehicles	Driver Contributing Circumstances (All Drivers)	Light Conditions	Manner of Collision	Road Surface Condition	Vehicle Actions Prior to Crash (All Vehicles)	Vehicle Travel Directions (All Vehicles)	Weather Conditions	Street Number	Roadway	Near Intersection Roadway
01/28/2014	Property damage only (none injured)	1:00 AM	1	D1: (Failure to keep in proper lane or running off road)	Dark - lighted roadway	Single vehicle crash	Dry	V1: Travelling straight ahead	V1: W	Clear		LAKE STREET / RAMP-RT 2 EB/ACORN PARK RD TO LAKE ST	
02/06/2014	Property damage only (none injured)	10:46 AM	1	D1: (Other improper action)	Daylight	Single vehicle crash	Snow	V1: Turning right	V1: E	Snow		RAMP-RT 2 EB/ACORN PARK RD TO LAKE ST	
08/01/2014	Property damage only (none injured)	9:10 AM	2	D1: (Inattention) / D2: (No improper driving)	Daylight	Angle	Dry	V1: Turning left / V2: Turning right	V1: E / V2: N	Clear		RAMP-LAKE STREET TO RT 2 EB	LAKE STREET
11/23/2017	Property damage only (none injured)	10:18 AM	2	D1: (Failed to yield right of way) / D2: (No improper driving)	Daylight	Sideswipe, same direction	Dry	V1: Travelling straight ahead / V2: Travelling straight ahead	V1: N / V2: N	Clear/Clear		LAKE STREET / RAMP-LAKE ST TO RT 2 EB /	
12/23/2017	Property damage only (none injured)	4:51 AM	1	D1: (Driving too fast for conditions)	Dark - lighted roadway	Single vehicle crash	Ice	V1: Travelling straight ahead	V1: N	Not Reported		LAKE STREET	RAMP-LAKE ST TO RT 2 EB

MassDOT Crash Report for Lake Street at Route 2 WB On-Off Ramps in Arlington MA 2013-2017

Crash Date	Crash Severity	Crash Time	Number of Vehicles	Driver Contributing Circumstances (All Drivers)	Light Conditions	Manner of Collision	Road Surface Condition	Vehicle Actions Prior to Crash (All Vehicles)	Vehicle Travel Directions (All Vehicles)	Weather Conditions	Street Number	Roadway	Near Intersection Roadway
03/11/2013	Not Reported	8:05 AM	2	D1: (No improper driving) / D2: (Disregarded traffic signs, signals, road markings)	Daylight	Not reported	Dry	V1: Travelling straight ahead / V2: Travelling straight ahead	V1: Not Reported / V2: Not Reported	Clear		LAKE STREET / RAMP-LAKE ST TO RT 2 WB / LAKE ST	
11/03/2013	Property damage only (none injured)	1:47 AM	1	D1: (Operating vehicle in erratic, reckless, careless, negligent or aggressive manner),(Disregarded traffic signs, signals, road markings)	Dark - lighted roadway	Single vehicle crash	Wet	V1: Travelling straight ahead	V1: W	Clear/Clear	200	LAKE ST	
10/15/2015	Not Reported	7:08 PM	2	D1: (No improper driving)	Daylight	Sideswipe, same direction	Dry	V1: Entering traffic lane / V2: Entering traffic lane	V1: N / V2: N	Clear		CONCORD TURNPIKE / LAKE STREET	
07/12/2016	Non-fatal injury	5:51 PM	2		Daylight	Rear-end	Dry	V1: Slowing or stopped in traffic / V2: Travelling straight ahead	V1: N / V2: N	Clear		LAKE STREET Rte 2 E	RAMP 2 WB TO LAKE STREET
06/02/2017	Non-fatal injury	12:52 PM	1		Daylight	Sideswipe, same direction	Dry	V1: Travelling straight ahead	V1: N	Clear		LAKE STREET / RAMP-RT 2 WB TO LAKE ST / RAMP-LAKE ST TO RT 2 WB	

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MassDOT Crash Report for Lake Street at Wilson Avenue in Arlington MA 2013-2017

Crash Date	Crash Severity	Crash Time	Number of Vehicles	Driver Contributing Circumstances (All Drivers)	Light Conditions	Manner of Collision	Road Surface Condition	Vehicle Actions Prior to Crash (All Vehicles)	Vehicle Travel Directions (All Vehicles)	Weather Conditions	Street Number	Roadway
08/12/2014	Property damage only (none injured)	11:50 AM	2	D1: (Unknown)	Daylight	Rear-end	Dry	V1: Travelling straight ahead / V2: Parked	V1: S / V2: S	Cloudy	181	LAKE ST
05/01/2015	Property damage only (none injured)	6:14 PM	2	D1: (No improper driving) / D2: (Made an improper turn)	Daylight	Angle	Dry	V1: Turning left / V2: Overtaking/passing	V1: E / V2: N	Clear		LAKE ST / WILSON AVE

MassDOT Crash Report for Massachusetts Avenue at Lake Street in Arlington MA 2013-2017

Crash Date	Crash Severity	Crash Time	Number of Vehicles	Driver Contributing Circumstances (All Drivers)	Light Conditions	Manner of Collision	Road Surface Condition	Vehicle Actions Prior to Crash (All Vehicles)	Vehicle Travel Directions (All Vehicles)	Weather Conditions	Street Number	Roadway	Near Intersection Roadway
03/02/2013	Property damage only (none injured)	5:16 PM	1	D1: (No improper driving)	Daylight	Angle	Dry	V1: Turning right	V1: S	Cloudy		LAKE ST / MASSACHUSETTS AVENUE	
05/22/2013	Property damage only (none injured)	1:01 PM	1	D1: (No improper driving)	Daylight	Sideswipe, same direction	Dry	V1: Travelling straight ahead	V1: E	Clear	204	MASS AVE	LAKE STREET
04/24/2013	Property damage only (none injured)	6:54 AM	2	D1: (No improper driving) / D2: (Followed too closely)	Daylight	Rear-end	Wet	V1: Slowing or stopped in traffic / V2: Travelling straight ahead	V1: E / V2: E	Cloudy		LAKE ST / MASSACHUSETTS AVENUE	
01/15/2014	Property damage only (none injured)	5:55 PM	2	D1: (No improper driving)	Daylight	Sideswipe, same direction	Dry	V1: Slowing or stopped in traffic / V2: Travelling straight ahead	V1: E / V2: E	Clear		LAKE ST / MASSACHUSETTS AVENUE	
07/02/2014	Not Reported	6:47 PM	3	D1: (No improper driving) / D2: (No improper driving) / D3: (Other improper action)	Dusk	Rear-end	Dry	V1: Slowing or stopped in traffic / V2: Slowing or stopped in traffic / V3: Travelling straight ahead	V1: W / V2: W / V3: W	Cloudy	204	MASSACHUSETTS AVENUE	LAKE STREET
11/20/2014	Property damage only (none injured)	6:07 PM	1	D1: (No improper driving)	Dark - lighted roadway	Angle	Dry	V1: Travelling straight ahead	V1: S	Clear		LAKE ST / MASSACHUSETTS AVENUE	
01/11/2015	Property damage only (none injured)	2:29 PM	2	D1: (Made an improper turn) / D2: (No improper driving)	Daylight	Angle	Dry	V1: Making U-turn / V2: Travelling straight ahead	V1: S / V2: Not Reported	Cloudy/Cloudy	191	MASSACHUSETTS AVENUE	
04/15/2015	Property damage only (none injured)	3:44 PM	2	D1: (No improper driving) / D2: (No improper driving)	Daylight	Sideswipe, same direction	Dry	V1: Travelling straight ahead / V2: Travelling straight ahead	V1: N / V2: N	Cloudy		LAKE ST / MASSACHUSETTS AVENUE	
04/29/2015	Not Reported	8:29 AM	2	D1: (No improper driving),(No improper driving) / D2: (No improper driving),(No improper driving)	Daylight	Sideswipe, same direction	Dry	V1: Turning right / V2: Travelling straight ahead	V1: E / V2: E	Clear/Clear	204	MASSACHUSETTS AVENUE	
05/01/2015	Property damage only (none injured)	5:54 AM	2	D1: (No improper driving) / D2: (Followed too closely),(Operating vehicle in erratic, reckless, careless, negligent or aggressive manner)	Daylight	Rear-end	Dry	V1: Slowing or stopped in traffic / V2: Travelling straight ahead	V1: E / V2: E	Clear		MASSACHUSETTS AVENUE / LAKE ST	
05/24/2015	Property damage only (none injured)	10:02 PM	2	D1: (No improper driving) / D2: (Inattention)	Dark - lighted roadway	Rear-end	Dry	V1: Slowing or stopped in traffic / V2: Travelling straight ahead	V1: W / V2: W	Clear		LAKE ST / MASSACHUSETTS AVENUE	
06/05/2015	Not Reported	2:28 PM	2	D1: (No improper driving),(No improper driving) / D2: (Illness)	Daylight	Rear-end	Dry	V1: Parked / V2: Travelling straight ahead	V1: W / V2: W	Clear/Clear		LAKE ST / MASSACHUSETTS AVENUE	
08/07/2015	Non-fatal injury	4:56 PM	2	D1: (No improper driving) / D2: (Failure to keep in proper lane or running off road),(Illness)	Daylight	Sideswipe, opposite direction	Dry	V1: Slowing or stopped in traffic / V2: Travelling straight ahead	V1: W / V2: E	Clear		LAKE ST / MASSACHUSETTS AVENUE	
11/19/2015	Not Reported	3:35 PM	2	D1: (No improper driving),(No improper driving) / D2: (No improper driving),(No improper driving)	Daylight	Angle	Dry	V1: Slowing or stopped in traffic / V2: Backing	V1: W / V2: W	Cloudy/Cloudy		LAKE ST / MASSACHUSETTS AVENUE Rte 185 W	
12/10/2015	Not Reported	6:27 AM	2	D1: (Unknown) / D2: (Unknown)	Dark - lighted roadway	Sideswipe, same direction	Dry	V1: Turning right / V2: Turning right	V1: E / V2: E	Clear		LAKE STREET / MASSACHUSETTS AVENUE	
01/17/2016	Property damage only (none injured)	2:51 PM	2	D1: (Inattention),(Other improper action) / D2: (No improper driving)	Daylight	Rear-end	Dry	V1: Travelling straight ahead / V2: Slowing or stopped in traffic	V1: N / V2: N	Cloudy	2	LAKE ST.	MASSACHUSETTS AVENUE Rte 3A 2
09/13/2016	Property damage only (none injured)	12:09 PM	1		Daylight	Single vehicle crash	Dry	V1: Travelling straight ahead	V1: S	Clear		LAKE ST / MASSACHUSETTS AVENUE	
06/03/2017	Property damage only (none injured)	1:12 PM	1	D1: (No improper driving)	Daylight	Sideswipe, same direction	Dry	V1: Travelling straight ahead	V1: W	Cloudy		MASSACHUSETTS AVENUE Rte 2A W	LAKE STREET
07/08/2017	Property damage only (none injured)	12:11 PM	2		Daylight	Sideswipe, same direction	Dry	V1: Travelling straight ahead / V2: Backing	V1: E / V2: E	Clear/Clear	204	MASSACHUSETTS AVENUE	
10/26/2017	Property damage only (none injured)	9:42 AM	2		Daylight	Sideswipe, same direction	Wet	V1: Travelling straight ahead / V2: Parked	V1: E / V2: E	Cloudy/Rain	204	MASSACHUSETTS AVENUE	
11/27/2017	Property damage only (none injured)	12:07 PM	2	D1: (No improper driving) / D2: (Made an improper turn),(Failure to keep in proper lane or running off road)	Daylight	Sideswipe, same direction	Dry	V1: Turning right / V2: Leaving traffic lane	V1: S / V2: E	Clear		LAKE STREET / MASSACHUSETTS AVENUE	
06/03/2017	Property damage only (none injured)	1:12 PM	2	D1: (No improper driving)	Daylight	Sideswipe, same direction	Dry	V1: Travelling straight ahead / V2: Travelling straight ahead	V1: W / V2: E	Cloudy		MASSACHUSETTS AVENUE Rte 3 W / LAKE STREET	

MassDOT Crash Report for Route 2 at Route 16 in Arlington MA 2013-2017

Crash Date	Crash Severity	Crash Time	Number of Vehicles	Driver Contributing Circumstances (All Drivers)	Light Conditions	Manner of Collision	Road Surface Condition	Vehicle Actions Prior to Crash (All Vehicles)	Vehicle Travel Directions (All Vehicles)	Weather Conditions	Street Number	Roadway	Near Intersection Roadway
01/23/2013	Property damage only (none injured)	1:20 PM	2	D1: (Disregarded traffic signs, signals, road markings) / D2: (No improper driving)	Daylight	Angle	Dry	V1: Travelling straight ahead / V2: Travelling straight ahead	V1: N / V2: W	Cloudy		CONCORD TURNPIKE Rte 2 W	ALEWIFE BROOK PARKWAY Rte 3A S
08/03/2013	Property damage only (none injured)	5:30 PM	2	D1: (No improper driving) / D2: (Followed too closely)	Daylight	Rear-end	Dry	V1: Travelling straight ahead / V2: Travelling straight ahead	V1: E / V2: E	Clear		CONCORD TURNPIKE Rte 2 E	CONCORD TURNPIKE Rte 2 E
09/21/2013	Non-fatal injury	11:57 AM	2	D1: (No improper driving) / D2: (Inattention)	Daylight	Rear-end	Dry	V1: Slowing or stopped in traffic / V2: Travelling straight ahead	V1: E / V2: E	Clear		CONCORD TURNPIKE Rte 2 E	CONCORD TURNPIKE Rte 2 E
03/24/2014	Property damage only (none injured)	1:37 PM	2	D1: (Disregarded traffic signs, signals, road markings) / D2: (No improper driving)	Daylight	Rear-end	Dry	V1: Travelling straight ahead / V2: Slowing or stopped in traffic	V1: W / V2: W	Cloudy		ALEWIFE BROOK PARKWAY Rte 2 E	CONCORD TURNPIKE Rte 2 W
08/09/2014	Property damage only (none injured)	7:31 AM	2	D1: (Disregarded traffic signs, signals, road markings) / D2: (No improper driving)	Daylight	Angle	Dry	V1: Travelling straight ahead / V2: Travelling straight ahead	V1: N / V2: W	Clear		ALEWIFE STATION ACCESS ROAD / ALEWIFE BROOK PARKWAY Rte US3 N	
10/06/2014	Non-fatal injury	2:51 PM	2	D1: (No improper driving) / D2: (Disregarded traffic signs, signals, road markings)	Daylight	Angle	Dry	V1: Travelling straight ahead / V2: Travelling straight ahead	V1: W / V2: S	Clear		CONCORD TURNPIKE Rte SR2 W / CONCORD TURNPIKE Rte SR2 W / ALEWIFE BROOK PARKWAY	
10/15/2014	Property damage only (none injured)	11:20 PM	2	D1: (No improper driving) / D2: (Followed too closely)	Dark - lighted roadway	Rear-end	Wet	V1: Slowing or stopped in traffic / V2: Travelling straight ahead	V1: W / V2: W	Rain		ALEWIFE BROOK PARKWAY	CONCORD TURNPIKE Rte 2 W
10/23/2014	Non-fatal injury	6:55 PM	3	D1: (Followed too closely) / D2: (No improper driving) / D3: (No improper driving)	Dark - roadway not lighted	Rear-end	Dry	V1: Travelling straight ahead / V2: Slowing or stopped in traffic / V3: Slowing or stopped in traffic	V1: E / V2: E / V3: E	Clear		CONCORD TURNPIKE Rte 2 E	ALEWIFE BROOK PARKWAY Rte 3A S
03/19/2015	Non-fatal injury	8:44 AM	2	D1: (Followed too closely) / D2: (No improper driving)	Daylight	Angle	Dry	V1: Travelling straight ahead / V2: Travelling straight ahead	V1: S / V2: N	Clear		ALEWIFE BROOK PARKWAY Rte UNKNOW	CONCORD TURNPIKE
04/08/2015	Property damage only (none injured)	7:34 PM	2	D1: (No improper driving) / D2: (Inattention)	Dark - lighted roadway	Rear-end	Dry	V1: Slowing or stopped in traffic / V2: Travelling straight ahead	V1: W / V2: W	Clear		CONCORD TURNPIKE Rte 2 W	ALEWIFE BROOK PARKWAY Rte 3
07/22/2015	Property damage only (none injured)	1:00 AM	2	D1: (No improper driving) / D2: (Followed too closely)	Dark - lighted roadway	Rear-end	Dry	V1: Slowing or stopped in traffic / V2: Travelling straight ahead	V1: W / V2: W	Clear		Rte 2 E	ALEWIFE BROOK PARKWAY
09/09/2015	Property damage only (none injured)	3:35 PM	2	D1: (No improper driving) / D2: (Failed to yield right of way)	Daylight	Sideswipe, same direction	Dry	V1: Travelling straight ahead / V2: Turning left	V1: S / V2: S	Clear		ALEWIFE BROOK PARKWAY / CONCORD TURNPIKE	
09/26/2015	Property damage only (none injured)	10:55 AM	2	D1: (Followed too closely) / D2: (No improper driving)	Daylight	Rear-end	Dry	V1: Travelling straight ahead / V2: Travelling straight ahead	V1: E / V2: E	Clear		CONCORD TURNPIKE Rte 2 E	
10/08/2015	Non-fatal injury	10:23 AM	2		Daylight	Angle	Dry	V1: Travelling straight ahead / V2: Travelling straight ahead	V1: N / V2: W	Clear		ALEWIFE BROOK PARKWAY Rte UNKNOW	ALEWIFE LOOP DRIVEWAY
10/29/2015	Property damage only (none injured)	3:40 PM	2	D1: (Followed too closely) / D2: (No improper driving)	Daylight	Rear-end	Dry	V1: Slowing or stopped in traffic / V2: Travelling straight ahead	V1: S / V2: S	Clear		CONCORD TURNPIKE Rte SR2 E / ALEWIFE BROOK PARKWAY Rte SR3A / ALEWIFE STATION ACCESS ROAD	
01/11/2016	Non-fatal injury	12:06 PM	3	D1: (Other improper action) / D2: (No improper driving) / D3: (No improper driving)	Daylight	Rear-end	Dry	V1: Travelling straight ahead / V2: Slowing or stopped in traffic / V3: Slowing or stopped in traffic	V1: E / V2: E / V3: E	Clear		CONCORD TURNPIKE Rte 2 E	ALEWIFE BROOK PARKWAY Rte 3
01/11/2016	Property damage only (none injured)	8:12 AM	3	D1: (Inattention) / D2: (No improper driving)	Daylight	Rear-end	Dry	V1: Travelling straight ahead / V2: Slowing or stopped in traffic / V3: Slowing or stopped in traffic	V1: E / V2: E / V3: E	Clear		ALEWIFE BROOK PARKWAY Rte US3 S / CONCORD TURNPIKE Rte SR2 E	
01/13/2016	Property damage only (none injured)	9:42 PM	2	D2: (Physical impairment)	Dark - lighted roadway	Rear-end	Dry	V1: Slowing or stopped in traffic / V2: Travelling straight ahead	V1: Not Reported / V2: N	Clear		ALEWIFE BROOK PARKWAY	
01/26/2016	Property damage only (none injured)	7:52 AM	2	D1: (No improper driving) / D2: (Other improper action)	Daylight	Sideswipe, same direction	Dry	V1: Travelling straight ahead / V2: Changing lanes	V1: E / V2: E	Clear		ALEWIFE BROOK PARKWAY	CONCORD TURNPIKE
04/01/2016	Property damage only (none injured)	6:43 PM	2	D1: (Disregarded traffic signs, signals, road markings) / D2: (No improper driving)	Dusk	Angle	Dry	V1: Turning right / V2: Travelling straight ahead	V1: N / V2: W	Clear		ALEWIFE BROOK PARKWAY / CONCORD TURNPIKE /	
05/03/2016	Property damage only (none injured)	1:38 AM	1	D1: (Made an improper turn)	Dark - lighted roadway	Single vehicle crash	Dry	V1: Not reported	V1: N	Clear		Rte 2 W	ALEWIFE BROOK PARKWAY
06/15/2016	Property damage only (none injured)	7:18 PM	2	D1: (No improper driving) / D2:	Daylight	Angle	Dry	V1: Travelling straight ahead / V2: Travelling straight ahead	V1: W / V2: S	Clear		ALEWIFE STATION ACCESS ROAD / ALEWIFE BROOK PARKWAY Rte US3 N	
07/29/2016	Non-fatal injury	1:42 PM	2	D1: (No improper driving) / D2: (Inattention)	Daylight	Rear-end	Dry	V1: Slowing or stopped in traffic / V2: Travelling straight ahead	V1: S / V2: S	Clear		ALEWIFE BROOK PARKWAY Rte UNKNOW	WHITTEMORE AVENUE
09/01/2016	Non-fatal injury	7:44 AM	2	D1: (Disregarded traffic signs, signals, road markings) / D2: (No improper driving)	Daylight	Angle	Dry	V1: Travelling straight ahead / V2: Travelling straight ahead	V1: N / V2: W	Clear		ALEWIFE BROOK PARKWAY / ALEWIFE LOOP DRIVEWAY	
10/11/2016	Property damage only (none injured)	11:06 AM	2		Daylight	Sideswipe, same direction	Dry	V1: Travelling straight ahead / V2: Travelling straight ahead	V1: N / V2: N	Clear		ALEWIFE BROOK PARKWAY / CONCORD TURNPIKE	

MassDOT Crash Report for Route 2 at Route 16 in Arlington MA 2013-2017

Crash Date	Crash Severity	Crash Time	Number of Vehicles	Driver Contributing Circumstances (All Drivers)	Light Conditions	Manner of Collision	Road Surface Condition	Vehicle Actions Prior to Crash (All Vehicles)	Vehicle Travel Directions (All Vehicles)	Weather Conditions	Street Number	Roadway	Near Intersection Roadway
10/17/2016	Property damage only (none injured)	8:01 AM	2	D1: (No improper driving) / D2: (Followed too closely)	Daylight	Rear-end	Dry	V1: Slowing or stopped in traffic / V2: Travelling straight ahead	V1: W / V2: W	Cloudy		CONCORD TURNPIKE Rte 2 W	ALEWIFE BROOK PARKWAY
11/02/2016	Property damage only (none injured)	1:35 PM	2	D1: (Inattention) / D2: (No improper driving)	Daylight	Rear-end	Dry	V1: Travelling straight ahead / V2: Slowing or stopped in traffic	V1: N / V2: N	Clear		ALEWIFE BROOK PARKWAY	ALEWIFE STATION ACCESS ROAD
11/29/2016	Property damage only (none injured)	4:25 PM	2	D1: (Failed to yield right of way) / D2: (No improper driving)	Dark - lighted roadway	Angle	Wet	V1: Entering traffic lane / V2: Travelling straight ahead	V1: W / V2: N	Cloudy/Rain		ALEWIFE BROOK PARKWAY Rte UNKNOW	WHITTEMORE AVENUE
12/09/2016	Non-fatal injury	8:07 AM	2	D1: (No improper driving) / D2: (Inattention)	Daylight	Sideswipe, same direction	Dry	V1: Travelling straight ahead / V2: Travelling straight ahead	V1: E / V2: E	Clear		ALEWIFE BROOK PARKWAY Rte 2 E	CONCORD TURNPIKE
12/17/2016	Property damage only (none injured)	1:10 PM	2	D1: (No improper driving) / D2: (Disregarded traffic signs, signals, road markings)	Daylight	Angle	Wet	V1: Travelling straight ahead / V2: Travelling straight ahead	V1: W / V2: N	Cloudy		ALEWIFE BROOK PARKWAY / ALEWIFE LOOP DRIVEWAY /	
01/15/2017	Property damage only (none injured)	8:42 AM	2	D1: (No improper driving)	Daylight	Rear-end	Dry	V1: Slowing or stopped in traffic / V2: Travelling straight ahead	V1: W / V2: W	Clear		ALEWIFE BROOK PARKWAY / CONCORD TURNPIKE	
03/11/2017	Property damage only (none injured)	1:36 AM	1	D1: (Over-correcting/over-steering)	Dark - lighted roadway	Single vehicle crash	Snow	V1: Slowing or stopped in traffic	V1: E	Snow		CONCORD TURNPIKE / ALEWIFE BROOK PARKWAY	
08/11/2017	Non-fatal injury	3:52 PM	3	D1: (Followed too closely) / D2: (No improper driving) / D3: (No improper driving)	Daylight	Rear-end	Dry	V1: Travelling straight ahead / V2: Slowing or stopped in traffic / V3: Slowing or stopped in traffic	V1: E / V2: E / V3: E	Clear		ALEWIFE BROOK PARKWAY Rte 3 S	CONCORD TURNPIKE Rte 2 W
09/06/2017	Property damage only (none injured)	6:10 PM	3	D1: (No improper driving) / D2: (No improper driving) / D3: (No improper driving)	Daylight	Rear-end	Dry	V1: Slowing or stopped in traffic / V2: Slowing or stopped in traffic / V3: Travelling straight ahead	V1: E / V2: E / V3: E	Clear		CONCORD TURNPIKE Rte 2 E	CONCORD TURNPIKE
10/30/2017	Property damage only (none injured)	4:13 PM	2	D1: (No improper driving) / D2: (Inattention)	Daylight	Rear-end	Dry	V1: Slowing or stopped in traffic / V2: Travelling straight ahead	V1: E / V2: E	Clear		CONCORD TURNPIKE Rte 2 E	ALEWIFE BROOK PARKWAY Rte 3A S
09/27/2017	Property damage only (none injured)	10:28 AM	3	D1: (Followed too closely) / D2: (No improper driving) / D3: (No improper driving)	Daylight	Rear-end	Dry	V1: Travelling straight ahead / V2: Slowing or stopped in traffic / V3: Slowing or stopped in traffic	V1: N / V2: N / V3: N	Clear		ALEWIFE BROOK PARKWAY Rte SR3A S / ALEWIFE BROOK PARKWAY Rte SR16 E / WHITTEMORE AVENUE	
03/11/2016	Property damage only (none injured)	2:16 AM	2	D1: (Physical impairment) / D2: (No improper driving)	Dark - lighted roadway	Sideswipe, same direction	Wet	V1: Travelling straight ahead / V2: Slowing or stopped in traffic	V1: E / V2: E	Not Reported		ALEWIFE BROOK PARKWAY / CONCORD TURNPIKE	
12/18/2015	Property damage only (none injured)	8:46 PM	2	D1: (No improper driving) / D2: (Operating vehicle in erratic, reckless, careless, negligent or aggressive manner)	Dark - lighted roadway	Rear-end	Dry	V1: Slowing or stopped in traffic / V2: Travelling straight ahead	V1: N / V2: S	Clear		ALEWIFE BROOK PARKWAY	CONCORD TURNPIKE
10/29/2015	Property damage only (none injured)	8:30 PM	2	D1: (No improper driving) / D2: (Followed too closely)	Dark - lighted roadway	Rear-end	Dry	V1: Slowing or stopped in traffic / V2: Travelling straight ahead	V1: W / V2: W	Clear		ALEWIFE BROOK PARKWAY Rte UNKNOW W	CONCORD TURNPIKE
11/02/2015	Non-fatal injury	3:33 PM	1	D1: (No improper driving)	Daylight	Rear-end	Dry	V1: Slowing or stopped in traffic	V1: E	Clear		CONCORD TURNPIKE Rte SR2 E / ALEWIFE BROOK PARKWAY Rte SR3A	
09/01/2015	Property damage only (none injured)	10:50 PM	2	D1: (Inattention)	Dark - lighted roadway	Rear-end	Dry	V1: Travelling straight ahead / V2: Not reported	V1: E / V2: Not Reported	Clear		Rte 16	CONCORD TURNPIKE
07/14/2015	Property damage only (none injured)	5:24 PM	2	D1: (No improper driving) / D2: (Other improper action)	Daylight	Rear-end	Dry	V1: Slowing or stopped in traffic / V2: Travelling straight ahead	V1: E / V2: E	Clear		CONCORD TURNPIKE Rte 2 E	RAMP-RT 2 EB TO ALEWIFE STA/ACORN PARK D
07/18/2015	Non-fatal injury	12:24 PM	3	D1: (No improper driving) / D2: (No improper driving) / D3: (Other improper action)	Daylight	Rear-end	Wet	V1: Slowing or stopped in traffic / V2: Slowing or stopped in traffic / V3: Travelling straight ahead	V1: E / V2: E / V3: E	Cloudy		CONCORD TURNPIKE Rte 2 E	ALEWIFE BROOK PARKWAY
07/05/2015	Non-fatal injury	4:56 PM	2	D1: (No improper driving) / D2: (Followed too closely)	Daylight	Rear-end	Dry	V1: Slowing or stopped in traffic / V2: Travelling straight ahead	V1: E / V2: E	Clear		CONCORD TURNPIKE Rte SR2 E / ALEWIFE BROOK PARKWAY Rte SR3 / ALEWIFE STATION ACCESS ROAD	
06/15/2015	Property damage only (none injured)	11:18 AM	3	D1: (Operating defective equipment) / D2: (No improper driving) / D3: (Other improper action)	Daylight	Rear-end	Dry	V1: Slowing or stopped in traffic / V2: Slowing or stopped in traffic / V3: Travelling straight ahead	V1: E / V2: E / V3: E	Clear		ALEWIFE BROOK PARKWAY Rte SR3A S / CONCORD TURNPIKE Rte SR2 E	
06/09/2015	Property damage only (none injured)	6:15 PM	2	D1: (No improper driving) / D2: (Other improper action)	Daylight	Rear-end	Dry	V1: Slowing or stopped in traffic / V2: Travelling straight ahead	V1: E / V2: E	Clear		CONCORD TURNPIKE / CONCORD TURNPIKE Rte SR2 E / ALEWIFE BROOK PARKWAY	
05/20/2015	Property damage only (none injured)	10:50 AM	2	D1: (No improper driving) / D2: (Inattention)	Daylight	Rear-end	Dry	V1: Slowing or stopped in traffic / V2: Travelling straight ahead	V1: W / V2: W	Clear		CONCORD TURNPIKE Rte SR2 W / ALEWIFE BROOK PARKWAY	
04/15/2015	Non-fatal injury	3:27 PM	5	D1: (No improper driving) / D2: (No improper driving) / D3: (No improper driving) / D4: (No improper driving) / D5: (Other improper action)	Daylight	Rear-end	Dry	V1: Slowing or stopped in traffic / V2: Slowing or stopped in traffic / V3: Slowing or stopped in traffic / V4: Slowing or stopped in traffic / V5: Changing lanes	V1: E / V2: E / V3: E / V4: E / V5: E	Clear		CONCORD TURNPIKE Rte 2 E	ALEWIFE BROOK PARKWAY
04/07/2015	Property damage only (none injured)	1:50 PM	2	D1: (No improper driving) / D2: (Disregarded traffic signs, signals, road markings)	Daylight	Angle	Dry	V1: Travelling straight ahead / V2: Travelling straight ahead	V1: N / V2: W	Not Reported		ALEWIFE BROOK PARKWAY Rte US3 N / ALEWIFE STATION ACCESS ROAD	
03/17/2015	Property damage only (none injured)	4:45 PM	2	D1: (No improper driving) / D2: (Disregarded traffic signs, signals, road markings)	Daylight	Angle	Dry	V1: Travelling straight ahead / V2: Travelling straight ahead	V1: W / V2: N	Clear		ALEWIFE STATION ACCESS ROAD / ALEWIFE BROOK PARKWAY Rte US3 N	

MassDOT Crash Report for Route 2 at Route 16 in Arlington MA 2013-2017

Crash Date	Crash Severity	Crash Time	Number of Vehicles	Driver Contributing Circumstances (All Drivers)	Light Conditions	Manner of Collision	Road Surface Condition	Vehicle Actions Prior to Crash (All Vehicles)	Vehicle Travel Directions (All Vehicles)	Weather Conditions	Street Number	Roadway	Near Intersection Roadway
02/05/2015	Property damage only (none injured)	9:20 AM	1	D1: (Failure to keep in proper lane or running off road)	Daylight	Single vehicle crash	Wet	V1: Travelling straight ahead	V1: N	Snow		ALEWIFE BROOK PARKWAY Rte UNKNOW	ALEWIFE LOOP DRIVEWAY
01/28/2015	Property damage only (none injured)	4:20 PM	2	D1: (Inattention) / D2: (No improper driving)	Daylight	Rear-end	Snow	V1: Travelling straight ahead / V2: Slowing or stopped in traffic	V1: N / V2: N	Cloudy		ALEWIFE BROOK PARKWAY Rte 16 E	
01/09/2015	Property damage only (none injured)	12:17 PM	2	D1: (No improper driving) / D2: (Disregarded traffic signs, signals, road markings)	Daylight	Angle	Wet	V1: Travelling straight ahead / V2: Travelling straight ahead	V1: W / V2: N	Clear		ALEWIFE BROOK PARKWAY Rte UNKNOW	ALEWIFE LOOP DRIVEWAY
10/08/2014	Property damage only (none injured)	6:22 PM	2		Dusk	Sideswipe, same direction	Dry	V1: Travelling straight ahead / V2: Travelling straight ahead	V1: W / V2: W	Clear		ALEWIFE BROOK PARKWAY Rte SR16 E / ALEWIFE BROOK PARKWAY Rte SR2 E / CONCORD TURNPIKE Rte SR2 W	
09/10/2014	Property damage only (none injured)	10:24 AM	2	D1: (No improper driving) / D2: (Made an improper turn)	Daylight	Angle	Dry	V1: Travelling straight ahead / V2: Turning left	V1: W / V2: S	Clear		CONCORD TURNPIKE Rte 2 W	ALEWIFE BROOK PARKWAY
09/08/2014	Property damage only (none injured)	3:58 PM	2	D1: (Followed too closely) / D2: (No improper driving)	Daylight	Rear-end	Dry	V1: Slowing or stopped in traffic / V2: Slowing or stopped in traffic	V1: W / V2: W	Clear		CONCORD TURNPIKE Rte 2 W	ALEWIFE BROOK PARKWAY
07/22/2014	Property damage only (none injured)	11:02 AM	2	D1: (Followed too closely) / D2: (No improper driving)	Daylight	Rear-end	Dry	V1: Travelling straight ahead / V2: Slowing or stopped in traffic	V1: W / V2: W	Not Reported		ALEWIFE BROOK PARKWAY Rte UNKNOW	CONCORD TURNPIKE
07/10/2014	Non-fatal injury	11:24 PM	2	D1: (Disregarded traffic signs, signals, road markings) / D2: (No improper driving)	Dark - lighted roadway	Angle	Dry	V1: Travelling straight ahead / V2: Travelling straight ahead	V1: W / V2: N	Clear		ALEWIFE STATION ACCESS ROAD / ALEWIFE BROOK PARKWAY Rte US3 N	
06/18/2014	Property damage only (none injured)	12:45 AM	2	D1: (Disregarded traffic signs, signals, road markings) / D2: (No improper driving)	Dark - lighted roadway	Angle	Dry	V1: Travelling straight ahead / V2: Travelling straight ahead	V1: W / V2: N	Clear		ALEWIFE BROOK PARKWAY Rte US3 S / CONCORD TURNPIKE Rte SR2 W / ALEWIFE STATION ACCESS ROAD	
06/14/2014	Property damage only (none injured)	3:06 AM	1	D1: (Fatigued/asleep)	Dark - lighted roadway	Single vehicle crash	Wet	V1: Travelling straight ahead	V1: E	Rain		CONCORD TURNPIKE Rte 2 E	ALEWIFE BROOK PARKWAY Rte 3A S
05/05/2014	Property damage only (none injured)	8:55 AM	2	D1: (No improper driving) / D2: (Failure to keep in proper lane or running off road)	Daylight	Sideswipe, same direction	Dry	V1: Travelling straight ahead / V2: Overtaking/passing	V1: E / V2: E	Cloudy		CONCORD TURNPIKE Rte 2 E	CONCORD TURNPIKE
05/22/2014	Non-fatal injury	10:51 AM	3	D1: (Failed to yield right of way) / D2: (No improper driving) / D3: (No improper driving)	Daylight	Angle	Dry	V1: Turning left / V2: Travelling straight ahead / V3: Travelling straight ahead	V1: W / V2: N / V3: S	Cloudy		ALEWIFE BROOK PARKWAY Rte UNKNOW N	WHITTEMORE AVENUE
05/07/2014	Property damage only (none injured)	11:43 AM	2	D1: (No improper driving) / D2: (Failure to keep in proper lane or running off road)	Daylight	Sideswipe, same direction	Dry	V1: Travelling straight ahead / V2: Travelling straight ahead	V1: E / V2: E	Clear		CONCORD TURNPIKE Rte 2 E	
05/03/2014	Property damage only (none injured)	10:41 PM	2	D1: (No improper driving) / D2: (Failure to keep in proper lane or running off road)	Dark - lighted roadway	Sideswipe, same direction	Dry	V1: Travelling straight ahead / V2: Travelling straight ahead	V1: E / V2: E	Clear		CONCORD TURNPIKE	CONCORD TURNPIKE Rte 2 E
04/23/2014	Property damage only (none injured)	9:35 AM	2	D1: (Followed too closely) / D2: (No improper driving)	Daylight	Rear-end	Wet	V1: Travelling straight ahead / V2: Slowing or stopped in traffic	V1: W / V2: W	Rain		ALEWIFE BROOK PARKWAY	CONCORD TURNPIKE Rte 2 W
03/29/2014	Not Reported	2:46 AM	1		Dark - lighted roadway	Single vehicle crash	Dry	V1: Travelling straight ahead	V1: W	Clear		CONCORD TURNPIKE Rte 2 W	ALEWIFE BROOK PARKWAY
01/20/2014	Property damage only (none injured)	6:40 PM	2	D1: (Followed too closely) / D2: (No improper driving)	Dark - roadway not lighted	Rear-end	Dry	V1: Travelling straight ahead / V2: Slowing or stopped in traffic	V1: E / V2: E	Clear		ALEWIFE BROOK PARKWAY Rte UNKNOW	CONCORD TURNPIKE
01/21/2014	Property damage only (none injured)	3:15 PM	2	D1: (No improper driving) / D2: (Followed too closely)	Daylight	Rear-end	Dry	V1: Slowing or stopped in traffic / V2: Travelling straight ahead	V1: W / V2: W	Clear		CONCORD TURNPIKE Rte SR2 W / ALEWIFE BROOK PARKWAY	
01/16/2014	Property damage only (none injured)	11:33 AM	2	D1: (Disregarded traffic signs, signals, road markings) / D2: (No improper driving)	Daylight	Angle	Dry	V1: Travelling straight ahead / V2: Travelling straight ahead	V1: N / V2: W	Cloudy		ALEWIFE BROOK PARKWAY Rte 3 N	ALEWIFE STATION ACCESS ROAD
01/09/2014	Property damage only (none injured)	9:09 PM	3	D1: (Failure to keep in proper lane or running off road) / D2: (No improper driving) / D3: (No improper driving)	Dark - lighted roadway	Sideswipe, same direction	Dry	V1: Changing lanes / V2: Travelling straight ahead / V3: Travelling straight ahead	V1: N / V2: N / V3: N	Clear		ALEWIFE BROOK PARKWAY / CONCORD TURNPIKE /	
11/09/2013	Property damage only (none injured)	9:27 AM	2	D1: (No improper driving) / D2: (Followed too closely)	Daylight	Rear-end	Dry	V1: Slowing or stopped in traffic / V2: Slowing or stopped in traffic	V1: S / V2: S	Clear		ALEWIFE BROOK PARKWAY	CONCORD TURNPIKE
09/30/2013	Property damage only (none injured)	7:23 PM	2	D1: (No improper driving) / D2: (Inattention)	Dark - lighted roadway	Rear-end	Dry	V1: Slowing or stopped in traffic / V2: Travelling straight ahead	V1: E / V2: E	Clear		CONCORD TURNPIKE Rte 2 E	ALEWIFE BROOK PARKWAY Rte 3 S
08/26/2013	Property damage only (none injured)	12:05 AM	2	D1: (Inattention) / D2: (Inattention)	Dark - lighted roadway	Sideswipe, opposite direction	Dry	V1: Travelling straight ahead / V2: Travelling straight ahead	V1: N / V2: W	Clear		ALEWIFE BROOK PARKWAY Rte UNKNOW	CONCORD TURNPIKE
08/07/2013	Property damage only (none injured)	11:20 AM	2	D1: (Inattention) / D2: (No improper driving)	Daylight	Sideswipe, same direction	Dry	V1: Travelling straight ahead / V2: Slowing or stopped in traffic	V1: W / V2: W	Cloudy		ALEWIFE BROOK PARKWAY Rte UNKNOW	CONCORD TURNPIKE
05/16/2013	Property damage only (none injured)	6:15 AM	2	D1: (No improper driving)	Daylight	Rear-end	Dry	V1: Travelling straight ahead / V2: Not reported	V1: E / V2: Not Reported	Clear		ALEWIFE BROOK PARKWAY Rte 3 S / CONCORD TURNPIKE / ALEWIFE STATION ACCESS ROAD	

MassDOT Crash Report for Route 2 at Route 16 in Arlington MA 2013-2017

Crash Date	Crash Severity	Crash Time	Number of Vehicles	Driver Contributing Circumstances (All Drivers)	Light Conditions	Manner of Collision	Road Surface Condition	Vehicle Actions Prior to Crash (All Vehicles)	Vehicle Travel Directions (All Vehicles)	Weather Conditions	Street Number	Roadway	Near Intersection Roadway
06/14/2013	Property damage only (none injured)	7:05 PM	2	D1: (No improper driving) / D2: (Followed too closely)	Daylight	Rear-end	Dry	V1: Slowing or stopped in traffic / V2: Travelling straight ahead	V1: E / V2: E	Clear		CONCORD TURNPIKE Rte 2 E	CONCORD TURNPIKE Rte 2 E
05/14/2013	Non-fatal injury	12:15 AM	2	D1: (Disregarded traffic signs, signals, road markings) / D2: (No improper driving)	Dark - lighted roadway	Angle	Dry	V1: Travelling straight ahead / V2: Travelling straight ahead	V1: E / V2: N	Not Reported		ALEWIFE STATION ACCESS ROAD / CONCORD TURNPIKE / ALEWIFE BROOK PARKWAY Rte 3 S	
05/13/2013	Non-fatal injury	11:00 PM	2	D1: (Disregarded traffic signs, signals, road markings) / D2: (No improper driving)	Dark - lighted roadway	Angle	Dry	V1: Travelling straight ahead / V2: Travelling straight ahead	V1: W / V2: N	Not Reported		ALEWIFE BROOK PARKWAY Rte 3 S / CONCORD TURNPIKE Rte 2 E	
05/25/2013	Non-fatal injury	11:53 AM	2	D1: (No improper driving) / D2: (Driving too fast for conditions)	Daylight	Rear-end	Dry	V1: Slowing or stopped in traffic / V2: Slowing or stopped in traffic	V1: W / V2: W	Clear		ALEWIFE BROOK PARKWAY	
05/13/2013	Property damage only (none injured)	3:01 PM	2	D1: (No improper driving) / D2: (Other improper action)	Daylight	Rear-end	Dry	V1: Slowing or stopped in traffic / V2: Travelling straight ahead	V1: W / V2: W	Clear		CONCORD TURNPIKE Rte 2 W	RAMP-ALEWIFE BROOK PARKWAY SB TO RT 2 WB
05/12/2013	Property damage only (none injured)	8:54 PM	2	D1: (No improper driving) / D2: (No improper driving)	Dark - lighted roadway	Sideswipe, same direction	Dry	V1: Other / V2: Other	V1: N / V2: N	Clear		ALEWIFE BROOK PARKWAY	CONCORD TURNPIKE
03/24/2013	Property damage only (none injured)	3:40 AM	1	D1: (Physical impairment)	Dark - roadway not lighted	Single vehicle crash	Dry	V1: Turning left	V1: W	Clear		ALEWIFE STATION ACCESS ROAD	ALEWIFE BROOK PARKWAY Rte 3 N
03/20/2013	Property damage only (none injured)	5:29 PM	2	D1: (Followed too closely) / D2: (No improper driving)	Daylight	Rear-end	Dry	V1: Travelling straight ahead / V2: Travelling straight ahead	V1: E / V2: E	Not Reported		CONCORD TURNPIKE Rte 2 E	ALEWIFE BROOK PARKWAY
03/20/2013	Property damage only (none injured)	10:06 AM	3	D1: (No improper driving) / D2: (No improper driving) / D3: (Followed too closely)	Daylight	Rear-end	Wet	V1: Slowing or stopped in traffic / V2: Slowing or stopped in traffic / V3: Travelling straight ahead	V1: W / V2: W / V3: W	Clear		CONCORD TURNPIKE Rte 2 W / ALEWIFE BROOK PARKWAY Rte 3 S	
03/14/2013	Property damage only (none injured)	4:52 PM	3	D1: (No improper driving) / D2: (No improper driving) / D3: (Inattention)	Daylight	Rear-end	Dry	V1: Slowing or stopped in traffic / V2: Slowing or stopped in traffic / V3: Slowing or stopped in traffic	V1: S / V2: S / V3: S	Clear		ALEWIFE BROOK PARKWAY Rte UNKNOW	WHITTEMORE AVENUE
01/30/2013	Non-fatal injury	11:50 PM	3	D1: (Physical impairment) / D2: (No improper driving) / D3: (No improper driving)	Dark - lighted roadway	Rear-end	Dry	V1: Travelling straight ahead / V2: Slowing or stopped in traffic / V3: Slowing or stopped in traffic	V1: W / V2: W / V3: W	Clear		ALEWIFE BROOK PARKWAY	
01/19/2013	Property damage only (none injured)	4:45 PM	2	D1: (Other improper action)	Dusk	Rear-end	Dry	V1: Slowing or stopped in traffic / V2: Travelling straight ahead	V1: E / V2: E	Cloudy		CONCORD TURNPIKE Rte 2 E	ALEWIFE BROOK PARKWAY
01/29/2013	Property damage only (none injured)	11:10 PM	2	D1: (Failed to yield right of way) / D2: (No improper driving)	Dark - lighted roadway	Angle	Wet	V1: Entering traffic lane / V2: Travelling straight ahead	V1: W / V2: N	Rain/Fog, smog, smoke		ALEWIFE BROOK PARKWAY Rte 16 W	CONCORD TURNPIKE

GROWTH RATE DATA

Massachusetts Highway Department
4925 Annual Growth Rate 2013-2019

Location ID:	**4925**	**Seasonal Factor Group:**	**U3**
County:	**Middlesex**	**Daily Factor Group:**	
Functional Class	**3 - Other Principal Arterial**	**Axle Factor Group:**	**U3**
Location:	**Waverly Oaks Road**	**Growth Factor Group:**	**U3**
	West of Beaver Road		

Year	**AADT**
2019	7529
2013	8331
A = 2019/2013	0.9037
B = A^(1/6)	0.9800
Average Annual Growth Rate Use	**-2.00**

TRIP GENERATION CALCULATIONS

Institute of Transportation Engineers (ITE)
Trip Generation, 10 **th Edition**
Land Use Code (LUC) 221 - Multifamily Housing (Mid-Rise)

Average Vehicle Trips Ends vs: Dwelling Units
Independent Variable (X): 176

AVERAGE WEEKDAY DAILY

T = 5.45 * (X) - 1.75
T = 5.45 * 176 - (1.75)
T = 957.45
T = 958 vehicle trips
with 50% (479 vpd) entering and 50% (479 vpd) exiting.

WEEKDAY MORNING PEAK HOUR OF ADJACENT STREET TRAFFIC

Ln T = 0.98 * Ln(X) - 0.98
Ln T = 0.98 * Ln 176 - (0.98)
Ln T = 4.09
T = 59.57
T = 60 vehicle trips
with 26% (16 vph) entering and 74% (44 vph) exiting.

WEEKDAY EVENING PEAK HOUR OF ADJACENT STREET TRAFFIC

Ln T = 0.96 * Ln(X) - 0.63
Ln T = 0.96 * Ln 176 - (0.63)
Ln T = 4.33
T = 76.22
T = 76 vehicle trips
with 61% (46 vph) entering and 39% (30 vph) exiting.

JOURNEY TO WORK DATA

Journey to Work: Exiting/Exiting Traffic							
Town/City/County	**Percent**	**Route 2 EB Enter WB Exit**	**Alwife Brook Parkway NB**	**Alwife Brook Parkway SB**	**Mass Ave NB**	**Mass Ave SB**	**Lake Street WB**
Andover town	1.46	0.97				0.49	
Salem city	1.33	0.67				0.67	
Acton town	1.05	1.05					
Arlington town	6.20				5.89	0.31	
Bedford town	1.81	1.81					
Belmont town	2.01						2.01
Billerica town	1.13	1.13					
Burlington town	3.30	3.30					
Cambridge city	6.26			2.09		4.17	
Chelmsford town	1.25	1.25					
Concord town	1.05	1.05					
Everett city	1.25				0.42	0.84	
Framingham town	1.63	1.08					0.54
Lexington town	3.52	3.52					
Malden city	1.18				0.39	0.78	
Medford city	2.56				1.70	0.85	
Newton city	2.65	0.88					1.77
Somerville city	2.48			0.83		1.65	
Stoneham town	1.02				0.51	0.51	
Waltham city	3.41						3.41
Watertown Town city	2.26						2.26
Weston town	1.44	1.44					
Winchester town	1.49	0.99			0.50		
Woburn city	2.43	1.22			1.22		
Brookline town	1.67			0.56		0.56	0.56
Wellesley town	1.95	1.30					0.65
Norwell town	1.16	0.39		0.39		0.39	
Boston city	8.23			2.74	2.74	2.74	
Worcester city	1.13	1.13					
Barnstable County	0.19	0.09				0.09	
Bristol County	0.20	0.10				0.10	
Essex County	6.18	3.09				3.09	
Middlesex County	12.83	12.83					
Norfolk County	5.58	2.79				2.79	
Plymouth County	1.19	0.60				0.60	
Suffolk County	1.60			0.80		0.80	
Worcester County	3.92	3.92					
TOTAL	**100.00**	**46.61**	**0.00**	**7.40**	**13.37**	**21.43**	**11.20**
USE	**100**	**45**	**0**	**10**	**15**	**20**	**10**

CAPACITY ANALYSIS

2020 Baseline Weekday Morning Peak Hour
2020 Baseline Weekday Evening Peak Hour
2027 No-Build Weekday Morning Peak Hour
2027 No-Build Weekday Evening Peak Hour
2027 Build Weekday Morning Peak Hour
2027 Build Weekday Evening Peak Hour

2020 Baseline Weekday Morning Peak Hour

Intersection						
Int Delay, s/veh	0.2					

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	574	3	1	1121	5	1
Future Vol, veh/h	574	3	1	1121	5	1
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	75	75	87	87	75	75
Heavy Vehicles, %	2	0	0	1	0	0
Mvmt Flow	765	4	1	1289	7	1

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	769	0	2058	767
Stage 1	-	-	-	-	767	-
Stage 2	-	-	-	-	1291	-
Critical Hdwy	-	-	4.1	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	854	-	61	405
Stage 1	-	-	-	-	462	-
Stage 2	-	-	-	-	260	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	854	-	61	405
Mov Cap-2 Maneuver	-	-	-	-	61	-
Stage 1	-	-	-	-	462	-
Stage 2	-	-	-	-	259	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	62
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	71	-	-	854	-
HCM Lane V/C Ratio	0.113	-	-	0.001	-
HCM Control Delay (s)	62	-	-	9.2	0
HCM Lane LOS	F	-	-	A	A
HCM 95th %tile Q(veh)	0.4	-	-	0	-

Intersection						
Int Delay, s/veh	1.6					

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	561	14	5	1098	24	6
Future Vol, veh/h	561	14	5	1098	24	6
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	75	75	93	93	75	75
Heavy Vehicles, %	2	0	0	1	0	0
Mvmt Flow	748	19	5	1181	32	8

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	767	0	1949	758
Stage 1	-	-	-	-	758	-
Stage 2	-	-	-	-	1191	-
Critical Hdwy	-	-	4.1	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	856	-	72	410
Stage 1	-	-	-	-	466	-
Stage 2	-	-	-	-	291	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	856	-	71	410
Mov Cap-2 Maneuver	-	-	-	-	71	-
Stage 1	-	-	-	-	466	-
Stage 2	-	-	-	-	286	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	80.4
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	85	-	-	856	-
HCM Lane V/C Ratio	0.471	-	-	0.006	-
HCM Control Delay (s)	80.4	-	-	9.2	0
HCM Lane LOS	F	-	-	A	A
HCM 95th %tile Q(veh)	2	-	-	0	-

Intersection						
Int Delay, s/veh	0.3					

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	562	5	3	1096	7	1
Future Vol, veh/h	562	5	3	1096	7	1
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	75	75	93	93	75	75
Heavy Vehicles, %	2	0	0	1	0	0
Mvmt Flow	749	7	3	1178	9	1

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	756	0	1937	753
Stage 1	-	-	-	-	753	-
Stage 2	-	-	-	-	1184	-
Critical Hdwy	-	-	4.1	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	864	-	73	413
Stage 1	-	-	-	-	469	-
Stage 2	-	-	-	-	293	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	864	-	72	413
Mov Cap-2 Maneuver	-	-	-	-	72	-
Stage 1	-	-	-	-	469	-
Stage 2	-	-	-	-	290	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	56.8
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	80	-	-	864	-
HCM Lane V/C Ratio	0.133	-	-	0.004	-
HCM Control Delay (s)	56.8	-	-	9.2	0
HCM Lane LOS	F	-	-	A	A
HCM 95th %tile Q(veh)	0.4	-	-	0	-

Intersection	
Int Delay, s/veh	1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	545	18	8	1080	5	8	0	14	4	0	11
Future Vol, veh/h	0	545	18	8	1080	5	8	0	14	4	0	11
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	79	79	79	96	96	96	80	80	80	92	92	92
Heavy Vehicles, %	0	1	0	0	0	0	0	0	10	0	0	0
Mvmt Flow	0	690	23	8	1125	5	10	0	18	4	0	12

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1130	0	0	713	0	0	1852	1848	702	1855	1857	1128
Stage 1	-	-	-	-	-	-	702	702	-	1144	1144	-
Stage 2	-	-	-	-	-	-	1150	1146	-	711	713	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.3	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.39	3.5	4	3.3
Pot Cap-1 Maneuver	626	-	-	896	-	-	58	75	425	57	74	251
Stage 1	-	-	-	-	-	-	432	443	-	245	277	-
Stage 2	-	-	-	-	-	-	243	276	-	427	438	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	626	-	-	896	-	-	54	73	425	54	72	251
Mov Cap-2 Maneuver	-	-	-	-	-	-	54	73	-	54	72	-
Stage 1	-	-	-	-	-	-	432	443	-	245	270	-
Stage 2	-	-	-	-	-	-	226	269	-	409	438	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.1	43.3	37.5
HCM LOS			E	E

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	121	626	-	-	896	-	-	127
HCM Lane V/C Ratio	0.227	-	-	-	0.009	-	-	0.128
HCM Control Delay (s)	43.3	0	-	-	9.1	0	-	37.5
HCM Lane LOS	E	A	-	-	A	A	-	E
HCM 95th %tile Q(veh)	0.8	0	-	-	0	-	-	0.4

Intersection	
Int Delay, s/veh	3.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	3	553	7	24	1069	3	9	0	22	3	0	15
Future Vol, veh/h	3	553	7	24	1069	3	9	0	22	3	0	15
Conflicting Peds, #/hr	0	0	0	304	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	84	84	84	97	97	97	75	75	75	75	75	75
Heavy Vehicles, %	0	2	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	4	658	8	25	1102	3	12	0	29	4	0	20

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1105	0	0	970	0	0	2138	2129	966	1839	2132	1104
Stage 1	-	-	-	-	-	-	974	974	-	1154	1154	-
Stage 2	-	-	-	-	-	-	1164	1155	-	685	978	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	639	-	-	719	-	-	36	50	311	59	50	259
Stage 1	-	-	-	-	-	-	305	333	-	242	274	-
Stage 2	-	-	-	-	-	-	239	274	-	441	331	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	639	-	-	537	-	-	22	33	232	46	33	259
Mov Cap-2 Maneuver	-	-	-	-	-	-	22	33	-	46	33	-
Stage 1	-	-	-	-	-	-	225	246	-	240	241	-
Stage 2	-	-	-	-	-	-	194	241	-	381	245	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0.3	139.9	34.4
HCM LOS			F	D

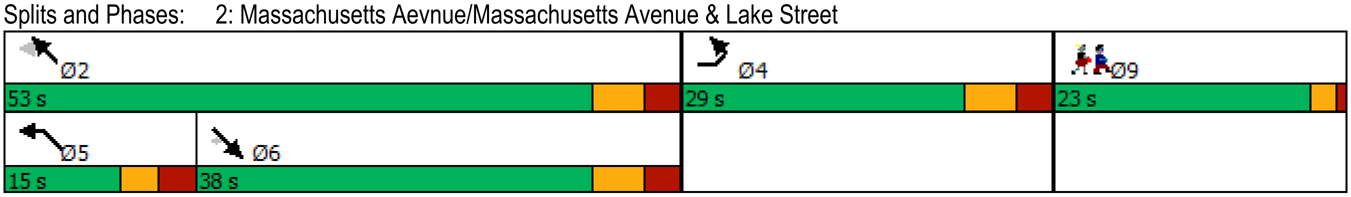
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	62	639	-	-	537	-	-	146
HCM Lane V/C Ratio	0.667	0.006	-	-	0.046	-	-	0.164
HCM Control Delay (s)	139.9	10.7	0	-	12	0	-	34.4
HCM Lane LOS	F	B	A	-	B	A	-	D
HCM 95th %tile Q(veh)	2.9	0	-	-	0.1	-	-	0.6

Lane Group	EBL	EBR	SET	SER	NWL	NWT	Ø9
Lane Configurations							
Traffic Volume (vph)	247	279	822	580	381	438	
Future Volume (vph)	247	279	822	580	381	438	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Lane Width (ft)	16	16	11	10	11	12	
Storage Length (ft)	0	0		55	150		
Storage Lanes	1	0		1	1		
Taper Length (ft)	25				25		
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	1.00	
Frt	0.928			0.850			
Flt Protected	0.977				0.950		
Satd. Flow (prot)	1933	0	3421	1492	1728	1863	
Flt Permitted	0.977				0.147		
Satd. Flow (perm)	1933	0	3421	1492	267	1863	
Right Turn on Red		Yes		Yes			
Satd. Flow (RTOR)	49			209			
Link Speed (mph)	30		30			30	
Link Distance (ft)	1126		640			645	
Travel Time (s)	25.6		14.5			14.7	
Peak Hour Factor	0.91	0.91	0.92	0.92	0.92	0.92	
Heavy Vehicles (%)	1%	1%	2%	1%	1%	2%	
Adj. Flow (vph)	271	307	893	630	414	476	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	578	0	893	630	414	476	
Enter Blocked Intersection	No	No	No	No	No	No	
Lane Alignment	Left	Right	Left	Right	Left	Left	
Median Width(ft)	16		11			11	
Link Offset(ft)	0		0			0	
Crosswalk Width(ft)	16		16			16	
Two way Left Turn Lane							
Headway Factor	0.85	0.85	1.04	1.09	1.04	1.00	
Turning Speed (mph)	15	9		9	15		
Number of Detectors	1		2	1	1	2	
Detector Template	Left		Thru	Right	Left	Thru	
Leading Detector (ft)	20		100	20	20	100	
Trailing Detector (ft)	0		0	0	0	0	
Detector 1 Position(ft)	0		0	0	0	0	
Detector 1 Size(ft)	20		6	20	20	6	
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel							
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	0.0	
Detector 2 Position(ft)			94			94	
Detector 2 Size(ft)			6			6	
Detector 2 Type			Cl+Ex			Cl+Ex	
Detector 2 Channel							
Detector 2 Extend (s)			0.0			0.0	
Turn Type	Prot		NA	Perm	pm+pt	NA	

Lane Group	EBL	EBR	SET	SER	NWL	NWT	Ø9
Protected Phases	4		6		5	2	9
Permitted Phases				6	2		
Detector Phase	4		6	6	5	2	
Switch Phase							
Minimum Initial (s)	4.0		4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	23.0		23.0	23.0	10.0	23.0	19.0
Total Split (s)	29.0		38.0	38.0	15.0	53.0	23.0
Total Split (%)	27.6%		36.2%	36.2%	14.3%	50.5%	22%
Maximum Green (s)	22.0		31.0	31.0	9.0	46.0	20.0
Yellow Time (s)	4.0		4.0	4.0	3.0	4.0	2.0
All-Red Time (s)	3.0		3.0	3.0	3.0	3.0	1.0
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0	
Total Lost Time (s)	7.0		7.0	7.0	6.0	7.0	
Lead/Lag			Lag	Lag	Lead		
Lead-Lag Optimize?			Yes	Yes	Yes		
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0	3.0
Recall Mode	None		Max	Max	None	Max	None
Walk Time (s)							5.0
Flash Dont Walk (s)							11.0
Pedestrian Calls (#/hr)							20
Act Effct Green (s)	22.2		31.3	31.3	47.5	46.5	
Actuated g/C Ratio	0.25		0.35	0.35	0.53	0.52	
v/c Ratio	1.12		0.75	0.96	1.43	0.49	
Control Delay	108.2		31.9	48.1	232.9	17.9	
Queue Delay	0.0		0.0	0.0	0.0	0.0	
Total Delay	108.2		31.9	48.1	232.9	17.9	
LOS	F		C	D	F	B	
Approach Delay	108.2		38.6			117.9	
Approach LOS	F		D			F	

Intersection Summary	
Area Type: Other	
Cycle Length: 105	
Actuated Cycle Length: 89.6	
Natural Cycle: 150	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 1.43	
Intersection Signal Delay: 75.7	Intersection LOS: E
Intersection Capacity Utilization 91.3%	ICU Level of Service F
Analysis Period (min) 15	

Splits and Phases: 2: Massachusetts Aevnue/Massachusetts Avenue & Lake Street



Lane Group	EBL	SET	SER	NWL	NWT
Lane Group Flow (vph)	578	893	630	414	476
v/c Ratio	1.12	0.75	0.96	1.43	0.49
Control Delay	108.2	31.9	48.1	232.9	17.9
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	108.2	31.9	48.1	232.9	17.9
Queue Length 50th (ft)	~306	198	213	~211	133
Queue Length 95th (ft)	#659	#371	#561	#512	317
Internal Link Dist (ft)	1046	560			565
Turn Bay Length (ft)			55	150	
Base Capacity (vph)	516	1196	657	289	966
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	1.12	0.75	0.96	1.43	0.49

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

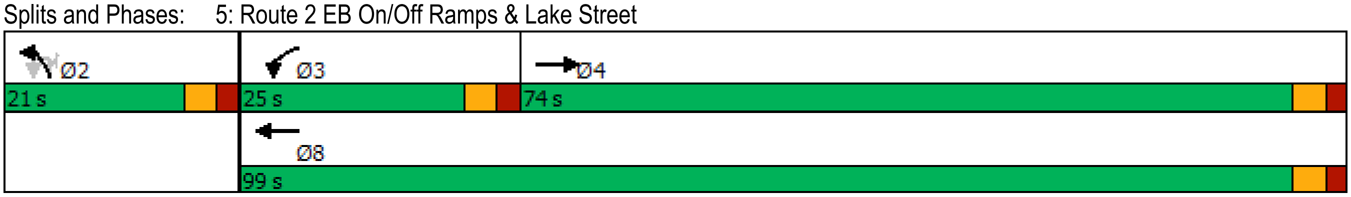
Lane Group	EBT	EBR	WBL	WBT	NBU	NBL	NBR
Lane Configurations							
Traffic Volume (vph)	284	435	166	390	253	208	493
Future Volume (vph)	284	435	166	390	253	208	493
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	16	16	10	11	12	16	14
Storage Length (ft)		150	110			0	0
Storage Lanes		1	1			1	1
Taper Length (ft)			25			25	
Lane Util. Factor	1.00	1.00	1.00	0.95	1.00	1.00	1.00
Frt		0.850					0.850
Flt Protected			0.950			0.950	
Satd. Flow (prot)	2132	1812	1685	3455	0	2036	1706
Flt Permitted			0.950			0.950	
Satd. Flow (perm)	2132	1812	1685	3455	0	2036	1706
Right Turn on Red		Yes					Yes
Satd. Flow (RTOR)		322					407
Link Speed (mph)	30			30		30	
Link Distance (ft)	239			505		387	
Travel Time (s)	5.4			11.5		8.8	
Peak Hour Factor	0.91	0.91	0.84	0.84	0.91	0.91	0.91
Heavy Vehicles (%)	1%	1%	0%	1%	0%	1%	1%
Adj. Flow (vph)	312	478	198	464	278	229	542
Shared Lane Traffic (%)							
Lane Group Flow (vph)	312	478	198	464	0	507	542
Enter Blocked Intersection	No	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	R NA	Left	Right
Median Width(ft)	12			12		16	
Link Offset(ft)	0			0		0	
Crosswalk Width(ft)	16			16		16	
Two way Left Turn Lane							
Headway Factor	0.85	0.85	1.09	1.04	1.00	0.85	0.92
Turning Speed (mph)		9	15		9	15	9
Number of Detectors	2	1	1	2	1	1	1
Detector Template	Thru	Right	Left	Thru	Left	Left	Right
Leading Detector (ft)	100	20	20	100	20	20	20
Trailing Detector (ft)	0	0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0	0	0
Detector 1 Size(ft)	6	20	20	6	20	20	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel							
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)	94			94			
Detector 2 Size(ft)	6			6			
Detector 2 Type	Cl+Ex			Cl+Ex			
Detector 2 Channel							
Detector 2 Extend (s)	0.0			0.0			
Turn Type	NA	Free	Prot	NA	Perm	Prot	Perm

Lane Group	EBT	EBR	WBL	WBT	NBU	NBL	NBR
Protected Phases	4		3	8		2	
Permitted Phases		Free			2		2
Detector Phase	4		3	8	2	2	2
Switch Phase							
Minimum Initial (s)	4.0		4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	21.0		9.0	21.0	21.0	21.0	21.0
Total Split (s)	74.0		25.0	99.0	21.0	21.0	21.0
Total Split (%)	61.7%		20.8%	82.5%	17.5%	17.5%	17.5%
Maximum Green (s)	69.0		20.0	94.0	16.0	16.0	16.0
Yellow Time (s)	3.0		3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0		2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0		0.0	0.0		0.0	0.0
Total Lost Time (s)	5.0		5.0	5.0		5.0	5.0
Lead/Lag	Lag		Lead				
Lead-Lag Optimize?	Yes		Yes				
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0	3.0
Recall Mode	None		None	None	Max	Max	Max
Walk Time (s)	5.0			5.0	5.0	5.0	5.0
Flash Dont Walk (s)	11.0			11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0			0	0	0	0
Act Effct Green (s)	14.3	57.9	12.2	31.6		16.2	16.2
Actuated g/C Ratio	0.25	1.00	0.21	0.55		0.28	0.28
v/c Ratio	0.59	0.26	0.56	0.25		0.89	0.70
Control Delay	24.7	0.4	27.5	7.0		44.0	12.1
Queue Delay	0.0	0.0	0.0	0.0		0.0	0.0
Total Delay	24.7	0.4	27.5	7.0		44.0	12.1
LOS	C	A	C	A		D	B
Approach Delay	10.0			13.1		27.5	
Approach LOS	A			B		C	

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 57.9
Natural Cycle: 60
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.89
Intersection Signal Delay: 18.2 Intersection LOS: B
Intersection Capacity Utilization 62.2% ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 5: Route 2 EB On/Off Ramps & Lake Street



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	312	478	198	464	507	542
v/c Ratio	0.59	0.26	0.56	0.25	0.89	0.70
Control Delay	24.7	0.4	27.5	7.0	44.0	12.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.7	0.4	27.5	7.0	44.0	12.1
Queue Length 50th (ft)	95	0	62	39	167	36
Queue Length 95th (ft)	176	0	116	53	#400	#191
Internal Link Dist (ft)	159			425	307	
Turn Bay Length (ft)		150	110			
Base Capacity (vph)	2132	1812	588	3455	568	769
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	0.15	0.26	0.34	0.13	0.89	0.70

Intersection Summary

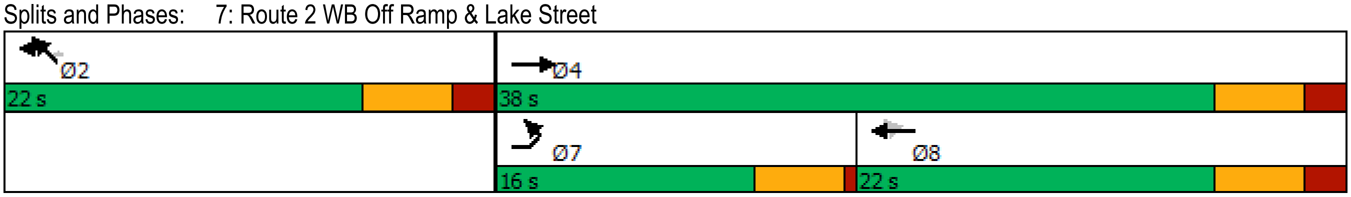
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (vph)	210	567	0	0	435	691	0	0	0	121	6	10
Future Volume (vph)	210	567	0	0	435	691	0	0	0	121	6	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	11	10	12	12	12	11	12	16
Storage Length (ft)	250		0	0		75	0		0	100		0
Storage Lanes	1		0	0		1	0		0	1		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00
Frt						0.850						0.850
Flt Protected	0.950									0.950	0.956	
Satd. Flow (prot)	1805	1881	0	0	1837	1492	0	0	0	1579	1583	1830
Flt Permitted	0.950									0.950	0.956	
Satd. Flow (perm)	1805	1881	0	0	1837	1492	0	0	0	1579	1583	1830
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						520						136
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		505			380			459			529	
Travel Time (s)		11.5			8.6			10.4			12.0	
Peak Hour Factor	0.88	0.88	0.88	0.92	0.92	0.92	0.92	0.92	0.92	0.81	0.81	0.81
Heavy Vehicles (%)	0%	1%	0%	0%	0%	1%	0%	0%	0%	5%	50%	0%
Adj. Flow (vph)	239	644	0	0	473	751	0	0	0	149	7	12
Shared Lane Traffic (%)										48%		
Lane Group Flow (vph)	239	644	0	0	473	751	0	0	0	77	79	12
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			11			11	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.04	1.09	1.00	1.00	1.00	1.04	1.00	0.85
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2			2	1				1	2	1
Detector Template	Left	Thru			Thru	Right				Left	Thru	Right
Leading Detector (ft)	20	100			100	20				20	100	20
Trailing Detector (ft)	0	0			0	0				0	0	0
Detector 1 Position(ft)	0	0			0	0				0	0	0
Detector 1 Size(ft)	20	6			6	20				20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex			Cl+Ex	Cl+Ex				Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0			0.0	0.0				0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0			0.0	0.0				0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0			0.0	0.0				0.0	0.0	0.0
Detector 2 Position(ft)		94			94						94	
Detector 2 Size(ft)		6			6						6	
Detector 2 Type		Cl+Ex			Cl+Ex						Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0						0.0	
Turn Type	Prot	NA			NA	Perm				Split	NA	Perm

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Protected Phases	7	4			8					2	2	
Permitted Phases						8						2
Detector Phase	7	4			8	8				2	2	2
Switch Phase												
Minimum Initial (s)	4.0	4.0			4.0	4.0				4.0	4.0	4.0
Minimum Split (s)	8.5	22.0			22.0	22.0				22.0	22.0	22.0
Total Split (s)	16.0	38.0			22.0	22.0				22.0	22.0	22.0
Total Split (%)	26.7%	63.3%			36.7%	36.7%				36.7%	36.7%	36.7%
Maximum Green (s)	11.5	32.0			16.0	16.0				16.0	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)	0.5	2.0			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)	4.5	6.0			6.0	6.0				6.0	6.0	6.0
Lead/Lag	Lead				Lag	Lag						
Lead-Lag Optimize?	Yes				Yes	Yes						
Vehicle Extension (s)	3.0	3.0			3.0	3.0				3.0	3.0	3.0
Recall Mode	None	None			None	None				Max	Max	Max
Walk Time (s)		5.0			5.0	5.0				5.0	5.0	5.0
Flash Dont Walk (s)		11.0			11.0	11.0				11.0	11.0	11.0
Pedestrian Calls (#/hr)		0			0	0				0	0	0
Act Effct Green (s)	10.8	31.4			16.0	16.0				16.0	16.0	16.0
Actuated g/C Ratio	0.18	0.53			0.27	0.27				0.27	0.27	0.27
v/c Ratio	0.73	0.65			0.96	0.96				0.18	0.19	0.02
Control Delay	37.8	13.8			56.5	34.1				18.4	18.4	0.1
Queue Delay	0.0	0.0			0.0	0.0				0.0	0.0	0.0
Total Delay	37.8	13.8			56.5	34.1				18.4	18.4	0.1
LOS	D	B			E	C				B	B	A
Approach Delay		20.3			42.7						17.1	
Approach LOS		C			D						B	

Intersection Summary	
Area Type: Other	
Cycle Length: 60	
Actuated Cycle Length: 59.4	
Natural Cycle: 70	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.96	
Intersection Signal Delay: 32.1	Intersection LOS: C
Intersection Capacity Utilization 71.7%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 7: Route 2 WB Off Ramp & Lake Street



Lane Group	EBL	EBT	WBT	WBR	NWL	NWT	NWR
Lane Group Flow (vph)	239	644	473	751	77	79	12
v/c Ratio	0.73	0.65	0.96	0.96	0.18	0.19	0.02
Control Delay	37.8	13.8	56.5	34.1	18.4	18.4	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	37.8	13.8	56.5	34.1	18.4	18.4	0.1
Queue Length 50th (ft)	81	150	168	80	22	23	0
Queue Length 95th (ft)	#164	238	#335	#314	47	48	0
Internal Link Dist (ft)		425	300			449	
Turn Bay Length (ft)	250			75	100		
Base Capacity (vph)	349	1014	495	782	426	427	592
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.68	0.64	0.96	0.96	0.18	0.19	0.02

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

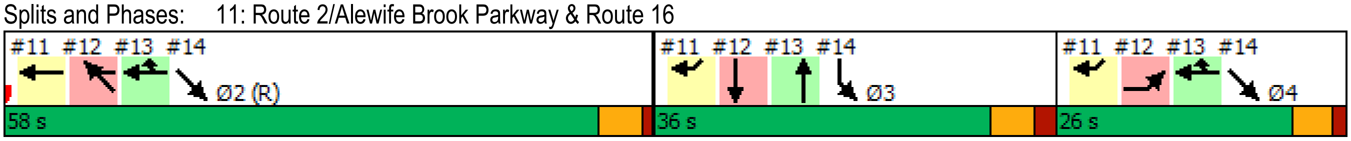
Lane Group	EBL	EBT	WBT	WBR	SWL	SWR	Ø3	Ø4
Lane Configurations								
Traffic Volume (vph)	0	0	1523	0	0	1019		
Future Volume (vph)	0	0	1523	0	0	1019		
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900		
Lane Width (ft)	13	13	13	13	13	13		
Lane Util. Factor	1.00	1.00	0.91	1.00	1.00	0.88		
Frt						0.850		
Flt Protected								
Satd. Flow (prot)	0	0	4729	0	0	2617		
Flt Permitted								
Satd. Flow (perm)	0	0	4729	0	0	2617		
Right Turn on Red				Yes		Yes		
Satd. Flow (RTOR)						9		
Link Speed (mph)		30	30		30			
Link Distance (ft)		201	192		296			
Travel Time (s)		4.6	4.4		6.7			
Peak Hour Factor	0.92	0.92	0.90	0.92	0.92	0.85		
Heavy Vehicles (%)	2%	2%	2%	2%	2%	1%		
Adj. Flow (vph)	0	0	1692	0	0	1199		
Shared Lane Traffic (%)								
Lane Group Flow (vph)	0	0	1692	0	0	1199		
Enter Blocked Intersection	No	No	No	No	No	No		
Lane Alignment	Left	Left	Left	Right	Left	Right		
Median Width(ft)		0	0		0			
Link Offset(ft)		0	0		0			
Crosswalk Width(ft)		16	16		16			
Two way Left Turn Lane								
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10		
Turning Speed (mph)	15			9	15	30		
Number of Detectors			2			1		
Detector Template			Thru			Right		
Leading Detector (ft)			100			20		
Trailing Detector (ft)			0			0		
Detector 1 Position(ft)			0			0		
Detector 1 Size(ft)			6			20		
Detector 1 Type			Cl+Ex			Cl+Ex		
Detector 1 Channel								
Detector 1 Extend (s)			0.0			0.0		
Detector 1 Queue (s)			0.0			0.0		
Detector 1 Delay (s)			0.0			0.0		
Detector 2 Position(ft)			94					
Detector 2 Size(ft)			6					
Detector 2 Type			Cl+Ex					
Detector 2 Channel								
Detector 2 Extend (s)			0.0					
Turn Type			NA			custom		
Protected Phases			2			3 4	3	4
Permitted Phases								
Detector Phase			2			3 4		

Lane Group	EBL	EBT	WBT	WBR	SWL	SWR	Ø3	Ø4
Switch Phase								
Minimum Initial (s)			10.0				10.0	10.0
Minimum Split (s)			15.0				19.0	15.0
Total Split (s)			58.0				36.0	26.0
Total Split (%)			48.3%				30%	22%
Maximum Green (s)			53.0				30.0	21.0
Yellow Time (s)			4.0				4.0	3.5
All-Red Time (s)			1.0				2.0	1.5
Lost Time Adjust (s)			0.0					
Total Lost Time (s)			5.0					
Lead/Lag							Lead	Lag
Lead-Lag Optimize?								
Vehicle Extension (s)			3.0				3.0	3.0
Recall Mode			C-Max				Max	Max
Walk Time (s)							5.0	
Flash Dont Walk (s)							8.0	
Pedestrian Calls (#/hr)							0	
Act Effct Green (s)			53.0			56.0		
Actuated g/C Ratio			0.44			0.47		
v/c Ratio			0.81			0.98		
Control Delay			5.7			52.6		
Queue Delay			2.3			0.0		
Total Delay			8.0			52.6		
LOS			A			D		
Approach Delay			8.0		52.6			
Approach LOS			A		D			

Intersection Summary

Area Type: CBD
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 16 (13%), Referenced to phase 2:WBT, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.04
Intersection Signal Delay: 26.5 Intersection LOS: C
Intersection Capacity Utilization 81.5% ICU Level of Service D
Analysis Period (min) 15

Splits and Phases: 11: Route 2/Alewife Brook Parkway & Route 16



Lane Group	WBT	SWR
Lane Group Flow (vph)	1692	1199
v/c Ratio	0.81	0.98
Control Delay	5.7	52.6
Queue Delay	2.3	0.0
Total Delay	8.0	52.6
Queue Length 50th (ft)	41	502
Queue Length 95th (ft)	m40	#613
Internal Link Dist (ft)	112	
Turn Bay Length (ft)		
Base Capacity (vph)	2088	1226
Starvation Cap Reductn	262	0
Spillback Cap Reductn	0	0
Storage Cap Reductn	0	0
Reduced v/c Ratio	0.93	0.98

Intersection Summary

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.

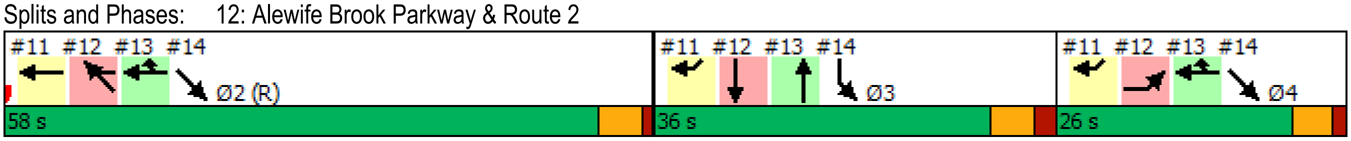
Lane Group	EBL	WBR	SBT	NWT
Lane Configurations				
Traffic Volume (vph)	486	163	489	1360
Future Volume (vph)	486	163	489	1360
Ideal Flow (vphpl)	1900	1900	1900	1900
Lane Width (ft)	13	16	13	13
Lane Util. Factor	0.97	1.00	0.95	0.95
Frt		0.865		
Flt Protected	0.950			
Satd. Flow (prot)	3224	1581	3291	3291
Flt Permitted	0.950			
Satd. Flow (perm)	3224	1581	3291	3291
Right Turn on Red				
Satd. Flow (RTOR)				
Link Speed (mph)			30	30
Link Distance (ft)			202	278
Travel Time (s)			4.6	6.3
Peak Hour Factor	0.97	0.94	0.85	0.90
Heavy Vehicles (%)	1%	6%	2%	2%
Adj. Flow (vph)	501	173	575	1511
Shared Lane Traffic (%)				
Lane Group Flow (vph)	501	173	575	1511
Enter Blocked Intersection	No	No	No	No
Lane Alignment	Left	R NA	Left	L NA
Median Width(ft)			0	0
Link Offset(ft)			0	0
Crosswalk Width(ft)			16	16
Two way Left Turn Lane				
Headway Factor	1.10	0.97	1.10	1.10
Turning Speed (mph)	15	30		
Number of Detectors	1	1	2	2
Detector Template	Left	Right	Thru	Thru
Leading Detector (ft)	20	20	100	100
Trailing Detector (ft)	0	0	0	0
Detector 1 Position(ft)	0	0	0	0
Detector 1 Size(ft)	20	20	6	6
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel				
Detector 1 Extend (s)	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0
Detector 2 Position(ft)			94	94
Detector 2 Size(ft)			6	6
Detector 2 Type			Cl+Ex	Cl+Ex
Detector 2 Channel				
Detector 2 Extend (s)			0.0	0.0
Turn Type	Prot	Prot	NA	NA
Protected Phases	4	2!	3	2!
Permitted Phases				
Detector Phase	4	2	3	2

Lane Group	EBL	WBR	SBT	NWT
Switch Phase				
Minimum Initial (s)	10.0	10.0	10.0	10.0
Minimum Split (s)	15.0	15.0	19.0	15.0
Total Split (s)	26.0	58.0	36.0	58.0
Total Split (%)	21.7%	48.3%	30.0%	48.3%
Maximum Green (s)	21.0	53.0	30.0	53.0
Yellow Time (s)	3.5	4.0	4.0	4.0
All-Red Time (s)	1.5	1.0	2.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	6.0	5.0
Lead/Lag	Lag		Lead	
Lead-Lag Optimize?				
Vehicle Extension (s)	3.0	3.0	3.0	3.0
Recall Mode	Max	C-Max	Max	C-Max
Walk Time (s)			5.0	
Flash Dont Walk (s)			8.0	
Pedestrian Calls (#/hr)			0	
Act Effct Green (s)	21.0	53.0	30.0	53.0
Actuated g/C Ratio	0.18	0.44	0.25	0.44
v/c Ratio	0.89	0.25	0.70	1.04
Control Delay	67.3	14.2	46.2	68.0
Queue Delay	0.0	2.4	0.0	0.8
Total Delay	67.3	16.6	46.2	68.8
LOS	E	B	D	E
Approach Delay			46.2	68.8
Approach LOS			D	E

Intersection Summary	
Area Type: CBD	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 16 (13%), Referenced to phase 2:WBT, Start of Green	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.04	
Intersection Signal Delay: 60.6	Intersection LOS: E
Intersection Capacity Utilization 100.1%	ICU Level of Service G
Analysis Period (min) 15	

! Phase conflict between lane groups.

Splits and Phases: 12: Alewife Brook Parkway & Route 2



Lane Group	EBL	WBR	SBT	NWT
Lane Group Flow (vph)	501	173	575	1511
v/c Ratio	0.89	0.25	0.70	1.04
Control Delay	67.3	14.2	46.2	68.0
Queue Delay	0.0	2.4	0.0	0.8
Total Delay	67.3	16.6	46.2	68.8
Queue Length 50th (ft)	197	82	213	~665
Queue Length 95th (ft)	#291	134	259	#804
Internal Link Dist (ft)			122	198
Turn Bay Length (ft)				
Base Capacity (vph)	564	698	822	1453
Starvation Cap Reductn	0	405	0	0
Spillback Cap Reductn	0	1	0	3
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.89	0.59	0.70	1.04

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

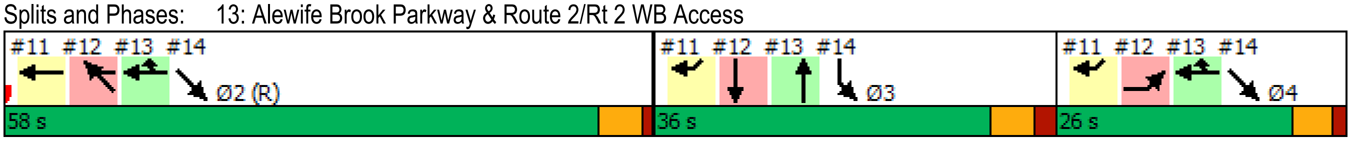
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↑	↱		↑↑				
Traffic Volume (vph)	0	0	0	0	163	52	0	216	0	0	0	0
Future Volume (vph)	0	0	0	0	163	52	0	216	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		200	0		0	0		0
Storage Lanes	0		0	0		1	0		0	0		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt						0.850						
Flt Protected												
Satd. Flow (prot)	0	0	0	0	1613	1333	0	3154	0	0	0	0
Flt Permitted												
Satd. Flow (perm)	0	0	0	0	1613	1333	0	3154	0	0	0	0
Right Turn on Red			No			No	No		No			No
Satd. Flow (RTOR)												
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		161			1225			227			185	
Travel Time (s)		3.7			27.8			5.2			4.2	
Confl. Peds. (#/hr)						2						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.90	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	0%	6%	9%	2%	3%	2%	2%	2%	2%
Adj. Flow (vph)	0	0	0	0	177	57	0	240	0	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	177	57	0	240	0	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors					2	1		2				
Detector Template					Thru	Right		Thru				
Leading Detector (ft)					100	20		100				
Trailing Detector (ft)					0	0		0				
Detector 1 Position(ft)					0	0		0				
Detector 1 Size(ft)					6	20		6				
Detector 1 Type					Cl+Ex	Cl+Ex		Cl+Ex				
Detector 1 Channel												
Detector 1 Extend (s)					0.0	0.0		0.0				
Detector 1 Queue (s)					0.0	0.0		0.0				
Detector 1 Delay (s)					0.0	0.0		0.0				
Detector 2 Position(ft)					94			94				
Detector 2 Size(ft)					6			6				
Detector 2 Type					Cl+Ex			Cl+Ex				
Detector 2 Channel												
Detector 2 Extend (s)					0.0			0.0				

Lane Group	Ø2	Ø4
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Ideal Flow (vphpl)		
Storage Length (ft)		
Storage Lanes		
Taper Length (ft)		
Lane Util. Factor		
Ped Bike Factor		
Frt		
Flt Protected		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Right Turn on Red		
Satd. Flow (RTOR)		
Link Speed (mph)		
Link Distance (ft)		
Travel Time (s)		
Confl. Peds. (#/hr)		
Peak Hour Factor		
Heavy Vehicles (%)		
Adj. Flow (vph)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Enter Blocked Intersection		
Lane Alignment		
Median Width(ft)		
Link Offset(ft)		
Crosswalk Width(ft)		
Two way Left Turn Lane		
Headway Factor		
Turning Speed (mph)		
Number of Detectors		
Detector Template		
Leading Detector (ft)		
Trailing Detector (ft)		
Detector 1 Position(ft)		
Detector 1 Size(ft)		
Detector 1 Type		
Detector 1 Channel		
Detector 1 Extend (s)		
Detector 1 Queue (s)		
Detector 1 Delay (s)		
Detector 2 Position(ft)		
Detector 2 Size(ft)		
Detector 2 Type		
Detector 2 Channel		
Detector 2 Extend (s)		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type					NA	Prot		NA				
Protected Phases					2 4	2 4		3				
Permitted Phases												
Detector Phase					2 4	2 4		3				
Switch Phase												
Minimum Initial (s)								10.0				
Minimum Split (s)								19.0				
Total Split (s)								36.0				
Total Split (%)								30.0%				
Maximum Green (s)								30.0				
Yellow Time (s)								4.0				
All-Red Time (s)								2.0				
Lost Time Adjust (s)								0.0				
Total Lost Time (s)								6.0				
Lead/Lag								Lead				
Lead-Lag Optimize?												
Vehicle Extension (s)								3.0				
Recall Mode								Max				
Walk Time (s)								5.0				
Flash Dont Walk (s)								8.0				
Pedestrian Calls (#/hr)								0				
Act Effct Green (s)					79.0	79.0		30.0				
Actuated g/C Ratio					0.66	0.66		0.25				
v/c Ratio					0.17	0.06		0.30				
Control Delay					8.3	7.6		37.8				
Queue Delay					0.1	0.0		0.0				
Total Delay					8.4	7.6		37.8				
LOS					A	A		D				
Approach Delay					8.2			37.8				
Approach LOS					A			D				

Intersection Summary	
Area Type: CBD	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 16 (13%), Referenced to phase 2:WBT, Start of Green	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.04	
Intersection Signal Delay: 23.2	Intersection LOS: C
Intersection Capacity Utilization 27.0%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 13: Alewife Brook Parkway & Route 2/Rt 2 WB Access



Lane Group	Ø2	Ø4
Turn Type		
Protected Phases	2	4
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	10.0	10.0
Minimum Split (s)	15.0	15.0
Total Split (s)	58.0	26.0
Total Split (%)	48%	22%
Maximum Green (s)	53.0	21.0
Yellow Time (s)	4.0	3.5
All-Red Time (s)	1.0	1.5
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag		Lag
Lead-Lag Optimize?		
Vehicle Extension (s)	3.0	3.0
Recall Mode	C-Max	Max
Walk Time (s)		
Flash Dont Walk (s)		
Pedestrian Calls (#/hr)		
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		
Approach LOS		

Intersection Summary

Lane Group	WBT	WBR	NBT
Lane Group Flow (vph)	177	57	240
v/c Ratio	0.17	0.06	0.30
Control Delay	8.3	7.6	37.8
Queue Delay	0.1	0.0	0.0
Total Delay	8.4	7.6	37.8
Queue Length 50th (ft)	48	15	80
Queue Length 95th (ft)	78	30	117
Internal Link Dist (ft)	1145		147
Turn Bay Length (ft)		200	
Base Capacity (vph)	1061	877	788
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	203	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.21	0.06	0.30

Intersection Summary

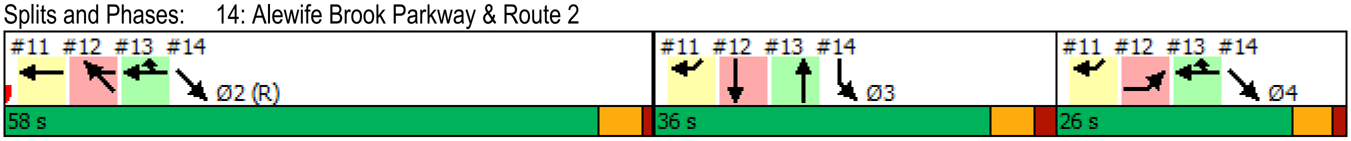
Lane Group	SBL	SBR	SEL	SET	NWT	NWR	Ø2	Ø4
Lane Configurations								
Traffic Volume (vph)	489	0	0	1064	0	0		
Future Volume (vph)	489	0	0	1064	0	0		
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900		
Lane Width (ft)	13	13	13	13	13	13		
Lane Util. Factor	0.97	1.00	1.00	0.95	1.00	1.00		
Frt								
Flt Protected	0.950							
Satd. Flow (prot)	3193	0	0	3324	0	0		
Flt Permitted	0.950							
Satd. Flow (perm)	3193	0	0	3324	0	0		
Right Turn on Red	Yes	Yes				Yes		
Satd. Flow (RTOR)	234							
Link Speed (mph)	30			30	30			
Link Distance (ft)	155			297	139			
Travel Time (s)	3.5			6.8	3.2			
Peak Hour Factor	0.85	0.92	0.92	0.97	0.92	0.92		
Heavy Vehicles (%)	2%	2%	2%	1%	2%	2%		
Adj. Flow (vph)	575	0	0	1097	0	0		
Shared Lane Traffic (%)								
Lane Group Flow (vph)	575	0	0	1097	0	0		
Enter Blocked Intersection	No	No	No	No	No	No		
Lane Alignment	Left	Right	Left	Left	Left	Right		
Median Width(ft)	26			0	0			
Link Offset(ft)	0			0	0			
Crosswalk Width(ft)	16			16	16			
Two way Left Turn Lane								
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10		
Turning Speed (mph)	30	9	15			9		
Number of Detectors	1			2				
Detector Template	Left			Thru				
Leading Detector (ft)	20			100				
Trailing Detector (ft)	0			0				
Detector 1 Position(ft)	0			0				
Detector 1 Size(ft)	20			6				
Detector 1 Type	Cl+Ex			Cl+Ex				
Detector 1 Channel								
Detector 1 Extend (s)	0.0			0.0				
Detector 1 Queue (s)	0.0			0.0				
Detector 1 Delay (s)	0.0			0.0				
Detector 2 Position(ft)				94				
Detector 2 Size(ft)				6				
Detector 2 Type				Cl+Ex				
Detector 2 Channel								
Detector 2 Extend (s)				0.0				
Turn Type	Prot			NA				
Protected Phases	3			2 4			2	4
Permitted Phases								
Detector Phase	3			2 4				

Lane Group	SBL	SBR	SEL	SET	NWT	NWR	Ø2	Ø4
Switch Phase								
Minimum Initial (s)	10.0						10.0	10.0
Minimum Split (s)	19.0						15.0	15.0
Total Split (s)	36.0						58.0	26.0
Total Split (%)	30.0%						48%	22%
Maximum Green (s)	30.0						53.0	21.0
Yellow Time (s)	4.0						4.0	3.5
All-Red Time (s)	2.0						1.0	1.5
Lost Time Adjust (s)	0.0							
Total Lost Time (s)	6.0							
Lead/Lag	Lead							Lag
Lead-Lag Optimize?								
Vehicle Extension (s)	3.0						3.0	3.0
Recall Mode	Max						C-Max	Max
Walk Time (s)	5.0							
Flash Dont Walk (s)	8.0							
Pedestrian Calls (#/hr)	0							
Act Effct Green (s)	30.0			79.0				
Actuated g/C Ratio	0.25			0.66				
v/c Ratio	0.59			0.50				
Control Delay	2.3			11.4				
Queue Delay	0.9			0.0				
Total Delay	3.2			11.4				
LOS	A			B				
Approach Delay	3.2			11.4				
Approach LOS	A			B				

Intersection Summary

Area Type: CBD
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 16 (13%), Referenced to phase 2:WBT, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.04
Intersection Signal Delay: 8.6 Intersection LOS: A
Intersection Capacity Utilization 57.3% ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 14: Alewife Brook Parkway & Route 2



Lane Group	SBL	SET
Lane Group Flow (vph)	575	1097
v/c Ratio	0.59	0.50
Control Delay	2.3	11.4
Queue Delay	0.9	0.0
Total Delay	3.2	11.4
Queue Length 50th (ft)	5	209
Queue Length 95th (ft)	0	258
Internal Link Dist (ft)	75	217
Turn Bay Length (ft)		
Base Capacity (vph)	973	2188
Starvation Cap Reductn	168	0
Spillback Cap Reductn	0	0
Storage Cap Reductn	0	0
Reduced v/c Ratio	0.71	0.50

Intersection Summary

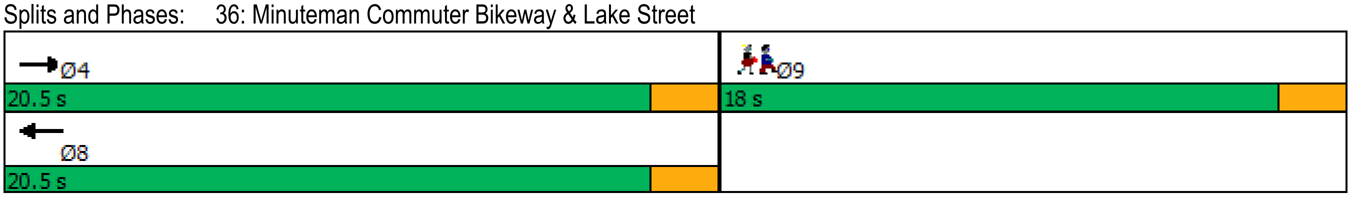
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	578	0	0	1096	0	0	0	0	0	0	0
Future Volume (vph)	0	578	0	0	1096	0	0	0	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	15	15	15	16	16	16	12	12	12	12	12	12
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
Frt												
Flt Protected												
Satd. Flow (prot)	0	2049	0	0	2153	0	0	0	0	0	0	0
Flt Permitted												
Satd. Flow (perm)	0	2049	0	0	2153	0	0	0	0	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)												
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		135			215			175			206	
Travel Time (s)		3.1			4.9			4.0			4.7	
Peak Hour Factor	0.84	0.84	0.84	0.97	0.97	0.97	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	0	688	0	0	1130	0	0	0	0	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	688	0	0	1130	0	0	0	0	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	0.88	0.88	0.88	0.85	0.85	0.85	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors		2			2							
Detector Template		Thru			Thru							
Leading Detector (ft)		100			100							
Trailing Detector (ft)		0			0							
Detector 1 Position(ft)		0			0							
Detector 1 Size(ft)		6			6							
Detector 1 Type		Cl+Ex			Cl+Ex							
Detector 1 Channel												
Detector 1 Extend (s)		0.0			0.0							
Detector 1 Queue (s)		0.0			0.0							
Detector 1 Delay (s)		0.0			0.0							
Detector 2 Position(ft)		94			94							
Detector 2 Size(ft)		6			6							
Detector 2 Type		Cl+Ex			Cl+Ex							
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0							
Turn Type		NA			NA							
Protected Phases		4			8							
Permitted Phases												
Detector Phase		4			8							

Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Heavy Vehicles (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (mph)	
Number of Detectors	
Detector Template	
Leading Detector (ft)	
Trailing Detector (ft)	
Detector 1 Position(ft)	
Detector 1 Size(ft)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Detector 2 Position(ft)	
Detector 2 Size(ft)	
Detector 2 Type	
Detector 2 Channel	
Detector 2 Extend (s)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Switch Phase												
Minimum Initial (s)		4.0			4.0							
Minimum Split (s)		20.5			20.5							
Total Split (s)		20.5			20.5							
Total Split (%)		53.2%			53.2%							
Maximum Green (s)		18.5			18.5							
Yellow Time (s)		2.0			2.0							
All-Red Time (s)		0.0			0.0							
Lost Time Adjust (s)		0.0			0.0							
Total Lost Time (s)		2.0			2.0							
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)		3.0			3.0							
Recall Mode		Max			Max							
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)		33.5			33.5							
Actuated g/C Ratio		0.63			0.63							
v/c Ratio		0.54			0.84							
Control Delay		7.6			15.8							
Queue Delay		0.0			48.7							
Total Delay		7.6			64.5							
LOS		A			E							
Approach Delay		7.6			64.5							
Approach LOS		A			E							

Intersection Summary	
Area Type: Other	
Cycle Length: 38.5	
Actuated Cycle Length: 53.5	
Natural Cycle: 60	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.84	
Intersection Signal Delay: 43.0	Intersection LOS: D
Intersection Capacity Utilization 61.0%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 36: Minuteman Commuter Bikeway & Lake Street



Lane Group	Ø9
Switch Phase	
Minimum Initial (s)	4.0
Minimum Split (s)	18.0
Total Split (s)	18.0
Total Split (%)	47%
Maximum Green (s)	16.0
Yellow Time (s)	2.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Recall Mode	None
Walk Time (s)	5.0
Flash Dont Walk (s)	11.0
Pedestrian Calls (#/hr)	304
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	

Intersection Summary

Lane Group	EBT	WBT
Lane Group Flow (vph)	688	1130
v/c Ratio	0.54	0.84
Control Delay	7.6	15.8
Queue Delay	0.0	48.7
Total Delay	7.6	64.5
Queue Length 50th (ft)	101	232
Queue Length 95th (ft)	149	#517
Internal Link Dist (ft)	55	135
Turn Bay Length (ft)		
Base Capacity (vph)	1283	1348
Starvation Cap Reductn	0	424
Spillback Cap Reductn	0	0
Storage Cap Reductn	0	0
Reduced v/c Ratio	0.54	1.22

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	30	520	28	4	957	0	22	4	3	3	7	117
Future Volume (vph)	30	520	28	4	957	0	22	4	3	3	7	117
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	14	14	14	13	13	13	12	12	12	12	12	12
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
Frt		0.993						0.986			0.876	
Flt Protected		0.997						0.963			0.999	
Satd. Flow (prot)	0	1984	0	0	1944	0	0	1804	0	0	1663	0
Flt Permitted		0.932			0.998			0.711			0.993	
Satd. Flow (perm)	0	1854	0	0	1940	0	0	1332	0	0	1653	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		4						4			150	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		215			1126			206			208	
Travel Time (s)		4.9			25.6			4.7			4.7	
Peak Hour Factor	0.91	0.91	0.91	0.87	0.87	0.87	0.75	0.75	0.75	0.78	0.78	0.78
Heavy Vehicles (%)	0%	1%	5%	0%	1%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	33	571	31	5	1100	0	29	5	4	4	9	150
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	635	0	0	1105	0	0	38	0	0	163	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	0.92	0.92	0.92	0.96	0.96	0.96	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	20	100		20	100		20	100		20	100	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases		4			8		5	2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		5	2		6	6	

Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Heavy Vehicles (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (mph)	
Number of Detectors	
Detector Template	
Leading Detector (ft)	
Trailing Detector (ft)	
Detector 1 Position(ft)	
Detector 1 Size(ft)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Detector 2 Position(ft)	
Detector 2 Size(ft)	
Detector 2 Type	
Detector 2 Channel	
Detector 2 Extend (s)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Switch Phase												
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	21.0	21.0		21.0	21.0		9.0	21.0		14.0	14.0	
Total Split (s)	28.0	28.0		28.0	28.0		10.0	24.0		14.0	14.0	
Total Split (%)	38.6%	38.6%		38.6%	38.6%		13.8%	33.1%		19.3%	19.3%	
Maximum Green (s)	24.0	24.0		24.0	24.0		6.0	20.0		10.0	10.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	1.0	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	
Total Lost Time (s)		4.0			4.0			4.0			4.0	
Lead/Lag							Lead			Lag	Lag	
Lead-Lag Optimize?							Yes			Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	Min		Min	Min	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)		25.0			25.0			6.9			6.9	
Actuated g/C Ratio		0.58			0.58			0.16			0.16	
v/c Ratio		0.59			0.98			0.18			0.42	
Control Delay		12.8			37.7			18.9			9.1	
Queue Delay		5.7			0.0			0.0			0.0	
Total Delay		18.5			37.7			18.9			9.1	
LOS		B			D			B			A	
Approach Delay		18.5			37.7			18.9			9.1	
Approach LOS		B			D			B			A	

Intersection Summary	
Area Type: Other	
Cycle Length: 72.5	
Actuated Cycle Length: 43	
Natural Cycle: 100	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.98	
Intersection Signal Delay: 28.7	Intersection LOS: C
Intersection Capacity Utilization 72.6%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 39: Brooks Avenue & Lake Street

Lane Group	Ø9
Switch Phase	
Minimum Initial (s)	4.0
Minimum Split (s)	20.5
Total Split (s)	20.5
Total Split (%)	28%
Maximum Green (s)	16.0
Yellow Time (s)	4.0
All-Red Time (s)	0.5
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Recall Mode	None
Walk Time (s)	5.0
Flash Dont Walk (s)	11.0
Pedestrian Calls (#/hr)	16
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	

Intersection Summary

Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	635	1105	38	163
v/c Ratio	0.59	0.98	0.18	0.42
Control Delay	12.8	37.7	18.9	9.1
Queue Delay	5.7	0.0	0.0	0.0
Total Delay	18.5	37.7	18.9	9.1
Queue Length 50th (ft)	55	147	6	2
Queue Length 95th (ft)	#408	#772	28	35
Internal Link Dist (ft)	135	1046	126	128
Turn Bay Length (ft)				
Base Capacity (vph)	1079	1127	647	513
Starvation Cap Reductn	378	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.91	0.98	0.06	0.32

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

2020 Baseline Weekday Evening Peak Hour

Intersection						
Int Delay, s/veh	0.4					

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	785	3	1	570	9	4
Future Vol, veh/h	785	3	1	570	9	4
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	83	83	94	94	75	75
Heavy Vehicles, %	0	0	0	0	29	0
Mvmt Flow	946	4	1	606	12	5

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	950	0	1556	948
Stage 1	-	-	-	-	948	-
Stage 2	-	-	-	-	608	-
Critical Hdwy	-	-	4.1	-	6.69	6.2
Critical Hdwy Stg 1	-	-	-	-	5.69	-
Critical Hdwy Stg 2	-	-	-	-	5.69	-
Follow-up Hdwy	-	-	2.2	-	3.761	3.3
Pot Cap-1 Maneuver	-	-	731	-	107	319
Stage 1	-	-	-	-	337	-
Stage 2	-	-	-	-	495	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	731	-	107	319
Mov Cap-2 Maneuver	-	-	-	-	107	-
Stage 1	-	-	-	-	337	-
Stage 2	-	-	-	-	494	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	35.6
HCM LOS			E

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	135	-	-	731	-
HCM Lane V/C Ratio	0.128	-	-	0.001	-
HCM Control Delay (s)	35.6	-	-	9.9	0
HCM Lane LOS	E	-	-	A	A
HCM 95th %tile Q(veh)	0.4	-	-	0	-

Intersection						
Int Delay, s/veh	0.7					

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	783	6	9	556	15	5
Future Vol, veh/h	783	6	9	556	15	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	87	87	89	89	75	75
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	900	7	10	625	20	7

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	907	0	1549	904
Stage 1	-	-	-	-	904	-
Stage 2	-	-	-	-	645	-
Critical Hdwy	-	-	4.1	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	759	-	127	338
Stage 1	-	-	-	-	398	-
Stage 2	-	-	-	-	526	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	759	-	124	338
Mov Cap-2 Maneuver	-	-	-	-	124	-
Stage 1	-	-	-	-	398	-
Stage 2	-	-	-	-	515	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.2	34.8
HCM LOS			D

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	147	-	-	759	-
HCM Lane V/C Ratio	0.181	-	-	0.013	-
HCM Control Delay (s)	34.8	-	-	9.8	0
HCM Lane LOS	D	-	-	A	A
HCM 95th %tile Q(veh)	0.6	-	-	0	-

Intersection						
Int Delay, s/veh	0.2					

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	787	1	1	559	6	4
Future Vol, veh/h	787	1	1	559	6	4
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	87	87	89	89	75	75
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	905	1	1	628	8	5

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	906	0	1536	906
Stage 1	-	-	-	-	906	-
Stage 2	-	-	-	-	630	-
Critical Hdwy	-	-	4.1	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	759	-	129	337
Stage 1	-	-	-	-	398	-
Stage 2	-	-	-	-	535	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	759	-	129	337
Mov Cap-2 Maneuver	-	-	-	-	129	-
Stage 1	-	-	-	-	398	-
Stage 2	-	-	-	-	534	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	27.8
HCM LOS			D

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	171	-	-	759	-
HCM Lane V/C Ratio	0.078	-	-	0.001	-
HCM Control Delay (s)	27.8	-	-	9.8	0
HCM Lane LOS	D	-	-	A	A
HCM 95th %tile Q(veh)	0.3	-	-	0	-

Intersection	
Int Delay, s/veh	1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	4	768	19	11	546	8	13	1	6	3	0	1
Future Vol, veh/h	4	768	19	11	546	8	13	1	6	3	0	1
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	86	86	86	86	86	86	75	75	75	75	75	75
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	5	893	22	13	635	9	17	1	8	4	0	1

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	644	0	0	915	0	0	1580	1584	904	1585	1591	640
Stage 1	-	-	-	-	-	-	914	914	-	666	666	-
Stage 2	-	-	-	-	-	-	666	670	-	919	925	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	951	-	-	754	-	-	89	110	338	89	108	479
Stage 1	-	-	-	-	-	-	330	355	-	452	460	-
Stage 2	-	-	-	-	-	-	452	459	-	328	351	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	951	-	-	754	-	-	86	106	338	84	104	479
Mov Cap-2 Maneuver	-	-	-	-	-	-	86	106	-	84	104	-
Stage 1	-	-	-	-	-	-	326	351	-	447	448	-
Stage 2	-	-	-	-	-	-	439	447	-	316	347	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.2	46.9	40.8
HCM LOS			E	E

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	112	951	-	-	754	-	-	106
HCM Lane V/C Ratio	0.238	0.005	-	-	0.017	-	-	0.05
HCM Control Delay (s)	46.9	8.8	0	-	9.9	0	-	40.8
HCM Lane LOS	E	A	A	-	A	A	-	E
HCM 95th %tile Q(veh)	0.9	0	-	-	0.1	-	-	0.2

Intersection	
Int Delay, s/veh	3.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	18	756	3	42	548	15	6	0	27	9	0	11
Future Vol, veh/h	18	756	3	42	548	15	6	0	27	9	0	11
Conflicting Peds, #/hr	0	0	0	304	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	83	83	83	88	88	88	81	81	81	80	80	80
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	22	911	4	48	623	17	7	0	33	11	0	14

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	640	0	0	1219	0	0	1996	1997	1217	1702	1991	632
Stage 1	-	-	-	-	-	-	1261	1261	-	728	728	-
Stage 2	-	-	-	-	-	-	735	736	-	974	1263	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	954	-	-	579	-	-	45	61	223	73	61	484
Stage 1	-	-	-	-	-	-	211	244	-	418	432	-
Stage 2	-	-	-	-	-	-	414	428	-	305	243	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	954	-	-	432	-	-	27	36	167	49	36	484
Mov Cap-2 Maneuver	-	-	-	-	-	-	27	36	-	49	36	-
Stage 1	-	-	-	-	-	-	150	174	-	398	357	-
Stage 2	-	-	-	-	-	-	333	354	-	233	173	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	1	79.9	54.5
HCM LOS			F	F

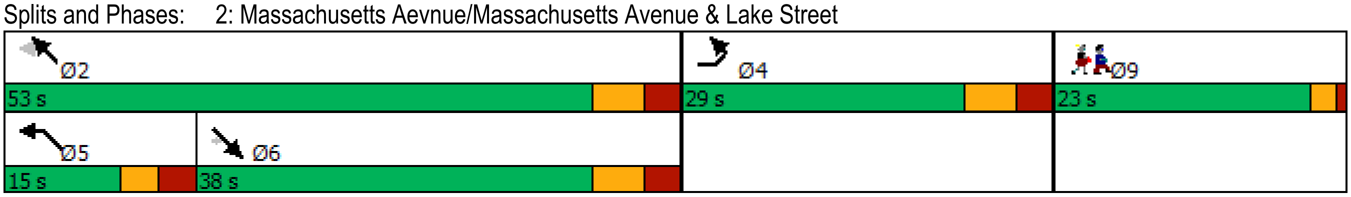
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	86	954	-	-	432	-	-	97
HCM Lane V/C Ratio	0.474	0.023	-	-	0.11	-	-	0.258
HCM Control Delay (s)	79.9	8.9	0	-	14.4	0	-	54.5
HCM Lane LOS	F	A	A	-	B	A	-	F
HCM 95th %tile Q(veh)	2	0.1	-	-	0.4	-	-	0.9

Lane Group	EBL	EBR	SET	SER	NWL	NWT	Ø9
Lane Configurations							
Traffic Volume (vph)	397	255	635	175	323	714	
Future Volume (vph)	397	255	635	175	323	714	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Lane Width (ft)	16	16	11	10	11	12	
Storage Length (ft)	0	0		55	150		
Storage Lanes	1	0		1	1		
Taper Length (ft)	25				25		
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	1.00	
Frt	0.947			0.850			
Flt Protected	0.970				0.950		
Satd. Flow (prot)	1978	0	3421	1507	1745	1863	
Flt Permitted	0.970				0.242		
Satd. Flow (perm)	1978	0	3421	1507	444	1863	
Right Turn on Red		Yes		Yes			
Satd. Flow (RTOR)	28			81			
Link Speed (mph)	30		30			30	
Link Distance (ft)	1126		640			645	
Travel Time (s)	25.6		14.5			14.7	
Peak Hour Factor	0.88	0.88	0.92	0.92	0.92	0.92	
Heavy Vehicles (%)	0%	0%	2%	0%	0%	2%	
Adj. Flow (vph)	451	290	690	190	351	776	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	741	0	690	190	351	776	
Enter Blocked Intersection	No	No	No	No	No	No	
Lane Alignment	Left	Right	Left	Right	Left	Left	
Median Width(ft)	16		11			11	
Link Offset(ft)	0		0			0	
Crosswalk Width(ft)	16		16			16	
Two way Left Turn Lane							
Headway Factor	0.85	0.85	1.04	1.09	1.04	1.00	
Turning Speed (mph)	15	9		9	15		
Number of Detectors	1		2	1	1	2	
Detector Template	Left		Thru	Right	Left	Thru	
Leading Detector (ft)	20		100	20	20	100	
Trailing Detector (ft)	0		0	0	0	0	
Detector 1 Position(ft)	0		0	0	0	0	
Detector 1 Size(ft)	20		6	20	20	6	
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel							
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	0.0	
Detector 2 Position(ft)			94			94	
Detector 2 Size(ft)			6			6	
Detector 2 Type			Cl+Ex			Cl+Ex	
Detector 2 Channel							
Detector 2 Extend (s)			0.0			0.0	
Turn Type	Prot		NA	Perm	pm+pt	NA	

Lane Group	EBL	EBR	SET	SER	NWL	NWT	Ø9
Protected Phases	4		6		5	2	9
Permitted Phases				6	2		
Detector Phase	4		6	6	5	2	
Switch Phase							
Minimum Initial (s)	4.0		4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	23.0		23.0	23.0	10.0	23.0	19.0
Total Split (s)	29.0		38.0	38.0	15.0	53.0	23.0
Total Split (%)	27.6%		36.2%	36.2%	14.3%	50.5%	22%
Maximum Green (s)	22.0		31.0	31.0	9.0	46.0	20.0
Yellow Time (s)	4.0		4.0	4.0	3.0	4.0	2.0
All-Red Time (s)	3.0		3.0	3.0	3.0	3.0	1.0
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0	
Total Lost Time (s)	7.0		7.0	7.0	6.0	7.0	
Lead/Lag			Lag	Lag	Lead		
Lead-Lag Optimize?			Yes	Yes	Yes		
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0	3.0
Recall Mode	None		Max	Max	None	Max	None
Walk Time (s)							5.0
Flash Dont Walk (s)							11.0
Pedestrian Calls (#/hr)							20
Act Effct Green (s)	22.2		31.3	31.3	47.5	46.5	
Actuated g/C Ratio	0.25		0.35	0.35	0.53	0.52	
v/c Ratio	1.45		0.58	0.33	0.96	0.80	
Control Delay	240.7		27.5	15.6	57.9	28.1	
Queue Delay	0.0		0.0	0.0	0.0	0.0	
Total Delay	240.7		27.5	15.6	57.9	28.1	
LOS	F		C	B	E	C	
Approach Delay	240.7		24.9			37.4	
Approach LOS	F		C			D	

Intersection Summary	
Area Type: Other	
Cycle Length: 105	
Actuated Cycle Length: 89.6	
Natural Cycle: 150	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 1.45	
Intersection Signal Delay: 88.2	Intersection LOS: F
Intersection Capacity Utilization 89.7%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 2: Massachusetts Aevnue/Massachusetts Avenue & Lake Street



Lane Group	EBL	SET	SER	NWL	NWT
Lane Group Flow (vph)	741	690	190	351	776
v/c Ratio	1.45	0.58	0.33	0.96	0.80
Control Delay	240.7	27.5	15.6	57.9	28.1
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	240.7	27.5	15.6	57.9	28.1
Queue Length 50th (ft)	~498	142	37	89	278
Queue Length 95th (ft)	#887	265	113	#359	#702
Internal Link Dist (ft)	1046	560			565
Turn Bay Length (ft)			55	150	
Base Capacity (vph)	511	1196	579	367	966
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	1.45	0.58	0.33	0.96	0.80

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

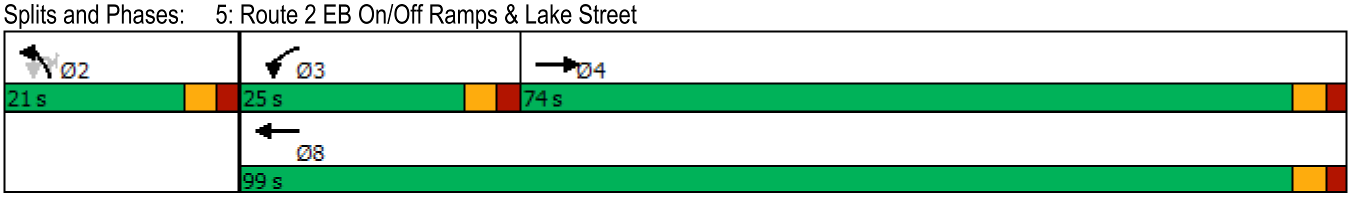
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lane Group	EBT	EBR	WBL	WBT	NBU	NBL	NBR
Lane Configurations							
Traffic Volume (vph)	520	171	159	283	14	488	571
Future Volume (vph)	520	171	159	283	14	488	571
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	16	16	10	11	12	16	14
Storage Length (ft)		150	110			0	0
Storage Lanes		1	1			1	1
Taper Length (ft)			25			25	
Lane Util. Factor	1.00	1.00	1.00	0.95	1.00	1.00	1.00
Frt		0.850					0.850
Flt Protected			0.950			0.950	
Satd. Flow (prot)	2153	1664	1652	3490	0	2046	1723
Flt Permitted			0.950			0.950	
Satd. Flow (perm)	2153	1664	1652	3490	0	2046	1723
Right Turn on Red		Yes					Yes
Satd. Flow (RTOR)		69					433
Link Speed (mph)	30			30		30	
Link Distance (ft)	239			505		387	
Travel Time (s)	5.4			11.5		8.8	
Peak Hour Factor	0.94	0.94	0.87	0.87	0.96	0.96	0.96
Heavy Vehicles (%)	0%	10%	2%	0%	0%	0%	0%
Adj. Flow (vph)	553	182	183	325	15	508	595
Shared Lane Traffic (%)							
Lane Group Flow (vph)	553	182	183	325	0	523	595
Enter Blocked Intersection	No	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	R NA	Left	Right
Median Width(ft)	12			12		16	
Link Offset(ft)	0			0		0	
Crosswalk Width(ft)	16			16		16	
Two way Left Turn Lane							
Headway Factor	0.85	0.85	1.09	1.04	1.00	0.85	0.92
Turning Speed (mph)		9	15		9	15	9
Number of Detectors	2	1	1	2	1	1	1
Detector Template	Thru	Right	Left	Thru	Left	Left	Right
Leading Detector (ft)	100	20	20	100	20	20	20
Trailing Detector (ft)	0	0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0	0	0
Detector 1 Size(ft)	6	20	20	6	20	20	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel							
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)	94			94			
Detector 2 Size(ft)	6			6			
Detector 2 Type	Cl+Ex			Cl+Ex			
Detector 2 Channel							
Detector 2 Extend (s)	0.0			0.0			
Turn Type	NA	Free	Prot	NA	Perm	Prot	Perm

Lane Group	EBT	EBR	WBL	WBT	NBU	NBL	NBR
Protected Phases	4		3	8		2	
Permitted Phases		Free			2		2
Detector Phase	4		3	8	2	2	2
Switch Phase							
Minimum Initial (s)	4.0		4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	21.0		9.0	21.0	21.0	21.0	21.0
Total Split (s)	74.0		25.0	99.0	21.0	21.0	21.0
Total Split (%)	61.7%		20.8%	82.5%	17.5%	17.5%	17.5%
Maximum Green (s)	69.0		20.0	94.0	16.0	16.0	16.0
Yellow Time (s)	3.0		3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0		2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0		0.0	0.0		0.0	0.0
Total Lost Time (s)	5.0		5.0	5.0		5.0	5.0
Lead/Lag	Lag		Lead				
Lead-Lag Optimize?	Yes		Yes				
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0	3.0
Recall Mode	None		None	None	Max	Max	Max
Walk Time (s)	5.0			5.0	5.0	5.0	5.0
Flash Dont Walk (s)	11.0			11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0			0	0	0	0
Act Effct Green (s)	24.1	68.8	13.0	42.2		16.4	16.4
Actuated g/C Ratio	0.35	1.00	0.19	0.61		0.24	0.24
v/c Ratio	0.73	0.11	0.59	0.15		1.08	0.81
Control Delay	26.1	0.1	35.0	5.4		93.4	18.6
Queue Delay	0.0	0.0	0.0	0.0		0.0	0.0
Total Delay	26.1	0.1	35.0	5.4		93.4	18.6
LOS	C	A	C	A		F	B
Approach Delay	19.7			16.1		53.6	
Approach LOS	B			B		D	

Intersection Summary	
Area Type: Other	
Cycle Length: 120	
Actuated Cycle Length: 68.8	
Natural Cycle: 60	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 1.08	
Intersection Signal Delay: 35.0	Intersection LOS: C
Intersection Capacity Utilization 76.5%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 5: Route 2 EB On/Off Ramps & Lake Street



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	553	182	183	325	523	595
v/c Ratio	0.73	0.11	0.59	0.15	1.08	0.81
Control Delay	26.1	0.1	35.0	5.4	93.4	18.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	26.1	0.1	35.0	5.4	93.4	18.6
Queue Length 50th (ft)	196	0	71	26	~253	57
Queue Length 95th (ft)	335	0	142	37	#556	#279
Internal Link Dist (ft)	159			425	307	
Turn Bay Length (ft)		150	110			
Base Capacity (vph)	2045	1664	491	3490	486	739
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	0.27	0.11	0.37	0.09	1.08	0.81

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

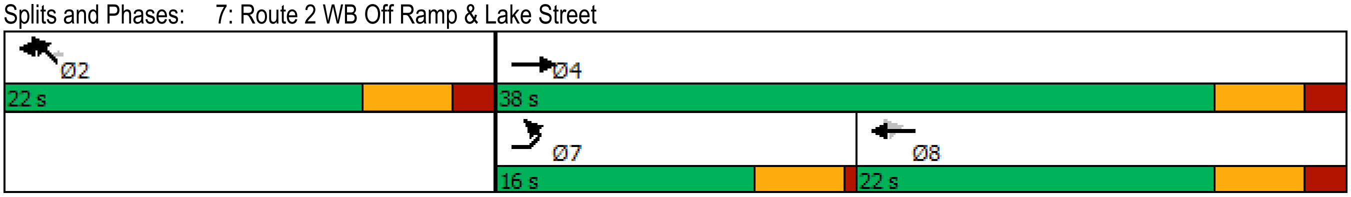
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (vph)	327	764	0	0	245	334	0	0	0	197	21	24
Future Volume (vph)	327	764	0	0	245	334	0	0	0	197	21	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	11	10	12	12	12	11	12	16
Storage Length (ft)	250		0	0		75	0		0	100		0
Storage Lanes	1		0	0		1	0		0	1		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00
Frt						0.850						0.850
Flt Protected	0.950									0.950	0.961	
Satd. Flow (prot)	1805	1881	0	0	1801	1463	0	0	0	1641	1705	1830
Flt Permitted	0.950									0.950	0.961	
Satd. Flow (perm)	1805	1881	0	0	1801	1463	0	0	0	1641	1705	1830
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						367						136
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		505			380			459			529	
Travel Time (s)		11.5			8.6			10.4			12.0	
Peak Hour Factor	0.88	0.88	0.88	0.91	0.91	0.91	0.92	0.92	0.92	0.95	0.95	0.95
Heavy Vehicles (%)	0%	1%	0%	0%	2%	3%	0%	0%	0%	1%	5%	0%
Adj. Flow (vph)	372	868	0	0	269	367	0	0	0	207	22	25
Shared Lane Traffic (%)										45%		
Lane Group Flow (vph)	372	868	0	0	269	367	0	0	0	114	115	25
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			11			11	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.04	1.09	1.00	1.00	1.00	1.04	1.00	0.85
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2			2	1				1	2	1
Detector Template	Left	Thru			Thru	Right				Left	Thru	Right
Leading Detector (ft)	20	100			100	20				20	100	20
Trailing Detector (ft)	0	0			0	0				0	0	0
Detector 1 Position(ft)	0	0			0	0				0	0	0
Detector 1 Size(ft)	20	6			6	20				20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex			Cl+Ex	Cl+Ex				Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0			0.0	0.0				0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0			0.0	0.0				0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0			0.0	0.0				0.0	0.0	0.0
Detector 2 Position(ft)		94			94						94	
Detector 2 Size(ft)		6			6						6	
Detector 2 Type		Cl+Ex			Cl+Ex						Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0						0.0	
Turn Type	Prot	NA			NA	Perm				Split	NA	Perm

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Protected Phases	7	4			8					2	2	
Permitted Phases						8						2
Detector Phase	7	4			8	8				2	2	2
Switch Phase												
Minimum Initial (s)	4.0	4.0			4.0	4.0				4.0	4.0	4.0
Minimum Split (s)	8.5	22.0			22.0	22.0				22.0	22.0	22.0
Total Split (s)	16.0	38.0			22.0	22.0				22.0	22.0	22.0
Total Split (%)	26.7%	63.3%			36.7%	36.7%				36.7%	36.7%	36.7%
Maximum Green (s)	11.5	32.0			16.0	16.0				16.0	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)	0.5	2.0			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)	4.5	6.0			6.0	6.0				6.0	6.0	6.0
Lead/Lag	Lead				Lag	Lag						
Lead-Lag Optimize?	Yes				Yes	Yes						
Vehicle Extension (s)	3.0	3.0			3.0	3.0				3.0	3.0	3.0
Recall Mode	None	None			None	None				Max	Max	Max
Walk Time (s)		5.0			5.0	5.0				5.0	5.0	5.0
Flash Dont Walk (s)		11.0			11.0	11.0				11.0	11.0	11.0
Pedestrian Calls (#/hr)		0			0	0				0	0	0
Act Effct Green (s)	11.5	30.0			14.0	14.0				16.0	16.0	16.0
Actuated g/C Ratio	0.20	0.52			0.24	0.24				0.28	0.28	0.28
v/c Ratio	1.04	0.89			0.62	0.58				0.25	0.24	0.04
Control Delay	87.4	26.7			26.5	6.7				19.1	19.0	0.1
Queue Delay	0.0	0.0			0.0	0.0				0.0	0.0	0.0
Total Delay	87.4	26.7			26.5	6.7				19.1	19.0	0.1
LOS	F	C			C	A				B	B	A
Approach Delay		44.9			15.0						17.2	
Approach LOS		D			B						B	

Intersection Summary	
Area Type: Other	
Cycle Length: 60	
Actuated Cycle Length: 58.1	
Natural Cycle: 65	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 1.04	
Intersection Signal Delay: 32.7	Intersection LOS: C
Intersection Capacity Utilization 58.6%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 7: Route 2 WB Off Ramp & Lake Street



Lane Group	EBL	EBT	WBT	WBR	NWL	NWT	NWR
Lane Group Flow (vph)	372	868	269	367	114	115	25
v/c Ratio	1.04	0.89	0.62	0.58	0.25	0.24	0.04
Control Delay	87.4	26.7	26.5	6.7	19.1	19.0	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	87.4	26.7	26.5	6.7	19.1	19.0	0.1
Queue Length 50th (ft)	~155	246	84	0	33	34	0
Queue Length 95th (ft)	#289	#461	149	55	72	72	0
Internal Link Dist (ft)		425	300			449	
Turn Bay Length (ft)	250			75	100		
Base Capacity (vph)	358	1039	497	669	453	470	603
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	1.04	0.84	0.54	0.55	0.25	0.24	0.04

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

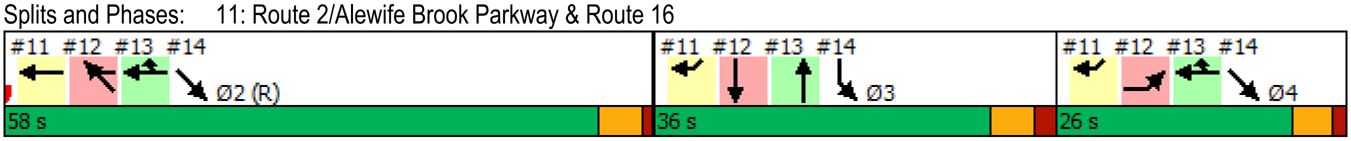
Lane Group	EBL	EBT	WBT	WBR	SWL	SWR	Ø3	Ø4
Lane Configurations								
Traffic Volume (vph)	0	0	2131	0	0	1091		
Future Volume (vph)	0	0	2131	0	0	1091		
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900		
Lane Width (ft)	13	13	13	13	13	13		
Lane Util. Factor	1.00	1.00	0.91	1.00	1.00	0.88		
Frt						0.850		
Flt Protected								
Satd. Flow (prot)	0	0	4776	0	0	2617		
Flt Permitted								
Satd. Flow (perm)	0	0	4776	0	0	2617		
Right Turn on Red				Yes		Yes		
Satd. Flow (RTOR)						2		
Link Speed (mph)		30	30		30			
Link Distance (ft)		201	192		296			
Travel Time (s)		4.6	4.4		6.7			
Peak Hour Factor	0.92	0.92	0.97	0.97	0.98	0.98		
Heavy Vehicles (%)	2%	2%	1%	0%	0%	1%		
Adj. Flow (vph)	0	0	2197	0	0	1113		
Shared Lane Traffic (%)								
Lane Group Flow (vph)	0	0	2197	0	0	1113		
Enter Blocked Intersection	No	No	No	No	No	No		
Lane Alignment	Left	Left	Left	Right	Left	Right		
Median Width(ft)		0	0		0			
Link Offset(ft)		0	0		0			
Crosswalk Width(ft)		16	16		16			
Two way Left Turn Lane								
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10		
Turning Speed (mph)	15			9	15	30		
Number of Detectors			2			1		
Detector Template			Thru			Right		
Leading Detector (ft)			100			20		
Trailing Detector (ft)			0			0		
Detector 1 Position(ft)			0			0		
Detector 1 Size(ft)			6			20		
Detector 1 Type			Cl+Ex			Cl+Ex		
Detector 1 Channel								
Detector 1 Extend (s)			0.0			0.0		
Detector 1 Queue (s)			0.0			0.0		
Detector 1 Delay (s)			0.0			0.0		
Detector 2 Position(ft)			94					
Detector 2 Size(ft)			6					
Detector 2 Type			Cl+Ex					
Detector 2 Channel								
Detector 2 Extend (s)			0.0					
Turn Type			NA			custom		
Protected Phases			2			3 4	3	4
Permitted Phases								
Detector Phase			2			3 4		

Lane Group	EBL	EBT	WBT	WBR	SWL	SWR	Ø3	Ø4
Switch Phase								
Minimum Initial (s)			10.0				10.0	10.0
Minimum Split (s)			15.0				19.0	15.0
Total Split (s)			58.0				36.0	26.0
Total Split (%)			48.3%				30%	22%
Maximum Green (s)			53.0				30.0	21.0
Yellow Time (s)			4.0				4.0	3.5
All-Red Time (s)			1.0				2.0	1.5
Lost Time Adjust (s)			0.0					
Total Lost Time (s)			5.0					
Lead/Lag							Lead	Lag
Lead-Lag Optimize?								
Vehicle Extension (s)			3.0				3.0	3.0
Recall Mode			C-Max				Max	Max
Walk Time (s)							5.0	
Flash Dont Walk (s)							8.0	
Pedestrian Calls (#/hr)							0	
Act Effct Green (s)			53.0			56.0		
Actuated g/C Ratio			0.44			0.47		
v/c Ratio			1.04			0.91		
Control Delay			29.4			41.9		
Queue Delay			1.5			0.0		
Total Delay			30.9			41.9		
LOS			C			D		
Approach Delay			30.9		41.9			
Approach LOS			C		D			

Intersection Summary

Area Type: CBD
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 16 (13%), Referenced to phase 2:WBT, Start of Green
Natural Cycle: 110
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.14
Intersection Signal Delay: 34.6 Intersection LOS: C
Intersection Capacity Utilization 97.3% ICU Level of Service F
Analysis Period (min) 15

Splits and Phases: 11: Route 2/Alewife Brook Parkway & Route 16



Lane Group	WBT	SWR
Lane Group Flow (vph)	2197	1113
v/c Ratio	1.04	0.91
Control Delay	29.4	41.9
Queue Delay	1.5	0.0
Total Delay	30.9	41.9
Queue Length 50th (ft)	~656	442
Queue Length 95th (ft)	m52	#606
Internal Link Dist (ft)	112	
Turn Bay Length (ft)		
Base Capacity (vph)	2109	1222
Starvation Cap Reductn	8	0
Spillback Cap Reductn	0	0
Storage Cap Reductn	0	0
Reduced v/c Ratio	1.05	0.91

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

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

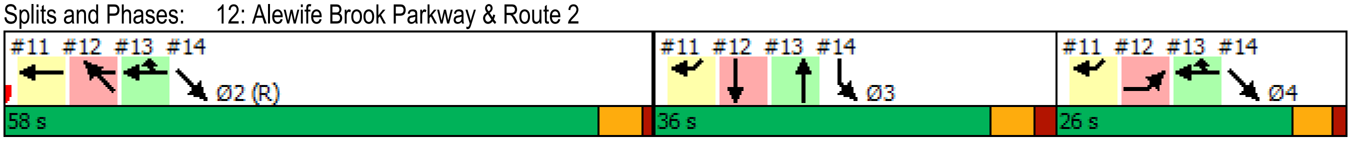
Lane Group	EBL	WBR	SBT	NWT
Lane Configurations				
Traffic Volume (vph)	581	571	241	1560
Future Volume (vph)	581	571	241	1560
Ideal Flow (vphpl)	1900	1900	1900	1900
Lane Width (ft)	13	16	13	13
Lane Util. Factor	0.97	1.00	0.95	0.95
Frt		0.865		
Flt Protected	0.950			
Satd. Flow (prot)	3257	1660	3291	3324
Flt Permitted	0.950			
Satd. Flow (perm)	3257	1660	3291	3324
Right Turn on Red				
Satd. Flow (RTOR)				
Link Speed (mph)			30	30
Link Distance (ft)			202	278
Travel Time (s)			4.6	6.3
Peak Hour Factor	0.90	0.95	0.98	0.97
Heavy Vehicles (%)	0%	1%	2%	1%
Adj. Flow (vph)	646	601	246	1608
Shared Lane Traffic (%)				
Lane Group Flow (vph)	646	601	246	1608
Enter Blocked Intersection	No	No	No	No
Lane Alignment	Left	R NA	Left	L NA
Median Width(ft)			0	0
Link Offset(ft)			0	0
Crosswalk Width(ft)			16	16
Two way Left Turn Lane				
Headway Factor	1.10	0.97	1.10	1.10
Turning Speed (mph)	15	30		
Number of Detectors	1	1	2	2
Detector Template	Left	Right	Thru	Thru
Leading Detector (ft)	20	20	100	100
Trailing Detector (ft)	0	0	0	0
Detector 1 Position(ft)	0	0	0	0
Detector 1 Size(ft)	20	20	6	6
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel				
Detector 1 Extend (s)	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0
Detector 2 Position(ft)			94	94
Detector 2 Size(ft)			6	6
Detector 2 Type			Cl+Ex	Cl+Ex
Detector 2 Channel				
Detector 2 Extend (s)			0.0	0.0
Turn Type	Prot	Prot	NA	NA
Protected Phases	4	2!	3	2!
Permitted Phases				
Detector Phase	4	2	3	2

Lane Group	EBL	WBR	SBT	NWT
Switch Phase				
Minimum Initial (s)	10.0	10.0	10.0	10.0
Minimum Split (s)	15.0	15.0	19.0	15.0
Total Split (s)	26.0	58.0	36.0	58.0
Total Split (%)	21.7%	48.3%	30.0%	48.3%
Maximum Green (s)	21.0	53.0	30.0	53.0
Yellow Time (s)	3.5	4.0	4.0	4.0
All-Red Time (s)	1.5	1.0	2.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	6.0	5.0
Lead/Lag	Lag		Lead	
Lead-Lag Optimize?				
Vehicle Extension (s)	3.0	3.0	3.0	3.0
Recall Mode	Max	C-Max	Max	C-Max
Walk Time (s)			5.0	
Flash Dont Walk (s)			8.0	
Pedestrian Calls (#/hr)			0	
Act Effct Green (s)	21.0	53.0	30.0	53.0
Actuated g/C Ratio	0.18	0.44	0.25	0.44
v/c Ratio	1.14	0.82	0.30	1.10
Control Delay	125.6	27.9	37.7	86.8
Queue Delay	0.0	1.3	0.0	2.1
Total Delay	125.6	29.2	37.7	89.0
LOS	F	C	D	F
Approach Delay			37.7	89.0
Approach LOS			D	F

Intersection Summary	
Area Type: CBD	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 16 (13%), Referenced to phase 2:WBT, Start of Green	
Natural Cycle: 110	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.14	
Intersection Signal Delay: 80.9	Intersection LOS: F
Intersection Capacity Utilization 130.6%	ICU Level of Service H
Analysis Period (min) 15	

! Phase conflict between lane groups.

Splits and Phases: 12: Alewife Brook Parkway & Route 2



Lane Group	EBL	WBR	SBT	NWT
Lane Group Flow (vph)	646	601	246	1608
v/c Ratio	1.14	0.82	0.30	1.10
Control Delay	125.6	27.9	37.7	86.8
Queue Delay	0.0	1.3	0.0	2.1
Total Delay	125.6	29.2	37.7	89.0
Queue Length 50th (ft)	~300	399	81	~741
Queue Length 95th (ft)	#418	#578	119	#880
Internal Link Dist (ft)			122	198
Turn Bay Length (ft)				
Base Capacity (vph)	569	733	822	1468
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	36	0	73
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	1.14	0.86	0.30	1.15

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

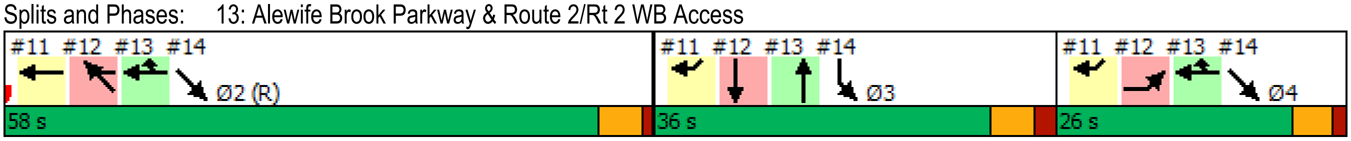
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	0	571	317	0	230	0	0	0	0
Future Volume (vph)	0	0	0	0	571	317	0	230	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		200	0		0	0		0
Storage Lanes	0		0	0		1	0		0	0		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt						0.850						
Flt Protected												
Satd. Flow (prot)	0	0	0	0	1693	1439	0	3217	0	0	0	0
Flt Permitted												
Satd. Flow (perm)	0	0	0	0	1693	1439	0	3217	0	0	0	0
Right Turn on Red			No			No	No		No			No
Satd. Flow (RTOR)												
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		161			1225			227			185	
Travel Time (s)		3.7			27.8			5.2			4.2	
Confl. Peds. (#/hr)						2						
Peak Hour Factor	0.92	0.92	0.92	0.95	0.95	0.95	0.97	0.97	0.97	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	0%	1%	1%	0%	1%	0%	2%	2%	2%
Adj. Flow (vph)	0	0	0	0	601	334	0	237	0	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	601	334	0	237	0	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors					2	1		2				
Detector Template					Thru	Right		Thru				
Leading Detector (ft)					100	20		100				
Trailing Detector (ft)					0	0		0				
Detector 1 Position(ft)					0	0		0				
Detector 1 Size(ft)					6	20		6				
Detector 1 Type					Cl+Ex	Cl+Ex		Cl+Ex				
Detector 1 Channel												
Detector 1 Extend (s)					0.0	0.0		0.0				
Detector 1 Queue (s)					0.0	0.0		0.0				
Detector 1 Delay (s)					0.0	0.0		0.0				
Detector 2 Position(ft)					94			94				
Detector 2 Size(ft)					6			6				
Detector 2 Type					Cl+Ex			Cl+Ex				
Detector 2 Channel												
Detector 2 Extend (s)					0.0			0.0				

Lane Group	Ø2	Ø4
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Ideal Flow (vphpl)		
Storage Length (ft)		
Storage Lanes		
Taper Length (ft)		
Lane Util. Factor		
Ped Bike Factor		
Frt		
Flt Protected		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Right Turn on Red		
Satd. Flow (RTOR)		
Link Speed (mph)		
Link Distance (ft)		
Travel Time (s)		
Confl. Peds. (#/hr)		
Peak Hour Factor		
Heavy Vehicles (%)		
Adj. Flow (vph)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Enter Blocked Intersection		
Lane Alignment		
Median Width(ft)		
Link Offset(ft)		
Crosswalk Width(ft)		
Two way Left Turn Lane		
Headway Factor		
Turning Speed (mph)		
Number of Detectors		
Detector Template		
Leading Detector (ft)		
Trailing Detector (ft)		
Detector 1 Position(ft)		
Detector 1 Size(ft)		
Detector 1 Type		
Detector 1 Channel		
Detector 1 Extend (s)		
Detector 1 Queue (s)		
Detector 1 Delay (s)		
Detector 2 Position(ft)		
Detector 2 Size(ft)		
Detector 2 Type		
Detector 2 Channel		
Detector 2 Extend (s)		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type					NA	Prot		NA				
Protected Phases					2 4	2 4		3				
Permitted Phases												
Detector Phase					2 4	2 4		3				
Switch Phase												
Minimum Initial (s)								10.0				
Minimum Split (s)								19.0				
Total Split (s)								36.0				
Total Split (%)								30.0%				
Maximum Green (s)								30.0				
Yellow Time (s)								4.0				
All-Red Time (s)								2.0				
Lost Time Adjust (s)								0.0				
Total Lost Time (s)								6.0				
Lead/Lag								Lead				
Lead-Lag Optimize?												
Vehicle Extension (s)								3.0				
Recall Mode								Max				
Walk Time (s)								5.0				
Flash Dont Walk (s)								8.0				
Pedestrian Calls (#/hr)								0				
Act Effct Green (s)					79.0	79.0		30.0				
Actuated g/C Ratio					0.66	0.66		0.25				
v/c Ratio					0.54	0.35		0.29				
Control Delay					13.1	10.4		37.7				
Queue Delay					1.7	0.0		0.0				
Total Delay					14.8	10.4		37.7				
LOS					B	B		D				
Approach Delay					13.2			37.7				
Approach LOS					B			D				

Intersection Summary	
Area Type: CBD	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 16 (13%), Referenced to phase 2:WBT, Start of Green	
Natural Cycle: 110	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.14	
Intersection Signal Delay: 18.2	Intersection LOS: B
Intersection Capacity Utilization 50.9%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 13: Alewife Brook Parkway & Route 2/Rt 2 WB Access



Lane Group	Ø2	Ø4
Turn Type		
Protected Phases	2	4
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	10.0	10.0
Minimum Split (s)	15.0	15.0
Total Split (s)	58.0	26.0
Total Split (%)	48%	22%
Maximum Green (s)	53.0	21.0
Yellow Time (s)	4.0	3.5
All-Red Time (s)	1.0	1.5
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag		Lag
Lead-Lag Optimize?		
Vehicle Extension (s)	3.0	3.0
Recall Mode	C-Max	Max
Walk Time (s)		
Flash Dont Walk (s)		
Pedestrian Calls (#/hr)		
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		
Approach LOS		

Intersection Summary

Lane Group	WBT	WBR	NBT
Lane Group Flow (vph)	601	334	237
v/c Ratio	0.54	0.35	0.29
Control Delay	13.1	10.4	37.7
Queue Delay	1.7	0.0	0.0
Total Delay	14.8	10.4	37.7
Queue Length 50th (ft)	227	106	78
Queue Length 95th (ft)	320	159	115
Internal Link Dist (ft)	1145		147
Turn Bay Length (ft)		200	
Base Capacity (vph)	1114	947	804
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	336	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.77	0.35	0.29

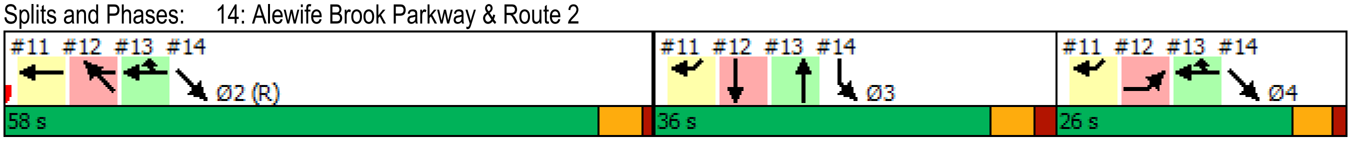
Intersection Summary

Lane Group	SBL	SBR	SEL	SET	NWT	NWR	Ø2	Ø4
Lane Configurations								
Traffic Volume (vph)	241	0	0	952	0	0		
Future Volume (vph)	241	0	0	952	0	0		
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900		
Lane Width (ft)	13	13	13	13	13	13		
Lane Util. Factor	0.97	1.00	1.00	0.95	1.00	1.00		
Frt								
Flt Protected	0.950							
Satd. Flow (prot)	3193	0	0	3324	0	0		
Flt Permitted	0.950							
Satd. Flow (perm)	3193	0	0	3324	0	0		
Right Turn on Red	Yes	Yes				Yes		
Satd. Flow (RTOR)	254							
Link Speed (mph)	30			30	30			
Link Distance (ft)	155			297	139			
Travel Time (s)	3.5			6.8	3.2			
Peak Hour Factor	0.98	0.98	0.90	0.90	0.92	0.92		
Heavy Vehicles (%)	2%	0%	0%	1%	2%	2%		
Adj. Flow (vph)	246	0	0	1058	0	0		
Shared Lane Traffic (%)								
Lane Group Flow (vph)	246	0	0	1058	0	0		
Enter Blocked Intersection	No	No	No	No	No	No		
Lane Alignment	Left	Right	Left	Left	Left	Right		
Median Width(ft)	26			0	0			
Link Offset(ft)	0			0	0			
Crosswalk Width(ft)	16			16	16			
Two way Left Turn Lane								
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10		
Turning Speed (mph)	30	9	15			9		
Number of Detectors	1			2				
Detector Template	Left			Thru				
Leading Detector (ft)	20			100				
Trailing Detector (ft)	0			0				
Detector 1 Position(ft)	0			0				
Detector 1 Size(ft)	20			6				
Detector 1 Type	Cl+Ex			Cl+Ex				
Detector 1 Channel								
Detector 1 Extend (s)	0.0			0.0				
Detector 1 Queue (s)	0.0			0.0				
Detector 1 Delay (s)	0.0			0.0				
Detector 2 Position(ft)				94				
Detector 2 Size(ft)				6				
Detector 2 Type				Cl+Ex				
Detector 2 Channel								
Detector 2 Extend (s)				0.0				
Turn Type	Prot			NA				
Protected Phases	3			2 4			2	4
Permitted Phases								
Detector Phase	3			2 4				

Lane Group	SBL	SBR	SEL	SET	NWT	NWR	Ø2	Ø4
Switch Phase								
Minimum Initial (s)	10.0						10.0	10.0
Minimum Split (s)	19.0						15.0	15.0
Total Split (s)	36.0						58.0	26.0
Total Split (%)	30.0%						48%	22%
Maximum Green (s)	30.0						53.0	21.0
Yellow Time (s)	4.0						4.0	3.5
All-Red Time (s)	2.0						1.0	1.5
Lost Time Adjust (s)	0.0							
Total Lost Time (s)	6.0							
Lead/Lag	Lead							Lag
Lead-Lag Optimize?								
Vehicle Extension (s)	3.0						3.0	3.0
Recall Mode	Max						C-Max	Max
Walk Time (s)	5.0							
Flash Dont Walk (s)	8.0							
Pedestrian Calls (#/hr)	0							
Act Effct Green (s)	30.0			79.0				
Actuated g/C Ratio	0.25			0.66				
v/c Ratio	0.25			0.48				
Control Delay	0.7			11.2				
Queue Delay	0.5			0.0				
Total Delay	1.3			11.2				
LOS	A			B				
Approach Delay	1.3			11.2				
Approach LOS	A			B				

Intersection Summary	
Area Type: CBD	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 16 (13%), Referenced to phase 2:WBT, Start of Green	
Natural Cycle: 110	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.14	
Intersection Signal Delay: 9.3	Intersection LOS: A
Intersection Capacity Utilization 46.7%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 14: Alewife Brook Parkway & Route 2



Lane Group	SBL	SET
Lane Group Flow (vph)	246	1058
v/c Ratio	0.25	0.48
Control Delay	0.7	11.2
Queue Delay	0.5	0.0
Total Delay	1.3	11.2
Queue Length 50th (ft)	0	198
Queue Length 95th (ft)	0	245
Internal Link Dist (ft)	75	217
Turn Bay Length (ft)		
Base Capacity (vph)	988	2188
Starvation Cap Reductn	419	0
Spillback Cap Reductn	0	0
Storage Cap Reductn	0	0
Reduced v/c Ratio	0.43	0.48

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	79	648	65	5	492	1	9	5	4	0	5	104
Future Volume (vph)	79	648	65	5	492	1	9	5	4	0	5	104
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	14	14	14	13	13	13	12	12	12	12	12	12
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
Frt		0.989						0.972			0.871	
Flt Protected		0.995			0.999			0.976				
Satd. Flow (prot)	0	1994	0	0	1961	0	0	1802	0	0	1655	0
Flt Permitted		0.903			0.992			0.807				
Satd. Flow (perm)	0	1810	0	0	1948	0	0	1490	0	0	1655	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		7						5			135	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		215			1126			206			208	
Travel Time (s)		4.9			25.6			4.7			4.7	
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.75	0.75	0.75	0.77	0.77	0.77
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	90	736	74	6	559	1	12	7	5	0	6	135
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	900	0	0	566	0	0	24	0	0	141	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	0.92	0.92	0.92	0.96	0.96	0.96	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	20	100		20	100		20	100		20	100	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		pm+pt	NA			NA	
Protected Phases		4			8		5	2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		5	2		6	6	

Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Heavy Vehicles (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (mph)	
Number of Detectors	
Detector Template	
Leading Detector (ft)	
Trailing Detector (ft)	
Detector 1 Position(ft)	
Detector 1 Size(ft)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Detector 2 Position(ft)	
Detector 2 Size(ft)	
Detector 2 Type	
Detector 2 Channel	
Detector 2 Extend (s)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Switch Phase												
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	21.0	21.0		21.0	21.0		9.0	21.0		14.0	14.0	
Total Split (s)	28.0	28.0		28.0	28.0		10.0	24.0		14.0	14.0	
Total Split (%)	38.6%	38.6%		38.6%	38.6%		13.8%	33.1%		19.3%	19.3%	
Maximum Green (s)	24.0	24.0		24.0	24.0		6.0	20.0		10.0	10.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	1.0	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	
Total Lost Time (s)		4.0			4.0			4.0			4.0	
Lead/Lag							Lead			Lag	Lag	
Lead-Lag Optimize?							Yes			Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	Min		Min	Min	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)		25.0			25.0			6.6			6.6	
Actuated g/C Ratio		0.58			0.58			0.15			0.15	
v/c Ratio		0.85			0.50			0.10			0.38	
Control Delay		21.8			10.4			17.5			8.7	
Queue Delay		48.8			0.0			0.0			0.0	
Total Delay		70.6			10.4			17.5			8.7	
LOS		E			B			B			A	
Approach Delay		70.6			10.4			17.5			8.7	
Approach LOS		E			B			B			A	

Intersection Summary

Area Type: Other

Cycle Length: 72.5

Actuated Cycle Length: 42.8

Natural Cycle: 90

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.85

Intersection Signal Delay: 43.6 Intersection LOS: D

Intersection Capacity Utilization 86.3% ICU Level of Service E

Analysis Period (min) 15

Splits and Phases: 39: Brooks Avenue & Lake Street

Lane Group	Ø9
Switch Phase	
Minimum Initial (s)	4.0
Minimum Split (s)	20.5
Total Split (s)	20.5
Total Split (%)	28%
Maximum Green (s)	16.0
Yellow Time (s)	4.0
All-Red Time (s)	0.5
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Recall Mode	None
Walk Time (s)	5.0
Flash Dont Walk (s)	11.0
Pedestrian Calls (#/hr)	9
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	

Intersection Summary

Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	900	566	24	141
v/c Ratio	0.85	0.50	0.10	0.38
Control Delay	21.8	10.4	17.5	8.7
Queue Delay	48.8	0.0	0.0	0.0
Total Delay	70.6	10.4	17.5	8.7
Queue Length 50th (ft)	97	43	4	1
Queue Length 95th (ft)	#636	#286	20	30
Internal Link Dist (ft)	135	1046	126	128
Turn Bay Length (ft)				
Base Capacity (vph)	1060	1138	728	505
Starvation Cap Reductn	272	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	1.14	0.50	0.03	0.28

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

2027 No-Build Weekday Morning Peak Hour

Intersection	
Int Delay, s/veh	0.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	614	3	1	1189	5	1
Future Vol, veh/h	614	3	1	1189	5	1
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	75	75	87	87	75	75
Heavy Vehicles, %	2	0	0	1	0	0
Mvmt Flow	819	4	1	1367	7	1

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	823	0	2190	821
Stage 1	-	-	-	-	821	-
Stage 2	-	-	-	-	1369	-
Critical Hdwy	-	-	4.1	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	816	-	51	378
Stage 1	-	-	-	-	436	-
Stage 2	-	-	-	-	239	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	816	-	51	378
Mov Cap-2 Maneuver	-	-	-	-	51	-
Stage 1	-	-	-	-	436	-
Stage 2	-	-	-	-	238	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	74
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	60	-	-	816	-
HCM Lane V/C Ratio	0.133	-	-	0.001	-
HCM Control Delay (s)	74	-	-	9.4	0
HCM Lane LOS	F	-	-	A	A
HCM 95th %tile Q(veh)	0.4	-	-	0	-

Intersection						
Int Delay, s/veh	2					

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	601	14	5	1166	24	6
Future Vol, veh/h	601	14	5	1166	24	6
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	75	75	93	93	75	75
Heavy Vehicles, %	2	0	0	1	0	0
Mvmt Flow	801	19	5	1254	32	8

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	820	0	2075	811
Stage 1	-	-	-	-	811	-
Stage 2	-	-	-	-	1264	-
Critical Hdwy	-	-	4.1	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	818	-	60	383
Stage 1	-	-	-	-	440	-
Stage 2	-	-	-	-	268	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	818	-	59	383
Mov Cap-2 Maneuver	-	-	-	-	59	-
Stage 1	-	-	-	-	440	-
Stage 2	-	-	-	-	263	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	107.5
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	71	-	-	818	-
HCM Lane V/C Ratio	0.563	-	-	0.007	-
HCM Control Delay (s)	107.5	-	-	9.4	0
HCM Lane LOS	F	-	-	A	A
HCM 95th %tile Q(veh)	2.4	-	-	0	-

Intersection						
Int Delay, s/veh	0.4					

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	605	5	3	1164	7	1
Future Vol, veh/h	605	5	3	1164	7	1
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	75	75	93	93	75	75
Heavy Vehicles, %	2	0	0	1	0	0
Mvmt Flow	807	7	3	1252	9	1

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	814	0	2069	811
Stage 1	-	-	-	-	811	-
Stage 2	-	-	-	-	1258	-
Critical Hdwy	-	-	4.1	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	822	-	60	383
Stage 1	-	-	-	-	440	-
Stage 2	-	-	-	-	270	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	822	-	59	383
Mov Cap-2 Maneuver	-	-	-	-	59	-
Stage 1	-	-	-	-	440	-
Stage 2	-	-	-	-	267	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	69.8
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	66	-	-	822	-
HCM Lane V/C Ratio	0.162	-	-	0.004	-
HCM Control Delay (s)	69.8	-	-	9.4	0
HCM Lane LOS	F	-	-	A	A
HCM 95th %tile Q(veh)	0.5	-	-	0	-

Intersection	
Int Delay, s/veh	1.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	585	18	8	1148	5	8	0	14	4	0	11
Future Vol, veh/h	0	585	18	8	1148	5	8	0	14	4	0	11
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	79	79	79	96	96	96	80	80	80	92	92	92
Heavy Vehicles, %	0	1	0	0	0	0	0	0	10	0	0	0
Mvmt Flow	0	741	23	8	1196	5	10	0	18	4	0	12

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1201	0	0	764	0	0	1974	1970	753	1977	1979	1199
Stage 1	-	-	-	-	-	-	753	753	-	1215	1215	-
Stage 2	-	-	-	-	-	-	1221	1217	-	762	764	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.3	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.39	3.5	4	3.3
Pot Cap-1 Maneuver	588	-	-	858	-	-	47	63	397	47	62	228
Stage 1	-	-	-	-	-	-	405	420	-	224	256	-
Stage 2	-	-	-	-	-	-	222	256	-	400	416	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	588	-	-	858	-	-	44	61	397	44	60	228
Mov Cap-2 Maneuver	-	-	-	-	-	-	44	61	-	44	60	-
Stage 1	-	-	-	-	-	-	405	420	-	224	249	-
Stage 2	-	-	-	-	-	-	204	249	-	382	416	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.1	53.5	44.2
HCM LOS			F	E

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	101	588	-	-	858	-	-	108
HCM Lane V/C Ratio	0.272	-	-	-	0.01	-	-	0.151
HCM Control Delay (s)	53.5	0	-	-	9.2	0	-	44.2
HCM Lane LOS	F	A	-	-	A	A	-	E
HCM 95th %tile Q(veh)	1	0	-	-	0	-	-	0.5

Intersection	
Int Delay, s/veh	4.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	3	593	7	24	1136	3	9	0	22	3	0	16
Future Vol, veh/h	3	593	7	24	1136	3	9	0	22	3	0	16
Conflicting Peds, #/hr	0	0	0	304	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	84	84	84	97	97	97	75	75	75	75	75	75
Heavy Vehicles, %	0	2	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	4	706	8	25	1171	3	12	0	29	4	0	21

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1174	0	0	1018	0	0	2255	2246	1014	1956	2249	1173
Stage 1	-	-	-	-	-	-	1022	1022	-	1223	1223	-
Stage 2	-	-	-	-	-	-	1233	1224	-	733	1026	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	602	-	-	689	-	-	30	42	292	49	42	236
Stage 1	-	-	-	-	-	-	287	316	-	221	254	-
Stage 2	-	-	-	-	-	-	219	254	-	415	315	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	602	-	-	514	-	-	18	27	218	38	27	236
Mov Cap-2 Maneuver	-	-	-	-	-	-	18	27	-	38	27	-
Stage 1	-	-	-	-	-	-	212	234	-	219	218	-
Stage 2	-	-	-	-	-	-	171	218	-	355	233	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0.3	192.1	39.6
HCM LOS			F	E

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	52	602	-	-	514	-	-	129
HCM Lane V/C Ratio	0.795	0.006	-	-	0.048	-	-	0.196
HCM Control Delay (s)	192.1	11	0	-	12.4	0	-	39.6
HCM Lane LOS	F	B	A	-	B	A	-	E
HCM 95th %tile Q(veh)	3.3	0	-	-	0.2	-	-	0.7

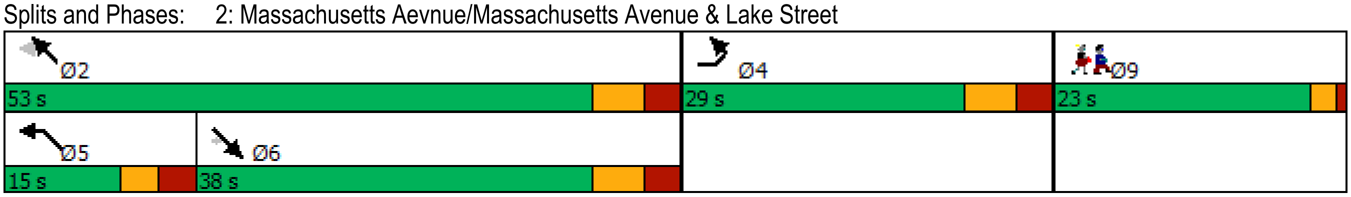
Lane Group	EBL	EBR	SET	SER	NWL	NWT	Ø9
Lane Configurations							
Traffic Volume (vph)	258	291	851	608	402	454	
Future Volume (vph)	258	291	851	608	402	454	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Lane Width (ft)	16	16	11	10	11	12	
Storage Length (ft)	0	0		55	150		
Storage Lanes	1	0		1	1		
Taper Length (ft)	25				25		
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	1.00	
Frt	0.928			0.850			
Flt Protected	0.977				0.950		
Satd. Flow (prot)	1933	0	3421	1492	1728	1863	
Flt Permitted	0.977				0.133		
Satd. Flow (perm)	1933	0	3421	1492	242	1863	
Right Turn on Red		Yes		Yes			
Satd. Flow (RTOR)	49			211			
Link Speed (mph)	30		30			30	
Link Distance (ft)	1126		640			645	
Travel Time (s)	25.6		14.5			14.7	
Peak Hour Factor	0.91	0.91	0.92	0.92	0.92	0.92	
Heavy Vehicles (%)	1%	1%	2%	1%	1%	2%	
Adj. Flow (vph)	284	320	925	661	437	493	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	604	0	925	661	437	493	
Enter Blocked Intersection	No	No	No	No	No	No	
Lane Alignment	Left	Right	Left	Right	Left	Left	
Median Width(ft)	16		11			11	
Link Offset(ft)	0		0			0	
Crosswalk Width(ft)	16		16			16	
Two way Left Turn Lane							
Headway Factor	0.85	0.85	1.04	1.09	1.04	1.00	
Turning Speed (mph)	15	9		9	15		
Number of Detectors	1		2	1	1	2	
Detector Template	Left		Thru	Right	Left	Thru	
Leading Detector (ft)	20		100	20	20	100	
Trailing Detector (ft)	0		0	0	0	0	
Detector 1 Position(ft)	0		0	0	0	0	
Detector 1 Size(ft)	20		6	20	20	6	
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel							
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	0.0	
Detector 2 Position(ft)			94			94	
Detector 2 Size(ft)			6			6	
Detector 2 Type			Cl+Ex			Cl+Ex	
Detector 2 Channel							
Detector 2 Extend (s)			0.0			0.0	
Turn Type	Prot		NA	Perm	pm+pt	NA	

Lane Group	EBL	EBR	SET	SER	NWL	NWT	Ø9
Protected Phases	4		6		5	2	9
Permitted Phases				6	2		
Detector Phase	4		6	6	5	2	
Switch Phase							
Minimum Initial (s)	4.0		4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	23.0		23.0	23.0	10.0	23.0	19.0
Total Split (s)	29.0		38.0	38.0	15.0	53.0	23.0
Total Split (%)	27.6%		36.2%	36.2%	14.3%	50.5%	22%
Maximum Green (s)	22.0		31.0	31.0	9.0	46.0	20.0
Yellow Time (s)	4.0		4.0	4.0	3.0	4.0	2.0
All-Red Time (s)	3.0		3.0	3.0	3.0	3.0	1.0
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0	
Total Lost Time (s)	7.0		7.0	7.0	6.0	7.0	
Lead/Lag			Lag	Lag	Lead		
Lead-Lag Optimize?			Yes	Yes	Yes		
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0	3.0
Recall Mode	None		Max	Max	None	Max	None
Walk Time (s)							5.0
Flash Dont Walk (s)							11.0
Pedestrian Calls (#/hr)							20
Act Effct Green (s)	22.2		31.3	31.3	47.5	46.5	
Actuated g/C Ratio	0.25		0.35	0.35	0.53	0.52	
v/c Ratio	1.17		0.77	1.00	1.57	0.51	
Control Delay	126.4		33.0	58.6	292.8	18.3	
Queue Delay	0.0		0.0	0.0	0.0	0.0	
Total Delay	126.4		33.0	58.6	292.8	18.3	
LOS	F		C	E	F	B	
Approach Delay	126.4		43.6			147.3	
Approach LOS	F		D			F	

Intersection Summary

Area Type: Other
Cycle Length: 105
Actuated Cycle Length: 89.6
Natural Cycle: 150
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.57
Intersection Signal Delay: 90.6 Intersection LOS: F
Intersection Capacity Utilization 94.6% ICU Level of Service F
Analysis Period (min) 15

Splits and Phases: 2: Massachusetts Aevnue/Massachusetts Avenue & Lake Street



Lane Group	EBL	SET	SER	NWL	NWT
Lane Group Flow (vph)	604	925	661	437	493
v/c Ratio	1.17	0.77	1.00	1.57	0.51
Control Delay	126.4	33.0	58.6	292.8	18.3
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	126.4	33.0	58.6	292.8	18.3
Queue Length 50th (ft)	~335	208	237	~250	140
Queue Length 95th (ft)	#698	#409	#604	#559	332
Internal Link Dist (ft)	1046	560			565
Turn Bay Length (ft)			55	150	
Base Capacity (vph)	516	1196	659	279	966
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	1.17	0.77	1.00	1.57	0.51

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

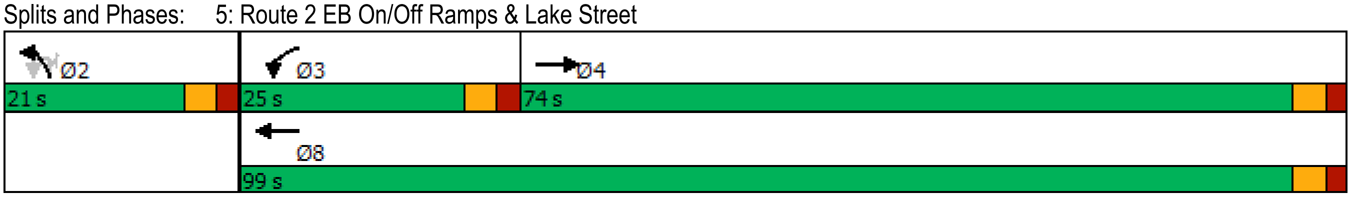
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lane Group	EBT	EBR	WBL	WBT	NBU	NBL	NBR
Lane Configurations							
Traffic Volume (vph)	311	493	210	419	271	221	520
Future Volume (vph)	311	493	210	419	271	221	520
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	16	16	10	11	12	16	14
Storage Length (ft)		150	110			0	0
Storage Lanes		1	1			1	1
Taper Length (ft)			25			25	
Lane Util. Factor	1.00	1.00	1.00	0.95	1.00	1.00	1.00
Frt		0.850					0.850
Flt Protected			0.950			0.950	
Satd. Flow (prot)	2132	1812	1685	3455	0	2037	1706
Flt Permitted			0.950			0.950	
Satd. Flow (perm)	2132	1812	1685	3455	0	2037	1706
Right Turn on Red		Yes					Yes
Satd. Flow (RTOR)		333					402
Link Speed (mph)	30			30		30	
Link Distance (ft)	239			505		387	
Travel Time (s)	5.4			11.5		8.8	
Peak Hour Factor	0.91	0.91	0.84	0.84	0.91	0.91	0.91
Heavy Vehicles (%)	1%	1%	0%	1%	0%	1%	1%
Adj. Flow (vph)	342	542	250	499	298	243	571
Shared Lane Traffic (%)							
Lane Group Flow (vph)	342	542	250	499	0	541	571
Enter Blocked Intersection	No	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	R NA	Left	Right
Median Width(ft)	12			12		16	
Link Offset(ft)	0			0		0	
Crosswalk Width(ft)	16			16		16	
Two way Left Turn Lane							
Headway Factor	0.85	0.85	1.09	1.04	1.00	0.85	0.92
Turning Speed (mph)		9	15		9	15	9
Number of Detectors	2	1	1	2	1	1	1
Detector Template	Thru	Right	Left	Thru	Left	Left	Right
Leading Detector (ft)	100	20	20	100	20	20	20
Trailing Detector (ft)	0	0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0	0	0
Detector 1 Size(ft)	6	20	20	6	20	20	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel							
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)	94			94			
Detector 2 Size(ft)	6			6			
Detector 2 Type	Cl+Ex			Cl+Ex			
Detector 2 Channel							
Detector 2 Extend (s)	0.0			0.0			
Turn Type	NA	Free	Prot	NA	Perm	Prot	Perm

Lane Group	EBT	EBR	WBL	WBT	NBU	NBL	NBR
Protected Phases	4		3	8		2	
Permitted Phases		Free			2		2
Detector Phase	4		3	8	2	2	2
Switch Phase							
Minimum Initial (s)	4.0		4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	21.0		9.0	21.0	21.0	21.0	21.0
Total Split (s)	74.0		25.0	99.0	21.0	21.0	21.0
Total Split (%)	61.7%		20.8%	82.5%	17.5%	17.5%	17.5%
Maximum Green (s)	69.0		20.0	94.0	16.0	16.0	16.0
Yellow Time (s)	3.0		3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0		2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0		0.0	0.0		0.0	0.0
Total Lost Time (s)	5.0		5.0	5.0		5.0	5.0
Lead/Lag	Lag		Lead				
Lead-Lag Optimize?	Yes		Yes				
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0	3.0
Recall Mode	None		None	None	Max	Max	Max
Walk Time (s)	5.0			5.0	5.0	5.0	5.0
Flash Dont Walk (s)	11.0			11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0			0	0	0	0
Act Effct Green (s)	15.7	63.2	16.2	37.0		16.2	16.2
Actuated g/C Ratio	0.25	1.00	0.26	0.59		0.26	0.26
v/c Ratio	0.64	0.30	0.58	0.25		1.04	0.78
Control Delay	27.7	0.4	27.3	6.5		78.8	16.8
Queue Delay	0.0	0.0	0.0	0.0		0.0	0.0
Total Delay	27.7	0.4	27.3	6.5		78.8	16.8
LOS	C	A	C	A		E	B
Approach Delay	11.0			13.4		47.0	
Approach LOS	B			B		D	

Intersection Summary	
Area Type: Other	
Cycle Length: 120	
Actuated Cycle Length: 63.2	
Natural Cycle: 60	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 1.04	
Intersection Signal Delay: 26.2	Intersection LOS: C
Intersection Capacity Utilization 67.8%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 5: Route 2 EB On/Off Ramps & Lake Street



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	342	542	250	499	541	571
v/c Ratio	0.64	0.30	0.58	0.25	1.04	0.78
Control Delay	27.7	0.4	27.3	6.5	78.8	16.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.7	0.4	27.3	6.5	78.8	16.8
Queue Length 50th (ft)	118	0	83	42	~234	54
Queue Length 95th (ft)	204	0	151	57	#482	#243
Internal Link Dist (ft)	159			425	307	
Turn Bay Length (ft)		150	110			
Base Capacity (vph)	2110	1812	538	3455	520	735
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	0.16	0.30	0.46	0.14	1.04	0.78

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

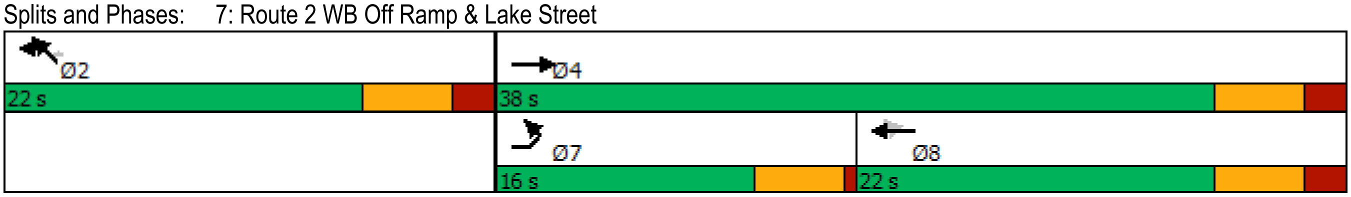
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (vph)	224	607	0	0	478	716	0	0	0	151	6	10
Future Volume (vph)	224	607	0	0	478	716	0	0	0	151	6	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	11	10	12	12	12	11	12	16
Storage Length (ft)	250		0	0		75	0		0	100		0
Storage Lanes	1		0	0		1	0		0	1		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00
Frt						0.850						0.850
Flt Protected	0.950									0.950	0.956	
Satd. Flow (prot)	1805	1881	0	0	1837	1492	0	0	0	1579	1594	1830
Flt Permitted	0.950									0.950	0.956	
Satd. Flow (perm)	1805	1881	0	0	1837	1492	0	0	0	1579	1594	1830
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						490						136
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		505			380			459			529	
Travel Time (s)		11.5			8.6			10.4			12.0	
Peak Hour Factor	0.88	0.88	0.88	0.92	0.92	0.92	0.92	0.92	0.92	0.81	0.81	0.81
Heavy Vehicles (%)	0%	1%	0%	0%	0%	1%	0%	0%	0%	5%	50%	0%
Adj. Flow (vph)	255	690	0	0	520	778	0	0	0	186	7	12
Shared Lane Traffic (%)										48%		
Lane Group Flow (vph)	255	690	0	0	520	778	0	0	0	97	96	12
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			11			11	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.04	1.09	1.00	1.00	1.00	1.04	1.00	0.85
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2			2	1				1	2	1
Detector Template	Left	Thru			Thru	Right				Left	Thru	Right
Leading Detector (ft)	20	100			100	20				20	100	20
Trailing Detector (ft)	0	0			0	0				0	0	0
Detector 1 Position(ft)	0	0			0	0				0	0	0
Detector 1 Size(ft)	20	6			6	20				20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex			Cl+Ex	Cl+Ex				Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0			0.0	0.0				0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0			0.0	0.0				0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0			0.0	0.0				0.0	0.0	0.0
Detector 2 Position(ft)		94			94						94	
Detector 2 Size(ft)		6			6						6	
Detector 2 Type		Cl+Ex			Cl+Ex						Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0						0.0	
Turn Type	Prot	NA			NA	Perm				Split	NA	Perm

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Protected Phases	7	4			8					2	2	
Permitted Phases						8						2
Detector Phase	7	4			8	8				2	2	2
Switch Phase												
Minimum Initial (s)	4.0	4.0			4.0	4.0				4.0	4.0	4.0
Minimum Split (s)	8.5	22.0			22.0	22.0				22.0	22.0	22.0
Total Split (s)	16.0	38.0			22.0	22.0				22.0	22.0	22.0
Total Split (%)	26.7%	63.3%			36.7%	36.7%				36.7%	36.7%	36.7%
Maximum Green (s)	11.5	32.0			16.0	16.0				16.0	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)	0.5	2.0			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)	4.5	6.0			6.0	6.0				6.0	6.0	6.0
Lead/Lag	Lead				Lag	Lag						
Lead-Lag Optimize?	Yes				Yes	Yes						
Vehicle Extension (s)	3.0	3.0			3.0	3.0				3.0	3.0	3.0
Recall Mode	None	None			None	None				Max	Max	Max
Walk Time (s)		5.0			5.0	5.0				5.0	5.0	5.0
Flash Dont Walk (s)		11.0			11.0	11.0				11.0	11.0	11.0
Pedestrian Calls (#/hr)		0			0	0				0	0	0
Act Effct Green (s)	11.0	31.5			16.0	16.0				16.0	16.0	16.0
Actuated g/C Ratio	0.18	0.53			0.27	0.27				0.27	0.27	0.27
v/c Ratio	0.77	0.69			1.05	1.03				0.23	0.22	0.02
Control Delay	40.9	15.0			81.3	51.2				19.0	18.9	0.1
Queue Delay	0.0	0.0			0.0	0.0				0.0	0.0	0.0
Total Delay	40.9	15.0			81.3	51.2				19.0	18.9	0.1
LOS	D	B			F	D				B	B	A
Approach Delay		22.0			63.2						17.8	
Approach LOS		C			E						B	

Intersection Summary

Area Type: Other
Cycle Length: 60
Actuated Cycle Length: 59.5
Natural Cycle: 80
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.05
Intersection Signal Delay: 43.5 Intersection LOS: D
Intersection Capacity Utilization 74.8% ICU Level of Service D
Analysis Period (min) 15

Splits and Phases: 7: Route 2 WB Off Ramp & Lake Street



Lane Group	EBL	EBT	WBT	WBR	NWL	NWT	NWR
Lane Group Flow (vph)	255	690	520	778	97	96	12
v/c Ratio	0.77	0.69	1.05	1.03	0.23	0.22	0.02
Control Delay	40.9	15.0	81.3	51.2	19.0	18.9	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	40.9	15.0	81.3	51.2	19.0	18.9	0.1
Queue Length 50th (ft)	88	167	~214	~135	28	28	0
Queue Length 95th (ft)	#179	265	#378	#357	56	55	0
Internal Link Dist (ft)		425	300			449	
Turn Bay Length (ft)	250			75	100		
Base Capacity (vph)	348	1012	494	759	425	429	591
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.73	0.68	1.05	1.03	0.23	0.22	0.02

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

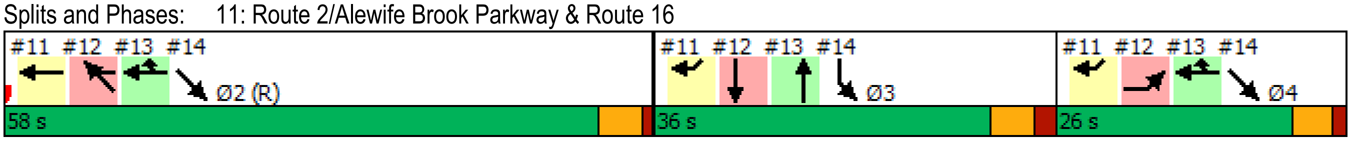
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lane Group	EBL	EBT	WBT	WBR	SWL	SWR	Ø3	Ø4
Lane Configurations								
Traffic Volume (vph)	0	0	1596	0	0	1062		
Future Volume (vph)	0	0	1596	0	0	1062		
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900		
Lane Width (ft)	13	13	13	13	13	13		
Lane Util. Factor	1.00	1.00	0.91	1.00	1.00	0.88		
Frt						0.850		
Flt Protected								
Satd. Flow (prot)	0	0	4729	0	0	2617		
Flt Permitted								
Satd. Flow (perm)	0	0	4729	0	0	2617		
Right Turn on Red				Yes		Yes		
Satd. Flow (RTOR)						7		
Link Speed (mph)		30	30		30			
Link Distance (ft)		201	192		296			
Travel Time (s)		4.6	4.4		6.7			
Peak Hour Factor	0.92	0.92	0.90	0.92	0.92	0.85		
Heavy Vehicles (%)	2%	2%	2%	2%	2%	1%		
Adj. Flow (vph)	0	0	1773	0	0	1249		
Shared Lane Traffic (%)								
Lane Group Flow (vph)	0	0	1773	0	0	1249		
Enter Blocked Intersection	No	No	No	No	No	No		
Lane Alignment	Left	Left	Left	Right	Left	Right		
Median Width(ft)		0	0		0			
Link Offset(ft)		0	0		0			
Crosswalk Width(ft)		16	16		16			
Two way Left Turn Lane								
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10		
Turning Speed (mph)	15			9	15	30		
Number of Detectors			2			1		
Detector Template			Thru			Right		
Leading Detector (ft)			100			20		
Trailing Detector (ft)			0			0		
Detector 1 Position(ft)			0			0		
Detector 1 Size(ft)			6			20		
Detector 1 Type			Cl+Ex			Cl+Ex		
Detector 1 Channel								
Detector 1 Extend (s)			0.0			0.0		
Detector 1 Queue (s)			0.0			0.0		
Detector 1 Delay (s)			0.0			0.0		
Detector 2 Position(ft)			94					
Detector 2 Size(ft)			6					
Detector 2 Type			Cl+Ex					
Detector 2 Channel								
Detector 2 Extend (s)			0.0					
Turn Type			NA			custom		
Protected Phases			2			3 4	3	4
Permitted Phases								
Detector Phase			2			3 4		

Lane Group	EBL	EBT	WBT	WBR	SWL	SWR	Ø3	Ø4
Switch Phase								
Minimum Initial (s)			10.0				10.0	10.0
Minimum Split (s)			15.0				19.0	15.0
Total Split (s)			58.0				36.0	26.0
Total Split (%)			48.3%				30%	22%
Maximum Green (s)			53.0				30.0	21.0
Yellow Time (s)			4.0				4.0	3.5
All-Red Time (s)			1.0				2.0	1.5
Lost Time Adjust (s)			0.0					
Total Lost Time (s)			5.0					
Lead/Lag							Lead	Lag
Lead-Lag Optimize?								
Vehicle Extension (s)			3.0				3.0	3.0
Recall Mode			C-Max				Max	Max
Walk Time (s)							5.0	
Flash Dont Walk (s)							8.0	
Pedestrian Calls (#/hr)							0	
Act Effct Green (s)			53.0			56.0		
Actuated g/C Ratio			0.44			0.47		
v/c Ratio			0.85			1.02		
Control Delay			5.6			62.8		
Queue Delay			4.5			0.0		
Total Delay			10.1			62.8		
LOS			B			E		
Approach Delay			10.1		62.8			
Approach LOS			B		E			

Intersection Summary	
Area Type: CBD	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 16 (13%), Referenced to phase 2:WBT, Start of Green	
Natural Cycle: 110	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.09	
Intersection Signal Delay: 31.9	Intersection LOS: C
Intersection Capacity Utilization 84.7%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 11: Route 2/Alewife Brook Parkway & Route 16



Lane Group	WBT	SWR
Lane Group Flow (vph)	1773	1249
v/c Ratio	0.85	1.02
Control Delay	5.6	62.8
Queue Delay	4.5	0.0
Total Delay	10.1	62.8
Queue Length 50th (ft)	43	~581
Queue Length 95th (ft)	m40	#659
Internal Link Dist (ft)	112	
Turn Bay Length (ft)		
Base Capacity (vph)	2088	1225
Starvation Cap Reductn	252	0
Spillback Cap Reductn	0	0
Storage Cap Reductn	0	0
Reduced v/c Ratio	0.97	1.02

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

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

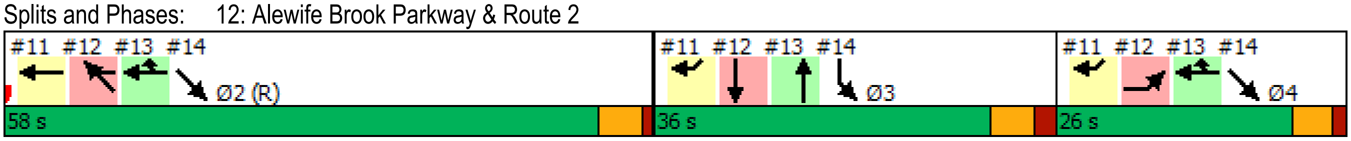
Lane Group	EBL	WBR	SBT	NWT
Lane Configurations				
Traffic Volume (vph)	505	169	506	1427
Future Volume (vph)	505	169	506	1427
Ideal Flow (vphpl)	1900	1900	1900	1900
Lane Width (ft)	13	16	13	13
Lane Util. Factor	0.97	1.00	0.95	0.95
Frt		0.865		
Flt Protected	0.950			
Satd. Flow (prot)	3224	1581	3291	3291
Flt Permitted	0.950			
Satd. Flow (perm)	3224	1581	3291	3291
Right Turn on Red				
Satd. Flow (RTOR)				
Link Speed (mph)			30	30
Link Distance (ft)			202	278
Travel Time (s)			4.6	6.3
Peak Hour Factor	0.97	0.94	0.85	0.90
Heavy Vehicles (%)	1%	6%	2%	2%
Adj. Flow (vph)	521	180	595	1586
Shared Lane Traffic (%)				
Lane Group Flow (vph)	521	180	595	1586
Enter Blocked Intersection	No	No	No	No
Lane Alignment	Left	R NA	Left	L NA
Median Width(ft)			0	0
Link Offset(ft)			0	0
Crosswalk Width(ft)			16	16
Two way Left Turn Lane				
Headway Factor	1.10	0.97	1.10	1.10
Turning Speed (mph)	15	30		
Number of Detectors	1	1	2	2
Detector Template	Left	Right	Thru	Thru
Leading Detector (ft)	20	20	100	100
Trailing Detector (ft)	0	0	0	0
Detector 1 Position(ft)	0	0	0	0
Detector 1 Size(ft)	20	20	6	6
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel				
Detector 1 Extend (s)	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0
Detector 2 Position(ft)			94	94
Detector 2 Size(ft)			6	6
Detector 2 Type			Cl+Ex	Cl+Ex
Detector 2 Channel				
Detector 2 Extend (s)			0.0	0.0
Turn Type	Prot	Prot	NA	NA
Protected Phases	4	2!	3	2!
Permitted Phases				
Detector Phase	4	2	3	2

Lane Group	EBL	WBR	SBT	NWT
Switch Phase				
Minimum Initial (s)	10.0	10.0	10.0	10.0
Minimum Split (s)	15.0	15.0	19.0	15.0
Total Split (s)	26.0	58.0	36.0	58.0
Total Split (%)	21.7%	48.3%	30.0%	48.3%
Maximum Green (s)	21.0	53.0	30.0	53.0
Yellow Time (s)	3.5	4.0	4.0	4.0
All-Red Time (s)	1.5	1.0	2.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	6.0	5.0
Lead/Lag	Lag		Lead	
Lead-Lag Optimize?				
Vehicle Extension (s)	3.0	3.0	3.0	3.0
Recall Mode	Max	C-Max	Max	C-Max
Walk Time (s)			5.0	
Flash Dont Walk (s)			8.0	
Pedestrian Calls (#/hr)			0	
Act Effct Green (s)	21.0	53.0	30.0	53.0
Actuated g/C Ratio	0.18	0.44	0.25	0.44
v/c Ratio	0.92	0.26	0.72	1.09
Control Delay	72.2	14.3	47.1	85.5
Queue Delay	0.0	2.4	0.0	3.6
Total Delay	72.2	16.7	47.1	89.1
LOS	E	B	D	F
Approach Delay			47.1	89.1
Approach LOS			D	F

Intersection Summary	
Area Type: CBD	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 16 (13%), Referenced to phase 2:WBT, Start of Green	
Natural Cycle: 110	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.09	
Intersection Signal Delay: 72.8	Intersection LOS: E
Intersection Capacity Utilization 103.7%	ICU Level of Service G
Analysis Period (min) 15	

! Phase conflict between lane groups.

Splits and Phases: 12: Alewife Brook Parkway & Route 2



Lane Group	EBL	WBR	SBT	NWT
Lane Group Flow (vph)	521	180	595	1586
v/c Ratio	0.92	0.26	0.72	1.09
Control Delay	72.2	14.3	47.1	85.5
Queue Delay	0.0	2.4	0.0	3.6
Total Delay	72.2	16.7	47.1	89.1
Queue Length 50th (ft)	206	86	223	~728
Queue Length 95th (ft)	#308	138	269	#868
Internal Link Dist (ft)			122	198
Turn Bay Length (ft)				
Base Capacity (vph)	564	698	822	1453
Starvation Cap Reductn	0	397	0	0
Spillback Cap Reductn	0	6	0	13
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.92	0.60	0.72	1.10

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

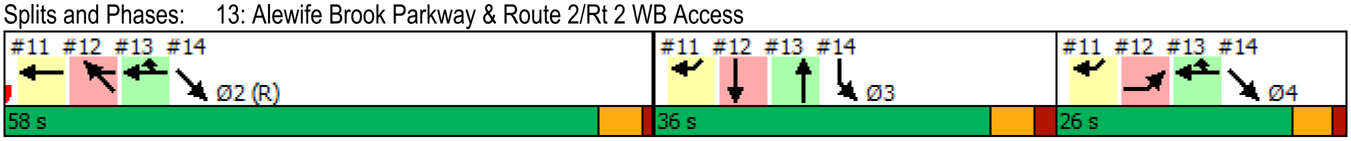
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↑	↱		↑↑				
Traffic Volume (vph)	0	0	0	0	169	54	0	224	0	0	0	0
Future Volume (vph)	0	0	0	0	169	54	0	224	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		200	0		0	0		0
Storage Lanes	0		0	0		1	0		0	0		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt						0.850						
Flt Protected												
Satd. Flow (prot)	0	0	0	0	1613	1333	0	3154	0	0	0	0
Flt Permitted												
Satd. Flow (perm)	0	0	0	0	1613	1333	0	3154	0	0	0	0
Right Turn on Red			No			No	No		No			No
Satd. Flow (RTOR)												
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		161			1225			227			185	
Travel Time (s)		3.7			27.8			5.2			4.2	
Confl. Peds. (#/hr)						2						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.90	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	0%	6%	9%	2%	3%	2%	2%	2%	2%
Adj. Flow (vph)	0	0	0	0	184	59	0	249	0	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	184	59	0	249	0	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors					2	1		2				
Detector Template					Thru	Right		Thru				
Leading Detector (ft)					100	20		100				
Trailing Detector (ft)					0	0		0				
Detector 1 Position(ft)					0	0		0				
Detector 1 Size(ft)					6	20		6				
Detector 1 Type					Cl+Ex	Cl+Ex		Cl+Ex				
Detector 1 Channel												
Detector 1 Extend (s)					0.0	0.0		0.0				
Detector 1 Queue (s)					0.0	0.0		0.0				
Detector 1 Delay (s)					0.0	0.0		0.0				
Detector 2 Position(ft)					94			94				
Detector 2 Size(ft)					6			6				
Detector 2 Type					Cl+Ex			Cl+Ex				
Detector 2 Channel												
Detector 2 Extend (s)					0.0			0.0				

Lane Group	Ø2	Ø4
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Ideal Flow (vphpl)		
Storage Length (ft)		
Storage Lanes		
Taper Length (ft)		
Lane Util. Factor		
Ped Bike Factor		
Frt		
Flt Protected		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Right Turn on Red		
Satd. Flow (RTOR)		
Link Speed (mph)		
Link Distance (ft)		
Travel Time (s)		
Confl. Peds. (#/hr)		
Peak Hour Factor		
Heavy Vehicles (%)		
Adj. Flow (vph)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Enter Blocked Intersection		
Lane Alignment		
Median Width(ft)		
Link Offset(ft)		
Crosswalk Width(ft)		
Two way Left Turn Lane		
Headway Factor		
Turning Speed (mph)		
Number of Detectors		
Detector Template		
Leading Detector (ft)		
Trailing Detector (ft)		
Detector 1 Position(ft)		
Detector 1 Size(ft)		
Detector 1 Type		
Detector 1 Channel		
Detector 1 Extend (s)		
Detector 1 Queue (s)		
Detector 1 Delay (s)		
Detector 2 Position(ft)		
Detector 2 Size(ft)		
Detector 2 Type		
Detector 2 Channel		
Detector 2 Extend (s)		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type					NA	Prot		NA				
Protected Phases					2 4	2 4		3				
Permitted Phases												
Detector Phase					2 4	2 4		3				
Switch Phase												
Minimum Initial (s)								10.0				
Minimum Split (s)								19.0				
Total Split (s)								36.0				
Total Split (%)								30.0%				
Maximum Green (s)								30.0				
Yellow Time (s)								4.0				
All-Red Time (s)								2.0				
Lost Time Adjust (s)								0.0				
Total Lost Time (s)								6.0				
Lead/Lag								Lead				
Lead-Lag Optimize?												
Vehicle Extension (s)								3.0				
Recall Mode								Max				
Walk Time (s)								5.0				
Flash Dont Walk (s)								8.0				
Pedestrian Calls (#/hr)								0				
Act Effct Green (s)					79.0	79.0		30.0				
Actuated g/C Ratio					0.66	0.66		0.25				
v/c Ratio					0.17	0.07		0.32				
Control Delay					8.4	7.6		38.0				
Queue Delay					0.1	0.0		0.0				
Total Delay					8.5	7.6		38.0				
LOS					A	A		D				
Approach Delay					8.3			38.0				
Approach LOS					A			D				

Intersection Summary	
Area Type: CBD	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 16 (13%), Referenced to phase 2:WBT, Start of Green	
Natural Cycle: 110	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.09	
Intersection Signal Delay: 23.3	Intersection LOS: C
Intersection Capacity Utilization 27.4%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 13: Alewife Brook Parkway & Route 2/Rt 2 WB Access



Lane Group	Ø2	Ø4
Turn Type		
Protected Phases	2	4
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	10.0	10.0
Minimum Split (s)	15.0	15.0
Total Split (s)	58.0	26.0
Total Split (%)	48%	22%
Maximum Green (s)	53.0	21.0
Yellow Time (s)	4.0	3.5
All-Red Time (s)	1.0	1.5
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag		Lag
Lead-Lag Optimize?		
Vehicle Extension (s)	3.0	3.0
Recall Mode	C-Max	Max
Walk Time (s)		
Flash Dont Walk (s)		
Pedestrian Calls (#/hr)		
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		
Approach LOS		

Intersection Summary

Lane Group	WBT	WBR	NBT
Lane Group Flow (vph)	184	59	249
v/c Ratio	0.17	0.07	0.32
Control Delay	8.4	7.6	38.0
Queue Delay	0.1	0.0	0.0
Total Delay	8.5	7.6	38.0
Queue Length 50th (ft)	50	15	83
Queue Length 95th (ft)	81	31	121
Internal Link Dist (ft)	1145		147
Turn Bay Length (ft)		200	
Base Capacity (vph)	1061	877	788
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	223	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.22	0.07	0.32

Intersection Summary

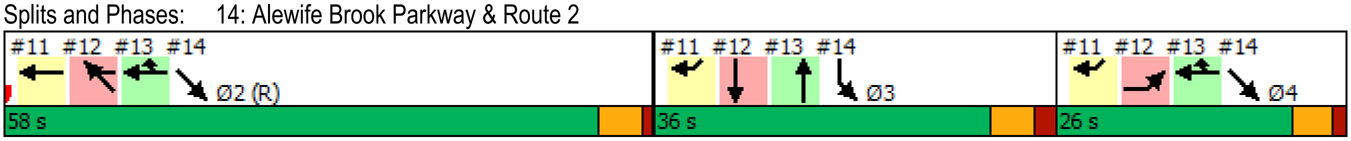
Lane Group	SBL	SBR	SEL	SET	NWT	NWR	Ø2	Ø4
Lane Configurations								
Traffic Volume (vph)	506	0	0	1102	0	0		
Future Volume (vph)	506	0	0	1102	0	0		
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900		
Lane Width (ft)	13	13	13	13	13	13		
Lane Util. Factor	0.97	1.00	1.00	0.95	1.00	1.00		
Frt								
Flt Protected	0.950							
Satd. Flow (prot)	3193	0	0	3324	0	0		
Flt Permitted	0.950							
Satd. Flow (perm)	3193	0	0	3324	0	0		
Right Turn on Red	Yes	Yes				Yes		
Satd. Flow (RTOR)	216							
Link Speed (mph)	30			30	30			
Link Distance (ft)	155			297	139			
Travel Time (s)	3.5			6.8	3.2			
Peak Hour Factor	0.85	0.92	0.92	0.97	0.92	0.92		
Heavy Vehicles (%)	2%	2%	2%	1%	2%	2%		
Adj. Flow (vph)	595	0	0	1136	0	0		
Shared Lane Traffic (%)								
Lane Group Flow (vph)	595	0	0	1136	0	0		
Enter Blocked Intersection	No	No	No	No	No	No		
Lane Alignment	Left	Right	Left	Left	Left	Right		
Median Width(ft)	26			0	0			
Link Offset(ft)	0			0	0			
Crosswalk Width(ft)	16			16	16			
Two way Left Turn Lane								
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10		
Turning Speed (mph)	30	9	15			9		
Number of Detectors	1			2				
Detector Template	Left			Thru				
Leading Detector (ft)	20			100				
Trailing Detector (ft)	0			0				
Detector 1 Position(ft)	0			0				
Detector 1 Size(ft)	20			6				
Detector 1 Type	Cl+Ex			Cl+Ex				
Detector 1 Channel								
Detector 1 Extend (s)	0.0			0.0				
Detector 1 Queue (s)	0.0			0.0				
Detector 1 Delay (s)	0.0			0.0				
Detector 2 Position(ft)				94				
Detector 2 Size(ft)				6				
Detector 2 Type				Cl+Ex				
Detector 2 Channel								
Detector 2 Extend (s)				0.0				
Turn Type	Prot			NA				
Protected Phases	3			2 4			2	4
Permitted Phases								
Detector Phase	3			2 4				

Lane Group	SBL	SBR	SEL	SET	NWT	NWR	Ø2	Ø4
Switch Phase								
Minimum Initial (s)	10.0						10.0	10.0
Minimum Split (s)	19.0						15.0	15.0
Total Split (s)	36.0						58.0	26.0
Total Split (%)	30.0%						48%	22%
Maximum Green (s)	30.0						53.0	21.0
Yellow Time (s)	4.0						4.0	3.5
All-Red Time (s)	2.0						1.0	1.5
Lost Time Adjust (s)	0.0							
Total Lost Time (s)	6.0							
Lead/Lag	Lead							Lag
Lead-Lag Optimize?								
Vehicle Extension (s)	3.0						3.0	3.0
Recall Mode	Max						C-Max	Max
Walk Time (s)	5.0							
Flash Dont Walk (s)	8.0							
Pedestrian Calls (#/hr)	0							
Act Effct Green (s)	30.0			79.0				
Actuated g/C Ratio	0.25			0.66				
v/c Ratio	0.62			0.52				
Control Delay	2.8			11.7				
Queue Delay	1.0			0.0				
Total Delay	3.7			11.7				
LOS	A			B				
Approach Delay	3.7			11.7				
Approach LOS	A			B				

Intersection Summary

Area Type: CBD
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 16 (13%), Referenced to phase 2:WBT, Start of Green
Natural Cycle: 110
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.09
Intersection Signal Delay: 9.0 Intersection LOS: A
Intersection Capacity Utilization 59.1% ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 14: Alewife Brook Parkway & Route 2



Lane Group	SBL	SET
Lane Group Flow (vph)	595	1136
v/c Ratio	0.62	0.52
Control Delay	2.8	11.7
Queue Delay	1.0	0.0
Total Delay	3.7	11.7
Queue Length 50th (ft)	5	220
Queue Length 95th (ft)	0	272
Internal Link Dist (ft)	75	217
Turn Bay Length (ft)		
Base Capacity (vph)	960	2188
Starvation Cap Reductn	156	0
Spillback Cap Reductn	0	0
Storage Cap Reductn	0	0
Reduced v/c Ratio	0.74	0.52

Intersection Summary

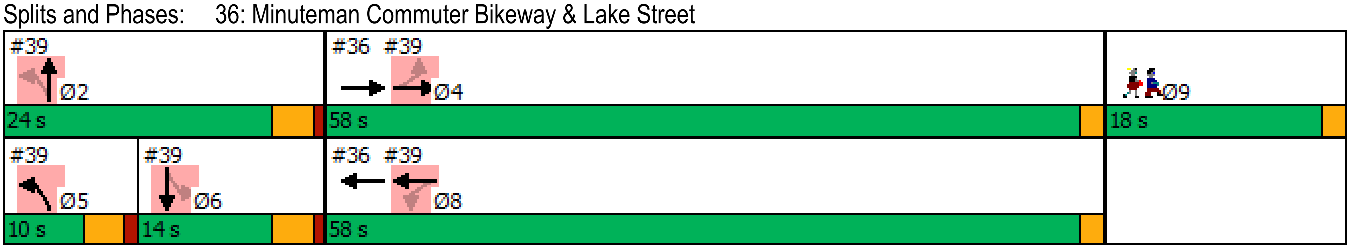
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑			↑							
Traffic Volume (vph)	0	618	0	0	1163	0	0	0	0	0	0	0
Future Volume (vph)	0	618	0	0	1163	0	0	0	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	15	15	15	16	16	16	12	12	12	12	12	12
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
Frt												
Flt Protected												
Satd. Flow (prot)	0	2049	0	0	2153	0	0	0	0	0	0	0
Flt Permitted												
Satd. Flow (perm)	0	2049	0	0	2153	0	0	0	0	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)												
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		135			215			175			206	
Travel Time (s)		3.1			4.9			4.0			4.7	
Peak Hour Factor	0.84	0.84	0.84	0.97	0.97	0.97	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	0	736	0	0	1199	0	0	0	0	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	736	0	0	1199	0	0	0	0	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	0.88	0.88	0.88	0.85	0.85	0.85	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors		2			2							
Detector Template		Thru			Thru							
Leading Detector (ft)		100			100							
Trailing Detector (ft)		0			0							
Detector 1 Position(ft)		0			0							
Detector 1 Size(ft)		6			6							
Detector 1 Type		Cl+Ex			Cl+Ex							
Detector 1 Channel												
Detector 1 Extend (s)		0.0			0.0							
Detector 1 Queue (s)		0.0			0.0							
Detector 1 Delay (s)		0.0			0.0							
Detector 2 Position(ft)		94			94							
Detector 2 Size(ft)		6			6							
Detector 2 Type		Cl+Ex			Cl+Ex							
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0							
Turn Type		NA			NA							
Protected Phases		4			8							
Permitted Phases												
Detector Phase		4			8							

Lane Group	Ø2	Ø5	Ø6	Ø9
Lane Configurations				
Traffic Volume (vph)				
Future Volume (vph)				
Ideal Flow (vphpl)				
Lane Width (ft)				
Lane Util. Factor				
Frt				
Flt Protected				
Satd. Flow (prot)				
Flt Permitted				
Satd. Flow (perm)				
Right Turn on Red				
Satd. Flow (RTOR)				
Link Speed (mph)				
Link Distance (ft)				
Travel Time (s)				
Peak Hour Factor				
Heavy Vehicles (%)				
Adj. Flow (vph)				
Shared Lane Traffic (%)				
Lane Group Flow (vph)				
Enter Blocked Intersection				
Lane Alignment				
Median Width(ft)				
Link Offset(ft)				
Crosswalk Width(ft)				
Two way Left Turn Lane				
Headway Factor				
Turning Speed (mph)				
Number of Detectors				
Detector Template				
Leading Detector (ft)				
Trailing Detector (ft)				
Detector 1 Position(ft)				
Detector 1 Size(ft)				
Detector 1 Type				
Detector 1 Channel				
Detector 1 Extend (s)				
Detector 1 Queue (s)				
Detector 1 Delay (s)				
Detector 2 Position(ft)				
Detector 2 Size(ft)				
Detector 2 Type				
Detector 2 Channel				
Detector 2 Extend (s)				
Turn Type				
Protected Phases	2	5	6	9
Permitted Phases				
Detector Phase				

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Switch Phase												
Minimum Initial (s)		4.0			4.0							
Minimum Split (s)		20.5			20.5							
Total Split (s)		58.0			58.0							
Total Split (%)		58.0%			58.0%							
Maximum Green (s)		56.0			56.0							
Yellow Time (s)		2.0			2.0							
All-Red Time (s)		0.0			0.0							
Lost Time Adjust (s)		0.0			0.0							
Total Lost Time (s)		2.0			2.0							
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)		3.0			3.0							
Recall Mode		Max			Max							
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)		56.1			56.1							
Actuated g/C Ratio		0.61			0.61							
v/c Ratio		0.59			0.92							
Control Delay		14.7			13.7							
Queue Delay		0.0			30.3							
Total Delay		14.7			44.0							
LOS		B			D							
Approach Delay		14.7			44.0							
Approach LOS		B			D							

Intersection Summary	
Area Type: Other	
Cycle Length: 100	
Actuated Cycle Length: 92.7	
Natural Cycle: 100	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.99	
Intersection Signal Delay: 32.9	Intersection LOS: C
Intersection Capacity Utilization 64.5%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 36: Minuteman Commuter Bikeway & Lake Street



Lane Group	Ø2	Ø5	Ø6	Ø9
Switch Phase				
Minimum Initial (s)	4.0	4.0	4.0	4.0
Minimum Split (s)	21.0	9.0	14.0	18.0
Total Split (s)	24.0	10.0	14.0	18.0
Total Split (%)	24%	10%	14%	18%
Maximum Green (s)	20.0	6.0	10.0	16.0
Yellow Time (s)	3.0	3.0	3.0	2.0
All-Red Time (s)	1.0	1.0	1.0	0.0
Lost Time Adjust (s)				
Total Lost Time (s)				
Lead/Lag		Lead	Lag	
Lead-Lag Optimize?		Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0
Recall Mode	Min	None	Min	None
Walk Time (s)				5.0
Flash Dont Walk (s)				11.0
Pedestrian Calls (#/hr)				304
Act Effct Green (s)				
Actuated g/C Ratio				
v/c Ratio				
Control Delay				
Queue Delay				
Total Delay				
LOS				
Approach Delay				
Approach LOS				

Intersection Summary

	→	←
Lane Group	EBT	WBT
Lane Group Flow (vph)	736	1199
v/c Ratio	0.59	0.92
Control Delay	14.7	13.7
Queue Delay	0.0	30.3
Total Delay	14.7	44.0
Queue Length 50th (ft)	245	121
Queue Length 95th (ft)	378	m#405
Internal Link Dist (ft)	55	135
Turn Bay Length (ft)		
Base Capacity (vph)	1240	1304
Starvation Cap Reductn	0	175
Spillback Cap Reductn	0	0
Storage Cap Reductn	0	0
Reduced v/c Ratio	0.59	1.06

Intersection Summary

\# 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.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	31	541	46	6	1004	0	38	4	5	3	7	121
Future Volume (vph)	31	541	46	6	1004	0	38	4	5	3	7	121
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	14	14	14	13	13	13	12	12	12	12	12	12
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
Frt		0.990						0.985			0.875	
Flt Protected		0.998						0.961			0.999	
Satd. Flow (prot)	0	1978	0	0	1944	0	0	1799	0	0	1661	0
Flt Permitted		0.916			0.997			0.422			0.994	
Satd. Flow (perm)	0	1815	0	0	1938	0	0	790	0	0	1653	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		7						6			155	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		215			1126			206			208	
Travel Time (s)		4.9			25.6			4.7			4.7	
Peak Hour Factor	0.91	0.91	0.91	0.87	0.87	0.87	0.75	0.75	0.75	0.78	0.78	0.78
Heavy Vehicles (%)	0%	1%	5%	0%	1%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	34	595	51	7	1154	0	51	5	7	4	9	155
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	680	0	0	1161	0	0	63	0	0	168	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	0.92	0.92	0.92	0.96	0.96	0.96	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	20	100		20	100		20	100		20	100	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases		4			8		5	2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		5	2		6	6	

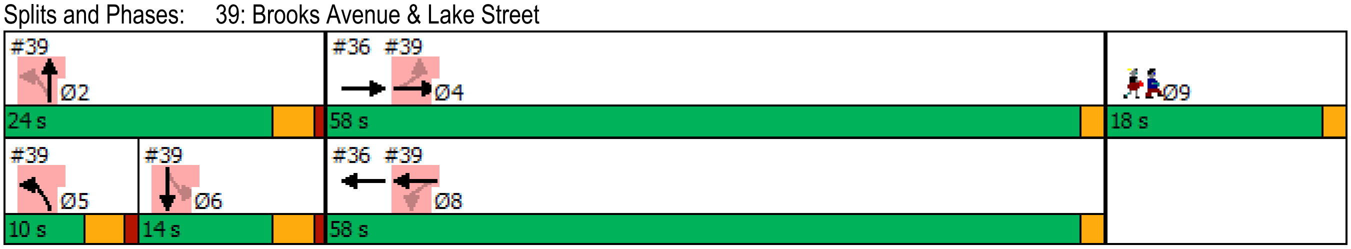
Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Heavy Vehicles (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (mph)	
Number of Detectors	
Detector Template	
Leading Detector (ft)	
Trailing Detector (ft)	
Detector 1 Position(ft)	
Detector 1 Size(ft)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Detector 2 Position(ft)	
Detector 2 Size(ft)	
Detector 2 Type	
Detector 2 Channel	
Detector 2 Extend (s)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Switch Phase												
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	20.5	20.5		20.5	20.5		9.0	21.0		14.0	14.0	
Total Split (s)	58.0	58.0		58.0	58.0		10.0	24.0		14.0	14.0	
Total Split (%)	58.0%	58.0%		58.0%	58.0%		10.0%	24.0%		14.0%	14.0%	
Maximum Green (s)	56.0	56.0		56.0	56.0		6.0	20.0		10.0	10.0	
Yellow Time (s)	2.0	2.0		2.0	2.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	0.0	0.0		0.0	0.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		2.0			2.0			4.0			4.0	
Lead/Lag							Lead			Lag	Lag	
Lead-Lag Optimize?							Yes			Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	Max	Max		Max	Max		None	Min		Min	Min	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)		56.1			56.1			12.5			12.5	
Actuated g/C Ratio		0.61			0.61			0.13			0.13	
v/c Ratio		0.62			0.99			0.57			0.47	
Control Delay		4.3			44.4			53.7			11.9	
Queue Delay		0.0			18.6			4.0			1.8	
Total Delay		4.3			62.9			57.7			13.7	
LOS		A			E			E			B	
Approach Delay		4.3			62.9			57.7			13.7	
Approach LOS		A			E			E			B	

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 92.7
Natural Cycle: 100
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.99
Intersection Signal Delay: 39.6 Intersection LOS: D
Intersection Capacity Utilization 76.1% ICU Level of Service D
Analysis Period (min) 15

Splits and Phases: 39: Brooks Avenue & Lake Street



Lane Group	Ø9
Switch Phase	
Minimum Initial (s)	4.0
Minimum Split (s)	18.0
Total Split (s)	18.0
Total Split (%)	18%
Maximum Green (s)	16.0
Yellow Time (s)	2.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Recall Mode	None
Walk Time (s)	5.0
Flash Dont Walk (s)	11.0
Pedestrian Calls (#/hr)	304
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	

Intersection Summary

Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	680	1161	63	168
v/c Ratio	0.62	0.99	0.57	0.47
Control Delay	4.3	44.4	53.7	11.9
Queue Delay	0.0	18.6	4.0	1.8
Total Delay	4.3	62.9	57.7	13.7
Queue Length 50th (ft)	9	618	32	7
Queue Length 95th (ft)	3	#1013	59	41
Internal Link Dist (ft)	135	1046	126	128
Turn Bay Length (ft)				
Base Capacity (vph)	1102	1173	175	375
Starvation Cap Reductn	2	0	0	0
Spillback Cap Reductn	0	69	61	98
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.62	1.05	0.55	0.61

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

2027 No-Build Weekday Evening Peak Hour

Intersection						
Int Delay, s/veh	0.4					

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	829	3	1	599	9	4
Future Vol, veh/h	829	3	1	599	9	4
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	83	83	94	94	75	75
Heavy Vehicles, %	0	0	0	0	29	0
Mvmt Flow	999	4	1	637	12	5

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1003	0	1640	1001
Stage 1	-	-	-	-	1001	-
Stage 2	-	-	-	-	639	-
Critical Hdwy	-	-	4.1	-	6.69	6.2
Critical Hdwy Stg 1	-	-	-	-	5.69	-
Critical Hdwy Stg 2	-	-	-	-	5.69	-
Follow-up Hdwy	-	-	2.2	-	3.761	3.3
Pot Cap-1 Maneuver	-	-	698	-	95	297
Stage 1	-	-	-	-	317	-
Stage 2	-	-	-	-	478	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	698	-	95	297
Mov Cap-2 Maneuver	-	-	-	-	95	-
Stage 1	-	-	-	-	317	-
Stage 2	-	-	-	-	477	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	40
HCM LOS			E

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	120	-	-	698	-
HCM Lane V/C Ratio	0.144	-	-	0.002	-
HCM Control Delay (s)	40	-	-	10.2	0
HCM Lane LOS	E	-	-	B	A
HCM 95th %tile Q(veh)	0.5	-	-	0	-

Intersection	
Int Delay, s/veh	0.7

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	827	6	9	585	15	5
Future Vol, veh/h	827	6	9	585	15	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	87	87	89	89	75	75
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	951	7	10	657	20	7

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	958	0	1632	955
Stage 1	-	-	-	-	955	-
Stage 2	-	-	-	-	677	-
Critical Hdwy	-	-	4.1	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	726	-	113	316
Stage 1	-	-	-	-	377	-
Stage 2	-	-	-	-	509	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	726	-	111	316
Mov Cap-2 Maneuver	-	-	-	-	111	-
Stage 1	-	-	-	-	377	-
Stage 2	-	-	-	-	498	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.2	39
HCM LOS			E

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	132	-	-	726	-
HCM Lane V/C Ratio	0.202	-	-	0.014	-
HCM Control Delay (s)	39	-	-	10	0
HCM Lane LOS	E	-	-	B	A
HCM 95th %tile Q(veh)	0.7	-	-	0	-

Intersection						
Int Delay, s/veh	0.3					

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	831	1	1	588	6	4
Future Vol, veh/h	831	1	1	588	6	4
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	87	87	89	89	75	75
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	955	1	1	661	8	5

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	956	0	1619	956
Stage 1	-	-	-	-	956	-
Stage 2	-	-	-	-	663	-
Critical Hdwy	-	-	4.1	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	727	-	115	316
Stage 1	-	-	-	-	376	-
Stage 2	-	-	-	-	516	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	727	-	115	316
Mov Cap-2 Maneuver	-	-	-	-	115	-
Stage 1	-	-	-	-	376	-
Stage 2	-	-	-	-	515	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	30.6
HCM LOS			D

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	154	-	-	727	-
HCM Lane V/C Ratio	0.087	-	-	0.002	-
HCM Control Delay (s)	30.6	-	-	10	0
HCM Lane LOS	D	-	-	A	A
HCM 95th %tile Q(veh)	0.3	-	-	0	-

Intersection	
Int Delay, s/veh	1.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	4	812	19	11	575	8	13	1	6	3	0	1
Future Vol, veh/h	4	812	19	11	575	8	13	1	6	3	0	1
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	86	86	86	86	86	86	75	75	75	75	75	75
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	5	944	22	13	669	9	17	1	8	4	0	1

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	678	0	0	966	0	0	1665	1669	955	1670	1676	674
Stage 1	-	-	-	-	-	-	965	965	-	700	700	-
Stage 2	-	-	-	-	-	-	700	704	-	970	976	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	923	-	-	721	-	-	78	97	316	77	96	458
Stage 1	-	-	-	-	-	-	309	336	-	433	444	-
Stage 2	-	-	-	-	-	-	433	443	-	307	332	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	923	-	-	721	-	-	75	93	316	72	92	458
Mov Cap-2 Maneuver	-	-	-	-	-	-	75	93	-	72	92	-
Stage 1	-	-	-	-	-	-	305	332	-	428	431	-
Stage 2	-	-	-	-	-	-	419	430	-	294	328	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.2	54.9	47
HCM LOS			F	E

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	98	923	-	-	721	-	-	91
HCM Lane V/C Ratio	0.272	0.005	-	-	0.018	-	-	0.059
HCM Control Delay (s)	54.9	8.9	0	-	10.1	0	-	47
HCM Lane LOS	F	A	A	-	B	A	-	E
HCM 95th %tile Q(veh)	1	0	-	-	0.1	-	-	0.2

Intersection	
Int Delay, s/veh	3.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	19	799	3	42	577	16	6	0	27	9	0	11
Future Vol, veh/h	19	799	3	42	577	16	6	0	27	9	0	11
Conflicting Peds, #/hr	0	0	0	304	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	83	83	83	88	88	88	81	81	81	80	80	80
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	23	963	4	48	656	18	7	0	33	11	0	14

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	674	0	0	1271	0	0	2083	2085	1269	1789	2078	665
Stage 1	-	-	-	-	-	-	1315	1315	-	761	761	-
Stage 2	-	-	-	-	-	-	768	770	-	1028	1317	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	927	-	-	553	-	-	39	54	208	64	54	464
Stage 1	-	-	-	-	-	-	196	230	-	401	417	-
Stage 2	-	-	-	-	-	-	397	413	-	285	229	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	927	-	-	413	-	-	23	31	155	41	31	464
Mov Cap-2 Maneuver	-	-	-	-	-	-	23	31	-	41	31	-
Stage 1	-	-	-	-	-	-	138	163	-	379	339	-
Stage 2	-	-	-	-	-	-	314	336	-	212	162	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	1	97.4	67.1
HCM LOS			F	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	76	927	-	-	413	-	-	82
HCM Lane V/C Ratio	0.536	0.025	-	-	0.116	-	-	0.305
HCM Control Delay (s)	97.4	9	0	-	14.9	0	-	67.1
HCM Lane LOS	F	A	A	-	B	A	-	F
HCM 95th %tile Q(veh)	2.3	0.1	-	-	0.4	-	-	1.1

Lane Group	EBL	EBR	SET	SER	NWL	NWT	Ø9
Lane Configurations							
Traffic Volume (vph)	419	271	658	183	336	739	
Future Volume (vph)	419	271	658	183	336	739	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Lane Width (ft)	16	16	11	10	11	12	
Storage Length (ft)	0	0		55	150		
Storage Lanes	1	0		1	1		
Taper Length (ft)	25				25		
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	1.00	
Frt	0.947			0.850			
Flt Protected	0.971				0.950		
Satd. Flow (prot)	1980	0	3421	1507	1745	1863	
Flt Permitted	0.971				0.229		
Satd. Flow (perm)	1980	0	3421	1507	421	1863	
Right Turn on Red		Yes		Yes			
Satd. Flow (RTOR)	28			82			
Link Speed (mph)	30		30			30	
Link Distance (ft)	1126		640			645	
Travel Time (s)	25.6		14.5			14.7	
Peak Hour Factor	0.88	0.88	0.92	0.92	0.92	0.92	
Heavy Vehicles (%)	0%	0%	2%	0%	0%	2%	
Adj. Flow (vph)	476	308	715	199	365	803	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	784	0	715	199	365	803	
Enter Blocked Intersection	No	No	No	No	No	No	
Lane Alignment	Left	Right	Left	Right	Left	Left	
Median Width(ft)	16		11			11	
Link Offset(ft)	0		0			0	
Crosswalk Width(ft)	16		16			16	
Two way Left Turn Lane							
Headway Factor	0.85	0.85	1.04	1.09	1.04	1.00	
Turning Speed (mph)	15	9		9	15		
Number of Detectors	1		2	1	1	2	
Detector Template	Left		Thru	Right	Left	Thru	
Leading Detector (ft)	20		100	20	20	100	
Trailing Detector (ft)	0		0	0	0	0	
Detector 1 Position(ft)	0		0	0	0	0	
Detector 1 Size(ft)	20		6	20	20	6	
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel							
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	0.0	
Detector 2 Position(ft)			94			94	
Detector 2 Size(ft)			6			6	
Detector 2 Type			Cl+Ex			Cl+Ex	
Detector 2 Channel							
Detector 2 Extend (s)			0.0			0.0	
Turn Type	Prot		NA	Perm	pm+pt	NA	

Lane Group	EBL	EBR	SET	SER	NWL	NWT	Ø9
Protected Phases	4		6		5	2	9
Permitted Phases				6	2		
Detector Phase	4		6	6	5	2	
Switch Phase							
Minimum Initial (s)	4.0		4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	23.0		23.0	23.0	10.0	23.0	19.0
Total Split (s)	29.0		38.0	38.0	15.0	53.0	23.0
Total Split (%)	27.6%		36.2%	36.2%	14.3%	50.5%	22%
Maximum Green (s)	22.0		31.0	31.0	9.0	46.0	20.0
Yellow Time (s)	4.0		4.0	4.0	3.0	4.0	2.0
All-Red Time (s)	3.0		3.0	3.0	3.0	3.0	1.0
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0	
Total Lost Time (s)	7.0		7.0	7.0	6.0	7.0	
Lead/Lag			Lag	Lag	Lead		
Lead-Lag Optimize?			Yes	Yes	Yes		
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0	3.0
Recall Mode	None		Max	Max	None	Max	None
Walk Time (s)							5.0
Flash Dont Walk (s)							11.0
Pedestrian Calls (#/hr)							20
Act Effct Green (s)	22.2		31.3	31.3	47.5	46.5	
Actuated g/C Ratio	0.25		0.35	0.35	0.53	0.52	
v/c Ratio	1.53		0.60	0.34	1.02	0.83	
Control Delay	276.0		27.9	16.0	74.7	29.9	
Queue Delay	0.0		0.0	0.0	0.0	0.0	
Total Delay	276.0		27.9	16.0	74.7	29.9	
LOS	F		C	B	E	C	
Approach Delay	276.0		25.3			43.9	
Approach LOS	F		C			D	

Intersection Summary

Area Type: Other

Cycle Length: 105

Actuated Cycle Length: 89.6

Natural Cycle: 150

Control Type: Actuated-Uncoordinated

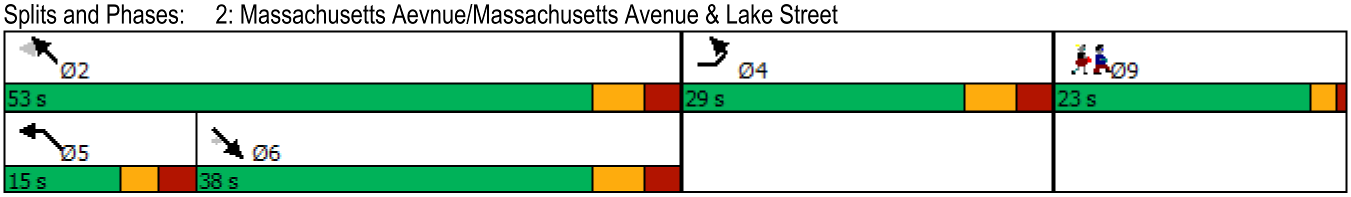
Maximum v/c Ratio: 1.53

Intersection Signal Delay: 101.5 Intersection LOS: F

Intersection Capacity Utilization 93.3% ICU Level of Service F

Analysis Period (min) 15

Splits and Phases: 2: Massachusetts Aevnue/Massachusetts Avenue & Lake Street



Lane Group	EBL	SET	SER	NWL	NWT
Lane Group Flow (vph)	784	715	199	365	803
v/c Ratio	1.53	0.60	0.34	1.02	0.83
Control Delay	276.0	27.9	16.0	74.7	29.9
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	276.0	27.9	16.0	74.7	29.9
Queue Length 50th (ft)	~546	148	40	93	294
Queue Length 95th (ft)	#949	277	119	#393	#740
Internal Link Dist (ft)	1046	560			565
Turn Bay Length (ft)			55	150	
Base Capacity (vph)	512	1196	580	357	966
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	1.53	0.60	0.34	1.02	0.83

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

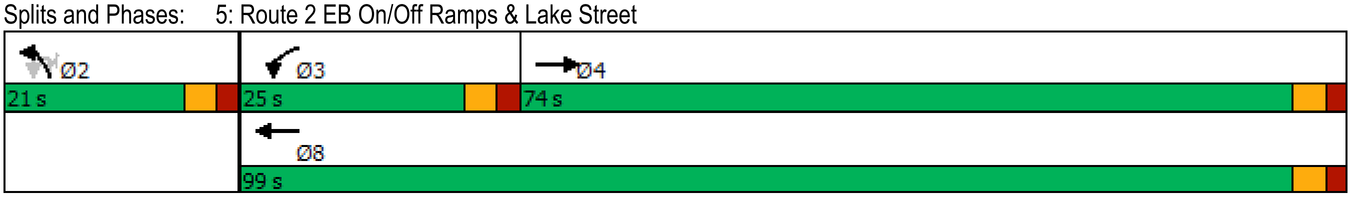
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lane Group	EBT	EBR	WBL	WBT	NBU	NBL	NBR
Lane Configurations							
Traffic Volume (vph)	543	181	171	299	14	531	632
Future Volume (vph)	543	181	171	299	14	531	632
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	16	16	10	11	12	16	14
Storage Length (ft)		150	110			0	0
Storage Lanes		1	1			1	1
Taper Length (ft)			25			25	
Lane Util. Factor	1.00	1.00	1.00	0.95	1.00	1.00	1.00
Frt		0.850					0.850
Flt Protected			0.950			0.950	
Satd. Flow (prot)	2153	1664	1652	3490	0	2046	1723
Flt Permitted			0.950			0.950	
Satd. Flow (perm)	2153	1664	1652	3490	0	2046	1723
Right Turn on Red		Yes					Yes
Satd. Flow (RTOR)		70					441
Link Speed (mph)	30			30		30	
Link Distance (ft)	373			505		387	
Travel Time (s)	8.5			11.5		8.8	
Peak Hour Factor	0.94	0.94	0.87	0.87	0.96	0.96	0.96
Heavy Vehicles (%)	0%	10%	2%	0%	0%	0%	0%
Adj. Flow (vph)	578	193	197	344	15	553	658
Shared Lane Traffic (%)							
Lane Group Flow (vph)	578	193	197	344	0	568	658
Enter Blocked Intersection	No	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	R NA	Left	Right
Median Width(ft)	12			12		16	
Link Offset(ft)	0			0		0	
Crosswalk Width(ft)	16			16		16	
Two way Left Turn Lane							
Headway Factor	0.85	0.85	1.09	1.04	1.00	0.85	0.92
Turning Speed (mph)		9	15		9	15	9
Number of Detectors	2	1	1	2	1	1	1
Detector Template	Thru	Right	Left	Thru	Left	Left	Right
Leading Detector (ft)	100	20	20	100	20	20	20
Trailing Detector (ft)	0	0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0	0	0
Detector 1 Size(ft)	6	20	20	6	20	20	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel							
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)	94			94			
Detector 2 Size(ft)	6			6			
Detector 2 Type	Cl+Ex			Cl+Ex			
Detector 2 Channel							
Detector 2 Extend (s)	0.0			0.0			
Turn Type	NA	Free	Prot	NA	Perm	Prot	Perm

Lane Group	EBT	EBR	WBL	WBT	NBU	NBL	NBR
Protected Phases	4		3	8		2	
Permitted Phases		Free			2		2
Detector Phase	4		3	8	2	2	2
Switch Phase							
Minimum Initial (s)	4.0		4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	21.0		9.0	21.0	21.0	21.0	21.0
Total Split (s)	74.0		25.0	99.0	21.0	21.0	21.0
Total Split (%)	61.7%		20.8%	82.5%	17.5%	17.5%	17.5%
Maximum Green (s)	69.0		20.0	94.0	16.0	16.0	16.0
Yellow Time (s)	3.0		3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0		2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0		0.0	0.0		0.0	0.0
Total Lost Time (s)	5.0		5.0	5.0		5.0	5.0
Lead/Lag	Lag		Lead				
Lead-Lag Optimize?	Yes		Yes				
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0	3.0
Recall Mode	None		None	None	Max	Max	Max
Walk Time (s)	5.0			5.0	5.0	5.0	5.0
Flash Dont Walk (s)	11.0			11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0			0	0	0	0
Act Effct Green (s)	25.7	71.4	14.0	44.8		16.4	16.4
Actuated g/C Ratio	0.36	1.00	0.20	0.63		0.23	0.23
v/c Ratio	0.75	0.12	0.61	0.16		1.21	0.90
Control Delay	26.9	0.1	36.0	5.3		143.6	27.8
Queue Delay	0.0	0.0	0.0	0.0		0.0	0.0
Total Delay	26.9	0.1	36.0	5.3		143.6	27.8
LOS	C	A	D	A		F	C
Approach Delay	20.2			16.5		81.4	
Approach LOS	C			B		F	

Intersection Summary	
Area Type: Other	
Cycle Length: 120	
Actuated Cycle Length: 71.4	
Natural Cycle: 70	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 1.21	
Intersection Signal Delay: 49.0	Intersection LOS: D
Intersection Capacity Utilization 80.7%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 5: Route 2 EB On/Off Ramps & Lake Street



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	578	193	197	344	568	658
v/c Ratio	0.75	0.12	0.61	0.16	1.21	0.90
Control Delay	26.9	0.1	36.0	5.3	143.6	27.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	26.9	0.1	36.0	5.3	143.6	27.8
Queue Length 50th (ft)	214	0	79	27	~314	90
Queue Length 95th (ft)	360	0	156	40	#633	#362
Internal Link Dist (ft)	293			425	307	
Turn Bay Length (ft)		150	110			
Base Capacity (vph)	2002	1664	473	3490	468	734
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	0.29	0.12	0.42	0.10	1.21	0.90

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

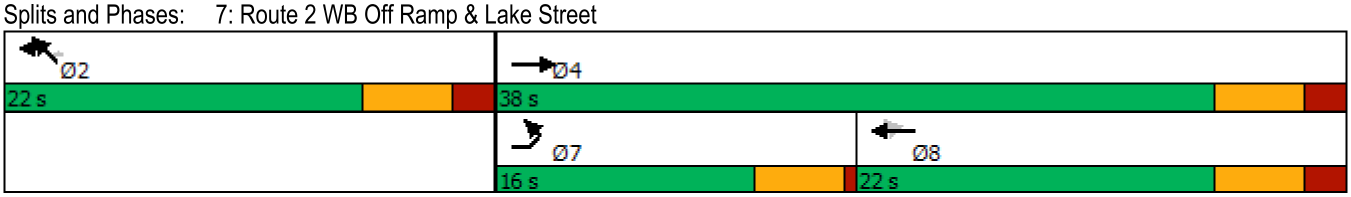
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (vph)	368	807	0	0	262	346	0	0	0	208	22	25
Future Volume (vph)	368	807	0	0	262	346	0	0	0	208	22	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	11	10	12	12	12	11	12	16
Storage Length (ft)	250		0	0		75	0		0	100		0
Storage Lanes	1		0	0		1	0		0	1		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00
Frt						0.850						0.850
Flt Protected	0.950									0.950	0.961	
Satd. Flow (prot)	1805	1881	0	0	1801	1463	0	0	0	1641	1705	1830
Flt Permitted	0.950									0.950	0.961	
Satd. Flow (perm)	1805	1881	0	0	1801	1463	0	0	0	1641	1705	1830
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						380						136
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		505			380			459			529	
Travel Time (s)		11.5			8.6			10.4			12.0	
Peak Hour Factor	0.88	0.88	0.88	0.91	0.91	0.91	0.92	0.92	0.92	0.95	0.95	0.95
Heavy Vehicles (%)	0%	1%	0%	0%	2%	3%	0%	0%	0%	1%	5%	0%
Adj. Flow (vph)	418	917	0	0	288	380	0	0	0	219	23	26
Shared Lane Traffic (%)										45%		
Lane Group Flow (vph)	418	917	0	0	288	380	0	0	0	120	122	26
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			11			11	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.04	1.09	1.00	1.00	1.00	1.04	1.00	0.85
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2			2	1				1	2	1
Detector Template	Left	Thru			Thru	Right				Left	Thru	Right
Leading Detector (ft)	20	100			100	20				20	100	20
Trailing Detector (ft)	0	0			0	0				0	0	0
Detector 1 Position(ft)	0	0			0	0				0	0	0
Detector 1 Size(ft)	20	6			6	20				20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex			Cl+Ex	Cl+Ex				Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0			0.0	0.0				0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0			0.0	0.0				0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0			0.0	0.0				0.0	0.0	0.0
Detector 2 Position(ft)		94			94						94	
Detector 2 Size(ft)		6			6						6	
Detector 2 Type		Cl+Ex			Cl+Ex						Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0						0.0	
Turn Type	Prot	NA			NA	Perm				Split	NA	Perm

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Protected Phases	7	4			8					2	2	
Permitted Phases						8						2
Detector Phase	7	4			8	8				2	2	2
Switch Phase												
Minimum Initial (s)	4.0	4.0			4.0	4.0				4.0	4.0	4.0
Minimum Split (s)	8.5	22.0			22.0	22.0				22.0	22.0	22.0
Total Split (s)	16.0	38.0			22.0	22.0				22.0	22.0	22.0
Total Split (%)	26.7%	63.3%			36.7%	36.7%				36.7%	36.7%	36.7%
Maximum Green (s)	11.5	32.0			16.0	16.0				16.0	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)	0.5	2.0			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)	4.5	6.0			6.0	6.0				6.0	6.0	6.0
Lead/Lag	Lead				Lag	Lag						
Lead-Lag Optimize?	Yes				Yes	Yes						
Vehicle Extension (s)	3.0	3.0			3.0	3.0				3.0	3.0	3.0
Recall Mode	None	None			None	None				Max	Max	Max
Walk Time (s)		5.0			5.0	5.0				5.0	5.0	5.0
Flash Dont Walk (s)		11.0			11.0	11.0				11.0	11.0	11.0
Pedestrian Calls (#/hr)		0			0	0				0	0	0
Act Effct Green (s)	11.5	30.6			14.6	14.6				16.0	16.0	16.0
Actuated g/C Ratio	0.20	0.52			0.25	0.25				0.27	0.27	0.27
v/c Ratio	1.18	0.93			0.64	0.59				0.27	0.26	0.04
Control Delay	134.3	32.2			27.1	6.6				19.4	19.3	0.1
Queue Delay	0.0	0.0			0.0	0.0				0.0	0.0	0.0
Total Delay	134.3	32.2			27.1	6.6				19.4	19.3	0.1
LOS	F	C			C	A				B	B	A
Approach Delay		64.1			15.4						17.5	
Approach LOS		E			B						B	

Intersection Summary	
Area Type: Other	
Cycle Length: 60	
Actuated Cycle Length: 58.7	
Natural Cycle: 65	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 1.18	
Intersection Signal Delay: 44.3	Intersection LOS: D
Intersection Capacity Utilization 61.9%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 7: Route 2 WB Off Ramp & Lake Street



Lane Group	EBL	EBT	WBT	WBR	NWL	NWT	NWR
Lane Group Flow (vph)	418	917	288	380	120	122	26
v/c Ratio	1.18	0.93	0.64	0.59	0.27	0.26	0.04
Control Delay	134.3	32.2	27.1	6.6	19.4	19.3	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	134.3	32.2	27.1	6.6	19.4	19.3	0.1
Queue Length 50th (ft)	~191	274	90	0	35	36	0
Queue Length 95th (ft)	#331	#502	160	56	75	76	0
Internal Link Dist (ft)		425	300			449	
Turn Bay Length (ft)	250			75	100		
Base Capacity (vph)	354	1028	492	675	448	465	598
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	1.18	0.89	0.59	0.56	0.27	0.26	0.04

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lane Group	EBL	EBT	WBT	WBR	SWL	SWR	Ø3	Ø4
Lane Configurations								
Traffic Volume (vph)	0	0	2209	0	0	1131		
Future Volume (vph)	0	0	2209	0	0	1131		
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900		
Lane Width (ft)	13	13	13	13	13	13		
Lane Util. Factor	1.00	1.00	0.91	1.00	1.00	0.88		
Frt						0.850		
Flt Protected								
Satd. Flow (prot)	0	0	4776	0	0	2617		
Flt Permitted								
Satd. Flow (perm)	0	0	4776	0	0	2617		
Right Turn on Red				Yes		Yes		
Satd. Flow (RTOR)						1		
Link Speed (mph)		30	30		30			
Link Distance (ft)		201	192		296			
Travel Time (s)		4.6	4.4		6.7			
Peak Hour Factor	0.92	0.92	0.97	0.97	0.98	0.98		
Heavy Vehicles (%)	2%	2%	1%	0%	0%	1%		
Adj. Flow (vph)	0	0	2277	0	0	1154		
Shared Lane Traffic (%)								
Lane Group Flow (vph)	0	0	2277	0	0	1154		
Enter Blocked Intersection	No	No	No	No	No	No		
Lane Alignment	Left	Left	Left	Right	Left	Right		
Median Width(ft)		0	0		0			
Link Offset(ft)		0	0		0			
Crosswalk Width(ft)		16	16		16			
Two way Left Turn Lane								
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10		
Turning Speed (mph)	15			9	15	30		
Number of Detectors			2			1		
Detector Template			Thru			Right		
Leading Detector (ft)			100			20		
Trailing Detector (ft)			0			0		
Detector 1 Position(ft)			0			0		
Detector 1 Size(ft)			6			20		
Detector 1 Type			Cl+Ex			Cl+Ex		
Detector 1 Channel								
Detector 1 Extend (s)			0.0			0.0		
Detector 1 Queue (s)			0.0			0.0		
Detector 1 Delay (s)			0.0			0.0		
Detector 2 Position(ft)			94					
Detector 2 Size(ft)			6					
Detector 2 Type			Cl+Ex					
Detector 2 Channel								
Detector 2 Extend (s)			0.0					
Turn Type			NA			custom		
Protected Phases			2			3 4	3	4
Permitted Phases								
Detector Phase			2			3 4		

Lane Group	EBL	EBT	WBT	WBR	SWL	SWR	Ø3	Ø4
Switch Phase								
Minimum Initial (s)			10.0				10.0	10.0
Minimum Split (s)			15.0				19.0	15.0
Total Split (s)			58.0				36.0	26.0
Total Split (%)			48.3%				30%	22%
Maximum Green (s)			53.0				30.0	21.0
Yellow Time (s)			4.0				4.0	3.5
All-Red Time (s)			1.0				2.0	1.5
Lost Time Adjust (s)			0.0					
Total Lost Time (s)			5.0					
Lead/Lag							Lead	Lag
Lead-Lag Optimize?								
Vehicle Extension (s)			3.0				3.0	3.0
Recall Mode			C-Max				Max	Max
Walk Time (s)							5.0	
Flash Dont Walk (s)							8.0	
Pedestrian Calls (#/hr)							0	
Act Effct Green (s)			53.0			56.0		
Actuated g/C Ratio			0.44			0.47		
v/c Ratio			1.08			0.95		
Control Delay			46.7			46.7		
Queue Delay			1.5			0.0		
Total Delay			48.2			46.7		
LOS			D			D		
Approach Delay			48.2		46.7			
Approach LOS			D		D			

Intersection Summary

Area Type: CBD

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 16 (13%), Referenced to phase 2:WBT, Start of Green

Natural Cycle: 140

Control Type: Actuated-Coordinated

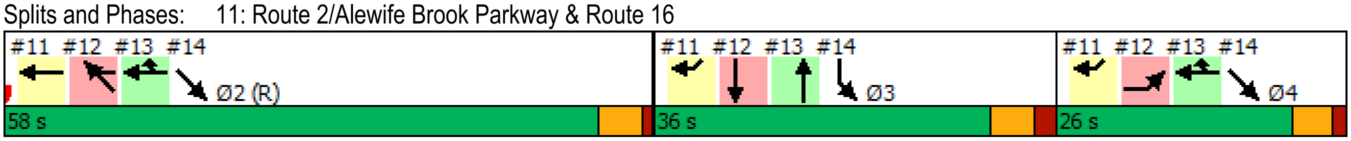
Maximum v/c Ratio: 1.19

Intersection Signal Delay: 47.7 Intersection LOS: D

Intersection Capacity Utilization 100.6% ICU Level of Service G

Analysis Period (min) 15

Splits and Phases: 11: Route 2/Alewife Brook Parkway & Route 16



Lane Group	WBT	SWR
Lane Group Flow (vph)	2277	1154
v/c Ratio	1.08	0.95
Control Delay	46.7	46.7
Queue Delay	1.5	0.0
Total Delay	48.2	46.7
Queue Length 50th (ft)	~702	472
Queue Length 95th (ft)	m#57	#644
Internal Link Dist (ft)	112	
Turn Bay Length (ft)		
Base Capacity (vph)	2109	1221
Starvation Cap Reductn	7	0
Spillback Cap Reductn	0	0
Storage Cap Reductn	0	0
Reduced v/c Ratio	1.08	0.95

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

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

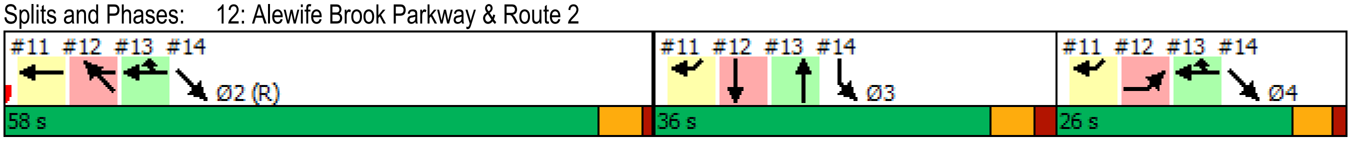
Lane Group	EBL	WBR	SBT	NWT
Lane Configurations				
Traffic Volume (vph)	610	591	250	1618
Future Volume (vph)	610	591	250	1618
Ideal Flow (vphpl)	1900	1900	1900	1900
Lane Width (ft)	13	16	13	13
Lane Util. Factor	0.97	1.00	0.95	0.95
Frt		0.865		
Flt Protected	0.950			
Satd. Flow (prot)	3257	1660	3291	3324
Flt Permitted	0.950			
Satd. Flow (perm)	3257	1660	3291	3324
Right Turn on Red				
Satd. Flow (RTOR)				
Link Speed (mph)			30	30
Link Distance (ft)			202	278
Travel Time (s)			4.6	6.3
Peak Hour Factor	0.90	0.95	0.98	0.97
Heavy Vehicles (%)	0%	1%	2%	1%
Adj. Flow (vph)	678	622	255	1668
Shared Lane Traffic (%)				
Lane Group Flow (vph)	678	622	255	1668
Enter Blocked Intersection	No	No	No	No
Lane Alignment	Left	R NA	Left	L NA
Median Width(ft)			0	0
Link Offset(ft)			0	0
Crosswalk Width(ft)			16	16
Two way Left Turn Lane				
Headway Factor	1.10	0.97	1.10	1.10
Turning Speed (mph)	15	30		
Number of Detectors	1	1	2	2
Detector Template	Left	Right	Thru	Thru
Leading Detector (ft)	20	20	100	100
Trailing Detector (ft)	0	0	0	0
Detector 1 Position(ft)	0	0	0	0
Detector 1 Size(ft)	20	20	6	6
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel				
Detector 1 Extend (s)	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0
Detector 2 Position(ft)			94	94
Detector 2 Size(ft)			6	6
Detector 2 Type			Cl+Ex	Cl+Ex
Detector 2 Channel				
Detector 2 Extend (s)			0.0	0.0
Turn Type	Prot	Prot	NA	NA
Protected Phases	4	2!	3	2!
Permitted Phases				
Detector Phase	4	2	3	2

Lane Group	EBL	WBR	SBT	NWT
Switch Phase				
Minimum Initial (s)	10.0	10.0	10.0	10.0
Minimum Split (s)	15.0	15.0	19.0	15.0
Total Split (s)	26.0	58.0	36.0	58.0
Total Split (%)	21.7%	48.3%	30.0%	48.3%
Maximum Green (s)	21.0	53.0	30.0	53.0
Yellow Time (s)	3.5	4.0	4.0	4.0
All-Red Time (s)	1.5	1.0	2.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	6.0	5.0
Lead/Lag	Lag		Lead	
Lead-Lag Optimize?				
Vehicle Extension (s)	3.0	3.0	3.0	3.0
Recall Mode	Max	C-Max	Max	C-Max
Walk Time (s)			5.0	
Flash Dont Walk (s)			8.0	
Pedestrian Calls (#/hr)			0	
Act Effct Green (s)	21.0	53.0	30.0	53.0
Actuated g/C Ratio	0.18	0.44	0.25	0.44
v/c Ratio	1.19	0.85	0.31	1.14
Control Delay	145.7	29.8	37.8	102.5
Queue Delay	0.0	3.3	0.0	0.3
Total Delay	145.7	33.1	37.8	102.8
LOS	F	C	D	F
Approach Delay			37.8	102.8
Approach LOS			D	F

Intersection Summary

Area Type: CBD
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 16 (13%), Referenced to phase 2:WBT, Start of Green
Natural Cycle: 140
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.19
Intersection Signal Delay: 93.2 Intersection LOS: F
Intersection Capacity Utilization 134.7% ICU Level of Service H
Analysis Period (min) 15
! Phase conflict between lane groups.

Splits and Phases: 12: Alewife Brook Parkway & Route 2



Lane Group	EBL	WBR	SBT	NWT
Lane Group Flow (vph)	678	622	255	1668
v/c Ratio	1.19	0.85	0.31	1.14
Control Delay	145.7	29.8	37.8	102.5
Queue Delay	0.0	3.3	0.0	0.3
Total Delay	145.7	33.1	37.8	102.8
Queue Length 50th (ft)	~326	422	84	~792
Queue Length 95th (ft)	#446	#639	123	#931
Internal Link Dist (ft)			122	198
Turn Bay Length (ft)				
Base Capacity (vph)	569	733	822	1468
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	53	0	107
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	1.19	0.91	0.31	1.23

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

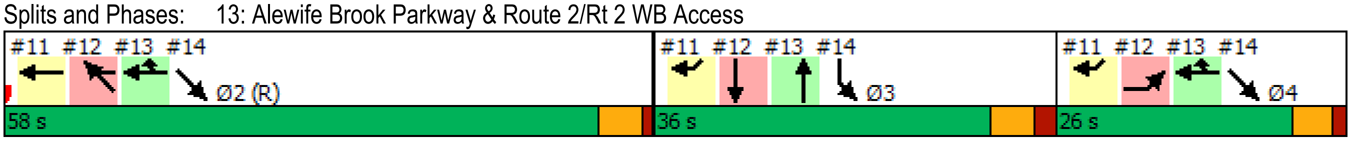
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↑	↱		↑↑				
Traffic Volume (vph)	0	0	0	0	591	328	0	238	0	0	0	0
Future Volume (vph)	0	0	0	0	591	328	0	238	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		200	0		0	0		0
Storage Lanes	0		0	0		1	0		0	0		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt						0.850						
Flt Protected												
Satd. Flow (prot)	0	0	0	0	1693	1439	0	3217	0	0	0	0
Flt Permitted												
Satd. Flow (perm)	0	0	0	0	1693	1439	0	3217	0	0	0	0
Right Turn on Red			No			No	No		No			No
Satd. Flow (RTOR)												
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		161			1225			227			185	
Travel Time (s)		3.7			27.8			5.2			4.2	
Confl. Peds. (#/hr)						2						
Peak Hour Factor	0.92	0.92	0.92	0.95	0.95	0.95	0.97	0.97	0.97	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	0%	1%	1%	0%	1%	0%	2%	2%	2%
Adj. Flow (vph)	0	0	0	0	622	345	0	245	0	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	622	345	0	245	0	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors					2	1		2				
Detector Template					Thru	Right		Thru				
Leading Detector (ft)					100	20		100				
Trailing Detector (ft)					0	0		0				
Detector 1 Position(ft)					0	0		0				
Detector 1 Size(ft)					6	20		6				
Detector 1 Type					Cl+Ex	Cl+Ex		Cl+Ex				
Detector 1 Channel												
Detector 1 Extend (s)					0.0	0.0		0.0				
Detector 1 Queue (s)					0.0	0.0		0.0				
Detector 1 Delay (s)					0.0	0.0		0.0				
Detector 2 Position(ft)					94			94				
Detector 2 Size(ft)					6			6				
Detector 2 Type					Cl+Ex			Cl+Ex				
Detector 2 Channel												
Detector 2 Extend (s)					0.0			0.0				

Lane Group	Ø2	Ø4
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Ideal Flow (vphpl)		
Storage Length (ft)		
Storage Lanes		
Taper Length (ft)		
Lane Util. Factor		
Ped Bike Factor		
Frt		
Flt Protected		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Right Turn on Red		
Satd. Flow (RTOR)		
Link Speed (mph)		
Link Distance (ft)		
Travel Time (s)		
Confl. Peds. (#/hr)		
Peak Hour Factor		
Heavy Vehicles (%)		
Adj. Flow (vph)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Enter Blocked Intersection		
Lane Alignment		
Median Width(ft)		
Link Offset(ft)		
Crosswalk Width(ft)		
Two way Left Turn Lane		
Headway Factor		
Turning Speed (mph)		
Number of Detectors		
Detector Template		
Leading Detector (ft)		
Trailing Detector (ft)		
Detector 1 Position(ft)		
Detector 1 Size(ft)		
Detector 1 Type		
Detector 1 Channel		
Detector 1 Extend (s)		
Detector 1 Queue (s)		
Detector 1 Delay (s)		
Detector 2 Position(ft)		
Detector 2 Size(ft)		
Detector 2 Type		
Detector 2 Channel		
Detector 2 Extend (s)		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type					NA	Prot		NA				
Protected Phases					2 4	2 4		3				
Permitted Phases												
Detector Phase					2 4	2 4		3				
Switch Phase												
Minimum Initial (s)								10.0				
Minimum Split (s)								19.0				
Total Split (s)								36.0				
Total Split (%)								30.0%				
Maximum Green (s)								30.0				
Yellow Time (s)								4.0				
All-Red Time (s)								2.0				
Lost Time Adjust (s)								0.0				
Total Lost Time (s)								6.0				
Lead/Lag								Lead				
Lead-Lag Optimize?												
Vehicle Extension (s)								3.0				
Recall Mode								Max				
Walk Time (s)								5.0				
Flash Dont Walk (s)								8.0				
Pedestrian Calls (#/hr)								0				
Act Effct Green (s)					79.0	79.0		30.0				
Actuated g/C Ratio					0.66	0.66		0.25				
v/c Ratio					0.56	0.36		0.30				
Control Delay					13.5	10.5		37.8				
Queue Delay					2.1	0.0		0.0				
Total Delay					15.6	10.5		37.8				
LOS					B	B		D				
Approach Delay					13.8			37.8				
Approach LOS					B			D				

Intersection Summary	
Area Type: CBD	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 16 (13%), Referenced to phase 2:WBT, Start of Green	
Natural Cycle: 140	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.19	
Intersection Signal Delay: 18.6	Intersection LOS: B
Intersection Capacity Utilization 52.1%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 13: Alewife Brook Parkway & Route 2/Rt 2 WB Access



Lane Group	Ø2	Ø4
Turn Type		
Protected Phases	2	4
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	10.0	10.0
Minimum Split (s)	15.0	15.0
Total Split (s)	58.0	26.0
Total Split (%)	48%	22%
Maximum Green (s)	53.0	21.0
Yellow Time (s)	4.0	3.5
All-Red Time (s)	1.0	1.5
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag		Lag
Lead-Lag Optimize?		
Vehicle Extension (s)	3.0	3.0
Recall Mode	C-Max	Max
Walk Time (s)		
Flash Dont Walk (s)		
Pedestrian Calls (#/hr)		
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		
Approach LOS		

Intersection Summary

Lane Group	WBT	WBR	NBT
Lane Group Flow (vph)	622	345	245
v/c Ratio	0.56	0.36	0.30
Control Delay	13.5	10.5	37.8
Queue Delay	2.1	0.0	0.0
Total Delay	15.6	10.5	37.8
Queue Length 50th (ft)	239	110	81
Queue Length 95th (ft)	337	165	119
Internal Link Dist (ft)	1145		147
Turn Bay Length (ft)		200	
Base Capacity (vph)	1114	947	804
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	337	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.80	0.36	0.30

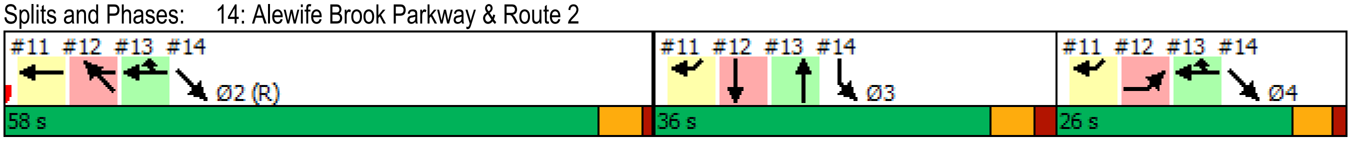
Intersection Summary

Lane Group	SBL	SBR	SEL	SET	NWT	NWR	Ø2	Ø4
Lane Configurations								
Traffic Volume (vph)	250	0	0	987	0	0		
Future Volume (vph)	250	0	0	987	0	0		
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900		
Lane Width (ft)	13	13	13	13	13	13		
Lane Util. Factor	0.97	1.00	1.00	0.95	1.00	1.00		
Frt								
Flt Protected	0.950							
Satd. Flow (prot)	3193	0	0	3324	0	0		
Flt Permitted	0.950							
Satd. Flow (perm)	3193	0	0	3324	0	0		
Right Turn on Red	Yes	Yes				Yes		
Satd. Flow (RTOR)	234							
Link Speed (mph)	30			30	30			
Link Distance (ft)	155			297	139			
Travel Time (s)	3.5			6.8	3.2			
Peak Hour Factor	0.98	0.98	0.90	0.90	0.92	0.92		
Heavy Vehicles (%)	2%	0%	0%	1%	2%	2%		
Adj. Flow (vph)	255	0	0	1097	0	0		
Shared Lane Traffic (%)								
Lane Group Flow (vph)	255	0	0	1097	0	0		
Enter Blocked Intersection	No	No	No	No	No	No		
Lane Alignment	Left	Right	Left	Left	Left	Right		
Median Width(ft)	26			0	0			
Link Offset(ft)	0			0	0			
Crosswalk Width(ft)	16			16	16			
Two way Left Turn Lane								
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10		
Turning Speed (mph)	30	9	15			9		
Number of Detectors	1			2				
Detector Template	Left			Thru				
Leading Detector (ft)	20			100				
Trailing Detector (ft)	0			0				
Detector 1 Position(ft)	0			0				
Detector 1 Size(ft)	20			6				
Detector 1 Type	Cl+Ex			Cl+Ex				
Detector 1 Channel								
Detector 1 Extend (s)	0.0			0.0				
Detector 1 Queue (s)	0.0			0.0				
Detector 1 Delay (s)	0.0			0.0				
Detector 2 Position(ft)				94				
Detector 2 Size(ft)				6				
Detector 2 Type				Cl+Ex				
Detector 2 Channel								
Detector 2 Extend (s)				0.0				
Turn Type	Prot			NA				
Protected Phases	3			2 4			2	4
Permitted Phases								
Detector Phase	3			2 4				

Lane Group	SBL	SBR	SEL	SET	NWT	NWR	Ø2	Ø4
Switch Phase								
Minimum Initial (s)	10.0						10.0	10.0
Minimum Split (s)	19.0						15.0	15.0
Total Split (s)	36.0						58.0	26.0
Total Split (%)	30.0%						48%	22%
Maximum Green (s)	30.0						53.0	21.0
Yellow Time (s)	4.0						4.0	3.5
All-Red Time (s)	2.0						1.0	1.5
Lost Time Adjust (s)	0.0							
Total Lost Time (s)	6.0							
Lead/Lag	Lead							Lag
Lead-Lag Optimize?								
Vehicle Extension (s)	3.0						3.0	3.0
Recall Mode	Max						C-Max	Max
Walk Time (s)	5.0							
Flash Dont Walk (s)	8.0							
Pedestrian Calls (#/hr)	0							
Act Effct Green (s)	30.0			79.0				
Actuated g/C Ratio	0.25			0.66				
v/c Ratio	0.26			0.50				
Control Delay	0.8			11.4				
Queue Delay	0.5			0.0				
Total Delay	1.3			11.4				
LOS	A			B				
Approach Delay	1.3			11.4				
Approach LOS	A			B				

Intersection Summary	
Area Type: CBD	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 16 (13%), Referenced to phase 2:WBT, Start of Green	
Natural Cycle: 140	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.19	
Intersection Signal Delay: 9.5	Intersection LOS: A
Intersection Capacity Utilization 47.8%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 14: Alewife Brook Parkway & Route 2



Lane Group	SBL	SET
Lane Group Flow (vph)	255	1097
v/c Ratio	0.26	0.50
Control Delay	0.8	11.4
Queue Delay	0.5	0.0
Total Delay	1.3	11.4
Queue Length 50th (ft)	0	209
Queue Length 95th (ft)	1	258
Internal Link Dist (ft)	75	217
Turn Bay Length (ft)		
Base Capacity (vph)	973	2188
Starvation Cap Reductn	391	0
Spillback Cap Reductn	0	0
Storage Cap Reductn	0	0
Reduced v/c Ratio	0.44	0.50

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	823	0	0	633	0	0	0	0	0	0	0
Future Volume (vph)	0	823	0	0	633	0	0	0	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	15	15	15	16	16	16	12	12	12	12	12	12
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
Frt												
Flt Protected												
Satd. Flow (prot)	0	2049	0	0	2153	0	0	0	0	0	0	0
Flt Permitted												
Satd. Flow (perm)	0	2049	0	0	2153	0	0	0	0	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)												
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		135			215			175			206	
Travel Time (s)		3.1			4.9			4.0			4.7	
Peak Hour Factor	0.84	0.84	0.84	0.97	0.97	0.97	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	0	980	0	0	653	0	0	0	0	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	980	0	0	653	0	0	0	0	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	0.88	0.88	0.88	0.85	0.85	0.85	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors		2			2							
Detector Template		Thru			Thru							
Leading Detector (ft)		100			100							
Trailing Detector (ft)		0			0							
Detector 1 Position(ft)		0			0							
Detector 1 Size(ft)		6			6							
Detector 1 Type		Cl+Ex			Cl+Ex							
Detector 1 Channel												
Detector 1 Extend (s)		0.0			0.0							
Detector 1 Queue (s)		0.0			0.0							
Detector 1 Delay (s)		0.0			0.0							
Detector 2 Position(ft)		94			94							
Detector 2 Size(ft)		6			6							
Detector 2 Type		Cl+Ex			Cl+Ex							
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0							
Turn Type		NA			NA							
Protected Phases		4			8							
Permitted Phases												
Detector Phase		4			8							

Lane Group	Ø2	Ø5	Ø6	Ø9
Lane Configurations				
Traffic Volume (vph)				
Future Volume (vph)				
Ideal Flow (vphpl)				
Lane Width (ft)				
Lane Util. Factor				
Frt				
Flt Protected				
Satd. Flow (prot)				
Flt Permitted				
Satd. Flow (perm)				
Right Turn on Red				
Satd. Flow (RTOR)				
Link Speed (mph)				
Link Distance (ft)				
Travel Time (s)				
Peak Hour Factor				
Heavy Vehicles (%)				
Adj. Flow (vph)				
Shared Lane Traffic (%)				
Lane Group Flow (vph)				
Enter Blocked Intersection				
Lane Alignment				
Median Width(ft)				
Link Offset(ft)				
Crosswalk Width(ft)				
Two way Left Turn Lane				
Headway Factor				
Turning Speed (mph)				
Number of Detectors				
Detector Template				
Leading Detector (ft)				
Trailing Detector (ft)				
Detector 1 Position(ft)				
Detector 1 Size(ft)				
Detector 1 Type				
Detector 1 Channel				
Detector 1 Extend (s)				
Detector 1 Queue (s)				
Detector 1 Delay (s)				
Detector 2 Position(ft)				
Detector 2 Size(ft)				
Detector 2 Type				
Detector 2 Channel				
Detector 2 Extend (s)				
Turn Type				
Protected Phases	2	5	6	9
Permitted Phases				
Detector Phase				

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Switch Phase												
Minimum Initial (s)		4.0			4.0							
Minimum Split (s)		20.5			20.5							
Total Split (s)		58.0			58.0							
Total Split (%)		58.0%			58.0%							
Maximum Green (s)		56.0			56.0							
Yellow Time (s)		2.0			2.0							
All-Red Time (s)		0.0			0.0							
Lost Time Adjust (s)		0.0			0.0							
Total Lost Time (s)		2.0			2.0							
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)		3.0			3.0							
Recall Mode		Max			Max							
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)		56.0			56.0							
Actuated g/C Ratio		0.64			0.64							
v/c Ratio		0.75			0.47							
Control Delay		15.6			4.0							
Queue Delay		0.0			0.3							
Total Delay		15.6			4.3							
LOS		B			A							
Approach Delay		15.6			4.3							
Approach LOS		B			A							

Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 87.3

Natural Cycle: 90

Control Type: Semi Act-Uncoord

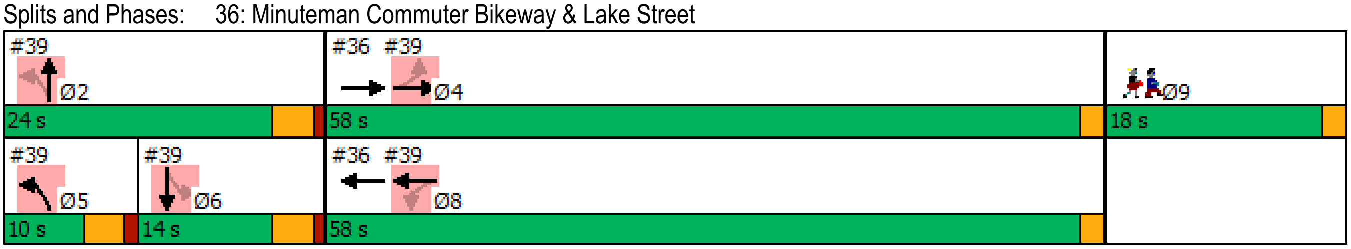
Maximum v/c Ratio: 0.82

Intersection Signal Delay: 11.1 Intersection LOS: B

Intersection Capacity Utilization 46.6% ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 36: Minuteman Commuter Bikeway & Lake Street



Lane Group	Ø2	Ø5	Ø6	Ø9
Switch Phase				
Minimum Initial (s)	4.0	4.0	4.0	4.0
Minimum Split (s)	21.0	9.0	14.0	18.0
Total Split (s)	24.0	10.0	14.0	18.0
Total Split (%)	24%	10%	14%	18%
Maximum Green (s)	20.0	6.0	10.0	16.0
Yellow Time (s)	3.0	3.0	3.0	2.0
All-Red Time (s)	1.0	1.0	1.0	0.0
Lost Time Adjust (s)				
Total Lost Time (s)				
Lead/Lag		Lead	Lag	
Lead-Lag Optimize?		Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0
Recall Mode	Min	None	Min	None
Walk Time (s)				5.0
Flash Dont Walk (s)				11.0
Pedestrian Calls (#/hr)				211
Act Effct Green (s)				
Actuated g/C Ratio				
v/c Ratio				
Control Delay				
Queue Delay				
Total Delay				
LOS				
Approach Delay				
Approach LOS				

Intersection Summary

Lane Group	EBT	WBT
Lane Group Flow (vph)	980	653
v/c Ratio	0.75	0.47
Control Delay	15.6	4.0
Queue Delay	0.0	0.3
Total Delay	15.6	4.3
Queue Length 50th (ft)	326	53
Queue Length 95th (ft)	460	98
Internal Link Dist (ft)	55	135
Turn Bay Length (ft)		
Base Capacity (vph)	1314	1381
Starvation Cap Reductn	0	236
Spillback Cap Reductn	0	0
Storage Cap Reductn	0	0
Reduced v/c Ratio	0.75	0.57

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	82	683	70	6	512	1	15	5	7	0	5	108
Future Volume (vph)	82	683	70	6	512	1	15	5	7	0	5	108
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	14	14	14	13	13	13	12	12	12	12	12	12
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
Frt		0.989						0.966			0.871	
Flt Protected		0.995			0.999			0.973				
Satd. Flow (prot)	0	1994	0	0	1961	0	0	1786	0	0	1655	0
Flt Permitted		0.897			0.992			0.466				
Satd. Flow (perm)	0	1798	0	0	1948	0	0	855	0	0	1655	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		8						9			140	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		215			1126			206			208	
Travel Time (s)		4.9			25.6			4.7			4.7	
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.75	0.75	0.75	0.77	0.77	0.77
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	93	776	80	7	582	1	20	7	9	0	6	140
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	949	0	0	590	0	0	36	0	0	146	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	0.92	0.92	0.92	0.96	0.96	0.96	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	20	100		20	100		20	100		20	100	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		pm+pt	NA			NA	
Protected Phases		4			8		5	2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		5	2		6	6	

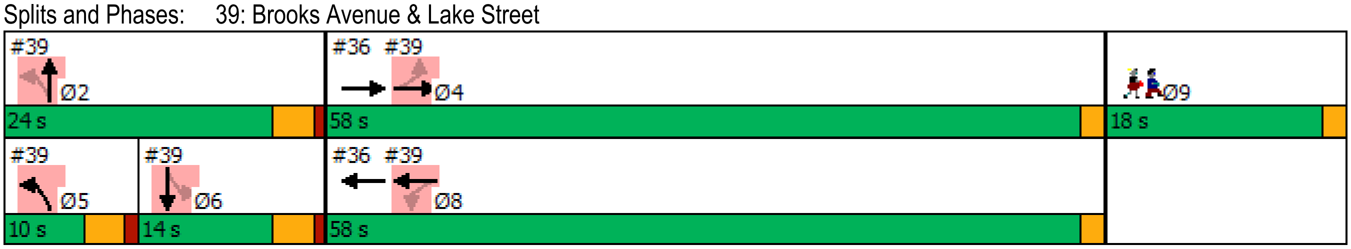
Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Heavy Vehicles (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (mph)	
Number of Detectors	
Detector Template	
Leading Detector (ft)	
Trailing Detector (ft)	
Detector 1 Position(ft)	
Detector 1 Size(ft)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Detector 2 Position(ft)	
Detector 2 Size(ft)	
Detector 2 Type	
Detector 2 Channel	
Detector 2 Extend (s)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Switch Phase												
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	20.5	20.5		20.5	20.5		9.0	21.0		14.0	14.0	
Total Split (s)	58.0	58.0		58.0	58.0		10.0	24.0		14.0	14.0	
Total Split (%)	58.0%	58.0%		58.0%	58.0%		10.0%	24.0%		14.0%	14.0%	
Maximum Green (s)	56.0	56.0		56.0	56.0		6.0	20.0		10.0	10.0	
Yellow Time (s)	2.0	2.0		2.0	2.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	0.0	0.0		0.0	0.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		2.0			2.0			4.0			4.0	
Lead/Lag							Lead			Lag	Lag	
Lead-Lag Optimize?							Yes			Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	Max	Max		Max	Max		None	Min		Min	Min	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)		56.0			56.0			7.3			7.3	
Actuated g/C Ratio		0.64			0.64			0.08			0.08	
v/c Ratio		0.82			0.47			0.46			0.55	
Control Delay		8.3			9.8			49.2			16.2	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		8.3			9.8			49.3			16.2	
LOS		A			A			D			B	
Approach Delay		8.3			9.8			49.3			16.2	
Approach LOS		A			A			D			B	

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 87.3
Natural Cycle: 90
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.82
Intersection Signal Delay: 10.3 Intersection LOS: B
Intersection Capacity Utilization 90.3% ICU Level of Service E
Analysis Period (min) 15

Splits and Phases: 39: Brooks Avenue & Lake Street



Lane Group	Ø9
Switch Phase	
Minimum Initial (s)	4.0
Minimum Split (s)	18.0
Total Split (s)	18.0
Total Split (%)	18%
Maximum Green (s)	16.0
Yellow Time (s)	2.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Recall Mode	None
Walk Time (s)	5.0
Flash Dont Walk (s)	11.0
Pedestrian Calls (#/hr)	211
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	

Intersection Summary

Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	949	590	36	146
v/c Ratio	0.82	0.47	0.46	0.55
Control Delay	8.3	9.8	49.2	16.2
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	8.3	9.8	49.3	16.2
Queue Length 50th (ft)	33	147	14	3
Queue Length 95th (ft)	38	234	36	37
Internal Link Dist (ft)	135	1046	126	128
Turn Bay Length (ft)				
Base Capacity (vph)	1156	1250	202	313
Starvation Cap Reductn	2	0	0	0
Spillback Cap Reductn	0	13	6	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.82	0.48	0.18	0.47

Intersection Summary

2027 Build Weekday Morning Peak Hour

Intersection	
Int Delay, s/veh	0.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	619	3	1	1202	5	1
Future Vol, veh/h	619	3	1	1202	5	1
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	75	75	87	87	75	75
Heavy Vehicles, %	2	0	0	1	0	0
Mvmt Flow	825	4	1	1382	7	1

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	829	0	2211	827
Stage 1	-	-	-	-	827	-
Stage 2	-	-	-	-	1384	-
Critical Hdwy	-	-	4.1	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	811	-	49	375
Stage 1	-	-	-	-	433	-
Stage 2	-	-	-	-	235	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	811	-	49	375
Mov Cap-2 Maneuver	-	-	-	-	49	-
Stage 1	-	-	-	-	433	-
Stage 2	-	-	-	-	234	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	78.2
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	57	-	-	811	-
HCM Lane V/C Ratio	0.14	-	-	0.001	-
HCM Control Delay (s)	78.2	-	-	9.4	0
HCM Lane LOS	F	-	-	A	A
HCM 95th %tile Q(veh)	0.5	-	-	0	-

Intersection	
Int Delay, s/veh	4.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	601	19	5	1166	37	6
Future Vol, veh/h	601	19	5	1166	37	6
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	75	75	93	93	75	75
Heavy Vehicles, %	2	0	0	1	0	0
Mvmt Flow	801	25	5	1254	49	8

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	826	0	2078	814
Stage 1	-	-	-	-	814	-
Stage 2	-	-	-	-	1264	-
Critical Hdwy	-	-	4.1	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	813	-	60	381
Stage 1	-	-	-	-	439	-
Stage 2	-	-	-	-	268	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	813	-	59	381
Mov Cap-2 Maneuver	-	-	-	-	59	-
Stage 1	-	-	-	-	439	-
Stage 2	-	-	-	-	263	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	173.7
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	67	-	-	813	-
HCM Lane V/C Ratio	0.856	-	-	0.007	-
HCM Control Delay (s)	173.7	-	-	9.5	0
HCM Lane LOS	F	-	-	A	A
HCM 95th %tile Q(veh)	4.1	-	-	0	-

Intersection	
Int Delay, s/veh	2.5

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	13	7	2	30	19	5
Future Vol, veh/h	13	7	2	30	19	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	14	8	2	33	21	5

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	61	24	26	0	-	0
Stage 1	24	-	-	-	-	-
Stage 2	37	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	950	1058	1601	-	-	-
Stage 1	1004	-	-	-	-	-
Stage 2	991	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	949	1058	1601	-	-	-
Mov Cap-2 Maneuver	949	-	-	-	-	-
Stage 1	1003	-	-	-	-	-
Stage 2	991	-	-	-	-	-

Approach	EB		NB		SB	
HCM Control Delay, s	8.7		0.5		0	
HCM LOS	A					

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1601	-	984	-	-
HCM Lane V/C Ratio	0.001	-	0.022	-	-
HCM Control Delay (s)	7.3	0	8.7	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0	-	0.1	-	-

Intersection	
Int Delay, s/veh	0.4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	602	5	3	1164	7	1
Future Vol, veh/h	602	5	3	1164	7	1
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	75	75	93	93	75	75
Heavy Vehicles, %	2	0	0	1	0	0
Mvmt Flow	803	7	3	1252	9	1

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	810	0	2065	807
Stage 1	-	-	-	-	807	-
Stage 2	-	-	-	-	1258	-
Critical Hdwy	-	-	4.1	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	825	-	61	385
Stage 1	-	-	-	-	442	-
Stage 2	-	-	-	-	270	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	825	-	60	385
Mov Cap-2 Maneuver	-	-	-	-	60	-
Stage 1	-	-	-	-	442	-
Stage 2	-	-	-	-	267	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	68.6
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	67	-	-	825	-
HCM Lane V/C Ratio	0.159	-	-	0.004	-
HCM Control Delay (s)	68.6	-	-	9.4	0
HCM Lane LOS	F	-	-	A	A
HCM 95th %tile Q(veh)	0.5	-	-	0	-

Intersection	
Int Delay, s/veh	1.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	585	18	10	1148	5	8	0	21	4	0	11
Future Vol, veh/h	0	585	18	10	1148	5	8	0	21	4	0	11
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	79	79	79	96	96	96	80	80	80	92	92	92
Heavy Vehicles, %	0	1	0	0	0	0	0	0	10	0	0	0
Mvmt Flow	0	741	23	10	1196	5	10	0	26	4	0	12

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1201	0	0	764	0	0	1978	1974	753	1985	1983	1199
Stage 1	-	-	-	-	-	-	753	753	-	1219	1219	-
Stage 2	-	-	-	-	-	-	1225	1221	-	766	764	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.3	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.39	3.5	4	3.3
Pot Cap-1 Maneuver	588	-	-	858	-	-	47	63	397	46	62	228
Stage 1	-	-	-	-	-	-	405	420	-	223	255	-
Stage 2	-	-	-	-	-	-	221	255	-	398	416	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	588	-	-	858	-	-	43	61	397	42	60	228
Mov Cap-2 Maneuver	-	-	-	-	-	-	43	61	-	42	60	-
Stage 1	-	-	-	-	-	-	405	420	-	223	246	-
Stage 2	-	-	-	-	-	-	202	246	-	372	416	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.1	47	45.5
HCM LOS			E	E

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	121	588	-	-	858	-	-	105
HCM Lane V/C Ratio	0.3	-	-	-	0.012	-	-	0.155
HCM Control Delay (s)	47	0	-	-	9.2	0	-	45.5
HCM Lane LOS	E	A	-	-	A	A	-	E
HCM 95th %tile Q(veh)	1.2	0	-	-	0	-	-	0.5

Intersection	
Int Delay, s/veh	5.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	3	600	7	24	1138	3	9	0	22	3	0	16
Future Vol, veh/h	3	600	7	24	1138	3	9	0	22	3	0	16
Conflicting Peds, #/hr	0	0	0	304	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	84	84	84	97	97	97	75	75	75	75	75	75
Heavy Vehicles, %	0	2	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	4	714	8	25	1173	3	12	0	29	4	0	21

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1176	0	0	1026	0	0	2265	2256	1022	1966	2259	1175
Stage 1	-	-	-	-	-	-	1030	1030	-	1225	1225	-
Stage 2	-	-	-	-	-	-	1235	1226	-	741	1034	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	601	-	-	685	-	-	29	42	289	48	42	236
Stage 1	-	-	-	-	-	-	284	313	-	221	254	-
Stage 2	-	-	-	-	-	-	218	253	-	411	312	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	601	-	-	511	-	-	17	27	216	37	27	236
Mov Cap-2 Maneuver	-	-	-	-	-	-	17	27	-	37	27	-
Stage 1	-	-	-	-	-	-	210	231	-	219	218	-
Stage 2	-	-	-	-	-	-	170	217	-	351	231	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0.3	213.9	39.9
HCM LOS			F	E

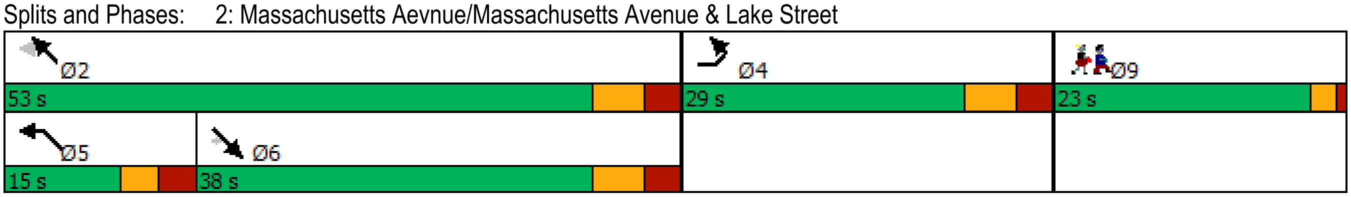
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	49	601	-	-	511	-	-	128
HCM Lane V/C Ratio	0.844	0.006	-	-	0.048	-	-	0.198
HCM Control Delay (s)	213.9	11	0	-	12.4	0	-	39.9
HCM Lane LOS	F	B	A	-	B	A	-	E
HCM 95th %tile Q(veh)	3.5	0	-	-	0.2	-	-	0.7

Lane Group	EBL	EBR	SET	SER	NWL	NWT	Ø9
Lane Configurations							
Traffic Volume (vph)	261	295	851	609	403	454	
Future Volume (vph)	261	295	851	609	403	454	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Lane Width (ft)	16	16	11	10	11	12	
Storage Length (ft)	0	0		55	150		
Storage Lanes	1	0		1	1		
Taper Length (ft)	25				25		
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	1.00	
Frt	0.928			0.850			
Flt Protected	0.977				0.950		
Satd. Flow (prot)	1933	0	3421	1492	1728	1863	
Flt Permitted	0.977				0.133		
Satd. Flow (perm)	1933	0	3421	1492	242	1863	
Right Turn on Red		Yes		Yes			
Satd. Flow (RTOR)	49			212			
Link Speed (mph)	30		30			30	
Link Distance (ft)	1126		640			645	
Travel Time (s)	25.6		14.5			14.7	
Peak Hour Factor	0.91	0.91	0.92	0.92	0.92	0.92	
Heavy Vehicles (%)	1%	1%	2%	1%	1%	2%	
Adj. Flow (vph)	287	324	925	662	438	493	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	611	0	925	662	438	493	
Enter Blocked Intersection	No	No	No	No	No	No	
Lane Alignment	Left	Right	Left	Right	Left	Left	
Median Width(ft)	16		11			11	
Link Offset(ft)	0		0			0	
Crosswalk Width(ft)	16		16			16	
Two way Left Turn Lane							
Headway Factor	0.85	0.85	1.04	1.09	1.04	1.00	
Turning Speed (mph)	15	9		9	15		
Number of Detectors	1		2	1	1	2	
Detector Template	Left		Thru	Right	Left	Thru	
Leading Detector (ft)	20		100	20	20	100	
Trailing Detector (ft)	0		0	0	0	0	
Detector 1 Position(ft)	0		0	0	0	0	
Detector 1 Size(ft)	20		6	20	20	6	
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel							
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	0.0	
Detector 2 Position(ft)			94			94	
Detector 2 Size(ft)			6			6	
Detector 2 Type			Cl+Ex			Cl+Ex	
Detector 2 Channel							
Detector 2 Extend (s)			0.0			0.0	
Turn Type	Prot		NA	Perm	pm+pt	NA	

Lane Group	EBL	EBR	SET	SER	NWL	NWT	Ø9
Protected Phases	4		6		5	2	9
Permitted Phases				6	2		
Detector Phase	4		6	6	5	2	
Switch Phase							
Minimum Initial (s)	4.0		4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	23.0		23.0	23.0	10.0	23.0	19.0
Total Split (s)	29.0		38.0	38.0	15.0	53.0	23.0
Total Split (%)	27.6%		36.2%	36.2%	14.3%	50.5%	22%
Maximum Green (s)	22.0		31.0	31.0	9.0	46.0	20.0
Yellow Time (s)	4.0		4.0	4.0	3.0	4.0	2.0
All-Red Time (s)	3.0		3.0	3.0	3.0	3.0	1.0
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0	
Total Lost Time (s)	7.0		7.0	7.0	6.0	7.0	
Lead/Lag			Lag	Lag	Lead		
Lead-Lag Optimize?			Yes	Yes	Yes		
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0	3.0
Recall Mode	None		Max	Max	None	Max	None
Walk Time (s)							5.0
Flash Dont Walk (s)							11.0
Pedestrian Calls (#/hr)							20
Act Effct Green (s)	22.2		31.3	31.3	47.5	46.5	
Actuated g/C Ratio	0.25		0.35	0.35	0.53	0.52	
v/c Ratio	1.18		0.77	1.00	1.57	0.51	
Control Delay	131.5		33.0	58.9	294.4	18.3	
Queue Delay	0.0		0.0	0.0	0.0	0.0	
Total Delay	131.5		33.0	58.9	294.4	18.3	
LOS	F		C	E	F	B	
Approach Delay	131.5		43.8			148.2	
Approach LOS	F		D			F	

Intersection Summary	
Area Type: Other	
Cycle Length: 105	
Actuated Cycle Length: 89.6	
Natural Cycle: 150	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 1.57	
Intersection Signal Delay: 92.0	Intersection LOS: F
Intersection Capacity Utilization 95.1%	ICU Level of Service F
Analysis Period (min) 15	

Splits and Phases: 2: Massachusetts Aevnue/Massachusetts Avenue & Lake Street



Lane Group	EBL	SET	SER	NWL	NWT
Lane Group Flow (vph)	611	925	662	438	493
v/c Ratio	1.18	0.77	1.00	1.57	0.51
Control Delay	131.5	33.0	58.9	294.4	18.3
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	131.5	33.0	58.9	294.4	18.3
Queue Length 50th (ft)	~343	208	237	~251	140
Queue Length 95th (ft)	#709	#409	#606	#562	332
Internal Link Dist (ft)	1046	560			565
Turn Bay Length (ft)			55	150	
Base Capacity (vph)	516	1196	659	279	966
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	1.18	0.77	1.00	1.57	0.51

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

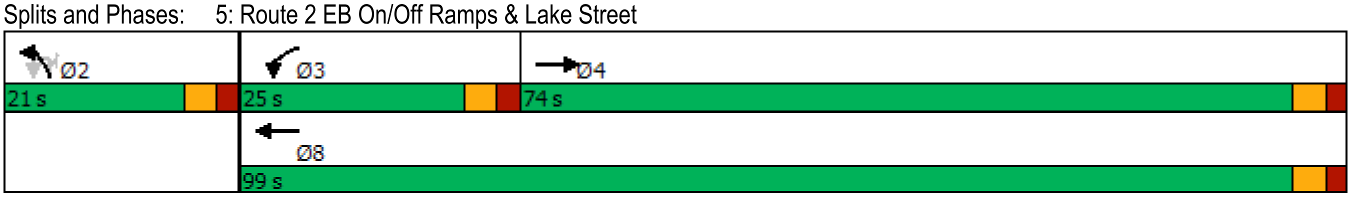
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lane Group	EBT	EBR	WBL	WBT	NBU	NBL	NBR
Lane Configurations							
Traffic Volume (vph)	312	493	212	421	271	221	523
Future Volume (vph)	312	493	212	421	271	221	523
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	16	16	10	11	12	16	14
Storage Length (ft)		150	110			0	0
Storage Lanes		1	1			1	1
Taper Length (ft)			25			25	
Lane Util. Factor	1.00	1.00	1.00	0.95	1.00	1.00	1.00
Frt		0.850					0.850
Flt Protected			0.950			0.950	
Satd. Flow (prot)	2132	1812	1685	3455	0	2037	1706
Flt Permitted			0.950			0.950	
Satd. Flow (perm)	2132	1812	1685	3455	0	2037	1706
Right Turn on Red		Yes					Yes
Satd. Flow (RTOR)		332					405
Link Speed (mph)	30			30		30	
Link Distance (ft)	239			505		387	
Travel Time (s)	5.4			11.5		8.8	
Peak Hour Factor	0.91	0.91	0.84	0.84	0.91	0.91	0.91
Heavy Vehicles (%)	1%	1%	0%	1%	0%	1%	1%
Adj. Flow (vph)	343	542	252	501	298	243	575
Shared Lane Traffic (%)							
Lane Group Flow (vph)	343	542	252	501	0	541	575
Enter Blocked Intersection	No	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	R NA	Left	Right
Median Width(ft)	12			12		16	
Link Offset(ft)	0			0		0	
Crosswalk Width(ft)	16			16		16	
Two way Left Turn Lane							
Headway Factor	0.85	0.85	1.09	1.04	1.00	0.85	0.92
Turning Speed (mph)		9	15		9	15	9
Number of Detectors	2	1	1	2	1	1	1
Detector Template	Thru	Right	Left	Thru	Left	Left	Right
Leading Detector (ft)	100	20	20	100	20	20	20
Trailing Detector (ft)	0	0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0	0	0
Detector 1 Size(ft)	6	20	20	6	20	20	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel							
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)	94			94			
Detector 2 Size(ft)	6			6			
Detector 2 Type	Cl+Ex			Cl+Ex			
Detector 2 Channel							
Detector 2 Extend (s)	0.0			0.0			
Turn Type	NA	Free	Prot	NA	Perm	Prot	Perm

Lane Group	EBT	EBR	WBL	WBT	NBU	NBL	NBR
Protected Phases	4		3	8		2	
Permitted Phases		Free			2		2
Detector Phase	4		3	8	2	2	2
Switch Phase							
Minimum Initial (s)	4.0		4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	21.0		9.0	21.0	21.0	21.0	21.0
Total Split (s)	74.0		25.0	99.0	21.0	21.0	21.0
Total Split (%)	61.7%		20.8%	82.5%	17.5%	17.5%	17.5%
Maximum Green (s)	69.0		20.0	94.0	16.0	16.0	16.0
Yellow Time (s)	3.0		3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0		2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0		0.0	0.0		0.0	0.0
Total Lost Time (s)	5.0		5.0	5.0		5.0	5.0
Lead/Lag	Lag		Lead				
Lead-Lag Optimize?	Yes		Yes				
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0	3.0
Recall Mode	None		None	None	Max	Max	Max
Walk Time (s)	5.0			5.0	5.0	5.0	5.0
Flash Dont Walk (s)	11.0			11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0			0	0	0	0
Act Effct Green (s)	15.8	63.5	16.4	37.3		16.1	16.1
Actuated g/C Ratio	0.25	1.00	0.26	0.59		0.25	0.25
v/c Ratio	0.65	0.30	0.58	0.25		1.04	0.78
Control Delay	27.8	0.4	27.3	6.4		80.3	17.0
Queue Delay	0.0	0.0	0.0	0.0		0.0	0.0
Total Delay	27.8	0.4	27.3	6.4		80.3	17.0
LOS	C	A	C	A		F	B
Approach Delay	11.0			13.4		47.7	
Approach LOS	B			B		D	

Intersection Summary	
Area Type: Other	
Cycle Length: 120	
Actuated Cycle Length: 63.5	
Natural Cycle: 60	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 1.04	
Intersection Signal Delay: 26.5	Intersection LOS: C
Intersection Capacity Utilization 67.9%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 5: Route 2 EB On/Off Ramps & Lake Street



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	343	542	252	501	541	575
v/c Ratio	0.65	0.30	0.58	0.25	1.04	0.78
Control Delay	27.8	0.4	27.3	6.4	80.3	17.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.8	0.4	27.3	6.4	80.3	17.0
Queue Length 50th (ft)	119	0	84	43	~236	55
Queue Length 95th (ft)	205	0	152	57	#482	#246
Internal Link Dist (ft)	159			425	307	
Turn Bay Length (ft)		150	110			
Base Capacity (vph)	2110	1812	535	3455	518	735
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	0.16	0.30	0.47	0.15	1.04	0.78

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

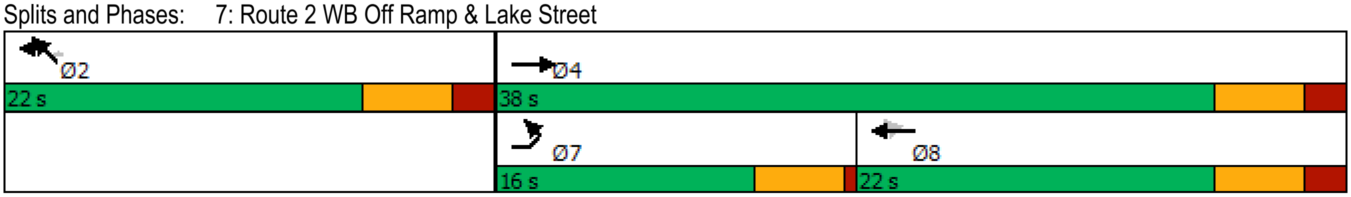
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (vph)	224	611	0	0	482	725	0	0	0	151	6	11
Future Volume (vph)	224	611	0	0	482	725	0	0	0	151	6	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	11	10	12	12	12	11	12	16
Storage Length (ft)	250		0	0		75	0		0	100		0
Storage Lanes	1		0	0		1	0		0	1		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00
Frt						0.850						0.850
Flt Protected	0.950									0.950	0.956	
Satd. Flow (prot)	1805	1881	0	0	1837	1492	0	0	0	1579	1594	1830
Flt Permitted	0.950									0.950	0.956	
Satd. Flow (perm)	1805	1881	0	0	1837	1492	0	0	0	1579	1594	1830
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						492						136
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		505			380			459			529	
Travel Time (s)		11.5			8.6			10.4			12.0	
Peak Hour Factor	0.88	0.88	0.88	0.92	0.92	0.92	0.92	0.92	0.92	0.81	0.81	0.81
Heavy Vehicles (%)	0%	1%	0%	0%	0%	1%	0%	0%	0%	5%	50%	0%
Adj. Flow (vph)	255	694	0	0	524	788	0	0	0	186	7	14
Shared Lane Traffic (%)										48%		
Lane Group Flow (vph)	255	694	0	0	524	788	0	0	0	97	96	14
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			11			11	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.04	1.09	1.00	1.00	1.00	1.04	1.00	0.85
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2			2	1				1	2	1
Detector Template	Left	Thru			Thru	Right				Left	Thru	Right
Leading Detector (ft)	20	100			100	20				20	100	20
Trailing Detector (ft)	0	0			0	0				0	0	0
Detector 1 Position(ft)	0	0			0	0				0	0	0
Detector 1 Size(ft)	20	6			6	20				20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex			Cl+Ex	Cl+Ex				Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0			0.0	0.0				0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0			0.0	0.0				0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0			0.0	0.0				0.0	0.0	0.0
Detector 2 Position(ft)		94			94						94	
Detector 2 Size(ft)		6			6						6	
Detector 2 Type		Cl+Ex			Cl+Ex						Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0						0.0	
Turn Type	Prot	NA			NA	Perm				Split	NA	Perm

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Protected Phases	7	4			8					2	2	
Permitted Phases						8						2
Detector Phase	7	4			8	8				2	2	2
Switch Phase												
Minimum Initial (s)	4.0	4.0			4.0	4.0				4.0	4.0	4.0
Minimum Split (s)	8.5	22.0			22.0	22.0				22.0	22.0	22.0
Total Split (s)	16.0	38.0			22.0	22.0				22.0	22.0	22.0
Total Split (%)	26.7%	63.3%			36.7%	36.7%				36.7%	36.7%	36.7%
Maximum Green (s)	11.5	32.0			16.0	16.0				16.0	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)	0.5	2.0			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)	4.5	6.0			6.0	6.0				6.0	6.0	6.0
Lead/Lag	Lead				Lag	Lag						
Lead-Lag Optimize?	Yes				Yes	Yes						
Vehicle Extension (s)	3.0	3.0			3.0	3.0				3.0	3.0	3.0
Recall Mode	None	None			None	None				Max	Max	Max
Walk Time (s)		5.0			5.0	5.0				5.0	5.0	5.0
Flash Dont Walk (s)		11.0			11.0	11.0				11.0	11.0	11.0
Pedestrian Calls (#/hr)		0			0	0				0	0	0
Act Effct Green (s)	11.0	31.5			16.0	16.0				16.0	16.0	16.0
Actuated g/C Ratio	0.18	0.53			0.27	0.27				0.27	0.27	0.27
v/c Ratio	0.77	0.70			1.06	1.04				0.23	0.22	0.02
Control Delay	40.9	15.1			83.8	54.7				19.0	18.9	0.1
Queue Delay	0.0	0.0			0.0	0.0				0.0	0.0	0.0
Total Delay	40.9	15.1			83.8	54.7				19.0	18.9	0.1
LOS	D	B			F	D				B	B	A
Approach Delay		22.0			66.3						17.7	
Approach LOS		C			E						B	

Intersection Summary	
Area Type: Other	
Cycle Length: 60	
Actuated Cycle Length: 59.5	
Natural Cycle: 80	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 1.06	
Intersection Signal Delay: 45.2	Intersection LOS: D
Intersection Capacity Utilization 75.4%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 7: Route 2 WB Off Ramp & Lake Street



Lane Group	EBL	EBT	WBT	WBR	NWL	NWT	NWR
Lane Group Flow (vph)	255	694	524	788	97	96	14
v/c Ratio	0.77	0.70	1.06	1.04	0.23	0.22	0.02
Control Delay	40.9	15.1	83.8	54.7	19.0	18.9	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	40.9	15.1	83.8	54.7	19.0	18.9	0.1
Queue Length 50th (ft)	88	168	~217	~169	28	28	0
Queue Length 95th (ft)	#179	268	#381	#364	56	55	0
Internal Link Dist (ft)		425	300			449	
Turn Bay Length (ft)	250			75	100		
Base Capacity (vph)	348	1012	494	760	425	429	591
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.73	0.69	1.06	1.04	0.23	0.22	0.02

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

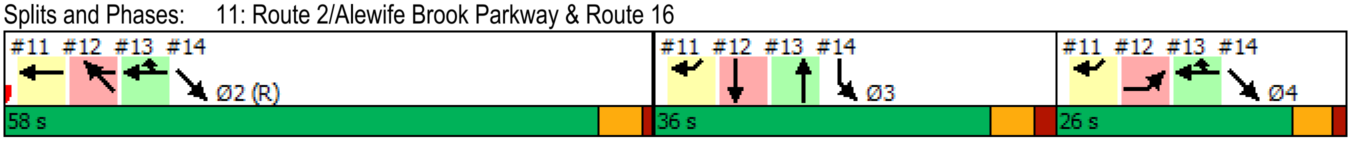
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lane Group	EBL	EBT	WBT	WBR	SWL	SWR	Ø3	Ø4
Lane Configurations								
Traffic Volume (vph)	0	0	1597	0	0	1062		
Future Volume (vph)	0	0	1597	0	0	1062		
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900		
Lane Width (ft)	13	13	13	13	13	13		
Lane Util. Factor	1.00	1.00	0.91	1.00	1.00	0.88		
Frt						0.850		
Flt Protected								
Satd. Flow (prot)	0	0	4729	0	0	2617		
Flt Permitted								
Satd. Flow (perm)	0	0	4729	0	0	2617		
Right Turn on Red				Yes		Yes		
Satd. Flow (RTOR)						7		
Link Speed (mph)		30	30		30			
Link Distance (ft)		201	192		296			
Travel Time (s)		4.6	4.4		6.7			
Peak Hour Factor	0.92	0.92	0.90	0.92	0.92	0.85		
Heavy Vehicles (%)	2%	2%	2%	2%	2%	1%		
Adj. Flow (vph)	0	0	1774	0	0	1249		
Shared Lane Traffic (%)								
Lane Group Flow (vph)	0	0	1774	0	0	1249		
Enter Blocked Intersection	No	No	No	No	No	No		
Lane Alignment	Left	Left	Left	Right	Left	Right		
Median Width(ft)		0	0		0			
Link Offset(ft)		0	0		0			
Crosswalk Width(ft)		16	16		16			
Two way Left Turn Lane								
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10		
Turning Speed (mph)	15			9	15	30		
Number of Detectors			2			1		
Detector Template			Thru			Right		
Leading Detector (ft)			100			20		
Trailing Detector (ft)			0			0		
Detector 1 Position(ft)			0			0		
Detector 1 Size(ft)			6			20		
Detector 1 Type			Cl+Ex			Cl+Ex		
Detector 1 Channel								
Detector 1 Extend (s)			0.0			0.0		
Detector 1 Queue (s)			0.0			0.0		
Detector 1 Delay (s)			0.0			0.0		
Detector 2 Position(ft)			94					
Detector 2 Size(ft)			6					
Detector 2 Type			Cl+Ex					
Detector 2 Channel								
Detector 2 Extend (s)			0.0					
Turn Type			NA			custom		
Protected Phases			2			3 4	3	4
Permitted Phases								
Detector Phase			2			3 4		

Lane Group	EBL	EBT	WBT	WBR	SWL	SWR	Ø3	Ø4
Switch Phase								
Minimum Initial (s)			10.0				10.0	10.0
Minimum Split (s)			15.0				19.0	15.0
Total Split (s)			58.0				36.0	26.0
Total Split (%)			48.3%				30%	22%
Maximum Green (s)			53.0				30.0	21.0
Yellow Time (s)			4.0				4.0	3.5
All-Red Time (s)			1.0				2.0	1.5
Lost Time Adjust (s)			0.0					
Total Lost Time (s)			5.0					
Lead/Lag							Lead	Lag
Lead-Lag Optimize?								
Vehicle Extension (s)			3.0				3.0	3.0
Recall Mode			C-Max				Max	Max
Walk Time (s)							5.0	
Flash Dont Walk (s)							8.0	
Pedestrian Calls (#/hr)							0	
Act Effct Green (s)			53.0			56.0		
Actuated g/C Ratio			0.44			0.47		
v/c Ratio			0.85			1.02		
Control Delay			5.6			62.8		
Queue Delay			4.6			0.0		
Total Delay			10.1			62.8		
LOS			B			E		
Approach Delay			10.1		62.8			
Approach LOS			B		E			

Intersection Summary	
Area Type:	CBD
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 16 (13%), Referenced to phase 2:WBT, Start of Green	
Natural Cycle: 110	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.09	
Intersection Signal Delay: 31.9	Intersection LOS: C
Intersection Capacity Utilization 84.7%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 11: Route 2/Alewife Brook Parkway & Route 16



Lane Group	WBT	SWR
Lane Group Flow (vph)	1774	1249
v/c Ratio	0.85	1.02
Control Delay	5.6	62.8
Queue Delay	4.6	0.0
Total Delay	10.1	62.8
Queue Length 50th (ft)	43	~581
Queue Length 95th (ft)	m40	#659
Internal Link Dist (ft)	112	
Turn Bay Length (ft)		
Base Capacity (vph)	2088	1225
Starvation Cap Reductn	252	0
Spillback Cap Reductn	0	0
Storage Cap Reductn	0	0
Reduced v/c Ratio	0.97	1.02

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

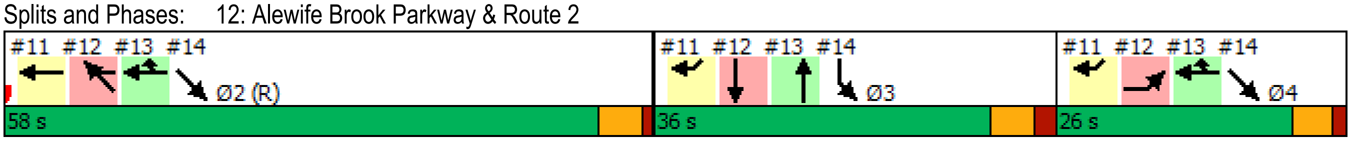
m Volume for 95th percentile queue is metered by upstream signal.

Lane Group	EBL	WBR	SBT	NWT
Lane Configurations				
Traffic Volume (vph)	505	169	506	1428
Future Volume (vph)	505	169	506	1428
Ideal Flow (vphpl)	1900	1900	1900	1900
Lane Width (ft)	13	16	13	13
Lane Util. Factor	0.97	1.00	0.95	0.95
Frt		0.865		
Flt Protected	0.950			
Satd. Flow (prot)	3224	1581	3291	3291
Flt Permitted	0.950			
Satd. Flow (perm)	3224	1581	3291	3291
Right Turn on Red				
Satd. Flow (RTOR)				
Link Speed (mph)			30	30
Link Distance (ft)			202	278
Travel Time (s)			4.6	6.3
Peak Hour Factor	0.97	0.94	0.85	0.90
Heavy Vehicles (%)	1%	6%	2%	2%
Adj. Flow (vph)	521	180	595	1587
Shared Lane Traffic (%)				
Lane Group Flow (vph)	521	180	595	1587
Enter Blocked Intersection	No	No	No	No
Lane Alignment	Left	R NA	Left	L NA
Median Width(ft)			0	0
Link Offset(ft)			0	0
Crosswalk Width(ft)			16	16
Two way Left Turn Lane				
Headway Factor	1.10	0.97	1.10	1.10
Turning Speed (mph)	15	30		
Number of Detectors	1	1	2	2
Detector Template	Left	Right	Thru	Thru
Leading Detector (ft)	20	20	100	100
Trailing Detector (ft)	0	0	0	0
Detector 1 Position(ft)	0	0	0	0
Detector 1 Size(ft)	20	20	6	6
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel				
Detector 1 Extend (s)	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0
Detector 2 Position(ft)			94	94
Detector 2 Size(ft)			6	6
Detector 2 Type			Cl+Ex	Cl+Ex
Detector 2 Channel				
Detector 2 Extend (s)			0.0	0.0
Turn Type	Prot	Prot	NA	NA
Protected Phases	4	2!	3	2!
Permitted Phases				
Detector Phase	4	2	3	2

Lane Group	EBL	WBR	SBT	NWT
Switch Phase				
Minimum Initial (s)	10.0	10.0	10.0	10.0
Minimum Split (s)	15.0	15.0	19.0	15.0
Total Split (s)	26.0	58.0	36.0	58.0
Total Split (%)	21.7%	48.3%	30.0%	48.3%
Maximum Green (s)	21.0	53.0	30.0	53.0
Yellow Time (s)	3.5	4.0	4.0	4.0
All-Red Time (s)	1.5	1.0	2.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	6.0	5.0
Lead/Lag	Lag		Lead	
Lead-Lag Optimize?				
Vehicle Extension (s)	3.0	3.0	3.0	3.0
Recall Mode	Max	C-Max	Max	C-Max
Walk Time (s)			5.0	
Flash Dont Walk (s)			8.0	
Pedestrian Calls (#/hr)			0	
Act Effct Green (s)	21.0	53.0	30.0	53.0
Actuated g/C Ratio	0.18	0.44	0.25	0.44
v/c Ratio	0.92	0.26	0.72	1.09
Control Delay	72.2	14.3	47.1	85.8
Queue Delay	0.0	2.4	0.0	3.3
Total Delay	72.2	16.7	47.1	89.1
LOS	E	B	D	F
Approach Delay			47.1	89.1
Approach LOS			D	F

Intersection Summary	
Area Type: CBD	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 16 (13%), Referenced to phase 2:WBT, Start of Green	
Natural Cycle: 110	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.09	
Intersection Signal Delay: 72.8	Intersection LOS: E
Intersection Capacity Utilization 103.7%	ICU Level of Service G
Analysis Period (min) 15	
! Phase conflict between lane groups.	

Splits and Phases: 12: Alewife Brook Parkway & Route 2



Lane Group	EBL	WBR	SBT	NWT
Lane Group Flow (vph)	521	180	595	1587
v/c Ratio	0.92	0.26	0.72	1.09
Control Delay	72.2	14.3	47.1	85.8
Queue Delay	0.0	2.4	0.0	3.3
Total Delay	72.2	16.7	47.1	89.1
Queue Length 50th (ft)	206	86	223	~730
Queue Length 95th (ft)	#308	138	269	#868
Internal Link Dist (ft)			122	198
Turn Bay Length (ft)				
Base Capacity (vph)	564	698	822	1453
Starvation Cap Reductn	0	397	0	0
Spillback Cap Reductn	0	6	0	13
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.92	0.60	0.72	1.10

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

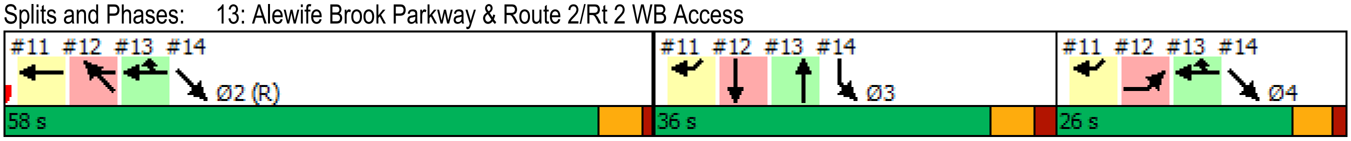
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	0	169	54	0	224	0	0	0	0
Future Volume (vph)	0	0	0	0	169	54	0	224	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		200	0		0	0		0
Storage Lanes	0		0	0		1	0		0	0		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt						0.850						
Flt Protected												
Satd. Flow (prot)	0	0	0	0	1613	1333	0	3154	0	0	0	0
Flt Permitted												
Satd. Flow (perm)	0	0	0	0	1613	1333	0	3154	0	0	0	0
Right Turn on Red			No			No	No		No			No
Satd. Flow (RTOR)												
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		161			1225			227			185	
Travel Time (s)		3.7			27.8			5.2			4.2	
Confl. Peds. (#/hr)						2						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.90	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	0%	6%	9%	2%	3%	2%	2%	2%	2%
Adj. Flow (vph)	0	0	0	0	184	59	0	249	0	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	184	59	0	249	0	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors					2	1		2				
Detector Template					Thru	Right		Thru				
Leading Detector (ft)					100	20		100				
Trailing Detector (ft)					0	0		0				
Detector 1 Position(ft)					0	0		0				
Detector 1 Size(ft)					6	20		6				
Detector 1 Type					Cl+Ex	Cl+Ex		Cl+Ex				
Detector 1 Channel												
Detector 1 Extend (s)					0.0	0.0		0.0				
Detector 1 Queue (s)					0.0	0.0		0.0				
Detector 1 Delay (s)					0.0	0.0		0.0				
Detector 2 Position(ft)					94			94				
Detector 2 Size(ft)					6			6				
Detector 2 Type					Cl+Ex			Cl+Ex				
Detector 2 Channel												
Detector 2 Extend (s)					0.0			0.0				

Lane Group	Ø2	Ø4
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Ideal Flow (vphpl)		
Storage Length (ft)		
Storage Lanes		
Taper Length (ft)		
Lane Util. Factor		
Ped Bike Factor		
Frt		
Flt Protected		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Right Turn on Red		
Satd. Flow (RTOR)		
Link Speed (mph)		
Link Distance (ft)		
Travel Time (s)		
Confl. Peds. (#/hr)		
Peak Hour Factor		
Heavy Vehicles (%)		
Adj. Flow (vph)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Enter Blocked Intersection		
Lane Alignment		
Median Width(ft)		
Link Offset(ft)		
Crosswalk Width(ft)		
Two way Left Turn Lane		
Headway Factor		
Turning Speed (mph)		
Number of Detectors		
Detector Template		
Leading Detector (ft)		
Trailing Detector (ft)		
Detector 1 Position(ft)		
Detector 1 Size(ft)		
Detector 1 Type		
Detector 1 Channel		
Detector 1 Extend (s)		
Detector 1 Queue (s)		
Detector 1 Delay (s)		
Detector 2 Position(ft)		
Detector 2 Size(ft)		
Detector 2 Type		
Detector 2 Channel		
Detector 2 Extend (s)		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type					NA	Prot		NA				
Protected Phases					2 4	2 4		3				
Permitted Phases												
Detector Phase					2 4	2 4		3				
Switch Phase												
Minimum Initial (s)								10.0				
Minimum Split (s)								19.0				
Total Split (s)								36.0				
Total Split (%)								30.0%				
Maximum Green (s)								30.0				
Yellow Time (s)								4.0				
All-Red Time (s)								2.0				
Lost Time Adjust (s)								0.0				
Total Lost Time (s)								6.0				
Lead/Lag								Lead				
Lead-Lag Optimize?												
Vehicle Extension (s)								3.0				
Recall Mode								Max				
Walk Time (s)								5.0				
Flash Dont Walk (s)								8.0				
Pedestrian Calls (#/hr)								0				
Act Effct Green (s)					79.0	79.0		30.0				
Actuated g/C Ratio					0.66	0.66		0.25				
v/c Ratio					0.17	0.07		0.32				
Control Delay					8.4	7.6		38.0				
Queue Delay					0.1	0.0		0.0				
Total Delay					8.5	7.6		38.0				
LOS					A	A		D				
Approach Delay					8.3			38.0				
Approach LOS					A			D				

Intersection Summary	
Area Type: CBD	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 16 (13%), Referenced to phase 2:WBT, Start of Green	
Natural Cycle: 110	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.09	
Intersection Signal Delay: 23.3	Intersection LOS: C
Intersection Capacity Utilization 27.4%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 13: Alewife Brook Parkway & Route 2/Rt 2 WB Access



Lane Group	Ø2	Ø4
Turn Type		
Protected Phases	2	4
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	10.0	10.0
Minimum Split (s)	15.0	15.0
Total Split (s)	58.0	26.0
Total Split (%)	48%	22%
Maximum Green (s)	53.0	21.0
Yellow Time (s)	4.0	3.5
All-Red Time (s)	1.0	1.5
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag		Lag
Lead-Lag Optimize?		
Vehicle Extension (s)	3.0	3.0
Recall Mode	C-Max	Max
Walk Time (s)		
Flash Dont Walk (s)		
Pedestrian Calls (#/hr)		
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		
Approach LOS		
Intersection Summary		

Lane Group	WBT	WBR	NBT
Lane Group Flow (vph)	184	59	249
v/c Ratio	0.17	0.07	0.32
Control Delay	8.4	7.6	38.0
Queue Delay	0.1	0.0	0.0
Total Delay	8.5	7.6	38.0
Queue Length 50th (ft)	50	15	83
Queue Length 95th (ft)	81	31	121
Internal Link Dist (ft)	1145		147
Turn Bay Length (ft)		200	
Base Capacity (vph)	1061	877	788
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	223	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.22	0.07	0.32

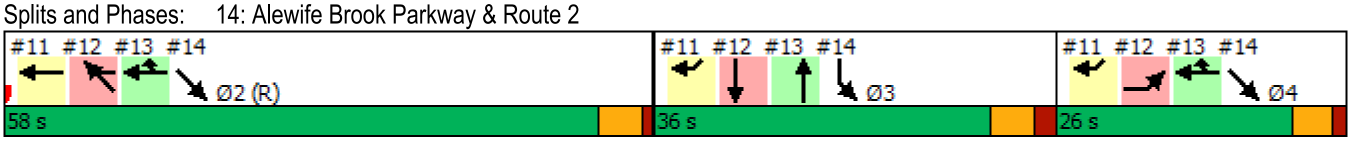
Intersection Summary

Lane Group	SBL	SBR	SEL	SET	NWT	NWR	Ø2	Ø4
Lane Configurations								
Traffic Volume (vph)	506	0	0	1104	0	0		
Future Volume (vph)	506	0	0	1104	0	0		
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900		
Lane Width (ft)	13	13	13	13	13	13		
Lane Util. Factor	0.97	1.00	1.00	0.95	1.00	1.00		
Frt								
Flt Protected	0.950							
Satd. Flow (prot)	3193	0	0	3324	0	0		
Flt Permitted	0.950							
Satd. Flow (perm)	3193	0	0	3324	0	0		
Right Turn on Red	Yes	Yes				Yes		
Satd. Flow (RTOR)	215							
Link Speed (mph)	30			30	30			
Link Distance (ft)	155			297	139			
Travel Time (s)	3.5			6.8	3.2			
Peak Hour Factor	0.85	0.92	0.92	0.97	0.92	0.92		
Heavy Vehicles (%)	2%	2%	2%	1%	2%	2%		
Adj. Flow (vph)	595	0	0	1138	0	0		
Shared Lane Traffic (%)								
Lane Group Flow (vph)	595	0	0	1138	0	0		
Enter Blocked Intersection	No	No	No	No	No	No		
Lane Alignment	Left	Right	Left	Left	Left	Right		
Median Width(ft)	26			0	0			
Link Offset(ft)	0			0	0			
Crosswalk Width(ft)	16			16	16			
Two way Left Turn Lane								
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10		
Turning Speed (mph)	30	9	15			9		
Number of Detectors	1			2				
Detector Template	Left			Thru				
Leading Detector (ft)	20			100				
Trailing Detector (ft)	0			0				
Detector 1 Position(ft)	0			0				
Detector 1 Size(ft)	20			6				
Detector 1 Type	Cl+Ex			Cl+Ex				
Detector 1 Channel								
Detector 1 Extend (s)	0.0			0.0				
Detector 1 Queue (s)	0.0			0.0				
Detector 1 Delay (s)	0.0			0.0				
Detector 2 Position(ft)				94				
Detector 2 Size(ft)				6				
Detector 2 Type				Cl+Ex				
Detector 2 Channel								
Detector 2 Extend (s)				0.0				
Turn Type	Prot			NA				
Protected Phases	3			2 4			2	4
Permitted Phases								
Detector Phase	3			2 4				

Lane Group	SBL	SBR	SEL	SET	NWT	NWR	Ø2	Ø4
Switch Phase								
Minimum Initial (s)	10.0						10.0	10.0
Minimum Split (s)	19.0						15.0	15.0
Total Split (s)	36.0						58.0	26.0
Total Split (%)	30.0%						48%	22%
Maximum Green (s)	30.0						53.0	21.0
Yellow Time (s)	4.0						4.0	3.5
All-Red Time (s)	2.0						1.0	1.5
Lost Time Adjust (s)	0.0							
Total Lost Time (s)	6.0							
Lead/Lag	Lead							Lag
Lead-Lag Optimize?								
Vehicle Extension (s)	3.0						3.0	3.0
Recall Mode	Max						C-Max	Max
Walk Time (s)	5.0							
Flash Dont Walk (s)	8.0							
Pedestrian Calls (#/hr)	0							
Act Effct Green (s)	30.0			79.0				
Actuated g/C Ratio	0.25			0.66				
v/c Ratio	0.62			0.52				
Control Delay	2.8			11.7				
Queue Delay	1.0			0.0				
Total Delay	3.7			11.7				
LOS	A			B				
Approach Delay	3.7			11.7				
Approach LOS	A			B				

Intersection Summary	
Area Type: CBD	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 16 (13%), Referenced to phase 2:WBT, Start of Green	
Natural Cycle: 110	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.09	
Intersection Signal Delay: 9.0	Intersection LOS: A
Intersection Capacity Utilization 59.1%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 14: Alewife Brook Parkway & Route 2



Lane Group	SBL	SET
Lane Group Flow (vph)	595	1138
v/c Ratio	0.62	0.52
Control Delay	2.8	11.7
Queue Delay	1.0	0.0
Total Delay	3.7	11.7
Queue Length 50th (ft)	5	221
Queue Length 95th (ft)	0	272
Internal Link Dist (ft)	75	217
Turn Bay Length (ft)		
Base Capacity (vph)	959	2188
Starvation Cap Reductn	155	0
Spillback Cap Reductn	0	0
Storage Cap Reductn	0	0
Reduced v/c Ratio	0.74	0.52

Intersection Summary

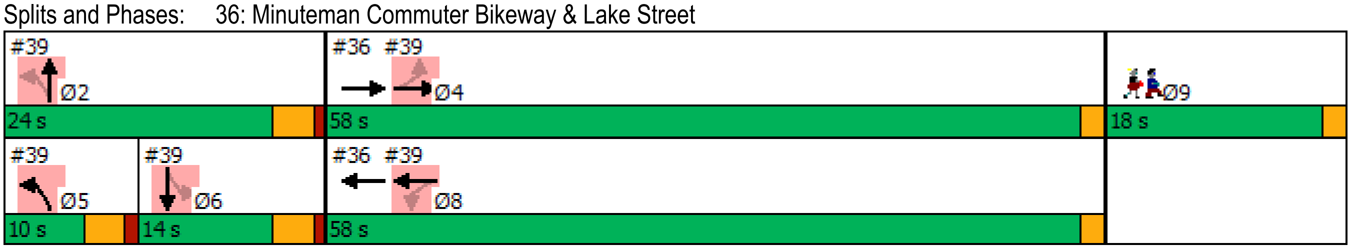
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	625	0	0	1165	0	0	0	0	0	0	0
Future Volume (vph)	0	625	0	0	1165	0	0	0	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	15	15	15	16	16	16	12	12	12	12	12	12
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
Frt												
Flt Protected												
Satd. Flow (prot)	0	2049	0	0	2153	0	0	0	0	0	0	0
Flt Permitted												
Satd. Flow (perm)	0	2049	0	0	2153	0	0	0	0	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)												
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		135			215			175			206	
Travel Time (s)		3.1			4.9			4.0			4.7	
Peak Hour Factor	0.84	0.84	0.84	0.97	0.97	0.97	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	0	744	0	0	1201	0	0	0	0	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	744	0	0	1201	0	0	0	0	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	0.88	0.88	0.88	0.85	0.85	0.85	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors		2			2							
Detector Template		Thru			Thru							
Leading Detector (ft)		100			100							
Trailing Detector (ft)		0			0							
Detector 1 Position(ft)		0			0							
Detector 1 Size(ft)		6			6							
Detector 1 Type		Cl+Ex			Cl+Ex							
Detector 1 Channel												
Detector 1 Extend (s)		0.0			0.0							
Detector 1 Queue (s)		0.0			0.0							
Detector 1 Delay (s)		0.0			0.0							
Detector 2 Position(ft)		94			94							
Detector 2 Size(ft)		6			6							
Detector 2 Type		Cl+Ex			Cl+Ex							
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0							
Turn Type		NA			NA							
Protected Phases		4			8							
Permitted Phases												
Detector Phase		4			8							

Lane Group	Ø2	Ø5	Ø6	Ø9
Lane Configurations				
Traffic Volume (vph)				
Future Volume (vph)				
Ideal Flow (vphpl)				
Lane Width (ft)				
Lane Util. Factor				
Frt				
Flt Protected				
Satd. Flow (prot)				
Flt Permitted				
Satd. Flow (perm)				
Right Turn on Red				
Satd. Flow (RTOR)				
Link Speed (mph)				
Link Distance (ft)				
Travel Time (s)				
Peak Hour Factor				
Heavy Vehicles (%)				
Adj. Flow (vph)				
Shared Lane Traffic (%)				
Lane Group Flow (vph)				
Enter Blocked Intersection				
Lane Alignment				
Median Width(ft)				
Link Offset(ft)				
Crosswalk Width(ft)				
Two way Left Turn Lane				
Headway Factor				
Turning Speed (mph)				
Number of Detectors				
Detector Template				
Leading Detector (ft)				
Trailing Detector (ft)				
Detector 1 Position(ft)				
Detector 1 Size(ft)				
Detector 1 Type				
Detector 1 Channel				
Detector 1 Extend (s)				
Detector 1 Queue (s)				
Detector 1 Delay (s)				
Detector 2 Position(ft)				
Detector 2 Size(ft)				
Detector 2 Type				
Detector 2 Channel				
Detector 2 Extend (s)				
Turn Type				
Protected Phases	2	5	6	9
Permitted Phases				
Detector Phase				

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Switch Phase												
Minimum Initial (s)		4.0			4.0							
Minimum Split (s)		20.5			20.5							
Total Split (s)		58.0			58.0							
Total Split (%)		58.0%			58.0%							
Maximum Green (s)		56.0			56.0							
Yellow Time (s)		2.0			2.0							
All-Red Time (s)		0.0			0.0							
Lost Time Adjust (s)		0.0			0.0							
Total Lost Time (s)		2.0			2.0							
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)		3.0			3.0							
Recall Mode		Max			Max							
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)		56.1			56.1							
Actuated g/C Ratio		0.61			0.61							
v/c Ratio		0.60			0.92							
Control Delay		14.8			13.8							
Queue Delay		0.0			30.5							
Total Delay		14.8			44.4							
LOS		B			D							
Approach Delay		14.8			44.4							
Approach LOS		B			D							

Intersection Summary	
Area Type: Other	
Cycle Length: 100	
Actuated Cycle Length: 92.7	
Natural Cycle: 100	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.99	
Intersection Signal Delay: 33.1	Intersection LOS: C
Intersection Capacity Utilization 64.6%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 36: Minuteman Commuter Bikeway & Lake Street



Lane Group	Ø2	Ø5	Ø6	Ø9
Switch Phase				
Minimum Initial (s)	4.0	4.0	4.0	4.0
Minimum Split (s)	21.0	9.0	14.0	18.0
Total Split (s)	24.0	10.0	14.0	18.0
Total Split (%)	24%	10%	14%	18%
Maximum Green (s)	20.0	6.0	10.0	16.0
Yellow Time (s)	3.0	3.0	3.0	2.0
All-Red Time (s)	1.0	1.0	1.0	0.0
Lost Time Adjust (s)				
Total Lost Time (s)				
Lead/Lag		Lead	Lag	
Lead-Lag Optimize?		Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0
Recall Mode	Min	None	Min	None
Walk Time (s)				5.0
Flash Dont Walk (s)				11.0
Pedestrian Calls (#/hr)				311
Act Effct Green (s)				
Actuated g/C Ratio				
v/c Ratio				
Control Delay				
Queue Delay				
Total Delay				
LOS				
Approach Delay				
Approach LOS				

Intersection Summary

Lane Group	EBT	WBT
Lane Group Flow (vph)	744	1201
v/c Ratio	0.60	0.92
Control Delay	14.8	13.8
Queue Delay	0.0	30.5
Total Delay	14.8	44.4
Queue Length 50th (ft)	249	122
Queue Length 95th (ft)	384	m#427
Internal Link Dist (ft)	55	135
Turn Bay Length (ft)		
Base Capacity (vph)	1240	1304
Starvation Cap Reductn	0	174
Spillback Cap Reductn	0	0
Storage Cap Reductn	0	0
Reduced v/c Ratio	0.60	1.06

Intersection Summary

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.

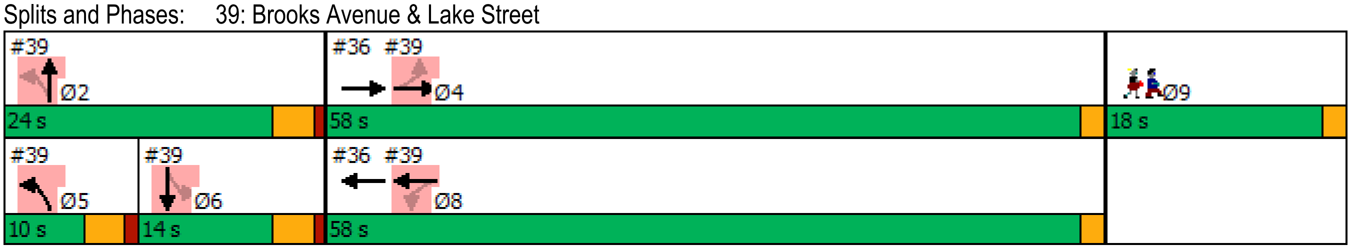
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	31	548	46	6	1006	0	38	4	5	3	7	121
Future Volume (vph)	31	548	46	6	1006	0	38	4	5	3	7	121
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	14	14	14	13	13	13	12	12	12	12	12	12
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
Frt		0.990						0.985			0.875	
Flt Protected		0.998						0.961			0.999	
Satd. Flow (prot)	0	1978	0	0	1944	0	0	1799	0	0	1661	0
Flt Permitted		0.917			0.997			0.422			0.994	
Satd. Flow (perm)	0	1817	0	0	1938	0	0	790	0	0	1653	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		7						6			155	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		215			1126			206			208	
Travel Time (s)		4.9			25.6			4.7			4.7	
Peak Hour Factor	0.91	0.91	0.91	0.87	0.87	0.87	0.75	0.75	0.75	0.78	0.78	0.78
Heavy Vehicles (%)	0%	1%	5%	0%	1%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	34	602	51	7	1156	0	51	5	7	4	9	155
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	687	0	0	1163	0	0	63	0	0	168	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	0.92	0.92	0.92	0.96	0.96	0.96	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	20	100		20	100		20	100		20	100	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases		4			8		5	2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		5	2		6	6	

Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Heavy Vehicles (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (mph)	
Number of Detectors	
Detector Template	
Leading Detector (ft)	
Trailing Detector (ft)	
Detector 1 Position(ft)	
Detector 1 Size(ft)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Detector 2 Position(ft)	
Detector 2 Size(ft)	
Detector 2 Type	
Detector 2 Channel	
Detector 2 Extend (s)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Switch Phase												
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	20.5	20.5		20.5	20.5		9.0	21.0		14.0	14.0	
Total Split (s)	58.0	58.0		58.0	58.0		10.0	24.0		14.0	14.0	
Total Split (%)	58.0%	58.0%		58.0%	58.0%		10.0%	24.0%		14.0%	14.0%	
Maximum Green (s)	56.0	56.0		56.0	56.0		6.0	20.0		10.0	10.0	
Yellow Time (s)	2.0	2.0		2.0	2.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	0.0	0.0		0.0	0.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		2.0			2.0			4.0			4.0	
Lead/Lag							Lead			Lag	Lag	
Lead-Lag Optimize?							Yes			Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	Max	Max		Max	Max		None	Min		Min	Min	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)		56.1			56.1			12.5			12.5	
Actuated g/C Ratio		0.61			0.61			0.13			0.13	
v/c Ratio		0.62			0.99			0.57			0.47	
Control Delay		4.4			44.8			53.7			11.9	
Queue Delay		0.0			18.9			4.0			1.8	
Total Delay		4.4			63.7			57.7			13.7	
LOS		A			E			E			B	
Approach Delay		4.4			63.7			57.7			13.7	
Approach LOS		A			E			E			B	

Intersection Summary	
Area Type: Other	
Cycle Length: 100	
Actuated Cycle Length: 92.7	
Natural Cycle: 100	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.99	
Intersection Signal Delay: 39.9	Intersection LOS: D
Intersection Capacity Utilization 76.2%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 39: Brooks Avenue & Lake Street



Lane Group	Ø9
Switch Phase	
Minimum Initial (s)	4.0
Minimum Split (s)	18.0
Total Split (s)	18.0
Total Split (%)	18%
Maximum Green (s)	16.0
Yellow Time (s)	2.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Recall Mode	None
Walk Time (s)	5.0
Flash Dont Walk (s)	11.0
Pedestrian Calls (#/hr)	311
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Intersection Summary	

Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	687	1163	63	168
v/c Ratio	0.62	0.99	0.57	0.47
Control Delay	4.4	44.8	53.7	11.9
Queue Delay	0.0	18.9	4.0	1.8
Total Delay	4.4	63.7	57.7	13.7
Queue Length 50th (ft)	8	621	32	7
Queue Length 95th (ft)	3	#1017	59	41
Internal Link Dist (ft)	135	1046	126	128
Turn Bay Length (ft)				
Base Capacity (vph)	1103	1173	175	375
Starvation Cap Reductn	3	0	0	0
Spillback Cap Reductn	0	69	61	98
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.62	1.05	0.55	0.61

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

2027 Build Weekday Evening Peak Hour

Intersection	
Int Delay, s/veh	0.4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	842	3	1	607	9	4
Future Vol, veh/h	842	3	1	607	9	4
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	83	83	94	94	75	75
Heavy Vehicles, %	0	0	0	0	29	0
Mvmt Flow	1014	4	1	646	12	5

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1018	0	1664	1016
Stage 1	-	-	-	-	1016	-
Stage 2	-	-	-	-	648	-
Critical Hdwy	-	-	4.1	-	6.69	6.2
Critical Hdwy Stg 1	-	-	-	-	5.69	-
Critical Hdwy Stg 2	-	-	-	-	5.69	-
Follow-up Hdwy	-	-	2.2	-	3.761	3.3
Pot Cap-1 Maneuver	-	-	689	-	92	291
Stage 1	-	-	-	-	312	-
Stage 2	-	-	-	-	473	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	689	-	92	291
Mov Cap-2 Maneuver	-	-	-	-	92	-
Stage 1	-	-	-	-	312	-
Stage 2	-	-	-	-	472	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	41
HCM LOS			E

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	117	-	-	689	-
HCM Lane V/C Ratio	0.148	-	-	0.002	-
HCM Control Delay (s)	41	-	-	10.2	0
HCM Lane LOS	E	-	-	B	A
HCM 95th %tile Q(veh)	0.5	-	-	0	-

Intersection	
Int Delay, s/veh	1.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	827	19	9	585	23	5
Future Vol, veh/h	827	19	9	585	23	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	87	87	89	89	75	75
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	951	22	10	657	31	7

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	973	0	1639	962
Stage 1	-	-	-	-	962	-
Stage 2	-	-	-	-	677	-
Critical Hdwy	-	-	4.1	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	717	-	112	313
Stage 1	-	-	-	-	374	-
Stage 2	-	-	-	-	509	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	717	-	110	313
Mov Cap-2 Maneuver	-	-	-	-	110	-
Stage 1	-	-	-	-	374	-
Stage 2	-	-	-	-	498	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.2	46.1
HCM LOS			E

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	124	-	-	717	-
HCM Lane V/C Ratio	0.301	-	-	0.014	-
HCM Control Delay (s)	46.1	-	-	10.1	0
HCM Lane LOS	E	-	-	B	A
HCM 95th %tile Q(veh)	1.2	-	-	0	-

Intersection						
Int Delay, s/veh	2.4					

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	8	5	7	20	15	13
Future Vol, veh/h	8	5	7	20	15	13
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	9	5	8	22	16	14

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	61	23	30	0	-	0
Stage 1	23	-	-	-	-	-
Stage 2	38	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	950	1060	1596	-	-	-
Stage 1	1005	-	-	-	-	-
Stage 2	990	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	945	1060	1596	-	-	-
Mov Cap-2 Maneuver	945	-	-	-	-	-
Stage 1	1000	-	-	-	-	-
Stage 2	990	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	8.7	1.9	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1596	-	986	-	-
HCM Lane V/C Ratio	0.005	-	0.014	-	-
HCM Control Delay (s)	7.3	0	8.7	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0	-	0	-	-

Intersection	
Int Delay, s/veh	0.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	831	1	1	588	6	4
Future Vol, veh/h	831	1	1	588	6	4
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	87	87	89	89	75	75
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	955	1	1	661	8	5

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	956	0	1619	956
Stage 1	-	-	-	-	956	-
Stage 2	-	-	-	-	663	-
Critical Hdwy	-	-	4.1	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	727	-	115	316
Stage 1	-	-	-	-	376	-
Stage 2	-	-	-	-	516	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	727	-	115	316
Mov Cap-2 Maneuver	-	-	-	-	115	-
Stage 1	-	-	-	-	376	-
Stage 2	-	-	-	-	515	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	30.6
HCM LOS			D

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	154	-	-	727	-
HCM Lane V/C Ratio	0.087	-	-	0.002	-
HCM Control Delay (s)	30.6	-	-	10	0
HCM Lane LOS	D	-	-	A	A
HCM 95th %tile Q(veh)	0.3	-	-	0	-

Intersection	
Int Delay, s/veh	1.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	4	812	19	18	575	8	13	1	11	3	0	1
Future Vol, veh/h	4	812	19	18	575	8	13	1	11	3	0	1
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	86	86	86	86	86	86	75	75	75	75	75	75
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	5	944	22	21	669	9	17	1	15	4	0	1

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	678	0	0	966	0	0	1681	1685	955	1689	1692	674
Stage 1	-	-	-	-	-	-	965	965	-	716	716	-
Stage 2	-	-	-	-	-	-	716	720	-	973	976	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	923	-	-	721	-	-	76	95	316	75	94	458
Stage 1	-	-	-	-	-	-	309	336	-	424	437	-
Stage 2	-	-	-	-	-	-	424	435	-	306	332	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	923	-	-	721	-	-	72	89	316	68	89	458
Mov Cap-2 Maneuver	-	-	-	-	-	-	72	89	-	68	89	-
Stage 1	-	-	-	-	-	-	305	332	-	419	416	-
Stage 2	-	-	-	-	-	-	403	415	-	287	328	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.3	51.4	49.6
HCM LOS			F	E

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	110	923	-	-	721	-	-	86
HCM Lane V/C Ratio	0.303	0.005	-	-	0.029	-	-	0.062
HCM Control Delay (s)	51.4	8.9	0	-	10.1	0	-	49.6
HCM Lane LOS	F	A	A	-	B	A	-	E
HCM 95th %tile Q(veh)	1.2	0	-	-	0.1	-	-	0.2

Intersection	
Int Delay, s/veh	3.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	19	804	3	42	584	16	6	0	27	9	0	11
Future Vol, veh/h	19	804	3	42	584	16	6	0	27	9	0	11
Conflicting Peds, #/hr	0	0	0	304	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	83	83	83	88	88	88	81	81	81	80	80	80
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	23	969	4	48	664	18	7	0	33	11	0	14

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	682	0	0	1277	0	0	2097	2099	1275	1803	2092	673
Stage 1	-	-	-	-	-	-	1321	1321	-	769	769	-
Stage 2	-	-	-	-	-	-	776	778	-	1034	1323	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	920	-	-	550	-	-	39	53	206	62	53	459
Stage 1	-	-	-	-	-	-	195	228	-	397	413	-
Stage 2	-	-	-	-	-	-	393	410	-	283	228	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	920	-	-	411	-	-	23	30	154	40	30	459
Mov Cap-2 Maneuver	-	-	-	-	-	-	23	30	-	40	30	-
Stage 1	-	-	-	-	-	-	138	161	-	376	335	-
Stage 2	-	-	-	-	-	-	309	333	-	210	161	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	1	97.4	69.3
HCM LOS			F	F

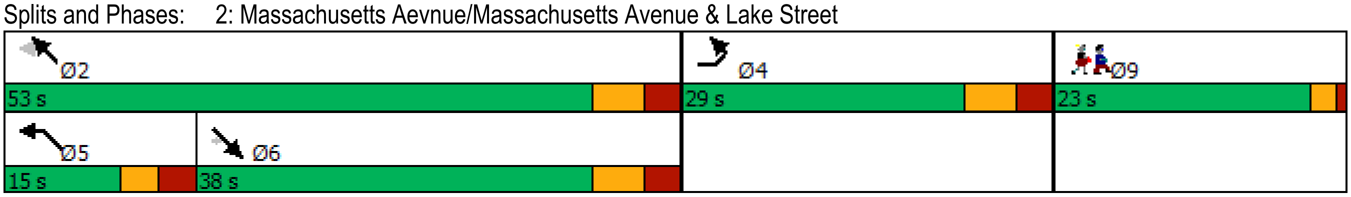
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	76	920	-	-	411	-	-	80
HCM Lane V/C Ratio	0.536	0.025	-	-	0.116	-	-	0.313
HCM Control Delay (s)	97.4	9	0	-	14.9	0	-	69.3
HCM Lane LOS	F	A	A	-	B	A	-	F
HCM 95th %tile Q(veh)	2.3	0.1	-	-	0.4	-	-	1.2

Lane Group	EBL	EBR	SET	SER	NWL	NWT	Ø9
Lane Configurations							
Traffic Volume (vph)	421	274	658	186	340	739	
Future Volume (vph)	421	274	658	186	340	739	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Lane Width (ft)	16	16	11	10	11	12	
Storage Length (ft)	0	0		55	150		
Storage Lanes	1	0		1	1		
Taper Length (ft)	25				25		
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	1.00	
Frt	0.947			0.850			
Flt Protected	0.971				0.950		
Satd. Flow (prot)	1980	0	3421	1507	1745	1863	
Flt Permitted	0.971				0.229		
Satd. Flow (perm)	1980	0	3421	1507	421	1863	
Right Turn on Red		Yes		Yes			
Satd. Flow (RTOR)	28			84			
Link Speed (mph)	30		30			30	
Link Distance (ft)	1126		640			645	
Travel Time (s)	25.6		14.5			14.7	
Peak Hour Factor	0.88	0.88	0.92	0.92	0.92	0.92	
Heavy Vehicles (%)	0%	0%	2%	0%	0%	2%	
Adj. Flow (vph)	478	311	715	202	370	803	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	789	0	715	202	370	803	
Enter Blocked Intersection	No	No	No	No	No	No	
Lane Alignment	Left	Right	Left	Right	Left	Left	
Median Width(ft)	16		11			11	
Link Offset(ft)	0		0			0	
Crosswalk Width(ft)	16		16			16	
Two way Left Turn Lane							
Headway Factor	0.85	0.85	1.04	1.09	1.04	1.00	
Turning Speed (mph)	15	9		9	15		
Number of Detectors	1		2	1	1	2	
Detector Template	Left		Thru	Right	Left	Thru	
Leading Detector (ft)	20		100	20	20	100	
Trailing Detector (ft)	0		0	0	0	0	
Detector 1 Position(ft)	0		0	0	0	0	
Detector 1 Size(ft)	20		6	20	20	6	
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel							
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	0.0	
Detector 2 Position(ft)			94			94	
Detector 2 Size(ft)			6			6	
Detector 2 Type			Cl+Ex			Cl+Ex	
Detector 2 Channel							
Detector 2 Extend (s)			0.0			0.0	
Turn Type	Prot		NA	Perm	pm+pt	NA	

Lane Group	EBL	EBR	SET	SER	NWL	NWT	Ø9
Protected Phases	4		6		5	2	9
Permitted Phases				6	2		
Detector Phase	4		6	6	5	2	
Switch Phase							
Minimum Initial (s)	4.0		4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	23.0		23.0	23.0	10.0	23.0	19.0
Total Split (s)	29.0		38.0	38.0	15.0	53.0	23.0
Total Split (%)	27.6%		36.2%	36.2%	14.3%	50.5%	22%
Maximum Green (s)	22.0		31.0	31.0	9.0	46.0	20.0
Yellow Time (s)	4.0		4.0	4.0	3.0	4.0	2.0
All-Red Time (s)	3.0		3.0	3.0	3.0	3.0	1.0
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0	
Total Lost Time (s)	7.0		7.0	7.0	6.0	7.0	
Lead/Lag			Lag	Lag	Lead		
Lead-Lag Optimize?			Yes	Yes	Yes		
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0	3.0
Recall Mode	None		Max	Max	None	Max	None
Walk Time (s)							5.0
Flash Dont Walk (s)							11.0
Pedestrian Calls (#/hr)							20
Act Effct Green (s)	22.2		31.3	31.3	47.5	46.5	
Actuated g/C Ratio	0.25		0.35	0.35	0.53	0.52	
v/c Ratio	1.54		0.60	0.35	1.04	0.83	
Control Delay	280.2		27.9	15.9	78.5	29.9	
Queue Delay	0.0		0.0	0.0	0.0	0.0	
Total Delay	280.2		27.9	15.9	78.5	29.9	
LOS	F		C	B	E	C	
Approach Delay	280.2		25.3			45.2	
Approach LOS	F		C			D	

Intersection Summary	
Area Type: Other	
Cycle Length: 105	
Actuated Cycle Length: 89.6	
Natural Cycle: 150	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 1.54	
Intersection Signal Delay: 103.3	Intersection LOS: F
Intersection Capacity Utilization 93.8%	ICU Level of Service F
Analysis Period (min) 15	

Splits and Phases: 2: Massachusetts Aevnue/Massachusetts Avenue & Lake Street



Lane Group	EBL	SET	SER	NWL	NWT
Lane Group Flow (vph)	789	715	202	370	803
v/c Ratio	1.54	0.60	0.35	1.04	0.83
Control Delay	280.2	27.9	15.9	78.5	29.9
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	280.2	27.9	15.9	78.5	29.9
Queue Length 50th (ft)	~551	148	40	95	294
Queue Length 95th (ft)	#955	277	121	#402	#740
Internal Link Dist (ft)	1046	560			565
Turn Bay Length (ft)			55	150	
Base Capacity (vph)	512	1196	581	357	966
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	1.54	0.60	0.35	1.04	0.83

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

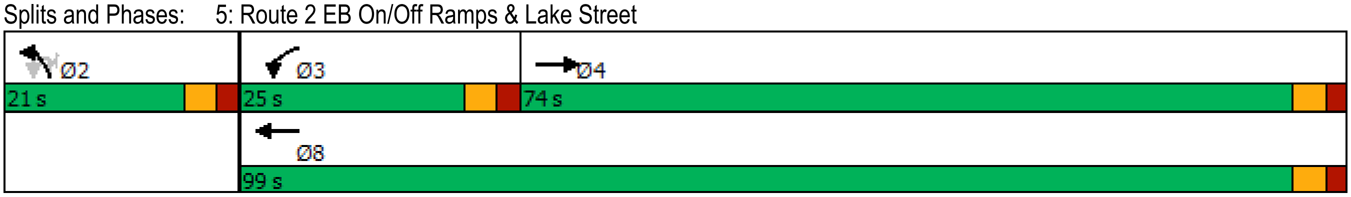
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lane Group	EBT	EBR	WBL	WBT	NBU	NBL	NBR
Lane Configurations							
Traffic Volume (vph)	545	181	172	300	14	531	641
Future Volume (vph)	545	181	172	300	14	531	641
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	16	16	10	11	12	16	14
Storage Length (ft)		150	110			0	0
Storage Lanes		1	1			1	1
Taper Length (ft)			25			25	
Lane Util. Factor	1.00	1.00	1.00	0.95	1.00	1.00	1.00
Frt		0.850					0.850
Flt Protected			0.950			0.950	
Satd. Flow (prot)	2153	1664	1652	3490	0	2046	1723
Flt Permitted			0.950			0.950	
Satd. Flow (perm)	2153	1664	1652	3490	0	2046	1723
Right Turn on Red		Yes					Yes
Satd. Flow (RTOR)		70					448
Link Speed (mph)	30			30		30	
Link Distance (ft)	239			505		387	
Travel Time (s)	5.4			11.5		8.8	
Peak Hour Factor	0.94	0.94	0.87	0.87	0.96	0.96	0.96
Heavy Vehicles (%)	0%	10%	2%	0%	0%	0%	0%
Adj. Flow (vph)	580	193	198	345	15	553	668
Shared Lane Traffic (%)							
Lane Group Flow (vph)	580	193	198	345	0	568	668
Enter Blocked Intersection	No	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	R NA	Left	Right
Median Width(ft)	12			12		16	
Link Offset(ft)	0			0		0	
Crosswalk Width(ft)	16			16		16	
Two way Left Turn Lane							
Headway Factor	0.85	0.85	1.09	1.04	1.00	0.85	0.92
Turning Speed (mph)		9	15		9	15	9
Number of Detectors	2	1	1	2	1	1	1
Detector Template	Thru	Right	Left	Thru	Left	Left	Right
Leading Detector (ft)	100	20	20	100	20	20	20
Trailing Detector (ft)	0	0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0	0	0
Detector 1 Size(ft)	6	20	20	6	20	20	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel							
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)	94			94			
Detector 2 Size(ft)	6			6			
Detector 2 Type	Cl+Ex			Cl+Ex			
Detector 2 Channel							
Detector 2 Extend (s)	0.0			0.0			
Turn Type	NA	Free	Prot	NA	Perm	Prot	Perm

Lane Group	EBT	EBR	WBL	WBT	NBU	NBL	NBR
Protected Phases	4		3	8		2	
Permitted Phases		Free			2		2
Detector Phase	4		3	8	2	2	2
Switch Phase							
Minimum Initial (s)	4.0		4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	21.0		9.0	21.0	21.0	21.0	21.0
Total Split (s)	74.0		25.0	99.0	21.0	21.0	21.0
Total Split (%)	61.7%		20.8%	82.5%	17.5%	17.5%	17.5%
Maximum Green (s)	69.0		20.0	94.0	16.0	16.0	16.0
Yellow Time (s)	3.0		3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0		2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0		0.0	0.0		0.0	0.0
Total Lost Time (s)	5.0		5.0	5.0		5.0	5.0
Lead/Lag	Lag		Lead				
Lead-Lag Optimize?	Yes		Yes				
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0	3.0
Recall Mode	None		None	None	Max	Max	Max
Walk Time (s)	5.0			5.0	5.0	5.0	5.0
Flash Dont Walk (s)	11.0			11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0			0	0	0	0
Act Effct Green (s)	25.8	71.6	14.1	45.0		16.4	16.4
Actuated g/C Ratio	0.36	1.00	0.20	0.63		0.23	0.23
v/c Ratio	0.75	0.12	0.61	0.16		1.22	0.90
Control Delay	27.0	0.1	36.1	5.3		144.9	28.6
Queue Delay	0.0	0.0	0.0	0.0		0.0	0.0
Total Delay	27.0	0.1	36.1	5.3		144.9	28.6
LOS	C	A	D	A		F	C
Approach Delay	20.3			16.5		82.1	
Approach LOS	C			B		F	

Intersection Summary	
Area Type: Other	
Cycle Length: 120	
Actuated Cycle Length: 71.6	
Natural Cycle: 70	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 1.22	
Intersection Signal Delay: 49.4	Intersection LOS: D
Intersection Capacity Utilization 80.9%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 5: Route 2 EB On/Off Ramps & Lake Street



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	580	193	198	345	568	668
v/c Ratio	0.75	0.12	0.61	0.16	1.22	0.90
Control Delay	27.0	0.1	36.1	5.3	144.9	28.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.0	0.1	36.1	5.3	144.9	28.6
Queue Length 50th (ft)	215	0	80	27	~315	92
Queue Length 95th (ft)	361	0	157	40	#634	#367
Internal Link Dist (ft)	159			425	307	
Turn Bay Length (ft)		150	110			
Base Capacity (vph)	2000	1664	471	3490	467	739
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	0.29	0.12	0.42	0.10	1.22	0.90

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

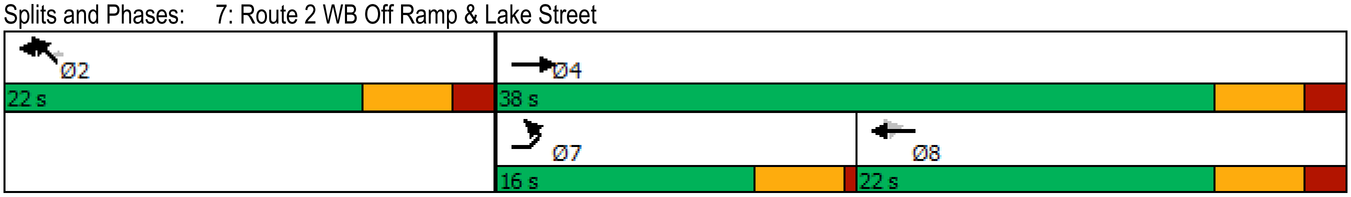
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (vph)	368	818	0	0	264	352	0	0	0	208	22	27
Future Volume (vph)	368	818	0	0	264	352	0	0	0	208	22	27
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	11	10	12	12	12	11	12	16
Storage Length (ft)	250		0	0		75	0		0	100		0
Storage Lanes	1		0	0		1	0		0	1		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00
Frt						0.850						0.850
Flt Protected	0.950									0.950	0.961	
Satd. Flow (prot)	1805	1881	0	0	1801	1463	0	0	0	1641	1705	1830
Flt Permitted	0.950									0.950	0.961	
Satd. Flow (perm)	1805	1881	0	0	1801	1463	0	0	0	1641	1705	1830
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						387						136
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		505			380			459			529	
Travel Time (s)		11.5			8.6			10.4			12.0	
Peak Hour Factor	0.88	0.88	0.88	0.91	0.91	0.91	0.92	0.92	0.92	0.95	0.95	0.95
Heavy Vehicles (%)	0%	1%	0%	0%	2%	3%	0%	0%	0%	1%	5%	0%
Adj. Flow (vph)	418	930	0	0	290	387	0	0	0	219	23	28
Shared Lane Traffic (%)										45%		
Lane Group Flow (vph)	418	930	0	0	290	387	0	0	0	120	122	28
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			11			11	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.04	1.09	1.00	1.00	1.00	1.04	1.00	0.85
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2			2	1				1	2	1
Detector Template	Left	Thru			Thru	Right				Left	Thru	Right
Leading Detector (ft)	20	100			100	20				20	100	20
Trailing Detector (ft)	0	0			0	0				0	0	0
Detector 1 Position(ft)	0	0			0	0				0	0	0
Detector 1 Size(ft)	20	6			6	20				20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex			Cl+Ex	Cl+Ex				Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0			0.0	0.0				0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0			0.0	0.0				0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0			0.0	0.0				0.0	0.0	0.0
Detector 2 Position(ft)		94			94						94	
Detector 2 Size(ft)		6			6						6	
Detector 2 Type		Cl+Ex			Cl+Ex						Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0						0.0	
Turn Type	Prot	NA			NA	Perm				Split	NA	Perm

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Protected Phases	7	4			8					2	2	
Permitted Phases						8						2
Detector Phase	7	4			8	8				2	2	2
Switch Phase												
Minimum Initial (s)	4.0	4.0			4.0	4.0				4.0	4.0	4.0
Minimum Split (s)	8.5	22.0			22.0	22.0				22.0	22.0	22.0
Total Split (s)	16.0	38.0			22.0	22.0				22.0	22.0	22.0
Total Split (%)	26.7%	63.3%			36.7%	36.7%				36.7%	36.7%	36.7%
Maximum Green (s)	11.5	32.0			16.0	16.0				16.0	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)	0.5	2.0			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)	4.5	6.0			6.0	6.0				6.0	6.0	6.0
Lead/Lag	Lead				Lag	Lag						
Lead-Lag Optimize?	Yes				Yes	Yes						
Vehicle Extension (s)	3.0	3.0			3.0	3.0				3.0	3.0	3.0
Recall Mode	None	None			None	None				Max	Max	Max
Walk Time (s)		5.0			5.0	5.0				5.0	5.0	5.0
Flash Dont Walk (s)		11.0			11.0	11.0				11.0	11.0	11.0
Pedestrian Calls (#/hr)		0			0	0				0	0	0
Act Effct Green (s)	11.5	30.9			14.9	14.9				16.0	16.0	16.0
Actuated g/C Ratio	0.20	0.52			0.25	0.25				0.27	0.27	0.27
v/c Ratio	1.19	0.94			0.64	0.59				0.27	0.26	0.05
Control Delay	136.9	33.5			26.8	6.6				19.4	19.3	0.1
Queue Delay	0.0	0.0			0.0	0.0				0.0	0.0	0.0
Total Delay	136.9	33.5			26.8	6.6				19.4	19.3	0.1
LOS	F	C			C	A				B	B	A
Approach Delay		65.6			15.2						17.4	
Approach LOS		E			B						B	

Intersection Summary	
Area Type: Other	
Cycle Length: 60	
Actuated Cycle Length: 58.9	
Natural Cycle: 65	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 1.19	
Intersection Signal Delay: 45.0	Intersection LOS: D
Intersection Capacity Utilization 62.3%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 7: Route 2 WB Off Ramp & Lake Street



Lane Group	EBL	EBT	WBT	WBR	NWL	NWT	NWR
Lane Group Flow (vph)	418	930	290	387	120	122	28
v/c Ratio	1.19	0.94	0.64	0.59	0.27	0.26	0.05
Control Delay	136.9	33.5	26.8	6.6	19.4	19.3	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	136.9	33.5	26.8	6.6	19.4	19.3	0.1
Queue Length 50th (ft)	~191	281	91	0	35	36	0
Queue Length 95th (ft)	#331	#513	161	57	75	76	0
Internal Link Dist (ft)		425	300			449	
Turn Bay Length (ft)	250			75	100		
Base Capacity (vph)	352	1022	489	679	446	463	596
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	1.19	0.91	0.59	0.57	0.27	0.26	0.05

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

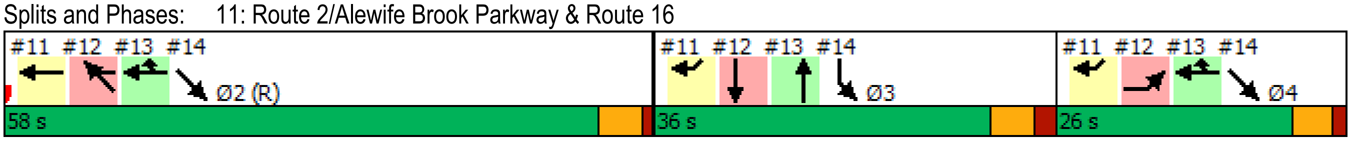
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lane Group	EBL	EBT	WBT	WBR	SWL	SWR	Ø3	Ø4
Lane Configurations								
Traffic Volume (vph)	0	0	2211	0	0	1131		
Future Volume (vph)	0	0	2211	0	0	1131		
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900		
Lane Width (ft)	13	13	13	13	13	13		
Lane Util. Factor	1.00	1.00	0.91	1.00	1.00	0.88		
Frt						0.850		
Flt Protected								
Satd. Flow (prot)	0	0	4776	0	0	2617		
Flt Permitted								
Satd. Flow (perm)	0	0	4776	0	0	2617		
Right Turn on Red				Yes		Yes		
Satd. Flow (RTOR)						1		
Link Speed (mph)		30	30		30			
Link Distance (ft)		201	192		296			
Travel Time (s)		4.6	4.4		6.7			
Peak Hour Factor	0.92	0.92	0.97	0.97	0.98	0.98		
Heavy Vehicles (%)	2%	2%	1%	0%	0%	1%		
Adj. Flow (vph)	0	0	2279	0	0	1154		
Shared Lane Traffic (%)								
Lane Group Flow (vph)	0	0	2279	0	0	1154		
Enter Blocked Intersection	No	No	No	No	No	No		
Lane Alignment	Left	Left	Left	Right	Left	Right		
Median Width(ft)		0	0		0			
Link Offset(ft)		0	0		0			
Crosswalk Width(ft)		16	16		16			
Two way Left Turn Lane								
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10		
Turning Speed (mph)	15			9	15	30		
Number of Detectors			2			1		
Detector Template			Thru			Right		
Leading Detector (ft)			100			20		
Trailing Detector (ft)			0			0		
Detector 1 Position(ft)			0			0		
Detector 1 Size(ft)			6			20		
Detector 1 Type			Cl+Ex			Cl+Ex		
Detector 1 Channel								
Detector 1 Extend (s)			0.0			0.0		
Detector 1 Queue (s)			0.0			0.0		
Detector 1 Delay (s)			0.0			0.0		
Detector 2 Position(ft)			94					
Detector 2 Size(ft)			6					
Detector 2 Type			Cl+Ex					
Detector 2 Channel								
Detector 2 Extend (s)			0.0					
Turn Type			NA			custom		
Protected Phases			2			3 4	3	4
Permitted Phases								
Detector Phase			2			3 4		

Lane Group	EBL	EBT	WBT	WBR	SWL	SWR	Ø3	Ø4
Switch Phase								
Minimum Initial (s)			10.0				10.0	10.0
Minimum Split (s)			15.0				19.0	15.0
Total Split (s)			58.0				36.0	26.0
Total Split (%)			48.3%				30%	22%
Maximum Green (s)			53.0				30.0	21.0
Yellow Time (s)			4.0				4.0	3.5
All-Red Time (s)			1.0				2.0	1.5
Lost Time Adjust (s)			0.0					
Total Lost Time (s)			5.0					
Lead/Lag							Lead	Lag
Lead-Lag Optimize?								
Vehicle Extension (s)			3.0				3.0	3.0
Recall Mode			C-Max				Max	Max
Walk Time (s)							5.0	
Flash Dont Walk (s)							8.0	
Pedestrian Calls (#/hr)							0	
Act Effct Green (s)			53.0			56.0		
Actuated g/C Ratio			0.44			0.47		
v/c Ratio			1.08			0.95		
Control Delay			47.1			46.7		
Queue Delay			1.5			0.0		
Total Delay			48.7			46.7		
LOS			D			D		
Approach Delay			48.7		46.7			
Approach LOS			D		D			

Intersection Summary	
Area Type: CBD	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 16 (13%), Referenced to phase 2:WBT, Start of Green	
Natural Cycle: 140	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.19	
Intersection Signal Delay: 48.0	Intersection LOS: D
Intersection Capacity Utilization 100.6%	ICU Level of Service G
Analysis Period (min) 15	

Splits and Phases: 11: Route 2/Alewife Brook Parkway & Route 16



Lane Group	WBT	SWR
Lane Group Flow (vph)	2279	1154
v/c Ratio	1.08	0.95
Control Delay	47.1	46.7
Queue Delay	1.5	0.0
Total Delay	48.7	46.7
Queue Length 50th (ft)	~704	472
Queue Length 95th (ft)	m#56	#644
Internal Link Dist (ft)	112	
Turn Bay Length (ft)		
Base Capacity (vph)	2109	1221
Starvation Cap Reductn	7	0
Spillback Cap Reductn	0	0
Storage Cap Reductn	0	0
Reduced v/c Ratio	1.08	0.95

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

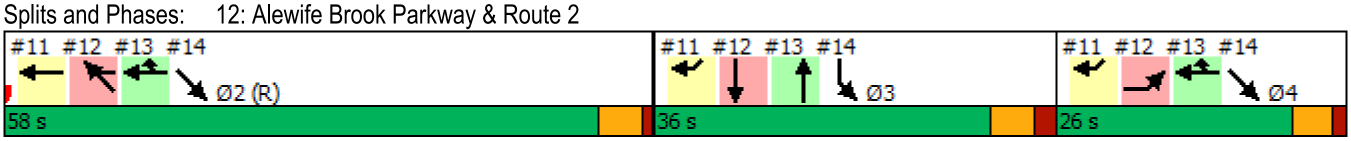
Lane Group	EBL	WBR	SBT	NWT
Lane Configurations				
Traffic Volume (vph)	610	591	250	1620
Future Volume (vph)	610	591	250	1620
Ideal Flow (vphpl)	1900	1900	1900	1900
Lane Width (ft)	13	16	13	13
Lane Util. Factor	0.97	1.00	0.95	0.95
Frt		0.865		
Flt Protected	0.950			
Satd. Flow (prot)	3257	1660	3291	3324
Flt Permitted	0.950			
Satd. Flow (perm)	3257	1660	3291	3324
Right Turn on Red				
Satd. Flow (RTOR)				
Link Speed (mph)			30	30
Link Distance (ft)			202	278
Travel Time (s)			4.6	6.3
Peak Hour Factor	0.90	0.95	0.98	0.97
Heavy Vehicles (%)	0%	1%	2%	1%
Adj. Flow (vph)	678	622	255	1670
Shared Lane Traffic (%)				
Lane Group Flow (vph)	678	622	255	1670
Enter Blocked Intersection	No	No	No	No
Lane Alignment	Left	R NA	Left	L NA
Median Width(ft)			0	0
Link Offset(ft)			0	0
Crosswalk Width(ft)			16	16
Two way Left Turn Lane				
Headway Factor	1.10	0.97	1.10	1.10
Turning Speed (mph)	15	30		
Number of Detectors	1	1	2	2
Detector Template	Left	Right	Thru	Thru
Leading Detector (ft)	20	20	100	100
Trailing Detector (ft)	0	0	0	0
Detector 1 Position(ft)	0	0	0	0
Detector 1 Size(ft)	20	20	6	6
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel				
Detector 1 Extend (s)	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0
Detector 2 Position(ft)			94	94
Detector 2 Size(ft)			6	6
Detector 2 Type			Cl+Ex	Cl+Ex
Detector 2 Channel				
Detector 2 Extend (s)			0.0	0.0
Turn Type	Prot	Prot	NA	NA
Protected Phases	4	2!	3	2!
Permitted Phases				
Detector Phase	4	2	3	2

Lane Group	EBL	WBR	SBT	NWT
Switch Phase				
Minimum Initial (s)	10.0	10.0	10.0	10.0
Minimum Split (s)	15.0	15.0	19.0	15.0
Total Split (s)	26.0	58.0	36.0	58.0
Total Split (%)	21.7%	48.3%	30.0%	48.3%
Maximum Green (s)	21.0	53.0	30.0	53.0
Yellow Time (s)	3.5	4.0	4.0	4.0
All-Red Time (s)	1.5	1.0	2.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	6.0	5.0
Lead/Lag	Lag		Lead	
Lead-Lag Optimize?				
Vehicle Extension (s)	3.0	3.0	3.0	3.0
Recall Mode	Max	C-Max	Max	C-Max
Walk Time (s)			5.0	
Flash Dont Walk (s)			8.0	
Pedestrian Calls (#/hr)			0	
Act Effct Green (s)	21.0	53.0	30.0	53.0
Actuated g/C Ratio	0.18	0.44	0.25	0.44
v/c Ratio	1.19	0.85	0.31	1.14
Control Delay	145.7	29.8	37.8	103.1
Queue Delay	0.0	3.3	0.0	0.3
Total Delay	145.7	33.1	37.8	103.3
LOS	F	C	D	F
Approach Delay			37.8	103.3
Approach LOS			D	F

Intersection Summary

Area Type: CBD
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 16 (13%), Referenced to phase 2:WBT, Start of Green
Natural Cycle: 140
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.19
Intersection Signal Delay: 93.5 Intersection LOS: F
Intersection Capacity Utilization 134.8% ICU Level of Service H
Analysis Period (min) 15
! Phase conflict between lane groups.

Splits and Phases: 12: Alewife Brook Parkway & Route 2



Lane Group	EBL	WBR	SBT	NWT
Lane Group Flow (vph)	678	622	255	1670
v/c Ratio	1.19	0.85	0.31	1.14
Control Delay	145.7	29.8	37.8	103.1
Queue Delay	0.0	3.3	0.0	0.3
Total Delay	145.7	33.1	37.8	103.3
Queue Length 50th (ft)	~326	422	84	~794
Queue Length 95th (ft)	#446	#639	123	#933
Internal Link Dist (ft)			122	198
Turn Bay Length (ft)				
Base Capacity (vph)	569	733	822	1468
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	53	0	107
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	1.19	0.91	0.31	1.23

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

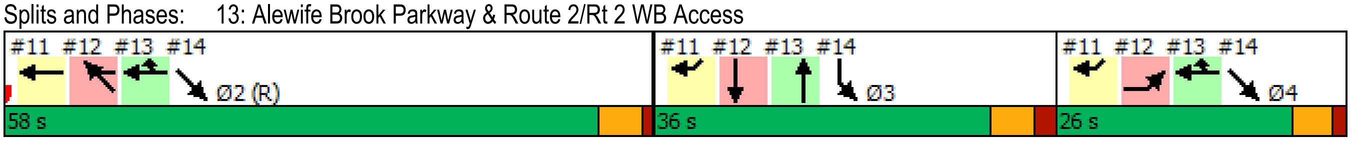
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↑	↱		↑↑				
Traffic Volume (vph)	0	0	0	0	591	328	0	238	0	0	0	0
Future Volume (vph)	0	0	0	0	591	328	0	238	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		200	0		0	0		0
Storage Lanes	0		0	0		1	0		0	0		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt						0.850						
Flt Protected												
Satd. Flow (prot)	0	0	0	0	1693	1439	0	3217	0	0	0	0
Flt Permitted												
Satd. Flow (perm)	0	0	0	0	1693	1439	0	3217	0	0	0	0
Right Turn on Red			No			No	No		No			No
Satd. Flow (RTOR)												
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		161			1225			227			185	
Travel Time (s)		3.7			27.8			5.2			4.2	
Confl. Peds. (#/hr)						2						
Peak Hour Factor	0.92	0.92	0.92	0.95	0.95	0.95	0.97	0.97	0.97	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	0%	1%	1%	0%	1%	0%	2%	2%	2%
Adj. Flow (vph)	0	0	0	0	622	345	0	245	0	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	622	345	0	245	0	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors					2	1		2				
Detector Template					Thru	Right		Thru				
Leading Detector (ft)					100	20		100				
Trailing Detector (ft)					0	0		0				
Detector 1 Position(ft)					0	0		0				
Detector 1 Size(ft)					6	20		6				
Detector 1 Type					Cl+Ex	Cl+Ex		Cl+Ex				
Detector 1 Channel												
Detector 1 Extend (s)					0.0	0.0		0.0				
Detector 1 Queue (s)					0.0	0.0		0.0				
Detector 1 Delay (s)					0.0	0.0		0.0				
Detector 2 Position(ft)					94			94				
Detector 2 Size(ft)					6			6				
Detector 2 Type					Cl+Ex			Cl+Ex				
Detector 2 Channel												
Detector 2 Extend (s)					0.0			0.0				

Lane Group	Ø2	Ø4
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Ideal Flow (vphpl)		
Storage Length (ft)		
Storage Lanes		
Taper Length (ft)		
Lane Util. Factor		
Ped Bike Factor		
Frt		
Flt Protected		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Right Turn on Red		
Satd. Flow (RTOR)		
Link Speed (mph)		
Link Distance (ft)		
Travel Time (s)		
Confl. Peds. (#/hr)		
Peak Hour Factor		
Heavy Vehicles (%)		
Adj. Flow (vph)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Enter Blocked Intersection		
Lane Alignment		
Median Width(ft)		
Link Offset(ft)		
Crosswalk Width(ft)		
Two way Left Turn Lane		
Headway Factor		
Turning Speed (mph)		
Number of Detectors		
Detector Template		
Leading Detector (ft)		
Trailing Detector (ft)		
Detector 1 Position(ft)		
Detector 1 Size(ft)		
Detector 1 Type		
Detector 1 Channel		
Detector 1 Extend (s)		
Detector 1 Queue (s)		
Detector 1 Delay (s)		
Detector 2 Position(ft)		
Detector 2 Size(ft)		
Detector 2 Type		
Detector 2 Channel		
Detector 2 Extend (s)		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type					NA	Prot		NA				
Protected Phases					2 4	2 4		3				
Permitted Phases												
Detector Phase					2 4	2 4		3				
Switch Phase												
Minimum Initial (s)								10.0				
Minimum Split (s)								19.0				
Total Split (s)								36.0				
Total Split (%)								30.0%				
Maximum Green (s)								30.0				
Yellow Time (s)								4.0				
All-Red Time (s)								2.0				
Lost Time Adjust (s)								0.0				
Total Lost Time (s)								6.0				
Lead/Lag								Lead				
Lead-Lag Optimize?												
Vehicle Extension (s)								3.0				
Recall Mode								Max				
Walk Time (s)								5.0				
Flash Dont Walk (s)								8.0				
Pedestrian Calls (#/hr)								0				
Act Effct Green (s)					79.0	79.0		30.0				
Actuated g/C Ratio					0.66	0.66		0.25				
v/c Ratio					0.56	0.36		0.30				
Control Delay					13.5	10.5		37.8				
Queue Delay					2.1	0.0		0.0				
Total Delay					15.6	10.5		37.8				
LOS					B	B		D				
Approach Delay					13.8			37.8				
Approach LOS					B			D				

Intersection Summary	
Area Type: CBD	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 16 (13%), Referenced to phase 2:WBT, Start of Green	
Natural Cycle: 140	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.19	
Intersection Signal Delay: 18.6	Intersection LOS: B
Intersection Capacity Utilization 52.1%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 13: Alewife Brook Parkway & Route 2/Rt 2 WB Access



Lane Group	Ø2	Ø4
Turn Type		
Protected Phases	2	4
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	10.0	10.0
Minimum Split (s)	15.0	15.0
Total Split (s)	58.0	26.0
Total Split (%)	48%	22%
Maximum Green (s)	53.0	21.0
Yellow Time (s)	4.0	3.5
All-Red Time (s)	1.0	1.5
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag		Lag
Lead-Lag Optimize?		
Vehicle Extension (s)	3.0	3.0
Recall Mode	C-Max	Max
Walk Time (s)		
Flash Dont Walk (s)		
Pedestrian Calls (#/hr)		
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		
Approach LOS		

Intersection Summary

Lane Group	WBT	WBR	NBT
Lane Group Flow (vph)	622	345	245
v/c Ratio	0.56	0.36	0.30
Control Delay	13.5	10.5	37.8
Queue Delay	2.1	0.0	0.0
Total Delay	15.6	10.5	37.8
Queue Length 50th (ft)	239	110	81
Queue Length 95th (ft)	337	165	119
Internal Link Dist (ft)	1145		147
Turn Bay Length (ft)		200	
Base Capacity (vph)	1114	947	804
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	337	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.80	0.36	0.30

Intersection Summary

Lane Group	SBL	SBR	SEL	SET	NWT	NWR	Ø2	Ø4
Lane Configurations								
Traffic Volume (vph)	250	0	0	988	0	0		
Future Volume (vph)	250	0	0	988	0	0		
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900		
Lane Width (ft)	13	13	13	13	13	13		
Lane Util. Factor	0.97	1.00	1.00	0.95	1.00	1.00		
Frt								
Flt Protected	0.950							
Satd. Flow (prot)	3193	0	0	3324	0	0		
Flt Permitted	0.950							
Satd. Flow (perm)	3193	0	0	3324	0	0		
Right Turn on Red	Yes	Yes				Yes		
Satd. Flow (RTOR)	234							
Link Speed (mph)	30			30	30			
Link Distance (ft)	155			297	139			
Travel Time (s)	3.5			6.8	3.2			
Peak Hour Factor	0.98	0.98	0.90	0.90	0.92	0.92		
Heavy Vehicles (%)	2%	0%	0%	1%	2%	2%		
Adj. Flow (vph)	255	0	0	1098	0	0		
Shared Lane Traffic (%)								
Lane Group Flow (vph)	255	0	0	1098	0	0		
Enter Blocked Intersection	No	No	No	No	No	No		
Lane Alignment	Left	Right	Left	Left	Left	Right		
Median Width(ft)	26			0	0			
Link Offset(ft)	0			0	0			
Crosswalk Width(ft)	16			16	16			
Two way Left Turn Lane								
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10		
Turning Speed (mph)	30	9	15			9		
Number of Detectors	1			2				
Detector Template	Left			Thru				
Leading Detector (ft)	20			100				
Trailing Detector (ft)	0			0				
Detector 1 Position(ft)	0			0				
Detector 1 Size(ft)	20			6				
Detector 1 Type	Cl+Ex			Cl+Ex				
Detector 1 Channel								
Detector 1 Extend (s)	0.0			0.0				
Detector 1 Queue (s)	0.0			0.0				
Detector 1 Delay (s)	0.0			0.0				
Detector 2 Position(ft)				94				
Detector 2 Size(ft)				6				
Detector 2 Type				Cl+Ex				
Detector 2 Channel								
Detector 2 Extend (s)				0.0				
Turn Type	Prot			NA				
Protected Phases	3			2 4			2	4
Permitted Phases								
Detector Phase	3			2 4				

Lane Group	SBL	SBR	SEL	SET	NWT	NWR	Ø2	Ø4
Switch Phase								
Minimum Initial (s)	10.0						10.0	10.0
Minimum Split (s)	19.0						15.0	15.0
Total Split (s)	36.0						58.0	26.0
Total Split (%)	30.0%						48%	22%
Maximum Green (s)	30.0						53.0	21.0
Yellow Time (s)	4.0						4.0	3.5
All-Red Time (s)	2.0						1.0	1.5
Lost Time Adjust (s)	0.0							
Total Lost Time (s)	6.0							
Lead/Lag	Lead							Lag
Lead-Lag Optimize?								
Vehicle Extension (s)	3.0						3.0	3.0
Recall Mode	Max						C-Max	Max
Walk Time (s)	5.0							
Flash Dont Walk (s)	8.0							
Pedestrian Calls (#/hr)	0							
Act Effct Green (s)	30.0			79.0				
Actuated g/C Ratio	0.25			0.66				
v/c Ratio	0.26			0.50				
Control Delay	0.8			11.4				
Queue Delay	0.5			0.0				
Total Delay	1.3			11.4				
LOS	A			B				
Approach Delay	1.3			11.4				
Approach LOS	A			B				

Intersection Summary

Area Type: CBD

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 16 (13%), Referenced to phase 2:WBT, Start of Green

Natural Cycle: 140

Control Type: Actuated-Coordinated

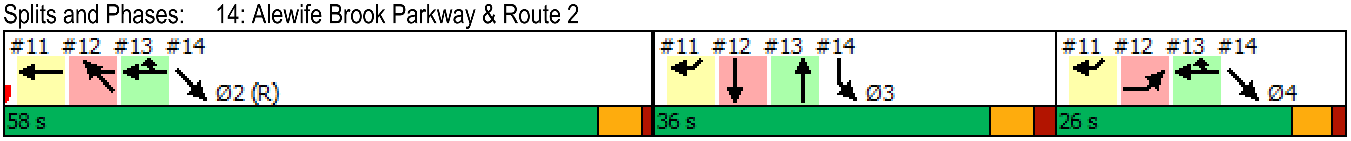
Maximum v/c Ratio: 1.19

Intersection Signal Delay: 9.5 Intersection LOS: A

Intersection Capacity Utilization 47.8% ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 14: Alewife Brook Parkway & Route 2



Lane Group	SBL	SET
Lane Group Flow (vph)	255	1098
v/c Ratio	0.26	0.50
Control Delay	0.8	11.4
Queue Delay	0.5	0.0
Total Delay	1.3	11.4
Queue Length 50th (ft)	0	210
Queue Length 95th (ft)	1	258
Internal Link Dist (ft)	75	217
Turn Bay Length (ft)		
Base Capacity (vph)	973	2188
Starvation Cap Reductn	391	0
Spillback Cap Reductn	0	0
Storage Cap Reductn	0	0
Reduced v/c Ratio	0.44	0.50

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	840	0	0	642	0	0	0	0	0	0	0
Future Volume (vph)	0	840	0	0	642	0	0	0	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	15	15	15	16	16	16	12	12	12	12	12	12
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
Frt												
Flt Protected												
Satd. Flow (prot)	0	2049	0	0	2153	0	0	0	0	0	0	0
Flt Permitted												
Satd. Flow (perm)	0	2049	0	0	2153	0	0	0	0	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)												
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		135			215			175			206	
Travel Time (s)		3.1			4.9			4.0			4.7	
Peak Hour Factor	0.84	0.84	0.84	0.97	0.97	0.97	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	0	1000	0	0	662	0	0	0	0	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	1000	0	0	662	0	0	0	0	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	0.88	0.88	0.88	0.85	0.85	0.85	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors		2			2							
Detector Template		Thru			Thru							
Leading Detector (ft)		100			100							
Trailing Detector (ft)		0			0							
Detector 1 Position(ft)		0			0							
Detector 1 Size(ft)		6			6							
Detector 1 Type		Cl+Ex			Cl+Ex							
Detector 1 Channel												
Detector 1 Extend (s)		0.0			0.0							
Detector 1 Queue (s)		0.0			0.0							
Detector 1 Delay (s)		0.0			0.0							
Detector 2 Position(ft)		94			94							
Detector 2 Size(ft)		6			6							
Detector 2 Type		Cl+Ex			Cl+Ex							
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0							
Turn Type		NA			NA							
Protected Phases		4			8							
Permitted Phases												
Detector Phase		4			8							

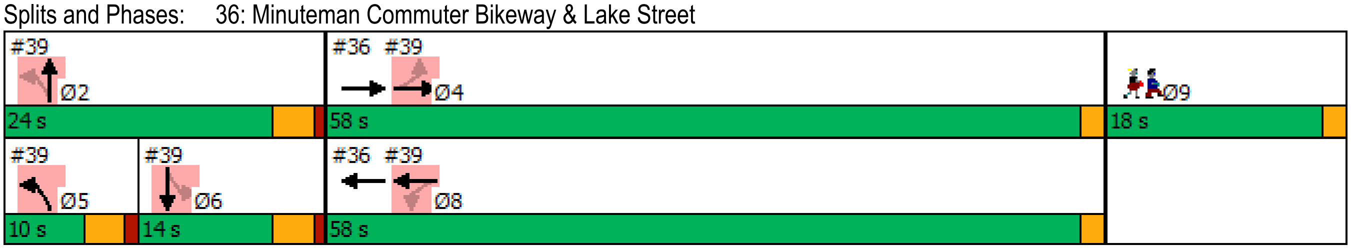
Lane Group	Ø2	Ø5	Ø6	Ø9
Lane Configurations				
Traffic Volume (vph)				
Future Volume (vph)				
Ideal Flow (vphpl)				
Lane Width (ft)				
Lane Util. Factor				
Frt				
Flt Protected				
Satd. Flow (prot)				
Flt Permitted				
Satd. Flow (perm)				
Right Turn on Red				
Satd. Flow (RTOR)				
Link Speed (mph)				
Link Distance (ft)				
Travel Time (s)				
Peak Hour Factor				
Heavy Vehicles (%)				
Adj. Flow (vph)				
Shared Lane Traffic (%)				
Lane Group Flow (vph)				
Enter Blocked Intersection				
Lane Alignment				
Median Width(ft)				
Link Offset(ft)				
Crosswalk Width(ft)				
Two way Left Turn Lane				
Headway Factor				
Turning Speed (mph)				
Number of Detectors				
Detector Template				
Leading Detector (ft)				
Trailing Detector (ft)				
Detector 1 Position(ft)				
Detector 1 Size(ft)				
Detector 1 Type				
Detector 1 Channel				
Detector 1 Extend (s)				
Detector 1 Queue (s)				
Detector 1 Delay (s)				
Detector 2 Position(ft)				
Detector 2 Size(ft)				
Detector 2 Type				
Detector 2 Channel				
Detector 2 Extend (s)				
Turn Type				
Protected Phases	2	5	6	9
Permitted Phases				
Detector Phase				

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Switch Phase												
Minimum Initial (s)		4.0			4.0							
Minimum Split (s)		20.5			20.5							
Total Split (s)		58.0			58.0							
Total Split (%)		58.0%			58.0%							
Maximum Green (s)		56.0			56.0							
Yellow Time (s)		2.0			2.0							
All-Red Time (s)		0.0			0.0							
Lost Time Adjust (s)		0.0			0.0							
Total Lost Time (s)		2.0			2.0							
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)		3.0			3.0							
Recall Mode		Max			Max							
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)		56.0			56.0							
Actuated g/C Ratio		0.64			0.64							
v/c Ratio		0.76			0.48							
Control Delay		16.1			4.0							
Queue Delay		0.0			0.3							
Total Delay		16.1			4.3							
LOS		B			A							
Approach Delay		16.1			4.3							
Approach LOS		B			A							

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 87.3
Natural Cycle: 90
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.83
Intersection Signal Delay: 11.4 Intersection LOS: B
Intersection Capacity Utilization 47.5% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 36: Minuteman Commuter Bikeway & Lake Street



Lane Group	Ø2	Ø5	Ø6	Ø9
Switch Phase				
Minimum Initial (s)	4.0	4.0	4.0	4.0
Minimum Split (s)	21.0	9.0	14.0	18.0
Total Split (s)	24.0	10.0	14.0	18.0
Total Split (%)	24%	10%	14%	18%
Maximum Green (s)	20.0	6.0	10.0	16.0
Yellow Time (s)	3.0	3.0	3.0	2.0
All-Red Time (s)	1.0	1.0	1.0	0.0
Lost Time Adjust (s)				
Total Lost Time (s)				
Lead/Lag		Lead	Lag	
Lead-Lag Optimize?		Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0
Recall Mode	Min	None	Min	None
Walk Time (s)				5.0
Flash Dont Walk (s)				11.0
Pedestrian Calls (#/hr)				220
Act Effct Green (s)				
Actuated g/C Ratio				
v/c Ratio				
Control Delay				
Queue Delay				
Total Delay				
LOS				
Approach Delay				
Approach LOS				
Intersection Summary				

Lane Group	EBT	WBT
Lane Group Flow (vph)	1000	662
v/c Ratio	0.76	0.48
Control Delay	16.1	4.0
Queue Delay	0.0	0.3
Total Delay	16.1	4.3
Queue Length 50th (ft)	339	53
Queue Length 95th (ft)	477	98
Internal Link Dist (ft)	55	135
Turn Bay Length (ft)		
Base Capacity (vph)	1314	1381
Starvation Cap Reductn	0	221
Spillback Cap Reductn	0	0
Storage Cap Reductn	0	0
Reduced v/c Ratio	0.76	0.57

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	82	688	70	6	519	1	15	5	7	0	5	108
Future Volume (vph)	82	688	70	6	519	1	15	5	7	0	5	108
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	14	14	14	13	13	13	12	12	12	12	12	12
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
Frt		0.989						0.966			0.871	
Flt Protected		0.995			0.999			0.973				
Satd. Flow (prot)	0	1994	0	0	1961	0	0	1786	0	0	1655	0
Flt Permitted		0.896			0.992			0.466				
Satd. Flow (perm)	0	1796	0	0	1948	0	0	855	0	0	1655	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		7						9			140	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		215			1126			206			208	
Travel Time (s)		4.9			25.6			4.7			4.7	
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.75	0.75	0.75	0.77	0.77	0.77
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	93	782	80	7	590	1	20	7	9	0	6	140
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	955	0	0	598	0	0	36	0	0	146	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	0.92	0.92	0.92	0.96	0.96	0.96	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	20	100		20	100		20	100		20	100	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		pm+pt	NA			NA	
Protected Phases		4			8		5	2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		5	2		6	6	

Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Heavy Vehicles (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (mph)	
Number of Detectors	
Detector Template	
Leading Detector (ft)	
Trailing Detector (ft)	
Detector 1 Position(ft)	
Detector 1 Size(ft)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Detector 2 Position(ft)	
Detector 2 Size(ft)	
Detector 2 Type	
Detector 2 Channel	
Detector 2 Extend (s)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Switch Phase												
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	20.5	20.5		20.5	20.5		9.0	21.0		14.0	14.0	
Total Split (s)	58.0	58.0		58.0	58.0		10.0	24.0		14.0	14.0	
Total Split (%)	58.0%	58.0%		58.0%	58.0%		10.0%	24.0%		14.0%	14.0%	
Maximum Green (s)	56.0	56.0		56.0	56.0		6.0	20.0		10.0	10.0	
Yellow Time (s)	2.0	2.0		2.0	2.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	0.0	0.0		0.0	0.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		2.0			2.0			4.0			4.0	
Lead/Lag							Lead			Lag	Lag	
Lead-Lag Optimize?							Yes			Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	Max	Max		Max	Max		None	Min		Min	Min	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)		56.0			56.0			7.3			7.3	
Actuated g/C Ratio		0.64			0.64			0.08			0.08	
v/c Ratio		0.83			0.48			0.46			0.55	
Control Delay		8.3			9.9			49.2			16.2	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		8.3			9.9			49.3			16.2	
LOS		A			A			D			B	
Approach Delay		8.3			9.9			49.3			16.2	
Approach LOS		A			A			D			B	

Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 87.3

Natural Cycle: 90

Control Type: Semi Act-Uncoord

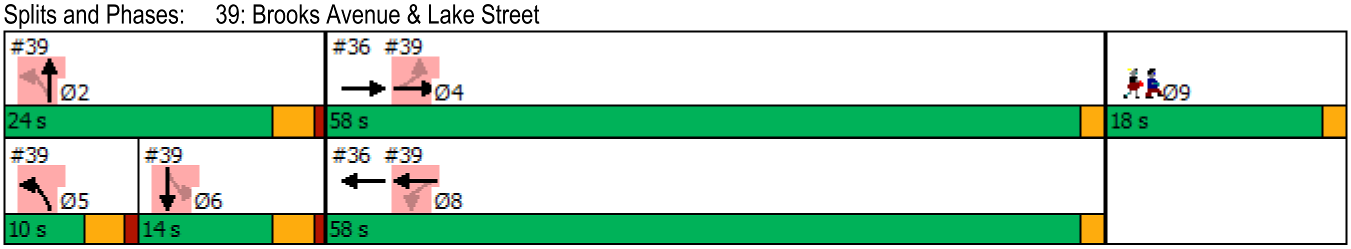
Maximum v/c Ratio: 0.83

Intersection Signal Delay: 10.4 Intersection LOS: B

Intersection Capacity Utilization 90.9% ICU Level of Service E

Analysis Period (min) 15

Splits and Phases: 39: Brooks Avenue & Lake Street



Lane Group	Ø9
Switch Phase	
Minimum Initial (s)	4.0
Minimum Split (s)	18.0
Total Split (s)	18.0
Total Split (%)	18%
Maximum Green (s)	16.0
Yellow Time (s)	2.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Recall Mode	None
Walk Time (s)	5.0
Flash Dont Walk (s)	11.0
Pedestrian Calls (#/hr)	220
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	

Intersection Summary

Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	955	598	36	146
v/c Ratio	0.83	0.48	0.46	0.55
Control Delay	8.3	9.9	49.2	16.2
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	8.3	9.9	49.3	16.2
Queue Length 50th (ft)	29	150	14	3
Queue Length 95th (ft)	#57	237	36	37
Internal Link Dist (ft)	135	1046	126	128
Turn Bay Length (ft)				
Base Capacity (vph)	1155	1250	202	313
Starvation Cap Reductn	2	0	0	0
Spillback Cap Reductn	0	13	6	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.83	0.48	0.18	0.47

Intersection Summary

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Wildlife Habitat and Vegetation Evaluation

Thorndike Place
Dorothy Road
Arlington, MA

November 2020

Prepared for:
Arlington Land Realty, LLC

Matt Burne, PWS
Senior Ecologist
BSC Project No. 23407.00

TABLE OF CONTENTS

LIST OF ATTACHMENTS

1.0 INTRODUCTION

The Thorndike Place Comprehensive Permit Civil/Site peer review conducted by BETA, dated August 5, 2020, identifies several concerns pertaining to wildlife habitat and vegetation on the project site, making several recommendations for thorough wildlife habitat and vegetation evaluation.

Recommendations include providing a field evaluation of functions and values of the Isolated Vegetated Wetland (IVW) and Arlington Bylaw Adjacent Upland Resource Areas (AURAs) to determine the area's significance to interests identified in the [Arlington] Bylaw and to conduct a wildlife habitat evaluation of the 17.7-acre site focusing on resource areas and potential loss of habitat within isolated wetlands and AURA zones.

The Arlington Regulations for Wetlands Protection (June 4, 2015) define wildlife as any non-domesticated mammal, bird, reptile, amphibian, fish, mollusk, arthropod or other invertebrate [that is not a pest], and wildlife habitat as an area being used by or necessary to provide breeding or nesting habitat, shelter, food and water for any animal species.

The Massachusetts Wetlands Protection Act (WPA) defines wildlife somewhat more restrictively as all mammals, birds, reptiles and amphibians, and additionally any state-listed species (which includes invertebrates). The WPA regulations identify the important wildlife habitat functions that wetlands provide as food, shelter, migratory or overwintering areas, or breeding areas for wildlife. The regulations further recognize that it is the topography, soil structure, plant community composition and structure, and hydrologic regime that provide important wildlife habitat functions.

This report presents the findings and analysis of a field investigation of the wildlife habitat and vegetation of the Thorndike Place project site conducted on October 27, 2020 by BSC Senior Ecologist Matt Burne, PWS. Matt holds a Master of Science degree from the University of Massachusetts Amherst in Fisheries & Wildlife Conservation and was previously employed by the Massachusetts Natural Heritage & Endangered Species Program as a Vernal Pool Ecologist and Rare Species Environmental Review Biologist for almost ten years.

2.0 METHODS

2.1 DESKTOP REVIEW AND FIELD PREPARATION

Prior to conducting field data collection, a desktop assessment of the site was conducted to identify existing known resources of potential interest including:

- Rare species habitat, Massachusetts Natural Heritage an Endangered Species Program (NHESP)
- BioMap2 Core Habitat, NHESP
- Critical Natural Communities, NHESP
- Prime Agricultural Soils, Natural Resources Conservation Service
- Current and historic aerial photography, Google Earth
- Wetlands, as mapped by BSC Group
- Flood zones, Federal Emergency Management Agency (FEMA)
- Areas of Critical Environmental Concern (ACEC), Department of Conservation and Recreation
- Important Bird Areas (IBA), National Audubon Society

Field survey points were identified in advance of field work with attention to the proposed project footprint where impacts to AURA are proposed or are immediately adjacent, to flood plain areas within the proposed project footprint, and to potentially suitable locations for compensatory storage (Attachment A).

2.2 FIELD SURVEY

A site visit was conducted on October 27, 2020 to collect data on the vegetation characteristics and important wildlife habitat features of the project site. At each field-located survey point, a 25-foot radius plot was established and vegetation was characterized within the survey plot (field forms attached as Attachment C). Field Forms developed by the Massachusetts Natural Heritage & Endangered Species Program for Quantitative Community Characterization were used to collect standardized data within each survey plot.

In addition to vegetative characterization, each survey plot was searched for signs of wildlife and for any additional features that provide important wildlife habitat values.

Survey plot center points were recorded using the ArcGIS Field Data Collector application, with GPS accuracy of approximately 15 feet under the forest cover. Photographs were collected at each survey point to create a visual record of conditions.

3.0 RESULTS

3.1 OVERVIEW

Much of the site is characterized by a diverse, mature forest canopy with dense understory vegetation. There are many very large specimens of Silver Maple (*Acer saccharinum*) and Cottonwood (*Populus deltoides*) throughout the property, especially near the series C wetland and on the eastern portion of the project site, near Parker Street. Several invasive exotic plant species are found throughout the site, with Garlic Mustard (*Alliaria petiolata*) especially common in the understory.

In many ways, the site is generally typical of urban forest fragments. In total, the forested area of the subject site and surrounding parcels that remain under forest canopy is approximately 18.5 acres. The setting of the forest patch that remains on this site is urban, though there is a tenable green-way connection to the bike path that leads north to Spy Pond, a Natural Heritage & Endangered Species Program BioMap2 Core Habitat and Priority Habitat polygon (PH 1421) and to the Alewife Brook Reservation, which connects to the Mystic River to the north. These connections have tree cover and are generally considered green space, though there is a heavy human presence in both corridors, and they are notably narrow.

This forest fragment is therefore not entirely isolated, despite the dense development surrounding it and the presence of the Route 2 corridor to its south, which isolates it from open space connected to Little Pond and Alewife Brook to the south. There is no direct connection to the Important Bird Area at Fresh Pond to the south in Cambridge.

Evidence was detected of several common bird species and a small number of mammals typical of urban woodland patches. There were no amphibians or reptiles encountered during the site visit, but it is recognized that late October is late in the year for encountering these groups of organisms.

It is important to acknowledge the extensive encampment of homeless persons on the subject parcel, as this has a direct and significant impact on the wildlife habitat values of the property overall. In general, wildlife species will not cohabitate with humans, and the presence of the large encampment and extensive areas of trash and waste spread throughout site depress any wildlife habitat values that may exist in this fragmented and isolated forest patch.

3.2 DESKTOP REVIEW AND FIELD PREPARATION

The status of the resources that are mapped or described by the reference material reviewed for the desktop assessment are summarized below in Table 1.

Table 1: Results of Desktop Resource Review

Resource	Source*	Present/Type	Comments
Rare Species Habitat	NHESP	Not present	Project site is not within mapped Priority Habitat or Estimated Habitat for rare species, as mapped in the current NHESP Rare Species Habitat Atlas (2017).
BioMap2 Core Habitat	NHESP	Not present	Project site is not within mapped BioMap2 Core Habitat, as mapped by NHESP and available through OLIVER, the MassGIS data viewer.
Critical Natural Communities	NHESP	Not present	Project site is not located within a mapped Critical Natural Community, as mapped by NHESP and available through OLIVER, the MassGIS data viewer.
Prime Agricultural Soils	NRCS	Present	Portions of the project site are mapped as Swansea Muck, identified as a Farmland of Unique Importance.
Current and historic aerial photography	Google Earth, historicalaerials	1938, 1955, 1995 - 2018	See discussion of aerial imagery below
Wetlands	MA DEP, Parcel Specific Delineation	Present	BSC has delineated wetlands on the project site.
Flood zones	FEMA	Present	Portions of the project site lie within FEMA Zone AE
Areas of Critical Environmental Concern (ACEC)	MA DCR	Not present	Project parcel does not lie within mapped ACEC, as indicated by the current data available through OLIVER.
Important Bird Areas (IBA),	NAS	Not present	The project parcel does not lie within an IBA, and the nearest mapped IBA is Fresh Pond, approximately 1200 meters away. An additional IBA, the Mystic Valley Watershed, is mapped within 1800 meters.

*Full Organizational names:
NHESP – Natural Heritage and Endangered Species Program
NRCS – Natural resources Conservation Service
MA DEP – Massachusetts Department of Environmental Protection
NAS – National Audubon Society

3.2.1 Historical Site Context

Aerial photography available on Google Earth was reviewed to evaluate changes in land use and cover type. The earliest imagery provided on the Google Earth platform was from 1995, and this image shows no change in the landscape context or use of the property over the twenty-five year period available for review.

Using historicalaerials.com, we were able to review aerial photography from 1938 and 1955, and subsequent years leading into the modern era. In the late 1930s, the property was in active farming with a number of distinct fields defined. Route 2 had been established several years prior (1935 or so) cutting off everything to the south of the property, and housing development was beginning to hem in the property from the north, though there was still a partial connection to the Spy Pond area with the exception of housing along Lake Street which fragmented the property from Spy Pond.

By 1955, farming had clearly been abandoned on the property, and more intensive housing development had occurred in the neighborhood of Dorothy Road and Littlejohn Street. In fact, by 1955, all of the housing in the neighborhood directly north of the property was in existence.

This parcel continued to revert to forest on the abandoned agricultural fields following the 1930s, and has been physically isolated from other natural areas for nearly 100 years.

3.2.2 Wetlands

Wetland delineations for this project site have been conducted and contested several times over nearly 20 years. We carefully reviewed current delineations and FEMA floodplain designations to plan survey plot locations to provide useful characterization of the parcel with respect to the current, significantly reduced Revised Site Plan (September 28, 2020).

The revised plan proposes no impact to Isolated Wetland (local), Bordering Vegetated Wetland, 25’ No Disturb Zones for Isolated or Bordering Vegetated Wetlands, and significantly reduces proposed impacts to 100’ Buffer and AURA associated with Bordering Vegetated Wetland and to Floodplain resources on the site.

Field data collection was planned for four (4) locations in AURA-BVW, three (3) locations in FEMA Floodplain, two (2) locations in possible Compensatory Flood Storage sites, and one (1) location in a very small Isolated Area on the northeast of the site that has been delineated as a wetland previously and which has had some question raised about possible function as a vernal pool. Two of the ten survey points were situated within the encampment and were therefore not included in the survey (see below).

3.3 FIELD SURVEY

3.3.1 AURA Survey Locations

AU-B9 Terrestrial deciduous forest with dense shrub layer
Tree canopy 35% cover composed of Ash (20%), Norway maple (10%), Black Locust (5%)
Shrub layer 20% cover composed of rose (15%), Chokeberry (Tr)
Vines present include Oriental Bittersweet (20%)
Herbaceous layer 70% composed of Garlic Mustard

Topography is gently sloping, dry loamy soil with thin litter and duff layer
There is a large amount of downed woody debris (30% cover) with a high fuel load
One snag > 4" DBH; few cavities observed
Few small mammal burrows observed

Evidence of dumping including concrete and macadam
Extensive invasive exotic plants

AU-C10 Terrestrial deciduous forest with well-developed shrub layer
Tree canopy 75% composed of Silver Maple (50%), Poplar (10%), Ash (10%) and Cherry (Tr)
Shrub layer 20% cover composed of Box Elder (10%), Elm (10%)
Vines including Oriental Bittersweet and grape present (20%)
Herbaceous layer composed of Garlic Mustard (70%) and Japanese Knotweed (20%)

Topography is gently sloping toward C-series wetland
There is a large amount of downed woody debris (40% cover) with moderate fuel loads
Three snags > 4" DBH, few cavities observed
No small mammal burrows observed

Evidence of human disturbance including refuse
Extensive exotic invasive plants

AU-C16 Terrestrial deciduous forest
Tree canopy 65% cover with Tree of Heaven (30%), American Elm (10%), and Cherry (5%)
Tree sub-canopy layer composed of very old fruit trees (25%)
Tangled shrub layer of Amur Honeysuckle (5%), vines (20%) including Bittersweet
Herbaceous layer 75% cover composed of Garlic Mustard

Topography is gently sloping toward C-series wetland
There is a small amount of downed woody debris (15%) with moderate fuel loads
No snags >4" DBH; no cavities observed
No small mammal burrows observed

Significant amount of trash and waste materials in this location
Extensive exotic invasive plants

AU-D18 Terrestrial deciduous forest with relatively open understory
Tree canopy 75% composed of Black Cherry (70%) and Silver Maple (5%)
Tree sub-canopy and shrub layer 30% with Black Cherry, Poison Sumac, and Tree-of-Heaven
Shrub and herbaceous layer 60% composed of American Pokeweed, Goldenrod, Buckthorn

Topography is essentially flat
There is only a trace amount of downed woody debris with a moderate fuel load
There are several snags >4" DBH (Tree-of-Heaven) and Cherry; few cavities
No small mammal burrows observed

Immediately adjacent to the largest encampment on the property.
Survey Plot has the least Garlic Mustard on the site
Evidence of dumping including concrete and macadam
Impact of highway evident

3.3.2 Floodplain Survey Locations

FP-1 Terrestrial deciduous forest with moderate understory
Tree canopy 80% composed of Cherry (60%), Box Elder (20%) and Black Oak (5%)
Understory composed of brambles, Chokecherry (10%), American Pokeweed (10%)
Herbaceous layer 80% composed of Garlic Mustard (70%), Goldenrod (5%)

Topography is generally flat
There is a moderate amount of downed woody debris (25%) and moderate fuel load
One snag 4" DBH present

Invasive exotic shrubs/vines are present but sparse, including Bittersweet, Knotweed
There are abundant plants that produce food for wildlife
Some evidence of the homeless encampment, including trash within survey plot
Evidence of dumping including concrete and macadam

FP-2 Terrestrial deciduous forest with fairly open understory
Tree canopy 80% with Ash (20%), Norway Maple (40%), Red Maple (10%), Elm (5%)
Tree sub-canopy and shrub layer composed of Cherry (5%), Norway Maple (5%)
Herbaceous layer 90% composed of Garlic Mustard, Sensitive Fern, ivy

Topography is generally flat
Small amount of downed woody debris, including 18" DBH trunk, moderate fuel load

Survey plot includes some very large trees, including specimens of 24" and 30" DBH
Site is close to Dorothy Road and there is evidence of yard waste dumping
Evidence of dumping concrete macadam

FP-3 Located within encampment and therefore not surveyed

3.3.3 Possible Compensatory Storage Locations

CS-1 Terrestrial deciduous forest with open understory
Tree canopy 100% composed of Norway Maple. Elm and Cherry present (Tr)
Understory has trace amount of Linden and Bittersweet

Topography gently sloping to the west
Small amount of downed wood debris (5%) with moderate fuel load
No snags observed; no cavities observed
No small mammal burrows observed

Some residential encroachment of lawn area, but no other evidence of impacts
Garlic mustard is present outside of plot at fence line

CS-2 Located within encampment and therefore not surveyed

3.3.4 Isolated Area

IA-1 Distinct topographic depression
Cottonwood trees on edge of basin
Knotweed and ferns in basin

This was evaluated for vernal pool habitat potential and does not meet such criteria

3.3.5 Wildlife Observations

Few animals were observed during the field survey on October 27, 2020. A dead Eastern gray squirrel (*Sciurus carolinensis*) was observed at the forest edge, opposite 65 Dorothy Road. An Eastern Cottontail rabbit (*Sylvilagus floridanus*) was observed near Plot IA-1. Fresh canid scat was found at Plot AU-B9. It is believed to be that of Eastern Coyote (*Canis latrans*), given apparent contents of the droppings (Photo AU-B9 #867).

Several birds were heard or observed within the forested parcel. Species included Northern Cardinal (*Cardinalis cardinalis*), Black-capped Chickadee (*Poecile atricapillus*), Blue Jay (*Cyanocitta cristata*), Downy Woodpecker (*Picoides pubescens*) and American Robin (*Turdus migratorius*).

Residents of the abutting neighborhood have stated that they have observed increased pest species activity, including rats. No evidence of rats or other pest species was observed during the field survey.

4.0 SUMMARY OF FINDINGS

4.1.1 Site Context

Fragmentation and isolation of forest patches have long-term adverse impacts on forests and wildlife habitat values associated with isolated patches. Fragmentation reduces overall forest health and leads to a loss of biodiversity, and increases invasive plants, pests, and pathogens. Isolation at the landscape scale inhibits the movement of plants and animals over the long-term.

As discussed above, the subject parcel has been isolated for nearly a century, since the construction of Route 2 on its south and the development of dense housing to its north. There is a greenway connection to Spy Pond and the Mystic River through existing bike paths, which mitigates the effects of isolation to a certain degree, but this remains a significantly isolated and therefore compromised patch of forest.

4.1.2 Important Wildlife Habitat Features

Survey plots were established in locations where direct impact to Arlington Bylaw Adjacent Upland Resource Areas (AURAs) is proposed or immediately adjacent, and to Floodplain sites that would be directly affected by proposed work, as well as to two locations where Compensatory Storage may be proposed for the project.

Using the Wetlands Protection Act Wildlife Habitat Protection Guidance, Appendix B: Detailed Wildlife Habitat Evaluation as a basis for site evaluation, BSC Group evaluated the project site for features that provide important wildlife habitat.

- Wetland/Aquatic Food Plants were not detected in survey plots. This is a result of locating plots primarily in AURA and floodplain locations. No plots were established within the flagged wetlands. Upland Food Plants are present on the project site, found in several of the survey plots. The project will not adversely affect availability of wetland plants that are important for wildlife food, but may marginally diminish available upland wildlife food plants. Mitigation of this impact could be accomplished with careful landscape planning.
- The property is characterized by numerous large trees, many of which are near or in excess of 30" DBH. We did not conduct an inventory of such trees as part of this evaluation, but they were present at five (5) of the eight (8) survey plots. Large trees were mostly living, and there were few dead standing trees across the site, and relatively few snags or cavities, considering the extensive amount of downed woody debris.
- The most significant feature found throughout the site is the extensive amount of downed woody debris. Each survey plot was characterized by a large amount of woody debris, from very small, typically abundant fuel wood to a number of quite large downed tree trunks. This feature can be particularly valuable to small mammals, reptiles and amphibians. The project may reduce available downed woody debris within the small amount of jurisdictional resource area proposed for alteration. However, we believe that the proportion of available woody debris on the site will not be adversely affected due to its abundance at all survey plots. Mitigation of this impact could be accomplished by placing coarse woody debris in compensatory storage areas or in AURA zones and with careful consideration in landscape design and implementation.
- Rocks, rock piles, and debris were also abundant on the project site, which can all provide valuable cover objects for small mammals, reptiles and amphibians.
- There was no suitable turtle nesting habitat, nor wetlands likely to support rare species. The large wetland on site (Series C) is dominated by Phragmites, and as such not expected to provide important waterfowl habitat.
- There are no depressions that appear to provide likely vernal pool habitat on the site.

4.1.3 Invasive Species

The site is characterized by the presence of invasive exotic plant species throughout most survey plots. Garlic Mustard is especially abundant throughout the site, dominating the herbaceous layer of the forest. Garlic Mustard forms dense stands and crowds out native plants. It is also allelopathic, affecting suitability of soil to native plants. Alteration of a native flora by invasive plants is known to alter the value of forest and wetland habitats for wildlife. The abundance of Garlic Mustard, and presence of Japanese Knotweed and Oriental Bittersweet at most survey sites has a significant adverse effect on wildlife.

4.1.4 Human Encampment

Two survey plots, FP-3 and CS-2, were located directly within the human encampment located on the property and therefore not surveyed. There is no suitable habitat value to an area with extensive, on-going habitation.

It is important to note the adverse effects on wildlife habitat values in the forest and wetlands on the project site resulting from the extensive human encampment. The extensive amount of trash that is spread throughout the site has a direct effect of eliminating important wildlife habitat functions. Trash may be construed to provide shelter for some species, and may attract prey organisms, but it eliminates natural cover, may introduce toxins to soil and water resources, and expands the footprint of human habitation which most wildlife make an effort to avoid.

The encampment on the site of the proposed project has a direct negative impact on the wildlife habitat values of the woods and wetlands.

5.0 CONCLUSION

The BSC Group investigation of the Wildlife Habitat and Vegetation on the site of the proposed Thorndike Place project identified suitable resources for common wildlife species that would normally be expected in an urban/suburban forest fragment of this size. Rabbit, squirrel, and (presumed) coyote were seen, along with a variety of passerine birds. Raccoon, skunk, fox, and possibly deer, and other human-adapted or human-tolerant species are likely to occur in this patch of woods over time. Wetlands on site could also support some species of frog, and the surrounding woods might provide non-breeding habitat for these.

The site is largely isolated from surrounding natural areas which significantly reduces its wildlife habitat value. The forest's potential habitat value is further diminished by extensive invasive exotic plants throughout the site, and by the large human presence on the property.

The current revised proposed project has eliminated a significant amount of direct wetland, buffer zone, and Adjacent Upland Resource Area impacts. The project's effects on wildlife habitat values of the jurisdictional resource areas on the project site have been reduced dramatically from earlier proposals. Through careful design and implementation of flood storage mitigation areas and thoughtful, wildlife-focused landscape planning, the project should have a net beneficial outcome on the wildlife habitat values of the project site.

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(Page Size 8.5 x 11)

Thorndike Place, Arlington, MA
Wildlife Habitat and Vegetation Evaluation
Field Survey Plot locations

Source: Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS,

THIS DOCUMENT IS INTENDED FOR GENERAL PLANNING & INFORMATION PURPOSES ONLY. ALL MEASUREMENTS & LOCATIONS ARE APPROXIMATE.

AU-B9 #866: Survey plot has a dense tangle of bittersweet, rose, and downed woody debris. A large Ash tree dominates the canopy.

AU-B9 #867: Canid scat observed in Survey Plot

AU-C10 #871: Large Silver Maple tree amid generally sparse understory and moderate course woody debris

AU-C10 #873: Open understory with course woody debris and small stand of Japanese Knotweed

AU-C16 #878: Old apple/fruit trees and refuse associated with encampment.

AU-C16 #880: Garlic mustard understory

AU-D18 #881: Cherry and maple make up the canopy trees, and the understory is fairly diverse, with American Pokeweed and Goldenrod dominant.

AU-D18 #882: Homeless encampment has a significant effect on wildlife habitat values of forest and wetlands on the site.

BSC GROUP

FP-1 #876: Relatively open understory with coarse woody debris and mature overstory trees.

FP-1 #877: Oak and chokecherry occur over garlic mustard

FP-2 #874: Large mature trees in overstory, with a sparse understory and a lot of coarse woody debris.

FP-1 #875: Area has sensitive fern and poison ivy and other indicators of moist floodplain conditions.

BSC GROUP

CS-1 #869: Very open understory under complete canopy of a large Norway Maple.

CS-1 #870: Survey Plot was very sparse in the understory and ground cover, with some coarse woody debris.

IA-1 #885: Distinct depression with stand of Japanese Knotweed. No vernal pool characteristics.

FP-1 #877: Very large Cottonwood trees in close proximity to IA-1 depression

Form 3: Quantitative Community Characterization

MA Natural Heritage & Endangered Species Program

A. Identifiers (general EOR information)

1. Community type (observed): ____ 2. GPS Point: 42 461330 71 151239
3. Assigned type (NHESP use): ____ 4. Lat: ____ N Long ____ W
5. Site name: Thorndike Place 6. Quad name(s): ____
7. Ecoregion (DFW): ____ 8. County name(s): ____
9. Town: Arlington 10. Directions: ____
11. Survey date 10/27/20 12. Previous observations at this site: ____
13. Surveyors: MRBurne

B. Environmental Description

14. **PLOT #** AU B9	15. **Photos taken** Y N; 0866, 0867 **Identifier** MB thorn 2	16. **Elevation (from topo):** ____ m or ft
17. **Topographic position**: ___ Summit/Crest ___ High slope ___ Mid slope ___ Low slope ___ Rolling Terrain ___ Level ___ Basin floor ___ Other Slight rise ___ Step in slope ___ Toe of slope ___ Channel wall ___ Channel bed	18. **Topographic sketch**: 19. **Slope aspect:** ____	20. **Slope Class** (Percent): Flat (<2%) Steep (48-95%) Gentle (2-9%) Very Steep (>95%) Moderate (10-25%) Abrupt (cliff or ledge) Rather Steep (26-47%) 21. **Slope Shape**: Vertically: Concave Convex Linear Horizontally: Concave Convex Linear
22. **Downed Wood** (within or partially within plot) Max. diameter/length/decay class: 8" 15' Partial. Average diameter for all downed wood ≥4 in. ~~3~~ 5" (estimate). Abundance of downed wood ≥4 in. diameter (using cover classes) 30%. 23. **Fuel load (< ¼ inch in diameter):** Low = 1 Moderate = 2 High = 3. 24. **Snags ≥ 4" DBH**: Species Ash, DBH 15, ht. 20	25. **Un-vegetated surface (check the single, most dominant feature):** ___ Bedrock ___ Large rocks (boulders > 24 in.) ___ Small rocks (stones 10-24 in.) ___ Cobbles (2-9 in.) ___ Gravel (<2 in.) ___ Sand ___ Litter ___ Bare soil ___ Water ___ Other: ____ 26. **Combined litter & duff depth:** 2" inches 27. **Parent material:** loam	28. **Moisture regime**: ___ Very dry ✓ Dry ___ Moist ___ Wet ___ Saturated ___ Periodically inundated ___ Permanently inundated 29. **Soil type** (if observed) ___ sand ___ clay ✓ loam ___ peat ___ muck other ____
30. **Sphagnum hummocks overhanging water:** (only if >25 m^2 and visible from plot) GPS point (location): ____ Size of habitat: ____ 3 water depths ____ (max. inches) Circle: Moving channels or Pools of Water Comments: ____	31. **Evidence of Land Use History**: stone walls, barbed wire, wolf trees cut stumps, multi-trunk trees, foundations, wells Other Pavement, concrete chunks	32. **Evidence of Disturbance**: Fires: fire scars, charcoal, standing snags Blowdowns: aligned downed trees Ice damage: broken tree tops Disease: adelgid, gypsy moth, beech bark Other: Invasives

33. **Environmental Comments**: vegetation homogeneity, erosion / sedimentation, invasive species presence/distribution, etc:

Robins calling
Fresh scat - could be coyote. Tangled understory
Downed wood considerable, but fairly small

29'
11 m

C. VEGETATION 34. **System:** √ Terrestrial __ Palustrine __ Estuarine 35. **PLOT NUMBER:** AU B9 36. **Plot Dimensions:** 20' / 6 M

37. **Leaf phenology**:
- X Deciduous
- ____Semi-deciduous
- ____Semi-Evergreen
- ____Evergreen
- ____Perennial
- ____Annual

38. **Physiognomic type**:
- ____Forest
- ____Sparse woodland
- ____Shrubland
- ____Dwarf shrubland
- ____Sparse dwarf shrubland
- ____Herbaceous
- ____Woodland
- ____Scrub thicket
- ____Sparse shrubland
- ____Dwarf scrub thicket
- ____Non-vascular
- ____Sparsely vegetated

39. **Photo Cover Type**: ____________

39a. **Field-Observed Cover Type:** Forest w/ dense Shrub layer

40. **Strata/life forms**

	height (m or ft)	% cover
T1 Emergent tree	~~100~~	~~25~~
T2 Tree canopy	80	25
T3 Tree sub-canopy	26	10
S1 Tall shrub		
S2 Short shrub	8	20
H Herbaceous		70
N Non-vascular		
V Vine / liana	15	15

Cover Classes
- + <1%
- **1** =1-5%
- **2** =6-25%
- **3** =26-50%
- **4** =51-75%
- **5** >75%

41. **Plant Species & abundance**: list each species and the corresponding cover class for each stratum.

Ash	20				
Norway maple	10				
Sycamore	Tr				
Black locust	5				
Rose	15				
Chokeberry	Tr				
Bittersweet	20				
Garlic mustard	70				

Coyote (?) scat
~~A~~ lot of downed wood

Form 3: Quantitative Community Characterization

MA Natural Heritage & Endangered Species Program

A. Identifiers (general EOR information)

1. Community type (observed): ______ 2. GPS Point: ______
3. Assigned type (NHESP use): ______ 4. Lat: ______ N Long ______ W
5. Site name: ______ 6. Quad name(s): ______
7. Ecoregion (DFW): ______ 8. County name(s): ______
9. Town: Arlington 10. Directions: 80' 0°N from NE C-10
11. Survey date 10/27/20 12. Previous observations at this site: ______
13. Surveyors: MR Burne

B. Environmental Description

14. PLOT # AU C10

15. Photos taken (Y) N; **Identifier** 871, 872, 873

16. Elevation (from topo): ____ m or ft

17. Topographic position:
- ___ Summit/Crest
- ___ High slope
- ___ Mid slope
- ___ Low slope
- ___ Rolling Terrain
- ___ Level
- ___ Basin floor
- ___ Other
- ___ Step in slope
- ___ Toe of slope
- ___ Channel wall
- ___ Channel bed

18. Topographic sketch:

Slight pitch to E

19. Slope aspect: 22°

20. Slope Class (Percent):
Flat (<2%) Steep (48-95%)
(Gentle (2-9%)) Very Steep (>95%)
Moderate (10-25%)
Abrupt (cliff or ledge)
Rather Steep (26-47%)

21. Slope Shape:
Vertically: Concave Convex Linear
Horizontally: Concave Convex Linear

22. Downed Wood (within or partially within plot)

Max. diameter/length/decay class: 10" 30' Partial

Average diameter for all downed wood ≥4 in. 6" (estimate)

Abundance of downed wood ≥4 in. diameter (using cover classes) 40%

23. Fuel load (< ¼ inch in diameter):
Low = 1 (Moderate = 2) High = 3

24. Snags ≥ 4" DBH:

Species	DBH	ht.
Elm	6	15
Unk	12	15
Ash	6	20

25. Un-vegetated surface (check the single, most dominant feature):
- ___ Bedrock
- ___ Large rocks (boulders > 24 in.)
- ___ Small rocks (stones 10-24 in.)
- ___ Cobbles (2-9 in.)
- ___ Gravel (<2 in.)
- ___ Sand
- ___ Litter
- ___ Bare soil
- ___ Water
- ___ Other: ______

26. Combined litter & duff depth: 2" inches

27. Parent material: loam

28. Moisture regime:
- ___ Very dry
- ✓ Dry
- ___ Moist
- ___ Wet
- ___ Saturated
- ___ Periodically inundated
- ___ Permanently inundated

29. Soil type (if observed)
- ___ sand
- ___ clay
- ✓ loam
- ___ peat
- ___ muck

other ______

30. Sphagnum hummocks overhanging water: (only if >25 m^2 and visible from plot)
GPS point (location): ______
Size of habitat: ______
3 water depths ______ (max. inches)
Circle: Moving channels or Pools of Water
Comments: ______

31. Evidence of Land Use History:
stone walls, barbed wire, wolf trees
cut stumps, multi-trunk trees,
foundations, wells
Other Invasives

32. Evidence of Disturbance:
Fires: fire scars, charcoal, standing snags
Blowdowns: aligned downed trees
Ice damage: broken tree tops
Disease: adelgid, gypsy moth, beech bark
Other: ______

33. Environmental Comments: vegetation homogeneity, erosion / sedimentation, invasive species presence/distribution, etc:

Knotweed, Garlic Mustard
Diverse Tree Species

C. VEGETATION 34. **System:** √ Terrestrial __ Palustrine __ Estuarine 35. **PLOT NUMBER:** AU C10 36. **Plot Dimensions:** 25' diam

37. **Leaf phenology**:
- ✓ Deciduous
- ___ Semi-deciduous
- ___ Semi-Evergreen
- ___ Evergreen
- ___ Perennial
- ___ Annual

38. **Physiognomic type**:
- ✓ Forest
- ___ Sparse woodland
- ___ Shrubland
- ___ Dwarf shrubland
- ___ Sparse dwarf shrubland
- ___ Herbaceous
- ___ Woodland
- ___ Scrub thicket
- ___ Sparse shrubland
- ___ Dwarf scrub thicket
- ___ Non-vascular
- ___ Sparsely vegetated

39. **Photo Cover Type:** ___________ 39a. **Field-Observed Cover Type:** Forest

40. **Strata/life forms**

Strata/life forms	height (m or ft)	% cover
T1 Emergent tree		
T2 Tree canopy	80	85
T3 Tree sub-canopy		
S1 Tall shrub	20	10
S2 Short shrub	15	10
H Herbaceous	80	90
N Non-vascular		
V Vine / liana		75

Cover Classes
- + <1%
- **1** =1-5%
- **2** =6-25%
- **3** =26-50%
- **4** =51-75%
- **5** >75%

41. **Plant Species & abundance**: list each species and the corresponding cover class for each stratum.

Silver maple	50	* Champion tree in plot		28" dia each of 3 stems	
Poplar	10				
Ash	10				
Cherry	Tr				
Box Elder	10				
Elm	10				
Knotweed	20				
Garlic mustard)	70				
Bittersweet	10				
Grape	10				

Form 3: Quantitative Community Characterization

MA Natural Heritage & Endangered Species Program

A. Identifiers (general EOR information)

1. Community type (observed): ______ 2. GPS Point: 42 401109 71 150064
3. Assigned type (NHESP use): ______ 4. Lat: ______ N Long ______ W
5. Site name: ______ 6. Quad name(s): ______
7. Ecoregion (DFW): ______ 8. County name(s): ______
9. Town: Arlington 10. Directions: ______
11. Survey date 10/27/20 12. Previous observations at this site: ______
13. Surveyors: MR Burne

B. Environmental Description

14. **PLOT #** AU C16	15. **Photos taken** Y N; **Identifier** 0878, 0879, 0880	16. **Elevation (from topo):** ____ m or ft
17. **Topographic position**: ___ Summit/Crest ___ High slope ___Step in slope ___ Mid slope ___Toe of slope ✓ Low slope ___ Rolling Terrain ___ Level ___Channel wall ___ Basin floor ___Channel bed ___ Other	18. **Topographic sketch:** N Gentle slope towards west 19. **Slope aspect:** 12+2	20. **Slope Class** (Percent): Flat (<2%) Steep (48-95%) Gentle (2-9%) Very Steep (>95%) Moderate (10-25%) Abrupt (cliff or ledge) Rather Steep (26-47%) 21. **Slope Shape:** Vertically: Concave Convex Linear Horizontally: Concave Convex Linear
22. **Downed Wood** (within or partially within plot) Max. diameter/length/decay class: 6" 15ft Fresh Average diameter for all downed wood ≥4 in. 4" (estimate) Abundance of downed wood ≥4 in. diameter (using cover classes) 15% 23. **Fuel load (< ¼ inch in diameter):** Low = 1 Moderate = 2 High = 3 24. **Snags ≥ 4" DBH:** Species DBH ht. None	25. **Un-vegetated surface (check the single, most dominant feature):** ___ Bedrock ___ Large rocks (boulders > 24 in.) ___ Small rocks (stones 10-24 in.) ___ Cobbles (2-9 in.) ___ Gravel (<2 in.) ___ Sand ___ Litter ___ Bare soil ___ Water ___ Other: 26. **Combined litter & duff depth:** 2 inches 27. **Parent material:** loam	28. **Moisture regime:** ___ Very dry ✓ Dry ___Wet ___ Moist ___Saturated ___ Periodically inundated ___ Permanently inundated 29. **Soil type** (if observed) ___ sand ✓ loam ___ clay ___ peat ___ muck other______
30. **Sphagnum hummocks overhanging water:** (only if >25 m² and visible from plot) GPS point (location): ______ Size of habitat: ______ 3 water depths ______ (max. inches) Circle: Moving channels or Pools of Water Comments: ______	31. **Evidence of Land Use History:** stone walls, barbed wire, wolf trees cut stumps, multi-trunk trees, foundations, wells Other Old fruit trees Lots of trash	32. **Evidence of Disturbance:** Fires: fire scars, charcoal, standing snags Blowdowns: aligned downed trees Ice damage: broken tree tops Disease: adelgid, gypsy moth, beech bark Other: ______

33. **Environmental Comments**: vegetation homogeneity, erosion / sedimentation, invasive species presence/distribution, etc:

location of encampment. Copious trash
Tangled understory. Lots of trash

C. VEGETATION 34. **System:** √ Terrestrial __ Palustrine __ Estuarine 35. **PLOT NUMBER:** AV O/6 36. **Plot Dimensions:** 25' Rad.

37. **Leaf phenology:**
- √ Deciduous
- ' Semi-deciduous
- ___ Semi-Evergreen
- ___ Evergreen
- ___ Perennial
- ___ Annual

38. **Physiognomic type:**
- √ Forest
- ___ Sparse woodland
- ___ Shrubland
- ___ Dwarf shrubland
- ___ Sparse dwarf shrubland
- ___ Herbaceous
- ___ Woodland
- ___ Scrub thicket
- ___ Sparse shrubland
- ___ Dwarf scrub thicket
- ___ Non-vascular
- ___ Sparsely vegetated

39. **Photo Cover Type:** ______

39a. **Field-Observed Cover Type:** Forest

40. **Strata/life forms**

Strata/life forms	height (m or ft)	% cover
T1 Emergent tree		
T2 Tree canopy	80	65
T3 Tree sub-canopy	50	20
S1 Tall shrub	20	60
S2 Short shrub		
H Herbaceous		75
N Non-vascular		
V Vine / liana		

Cover Classes
- + <1%
- **1** =1-5%
- **2** =6-25%
- **3** =26-50%
- **4** =51-75%
- **5** >75%

41. **Plant Species & abundance:** list each species and the corresponding cover class for each stratum.

Ailanthus	30		
American Elm	10		
Cherry	15		
Old decrepit apples	25		
Amur honeysuckle	5	Fruit	
Tangled vines group	20		
Bittersweet			
Garlic mustard	25		

Cardinal observed
Birds twittering, chickadees

Form 3: Quantitative Community Characterization

MA Natural Heritage & Endangered Species Program

A. Identifiers (general EOR information)

1. Community type (observed): ______ 2. GPS Point: 42 401132 71 149118
3. Assigned type (NHESP use): ______ 4. Lat: ______N Long ______W
5. Site name: ______ 6. Quad name(s): ______
7. Ecoregion (DFW): ______ 8. County name(s): ______
9. Town: Arlington 10. Directions: ______

11. Survey date 10/27/20 12. Previous observations at this site: ______
13. Surveyors: MR Brown

B. Environmental Description

14. **PLOT #** AU D18	15. **Photos taken** (Y) N; **Identifier** 0881 – 0883	16. **Elevation (from topo):** ____ m or ft
17. **Topographic position:** ___ Summit/Crest; ___ High slope; ___ Mid slope; ___ Low slope; ___ Rolling Terrain; ✓ Level; ___ Basin floor; ___ Other; ___ Step in slope; ___ Toe of slope; ___ Channel wall; ___ Channel bed	18. **Topographic sketch:** Encampment; Rte 2 19. **Slope aspect:** ______	20. **Slope Class** (Percent): (Flat (<2%)); Steep (48-95%); Gentle (2-9%); Very Steep (>95%); Moderate (10-25%); Abrupt (cliff or ledge); Rather Steep (26-47%) 21. **Slope Shape:** Vertically: Concave Convex (Linear); Horizontally: Concave Convex (Linear)
22. **Downed Wood** (within or partially within plot) Max. diameter/length/decay class: 4 / 10' / partial Average diameter for all downed wood ≥4 in. n/a (estimate) Abundance of downed wood ≥4 in. diameter (using cover classes) Tr there is burned wood, but most <4 23. **Fuel load (< ¼ inch in diameter):** Low = 1 (Moderate = 2) High = 3 24. **Snags ≥ 4" DBH:** Species / DBH / ht.: Cherry / 3 / —; Ailanthus (5) / 4 / 20	25. **Un-vegetated surface (check the single, most dominant feature):** ___ Bedrock; ___ Large rocks (boulders > 24 in.); ___ Small rocks (stones 10-24 in.); ___ Cobbles (2-9 in.); ___ Gravel (<2 in.); ___ Sand; ___ Litter; ___ Bare soil; ___ Water; ___ Other: 26. **Combined litter & duff depth:** 2 inches 27. **Parent material:** loam	28. **Moisture regime:** ___ Very dry; ✓ Dry; ___ Moist; ___ Wet; ___ Saturated; ___ Periodically inundated; ___ Permanently inundated 29. **Soil type** (if observed): ___ sand; ___ clay; ✓ loam; ___ peat; ___ muck; other ______
30. **Sphagnum hummocks overhanging water:** (only if >25 m² and visible from plot) GPS point (location): ______ Size of habitat: ______ 3 water depths ______ (max. inches) Circle: Moving channels or Pools of Water Comments: ______	31. **Evidence of Land Use History:** stone walls, barbed wire, wolf trees; cut stumps, multi-trunk trees, foundations, wells Other Chunks of pavement	32. **Evidence of Disturbance:** Fires: fire scars, charcoal, standing snags; Blowdowns: aligned downed trees; Ice damage: broken tree tops; Disease: adelgid, gypsy moth, beech bark; Other: ______

33. **Environmental Comments:** vegetation homogeneity, erosion / sedimentation, invasive species presence/distribution, etc:

Ground is relatively flat w/ some topographic undulation

Chickadee flying, Blue Jay calling

Significant homeless encampment here

C. VEGETATION 34. System: ✓ Terrestrial ___ Palustrine ___ Estuarine 35. PLOT NUMBER: AU D-18 36. Plot Dimensions: 75' Rad

37. **Leaf phenology**:
- ✓ Deciduous
- ___ Semi-deciduous
- ___ Semi-Evergreen
- ___ Evergreen
- ___ Perennial
- ___ Annual

38. **Physiognomic type**:
- ✓ Forest
- ___ Sparse woodland
- ___ Shrubland
- ___ Dwarf shrubland
- ___ Sparse dwarf shrubland
- ___ Herbaceous
- ___ Woodland
- ___ Scrub thicket
- ___ Sparse shrubland
- ___ Dwarf scrub thicket
- ___ Non-vascular
- ___ Sparsely vegetated

39. **Photo Cover Type**: ___________

39a. **Field-Observed Cover Type**: Forest

40. Strata/life forms	height (m or ft)	% cover
T1 Emergent tree		
T2 Tree canopy	80	75
T3 Tree sub-canopy	60	15
S1 Tall shrub	25	30
S2 Short shrub	12	10
H Herbaceous		60
N Non-vascular		
V Vine / liana		

Cover Classes
- + <1%
- 1 =1-5%
- 2 =6-25%
- 3 =26-50%
- 4 =51-75%
- 5 >75%

41. **Plant Species & abundance**: list each species and the corresponding cover class for each stratum.

Black Cherry	70	8" to 12" DBH			
Silver maple	5				
Poison Sumack	Tr				
Black Cherry	15	Fairly numerous in tall shrub layer			
Ailanthus	Tr				
American Pokeweed	20				
Goldenrod	30				
Buckthorn	5				
Knotweed	Tr				

Downy woodpecker
least Garlic mustard of entire site

Form 3: Quantitative Community Characterization

MA Natural Heritage & Endangered Species Program

A. Identifiers (general EOR information)

1. Community type (observed): ______ 2. GPS Point: 42 401323 71 149881
3. Assigned type (NHESP use): ______ 4. Lat: ______N Long ______W
5. Site name: ______ 6. Quad name(s): ______
7. Ecoregion (DFW): ______ 8. County name(s): ______
9. Town: Arlington 10. Directions: ______
11. Survey date 10/27/20 1130p 12. Previous observations at this site: ______
13. Surveyors: W Byrne

B. Environmental Description

14. **PLOT #** FP 1	15. **Photos taken** Y N; **Identifier** 0876 0877	16. **Elevation (from topo)**: ____ m or ft
17. **Topographic position**: ___ Summit/Crest ___ High slope ___Step in slope ___ Mid slope ___Toe of slope ___ Low slope ___ Rolling Terrain ___ Level ___Channel wall ___ Basin floor ___Channel bed ___ Other flood plain	18. **Topographic sketch**: 19. **Slope aspect**:______	20. **Slope Class** (Percent): Flat (<2%) Steep (48-95%) Gentle (2-9%) Very Steep (>95%) Moderate (10-25%) Abrupt (cliff or ledge) Rather Steep (26-47%) 21. **Slope Shape**: Vertically: Concave Convex Linear Horizontally: Concave Convex Linear
22. **Downed Wood** (within or partially within plot) Max. diameter/length/decay class: 12" 10' fresh Average diameter for all downed wood ≥4 in. 5" (estimate) Abundance of downed wood ≥4 in. diameter (using cover classes) 25% 23. **Fuel load (< ¼-inch in diameter)**: Low = 1 Moderate = 2 High = 3 24. **Snags ≥ 4" DBH**: Species: Ash DBH: 4 ht.: ___	25. **Un-vegetated surface (check the single, most dominant feature)**: ___ Bedrock ___ Large rocks (boulders > 24 in.) ___ Small rocks (stones 10-24 in.) ___ Cobbles (2-9 in.) ___ Gravel (<2 in.) ___ Sand ___ Litter ___ Bare soil ___ Water ___ Other: ______ 26. **Combined litter & duff depth**: 1" inches 27. **Parent material**: loam	28. **Moisture regime**: ___Very dry ✓ Dry ___Wet ___Moist ___Saturated ___Periodically inundated ___Permanently inundated 29. **Soil type** (if observed) ___ sand ✓ loam ___ clay ___ peat ___ muck other______
30. **Sphagnum hummocks/overhanging water:** (only if >25 m² and visible from plot) GPS point (location): ______ Size of habitat: ______ 3 water depths ______ (max. inches) Circle: Moving channels or Pools of Water Comments: ______	31. **Evidence of Land Use History**: stone walls, barbed wire, wolf trees cut stumps, multi-trunk trees, foundations, wells Other Chunks of pavement & bricks, etc	32. **Evidence of Disturbance**: Fires: fire scars, charcoal, standing snags Blowdowns: aligned downed trees Ice damage: broken tree tops Disease: adelgid, gypsy moth, beech bark Other: ______

33. **Environmental Comments**: vegetation homogeneity, erosion / sedimentation, invasive species presence/distribution, etc:

Some evidence of homeless encampment

C. VEGETATION 34. System: ✓ Terrestrial __ Palustrine __ Estuarine 35. PLOT NUMBER: FP 1 36. Plot Dimensions: [illegible] radius

37. **Leaf phenology**:
- ✓ Deciduous
- ___ Semi-deciduous
- ___ Semi-Evergreen
- ___ Evergreen
- ___ Perennial
- ___ Annual

38. **Physiognomic type**:
- ✓ Forest
- ___ Sparse woodland
- ___ Shrubland
- ___ Dwarf shrubland
- ___ Sparse dwarf shrubland
- ___ Herbaceous
- ___ Woodland
- ___ Scrub thicket
- ___ Sparse shrubland
- ___ Dwarf scrub thicket
- ___ Non-vascular
- ___ Sparsely vegetated

39. **Photo Cover Type**: ______

39a. **Field-Observed Cover Type**: Forest

40. **Strata/life forms**

Strata/life forms	height (m or ft)	% cover
T1 Emergent tree		0
T2 Tree canopy	80	80
T3 Tree sub-canopy	60	15
S1 Tall shrub	25	15
S2 Short shrub		
H Herbaceous		80
N Non-vascular		
V Vine / liana		15

Cover Classes
- + <1%
- **1** =1-5%
- **2** =6-25%
- **3** =26-50%
- **4** =51-75%
- **5** >75%

41. **Plant Species & abundance**: list each species and the corresponding cover class for each stratum.

Cherry	60				
Boxelder	20				
Black oak	5				
Brambles	5				
Chokecherry	10				
American pokeweed	10				
Garlic mustard	70				
Goldenrod	5	5			
Knotweed		present but not bad			
Bittersweet	5	Sparse			

Fairly open, sparse area, lots of CWD, & trees/shrubs that produce food

Form 3: Quantitative Community Characterization

MA Natural Heritage & Endangered Species Program MB Thorn 5

A. Identifiers (general EOR information)

1. Community type (observed): ______ 2. GPS Point: 42 401643 71 1495717
3. Assigned type (NHESP use): ______ 4. Lat: ______ N Long ______ W
5. Site name: ______ 6. Quad name(s): ______
7. Ecoregion (DFW): ______ 8. County name(s): ______
9. Town: Arlington 10. Directions: ______
11. Survey date 10/27/20 12. Previous observations at this site: ______
13. Surveyors: MRB

B. Environmental Description

14. PLOT # FP2

15. **Photos taken** (Y) N; 874, 875
Identifier MB Thorn 5

16. **Elevation (from topo):** ____ m or ft

17. **Topographic position**:
- ___ Summit/Crest
- ___ High slope
- ___ Mid slope
- ___ Low slope
- ___ Rolling Terrain
- ✓ Level
- ___ Basin floor
- ___ Other
- ___ Step in slope
- ___ Toe of slope
- ___ Channel wall
- ___ Channel bed

18. **Topographic sketch**:

19. **Slope aspect:** road

20. **Slope Class** (Percent):
(Flat (<2%)) Steep (48-95%)
Gentle (2-9%) Very Steep (>95%)
Moderate (10-25%)
Abrupt (cliff or ledge)
Rather Steep (26-47%)

21. **Slope Shape:**
Vertically: Concave Convex (Linear)
Horizontally: Concave Convex (Linear)

22. **Downed Wood** (within or partially within plot)
Max. diameter/length/decay class: 18" 25' Partial
Average diameter for all downed wood ≥4 in. 5" (estimate)
Abundance of downed wood ≥4 in. diameter (using cover classes) 20

23. **Fuel load (< ¼ inch in diameter):**
Low = 1 (Moderate = 2) High = 3

24. **Snags ≥ 4" DBH**:

Species	DBH	ht.
Unk	18	7'

25. **Un-vegetated surface (check the single, most dominant feature)**:
- ___ Bedrock
- ___ Large rocks (boulders > 24 in.)
- ___ Small rocks (stones 10-24 in.)
- ___ Cobbles (2-9 in.)
- ___ Gravel (<2 in.)
- ___ Sand
- ___ Litter
- ___ Bare soil
- ___ Water
- ___ Other: ______

26. **Combined litter & duff depth**: 2 inches

27. **Parent material:** mineral soil

28. **Moisture regime**:
- ✓ Very dry
- ✓ Dry
- ___ Moist
- ___ Wet
- ___ Saturated
- ___ Periodically inundated
- ___ Permanently inundated

29. **Soil type** (if observed)
- ___ sand
- ___ clay
- ✓ loam
- ___ peat
- ___ muck
- other______

30. **Sphagnum hummocks overhanging water:** (only if >25 m² and visible from plot)
GPS point (location): ______
Size of habitat: ______
3 water depths ______ (max. inches)
Circle: Moving channels or Pools of Water
Comments: ______

31. **Evidence of Land Use History**:
stone walls, barbed wire, wolf trees
cut stumps, multi-trunk trees,
foundations, wells
Other Lots of pavement chunks

32. **Evidence of Disturbance**:
Fires: fire scars, charcoal, standing snags
Blowdowns: aligned downed trees
Ice damage: broken tree tops
Disease: adelgid, gypsy moth, beech bark
Other: ______

33. **Environmental Comments:** vegetation homogeneity, erosion / sedimentation, invasive species presence/distribution, etc:
Close to road & houses, evidence of yard dumping from neighbors
Dead Squirrel at roadside

C. VEGETATION 34. **System:** ✓ Terrestrial __ Palustrine __ Estuarine 35. **PLOT NUMBER:** PP 2 36. **Plot Dimensions:** 25' diam

37. **Leaf phenology:**
- ✓ Deciduous
- ____ Semi-deciduous
- ____ Semi-Evergreen
- ____ Evergreen
- ____ Perennial
- ____ Annual

38. **Physiognomic type:**
- ✓ Forest
- ____ Sparse woodland
- ____ Shrubland
- ____ Dwarf shrubland
- ____ Sparse dwarf shrubland
- ____ Herbaceous
- ____ Woodland
- ____ Scrub thicket
- ____ Sparse shrubland
- ____ Dwarf scrub thicket
- ____ Non-vascular
- ____ Sparsely vegetated

39. **Photo Cover Type:** ________ 39a. **Field-Observed Cover Type:** forest

40. **Strata/life forms**

	height (m or ft)	% cover
T1 Emergent tree		
T2 Tree canopy	80	60
T3 Tree sub-canopy	30	10
S1 Tall shrub		
S2 Short shrub	15	25
H Herbaceous		90
N Non-vascular		
V Vine / liana		

Cover Classes
- + <1%
- **1** =1-5%
- **2** =6-25%
- **3** =26-50%
- **4** =51-75%
- **5** >75%

41. **Plant Species & abundance:** list each species and the corresponding cover class for each stratum.

Ash	20	24" diameter			
Norway maple	40	24" diameter			
Red maple	10	30" diameter			
Elm	5				
Cherry	5				
Norway maple	5				
Common buckthorn	45				
Ivy	10				
Sensitive fern	5				
Garlic Mustard	90				

Some very large trees, good diversity of tree spp
large amount CWD

Form 3: Quantitative Community Characterization

MA Natural Heritage & Endangered Species Program

A. Identifiers (general EOR information)

1. Community type (observed): ______ 2. GPS Point: 42.401566 / 71.152019
3. Assigned type (NHESP use): ______ 4. Lat: ______N Long ______W
5. Site name: ______ 6. Quad name(s): ______
7. Ecoregion (DFW): ______ 8. County name(s): ______
9. Town: Arlington 10. Directions: laser measured 23m from bck wall of house
11. Survey date 10/27/20 12. Previous observations at this site: ______
13. Surveyors: MRB

B. Environmental Description

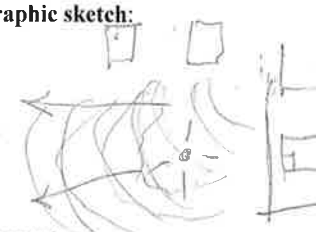
14. PLOT # CS-1

15. Photos taken Y N; 0869, 870
Identifier ______ MB Form 3

16. Elevation (from topo): ____ m or ft

17. Topographic position:
- ___ Summit/Crest
- ___ High slope
- ___ Mid slope
- ✓ Low slope
- ___ Rolling Terrain
- ___ Level
- ___ Basin floor
- ___ Other Slight slope away from houses to E & N
- ___ Step in slope
- ___ Toe of slope
- ___ Channel wall
- ___ Channel bed

18. Topographic sketch:



19. Slope aspect: ______

20. Slope Class (Percent):
Flat (<2%) Steep (48-95%)
~~Gentle (2-9%)~~ Very Steep (>95%)
Moderate (10-25%)
Abrupt (cliff or ledge)
Rather Steep (26-47%)

21. Slope Shape:
Vertically: Concave Convex Linear
Horizontally: Concave Convex Linear

22. Downed Wood
(within or partially within plot)
Max. diameter/length/decay class:
9" 12' Fresh not dec
Average diameter for all downed wood ≥4 in.
5" (estimate)
Abundance of downed wood ≥4 in. diameter (using cover classes) 5%

23. Fuel load (< ¼ inch in diameter):
Low = 1 Moderate = 2 High = 3

24. Snags ≥ 4" DBH:

Species	DBH	ht.
None		

25. Un-vegetated surface (check the single, most dominant feature):
- ____ Bedrock
- ____ Large rocks (boulders > 24 in.)
- ____ Small rocks (stones 10-24 in.)
- ____ Cobbles (2-9 in.)
- ____ Gravel (<2 in.)
- ____ Sand
- ____ Litter
- ____ Bare soil
- ____ Water
- ____ Other: ______

26. Combined litter & duff depth:
3" inches

27. Parent material: Mineral soil

28. Moisture regime:
- ____ Very dry
- ✓ Dry
- ____ Moist
- ____ Wet
- ____ Saturated
- ____ Periodically inundated
- ____ Permanently inundated

29. Soil type (if observed)
- ____ sand
- ____ clay
- ____ loam
- ____ peat
- ____ muck

other______

30. Sphagnum hummocks overhanging water: (only if >25 m^2 and visible from plot)
GPS point (location): ______
Size of habitat: ______
3 water depths ______ (max. inches)
Circle: Moving channels or Pools of Water
Comments: ______

31. Evidence of Land Use History:
stone walls, barbed wire, wolf trees
cut stumps, multi-trunk trees,
foundations, wells
Other Some encroachment

32. Evidence of Disturbance:
Fires: fire scars, charcoal, standing snags
Blowdowns: aligned downed trees
Ice damage: broken tree tops
Disease: adelgid, gypsy moth, beech bark
Other: ______

33. Environmental Comments: vegetation homogeneity, erosion / sedimentation, invasive species presence/distribution, etc:
Sparse understory, Complete overstory

C. VEGETATION 34. **System:** __ Terrestrial __ Palustrine __ Estuarine 35. **PLOT NUMBER:**______ 36. **Plot Dimensions:**______

37. **Leaf phenology:**
- ✓ Deciduous
- ____Semi-deciduous
- ____Semi-Evergreen
- ____Evergreen
- ____Perennial
- ____Annual

38. **Physiognomic type:**
- ✓ Forest
- ____Sparse woodland
- ____Shrubland
- ____Dwarf shrubland
- ____Sparse dwarf shrubland
- ____Herbaceous
- ____Woodland
- ____Scrub thicket
- ____Sparse shrubland
- ____Dwarf scrub thicket
- ____Non-vascular
- ____Sparsely vegetated

39. **Photo Cover Type:** ______

39a. **Field-Observed Cover Type:** Forest

40. **Strata/life forms**

	height (m or ft)	**% cover**
T1 Emergent tree		
T2 Tree canopy	90	100
T3 Tree sub-canopy	60	20
S1 Tall shrub	10	10
S2 Short shrub		0
H Herbaceous		0
N Non-vascular		
V Vine / liana	15'	Tr

Cover Classes
- + <1%
- **1** =1-5%
- **2** =6-25%
- **3** =26-50%
- **4** =51-75%
- **5** >75%

41. **Plant Species & abundance**: list each species and the corresponding cover class for each stratum.

Norway maple	100		
American Elm	Tr		
Cherry	Tr		
Linden	5		
Bittersweet	Tr		

Garlic mustard at fence line near second house.
Not present in plot.

Form 3: Quantitative Community Characterization

MA Natural Heritage & Endangered Species Program

A. Identifiers (general EOR information)

1. Community type (observed): ____________ 2. GPS Point: ____________
3. Assigned type (NHESP use): ____________ 4. Lat: ______N Long ______W
5. Site name: ____________ 6. Quad name(s): ____________
7. Ecoregion (DFW): ____________ 8. County name(s): ____________
9. Town: Arlington 10. Directions: ____________
11. Survey date 10/27/20 12. Previous observations at this site: ____________
13. Surveyors: MRBurne

B. Environmental Description

14. **PLOT #** 1A-1

15. **Photos taken** Y / N;
Identifier 0885, 0884

16. **Elevation (from topo)**: ____ m or ft

17. **Topographic position**:
___ Summit/Crest
___ High slope ___Step in slope
___ Mid slope ___Toe of slope
___ Low slope
___ Rolling Terrain
___ Level ___Channel wall
___ Basin floor ___Channel bed
___ Other edge of basin

18. **Topographic sketch**:

19. **Slope aspect**:________

20. **Slope Class** (Percent):
Flat (<2%) Steep (48-95%)
Gentle (2-9%) Very Steep (>95%)
Moderate (10-25%)
Abrupt (cliff or ledge)
Rather Steep (26-47%)

21. **Slope Shape**:
Vertically: Concave Convex Linear
Horizontally: Concave Convex Linear

22. **Downed Wood**
(within or partially within plot)
Max. diameter/length/decay class: ________
Average diameter for all downed wood ≥4 in. ________(estimate)
Abundance of downed wood ≥4 in. diameter (using cover classes) ________

23. **Fuel load (< ¼ inch in diameter)**:
Low = 1 Moderate = 2 High = 3

24. **Snags ≥ 4" DBH**:

Species	DBH	ht.

25. **Un-vegetated surface (check the single, most dominant feature)**:
____ Bedrock
____ Large rocks (boulders > 24 in.)
____ Small rocks (stones 10-24 in.)
____ Cobbles (2-9 in.)
____ Gravel (<2 in.)
____ Sand
____ Litter
____ Bare soil
____ Water
____ Other: ________

26. **Combined litter & duff depth**: ________inches

27. **Parent material**: ________

28. **Moisture regime**:
____Very dry
____Dry ____Wet
____Moist ____Saturated
____Periodically inundated
____Permanently inundated

29. **Soil type** (if observed)
____ sand ____loam
____clay ____peat
____muck
other________

30. **Sphagnum hummocks overhanging water:** (only if >25 m^2 and visible from plot)
GPS point (location): ________
Size of habitat: ________
3 water depths ________ (max. inches)
Circle: Moving channels or Pools of Water
Comments: ________

31. **Evidence of Land Use History**:
stone walls, barbed wire, wolf trees
cut stumps, multi-trunk trees,
foundations, wells
Other Trash

32. **Evidence of Disturbance**:
Fires: fire scars, charcoal, standing snags
Blowdowns: aligned downed trees
Ice damage: broken tree tops
Disease: adelgid, gypsy moth, beech bark
Other: ________

33. **Environmental Comments**: vegetation homogeneity, erosion / sedimentation, invasive species presence/distribution, etc:
There is a slight topographic depression large cottonwood Basin filled with knotweed. Clearly not a vernal pool Trash in basin

C. VEGETATION 34. **System:** ✓ Terrestrial __ Palustrine __ Estuarine 35. **PLOT NUMBER:**________ 36. **Plot Dimensions:**________

37. **Leaf phenology:**
- ✓ Deciduous
- ____ Semi-deciduous
- ____ Semi-Evergreen
- ____ Evergreen
- ____ Perennial
- ____ Annual

38. **Physiognomic type:**
- ✓ Forest
- ____ Sparse woodland
- ____ Shrubland
- ____ Dwarf shrubland
- ____ Sparse dwarf shrubland
- ____ Herbaceous
- ____ Woodland
- ____ Scrub thicket
- ____ Sparse shrubland
- ____ Dwarf scrub thicket
- ____ Non-vascular
- ____ Sparsely vegetated

39. **Photo Cover Type:** ________ 39a. **Field-Observed Cover Type:** forest

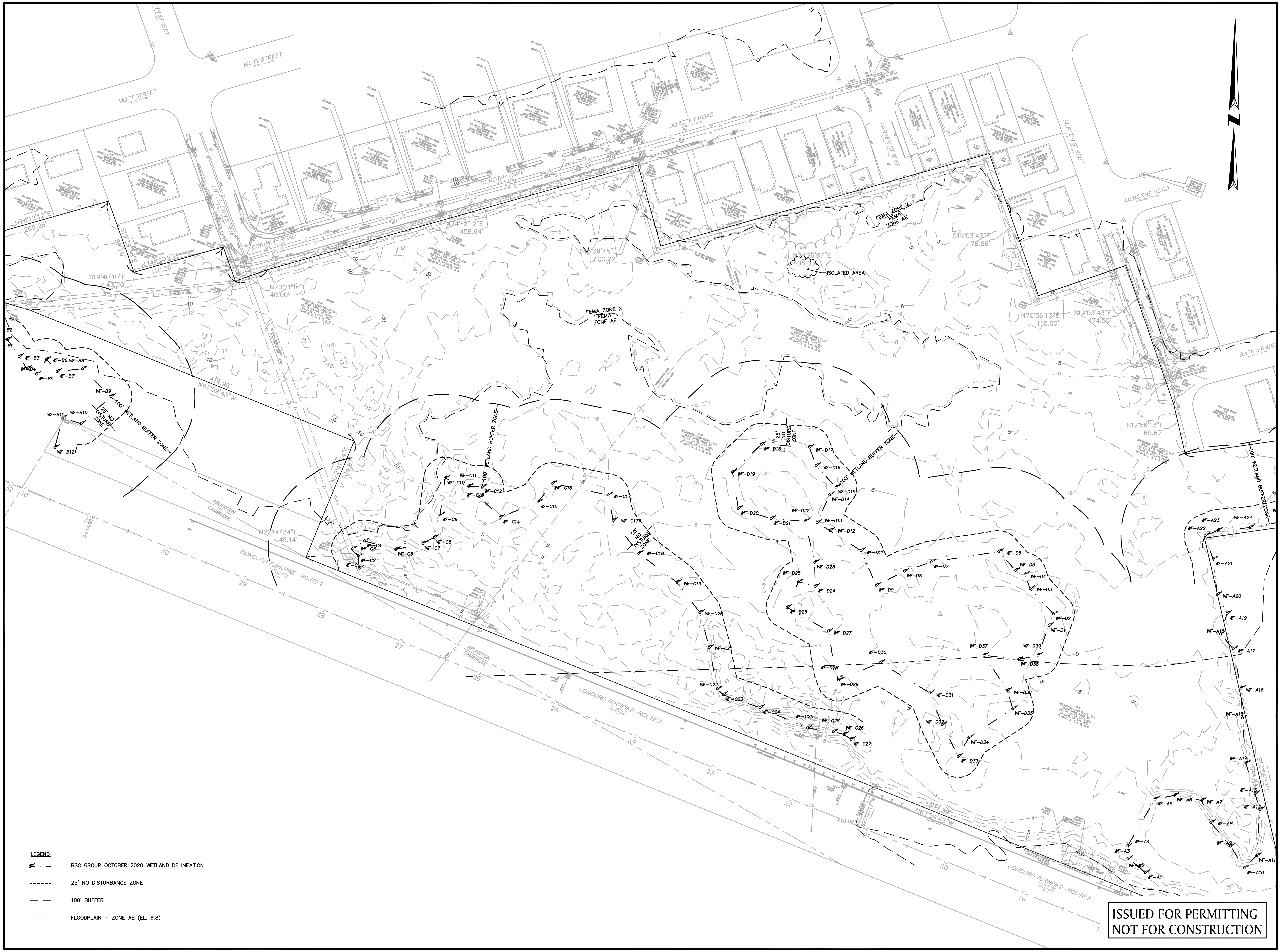
40. **Strata/life forms**

Strata/life forms	height (m or ft)	% cover
T1 Emergent tree		
T2 Tree canopy		60
T3 Tree sub-canopy		
S1 Tall shrub		
S2 Short shrub		
H Herbaceous		80
N Non-vascular		
V Vine / liana		

Cover Classes
- + <1%
- **1** =1-5%
- **2** =6-25%
- **3** =26-50%
- **4** =51-75%
- **5** >75%

41. **Plant Species & abundance:** list each species and the corresponding cover class for each stratum.

Knotweed					
Ferns					
Cottonwood					



ISSUED FOR PERMITTING
NOT FOR CONSTRUCTION

PROFESSIONAL ENGINEER DATE

THORNDIKE PLACE

DOROTHY ROAD

IN

ARLINGTON
MASSACHUSETTS
(MIDDLESEX COUNTY)

EXISTING ENVIRONMENTAL RESOURCES PLAN

MARCH 13, 2020

REVISIONS:

NO.	DATE	DESC.
1	10/22/20	WETLAND DELINEATION

PREPARED FOR:

ARLINGTON LAND REALTY, LLC
84 SHERMAN STREET, 2ND FLOOR
CAMBRIDGE, MA 02140

BSC GROUP
803 Summer Street
Boston, Massachusetts
02127
617 896 4300

SCALE: 1" = 50'

0 25 50 100 FEET

FILE: 2340700\C\D\2340700-CONSTRAINTS
DWG.:
JOB. NO: 23407.00
SHEET C-100

From: Matt McKinnon <ripesensor@gmail.com>
To: "zba@town.arlington.ma.us" <zba@town.arlington.ma.us>
Date: Fri, 13 Nov 2020 10:15:43 -0500
Subject: Mugar Wetlands

Hello Arlington ZBA,

It seems like the Mugar family has been trying to develop their parcel of land in the town of Arlington for quite some time, and has run into opposition for just as long.

Given the sensitivity of the land ecologically, would it be possible to use the land for wind power generation? The small footprint of a wind turbine would have little impact on the wetlands, and generate revenue on land that is seemingly difficult to develop on.

Cooperative ideas from the town of Arlington on how to best profit off the land may be a reasonable request to the Mugar family, even if this particular idea is improbable.

Sincerely,
Matt McKinnon
9 Littlejohn St, Arlington

November 20, 2020

Jenny Raitt, Director, Department of Planning and Community Development

Arlington Town Counsel
50 Pleasant Street
Arlington, MA 02476

Re: Thorndike Place - Arlington, MA
Comprehensive Permit Civil / Site Peer Review #2

Dear Ms. Raitt:

BETA Group, Inc. (BETA) has completed its second peer review of the environmental, civil and stormwater related elements of the site plans and supporting engineering documents for the above-referenced project, based on the following materials:

- Thorndike Place Comprehensive Permit stamped plan set, Dorothy Road, Arlington MA, 12 sheets, dated March 13, 2020, revised November 3, 2020 prepared by BCS Group;
- Thorndike Place Stormwater Report, Dorothy Road, Arlington MA, dated November 2020 prepared by BCS Group;
- Notice of Eligibility for 40B Site Eligibility Letter, "Thorndike Place" off Dorothy Road, (Mugar Site) Arlington, MA, peer review letter prepared by Nover-Armstrong Associates, dated August 10, 2015;
- Report on Existing Conditions (Section 3.2.6 of Arlington Comprehensive Permit Regulations), dated November 3, 2020 prepared by Smolak & Vaughan, LLP;
- Architectural Drawings, dated November 3, 2020;
- Wildlife Habitat and Vegetation Evaluation;
- Updated waiver request list;
- Statement of Compliance with Arlington's Master Plan, Housing Production Plan, and Open Space and Recreation Plan; and
- Wetland Delineation Memorandum and Wetland Delineation Field Data Forms, October 19, 2020;
- FEMA Flood Insurance Study, Middlesex County, Revised June 6, 2016;
- City of Cambridge Floodviewer v2.1
- Town of Arlington Zoning Bylaw with amendments through April 2016;
- Town of Arlington Wetland Protection Bylaw, Article 8 and Regulations for Wetland Protection, June 4, 2015;
- MassDEP Stormwater Management Standards (SMS);
- Massachusetts GIS mapping tool OLIVER (http://maps.massgis.state.ma.us/map_ol/oliver.php), website visited July 20, 2020;
- USFWS Information for Planning and Consultation (IPaC), online tool (https://ecos.fws.gov/ipac/), website visited July 20, 2020.

BETA GROUP, INC.
701 George Washington Highway, Lincoln, RI 02865
P: 401.333.2382 | F: 401.333.9225 | W: www.BETA-Inc.com

GENERAL
BETA Group was retained to perform a civil / site / stormwater design and traffic impact study peer review of the Comprehensive Permit application for the proposed Thorndike Place 40B housing project. Part of this review includes an overall analysis of the existing site to confirm its suitability for the proposed project. Stormwater calculations have been provided and proposed utilities are shown on the site plans. BETA's review of the Applicant's Traffic Impact Study is currently being conducted and those findings and recommendations will be provided in a separate comment letter.

BETA conducted a detailed site evaluation on November 12, 2020 to verify the data provided in the supplemental materials provided by BSC. The visit included confirmation of wetland boundaries, previously identified isolated wetland areas, review of general wildlife and vegetative habitat, and examination of the site for evidence of potential wetland conditions underlaying fill material.

EXISTING CONDITIONS
The project site includes multiple parcels that total approximately 17.7-acres of land located between Dorothy Road, Burch Street, and the Concord Turnpike (Route 2) in Arlington, Mass. Dorothy Road and Burch Street are both residential neighborhood streets featuring predominantly single-family houses. The site is essentially undeveloped woodland area that has been a location for the dumping of earthen fill and assorted debris throughout the years. Site topography generally slopes southerly towards the Concord Turnpike.

A review of the current FEMA Flood Insurance Study for Middlesex County indicates that a majority of the site is located within the mapped 100-year flood plain Zone AE (Elev. 6.8) and that almost all of the site is located within the 500-year flood plain Zone X.

PROPOSED PROJECT
The proposed project includes the construction of a multi-unit 4-story residential apartment building along with associated access driveways, parking areas, utilities, infrastructure, and stormwater management system.

2015 Comprehensive Permit Application
A Comprehensive Permit Application was originally submitted for the proposed Thorndike Place project by the Applicant in 2015. Nover-Armstrong Associates (N-A) conducted a detailed peer review of the application package and issued a peer review letter dated August 10, 2015. Their review letter contained eighteen (18) comments regarding the site plans and application package. The following comments from the 2015 N-A review letter related to civil/site design remain applicable:

> 15. Eight boring locations are shown on the Existing Conditions Plan C-1 with surface elevations and depths to groundwater noted. Dated and detailed boring logs are not provided on the plans or in the Application making it difficult to evaluate whether the depth of the groundwater observed represents the seasonal high groundwater elevation. The depth to groundwater is presumed to have been measured the day the borings were advanced and may not represent the actual high ground water elevation.
>
> 16. Excavated test holes witnessed by a MassDEP Soil Evaluator are necessary to definitively identify the Site's soil types and whether the conceptual project design is generally appropriate for the Site.

Boring logs document encountered type soils on the Project Site which help evaluate what types of BMPs would be feasible for the stormwater management system.

Recommendation: The results of any soil borings or test pits done on the project site should be submitted for review. Determination of the seasonal high groundwater elevation is necessary to confirm that the proposed stormwater BMPs are suitable as shown.

2020 Comprehensive Permit Application

The following are new comments based on our review of the revised Comprehensive Permit submittal from November 2020:

SITE PLANS

1. The proposed erosion control barrier is shown on the Site Preparation plan only.
   Recommendation: The applicant should also show the erosion control barrier on the Layout, Grading and Utility Plans.

2. A 15-ft wide pervious paver emergency access drive is shown looping around the rear of the main site building.
   Recommendation: The Applicant should confirm that the access drive can accommodate an emergency vehicle (fire truck) turning around the southeast corner of the site building.

3. Existing Conditions Plan - The applicant should add a professional surveyor's stamp.

4. General – The applicant proposes to provide stormwater detention/retention on the building roof. The applicant should provide design plans/calcs of the proposed building roof (when developed) for review by an architect and/or structural engineer.

5. The applicant proposed a subsurface "Stormtrap" infiltration chamber system on the west side of the project site. The proposed system is located directly on top of an existing 14-inch sewer line. This presents a potential issue regarding accessing the existing sewer line for future maintenance or repair requirements.
   Recommendation: The Applicant should confirm with the Arlington Public Works and/or Sewer Department that the proposed location of the infiltration system is acceptable.

6. Grading and Drainage Plan – The proposed 15-inch drainpipe from OCS-1 to FES-1 has minimal cover.
   Recommendation: The applicant should revise the proposed grading in this area to provide adequate cover over the proposed drain.

7. Grading and Drainage Plan – The applicant proposes an entrance door to the garage level on the east side of the building, the proposed finished grade elevation is 2.83. The seasonal high groundwater elevation of the site development area is presumed to be around elev. 3.0 based on past soil borings.
   Recommendation: The applicant should confirm the seasonal high groundwater elevation in this area and provide appropriate mitigative measures if necessary, to prevent surface water from entering the garage through the doorway.

8. Areas for trash collection and snow storage are not identified on the site plan.
   Recommendation: The Applicant should identify potential areas for trash collection and snow storage on the site plan to confirm that these will not conflict with other site elements.

9. Civil and Landscape Details (sheet 1) – The applicant has provided a Silt fence with Haybales erosion control barrier detail.
   Recommendation: The applicant should utilize an 18-inch diameter compost-filled silt sock with silt fence in lieu of staked haybales for erosion control measures.

10. The applicant should provide a detail of the proposed Outlet Control Structures #1 and #2. Also, the applicant should review OCS-2 as it appears that the structure is too shallow to be constructed as shown.

11. Recommend the applicant adjust the location of the proposed pedestrian ramp on the west side of the site building so that it is located within the proposed crosswalk crossing the site access drive.

12. Recommend the applicant confirm that any footing of the proposed retaining wall near the driveway garage entrance will not conflict with the existing drainage pipe located in the same area.

<u>FLOOD PLAIN</u>

13. A portion of the proposed project design requires filling within the 100-year flood plain. Compensatory storage is required on a 1:1 (per foot) basis by the Mass Wetlands Protection Act (310 CMR 10.57) and on a 2:1 basis by the Arlington Wetlands Bylaw.

    The applicant has provided compensatory flood plain storage calculations in the stormwater report (Sec. 2.12) and has designated an upland area on the site plan southeast of the proposed building for compensatory storage. In addition, the southeast courtyard area is labeled "Open Space / Flood Storage".

    Recommendation: The Applicant should provide a plan graphic showing the existing flood plain area being altered by the proposed building / site development, currently the building hatch is obscuring the flood plain limits. The proposed compensatory flood storage volume calculations and designated flood storage volume area appear consistent.

<u>STORMWATER MANAGEMENT</u>

14. The Applicant should provide onsite soil exploration / test pit data for review, specifically within the footprints of the two proposed subsurface infiltration chamber systems. The test pit data is required at a minimum to determine the seasonal high groundwater elevations within the project limits.

15. The proposed site building roof will be designed to provide stormwater detention, with a roof drain connection to the proposed subsurface infiltration chamber system #1 located west of the building. The HydroCAD model included with the Stormwater Report shows zero runoff leaving the roof area for all storms up to and including the 100-year design storm. Discussions with the applicant indicate the disposition of this retained stormwater has not yet been finalized. Until the disposition of the retained rooftop stormwater is known, its effects on the proposed stormwater BMPs cannot be evaluated.

16. The proposed infiltration chamber system #1 receives stormwater from a proposed CB located between the site access drive and proposed parking area west of the site building. The rim elevation of this CB is 8.0. The results of the HydroCAD model indicate that the 50-yr flood elevation within the infiltration system is elev. 8.28. This flood elevation will cause stormwater to surcharge out of the CB grate and overflow down the access driveway to the lower garage level.
    Recommendation: The Applicant should reevaluate the proposed infiltration chamber system #1 to provide adequate stormwater capacity so that there is no onsite surface surcharge for any of the proposed design storms.

17. The proposed infiltration chamber system #2 located near the southwest corner of the site building receives stormwater from a proposed trench drain located across the access driveway to the lower garage level. The rim elevation of the proposed trench drain is 4.1. The results of the HydroCAD model indicate that the 2-yr flood elevation within the infiltration chamber system is elev. 8.40. This is not possible. The applicant is currently reevaluating the design of Infiltration Chamber System #2.

18. The applicant should provide groundwater mounding calculations as the two proposed infiltration chamber systems are designed to provide peak rate mitigation and appear to be within 4-ft of estimated seasonal high groundwater.

19. The HydroCAD model included in the stormwater report analyzes the proposed stormwater BMPs over a 24-hr time period.
    Recommendation: The applicant should increase the analysis time period to 72 hours to allow the BMPs to demonstrate their drain down capacity after the storm event concludes.

20. MassDEP Stormwater Standard #10 – The applicant should provide a signed Illicit Discharge Compliance statement.

<u>UTILITIES</u>

21. The applicant proposes some drain manholes (DMH-2, 3) requiring shallow installations. For these applications the applicant should confirm the frame/cover height (standard 8-in, shallow 4-in) and that adequate cover exists over the inlet/outlet pipes for constructability.

22. The Utility Plans show the proposed utility services from the project site to the existing municipal/gas/electric utilities in Dorothy Road.

    Recommendation: We recommend the Applicant coordinate with the Arlington Public Works Department and local utility companies regarding all proposed site utility connections to the public utilities in Dorothy Road to confirm compliance with applicable construction standards.

23. The existing survey shows an existing drain line in Dorothy Road that runs in front of the project site. The Utility Plan shows three proposed sewer service lines from the building to the existing municipal sewer in Dorothy Road that cross the drain line.
    Recommendation: The Applicant should confirm the proposed sewer services as shown do not conflict with the existing drain line.

CONSTRUCTION

24. Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan – Section 3.10.4 Equipment/Vehicle Maintenance and Fueling Areas:
    Recommendation: We recommend adding a provision prohibiting refueling of vehicles or equipment within 100-feet of any onsite resource area.

25. Recommend the applicant add a provision to the Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan that "Dorothy Road shall be swept clean on a daily basis of any soils tracked onto it from the project site".

26. As part of a Construction Management Plan the applicant should develop a map of approved haul routes for trucks traveling to/from the project site during construction as the immediate site vicinity is comprised of narrow residential streets.

WETLAND BOUNDARY

During the site visit BETA confirmed the wetland boundaries were field delineated in accordance with the definition and methods approved in the MA DEP Delineating Bordering Vegetated Wetlands Handbook (March 1995). BETA found BSC's evaluation of the previously delineated isolated wetlands, presented on the 2006 ANRAD Plan as Wetlands F, G, H, and I, to be accurate in that the areas did not demonstrate a predominance of wetland vegetation or other indicators of hydrology.

EVIDENCE OF FILLED WETLANDS

A history of disturbance is apparent throughout much of the site with remanent piles of asphalt, piles of earthen material, and an abundance of construction stone and debris. BETA's site review included looking for evidence of potentially filled wetlands as a result of these disturbances. BETA did not look at soil profiles underlaying disturbed areas because of the potential health hazards that exist from old construction material as well as human waste present at the site. BETA examined vegetation, topography, historic aerial photographs, and historical topographic maps and found no evidence of preexisting wetlands or hydrologic conditions beyond the delineated wetlands at the site. Large cottonwood trees (Populus deltoides) and a large willow (Salix sp.), indicators of hydrology, were observed at the northeastern portion of the site and consistent with the floodplain. Based on review of historic topographic maps and aerial photographs that went back as early as 1893 (https://www.historicaerials.com/viewer) BETA concluded there was no indication of additional wetland conditions at the site prior to the construction of Route 2.

WILDLIFE HABITAT REVIEW AND EVALUATION

BETA reviewed the Wildlife Habitat and Vegetation Evaluation provided by BSC as well as conducted observational surveys of wildlife and habitat during the November 12, 2020 site visit. BETA's inspection of the site was done during mid-November when most wildlife is dormant, and weather was cool and overcast. A walkthrough was completed of the proposed construction and floodplain fill mitigation areas and the 100-foot buffers to BVW / AURA to evaluate existing habitat on the site. An Eastern Cottontail (Sylvilagus floridanus) was seen fleeing through the underbrush, but no other species were observed. Signs of wildlife activity seem to corroborate the previous BSC's field observations. Deer scat was found throughout the site as well as one instance of Eastern cottontail scat. Squirrel nests were found in trees throughout the site and snags containing cavities showing evidence of habitation by some tree dwelling species.

The western end of the site, where the proposed parking lot will be located mostly consists of fallen trees, standing deadwood, tall shrubs/small trees, dense briers and woody vines. Decaying logs are common in this area providing ample ground cover for small mammals, reptiles and amphibians. This dense area of woody vines includes bittersweet, briers, and grape which provide food for local wildlife. No songbird nests were seen in this area at the time of the observation, despite the dense vegetation cover which suggests this area is not used by songbirds for protection and reproduction.

The eastern end of the site, from the eastern edge of the proposed building to the edge of the property is generally more open in the understory. There are more large standing trees in this area but with fewer decomposing logs or vegetated ground cover which provides less protection for wildlife. Suitable bat habitat, including large foliating bark trees, were not present on the site. The site has extensive stands of invasive species including Japanese knotweed (Polygonum cuspidatum) that tend to dominate the understory in some places. Japanese knotweed can provide food for pollinators but crowd out other native plant food species. Although this area has less cover and apparent food sources than the western side, a songbird nest was found, and signs of deer activity were common.

Based on the proposed plans the eastern section of the property will not be cleared as part of construction. The potential for wildlife habitat improvements exist at the site and include replacing proposed cultivar plant species with native plantings, incorporating fruit producing shrubs to encourage foraging and controlling invasive species.

CONCLUSIONS

At this early design phase, the Applicant has not provided sufficient detail regarding the disposition of site-generated stormwater runoff to determine that the proposed project is able to satisfy MassDEP Stormwater Management Regulations. The proposed stormwater management approach utilizes rooftop detention and subsurface infiltration BMPs to mitigate the impacts from the proposed site development. Absent the disposition of the rooftop stormwater detention in the stormwater calculations, it is not possible to evaluate if the requisite peak rate/volume mitigation has been provided.

The project design includes compensatory flood storage to offset proposed filling within the 100-year floodplain. The proposed volume of compensatory storage included in the calculations appears consistent with the compensatory flood storage area designated on the site plans.

The proposed site grading plans appears to demonstrate that the proposed surface grading of the site will allow it to drain properly; however, necessary revisions to the proposed stormwater management system identified in the previous comments will likely require adjustments to the grading currently shown.

The proposed utility layouts for sewer, water and drainage are shown and appear feasible. Gas, electric and tele/com utility layouts are also shown, and their final design will require coordination with the appropriate utility providers. Coordination with Town Departments regarding sewer/water service connections to municipal utilities will be required to verify compliance with Town construction standards.

BETA concurs that the functions and values provided by the site's AURA and upland floodplain habitat are currently low and we support the Applicant's 2:1 floodplain compensation proposal. A 2:1 floodplain compensation ratio begins to address climate change and resiliency by providing more storage during flooding events and also provides an opportunity to replace the invasive species and low quality native vegetative species with higher quality native species that provide wildlife food, cover and nesting habitat resulting in a more resilient project.

As the development design advances, there may be additional impact to the AURA and 100-year floodplain for the ZBA and Conservation Commission to consider and this may provide an opportunity for additional mitigation and habitat improvement. BETA recommends that the Applicant provide a clear commitment towards these significant mitigation opportunities on this site in their next submittal to the ZBA including floodplain and AURA/Buffer Zone restoration design details.

If you have questions about any of these comments, please feel free to contact me at (401) 333-2382.

Very truly yours,
BETA Group, Inc.

Todd Undzis, P.E.
Project Manager

Marta Nover
Vice President

cc: Jennifer Raitt, Director Department of Planning and Community Development
Emily Sullivan, Environmental Planner & Conservation Commission Agent
Douglas W. Heim, Arlington Town Counsel

Town of Arlington, Massachusetts

Discussion of Schedule going Forward

ATTACHMENTS:

	Type	File Name	Description
🗋	Reference Material	Thorndike_Place_Notes_from_20_1120.pdf	Thorndike Place Notes from 20_1120

BOARD OF APPEALS

Town of Arlington
Arlington, Massachusetts 02476
51 Grove Street
Telephone (781) 316-3396

MEMORANDUM
November 22, 2020

Notes from November 20, 2020 Coordination Call

In Attendance: Christian Klein, Patrick Hanlon, Jennifer Raitt, Paul Haverty, Stephanie Kiefer, John Hession, Marta Nover

Representatives of the Town and the Applicant met via Zoom conference call on Friday, November 20, 2020 to review the status of the review of the comprehensive permit application and discuss the schedule for the review hearings. Per the schedule established at the September 11 meeting, the Applicant delivered a more detailed design package to the Board on November 3. Those documents were provided to the Town's peer-review engineer, BETA Group for their review and comment. In order to allow review of the proposed revisions ahead of resuming hearings, to provide occasions for working sessions with town agencies, and to ensure future hearings will be as productive as possible, the attendees agreed to the following schedule. (Please note that some of the dates have been rearranged per subsequent discussions on Nov. 20.)

Nov. 24: ZBA Meeting to accept new documentation and present revised review schedule.

Dec. 1: Conference Call to discuss preparations for Dec. 8 ZBA Hearing. (date flexible)

Dec. 3: Conservation Commission Working Session on revised submittal package and review documentation.

Dec. 8: ZBA Hearing to discuss wetland and floodplain submission, reviews, and comments.

Dec. 9: Possible Transportation Advisory Committee Working Session on transportation analysis.

Dec. 15: Conference Call to discuss preparations for Dec. 22 ZBA Hearing. (date flexible)

Dec. 22: ZBA Hearing to continue discussion of wetland and floodplain issues.

Jan. 5: Conference Call to discuss preparations for Jan. 12 ZBA Hearing. (date flexible)

Jan. 12: ZBA Hearing to discuss traffic impact study, review, and comments.

Jan. 19: Conference Call to discuss preparations for Jan. 26 ZBA Hearing. (date flexible)

Jan. 26: ZBA Hearing to discuss architectural and urban design aspects of project submission.

Feb. 2: Conference Call to discuss preparations for Feb. 9 ZBA Hearing (date flexible)

Feb. 9: ZBA Hearing to continue discussions on traffic impact study and urban design issues.

51 Grove Street
Telephone (781) 316-3396

Feb. 16: Conference Call to discuss preparations for Feb. 23 ZBA Hearing (date flexible)

Feb. 23: ZBA Hearing (Topic TBD).

The "180 Day" date was moved to Friday, April 9, 2021 by mutual agreement after the October 13 hearing.

The Department of Planning and Community Development will continue working to provide Atty. Kiefer with the requested contract documents between the Town and BETA Group.

If there are any questions or concerns regarding these notes, please notify me as soon as possible.

Christian Klein
ZBA Chair

Town of Arlington, Massachusetts

Discussion of the ZBA Website Revision

ATTACHMENTS:

	Type	File Name	Description
🗋	Reference Material	Thorndike_Place_Webpage_Revised_Layout_-_Proposed.pdf	Thorndike Place Webpage Revised Layout - Proposed

Thorndike Place Comprehensive Permit

Project Summary

Thorndike Place is a proposed rental and ownership residential community to be located on a 17.7-acre parcel of land, located between Route 2/Concord Turnpike to the south and residential neighborhoods to the north and east. The proposed development includes 12 ownership units to be housed in six (6) two-family townhouses and 207 rental units set farther back in a four (4)-story building, consisting of 104 one-bedroom units, 92 two-bedroom units and 23 three-bedroom units. Twenty-five percent (25%) of the housing units will be available to households earning no more than 80% of Area Median Income, adjusted for household size, for the Boston-Cambridge-Quincy HMFA area.

The proposal was revised in November 2020 to eliminate the two-family townhouses and locate a reduced size four (4)-story building directly on Dorothy Road. The total number of rental units is reduced to 176 units, 25% (44 units) of which would be permanently affordable to low and moderate income families. The proposal includes 11 studio units, 87 one-bedroom units, 58 two-bedroom units, and 20 three-bedroom units.

Original August 2016 Application

Application for Comprehensive Permit dated August 31, 2016
Application Cover Letter dated August 31, 2016
Building Tabulation Data (undated)
Applicant Entity Information dated May 15, 2015
Evidence of Site Control dated October 27, 2015
Mass Housing Project Eligibility Letter dated December 4, 2015
List of Requested Wavers (undated)
Traffic Impact and Access Study (Draft) dated April, 2014
Mass Housing Sustainable Development Scorecard dated May 12, 2015
Preliminary Civil Engineering Plans dated February 24, 2015
Preliminary Landscape Plans dated February 24, 2015
Preliminary Architectural Plans and Elevations dated March 16, 2015
Certified List of Abutters dated August 16, 2016
Project Team & Contact Information (undated)

Department Comments to August 2016 Application

Department Letters and Comments

Revised March 2020 Application

Transmittal Letters and Memoranda

Smolak & Vaughan LLP Transmittal Letter dated March 19, 2020
Smolak & Vaughan Response to Completeness Review dated March 18, 2020
BSC Group Transmittal Letter dated March 16, 2020

Arlington Town Bylaws in Effect at Time of Original Application

Town of Arlington Zoning Bylaw with Amendments through April, 2016
Town of Arlington Regulations for Wetlands Protection dated June 4, 2015

Drawings and Plans

Revised Architectural Plan Set dated March 11, 2020
Revised Civil Engineering Plan Set Dated March 16, 2020

Department Comments to March 2020 Application

Arlington Redevelopment Board Letter dated July 7, 2020
Arlington Transportation Advisory Committee Email date June 16, 2020
Arlington Select Board Letter dated July 7, 2020
Arlington Inspectional Services Department Letter dated July 3, 2020
Arlington Open Space Committee Letter dated July 6, 2020
Arlington Fire Department Email dated June 22, 2020
Arlington Conservation Commission Letter dated July 9, 2020
Rizzo ANRAD Report dated July 11, 2000
Rizzo ANRAD Plan dated October 18, 2000

Public Comments to March 2020 Application

Arlington Land Trust Letter dated July 3, 2020
Mugar Comment
Letter on Thorndike Place Proposal

Consultant Comments to March 2020 Application

KP Review of Response to Original Completeness Review Memorandum dated July 7, 2020
BETA Group Review of Environmental, Civil, and Stormwater Elements dated August 5, 2020
BETA Group Review of Traffic Study dated July 29, 2020

Revised September 2020 Application

Transmittal Letters and Memoranda

BSC Group Transmittal Letter dated September 28, 2020
Smolak & Vaughan Response to Completeness Review dated September 25, 2020

Drawings and Plans

Rendered Site Plan with Wetland Boundaries dated March 13, 2020
Revised Rendered Site Plan with Wetland Boundaries (undated)

Department Comments to September 2020 Application

Arlington Conservation Commission Letter dated October 9, 2020
Arlington Conservation Commission Comments to October 13, 2020 Hearing

Consultant Comments to September 2020 Application

BETA Group Review of Revised Site Plan dated October 8, 2020

Revised November 2020 Application

Transmittal Letters and Memoranda

BSC Group Transmittal Letter dated November 3, 2020
Smolak & Vaughan LLP Narrative Report dated November 3, 2020
Smolak & Vaughan LLP Statement of Master Plan Compliance dated November 3, 2020
Smolak & Vaughan LLP Revised List of Requested Waivers dated November 3, 2020
BSC Group Stormwater Report dated November 3, 2020
BSC Group Wildlife Habitat and Vegetation Evaluation dated November 3, 2020

Vanasse & Associates Transportation Impact Assessment dated November, 2020

Drawings and Plans

Thorndike Place Architectural Drawing Set dated November 3, 2020

Thorndike Place Civil Drawing Set dated November 3, 2020

Wetlands Delineation Documentation

BSC Group Wetlands Delineation Memorandum dated October 19, 2020

BSC Group Wetlands Delineation Plan dated October 22, 2020

BSC Group Wetlands Delineation Field Data Forms (undated)

Department Comments to November 2020 Application

Consultant Comments to November 2020 Application

Arlington Zoning Board of Appeals Correspondence

Revised Hearing Schedule Memorandum dated September 15, 2020

Revised Hearing Schedule Memorandum dated November 22, 2020