PLAN OF ALTERATION & WIDENING OF BROAD STREET PLAN 1065B AT WEYMOUTH ENGINEERING DEPARTMENT

WASHINGTON STREET
(60.0 FT. WIDE – PUBLIC)

BIT. CONC. ROADWAY
GRANITE EDGESTONE
CEM. CONC. SIDEWALK
BIT. CONC. SIDEWALK
6' C. L. F. BIT. CONC. SIDEWALK

STONE BOUND FOUND, CENTER BACK HELD

S30°28'20"E
246.37'

IRON PIN FOUND, HELD

FACE OF EXPOSED LEDGE

L=51.41'
R=35.00'

TRAFFIC SIGNAL
WALK SIGNAL
SIGN
LANDSCAPED AREA
BIT. CONC. PARKING
PAINT STRIPES
BOLLARDS
ELEC METERS
SINGLE STORY CONC. BUILDING
3 STORY WOOD FRAME
CONC. CURBING

#217–219 WASHINGTON STREET
BLOCK/LOT 275–19
N/F
NLTT, LLCC
DEED 34844/16
PLAN 4864/214
29,118 S.F.±

EXPOSED LEDGE

82.67'
S78°29'15"W

#231 WASHINGTON STREET
BLOCK/LOT 275–18
N/F
CELTIC ANGEL CARE, LLC
DEED 30631/540
PLAN 4864/214

BROAD STREET
(40.0 FT. WIDE – PUBLIC)
BIT. CONC. ROADWAY
GRANITE EDGESTONE
CONC. SIDEWALK

33.48'
N65°22'06"E
26.69'

ACCESS EASEMENT
S06°51'47"E
95.34'
72.63'
13.67'
PARKING EASEMENT
91.49'
18.45'
35.80'
ACCESS EASEMENT
N31°42'16"W 127.29'
54.16'
S20°56'21"E

66.00'
N25°01'44"W

#27 LINDBERG STREET
BLOCK/LOT 275–10
N/F
COLLEEN DONNELLAN
DEED 10791/739
PLAN 4864/214

DECK
2 STORY WOOD FRAME

CONC. CURBING
CONCRETE SIDEWALK
CONC. RET. WALL
LANDSCAPED AREA
SIGNLE STORY BRICK

#69 BROAD STREET
BLOCK/LOT 275–23
N/F
NAEEM KHALID
DEED 25603/112
PLAN 966/1971

BIT. CONC. PARKING
WALL
CONC. RETAINING WALL
BOLLARDS
GARAGE

N64°10'46"E
73.84'
S73°44'26"W
120.06'
N70°26'26"E
115.00'
118.68'
S74°45'50"W

#23–25 LINDBERG STREET
BLOCK/LOT 275–11
N/F
JOHN & DEBORAH MCEACHERN
DEED 9255/264
PLAN 4864/214

20.0 FT. WIDE SEWER EASEMENT

28.68'
N07°48'00"W
10.00'
N12°32'07"W

LINDBERG AVENUE
(20.0 FT. WIDE – PRIVATE)

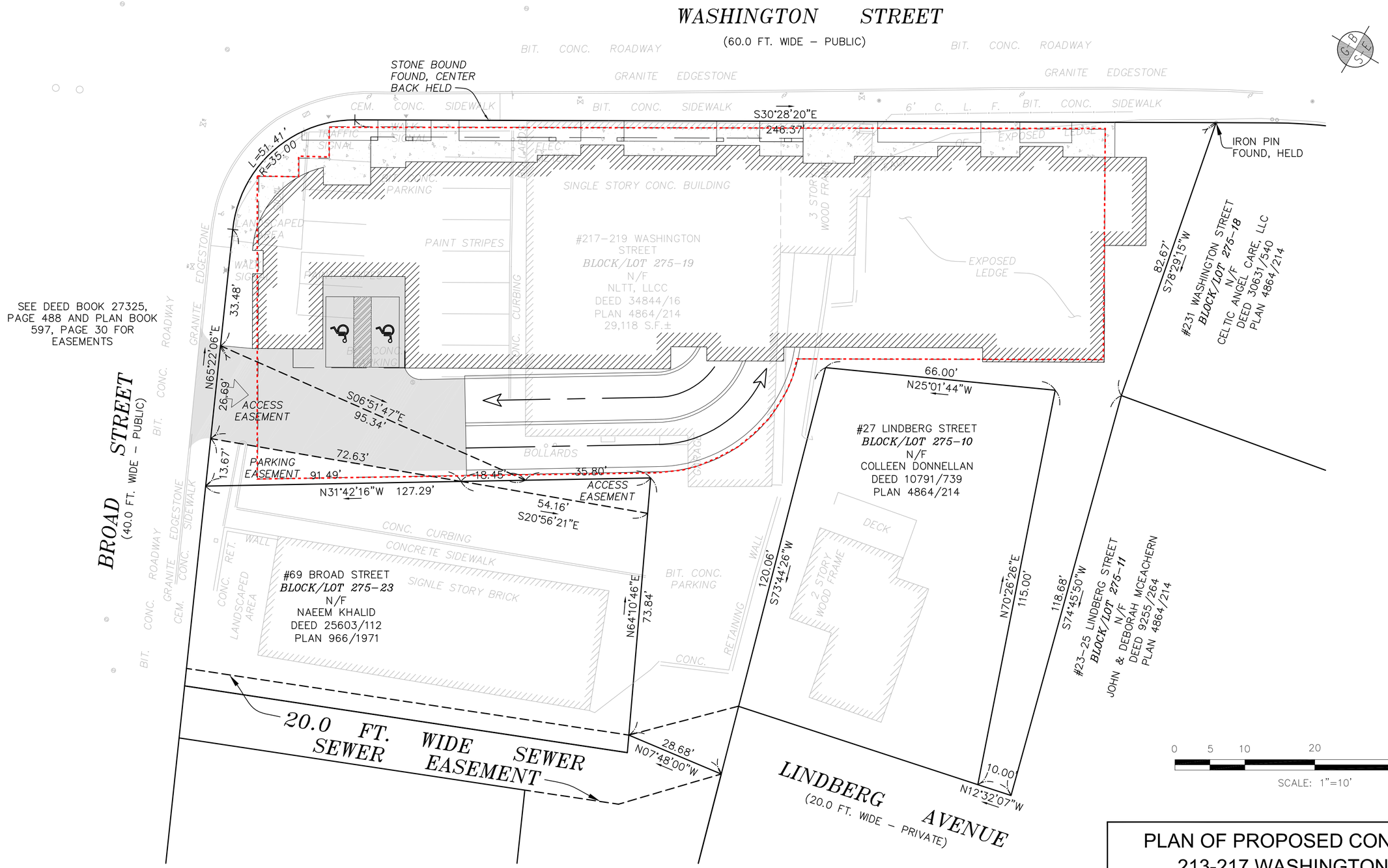
0 5 10 20 40
SCALE: 1"=10'

PLAN OF LAND
213-217 WASHINGTON STREET
WEYMOUT, MASSACHUSETTS
(NORFOLK COUNTY REGISTRY OF DEEDS)

PREPARED FOR

GREATER BOSTON SURVEYING AND ENGINEERING
19 FREDITH ROAD
WEYMOUTH, MA 02189
(781) 331-6128

CALC BY: PJT	DATE: OCTOBER 8, 2020	SCALE: 1"=10'



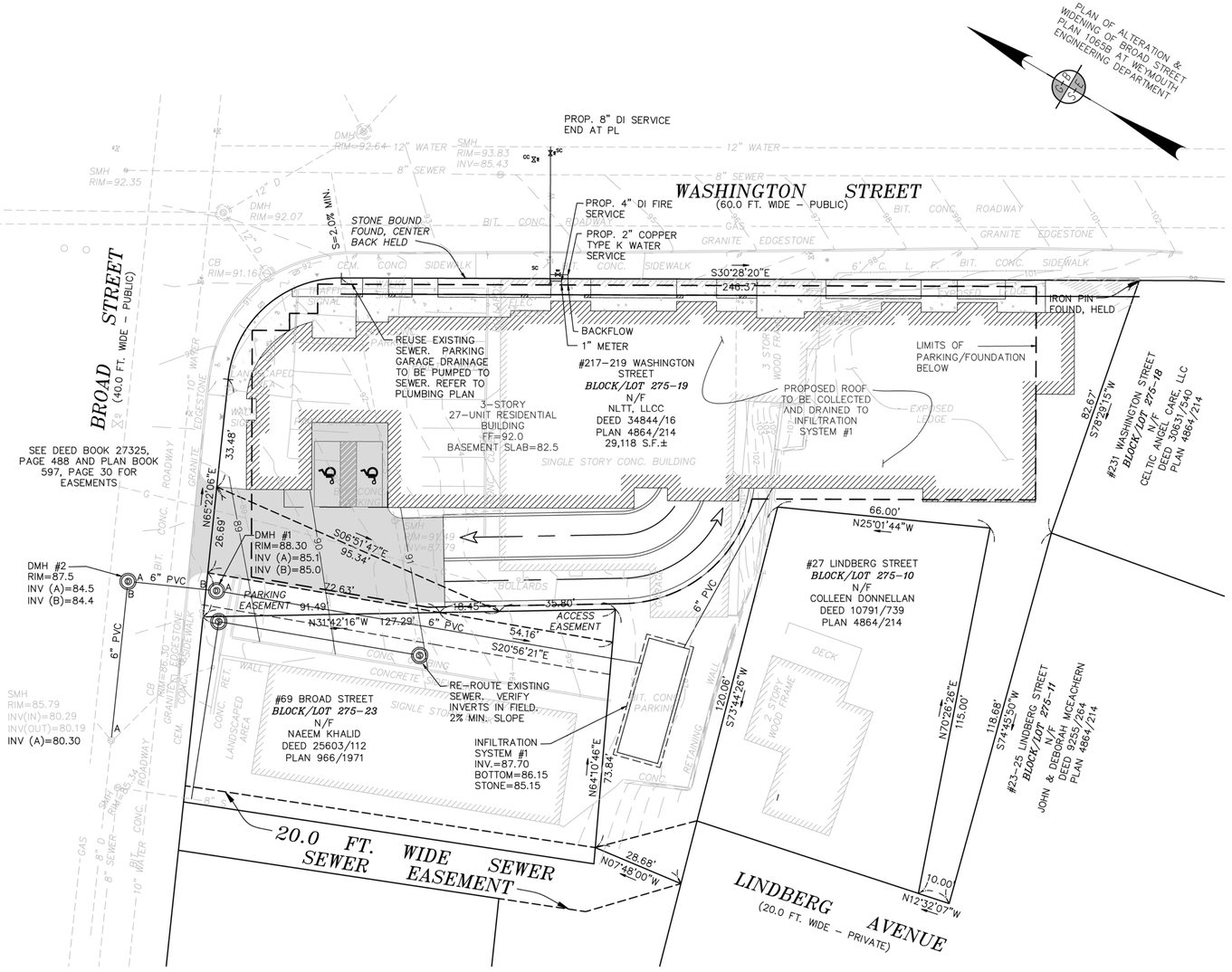
PLAN OF PROPOSED CONSTRUCTION
213-217 WASHINGTON STREET
WEYMOUTH, MASSACHUSETTS

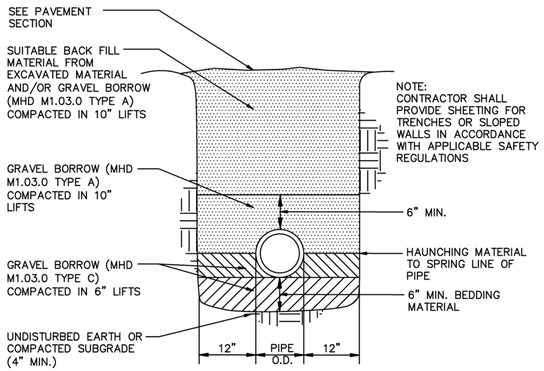
(NORFOLK COUNTY REGISTRY OF DEEDS)

PREPARED FOR

GREATER BOSTON SURVEYING AND ENGINEERING
19 FREDITH ROAD
WEYMOUTH, MA 02189
(781) 331-6128

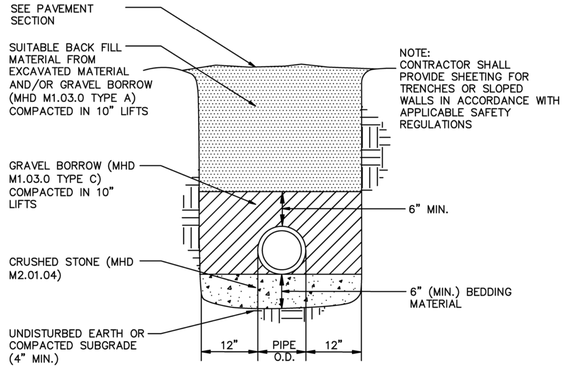
CALC BY: PJT	DATE: DECEMBER 17, 2021	SCALE: 1"=20'





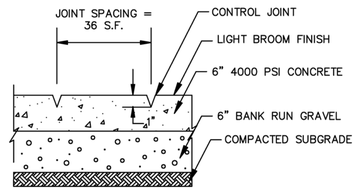
PVC TRENCH DETAIL

NOT TO SCALE



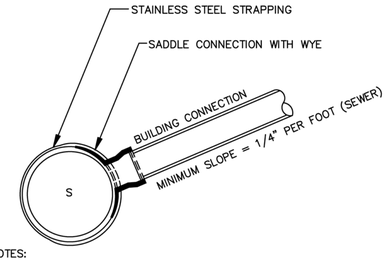
COPPER PIPE TRENCH DETAIL

NOT TO SCALE



CONCRETE SIDEWALK DETAIL

NOT TO SCALE

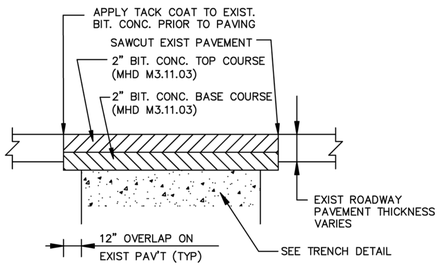


NOTES:

1. FULL PVC OR IRON SADDLE MAY BE USED TO CONNECT TO EXISTING PVC, CLAY, CONCRETE OR IRON PIPE.
2. SADDLES MUST HAVE RUBBER GASKETS AND SHALL BE TIGHTENED WITH STRAPS. SADDLES WILL NOT BE CEMENTED ONTO THE PIPE.
3. FULL WYE CONNECTION FITTINGS MAY BE USED.
4. PIPE SHALL BE CUT TO CONFORM TO THE OPENING IN THE SADDLE.
5. CONNECTIONS DIRECTLY INTO THE EXISTING PIPE WITHOUT A SADDLE OR A FULL WYE FITTING ARE NOT ALLOWED.

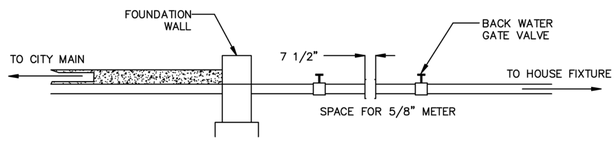
CONNECTION TO EXISTING SEWER

NOT TO SCALE



PAVEMENT PATCH DETAIL

NOT TO SCALE



5/8" METER SPACING DETAIL

NOT TO SCALE

0 5 10 20 40

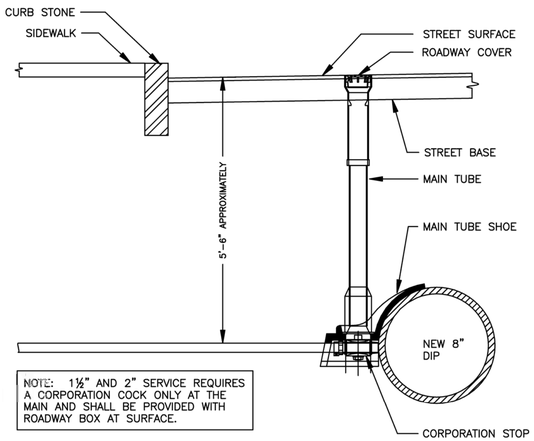
SCALE: 1"=20'

PLAN OF PROPOSED CONSTRUCTION
213-217 WASHINGTON STREET
WEYMOUTH, MASSACHUSETTS
(NORFOLK COUNTY REGISTRY OF DEEDS)

PREPARED FOR

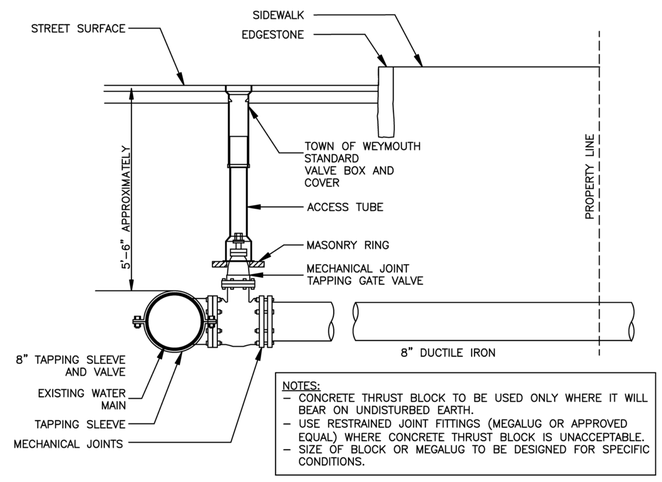
GREATER BOSTON SURVEYING AND ENGINEERING
19 FREDITH ROAD
WEYMOUTH, MA 02189
(781) 331-6128

DESIGN BY: PJT	DATE: JAN. 26, 2022	SCALE: 1" = 20'



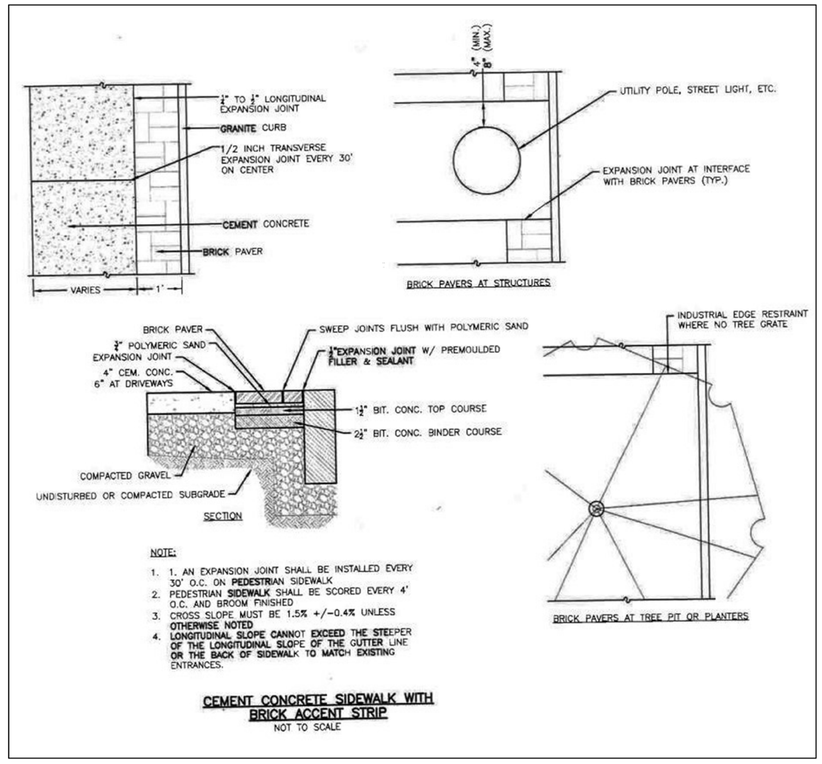
2" WATER SERVICE CONNECTION DETAIL

NOT TO SCALE



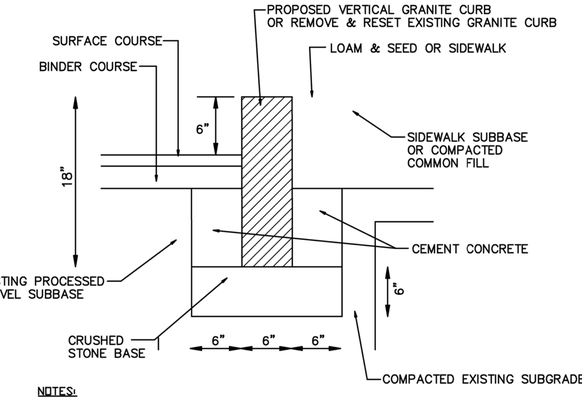
8" MAIN CONNECTION DETAIL

NOT TO SCALE



CEMENT CONCRETE SIDEWALK WITH BRICK ACCENT STRIP

NOT TO SCALE

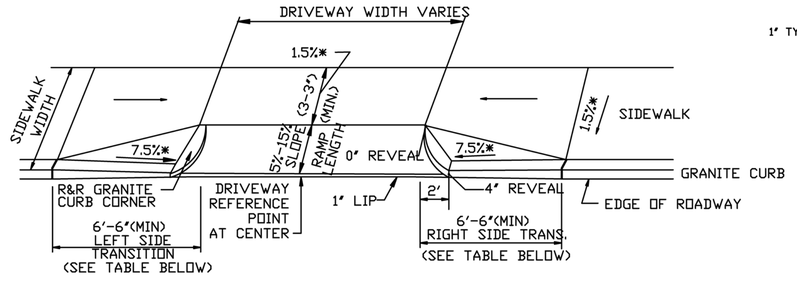


NOTES:

1. THIS PROCEDURE IS APPLICABLE ONLY IF CURB IS TO BE SET AFTER THE BASE AND/OR BINDER COURSES ARE IN PLACE OR FOR RESETTING CURB.
2. CUT NEAT LINE 6" FROM CURB LINE AND REMOVE PAVEMENT, BASE AND SUBGRADE, PLACE AND COMPACT CRUSHED STONE BASE, SET CURB TO PROPER GRADE, PLACE AND COMPACT GRAVEL SUBBASE, PLACE CEMENT CONCRETE IN FRONT AND BACK OF CURB. WHEN THE CONCRETE IS SUFFICIENTLY CURED, PLACE THE TWO COURSES OF ASPHALT, MORTAR AND POINT THE CURB JOINTS.
3. ANY DESIGNATED CEMENT CONCRETE THAT IS ACCEPATABLE UNDER SECTION M4 OF THE STANDARD MHD SPECIFICATIONS MAY BE USED. BITUMINOUS CONCRETE SHALL NOT BE USED AS A SUBSTITUTE.

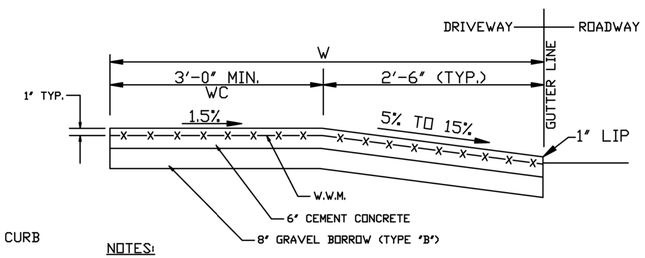
GRANITE CURB DETAIL

NOT *TO SCALE*



SIDEWALK THROUGH DRIVEWAYS WITH CURB RETURNS

NOT *TO SCALE*



NOTES:

1. PROVIDE 6x6 W5.4/5.4 W.W.M. IN CONCRETE
2. USE 4000 P.S.I. CONCRETE, 6" THICK MIN.

WC = WHEELCHAIR (PATHWAY)
W = SIDEWALK WIDTH
W.W.M. = WELDED WIRE MESH

CROSS SECTION OF CEMENT CONCRETE DRIVEWAY APRON

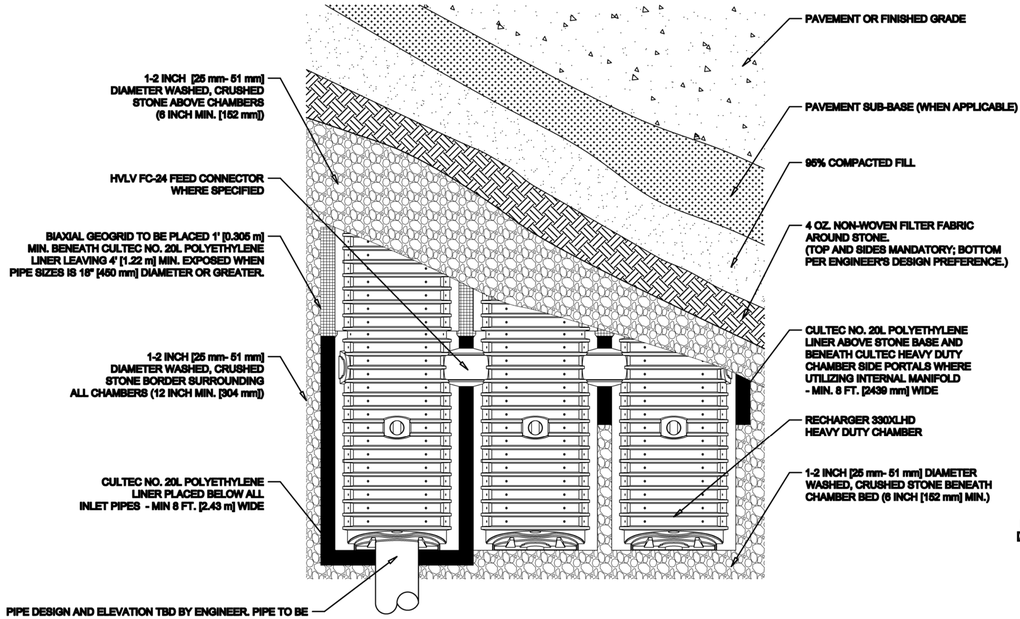
NOT *TO SCALE*

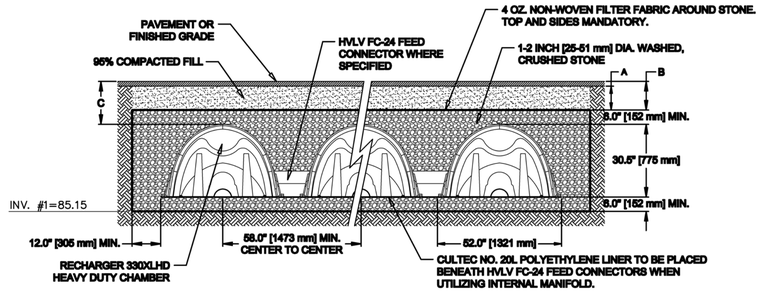
PLAN OF PROPOSED CONSTRUCTION
213-217 WASHINGTON STREET
WEYMOUTH, MASSACHUSETTS
(NORFOLK COUNTY REGISTRY OF DEEDS)

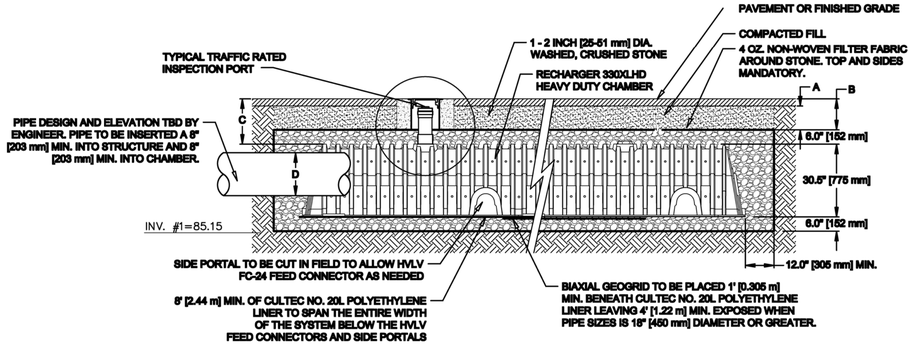
PREPARED FOR

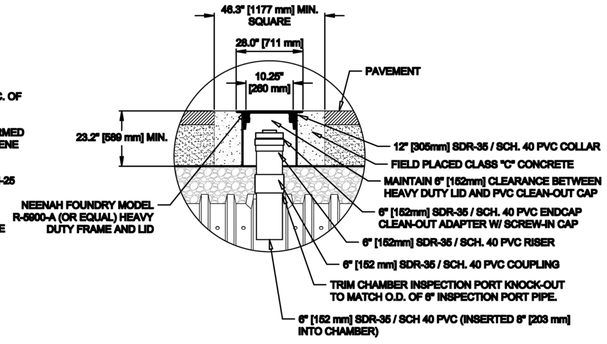
GREATER BOSTON SURVEYING AND ENGINEERING
19 FREDITH ROAD
WEYMOUTH, MA 02189
(781) 331-6128

DESIGN BY: PJT	DATE: JAN. 26, 2022	SCALE: AS NOTED









CHAMBER PARAMETERS

1. ALL PRODUCTS SHALL BE MANUFACTURED BY CULTEC, INC. OF BROOKFIELD, CT. (203-775-4416 OR 1-800-428-5832).
2. THE CHAMBER AND FEEDER WILL BE VACUUM THERMOFORMED OF BLACK HIGH MOLECULAR WEIGHT HIGH DENSITY POLYETHYLENE (HMWHDPE).
3. THE SYSTEM WILL BE DESIGNED TO WITHSTAND AASHTO H-25 LOAD RATING WHEN INSTALLED ACCORDING TO CULTEC'S RECOMMENDED INSTALLATION INSTRUCTIONS.
4. SYSTEM TO BE INSTALLED IN STRICT CONFORMANCE WITH THE MANUFACTURERS INSTALLATION PROCEDURES.

CULTEC RECHARGER 330XLHD CHAMBER
(STORAGE PROVIDED = 11.32 CF/FT [1.05 m3/m] PER DESIGN UNIT)

A	MIN. DEPTH REQUIRED OF 95% COMPACTED FILL FOR PAVED APPLICATIONS	10"	254 mm
B	MIN. DEPTH REQUIRED OF 95% COMPACTED FILL FOR UNPAVED APPLICATIONS	12"	305 mm
C	MAX. DEPTH OF COVER ALLOWED ABOVE CROWN OF CHAMBER	12'	3.66 m
D	MAX. INLET/OUTLET PIPE SIZE INTO THE END WALL OF THE CHAMBER	24"	600 mm

INFILTRAITON SYSTEM DETAIL

NOT TO SCALE

PLAN OF PROPOSED CONSTRUCTION
213-217 WASHINGTON STREET
WEYMOUTH, MASSACHUSETTS
(NORFOLK COUNTY REGISTRY OF DEEDS)

PREPARED FOR

GREATER BOSTON SURVEYING AND ENGINEERING
19 FREDITH ROAD
WEYMOUTH, MA 02189
(781) 331-6128

DESIGN BY: PJT | DATE: JAN. 26, 2022 | SCALE: AS NOTED

REV.	DATE	DESCRIPTION
1	X-XX-XX	XXX

213-217 Washington Street
Weymouth, MA 02188

NUMBER OF UNITS	27
RETAIL AREA	4,285 s.f.
LOT AREA	29,118 s.f.
TOTAL GROSS LIVING AREA	32,106 s.f.
FAR	1.10

FLOOR AREA RATIO (FAR)
The fixed relation between the lot area and the floor area of all multiple-family residential buildings, excluding the floor area of garages, carports, breezeways, stairways, hallways and balconies and excluding the area of any floor more than four feet below average grade where no part of such basement is used for sleeping rooms or other living quarters, and expressed as a fraction of floor area/lot areA.

ZONING	B-2 (Limited Business District)
	R-1 (Resident District)
	VC (Village Center Overlay District

VC (Village Center Overlay District	
Maximum Height	4 stories, not to exceed 50 feet by special permit
Front, Side and Rear Setbacks	shall be calculated as follows: the maximum front and street side building setback may not exceed the average front yard depth of the nearest two lots on both sides of the subject lot or 10 feet, whichever is less.
A portion of the building may be set back from the maximum setback line in order to provide an articulated facade or accommodate a building entrance feature, provided that the total area of the space created must not exceed one square foot for every linear foot of building frontage.	

PARKING REQUIREMENTS (20-25-7)	
Dwelling Units	1.5 per unit
Retail	1 per 250 s.f. (min.) of gross area on the 1st floor of a building

PROVIDED PARKING SPACES - 50 TOTAL	
27 Units	41 spaces (1.5 per unit)
Retail	9 spaces for 4,662 s.f. (4,662 / 250 s.f. = 19 spaces req'd.)
Bike	1 Bike per 20 Parking Spaces. (50/20 = 3 Bike spaces req'd.)

PROPOSED UNIT SQUARE FOOTAGE:

UNIT 1: TOTAL GROSS LIVING AREA: 1,096 S.F.
TOTAL NUMBER OF BEDROOMS: 02
TOTAL NUMBER OF BATHS: 02

UNIT 2: TOTAL GROSS LIVING AREA: 1017 S.F.
TOTAL NUMBER OF BEDROOMS: 02
TOTAL NUMBER OF BATHS: 02

UNIT 3: TOTAL GROSS LIVING AREA: 993 S.F.
TOTAL NUMBER OF BEDROOMS: 02
TOTAL NUMBER OF BATHS: 02

UNIT 4: TOTAL GROSS LIVING AREA: 1,005 S.F.
TOTAL NUMBER OF BEDROOMS: 02
TOTAL NUMBER OF BATHS: 02

UNIT 5: TOTAL GROSS LIVING AREA: 1,005 S.F.
TOTAL NUMBER OF BEDROOMS: 02
TOTAL NUMBER OF BATHS: 02

UNIT 6: TOTAL GROSS LIVING AREA: 1,037 S.F.
TOTAL NUMBER OF BEDROOMS: 02
TOTAL NUMBER OF BATHS: 02

UNIT 7: TOTAL GROSS LIVING AREA: 1,017 S.F.
TOTAL NUMBER OF BEDROOMS: 02
TOTAL NUMBER OF BATHS: 02

UNIT 8: TOTAL GROSS LIVING AREA: 993 S.F.
TOTAL NUMBER OF BEDROOMS: 02
TOTAL NUMBER OF BATHS: 02

UNIT 9: TOTAL GROSS LIVING AREA: 1,005 S.F.
TOTAL NUMBER OF BEDROOMS: 02
TOTAL NUMBER OF BATHS: 02

PROPOSED UNIT SQUARE FOOTAGE:

UNIT 10: TOTAL GROSS LIVING AREA: 1,005 S.F.
TOTAL NUMBER OF BEDROOMS: 02
TOTAL NUMBER OF BATHS: 02

UNIT 11: TOTAL GROSS LIVING AREA: 983 S.F.
TOTAL NUMBER OF BEDROOMS: 02
TOTAL NUMBER OF BATHS: 02

UNIT 12: TOTAL GROSS LIVING AREA: 1,007 S.F.
TOTAL NUMBER OF BEDROOMS: 02
TOTAL NUMBER OF BATHS: 02

UNIT 13: TOTAL GROSS LIVING AREA: 1,007 S.F.
TOTAL NUMBER OF BEDROOMS: 02
TOTAL NUMBER OF BATHS: 02

UNIT 14: TOTAL GROSS LIVING AREA: 1,001 S.F.
TOTAL NUMBER OF BEDROOMS: 02
TOTAL NUMBER OF BATHS: 02

UNIT 15: TOTAL GROSS LIVING AREA: 1,001 S.F.
TOTAL NUMBER OF BEDROOMS: 02
TOTAL NUMBER OF BATHS: 02

UNIT 16: TOTAL GROSS LIVING AREA: 1,108 S.F.
TOTAL NUMBER OF BEDROOMS: 02
TOTAL NUMBER OF BATHS: 02

UNIT 17: TOTAL GROSS LIVING AREA: 1,037 S.F.
TOTAL NUMBER OF BEDROOMS: 02
TOTAL NUMBER OF BATHS: 02

UNIT 18: TOTAL GROSS LIVING AREA: 1,017 S.F.
TOTAL NUMBER OF BEDROOMS: 02
TOTAL NUMBER OF BATHS: 02

PROPOSED UNIT SQUARE FOOTAGE:

UNIT 19: TOTAL GROSS LIVING AREA: 993 S.F.
TOTAL NUMBER OF BEDROOMS: 02
TOTAL NUMBER OF BATHS: 02

UNIT 20: TOTAL GROSS LIVING AREA: 1,005 S.F.
TOTAL NUMBER OF BEDROOMS: 02
TOTAL NUMBER OF BATHS: 02

UNIT 21: TOTAL GROSS LIVING AREA: 1,005 S.F.
TOTAL NUMBER OF BEDROOMS: 02
TOTAL NUMBER OF BATHS: 02

UNIT 22: TOTAL GROSS LIVING AREA: 983 S.F.
TOTAL NUMBER OF BEDROOMS: 02
TOTAL NUMBER OF BATHS: 02

UNIT 23: TOTAL GROSS LIVING AREA: 1,007 S.F.
TOTAL NUMBER OF BEDROOMS: 02
TOTAL NUMBER OF BATHS: 02

UNIT 24: TOTAL GROSS LIVING AREA: 1,007 S.F.
TOTAL NUMBER OF BEDROOMS: 02
TOTAL NUMBER OF BATHS: 02

UNIT 25: TOTAL GROSS LIVING AREA: 1,001 S.F.
TOTAL NUMBER OF BEDROOMS: 02
TOTAL NUMBER OF BATHS: 02

UNIT 26: TOTAL GROSS LIVING AREA: 1,001 S.F.
TOTAL NUMBER OF BEDROOMS: 02
TOTAL NUMBER OF BATHS: 02

UNIT 27: TOTAL GROSS LIVING AREA: 1,108 S.F.
TOTAL NUMBER OF BEDROOMS: 02
TOTAL NUMBER OF BATHS: 02

LOCATION PLAN

GENERAL NOTE:

VERIFY AND CONFIRM ALL CONDITIONS AND/OR DIMENSIONS SHOWN PRIOR TO COMMENCING CONSTRUCTION OR ORDERING MATERIALS. NOTIFY ARCHITECT OF ANY INCONSISTENCIES FOR REVIEW AND APPROVAL BEFORE PROCEEDING WITH CONSTRUCTION.

RCA, LLC
1156 Dorchester Avenue
Dorchester, Massachusetts 02125
Telephone: 617-282-9030
Fax: 617-282-1080
www.roche-christopher.com

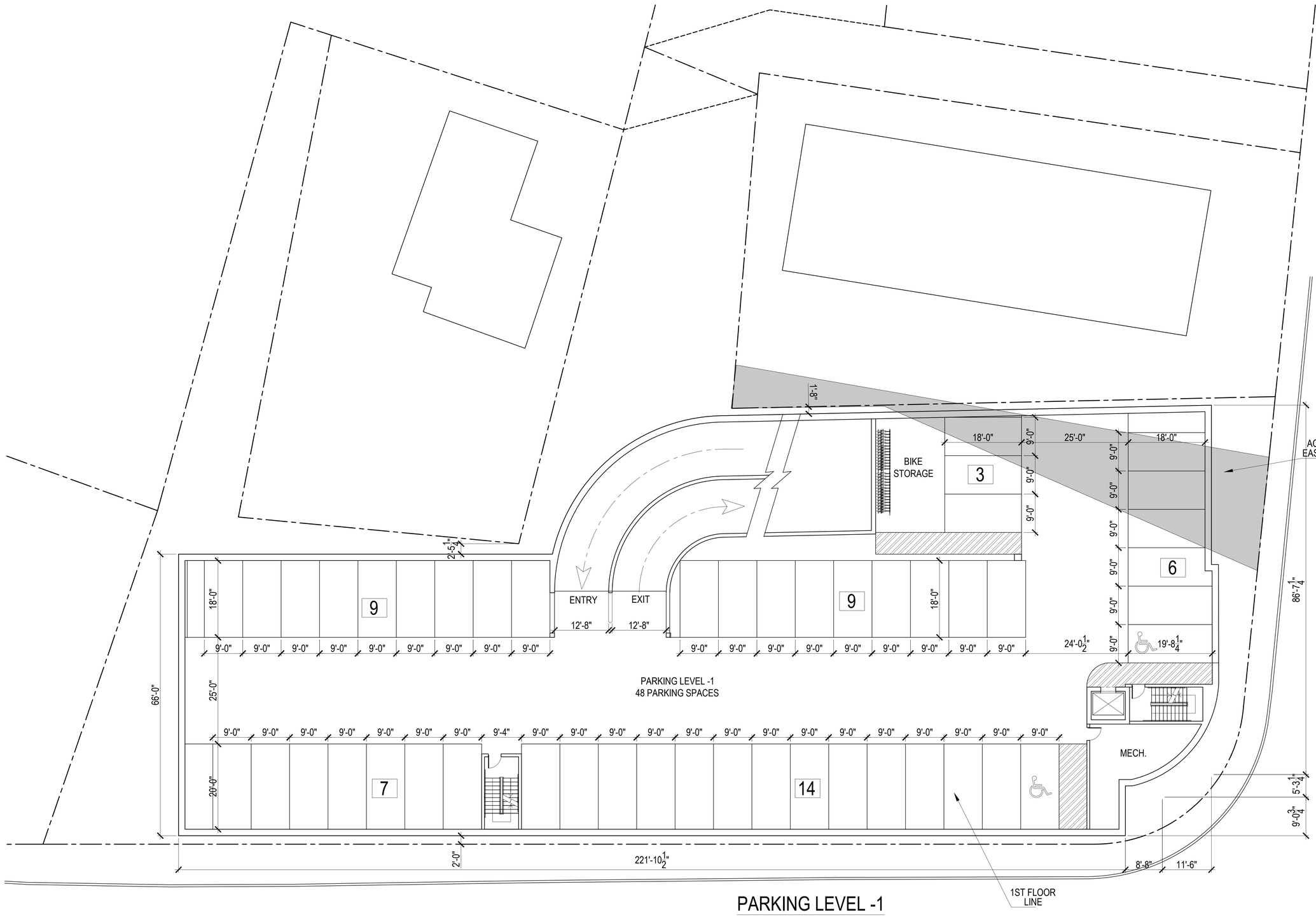
213-217 WASHINGTON STREET
WEYMOUTH MA, 02184

PROJECT # 21-072
DATE: 11-22-21
REV:
SCALE: 3/32" = 1'-0"
DRAWN BY: L.P.
CHECKED BY: W.C.

ZONING ANALYSIS AND LOCATION PLAN

T0

REV.	DATE	DESCRIPTION
1	X-XX-XX	XXX



PARKING LEVEL -1

GENERAL NOTE:

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WILLIAM P. CHRISTOPHER
REGISTERED ARCHITECT
No. 9657
DORCHESTER, MA
COMMONWEALTH OF MASSACHUSETTS

RCA, LLC
1156 Dorchester Avenue
Dorchester, Massachusetts 02125
www.roche-christopher.com
Telephone: 617-282-9030
Fax: 617-282-1080

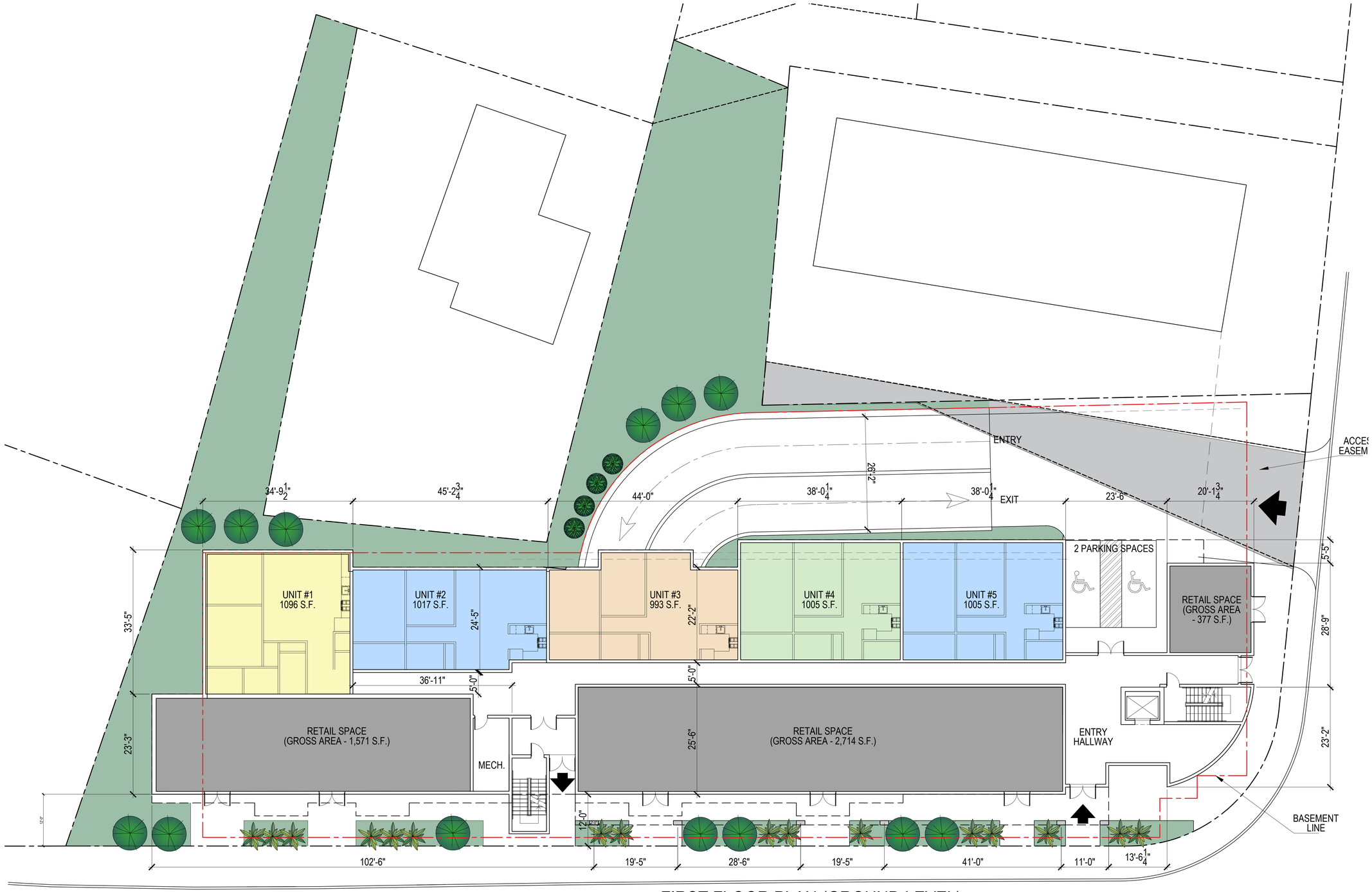
213-217 WASHINGTON STREET
WEYMOUTH MA, 02184

PROJECT #	21-072
DATE:	11-22-21
REV:	
SCALE:	3/32" = 1'-0"
DRAWN BY:	L.P.
CHECKED BY:	W.C.

PROPOSED BASEMENT PLAN

A1

REV.	DATE	DESCRIPTION
1	X-XX-XX	XXX



FIRST FLOOR PLAN (GROUND LEVEL)

RESIDENTIAL GROSS LIVING AREA - 5,060 S.F.
RETAIL GROSS AREA - 4,285 S.F.

GENERAL NOTE:

VERIFY AND CONFIRM ALL CONDITIONS AND/OR DIMENSIONS SHOWN PRIOR TO COMMENCING CONSTRUCTION OR ORDERING MATERIALS. NOTIFY ARCHITECT OF ANY INCONSISTENCIES FOR REVIEW AND APPROVAL BEFORE PROCEEDING WITH CONSTRUCTION.

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1156 Dorchester Avenue
Dorchester, Massachusetts 02125
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Telephone: 617-282-9030
Fax: 617-282-1080

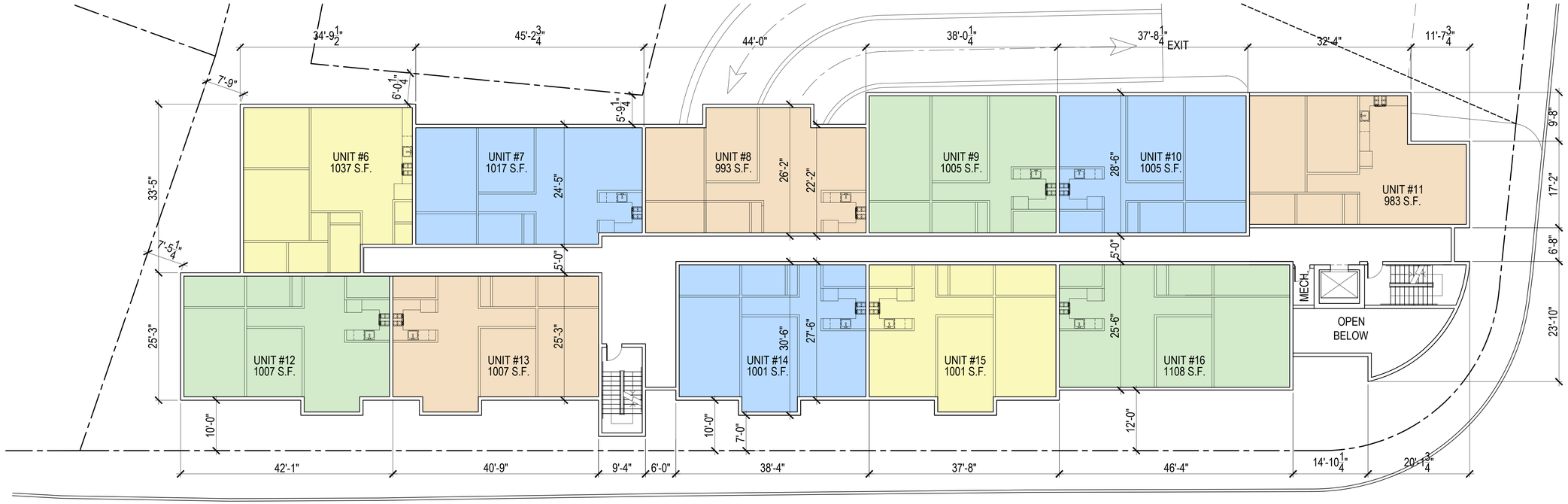
213-217 WASHINGTON STREET
WEYMOUTH MA, 02184

PROJECT #	21-072
DATE:	11-22-21
REV:	
SCALE:	3/32" = 1'-0"
DRAWN BY:	L.P.
CHECKED BY:	W.C.

PROPOSED FIRST FLOOR PLAN

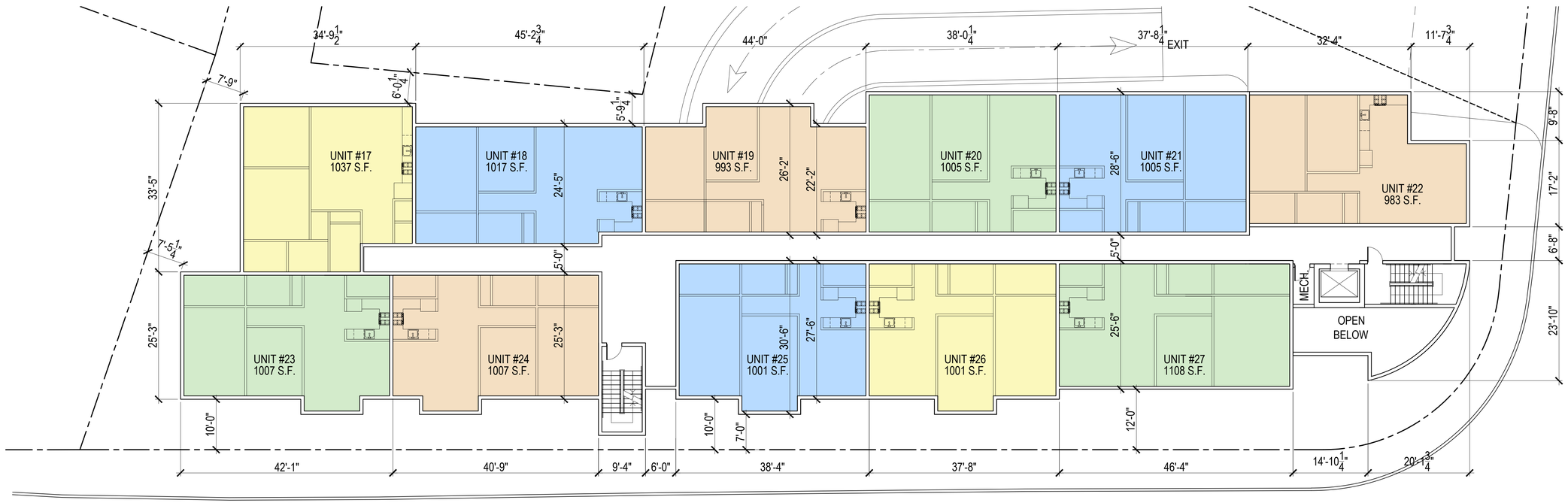
A2

REV.	DATE	DESCRIPTION
1	X-XX-XX	XXX



SECOND FLOOR PLAN

RESIDENTIAL GROSS LIVING AREA - 11,164 S.F.



THIRD FLOOR PLAN

RESIDENTIAL GROSS LIVING AREA - 11,164 S.F.

GENERAL NOTE:

VERIFY AND CONFIRM ALL CONDITIONS AND/OR DIMENSIONS SHOWN PRIOR TO COMMENCING CONSTRUCTION OR ORDERING MATERIALS. NOTIFY ARCHITECT OF ANY INCONSISTENCIES FOR REVIEW AND APPROVAL BEFORE PROCEEDING WITH CONSTRUCTION.

RCA, LLC
1156 Dorchester Avenue
Dorchester, Massachusetts 02125
Telephone: 617-282-9030
Fax: 617-282-1080
www.roche-christopher.com

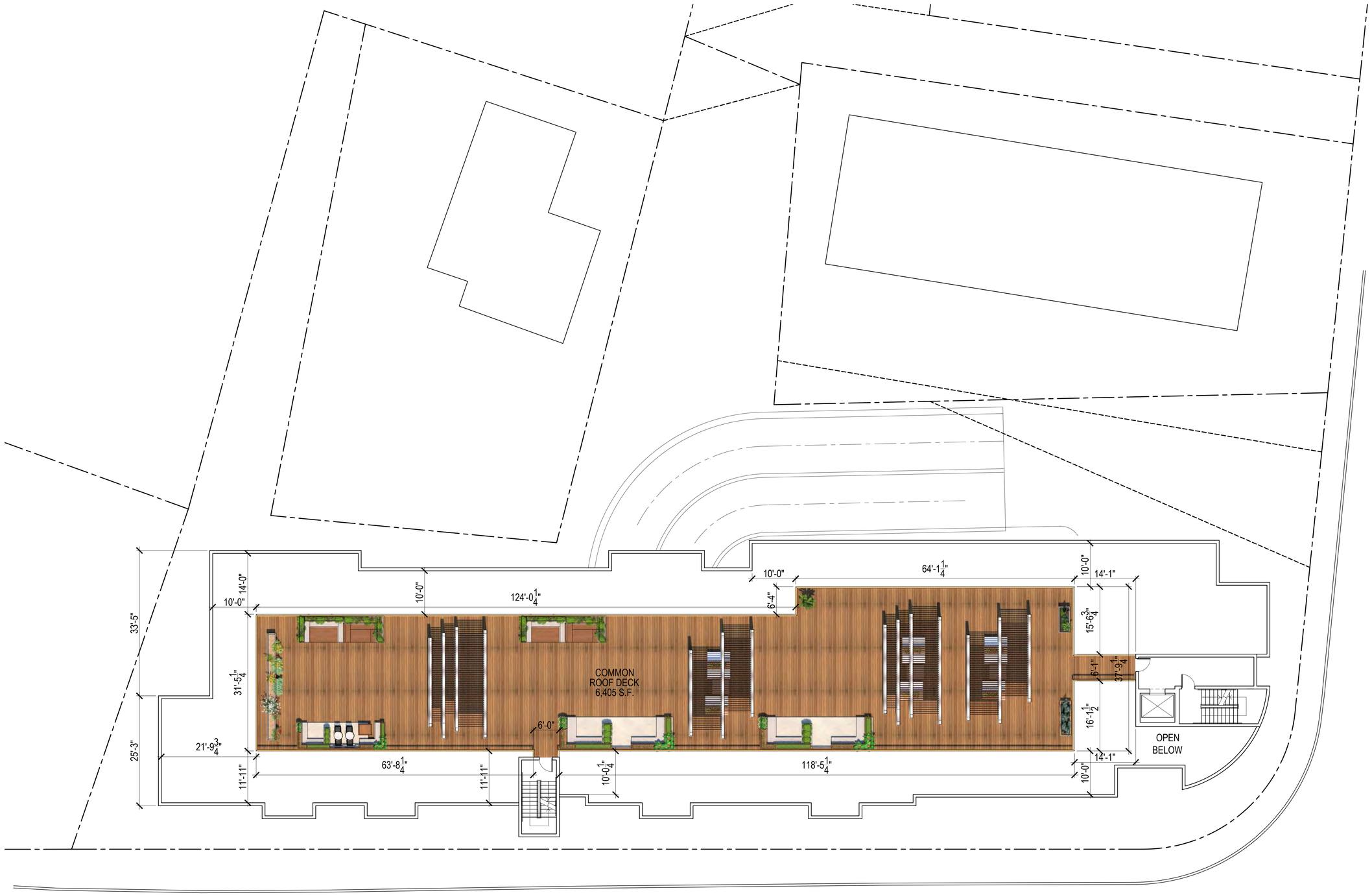
213-217 WASHINGTON STREET
WEYMOUTH MA, 02184

PROJECT # 21-072
DATE: 11-22-21 REV:
SCALE: 3/32" = 1'-0"
DRAWN BY: L.P.
CHECKED BY: W.C.

PROPOSED TYPICAL FLOOR PLAN

A3

REV.	DATE	DESCRIPTION
1	X-XX-XX	XXX



ROOF DECK PLAN

GENERAL NOTE:

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213-217 WASHINGTON STREET
WEYMOUTH MA, 02184

PROJECT # 21-072
DATE: 11-22-21
REV:
SCALE: 3/32" = 1'-0"
DRAWN BY: L.P.
CHECKED BY: W.C.

PROPOSED ROOF DECK

A4

REV.	DATE	DESCRIPTION
1	X-XX-XX	XXX

FRONT ELEVATION

REAR ELEVATION

RIGHT SIDE ELEVATION

LEFT SIDE ELEVATION

GENERAL NOTE:

VERIFY AND CONFIRM ALL CONDITIONS AND/OR DIMENSIONS SHOWN PRIOR TO COMMENCING CONSTRUCTION OR ORDERING MATERIALS. NOTIFY ARCHITECT OF ANY INCONSISTENCIES FOR REVIEW AND APPROVAL BEFORE PROCEEDING WITH CONSTRUCTION.

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Telephone: 617-282-9030
Fax: 617-282-1080

213-217 WASHINGTON STREET
WEYMOUTH MA, 02184

PROJECT # 21-072
DATE: 11-22-21
REV:
SCALE: 3/32" = 1'-0"
DRAWN BY: L.P.
CHECKED BY: W.C.

PROPOSED ELEVATIONS

A5

REV.	DATE	DESCRIPTION
1	X-XX-XX	XXX

GENERAL NOTE:

VERIFY AND CONFIRM ALL CONDITIONS AND/OR DIMENSIONS SHOWN PRIOR TO COMMENCING CONSTRUCTION OR ORDERING MATERIALS. NOTIFY ARCHITECT OF ANY INCONSISTENCIES FOR REVIEW AND APPROVAL BEFORE PROCEEDING WITH CONSTRUCTION.

RCA, LLC

115b Dorchester Avenue
Dorchester, Massachusetts 02125

www.roche-christopher.com

Telephone: 617-282-9030
Fax: 617-282-1080

213-217 WASHINGTON STREET
WEYMOUTH MA, 02184

PROJECT # 21-072
DATE: 11-22-21
REV:
SCALE: 3/32" = 1'-0"
DRAWN BY: L.P.
CHECKED BY: W.C.

3D RENDERS

A6

REV.	DATE	DESCRIPTION
1	X-XX-XX	XXX

GENERAL NOTE:

VERIFY AND CONFIRM ALL CONDITIONS AND/OR DIMENSIONS SHOWN PRIOR TO COMMENCING CONSTRUCTION OR ORDERING MATERIALS. NOTIFY ARCHITECT OF ANY INCONSISTENCIES FOR REVIEW AND APPROVAL BEFORE PROCEEDING WITH CONSTRUCTION.

RCA, LLC

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Telephone: 617-282-9030
Fax: 617-282-1080

213-217 WASHINGTON STREET
WEYMOUTH MA, 02184

PROJECT # 21-072
DATE: 11-22-21
REV:
SCALE: 3/32" = 1'-0"
DRAWN BY: L.P.
CHECKED BY: W.C.

3D RENDERS

A7

ZADE

ZADE ASSOCIATES, LLC
Consulting Engineers
140 Beach St., Boston, MA 02111
Phone: (617) 338-4406
Fax: (617) 451-2540
Email: zade@zadeengineering.com

Mohammed Zade Ph.D., P.E.
Muzaffer Muctehitzade M.Sc., P.E

RCA, LLC **11/23/2021**
1156 Dorchester Ave
Dorchester, MA 02125

Att: Mr. James Christopher
Ref: 213-217 Washington
Dorchester

Sbj: Sewer Load

Dear James ,

Based on 248 CMR 10.14 Table 1 we estimate the water demand (Hot and Cold) requirements as follows:

Water Demand:
Residential (27 units)

Item	Quantity	Factor	Total F.U.
Kitchen Sink:	27	2.0	54
Water Closet (tank type):	54	6.0	324
Lavatory:	54	1.0	54
Dishwasher:	27	1.0	27
Tub/Shower	54	2.0	108
Washer:	27	2.0	54
Total:			**621**

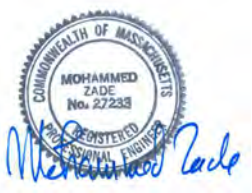
Provide 8” Sewer Service for the Residential Building (good for 1400 FU)

Daily Sewage Flow Rates (per 310 CMR 15):

54 Bed @ 110 gal per:	5,940 GPD
Retail 1 1,574 sqf @ 50/1000 sqf:	79 GPD
Retail 2 2,714 sqf @ 50/1000 sqf:	138 GPD
Retail 3 377 sqf @ 50/1000 sqf:	19 GPD

If you should have any questions, or require further information, please contact our office.

Sincerely,
ZADE ASSOCIATES LLC



Mohammed Zade Ph.D., P.E.
Principal

DRAINAGE SUMMARY

PROPOSED 27-UNIT
RESIDENTIAL BUILDING
213-217 WASHINGTON STREET
WEYMOUTH, MASSACHUSETTS

January 25, 2022

GREATER BOSTON SURVEY AND ENGINEERING
17 FREDITH ROAD
WEYMOUTH, MA 02189

DRAINAGE SUMMARY
PROPOSED 27-UNIT
RESIDENTIAL BUILDING
WEYMOUTH, MASSACHUSETTS

The proposed project consists of the demolition of an existing commercial building and bituminous concrete parking lots, and the construction of a new twenty-seven (27) unit residential building, including underground parking in Weymouth, MA, under the requirements of the City of Weymouth.

The on-site soils in the area are shown as predominantly "602-Urban Land 0 to 15 percent slopes" that are soils that do not fall within any Hydrological Soil Group. A geotechnical investigation was completed for the site by KMM Geotechnical Consultants, LLC and onsite soils were confirmed as a silty sand fill material above glacial till. For purposes of our drainage design, we have designed based on soil Type D and used a conservative infiltration rate of 0.09 in/hr based on Rawles Rates.

Ground cover on the site is an existing building and bituminous concrete parking lots. There is a large exposed ledge outcropping on the southern edge of the site. The entire site is impervious, including the ledge. The existing drainage on the site flows overland towards Broad Street. Overall, the proposed site will consist mostly of the proposed building, with small amounts of walkways and access drives, however stormwater runoff will be collected, infiltrated to maximum extent practical, before it continues to flow towards Broad Street

There are no Bordering Vegetated wetlands within the project area. The proposed drainage controls are designed to capture & contain the runoff from the proposed building. This system will store the runoff from the proposed Building and allow the stored water to slowly infiltrate after the storm event and overflow offsite.

Under the proposed conditions, the rate of site runoff from the re-developed lot area will be greater than the existing conditions for the 2, 10, 25 and 100-year storm events. The proposed controls have been designed to store this increase to maintain the pre and post runoff rates. In addition, the proposed controls will provide some additional recharge of the groundwater at the site.

COMPLIANCE WITH STORMWATER STANDARDS

Untreated Stormwater (Standard 1)

The project is designed so that new stormwater conveyances (outfalls/discharges) do not discharge untreated stormwater into, or cause erosion to, existing wetlands.

Post-Development Peak Rates (Standard 2)

A hydrologic study was performed to determine the rate of runoff for the 2-, 10-, 50- and 100-year storm events under pre-development (existing) conditions. Unmitigated post-development rates were then computed in a similar manner. The study point where the peak rates were compared were taken at one (1) location at the existing offsite flow area. From these analyses, it was determined that the proposed project and its stormwater management system would not increase the peak runoff rates above existing levels. It is the intent of the stormwater management system to minimize impacts to drainage patterns, downstream property, and wetlands prior to its release from the site or discharge to wetlands.

The *United States Department of Agriculture (U.S.D.A)*. Soil Conservation Service (SCS) Technical Release 55 (TR-55), 1986, was used as the procedure for estimating runoff. A SCS TR-20-based computer program was used for estimating peak discharges. TR-55 is a generally accepted model for use on small sites that begin with a rainfall amount uniformly imposed on the watershed over a specified time distribution. Mass rainfall is converted to mass runoff by using a runoff curve number (CN). CN is based on soils, plant cover, impervious areas, interception, and surface storage. Runoff is then transformed into a hydrograph that depends on runoff travel time through segments of the watershed.

Development in a watershed changes the watershed's response to precipitation. The most common effects are reduced infiltration and decreased travel time, which can result in significantly higher peak rates of runoff. The volume of runoff is determined primarily by the amount of precipitation and by infiltration characteristics related to soil type, antecedent rainfall, type of vegetal cover, impervious surfaces, and surface retention. Travel time is determined primarily by slope, flow length, depth of flow, and roughness of flow surfaces. Peak rates of discharge are based on the relationship of the above parameters, as well as the total drainage area of the watershed, the location of the development in relation to the total drainage area, and the effect of any flood control works or other manmade storage. Peak rates of discharge are also influenced by the distribution of rainfall within a given storm event.

Stormwater management computations for the full-build were performed using a SCS-based *HYDROCAD* for existing and proposed conditions, curve numbers, time of concentrations and unit hydrograph computations. NOAA Atlas 14, NOAA Hydrometeorological Design Studies Center, September 2015 was used for the 24-hr design storm.

Existing Conditions

Table 1. Shows the curve numbers, areas and times of concentration used to develop the pre-development hydrologic model of the site.

Table 1. – Existing Conditions					
Sub-Areas	**Surface Cover**	**Curve Number (CN)**	**Area (SF)**	**Tc (Mins.)**	**Remarks**
Area #1				6.0	
	Exist Bldg.	98	7,725		
	Exist. Imp.	98	13,660		Driveway & Walks
	Exist. Ledge	98	8,078		
	Lawn Areas	79	3,614		
		Total Area	29,463		Incls. Easement areas
*CN based on Class D soils.					

Proposed Conditions

The proposed conditions will result in a new collection system that will collect the site run-off from the proposed building and direct it to underground leaching systems prior to overflowing off-site.

Table 2. Shows the curve numbers, areas and times of concentration used to develop the post-development hydrologic model of the site.

Table 2. – Proposed Conditions					
Sub-Areas	**Surface Cover**	**Curve Number (CN)**	**Area (SF)**	**Tc (Mins.)**	**Remarks**
Area #1				6.0	
	Prop. Building	98	13,548		
Area #2				6.0	
	Prop. Drive	98	2,775		
Area #3					
	Prop. Walk	98	2,118		
	Ledge	98	1,745		
	Prop. Landscaping	84	9,277		
		Total Area	29,463		
*CN based on Class D soils.					

Peak Rate Summary

Table 3. Shows the peak runoff for the existing, as well as for the developed site at 2-, 10-, 25- and 100-year design storms.

Areas	Design Storm	Existing Runoff* (CFS)	Existing Volume* (Ac-Ft)	Proposed Runoff* (CFS)	Proposed Volume* (Ac-Ft)
Offsite Flow					
	2-yr.	2.15	0.168	1.38	0.104
	10-yr.	3.26	0.260	2.82	0.193
	25-yr	4.14	0.333	4.05	0.264
	100-yr.	5.93	0.482	6.08	0.411

Recharge to Groundwater (Standard 3)

The change in groundcover for the new development will change by decreasing the impervious area by approximately 9,200 sf.

Required Recharge Volume for the entire site was calculated in accordance with the Massachusetts Stormwater Management Standards:

Rv = F * impervious area (in acres)
Rv = (0.10/12) * 0.463 = 0.004 Ac-ft. = 168.2 CF

Rv = Required Recharge Volume;
F = Target Depth Factor (0.10 in. for soils of Hydrologic Soil Group D);
Impervious area = building, pavement on site in post development condition (0.463 Ac).

The proposed onsite leaching systems will infiltrate over 168.2 CF in the 2-year storm event alone. This requirement has been met.

Removal of TSS (Standard 4)

The underground stormwater storage is sized based on the building roof footprint, which will be clean runoff. Therefore, TSS removal is not anticipated.

Land Uses with Higher Potential Pollutant Loads (Standard 5)

The use proposed does not differ from the current use of the space and has no higher potential for pollution.

Critical Areas (Standard 6 – Water Quality Treatments)

This site does not lie within a critical area. One-half inch (1/2") of runoff is the standard for treatment relative to water quality, but as stated prior, the proposed use will not create pollutants in excess of what exists today.

Redevelopment (Standard 7)

Redevelopment projects are those that involve development, rehabilitation or expansion on previously developed sites provided the redevelopment results in no net increase in impervious area. Furthermore, components of redevelopment project, which include development of previously undeveloped sites, do not fall under Standard 7. In addition, redevelopment of previously developed sites must meet the Stormwater Management Standards to the maximum extent practicable. However, if it is not practicable to meet all the Standards, new (retrofitted or expanded) stormwater management systems must be designed to improve existing conditions.

The project, as proposed, is a new building on an existing site that has been previously developed. In addition, the proposed development decreased the impervious area onsite. GBSE has considered this project a re-development and we have met all of the applicable standards of the Massachusetts Stormwater Policy to the maximum extent possible.

Erosion and Sedimentation Controls (Standard 8)

Erosion control is depicted on the Proposed Site Plan provided as part of the application.

Operation and Maintenance Plan (Standard 9)

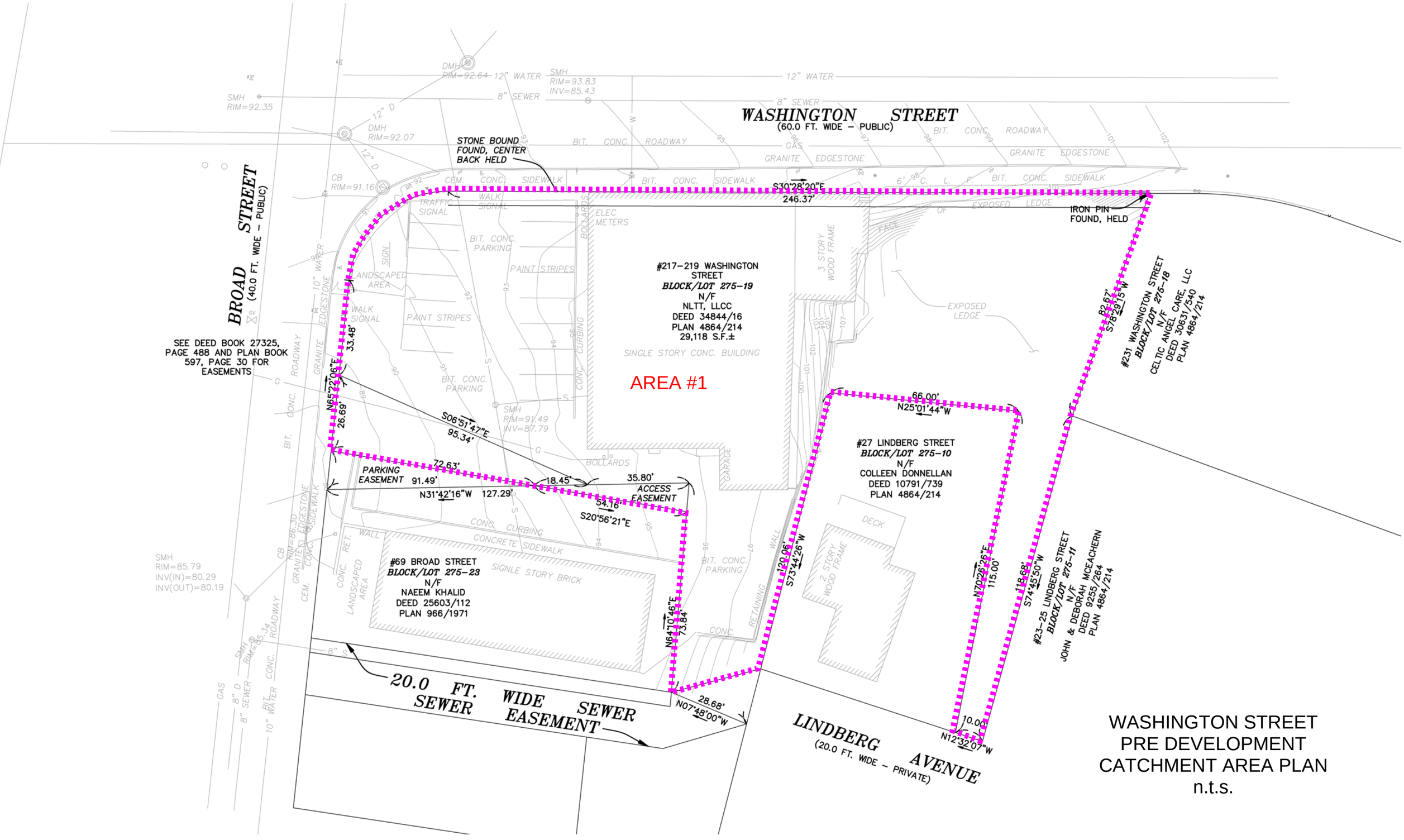
An Operation and Maintenance (O&M) Plan is provided as part of the application.

Prohibition of Illicit Discharges

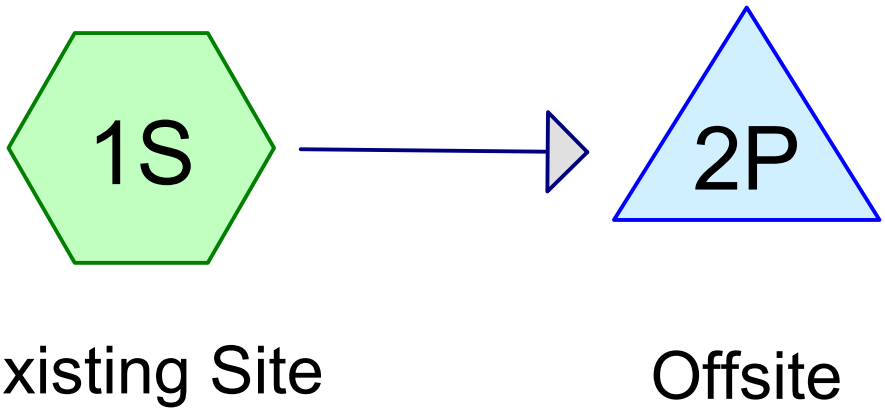
The Owner and User of the facility, assures that there will not be illicit discharges to the nearby wetlands from the proposed facility.

Floodplain (310 CMR 10.57)

The project site does not fall with a floodplain district.



WASHINGTON STREET
PRE DEVELOPMENT
CATCHMENT AREA PLAN
n.t.s.



Subcat Reach Pond Link

Routing Diagram for Washington Street - Pre Development
Prepared by HP, Printed 1/11/2022

Washington Street - Pre Development

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.177	98	Existing Building (1S)
0.185	98	Existing Ledge Outcrop (1S)
0.314	98	Paved parking, HSG D (1S)
0.676	**98**	**TOTAL AREA**

Summary for Subcatchment 1S: Existing Site

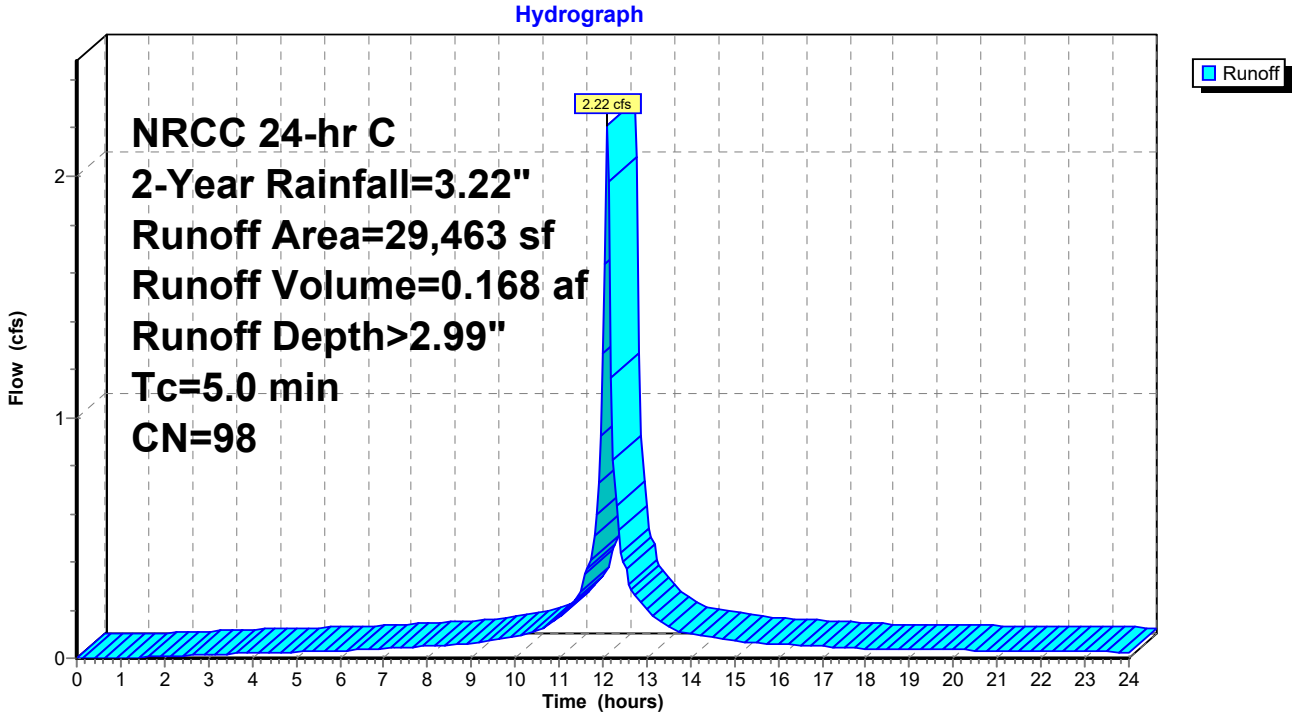
Runoff = 2.22 cfs @ 12.11 hrs, Volume= 0.168 af, Depth> 2.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
NRCC 24-hr C 2-Year Rainfall=3.22"

	Area (sf)	CN	Description
*	7,725	98	Existing Building
*	8,078	98	Existing Ledge Outcrop
	13,660	98	Paved parking, HSG D
	29,463	98	Weighted Average
	29,463		100.00% Impervious Area

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

Subcatchment 1S: Existing Site

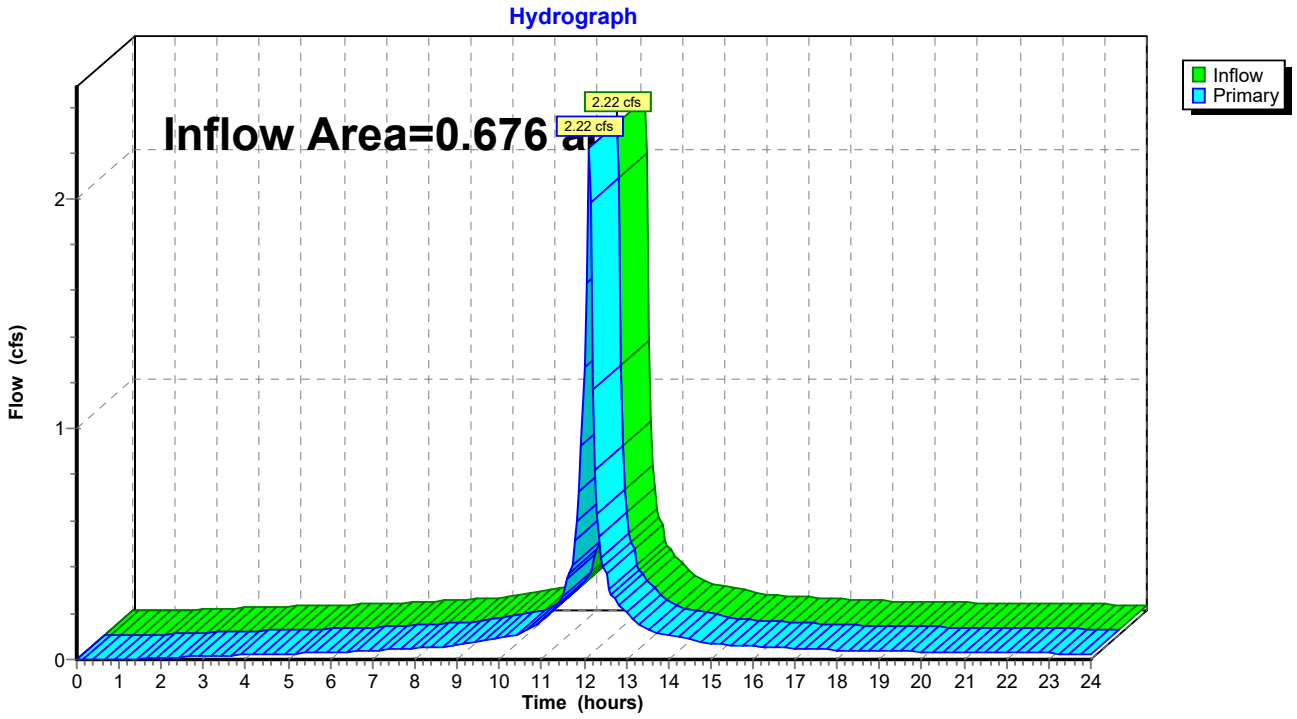


Summary for Pond 2P: Offsite

Inflow Area = 0.676 ac,100.00% Impervious, Inflow Depth > 2.99" for 2-Year event
Inflow = 2.22 cfs @ 12.11 hrs, Volume= 0.168 af
Primary = 2.22 cfs @ 12.11 hrs, Volume= 0.168 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Pond 2P: Offsite



Summary for Subcatchment 1S: Existing Site

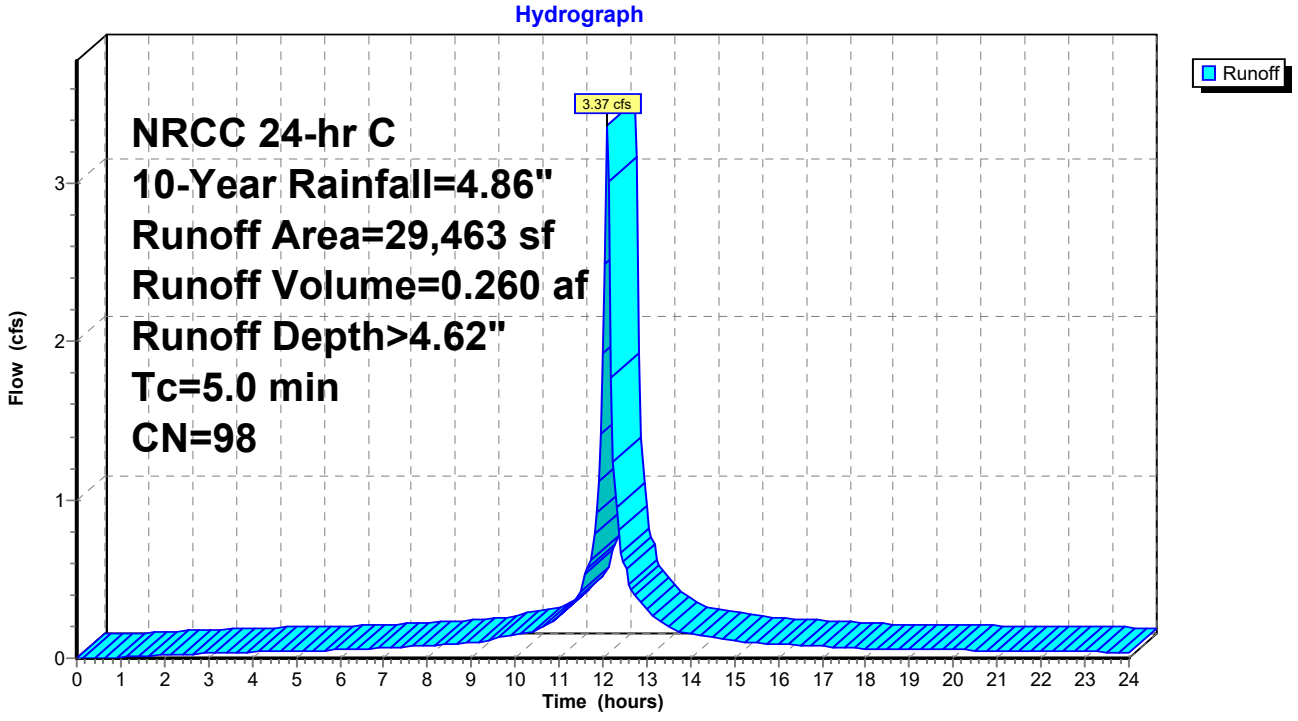
Runoff = 3.37 cfs @ 12.11 hrs, Volume= 0.260 af, Depth> 4.62"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
NRCC 24-hr C 10-Year Rainfall=4.86"

	Area (sf)	CN	Description
*	7,725	98	Existing Building
*	8,078	98	Existing Ledge Outcrop
	13,660	98	Paved parking, HSG D
	29,463	98	Weighted Average
	29,463		100.00% Impervious Area

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

Subcatchment 1S: Existing Site

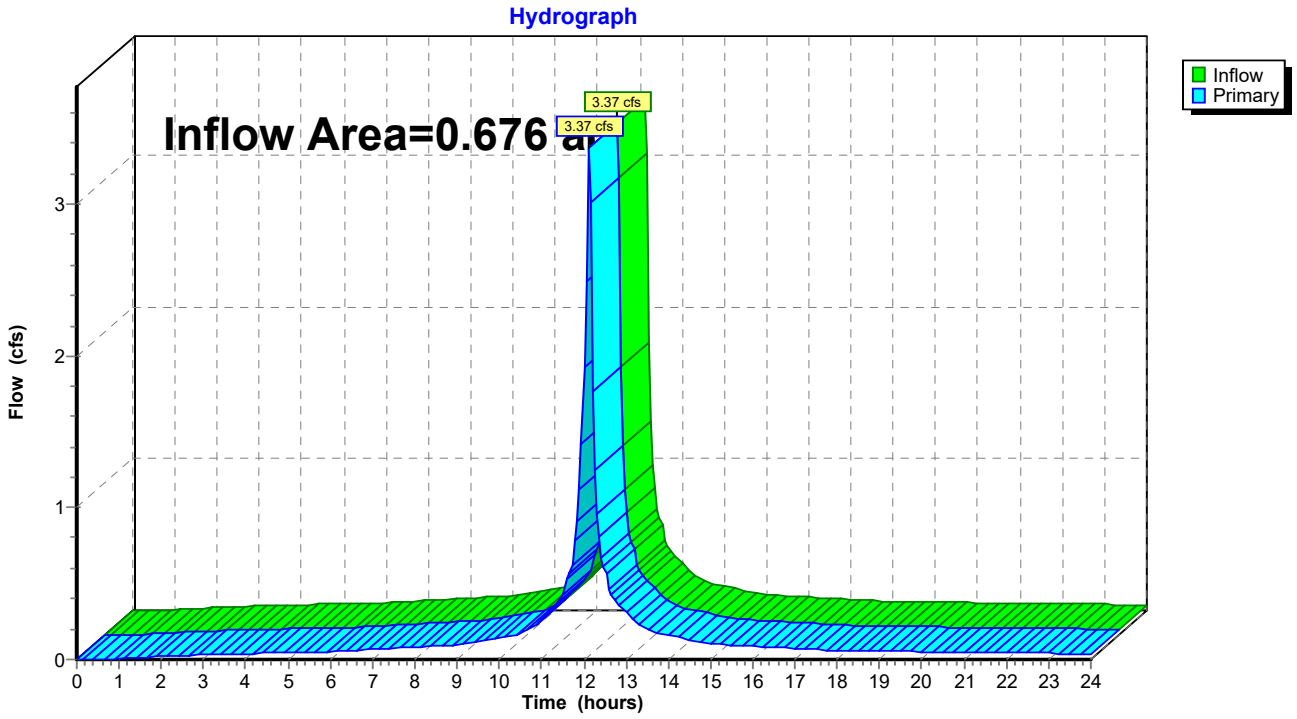


Summary for Pond 2P: Offsite

Inflow Area = 0.676 ac,100.00% Impervious, Inflow Depth > 4.62" for 10-Year event
Inflow = 3.37 cfs @ 12.11 hrs, Volume= 0.260 af
Primary = 3.37 cfs @ 12.11 hrs, Volume= 0.260 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Pond 2P: Offsite



Summary for Subcatchment 1S: Existing Site

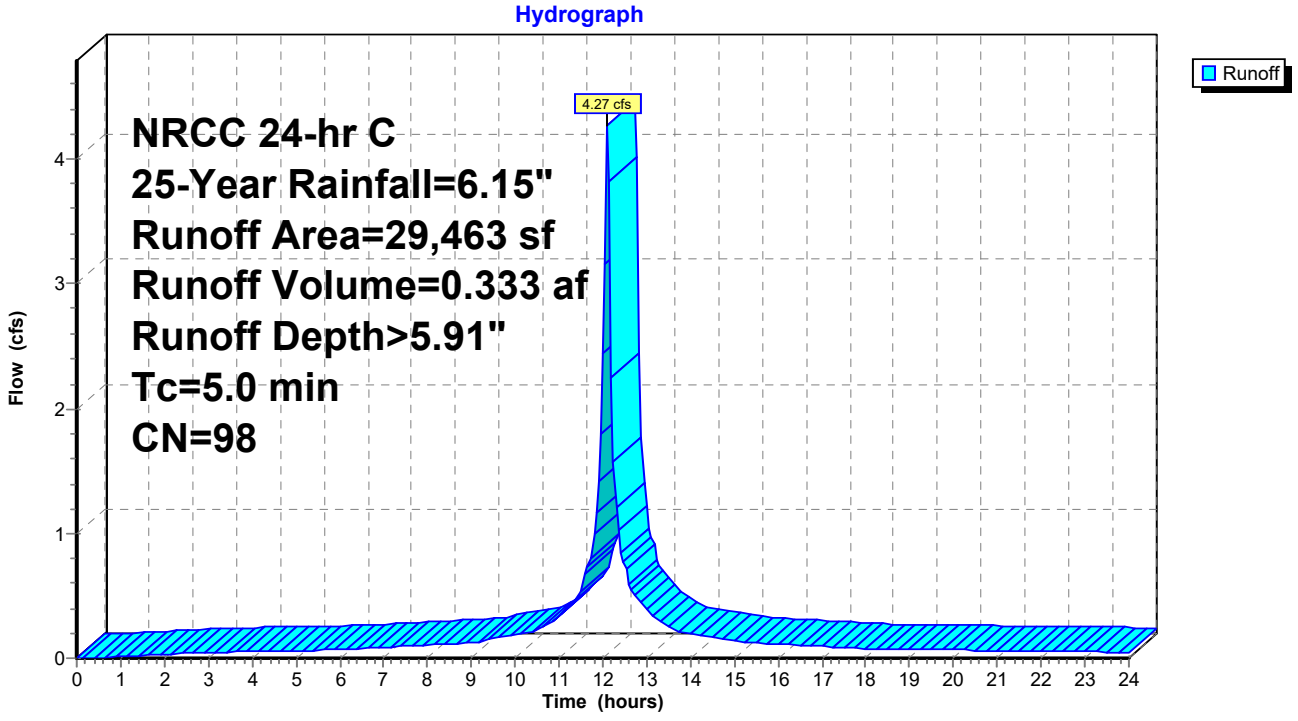
Runoff = 4.27 cfs @ 12.11 hrs, Volume= 0.333 af, Depth> 5.91"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
NRCC 24-hr C 25-Year Rainfall=6.15"

	Area (sf)	CN	Description
*	7,725	98	Existing Building
*	8,078	98	Existing Ledge Outcrop
	13,660	98	Paved parking, HSG D
	29,463	98	Weighted Average
	29,463		100.00% Impervious Area

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

Subcatchment 1S: Existing Site

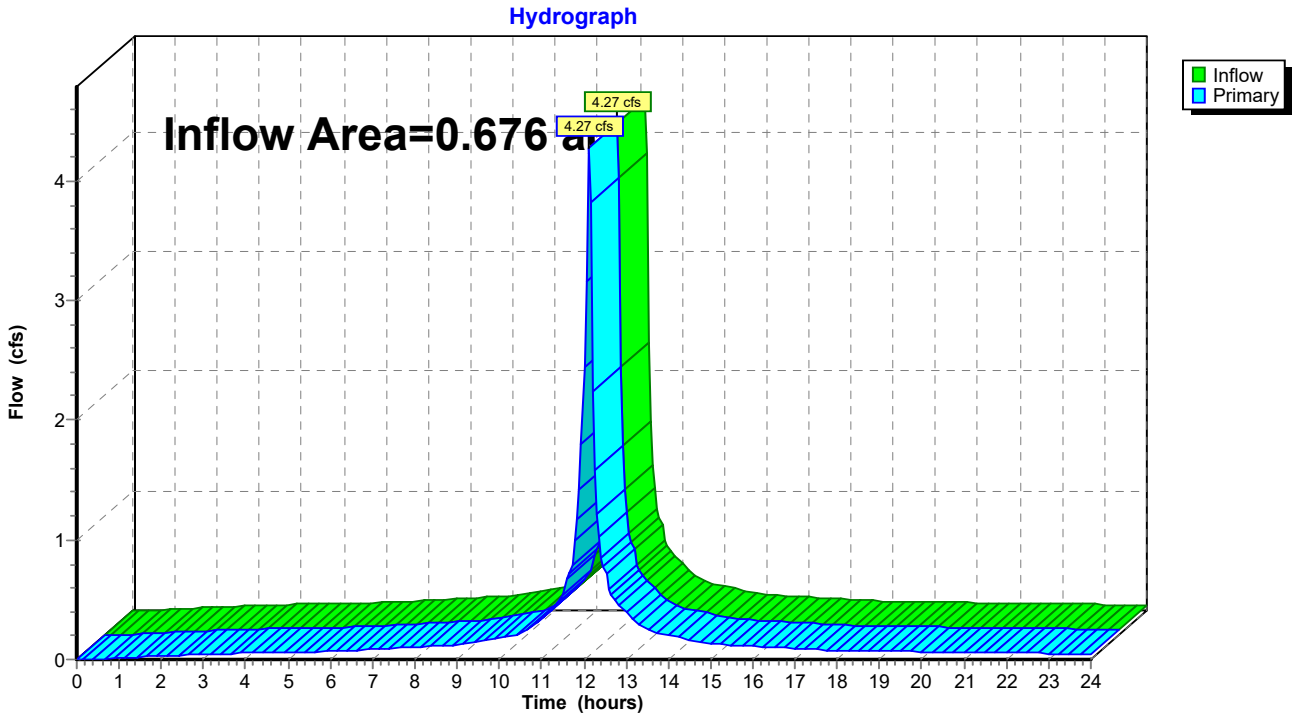


Summary for Pond 2P: Offsite

Inflow Area = 0.676 ac,100.00% Impervious, Inflow Depth > 5.91" for 25-Year event
Inflow = 4.27 cfs @ 12.11 hrs, Volume= 0.333 af
Primary = 4.27 cfs @ 12.11 hrs, Volume= 0.333 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Pond 2P: Offsite



Summary for Subcatchment 1S: Existing Site

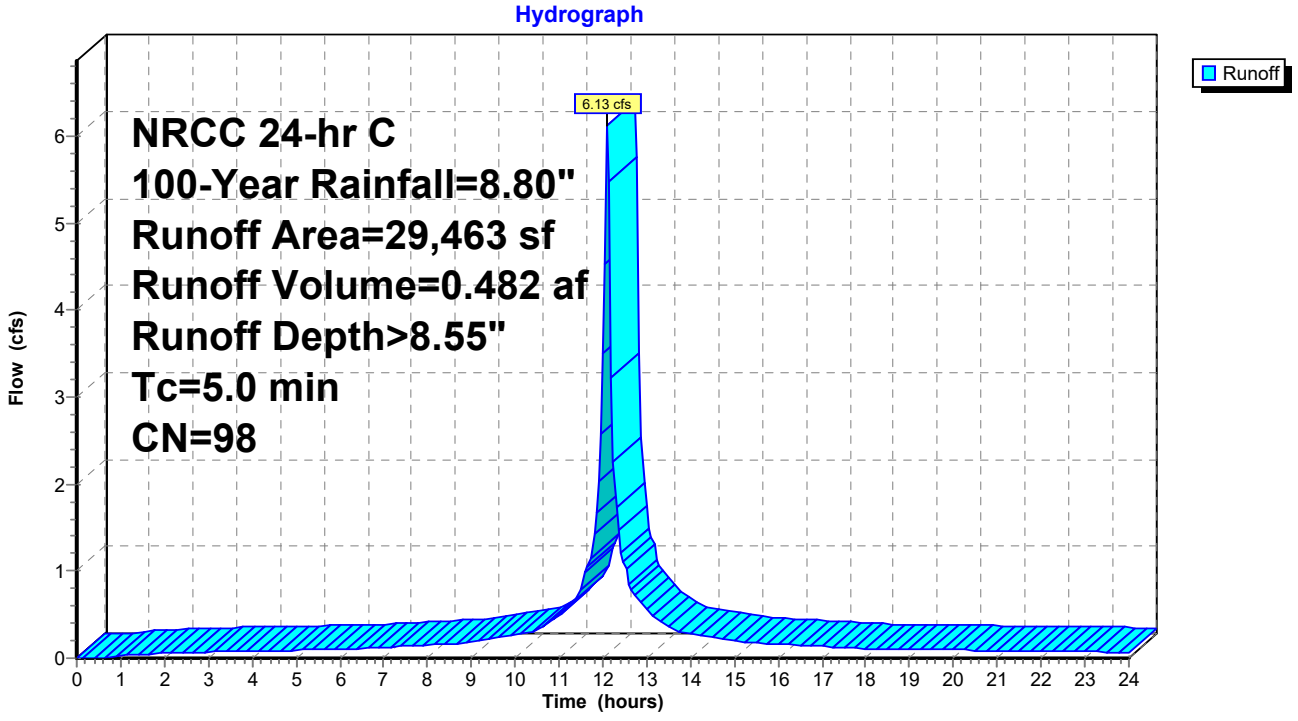
Runoff = 6.13 cfs @ 12.11 hrs, Volume= 0.482 af, Depth> 8.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
NRCC 24-hr C 100-Year Rainfall=8.80"

	Area (sf)	CN	Description
*	7,725	98	Existing Building
*	8,078	98	Existing Ledge Outcrop
	13,660	98	Paved parking, HSG D
	29,463	98	Weighted Average
	29,463		100.00% Impervious Area

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

Subcatchment 1S: Existing Site

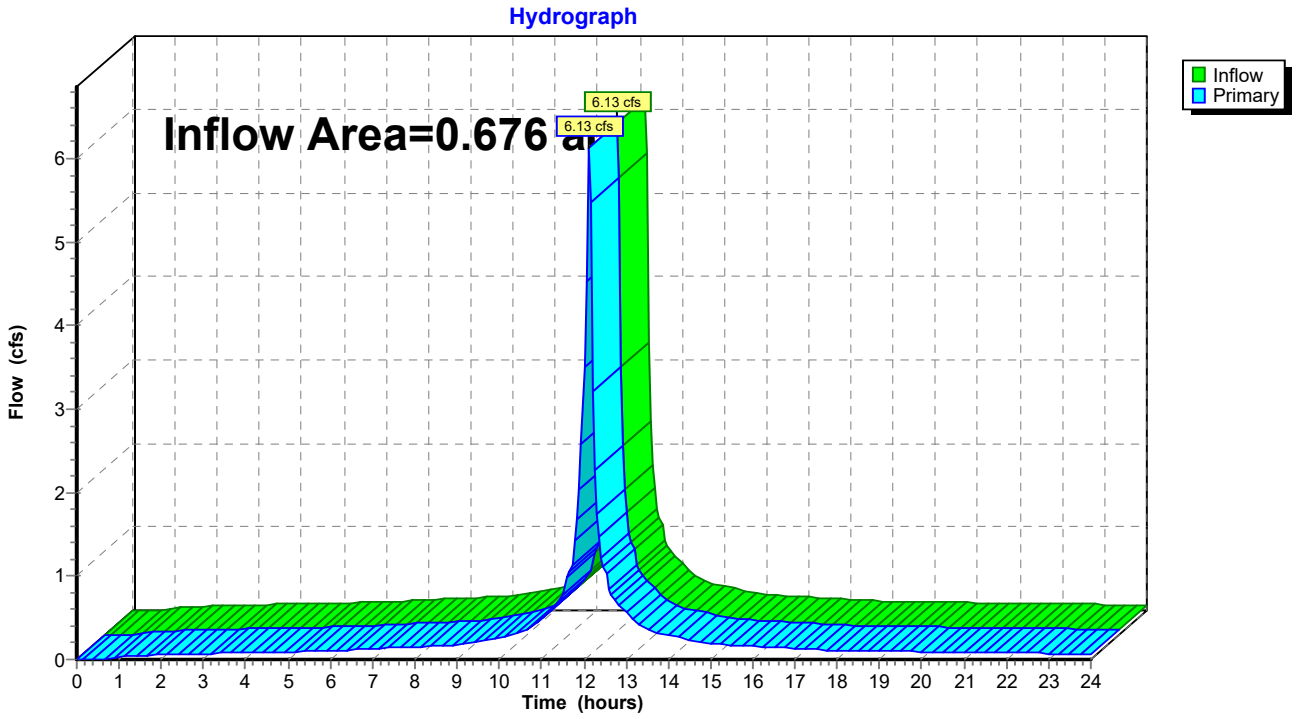


Summary for Pond 2P: Offsite

Inflow Area = 0.676 ac,100.00% Impervious, Inflow Depth > 8.55" for 100-Year event
Inflow = 6.13 cfs @ 12.11 hrs, Volume= 0.482 af
Primary = 6.13 cfs @ 12.11 hrs, Volume= 0.482 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Pond 2P: Offsite



PROP. 8" DI SERVICE
END AT PL

WASHINGTON STREET
(60.0 FT. WIDE – PUBLIC)

BROAD STREET
(40.0 FT. WIDE – PUBLIC)

PROP. 4" DI FIRE SERVICE

PROP. 2" COPPER TYPE K WATER SERVICE

STONE BOUND FOUND, CENTER BACK HELD

S=2.0% MIN.

S30°28'20"E
246.37'

IRON PIN FOUND, HELD

BACKFLOW

1" METER

REUSE EXISTING SEWER. PARKING GARAGE DRAINAGE TO BE PUMPED TO SEWER. REFER TO PLUMBING PLAN

3-STORY
27-UNIT RESIDENTIAL
BUILDING
FF=92.0
BASEMENT SLAB=82.5

#217-219 WASHINGTON STREET
BLOCK/LOT 275-19
N/F
NLTT, LLCC
DEED 34844/16
PLAN 4864/214
29,118 S.F.±

LIMITS OF PARKING/FOUNDATION BELOW

PROPOSED ROOF TO BE COLLECTED AND DRAINED TO INFILTRATION SYSTEM #1

AREA #2

SEE DEED BOOK 27325, PAGE 488 AND PLAN BOOK 597, PAGE 30 FOR EASEMENTS

N55°32'06"E 33.48'

26.69'

DMH #1
RIM=88.30
INV (A)=85.1
INV (B)=85.0

S06°51'47"E 95.34'

72.63'

DMH #2
RIM=87.5
INV (A)=84.5
INV (B)=84.4

6" PVC

PARKING EASEMENT 91.49

N31°42'16"W 127.29'

10.45'

35.80'

ACCESS EASEMENT

AREA #1

54.16'

S20°56'21"E

RE-ROUTE EXISTING SEWER. VERIFY INVERTS IN FIELD. 2% MIN. SLOPE

#69 BROAD STREET
BLOCK/LOT 275-23
N/F
NAEEM KHALID
DEED 25603/112
PLAN 966/1971

INFILTRATION SYSTEM #1
INV.=87.70
BOTTOM=86.15
STONE=85.15

SMH
RIM=85.79
INV(IN)=80.29
INV(OUT)=80.19
INV (A)=80.30

N64°10'46"E 73.84'

S73°14'26"W 120.06'

66.00'
N25°01'44"W

#27 LINDBERG STREET
BLOCK/LOT 275-10
N/F
COLLEEN DONNELLAN
DEED 10791/739
PLAN 4864/214

N70°29'26"E 115.00'

S74°45'50"W 118.68'

#23-25 LINDBERG STREET
BLOCK/LOT 275-11
N/F
JOHN & DEBORAH MCEACHERN
DEED 9255/264
PLAN 4864/214

82.67'
S78°29'15"W

#231 WASHINGTON STREET
BLOCK/LOT 275-18
N/F
CELTIC ANGEL CARE, LLC
DEED 30631/540
PLAN 4864/214

20.0 FT. WIDE SEWER EASEMENT

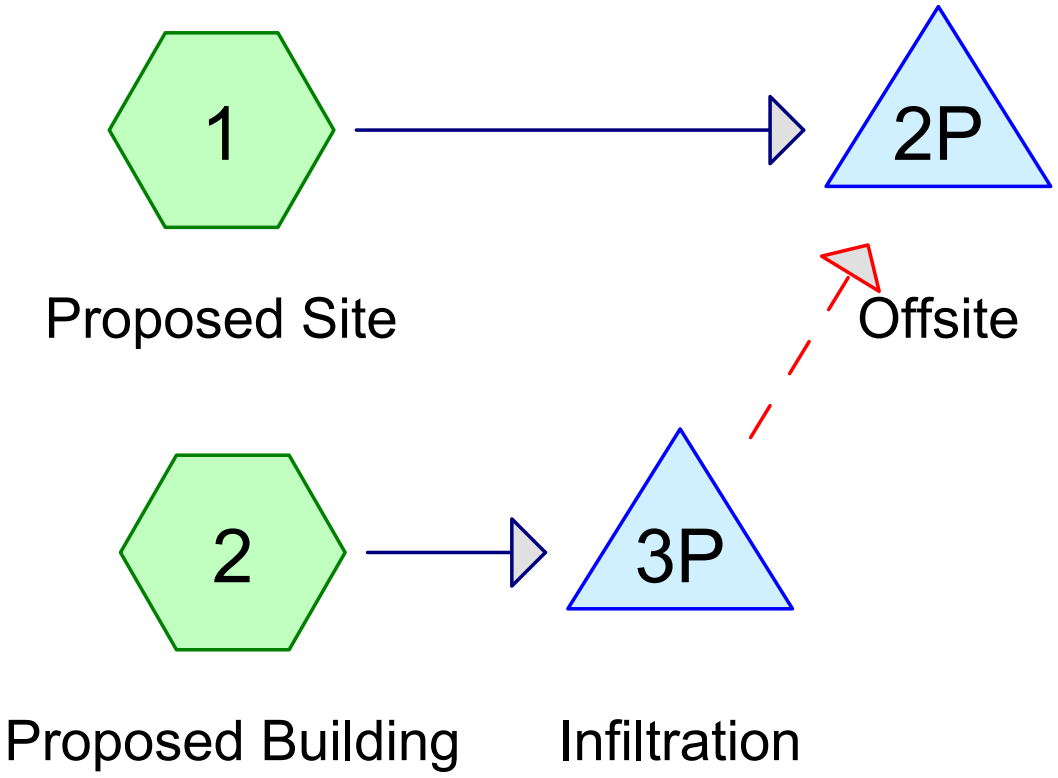
28.68'
N07°48'00"W

10.05'
N12°32'07"W

LINDBERG AVENUE
(20.0 FT. WIDE – PRIVATE)

WASHINGTON STREET POST DEVELOPMENT CATCHMENT AREA PLAN

n.t.s.



Subcat Reach Pond Link

Routing Diagram for Washington Street - Post Development
Prepared by HP, Printed 2/2/2022

Washington Street - Post Development

Prepared by HP

Printed 2/2/2022

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.213	84	50-75% Grass cover, Fair, HSG D (1)
0.040	98	Ledge (1)
0.311	98	Prop. Building (2)
0.049	98	Proposed Conc. Walks (1)
0.064	98	Proposed Drvie (1)
0.676	**94**	**TOTAL AREA**

Washington Street - Post Development
Prepared by HP

Summary for Subcatchment 1: Proposed Site

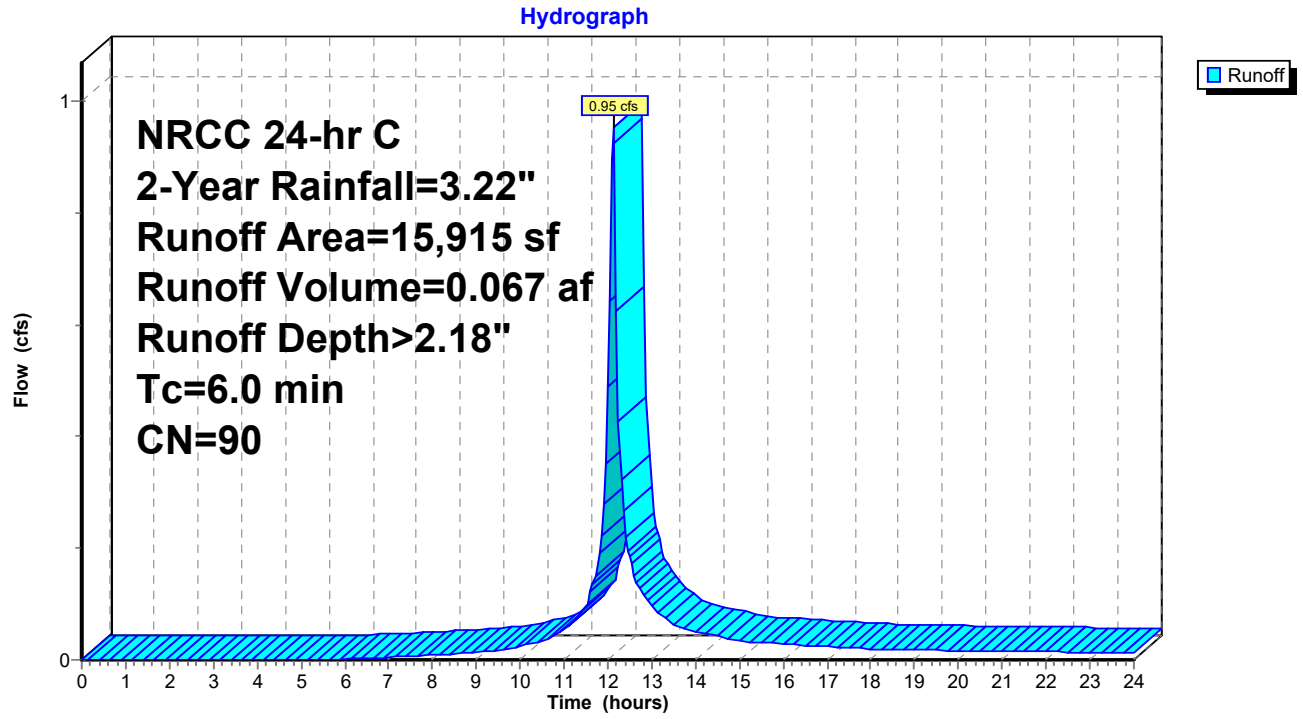
Runoff = 0.95 cfs @ 12.13 hrs, Volume= 0.067 af, Depth> 2.18"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
NRCC 24-hr C 2-Year Rainfall=3.22"

	Area (sf)	CN	Description
*	2,775	98	Proposed Drvie
*	2,118	98	Proposed Conc. Walks
*	1,745	98	Ledge
	9,277	84	50-75% Grass cover, Fair, HSG D
	15,915	90	Weighted Average
	9,277		58.29% Pervious Area
	6,638		41.71% Impervious Area

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

Subcatchment 1: Proposed Site



Washington Street - Post Development
Prepared by HP

Summary for Subcatchment 2: Proposed Building

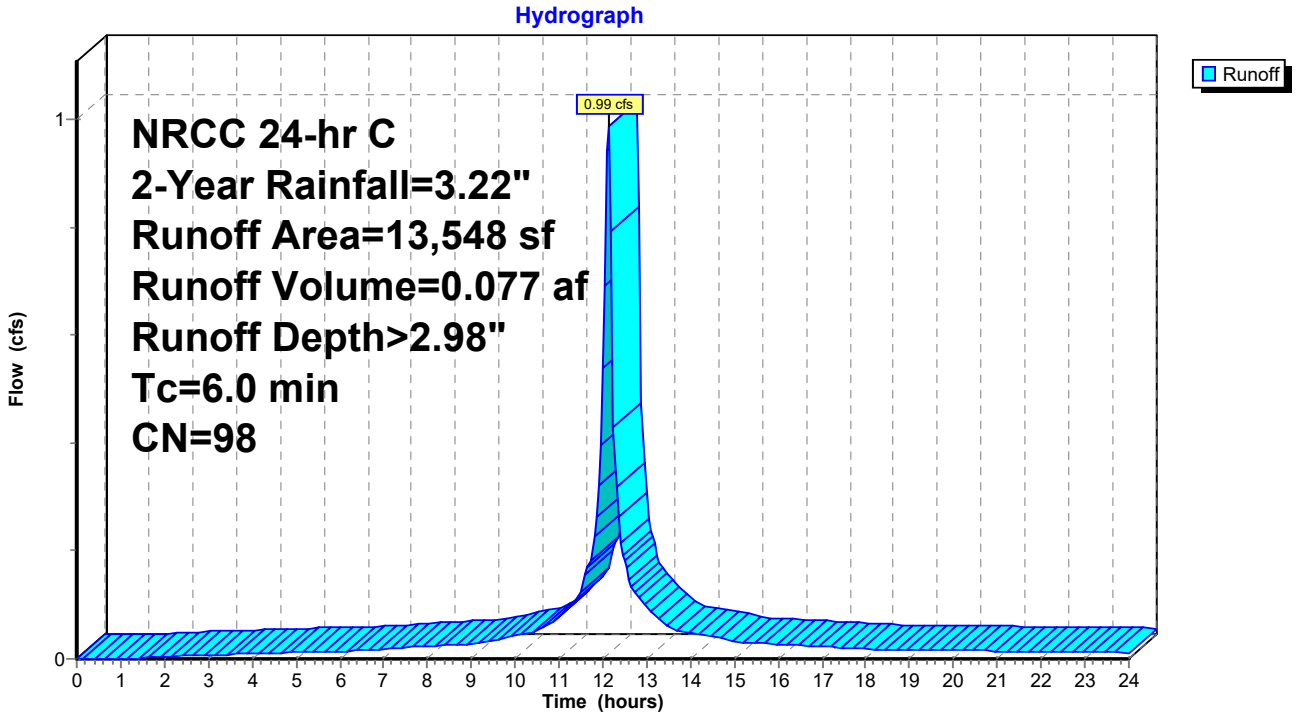
Runoff = 0.99 cfs @ 12.13 hrs, Volume= 0.077 af, Depth> 2.98"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
NRCC 24-hr C 2-Year Rainfall=3.22"

	Area (sf)	CN	Description
*	13,548	98	Prop. Building
	13,548		100.00% Impervious Area

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

Subcatchment 2: Proposed Building

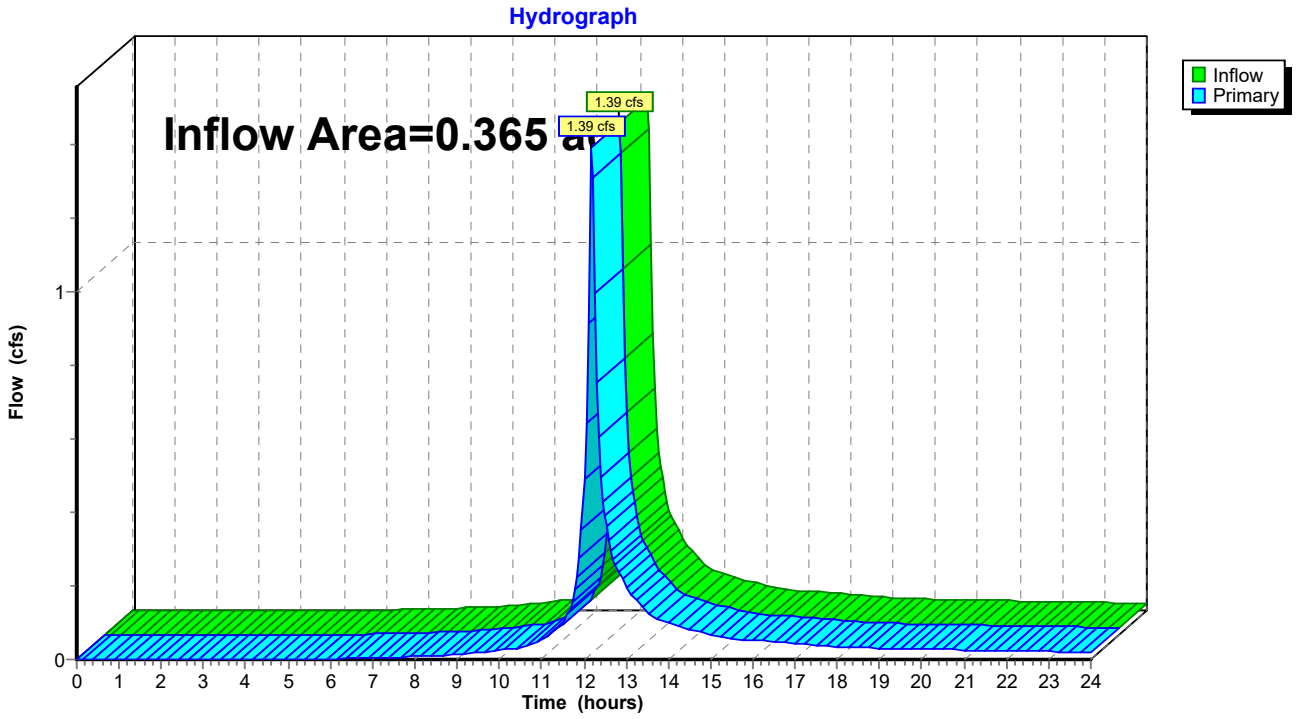


Summary for Pond 2P: Offsite

Inflow Area = 0.365 ac, 41.71% Impervious, Inflow Depth > 3.42" for 2-Year event
Inflow = 1.39 cfs @ 12.17 hrs, Volume= 0.104 af
Primary = 1.39 cfs @ 12.17 hrs, Volume= 0.104 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Pond 2P: Offsite



Summary for Pond 3P: Infiltration

Inflow Area = 0.311 ac,100.00% Impervious, Inflow Depth > 2.98" for 2-Year event
Inflow = 0.99 cfs @ 12.13 hrs, Volume= 0.077 af
Outflow = 0.69 cfs @ 12.21 hrs, Volume= 0.046 af, Atten= 30%, Lag= 5.0 min
Discarded = 0.00 cfs @ 3.00 hrs, Volume= 0.008 af
Secondary = 0.69 cfs @ 12.21 hrs, Volume= 0.038 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 88.16' @ 12.21 hrs Surf.Area= 0.017 ac Storage= 0.036 af

Plug-Flow detention time= 211.8 min calculated for 0.046 af (59% of inflow)
Center-of-Mass det. time= 93.2 min (850.9 - 757.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	85.15'	0.014 af	**19.33'W x 38.50'L x 3.54'H Field A** 0.061 af Overall - 0.025 af Embedded = 0.036 af x 40.0% Voids
#2A	85.65'	0.025 af	**Cultec R-330XLHD** x 20 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 4 rows
		0.039 af	Total Available Storage

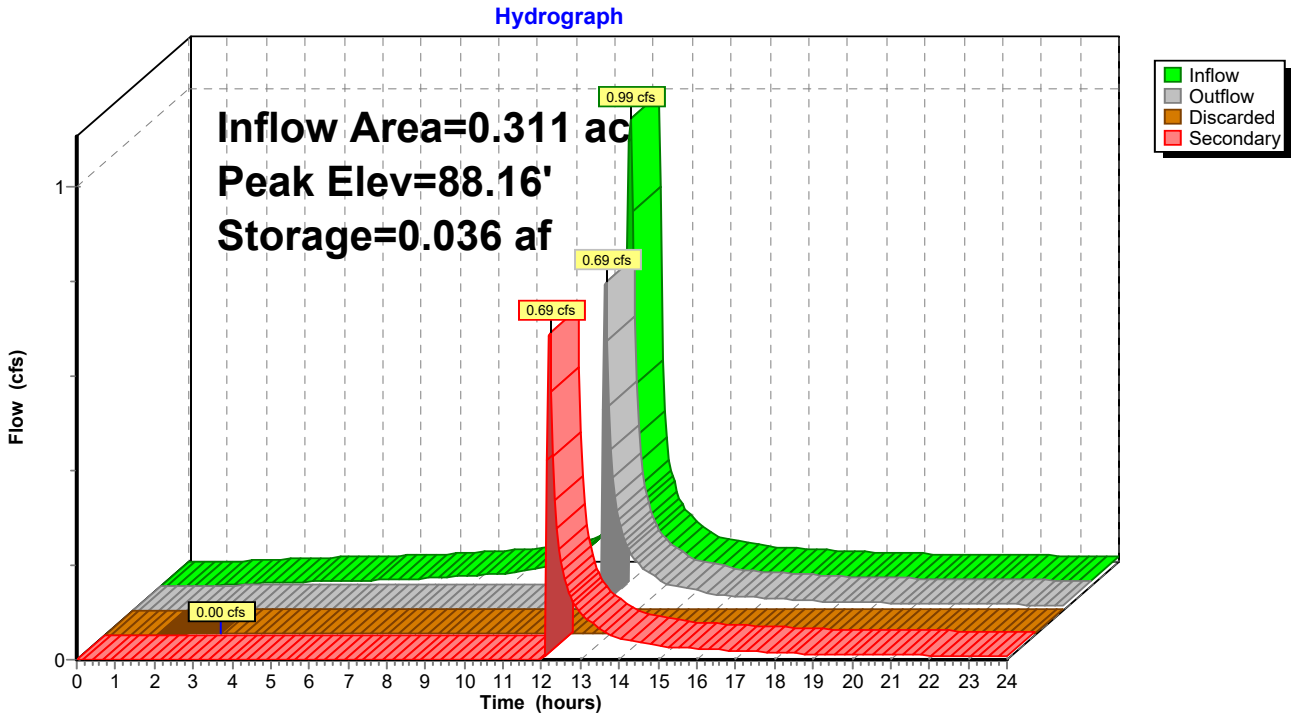
Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	85.15'	**0.270 in/hr Exfiltration over Surface area**
#2	Secondary	87.65'	**8.0" Vert. Orifice/Grate** C= 0.600

Discarded OutFlow Max=0.00 cfs @ 3.00 hrs HW=85.19' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.00 cfs)

Secondary OutFlow Max=0.66 cfs @ 12.21 hrs HW=88.14' (Free Discharge)
↑—**2=Orifice/Grate** (Orifice Controls 0.66 cfs @ 2.39 fps)

Pond 3P: Infiltration



Summary for Subcatchment 1: Proposed Site

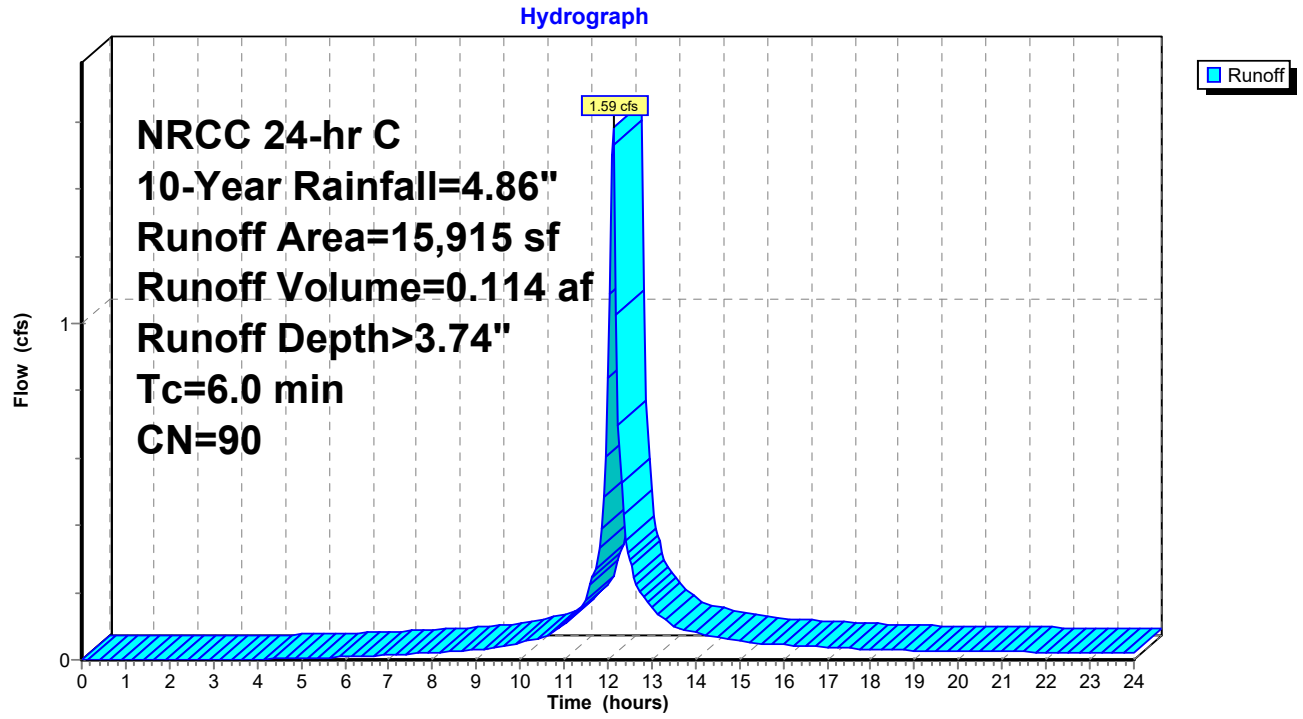
Runoff = 1.59 cfs @ 12.13 hrs, Volume= 0.114 af, Depth> 3.74"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
NRCC 24-hr C 10-Year Rainfall=4.86"

	Area (sf)	CN	Description
*	2,775	98	Proposed Drvie
*	2,118	98	Proposed Conc. Walks
*	1,745	98	Ledge
	9,277	84	50-75% Grass cover, Fair, HSG D
	15,915	90	Weighted Average
	9,277		58.29% Pervious Area
	6,638		41.71% Impervious Area

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

Subcatchment 1: Proposed Site



Summary for Subcatchment 2: Proposed Building

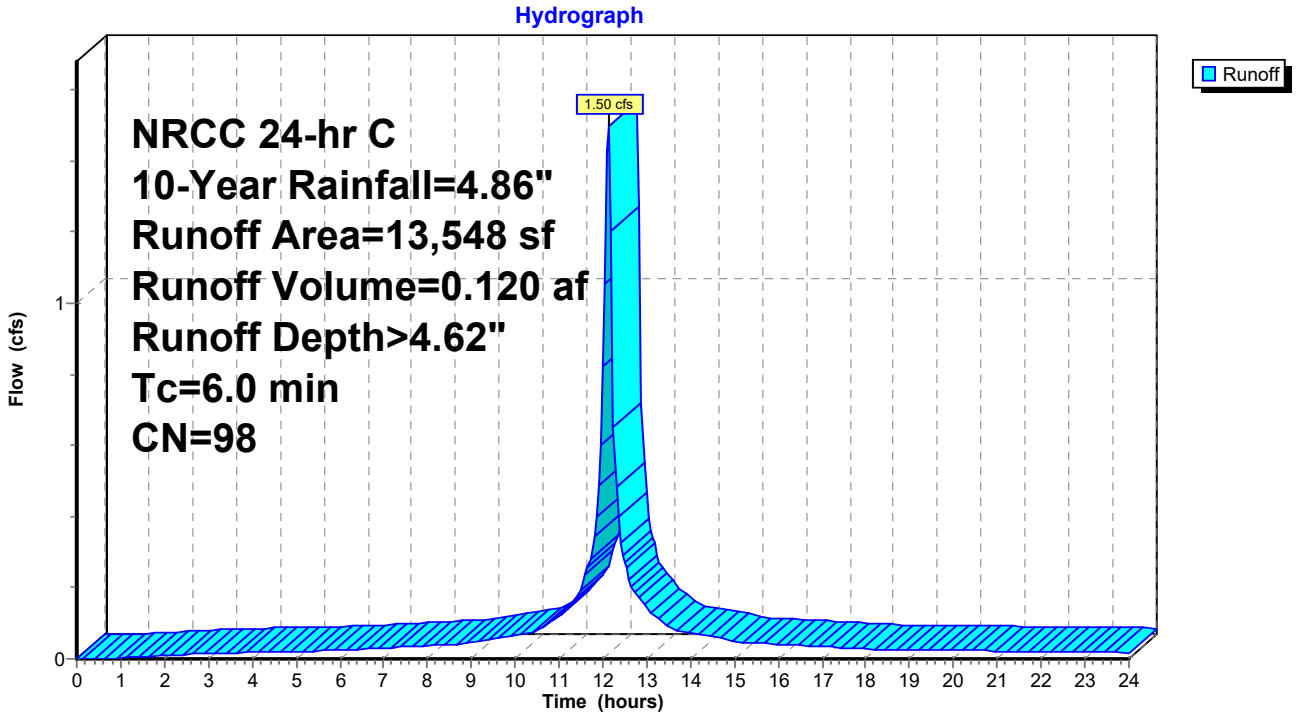
Runoff = 1.50 cfs @ 12.13 hrs, Volume= 0.120 af, Depth> 4.62"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
NRCC 24-hr C 10-Year Rainfall=4.86"

	Area (sf)	CN	Description
*	13,548	98	Prop. Building
	13,548		100.00% Impervious Area

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

Subcatchment 2: Proposed Building

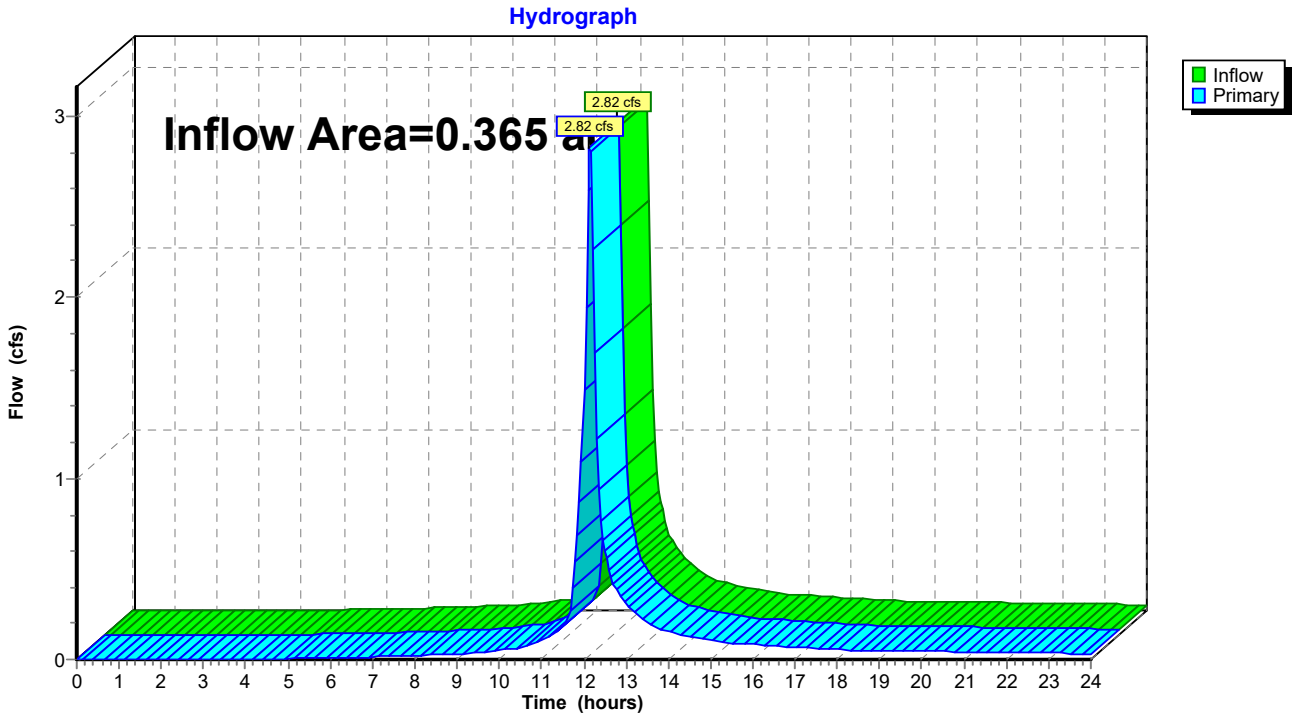


Summary for Pond 2P: Offsite

Inflow Area = 0.365 ac, 41.71% Impervious, Inflow Depth > 6.35" for 10-Year event
Inflow = 2.82 cfs @ 12.14 hrs, Volume= 0.193 af
Primary = 2.82 cfs @ 12.14 hrs, Volume= 0.193 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Pond 2P: Offsite



Summary for Pond 3P: Infiltration

Inflow Area = 0.311 ac,100.00% Impervious, Inflow Depth > 4.62" for 10-Year event
Inflow = 1.50 cfs @ 12.13 hrs, Volume= 0.120 af
Outflow = 1.29 cfs @ 12.17 hrs, Volume= 0.088 af, Atten= 14%, Lag= 2.4 min
Discarded = 0.00 cfs @ 1.95 hrs, Volume= 0.009 af
Secondary = 1.28 cfs @ 12.17 hrs, Volume= 0.080 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 88.57' @ 12.17 hrs Surf.Area= 0.017 ac Storage= 0.038 af

Plug-Flow detention time= 174.9 min calculated for 0.088 af (74% of inflow)
Center-of-Mass det. time= 77.5 min (826.8 - 749.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	85.15'	0.014 af	**19.33'W x 38.50'L x 3.54'H Field A** 0.061 af Overall - 0.025 af Embedded = 0.036 af x 40.0% Voids
#2A	85.65'	0.025 af	**Cultec R-330XLHD** x 20 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 4 rows
		0.039 af	Total Available Storage

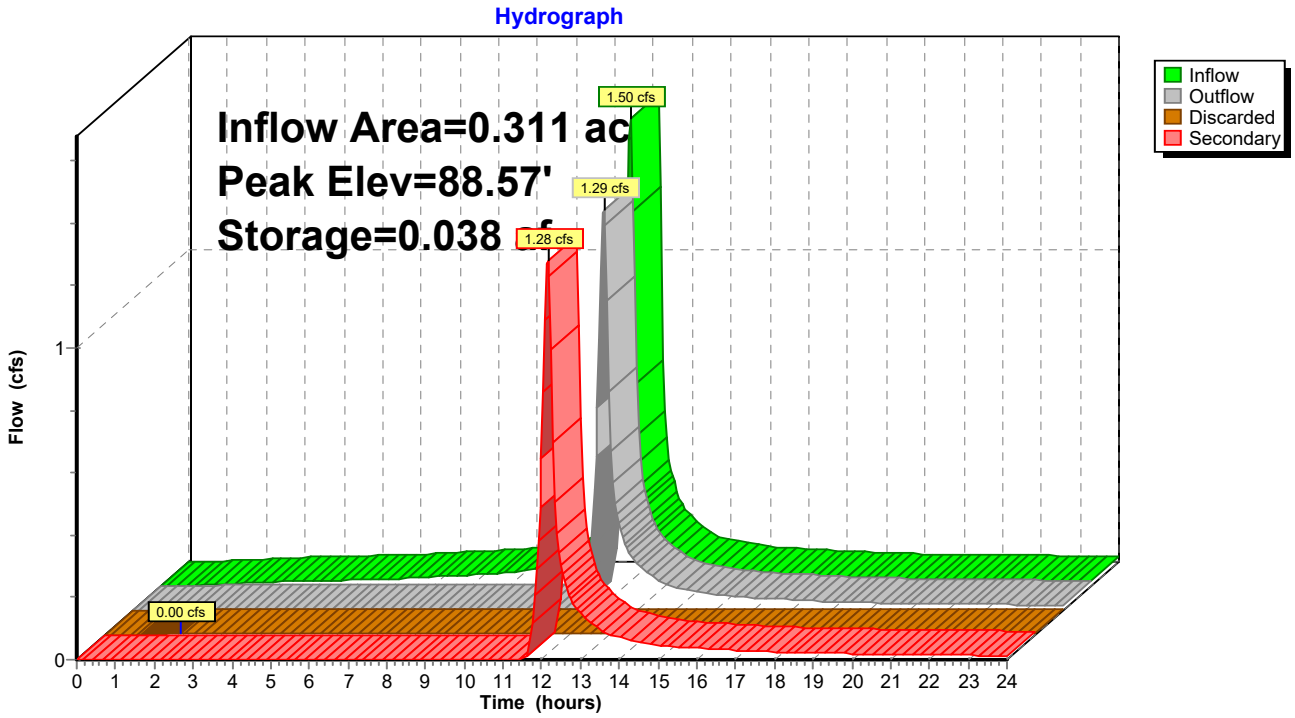
Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	85.15'	**0.270 in/hr Exfiltration over Surface area**
#2	Secondary	87.65'	**8.0" Vert. Orifice/Grate** C= 0.600

Discarded OutFlow Max=0.00 cfs @ 1.95 hrs HW=85.19' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.00 cfs)

Secondary OutFlow Max=1.26 cfs @ 12.17 hrs HW=88.54' (Free Discharge)
↑—**2=Orifice/Grate** (Orifice Controls 1.26 cfs @ 3.61 fps)

Pond 3P: Infiltration



Summary for Subcatchment 1: Proposed Site

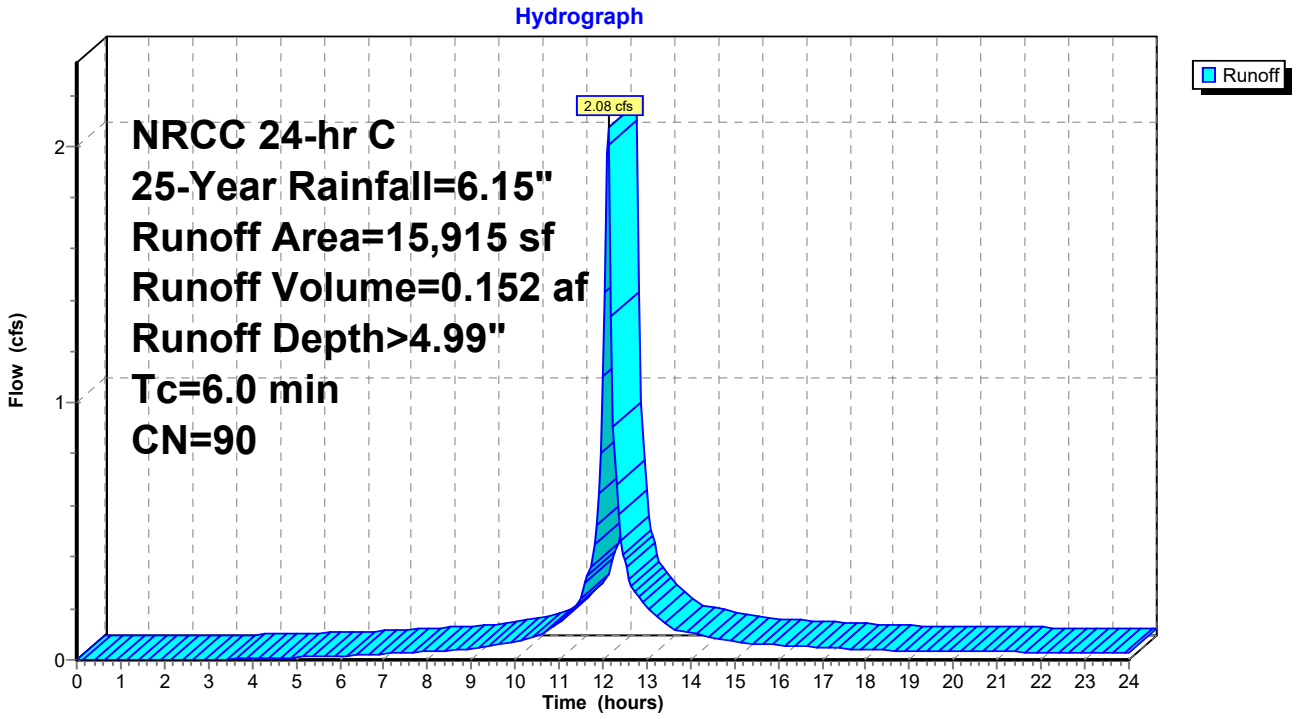
Runoff = 2.08 cfs @ 12.13 hrs, Volume= 0.152 af, Depth> 4.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
NRCC 24-hr C 25-Year Rainfall=6.15"

	Area (sf)	CN	Description
*	2,775	98	Proposed Drvie
*	2,118	98	Proposed Conc. Walks
*	1,745	98	Ledge
	9,277	84	50-75% Grass cover, Fair, HSG D
	15,915	90	Weighted Average
	9,277		58.29% Pervious Area
	6,638		41.71% Impervious Area

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

Subcatchment 1: Proposed Site



Summary for Subcatchment 2: Proposed Building

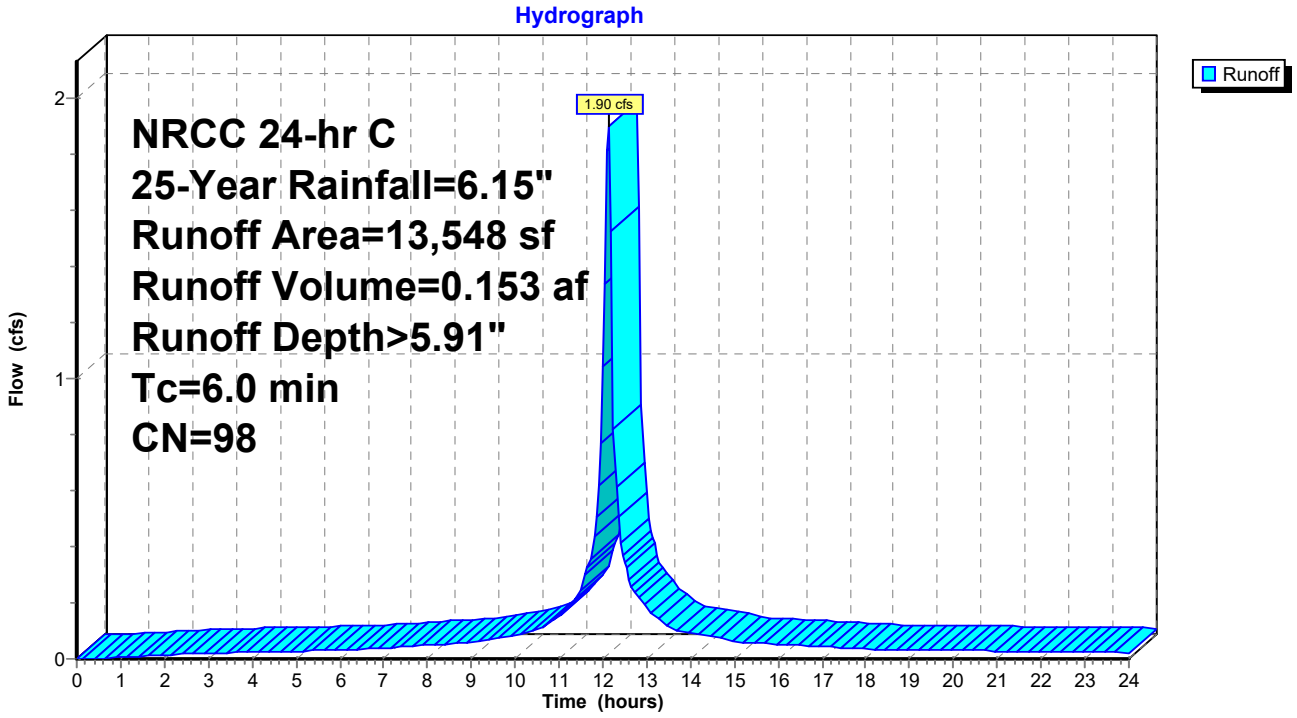
Runoff = 1.90 cfs @ 12.13 hrs, Volume= 0.153 af, Depth> 5.91"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
NRCC 24-hr C 25-Year Rainfall=6.15"

	Area (sf)	CN	Description
*	13,548	98	Prop. Building
	13,548		100.00% Impervious Area

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

Subcatchment 2: Proposed Building

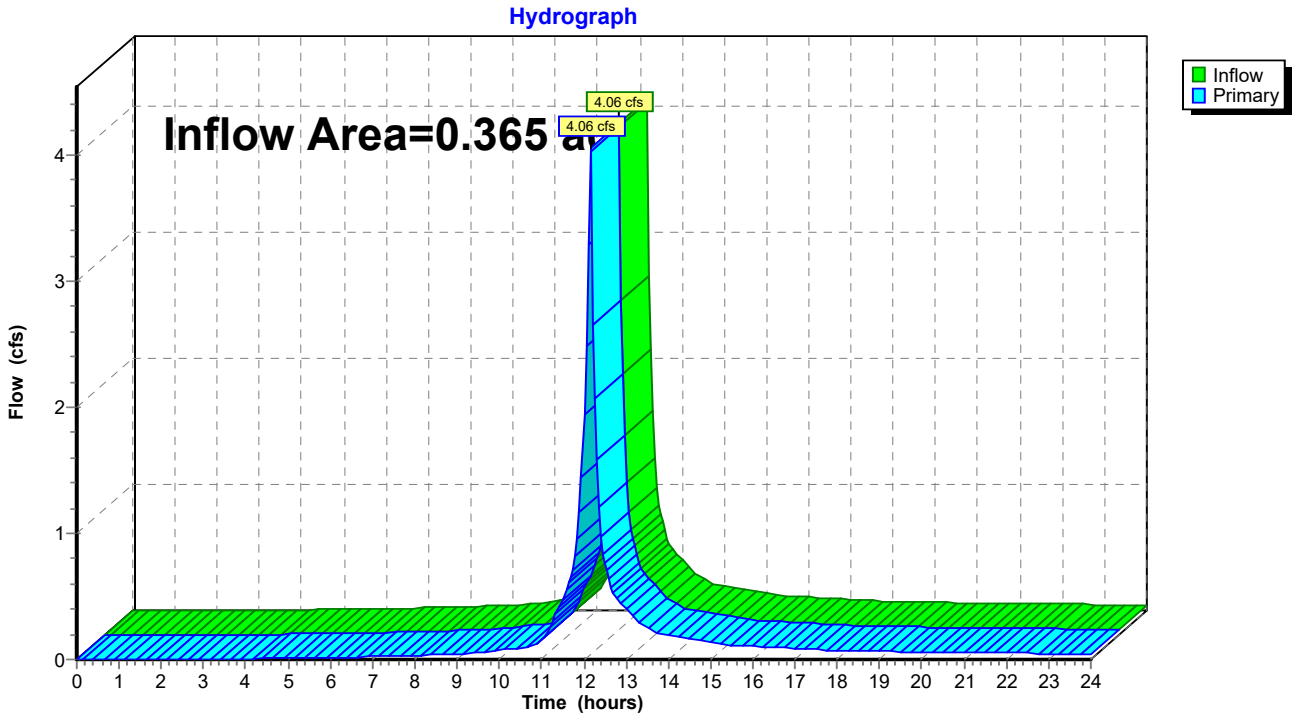


Summary for Pond 2P: Offsite

Inflow Area = 0.365 ac, 41.71% Impervious, Inflow Depth > 8.69" for 25-Year event
Inflow = 4.06 cfs @ 12.14 hrs, Volume= 0.265 af
Primary = 4.06 cfs @ 12.14 hrs, Volume= 0.265 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Pond 2P: Offsite



Summary for Pond 3P: Infiltration

Inflow Area = 0.311 ac,100.00% Impervious, Inflow Depth > 5.91" for 25-Year event
Inflow = 1.90 cfs @ 12.13 hrs, Volume= 0.153 af
Outflow = 2.03 cfs @ 12.15 hrs, Volume= 0.121 af, Atten= 0%, Lag= 1.4 min
Discarded = 0.00 cfs @ 1.50 hrs, Volume= 0.009 af
Secondary = 2.03 cfs @ 12.15 hrs, Volume= 0.113 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 89.44' @ 12.15 hrs Surf.Area= 0.017 ac Storage= 0.039 af

Plug-Flow detention time= 158.2 min calculated for 0.121 af (79% of inflow)
Center-of-Mass det. time= 72.1 min (817.4 - 745.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	85.15'	0.014 af	**19.33'W x 38.50'L x 3.54'H Field A** 0.061 af Overall - 0.025 af Embedded = 0.036 af x 40.0% Voids
#2A	85.65'	0.025 af	**Cultec R-330XLHD** x 20 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 4 rows
		0.039 af	Total Available Storage

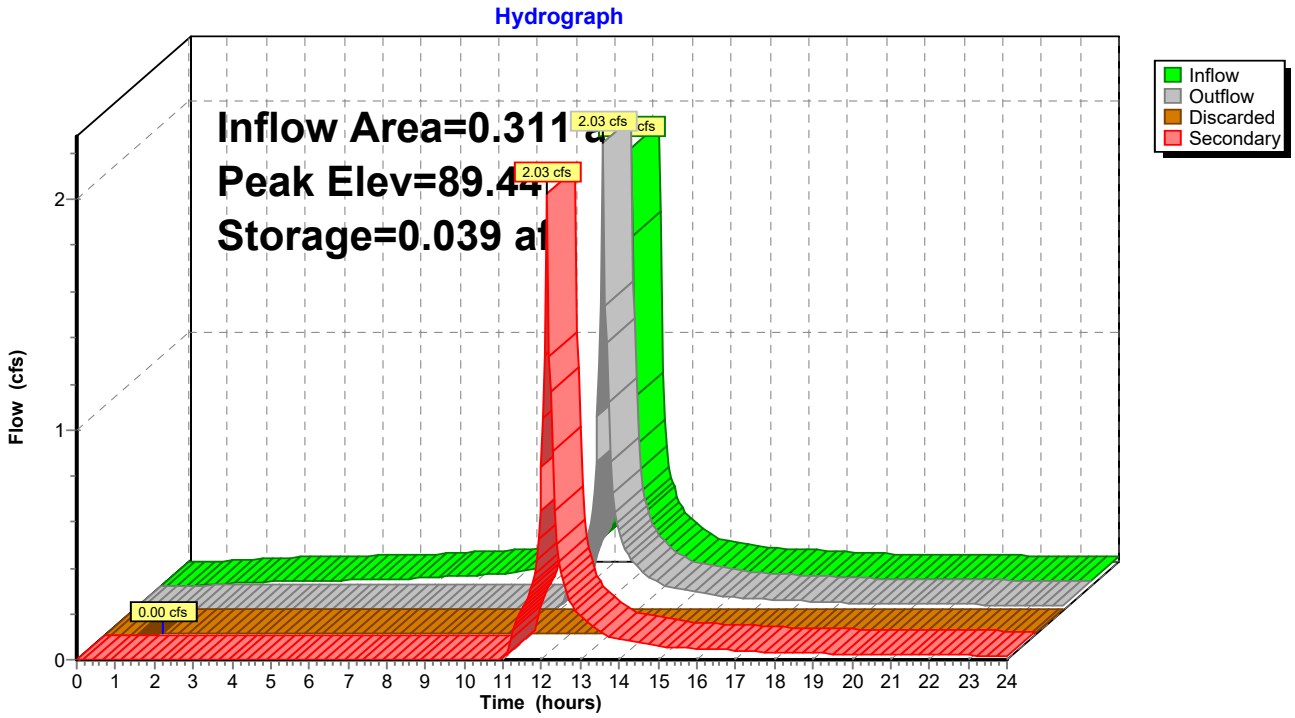
Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	85.15'	**0.270 in/hr Exfiltration over Surface area**
#2	Secondary	87.65'	**8.0" Vert. Orifice/Grate** C= 0.600

Discarded OutFlow Max=0.00 cfs @ 1.50 hrs HW=85.19' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.00 cfs)

Secondary OutFlow Max=2.03 cfs @ 12.15 hrs HW=89.44' (Free Discharge)
↑—**2=Orifice/Grate** (Orifice Controls 2.03 cfs @ 5.80 fps)

Pond 3P: Infiltration



Summary for Subcatchment 1: Proposed Site

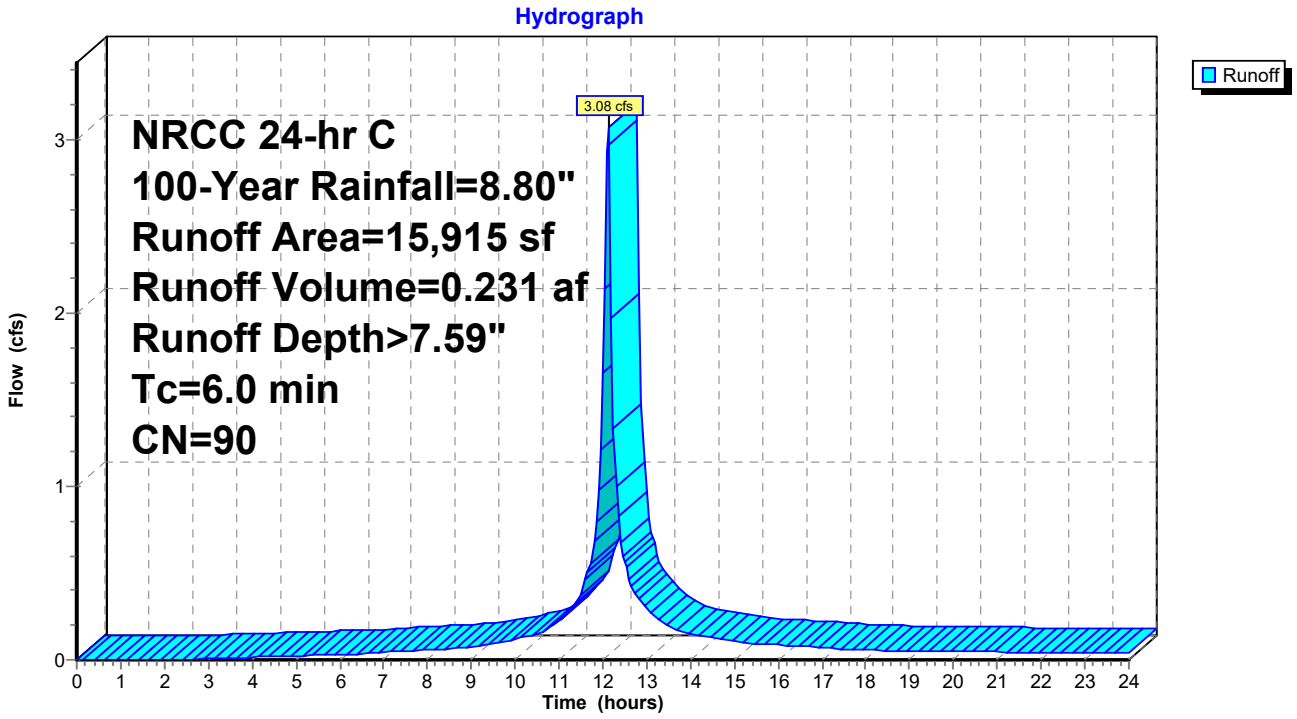
Runoff = 3.08 cfs @ 12.13 hrs, Volume= 0.231 af, Depth> 7.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
NRCC 24-hr C 100-Year Rainfall=8.80"

	Area (sf)	CN	Description
*	2,775	98	Proposed Drvie
*	2,118	98	Proposed Conc. Walks
*	1,745	98	Ledge
	9,277	84	50-75% Grass cover, Fair, HSG D
	15,915	90	Weighted Average
	9,277		58.29% Pervious Area
	6,638		41.71% Impervious Area

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

Subcatchment 1: Proposed Site



Summary for Subcatchment 2: Proposed Building

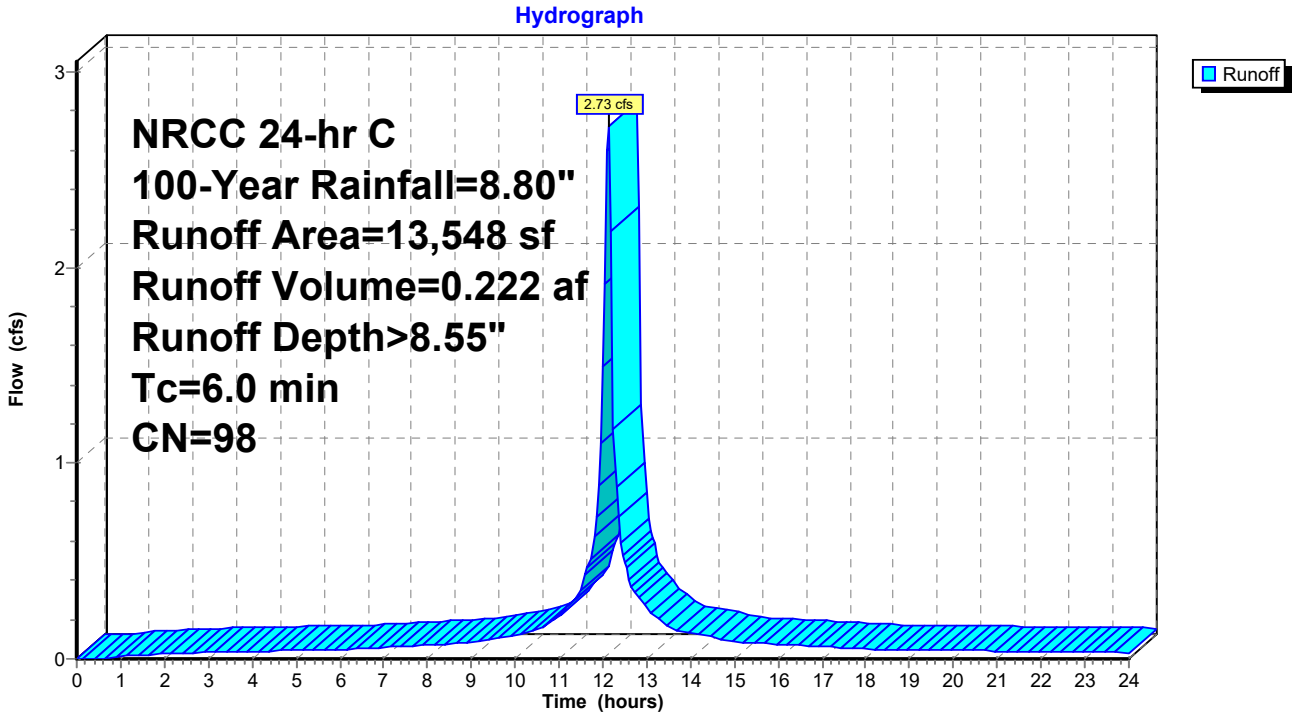
Runoff = 2.73 cfs @ 12.13 hrs, Volume= 0.222 af, Depth> 8.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
NRCC 24-hr C 100-Year Rainfall=8.80"

	Area (sf)	CN	Description
*	13,548	98	Prop. Building
	13,548		100.00% Impervious Area

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

Subcatchment 2: Proposed Building

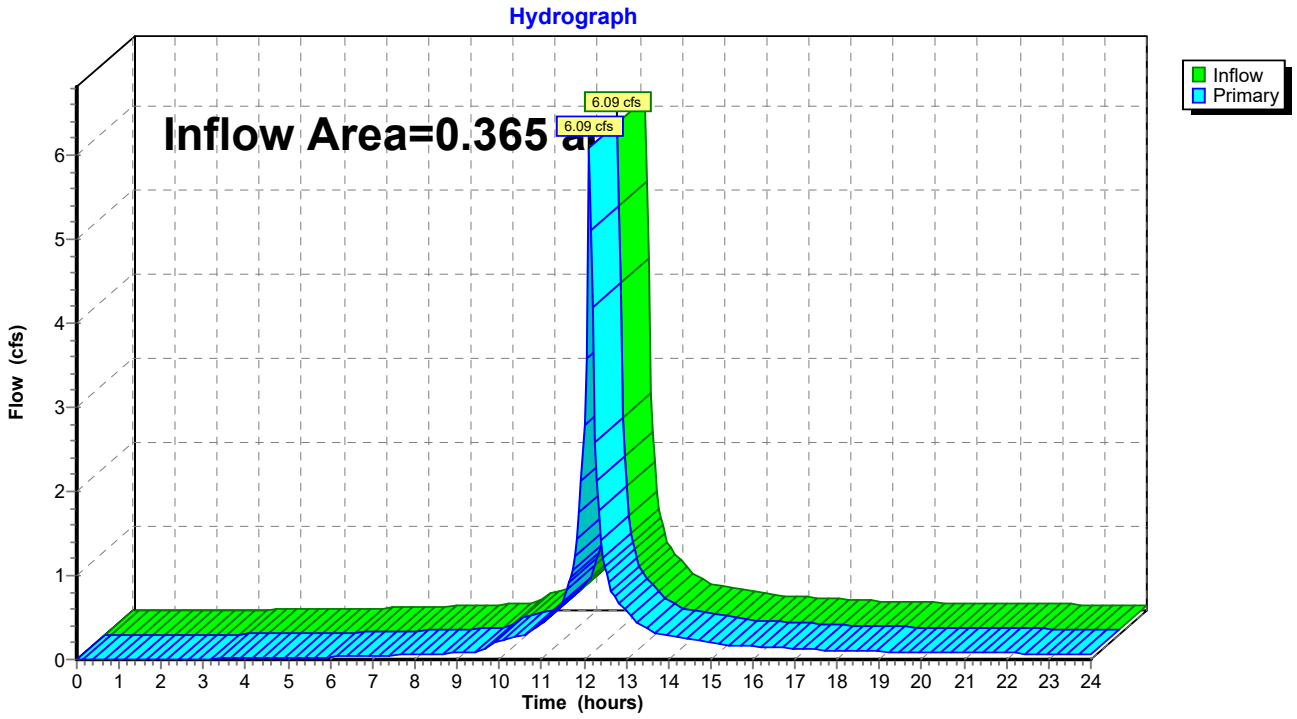


Summary for Pond 2P: Offsite

Inflow Area = 0.365 ac, 41.71% Impervious, Inflow Depth > 13.53" for 100-Year event
Inflow = 6.09 cfs @ 12.11 hrs, Volume= 0.412 af
Primary = 6.09 cfs @ 12.11 hrs, Volume= 0.412 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Pond 2P: Offsite



Summary for Pond 3P: Infiltration

Inflow Area = 0.311 ac,100.00% Impervious, Inflow Depth > 8.55" for 100-Year event
Inflow = 2.73 cfs @ 12.13 hrs, Volume= 0.222 af
Outflow = 3.10 cfs @ 12.11 hrs, Volume= 0.190 af, Atten= 0%, Lag= 0.0 min
Discarded = 0.00 cfs @ 1.10 hrs, Volume= 0.009 af
Secondary = 3.10 cfs @ 12.11 hrs, Volume= 0.181 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 91.35' @ 12.11 hrs Surf.Area= 0.017 ac Storage= 0.039 af

Plug-Flow detention time= 132.5 min calculated for 0.190 af (86% of inflow)
Center-of-Mass det. time= 62.8 min (803.1 - 740.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	85.15'	0.014 af	**19.33'W x 38.50'L x 3.54'H Field A** 0.061 af Overall - 0.025 af Embedded = 0.036 af x 40.0% Voids
#2A	85.65'	0.025 af	**Cultec R-330XLHD** x 20 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 4 rows
		0.039 af	Total Available Storage

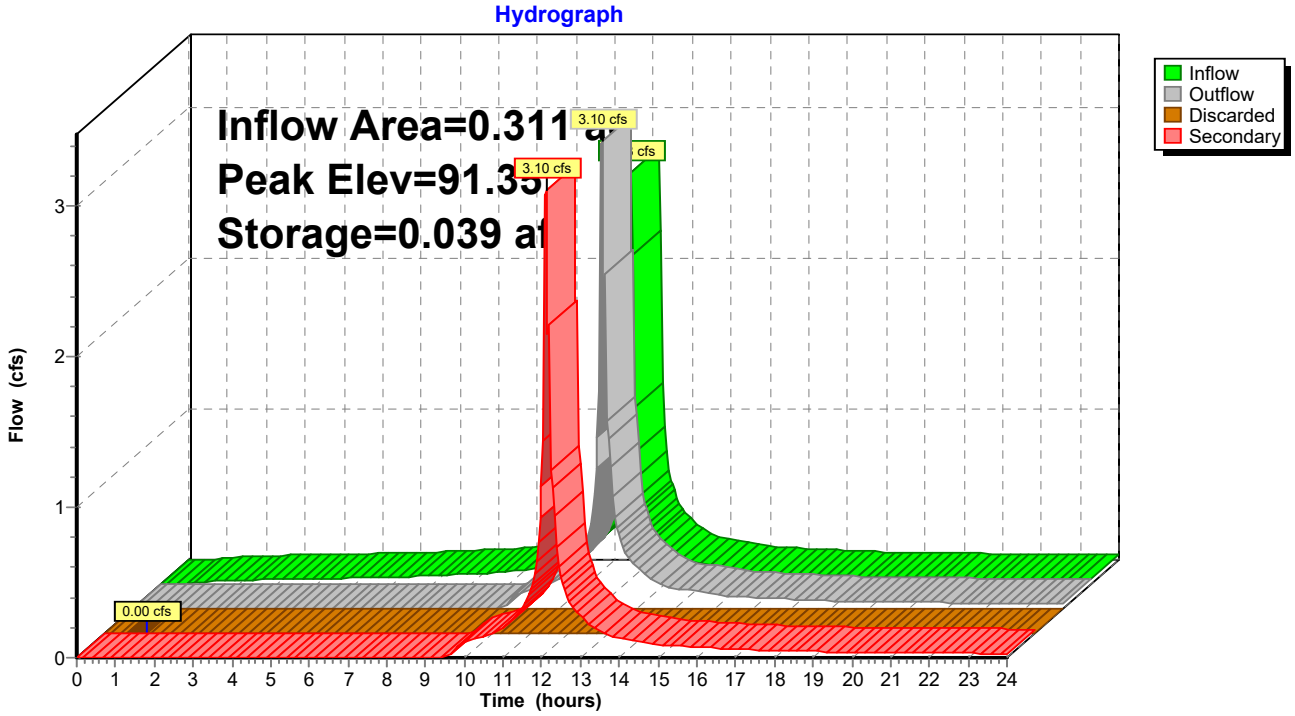
Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	85.15'	**0.270 in/hr Exfiltration over Surface area**
#2	Secondary	87.65'	**8.0" Vert. Orifice/Grate** C= 0.600

Discarded OutFlow Max=0.00 cfs @ 1.10 hrs HW=85.19' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.00 cfs)

Secondary OutFlow Max=2.96 cfs @ 12.11 hrs HW=91.08' (Free Discharge)
↑—**2=Orifice/Grate** (Orifice Controls 2.96 cfs @ 8.48 fps)

Pond 3P: Infiltration



Map Scale: 1:596 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 5 10 20 30

Feet
0 25 50 100 150

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: Norfolk and Suffolk Counties, Massachusetts
Survey Area Data: Version 17, Sep 3, 2021

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Sep 26, 2020—Oct 15, 2020

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
602	Urban land, 0 to 15 percent slopes	0.7	94.7%
630C	Charlton-Hollis-Urban land complex, 3 to 15 percent slopes	0.0	5.3%
Totals for Area of Interest		**0.7**	**100.0%**

Norfolk and Suffolk Counties, Massachusetts

602—Urban land, 0 to 15 percent slopes

Map Unit Setting

National map unit symbol: vkyj
Mean annual precipitation: 32 to 50 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 120 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition

Urban land: 99 percent
Minor components: 1 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Urban Land

Setting

Parent material: Excavated and filled land

Minor Components

Rock outcrops

Percent of map unit: 1 percent
Hydric soil rating: Unranked

Data Source Information

Soil Survey Area: Norfolk and Suffolk Counties, Massachusetts
Survey Area Data: Version 17, Sep 3, 2021

KEVIN M. MARTIN, P.E.
KMM GEOTECHNICAL CONSULTANTS, LLC
7 Marshall Road
Hampstead, NH 03841
603-489-5556 (p)/ 603-489-5558 (f)/781-718-4084(m)
kevinmartinpe@aol.com

MEMORANDUM

TO: Jennifer Nguyen
c/o RCA, LLC
415 Neponset Avenue
Dorchester, MA 02122

FROM: Kevin M. Martin, P.E.
Geotechnical Engineer

DATE: August 5, 2021

RE: **PRELIMINARY GEOTECHNICAL REVIEW**
PROPOSED MIXED-USE BUILDING
213-217 WASHINGTON STREET @ BROAD STREET
WEYMOUTH, MASSACHUSETTS

This memorandum report serves as a *Preliminary Geotechnical Summary Report* for the referenced project. The contents of this memorandum are subject to the attached ***Limitations***.

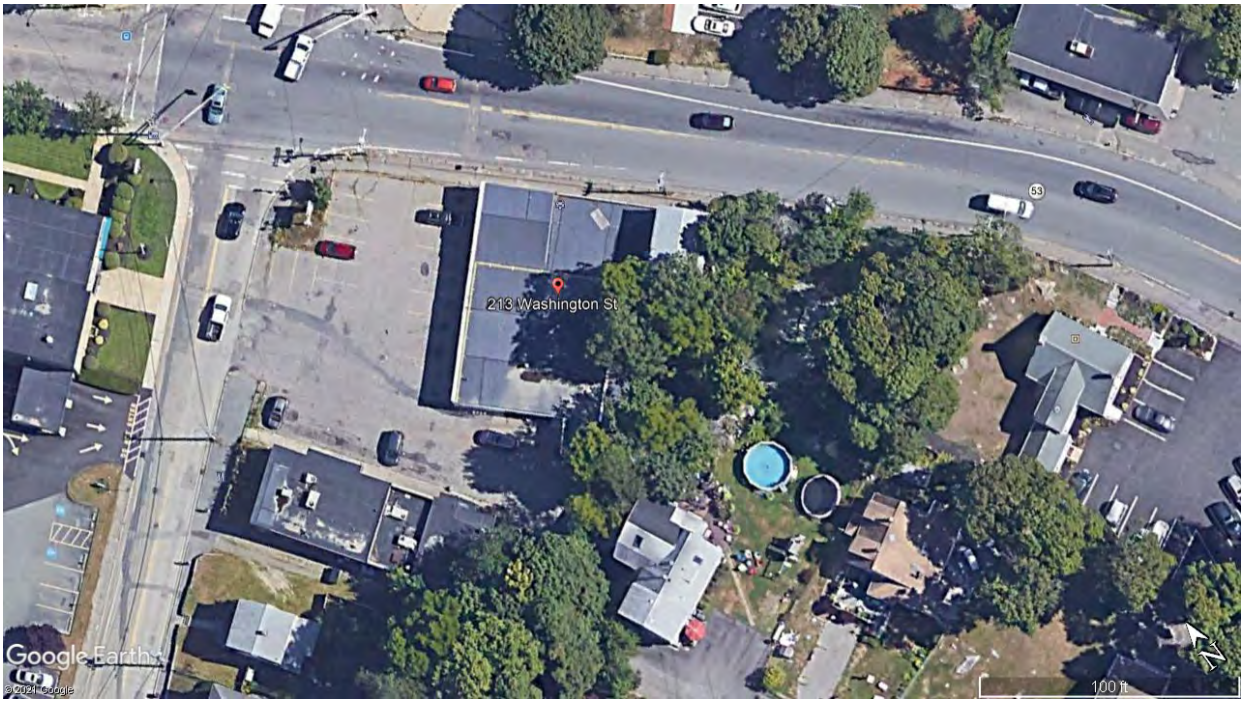
SITE & PROJECT DESCRIPTION

Present development includes a commercial building with associated pavement. Part of the lot also includes massive bedrock outcropping. This building and associated construction will be razed to accommodate the project. KMM has no knowledge of past use, construction and/or development of the property except what is visible or shown on prior Plans. Limited Plans were available at this time. There were no *Topographic or Grading Plans*.

The project includes a new, 4-story, mixed-use, steel and wood-framed building that will occupy the majority of the lot. The first floor will be used for retail, residential units and handicap parking. It is intended to support the building on a basement garage foundation using conventional spread footings. There are two (2) proposed basement levels below grade which will extend ≈20 ft in depth if feasible. The basement levels are not included where there is ledge outcrop. *Grading Plans* were not available at this time.

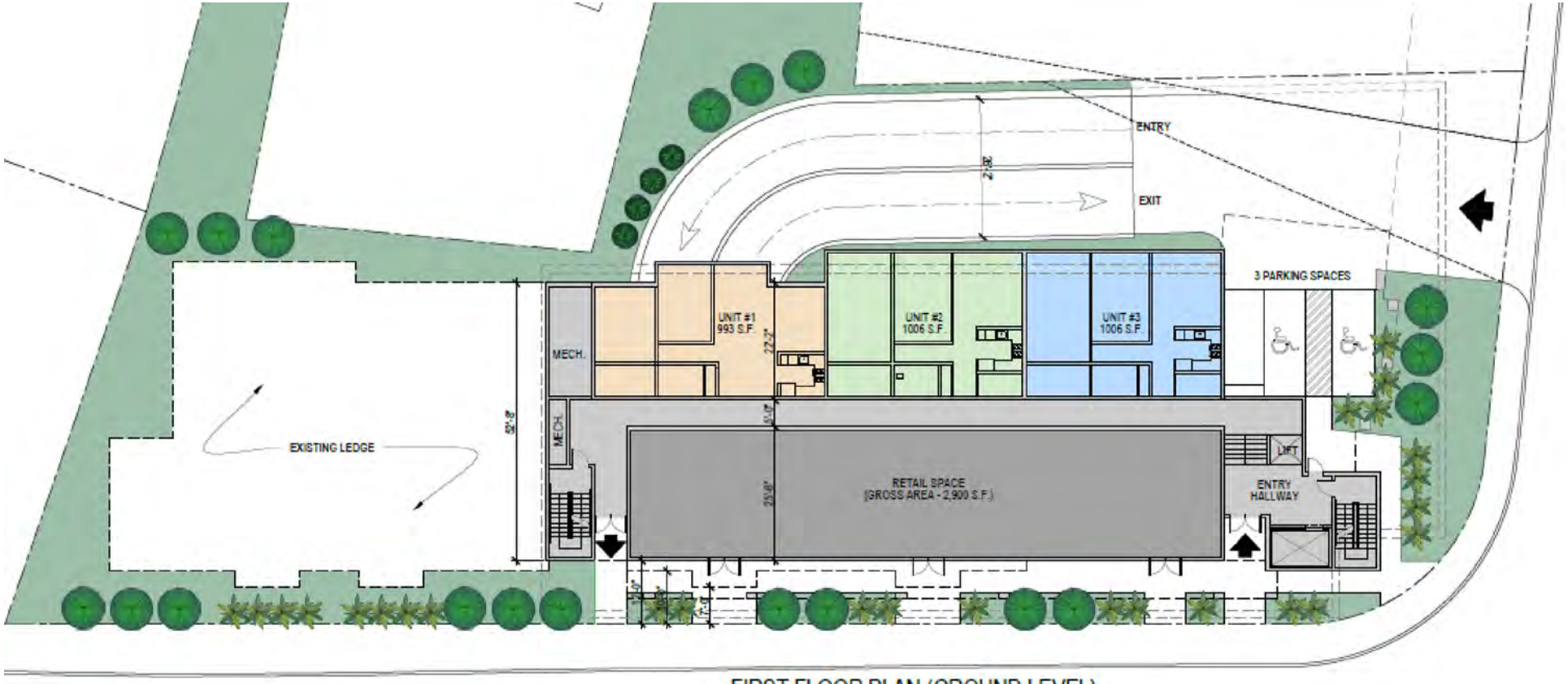
The purpose of this study is to review the subgrade conditions and provide a preliminary geotechnical evaluation related to foundation design and construction per the *Massachusetts State Building Code*. This report does not include an environmental assessment relative to oil, gasoline,

solid waste and/or other hazardous materials. The environmental conditions of the property should be addressed by others as necessary. This study also does not include review of site design or construction issues such as infiltration systems, excavation support, underground utilities, protection of surrounding buildings/utilities, shoring, crane pads, underpinning, blasting, water-proofing, retaining walls or other site and/or temporary design unless specifically addressed herein.




SPEED LIMIT 30
Google Earth
© 2021 Google
8.07 ft
N

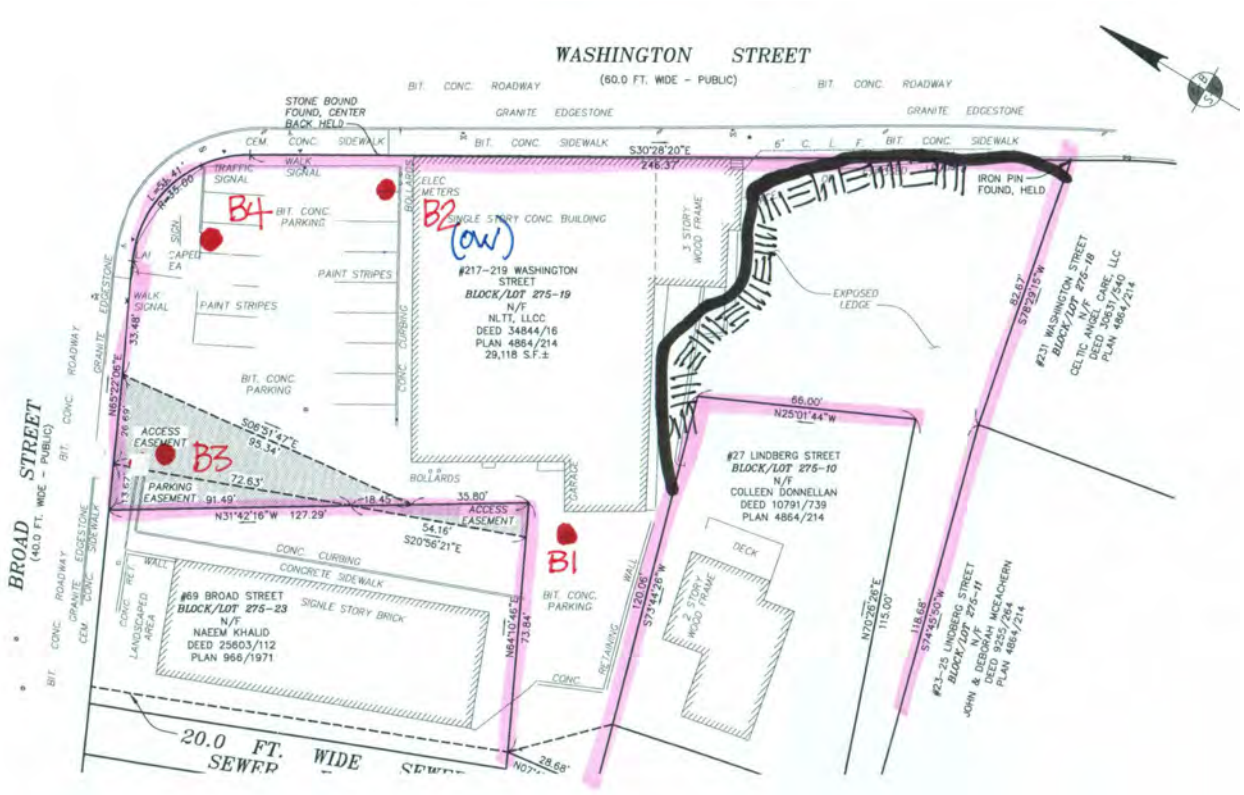

Google Earth
© 2021 Google
8.17 ft



FIRST FLOOR PLAN (GROUND LEVEL)

RESIDENTIAL GROSS LIVING AREA - 3,238 S.F.
RETAIL GROSS AREA - 2,900 S.F.

FRONT ELEVATION



TEST BORE LOCATIONS

SUBSURFACE EXPLORATION PROGRAM

Test Bores

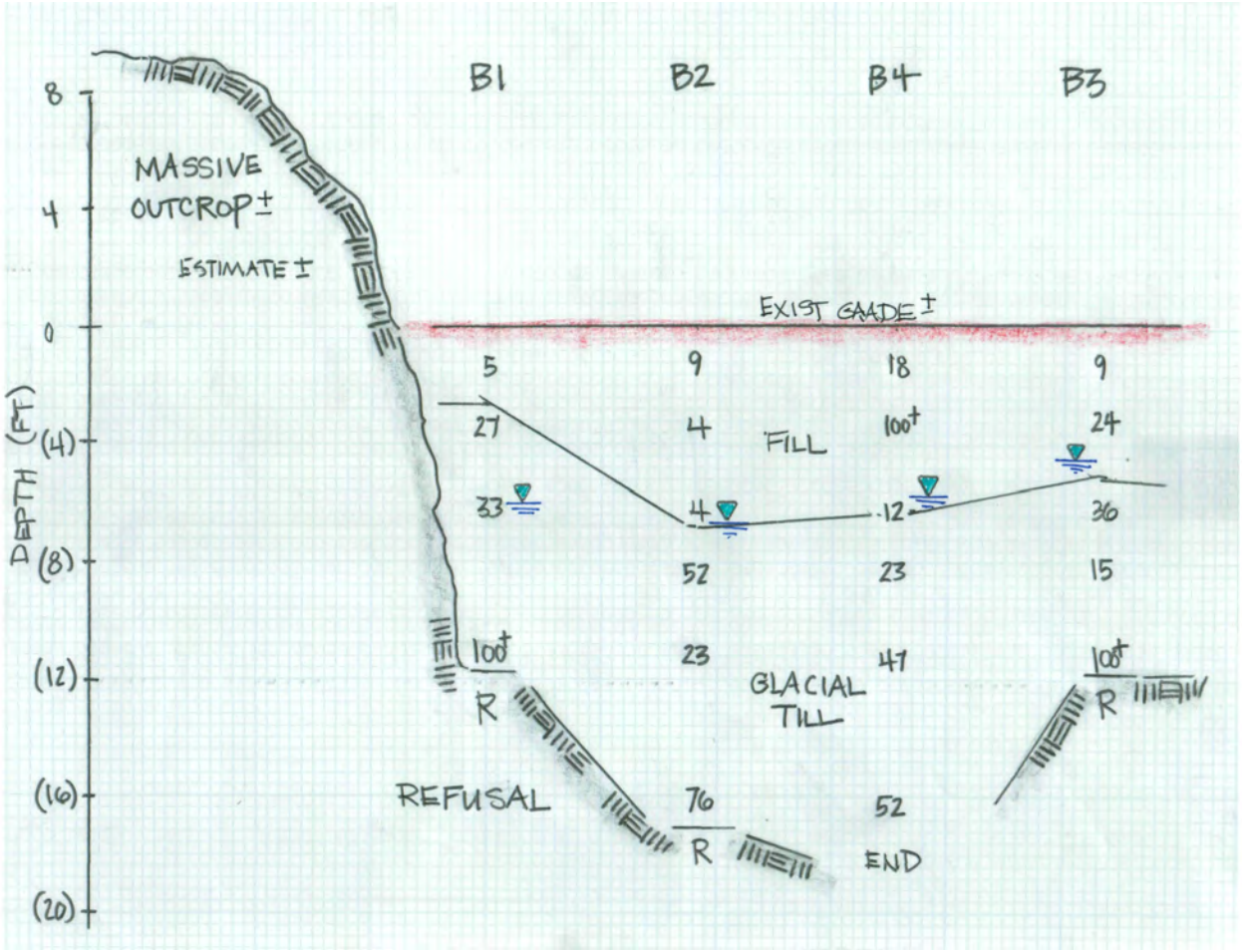
The exploration program involved four (4) test bores throughout the site where accessible. The test bores (B1 to B4) were advanced to refusal depths of ≈10-17 ft utilizing 4 inch hollow stem augers. Soil samples were typically retrieved at no greater than 5 ft intervals with a 2 inch diameter split-spoon sampler. Standard Penetration Tests (SPTs) were performed at the sampling intervals in general accordance with ASTM-D1586 (*Standard Method for Penetration Test and Split-Barrel Sampling of Soils*). Field descriptions and penetration resistance of the soils encountered, observed depth to groundwater, depth to apparent bedrock refusal and other pertinent data are contained on the attached *Test Boring Logs*. The attached *Sketch* shows the test bore locations.

Observation Well

An Observation Well (OW) was developed in B2 to monitor groundwater fluctuations. The well includes 2 inch diameter slotted well screen set at ≈15 ft. The well was constructed with requisite filter sand, bentonite seal, end plugs and a protective road box.

SUBSURFACE CONDITIONS

The subgrade conditions below (1) undocumented Fill include (2) stable Glacial soils then (3) apparent Bedrock refusal. Bedrock dominates the southern portions of the site with massive outcropping. A *Subsurface Profile* depicting the soil and groundwater conditions is attached.



SUBSURFACE PROFILE

Undocumented Fill was encountered to depths ≈5-7 ft. The Fill varies in composition to include Clean Sand (B2) but primarily includes a dark brown, silty Sand, little to trace gravel, trace rubble, brick, organic and other matter. The Fill was generally loose. An apparent abandoned foundation was encountered at B3. Other Fill should also be expected given the existing foundations, intersecting utilities and past construction.

The parent site soils generally consist of a Glacial Till. These soils include a brown, well-graded, fine to medium Sand, some gravel, some silt with embedded cobbles and boulders. These soils are stable and compact. The fine-grained composition of the Glacial soils renders them moisture sensitive, poor-draining and frost susceptible.

The *USGS Surficial Geologic Map* of the area indicates shallow Bedrock. This is consistent with this study.

USGS SURFICIAL GEOLOGIC MAP WEYMOUTH, MA - 2018

Bedrock Areas

Bedrock outcrops and areas of abundant outcrop or shallow bedrock—Solid color shows extent of individual bedrock outcrops; horizontal-line pattern indicates areas of shallow bedrock or areas where small outcrops are too numerous to map individually; in areas of shallow bedrock, surficial materials are less than 5 to 10 ft thick. These units were not mapped consistently among all quadrangles; see note at beginning of appendix 1 for information on bedrock outcrop mapping by quadrangle

USGS BEDROCK GEOLOGIC MAP OF MASSACHUSETTS - 1993

Zdgr

Dedham Granite (Proterozoic Z)

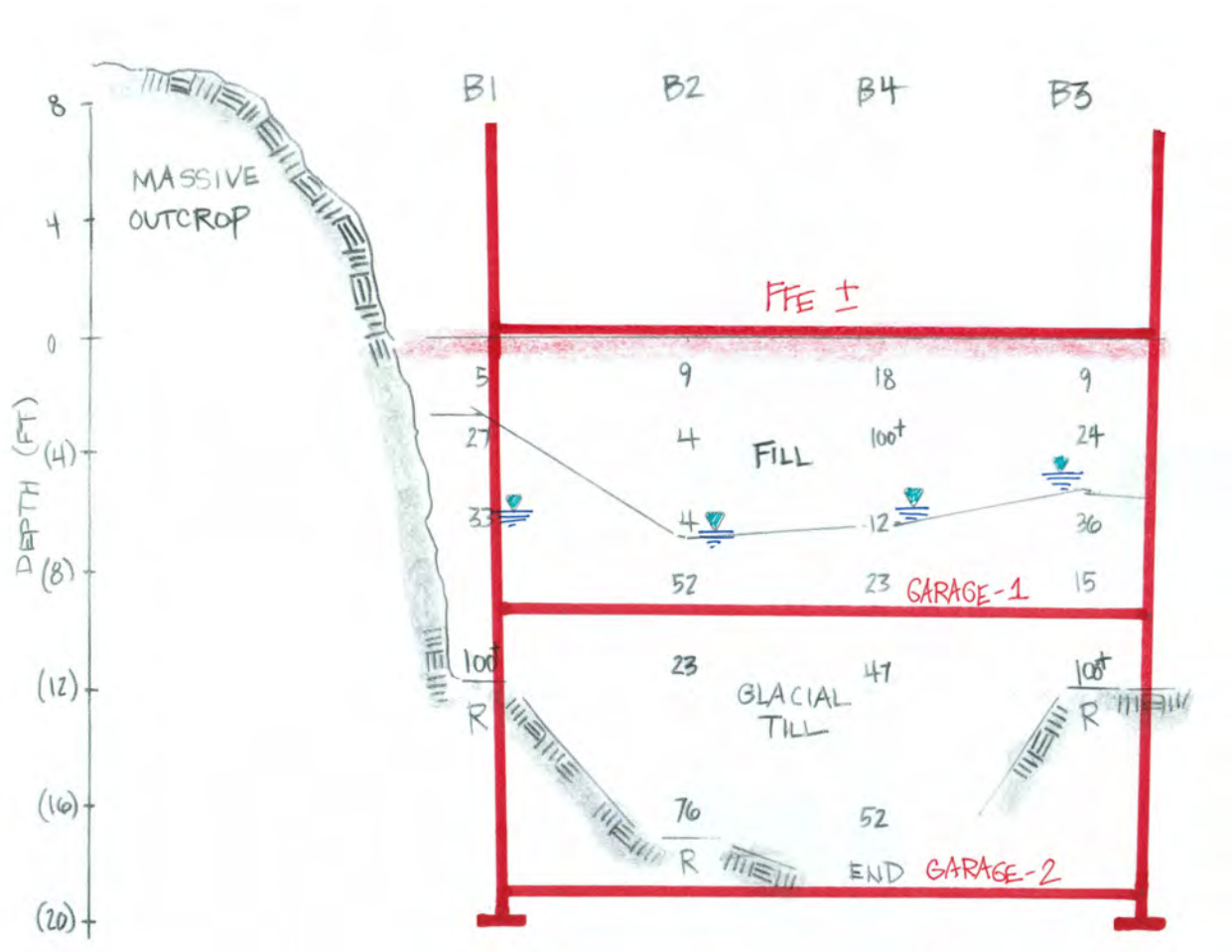
Light grayish-pink to greenish-gray, equigranular to slightly porphyritic, variably altered, granite south and west of Boston. Includes dioritic rock near Scituate and Cohasset and Barefoot Hills Quartz Monzonite of Lyons (1969) and Lyons and Wolfe (1971). Intrudes Zdi, Zgb, Zb, Zv

Test Bore refusal, presumably Bedrock, was encountered at depths of ≈10-17 ft below grade. The depth to refusal was surprising given the adjacent outcrop. Rock coring was not completed for this study. The southern portions of the site are dominated by massive bedrock outcrops. The Bedrock is expected to have a sloping and undulation contour given the variable depths. Bedrock in the area is expected to include Dedham Granite. Such rock is characteristically hard and of sound quality.

Groundwater was encountered in the test bores at shallow depths of ≈4-6 ft below grade. Wet and saturated soils were encountered below these depths. An observation well was installed to monitor groundwater fluctuations. It should be noted that fluctuations in the level of the groundwater may occur due to variations in rainfall, temperature, utilities, flooding and other factors differing from the time of the measurements. This study was completed at a time of seasonally normal groundwater.

PRELIMINARY FOUNDATION EVALUATION

The subgrade conditions are favorable for supporting the proposed building on a conventional spread footing foundation. Both the Glacial soils and Bedrock are suitable for structural bearing capacity support. However, the concerns with such a deep foundation include (1) bedrock impact, (2) shallow groundwater and (3) support of excavation (SOE).



CONCEPTUAL BASEMENT FOUNDATION

Bedrock Impact

There will some Bedrock excavation and removal to accommodate the proposed basement construction as well as other areas depending on final grading. Based on our general experience with bedrock in the area, it is expected to be hard and of sound quality. As such, bedrock removal will likely involve blasting for large areas or mechanical hoe rams for localized areas.

Bedrock conditions are expected to be encountered throughout the construction. The bedrock surface should be relatively level with a slope no greater than ≈15%. It is recommended that a minimum ≈12 inch lift of one inch minus crushed stone be placed between the footing and the bedrock surface to provide a more uniform and elastic bearing subgrade. The purpose of the gravel base ("cushion base") is to mitigate differential settlements throughout the foundation. Following a ledge blast within the building footprint, the heaved/disturbed over-blast should be fully removed exposing the underlying intact/competent ledge. This is especially important in the building area for support of the spread footing foundation. It should be noted that drill holes at least ≈8 ft in depth are typically necessary in order to remove ledge with explosive blasting. This may generate additional over-blast that should require engineering review. It may be possible to leave some of the over-blast in-place, however, this will require engineering review (via test pits) during construction. Extensively heaved/disturbed over-blast will not be considered a suitable subgrade as potential subsidence may be experienced when loaded. Our experience with similar projects suggests that the overblast may remain below the foundation limits. This is contingent upon a one foot base of one inch minus crushed stone being placed a minimum one foot below and laterally beyond the footing limits in order to provide a more uniform subgrade. The over-blast to remain will need to be densified and/or compacted prior to the placement of the specified stone base. This may be accomplished with a thin leveling base of one inch minus stone to fill surface irregularities then densification with a minimum one-ton vibratory compactor operating at peak frequency making at least 4-5 passes across the bearing subgrade. The blasting contractor should understand the concerns associated with the over-blast conditions and provide an appropriate drilling/blast pattern. A one inch minus crushed stone may be used to fill in surface irregularities. Controlled blasting is expected to be necessary given the site location. Line drilling and pre-splitting may be means to provide a near vertical ledge cut. The means and methods of ledge removal should be reviewed by the contractor.

Temporary exposed ledge cuts upwards of ≈5-15 ft could be necessary for the project. Rock slopes shall be between 1H:3H to 1H:5V provided the exposed rock is stable and intact. Loose and/or overhanging rock shall be removed as necessary. Given the expected rock slopes, it is recommended that the rock face be pre-split or drilled (line drilling) prior to blasting or removal to create a weak plane in order to protect the competency of the bedrock to remain and minimize over fracturing. The pre-drilled holes shall be battered at the proposed rock slope but no steeper than 1H:4V to account for some overhang. The pre-drilled holes shall be minimum 3 inch diameter holes that extend to the base of the slope placed no greater than ≈2-3 ft on-center. Controlled blasting procedures utilizing pre-splitting and/or cushion blasting with light charges should also be used to create a fractured plane that will not be impacted by the primary blasting. General specifications for pre-splitting bedrock

are outlined in the *MA-DPW Standard Specifications for Highways & Bridges* (Section 120.63). A blast design with Submittal completed by an experienced and qualified Blasting Engineer shall be provided for the project. The condition of the bedrock shall be reviewed by a competent Engineer during construction. The intent is to create a sloped rock face with minimal fracturing for temporary stability. It is difficult to predict the quality or stability of the exposed bedrock given the inherent variabilities with the ledge, blasting and construction. Our experience suggests non-uniform conditions with inherent difficulties providing a stable bedrock cut. We would recommend battering the slope as flat as practicable in this regard. We also recommend at least a 15% contingency for location and grading (ie: room for error). Any overburden atop the rock may also impact surface stability (if to be cut to a steepened slope). A qualified Contractor should also be retained for this work given the concerns and difficulties.

The bearing subgrade should ultimately be stable, dewatered, protected from frost and compact throughout construction. Bearing subgrades that become weakened or disturbed due to wet conditions or other reason will be rendered unsuitable for structural support. The Contractor shall ultimately be responsible for the means and methods of temporary groundwater control, subgrade protection and site stability during construction. An Engineer from KMM should be scheduled to review the foundation subgrade conditions and preparation during construction.

Groundwater Impact

The shallow groundwater will impact the proposed basement level construction and design. Groundwater was encountered about ≈4-6 ft below grade. An observation was installed to review groundwater fluctuations. Nonetheless, a shallow groundwater table is expected at the site. Groundwater and storm water will need to ne temporarily pumped during construction. The presence of restrictive bedrock would create a "bath tub" scenario both during and post-construction.

Means to address groundwater for design include (1) pumping or (2) water-proofing the foundation with structural fortification to resist lateral hydrostatic pressure as well as buoyant pressures. A pump system does not appear feasible as it will need to continually operate 24/7 and there needs to be a discharge location. Most municipalities will not allow discharge to their drain system. The discharge of collected water would need to be reviewed by the Site Engineer. Pumping groundwater to an on-site infiltration system will likely result in a redundant system given the small lot.

Water-proofing the foundation with structural design to resist increased water pressure and buoyancy would likely be the means to proceed with the intended concept. Such a design would be difficult for a single basement; a sub-basement would result in significantly larger loads. Buoyant pressures of ≈1,000 psf would need to be resisted with 2 levels of basement. Rock anchors acting in tension would likely be necessary given such load. Given such impact, strong consideration should be given to eliminating the sub-basement level. A single basement level will present it's own difficulties given the shallow groundwater.

Lateral Support of Excavation (SOE)

Deep excavations (greater than ≈15-25 ft) are expected for foundation construction and possibly for utility installation around the property. Excavations should be sloped and/or laterally supported in accordance with the *Occupational and Health Administration (OSHA)* regulations (29 CFR Part 1926) and the *Commonwealth of Massachusetts Department of Labor and Industries Division of Industrial Safety (DLIDIS) - Rules and Regulations for the Prevention of Accidents in Construction Operations* (454 CMR 10.00), Part 14. Should excavations be sloped, the minimum slope based on soil type (Fill) is 1.5H:1V provided the groundwater is properly lowered below the bottom of the excavation. The foregoing slope requirement does not consider surcharge loads (stockpiled soils, equipment, materials) which may be situated at the crest of the slope and vibration loads (soil compaction, sheet piling). It should be noted that these slope requirements are minimums required by OSHA regulations. The contractor should be ultimately responsible for design, maintenance and stability of the temporary slopes and/or shoring associated with construction activities.

Laterally supported earth systems should be designed by a qualified Professional Engineer retained by the contractor per OSHA Regulations. The deep excavations along the property limits are expected to require excavation support given the abutting property limits as well as surrounding utilities and roadways. Cantilevered sheeting or soldier piles with lagging are expected to be feasible for depths of ≈8-10 ft. Bracing or tiebacks will likely be necessary for deeper excavations. Given the depth of excavation (≈15-25 ft), the presence of ledge and proposed construction along the property line, it is expected that drilled soldier piles into ledge will be necessary for temporary support. Internal bracing or exterior tiebacks will likely be necessary for a sub-basement (not necessary for a single basement). The means, methods, selection and design of the temporary earth support system should be reviewed by the Contractor.

CLOSURE

This study was completed for Preliminary Geotechnical review. This study is considered preliminary given lack of Plans and a sub-basement concept that may not be feasible. The final foundation design shall be completed in accordance with the *Massachusetts State Building Code*. There are several design and construction issues that will likely need to be reviewed and vetted as the project progresses. Additional (deeper) test bores will likely be necessary especially if the concept of two levels of below grade parking remains for the project.

We trust the contents of this report are responsive to your needs at this time. Should you have any questions or require additional assistance, please do not hesitate to contact our office.

LIMITATIONS

Explorations

1. The analyses, recommendations and designs submitted in this report are based in part upon the data obtained from preliminary subsurface explorations. The nature and extent of variations between these explorations may not become evident until construction. If variations then appear evident, it will be necessary to re-evaluate the recommendations of this report.

2. The generalized soil profile described in the text is intended to convey trends in subsurface conditions. The boundaries between strata are approximate and idealized and have been developed by interpretation of widely spaced explorations and samples; actual soil transitions are probably more gradual. For specific information, refer to the individual test pit and/or boring logs.

3. Water level readings have been made in the test pits and/or test borings under conditions stated on the logs. These data have been reviewed and interpretations have been made in the text of this report. However, it must be noted that fluctuations in the level of the groundwater may occur due to variations in rainfall, temperature, and other factors differing from the time the measurements were made.

Review

4. It is recommended that this firm be given the opportunity to review final design drawings and specifications to evaluate the appropriate implementation of the recommendations provided herein.

5. In the event that any changes in the nature, design, or location of the proposed areas are planned, the conclusions and recommendations contained in this report shall not be considered valid unless the changes are reviewed and conclusions of the report modified or verified in writing by KMM Geotechnical Consultants, LLC.

Construction

6. It is recommended that this firm be retained to provide geotechnical engineering services during the earthwork phases of the work. This is to observe compliance with the design concepts, specifications, and recommendations and to allow design changes in the event that subsurface conditions differ from those anticipated prior to the start of construction.

Use of Report

7. This report has been prepared for the exclusive use of RCA, LLC in accordance with generally accepted soil and foundation engineering practices. No other warranty, expressed or implied, is made.

8. This report has been prepared for this project by KMM Geotechnical Consultants, LLC. This report was completed for preliminary design purposes and may be limited in its scope to complete an accurate bid. Contractors wishing a copy of the report may secure it with the understanding that its scope is limited to preliminary geotechnical design considerations only.

TEST BORING LOG

SOIL X, Corp.
148 Pioneer Drive
Leominster, MA 01453

Proposed Building
217-291 Washington St
Weymouth, MA

BORING B-1

21-06031

Ground Elevation:
Date Started: 7/20/2021
Date Finished: 7/20/2021
Driller: RB
Soil Engineer/Geologist:

GROUNDWATER OBSERVATIONS

DATE	DEPTH	CASING AT	STABILIZATION
7/20/21	5.5 ft		

Depth Ft.	Casing bl/ft	Sample No.	Pen/ Rec	Depth	Blows/6"	Strata Break	Visual Identification of Soil and / or Rock Sample
						2"	ASPHALT
			0"	0'2"-1'0"	N/A		
1		1	15"	0'6"-2'6"	3-2-3-2		Dark Brown, loamy, silty Sand, trace gravel (FILL)
						2'6"	
		2	14"	2'6"-4'6"	10-12-15-13		Brown, f-m Sand, some silt, little gravel
5		3	16"	5'0"-7'0"	5-14-19-28		Brown, fine to medium Sand, some silt, some gravel, cobbles
							(GLACIAL)
10		4	2"	10'0"-11'3"	22-45-50/3"		Same
						11'3"	
							Refusal at 11'3"
							Ground Water encountered 5'6" at completion
15							
20							
25							

Notes: Hollow Stem Auger 4 ¼

Cohesionless: 0 - 4 V. Loose, 4 - 10 Loose, 10 -30 M Dense, 30 -50 Dense, 50+ V Dense.
Cohesive: 0 -2 V Soft, 2 -4 Soft, 4 -8 M Stiff 8 -15 Stiff, 15 -30 V. Stiff, 30 + Hard.

Trace	0 to 10%
Little	10 to 20%
Some	20 to 35%
And	35% to 50%

	CASING	SAMPLE	CORE TYPE
ID SIZE (IN)		SS	
HAMMER WGT (LB)		140 lb.	
HAMMER FALL (IN)		30"	

TEST BORING LOG

SOIL X, Corp.
148 Pioneer Drive
Leominster, MA 01453

Proposed Building
217-291 Washington St
Weymouth, MA

BORING B-2

21-06031

Ground Elevation:
Date Started: 7/20/2021
Date Finished: 7/20/2021
Driller: RB
Soil Engineer/Geologist:

GROUNDWATER OBSERVATIONS

DATE	DEPTH	CASING AT	STABILIZATION
7/20/21	5.5 ft		

Depth Ft.	Casing bl/ft	Sample No.	Pen/ Rec	Depth	Blows/6"	Strata Break	Visual Identification of Soil and / or Rock Sample
						2"	ASPHALT
1		1	3"	0'6"-2'6"	4-5-4-3		Black, fine to medium Sand & Gravel (GRAVEL FILL)
		2	10"	2'6"-4'6"	3-2-2-2	2'6"	Tan, fine to medium Sand, dry (FILL)
							Tan, f-c Sand, trace gravel, wet (FILL)
5		3	12"	5'0"-6'6"	2-2-2		
		3A	6"	6'6"-7'0"	12	6'6"	
		4	6"	7'0"-9'0"	14-19-33-20		Brown, fine to coarse Sand & Gravel, some silt, cobbles, wet
10		4	14"	10'0"-12'0"	14-12-11-23		Brown, f-m Sand & Gravel, some silt, cobbles, wet
						14'	
15		5	14"	15'0"-17'0"	35-34-42-24		Olive, f-m Sand & Silt, little gravel, cobbles, wet
							Refusal at 17 ft Ground Water encountered 5'6" at completion Well set at 15 ft
20							
25							

Notes: Hollow Stem Auger 4 ¼

Cohesionless: 0 - 4 V. Loose, 4 - 10 Loose, 10 -30 M Dense, 30 -50 Dense, 50+ V Dense.
Cohesive: 0 -2 V Soft, 2 -4 Soft, 4 -8 M Stiff 8 -15 Stiff, 15 -30 V. Stiff, 30 + Hard.

Trace	0 to 10%
Little	10 to 20%
Some	20 to 35%
And	35% to 50%

	CASING	SAMPLE	CORE TYPE
ID SIZE (IN)		SS	
HAMMER WGT (LB)		140 lb.	
HAMMER FALL (IN)		30"	

TEST BORING LOG

SOIL X, Corp.
148 Pioneer Drive
Leominster, MA 01453

Proposed Building
217-291 Washington St
Weymouth, MA

BORING B-3

21-06031

Ground Elevation:
Date Started: 7/20/2021
Date Finished: 7/20/2021
Driller: RB
Soil Engineer/Geologist:

GROUNDWATER OBSERVATIONS

DATE	DEPTH	CASING AT	STABILIZATION
7/20/21	3 ft		

Depth Ft.	Casing bl/ft	Sample No.	Pen/ Rec	Depth	Blows/6"	Strata Break	Visual Identification of Soil and / or Rock Sample
						2"	ASPHALT
1		1	6"	0'6"-2'6"	24-5-4-4		Sand/ Gravel/ Concrete (FILL)
		2	8"	2'6"-4'6"	7-9-15-22		Dark Brown, Sand, Silt, Gravel, trace organic, wet (FILL)
						5'	
5		3	12"	5'0"-7'0"	10-14-22-15		
		4	18"	7'0"-9'0"	9-9-6-11		Brown, fine to medium Sand, some silt, some gravel, cobbles
							(GLACIAL)
10		4	10"	10'0"-10'4"	18-24-50/4"		
						10'4"	Refusal at 10'4"
							Ground Water encountered 2'6" at completion
15							Old foundation at 5 ft.....
20							
25							

Notes: Hollow Stem Auger 4 ¼

Cohesionless: 0 - 4 V. Loose, 4 - 10 Loose, 10 -30 M Dense, 30 -50 Dense, 50+ V Dense.
Cohesive: 0 -2 V Soft, 2 -4 Soft, 4 -8 M Stiff 8 -15 Stiff, 15 -30 V. Stiff, 30 + Hard.

Trace	0 to 10%
Little	10 to 20%
Some	20 to 35%
And	35% to 50%

	CASING	SAMPLE	CORE TYPE
ID SIZE (IN)		SS	
HAMMER WGT (LB)		140 lb.	
HAMMER FALL (IN)		30"	

TEST BORING LOG

SOIL X, Corp.
148 Pioneer Drive
Leominster, MA 01453

Proposed Building
217-291 Washington St
Weymouth, MA

BORING B-4

21-06031

Ground Elevation:
Date Started: 7/20/2021
Date Finished: 7/20/2021
Driller: RB
Soil Engineer/Geologist:

GROUNDWATER OBSERVATIONS

DATE	DEPTH	CASING AT	STABILIZATION
7/20/21	4 ft		

Depth Ft.	Casing bl/ft	Sample No.	Sample Pen/Rec	Sample Depth	Sample Blows/6"	Strata Break	Visual Identification of Soil and / or Rock Sample
						2"	ASPHALT
1		1	12"	0'6"-2'6"	8-8-10-9		Dark Brown, silty Sand, little gravel
		2	3"	2'6"-4'6"	18-50/4"		Dark Brown, Sand & Gravel, little silt, concrete, trace glass (FILL)
5		3	12"	5'0"-7'0"	4-3-9-12	6'6"	Grey-Brown, silty Sand, little gravel, wet
		4	12"	7'0"-9'0"	7-11-12-14		Grey, Silt-Clay-Sand, little gravel, wet
10		5	18"	10'0"-12'0"	22-24-23-19		Brown, fine to medium Sand, some silt, some gravel, trace clay, cobbles, wet (GLACIAL)
15		6	18"	15'0"-17'0"	7-21-31-34		Brown, f-m Sand, some silt, some gravel, cobbles, wet
							End of Exploration at 17 ft Ground Water encountered 4 ft at completion
20							
25							

Notes: Hollow Stem Auger 4 ¼

Cohesionless: 0 - 4 V. Loose, 4 - 10 Loose, 10 -30 M Dense, 30 -50 Dense, 50+ V Dense.
Cohesive: 0 -2 V Soft, 2 -4 Soft, 4 -8 M Stiff 8 -15 Stiff, 15 -30 V. Stiff, 30 + Hard.

Trace	0 to 10%
Little	10 to 20%
Some	20 to 35%
And	35% to 50%

	CASING	SAMPLE	CORE TYPE
ID SIZE (IN)		SS	
HAMMER WGT (LB)		140 lb.	
HAMMER FALL (IN)		30"	


acker
LAUNDRO


Google Earth
© 2021 Google
7.78 ft
N

BEDROCK OUTCROPS

WEYMOUTH, MASSACHUSETTS

213-217 Washington Street

Transportation Impact Assessment

Prepared for
Town of Weymouth

Prepared by
Howard Stein Hudson

June 2022

HOWARD STEIN HUDSON

Engineers + Planners

HOWARD STEIN HUDSON

June 23, 2022

Town of Weymouth
Zoning Board of Appeals
75 Middle Street
Weymouth, MA 02189

Re: 213-217 Washington Street Transportation Impact Assessment (TIA)

Dear Reviewer:

This letter shall certify that this Transportation Impact Assessment (TIA) has been prepared under my direct supervision and responsible charge. I am a Registered Professional Engineer (P.E.) in the Commonwealth of Massachusetts (Massachusetts P.E. No. 47252) and hold Certification as a Professional Traffic Operations Engineer (PTOE Certificate No. 906) from the Transportation Professional Certification Board, Inc. (TPCB), an independent affiliate of the Institute of Transportation Engineers (ITE).

\Sincerely,

Keri Pyke, P.E., PTOE
Principal of Transportation Planning and Land Development

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Introduction

Project Description

Howard Stein Hudson (HSH) has conducted an evaluation of the transportation impacts of the proposed redevelopment of a vacant commercial building with a surface parking, located at 213-217 Washington Street (the "Project"/the "Site") in Weymouth, Massachusetts. The proposed Project will consist of the construction of a new mixed-use building with approximately 27 residential units and approximately 4,285 square feet (sf) of ground floor commercial space. The Project will also have an underground parking garage with a total of 50 parking spaces: 41 parking spaces will be for residential use and nine (9) parking spaces for retail use. Vehicular access to the Site will be provided via Broad Street.

Study Methodology

This transportation study and its supporting analyses were conducted in accordance with Massachusetts Department of Transportation (MassDOT) and the Town of Weymouth guidelines and are described in later sections. The Existing Condition analysis includes an inventory of the existing transportation conditions such as traffic characteristics, roadway and intersection geometries, transit services, and bicycle and pedestrian facilities. Existing vehicular counts were collected at the study area intersections. The traffic data collection effort forms the basis for the transportation analysis.

The future transportation conditions analyses evaluate potential transportation impacts associated with the Project. The long-term transportation impacts are evaluated for the year 2029, based on a seven-year horizon from the year of the filing of this traffic study. The No-build (2029) Condition analysis includes general background traffic growth, traffic growth associated with specific developments (not including this Project), and transportation improvements that are planned in the vicinity of the Project site.

The Build (2029) Condition analysis includes a net increase in traffic volume due to the addition of Project-generated trip estimates to the traffic volumes developed as part of the No-build (2029) Condition analysis. The transportation study identifies expected roadway, parking, and bicycle accommodations, as well as loading capabilities.

The final part of the transportation study identifies measures to mitigate Project-related impacts and to address any traffic, pedestrian, bicycle, transit, safety, or construction-related issues that are necessary to accommodate the Project.

Study Area

The transportation study area is generally bounded by Washington Street to the east, The Landing Laundromat to the west, Broad Street to the north, and private property to the south. The study area consists of the signalized intersection of Washington Street at Broad Street, shown in **Figure 1**.

Transportation Summary

Key transportation characteristics of the Project and analysis results include:

- The Site is located in Weymouth Landing, a walkable area with various nearby amenities. The Site is located within the vicinity of multiple Massachusetts Bay Transportation Authority (MBTA) transit services, which will provide residents and visitors with alternative transportation options.
- The Proponent will provide approximately 25 bicycle spaces in a secure bicycle room located in the basement level of the building.
- The Project will provide a total of 50 vehicle parking spaces, 41 for the residential units and nine (9) for the retail space, resulting in a residential parking ratio of 1.5 spaces per unit (41 spaces/27 units) and a retail parking ratio of 0.5 per 250 sf (9 spaces/4,285 sf).
- The Project will generate 12 new vehicle trips (5 entering and 7 exiting) during the a.m. peak hour and 21 new vehicle trips (11 entering and 10 exiting) during the p.m. peak hour.
- At the study area intersection, the overall operational level of service (LOS) will remain the same from the No-build to the Build condition, indicating that the Project will not affect traffic operations in the area.
- The Project's deliveries, trash/recycling pick-up, and move-in/move-out activity will occur on-street along Washington Street or Broad Street.
- The Proponent is committed to implementing Transportation Management Plan (TMP) elements to minimize the number of Project vehicle trips on the adjacent roadway network. TMP measures will promote walking and bicycle, as well as other options to reduce single-occupant vehicle trips.

Figure 1. ***Study Area***

Existing Conditions

This section includes descriptions of existing study area roadway geometries, intersection traffic control, peak-hour vehicular volumes, public transportation availability, and motor vehicle collision data.

Existing Roadway Descriptions

Washington Street is a two-way, two-lane roadway that runs predominantly in the north-south direction between Commercial Street to the north and Whiting Street to the south. Washington Street between Front Street and Broad Street is classified as an urban principal arterial under the Town of Weymouth jurisdiction, and south of Broad Street is classified as an urban principal arterial under MassDOT jurisdiction. Within the study area, on-street parking is not permitted, and sidewalks are provided along both sides of the roadway.

Broad Street is a two-way, two-lane roadway that runs predominately in the east-west direction between Commercial Street to the east and Front Street to the west. Broad Street, between Commercial Street and Washington Street, is classified as an urban collector under the Town of Weymouth jurisdiction, and east of Broad Street is classified as an urban minor arterial under the jurisdiction of the Town of Weymouth. Within the study area, on-street parking is not permitted; sidewalks are provided along both sides of the roadway.

Existing Intersection Description

Washington Street/Broad Street is a four-legged signalized intersection with four approaches. The Broad Street eastbound approach consists of one shared left-turn/through/right-turn lane. The Broad Street westbound approach consists of a shared left-turn/through lane and an exclusive right-turn lane with approximately 100 feet of storage. The Washington Street northbound approach consists of a shared left-turn/through lane and a shared through/right-turn lane. The Washington Street southbound approach consists of an exclusive left-turn lane with approximately 100 feet of storage and a through/right-turn lane. On-street parking is not permitted along any of the approaches. Crosswalks and curb ramps are provided across all approaches.

Existing Traffic Data

Typically, the baseline transportation conditions in the vicinity of the Project are established through a targeted data collection program. Turning movement counts (TMCs) were conducted during the weekday a.m. and p.m. peak periods (7:00 – 9:00 a.m. and 4:00 – 6:00 p.m., respectively)

at the study area intersection on Tuesday, May 24, 2022. The TMCs included automobile, truck, pedestrian, and bicycle movements.

To account for the impact on traffic volumes and trip patterns resulting from the pandemic, the traffic volumes were grown according to the revised MassDOT Guidance on Traffic Count Data. The traffic volumes from May 2022 were compared to count data from May 2014 at the Washington Street/Broad Street intersection. This comparison resulted in a 20% difference during the a.m. peak hour and a 32% difference during the p.m. peak hour; therefore, the May 2022 a.m. and p.m. counts were increased by 20% and 32%, respectively, to estimate traffic volumes without the impact of COVID-19. The resulting Existing Condition vehicle volumes for the weekday a.m. and p.m. peak hours are shown in **Figure 2**. The detailed traffic counts are provided in the **Appendix A.**

Existing On-Street Parking Regulations

An inventory of the existing curb uses and on-street parking in the vicinity of the Site was collected. Along Washington Street, on-street parking consists of two-hour parking, unrestricted parking, or no parking. There is no parking permitted along Broad Street. The existing on-street parking regulations are shown on **Figure 3**.

Existing Pedestrian and Bicycle Conditions

Sidewalks of sufficient width are generally provided along both sides of Washington Street and Broad Street. However, the sidewalks along Broad Street, west of Washington Street, and the sidewalks along Washington Street, south of Broad Street, are generally in poor condition with overgrown vegetation. Crosswalks and wheelchair ramps are provided at the study area signalized intersection; however, the crosswalks are in poor conditions and the wheelchair ramps are not ADA-complaint. The existing pedestrian volumes are shown in **Figure 4**.

In recent years, bicycle use has increased, and communities are incorporating bicycle facilities (bicycle lanes/paths) into the public realm. While there are no formal on-street bicycle facilities within the study area, the Town of Weymouth implemented the Pleasant Street Bike Lane Project in May 2021. This project, located on the east side of the Town, included buffered bike lanes along the eastern side of Pleasant Street, between Tower Street and Water Street, and bike lanes along the western side of the road. Pavement markings are found along Water Street and Commercial Street, between Broad Street and the East Weymouth Commuter Rail Station. Based on the existing bicycle data, no bike activity was observed during the morning peak hour and minimal activity during the afternoon peak hour.

Figure 2. ***Existing Condition Vehicle Volumes, Weekday a.m. and p.m. Peak Hours***

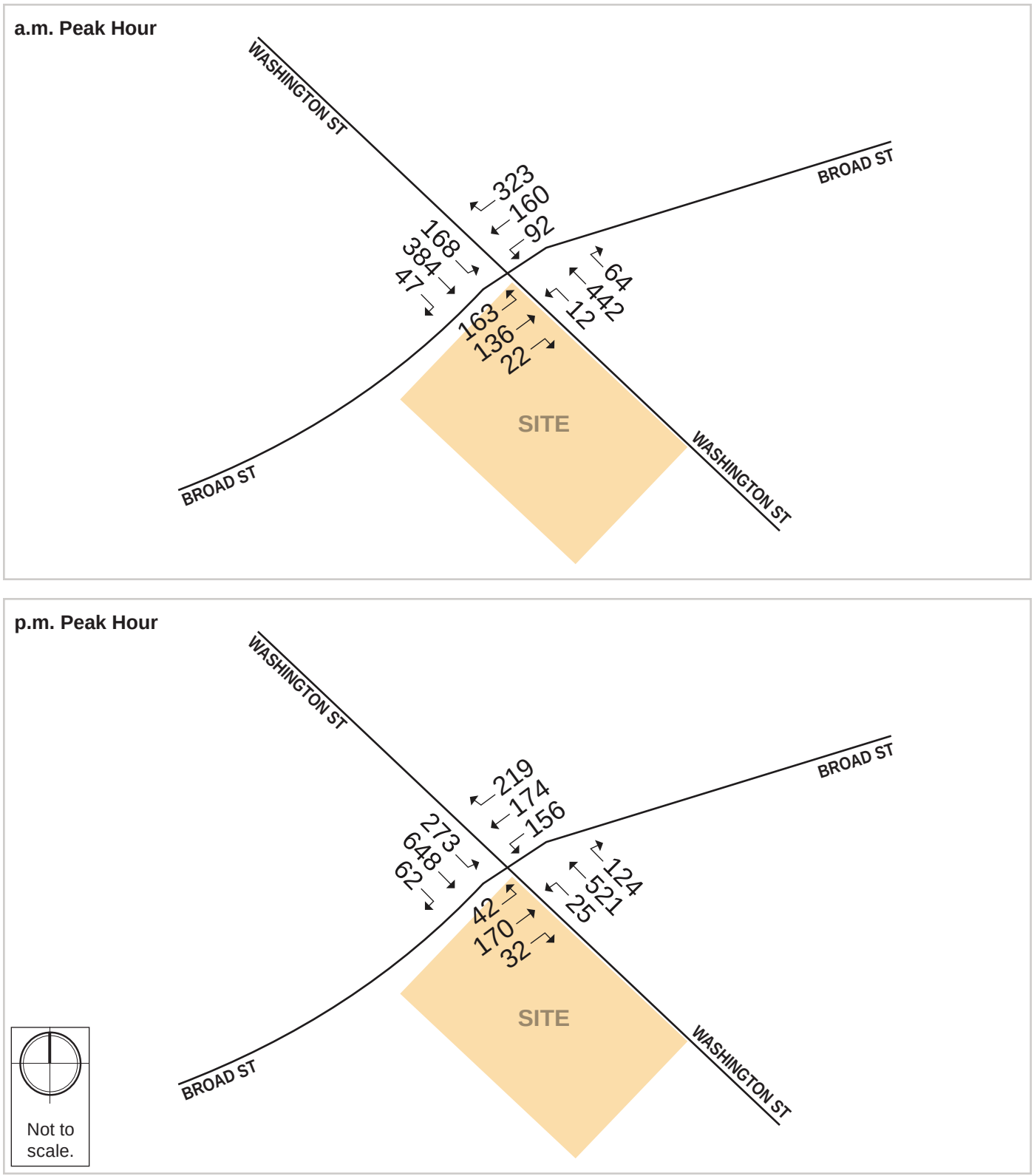


Figure 3. ***On-street Parking Regulations***

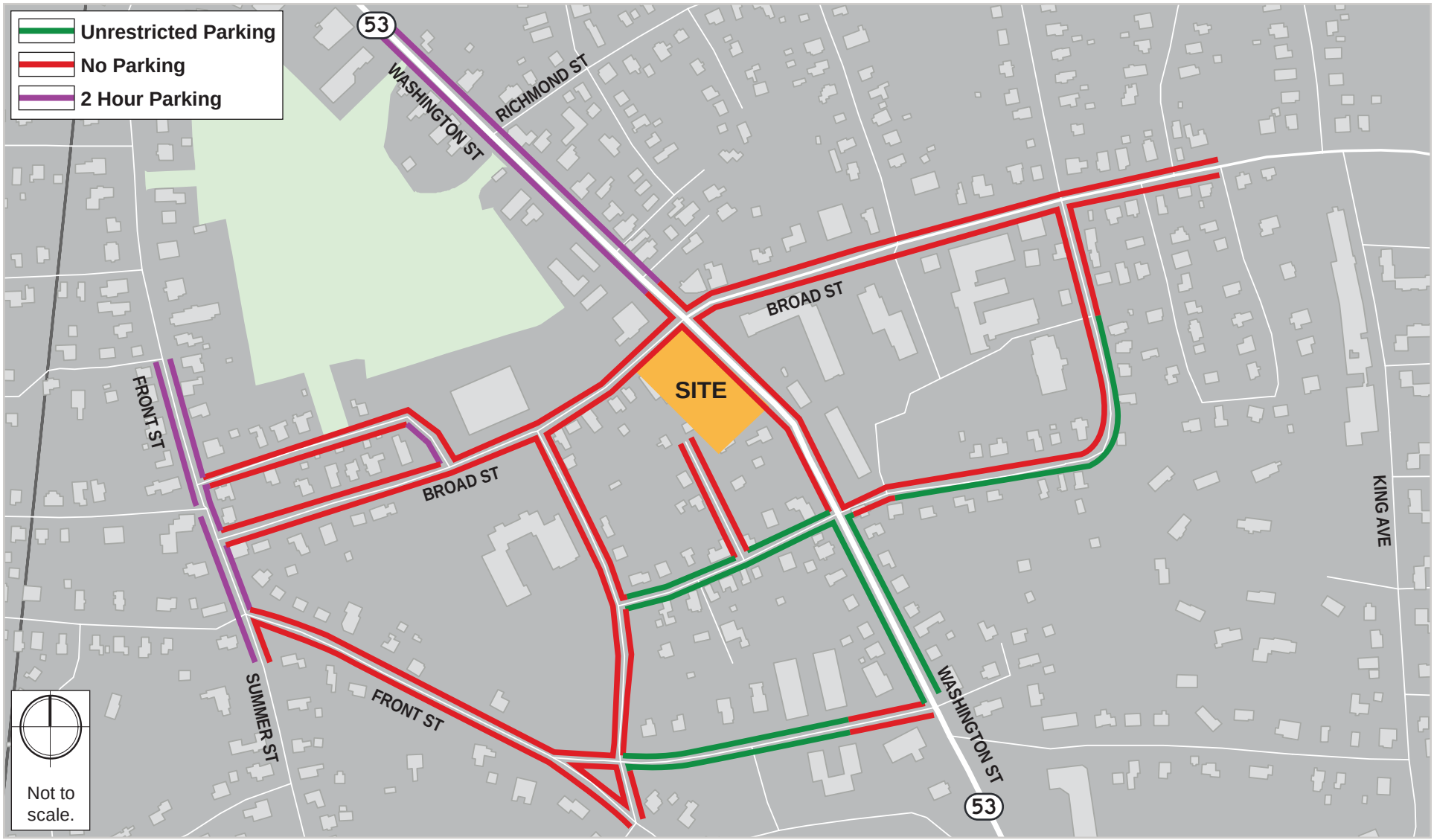
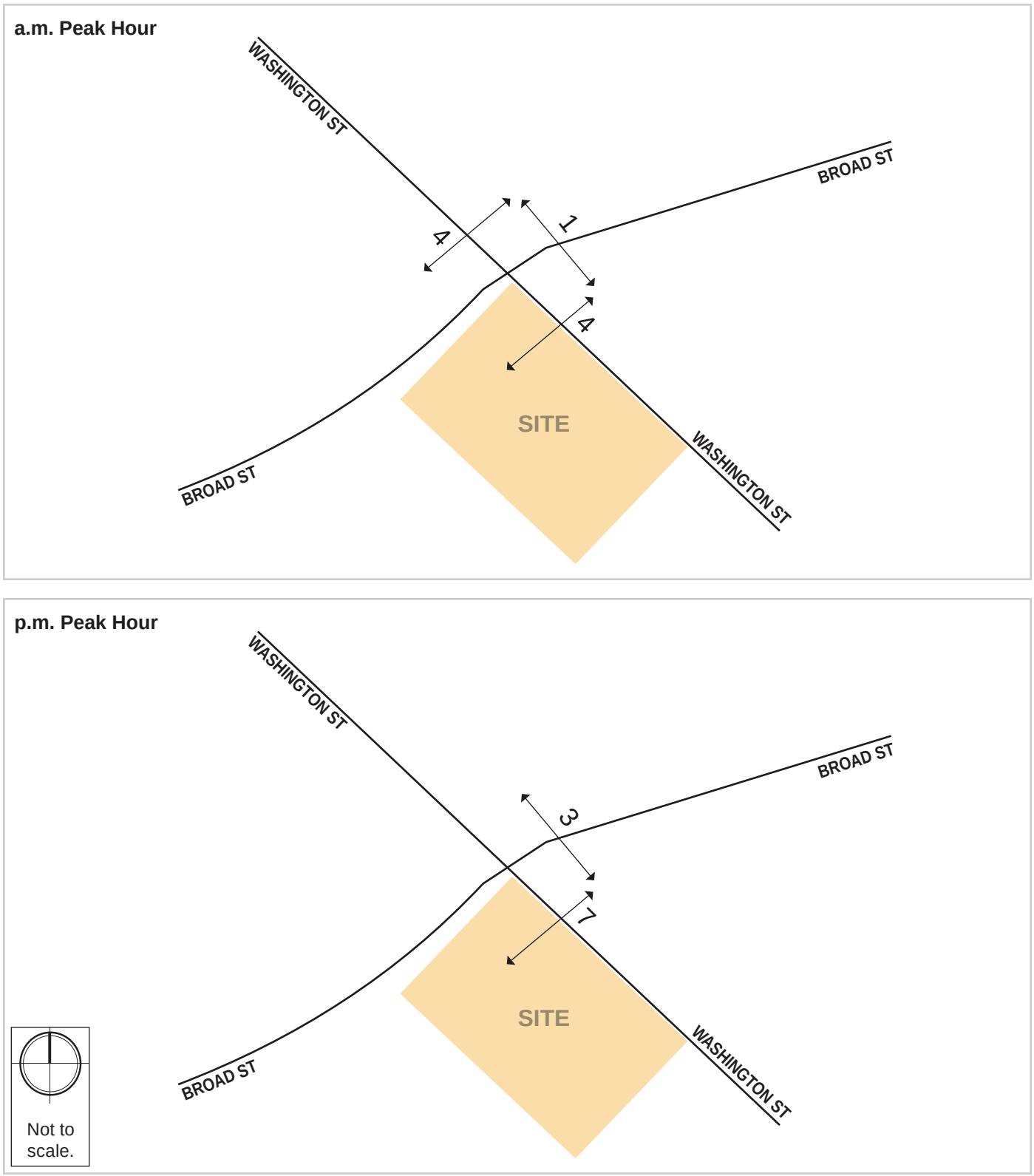


Figure 4. ***Existing Condition Pedestrian Volumes, Weekday a.m. and p.m. Peak Hours***



Existing Public Transportation

The Project is proximate to two MBTA commuter rail stations, providing access to the Greenbush Line commuter rail and Kingston Line Commuter Rail. Weymouth Landing/East Braintree Station, located approximately a half mile north of the Project Site, provides access to the Greenbush Line Commuter Rail and operates with a headway of 70 minutes. Braintree Station, located approximately three miles west of the Project Site, provides access to the Kingston Line commuter rail and the Red Line. The Kingston Line operates with a headway of 60 minutes, and the Red Line operates with a headway of 11 minutes. The Project Site is located along Bus Routes 225 and 226, providing access to Weymouth Landing and Braintree Stations. A map of the public transportation services in the study area is shown in **Figure 5**.

Motor Vehicle Crash Data

HSH compiled motor vehicle crash data from the MassDOT Crash Records System for the most recent five-year period for which they are available (2015-2019). Crash rates are determined based on the number of crashes per million entering vehicles (MEV) at an intersection. **Table 1** shows the crash summary information. The detailed crash data and crash rate worksheets are included in **Appendix B**.

Figure 5. ***Public Transportation***

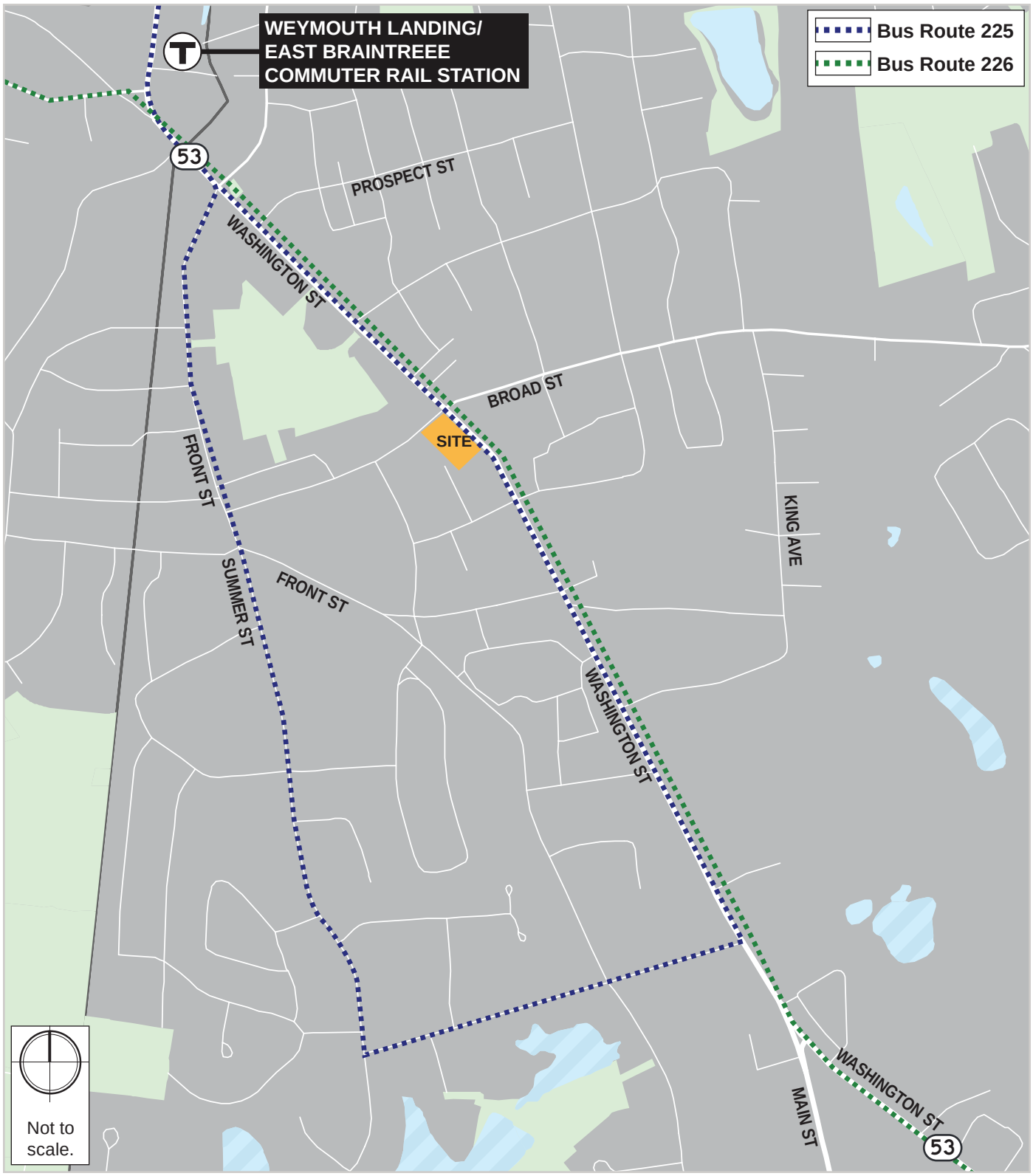


Table 1. Motor Vehicle Crash Data Summary

Characteristic	Washington Street/Broad Street
Year	
2015	8
2016	3
2017	11
2018	6
2019	9
Crash Type	
Angle	10
Rear-end	14
Single vehicle	5
Sideswipe	6
Head-on	1
Rear to Rear	1
Pedestrian	0
Not Reported	0
Weather	
Clear	25
Cloudy	4
Rain	7
Snow	1
Not Reported	0
Total Crashes	37
Crash Rate	0.75
District 6 Average – Signalized Intersections	0.71

Source: MassDOT, Crash Portal and District 6 Average Crash Rates

As shown in **Table 1**, the signalized intersection has a crash rate of approximately 0.75 crashes per MEV, which is above the MassDOT District 6 average of 0.71 crashes per MEV for signalized intersections. Although the crash rate at Washington Street/Broad Street exceeds the district average, the intersection was part of the Highway Safety Improvement Program (HSIP), where a safety study was completed at the intersection in 2015. The Town is currently exploring signal timing changes and other improvements at the intersection.

No-build (2029) Condition

For transportation impact analyses, it is standard practice to evaluate two future conditions: A No-build Condition (without the proposed Project) and a Build Condition (with the proposed Project). In accordance with MassDOT guidelines, these conditions are projected to a future date seven years from the current year. For the evaluation of this Project, 2029, seven years from the date the Project is submitted, was selected as the horizon year for the future conditions' analyses.

The No-build (2029) Condition reflects a future scenario that incorporates anticipated traffic volume changes associated with general background traffic growth, traffic associated with other planned specific developments, and planned infrastructure improvements that will affect travel patterns throughout the study area. These infrastructure improvements include roadway, public transportation, pedestrian, and bicycle improvements. The No-build (2029) Condition does not include the Project-related impacts.

Background Traffic Growth

The methodology to account for future background traffic growth, independent of large development projects, may be affected by changes in demographics, smaller scale development projects, or projects unforeseen at this time. Based on a review of traffic-volume data compiled by MassDOT permanent count stations located in the area and to account for any additional unforeseen traffic growth, a conservative 1% annual growth rate was applied to the existing intersection volumes, compounded annually over seven years to account for background growth by 2029.

Specific Development Projects

Traffic volumes associated with other development projects can affect traffic patterns throughout the study area within the future analysis time horizon. Traffic associated with the following projects was directly incorporated into the future conditions' traffic volumes:

- **655 Washington Street** – This project consists of the redevelopment of the Boston Motel into a mixed-use development with 160 residential units and 4,000 sf of ground floor retail space. Off-street parking will be provided for 260 vehicles.
- **116 Washington Street** – This project consists of the development of a mixed-use building with 22 residential units and 1400 sf of retail/commercial space.
- **15 Front Street** – This project consists of the development of a new mixed-use building with 24 residential units and 900 sf of retail/commercial space.
- **125 Broad Street** – This project consists of the development of a new residential building with 60 residential units.

A map of the background development projects is shown in **Figure 6**.

Figure 6. ***Background Development Projects***

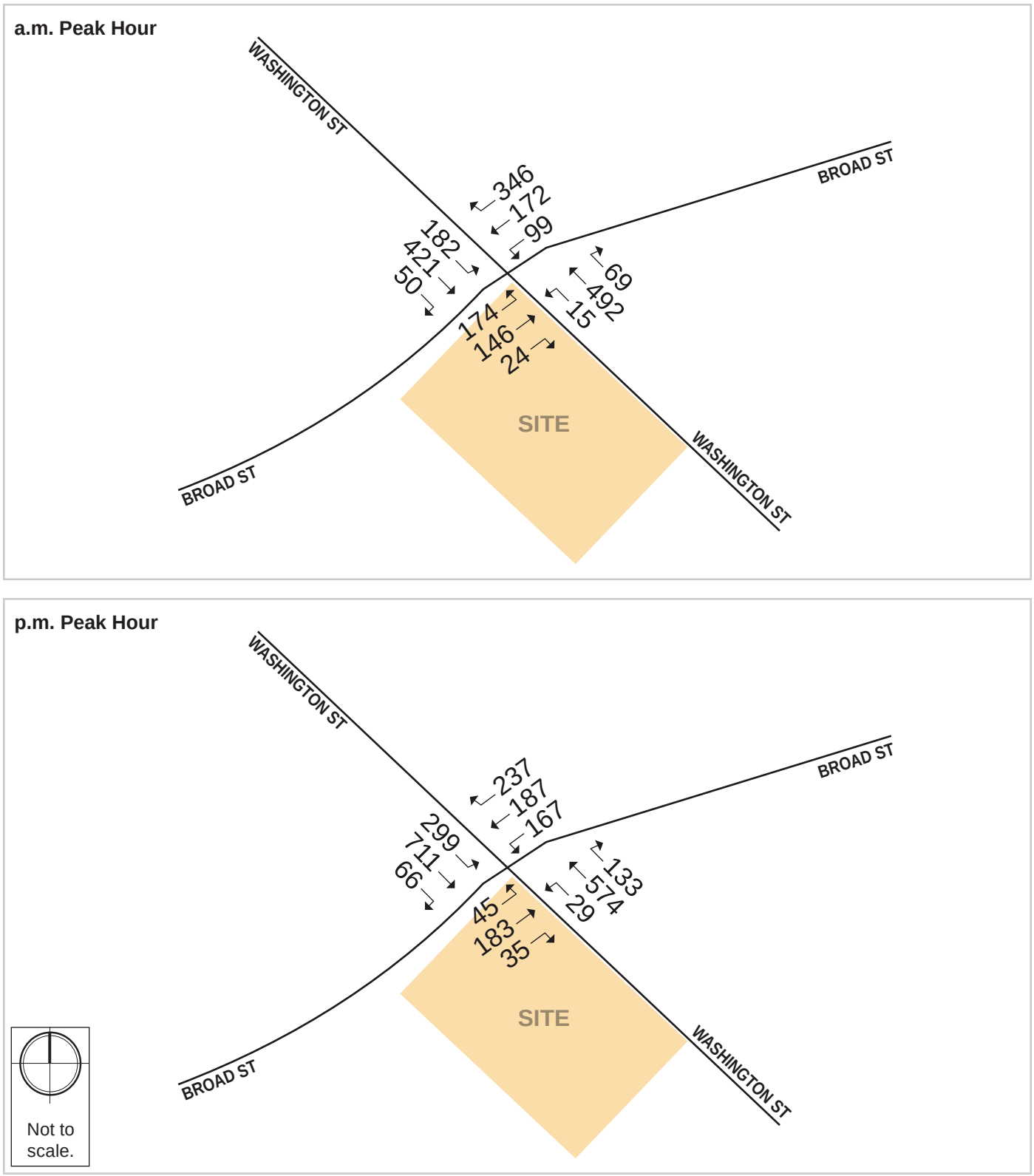
Infrastructure Improvements

A review of planned improvements to roadways, public transportation, and bicycle and pedestrian facilities was conducted to determine if there were any nearby infrastructure improvement projects that would affect travel patterns or behavior. As previously mentioned, one planned improvement was identified which consists of signal timing changes and adding a Broad Street westbound lead left-turn to the intersection of Washington Street at Broad Street. The proposed traffic signal plans were obtained from the Town of Weymouth and incorporated into the future conditions.

No-build (2029) Condition Traffic Volumes

The 1% per year annual growth rate was applied to the Existing Condition traffic volumes, and then the traffic volumes from the specific development projects were added to the study area intersection to develop the No-build (2029) Condition traffic volumes. The No-build (2029) Condition Weekday a.m. and p.m. peak hour traffic volumes are shown in Figure 7.

Figure 7. ***No-build (2029) Condition Traffic Volumes, Weekday a.m. and p.m. Peak Hours***



Build (2029) Condition

As previously summarized, the Project site is located at 213-217 Washington Street in Weymouth, Massachusetts. The Project will consist of the construction of approximately 27 residential units, approximately 4,285 sf of ground floor commercial space, and approximately 50 parking spaces.

Site Description, Access, and Parking

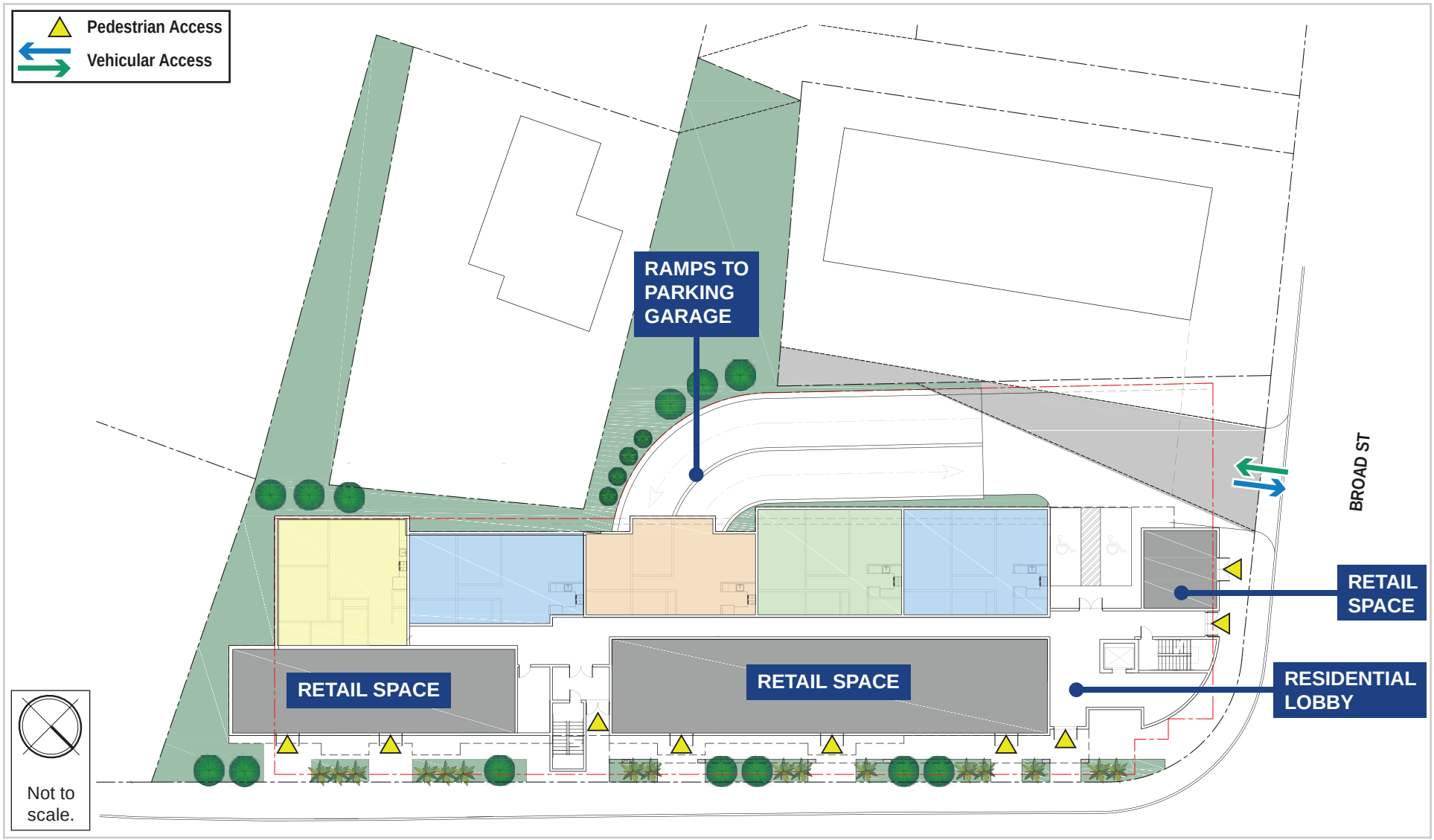
The site plan for the proposed Project is shown in **Figure 8.** The main residential lobby will be located at the corner of Washington Street and Broad Street. The retail space, broken into three different spaces, will be primarily accessed via Washington Street, with one retail space along Broad Street.

The current Project site has an approximately 25-foot-wide curb cut along Broad Street. The proposed Project will retain the existing curb cut to provide access to the underground parking garage with approximately 48 parking spaces. Two handicap parking spaces will be provided on the ground floor, before the parking garage ramp. The Project will include a secure, covered bicycle storage room for approximately 25 bicycles on the basement level.

Loading and Service

Residential units primarily generate delivery trips related to small packages, prepared food that arrive in small box trucks or smaller vehicles, as well as move-in/move-out activity. These deliveries, move-in/move-out activity, and retail deliveries would be accommodated on-street along Washington Street and Broad Street. The trash room will be in the basement level, next to the bicycle room, and is expected to be picked up by a private company.

Figure 8. ***Site Plan***



Project Vehicle Trip Generation

TRIP GENERATION METHODOLOGY

As is standard practice, new trip generation is based on rates published in the Institute of Transportation Engineers (ITE) *Trip Generation* (11th edition, 2021). The ITE rates, available for a variety of land uses, produce "unadjusted" vehicle trip estimates, which are converted to person trips based on vehicle occupancy. Through application of the appropriate travel mode share information for the specific study area, the total person trips are "adjusted" to vehicle, transit, and walk/bicycle trips. Detailed trip generation worksheets are provided in **Appendix C**. To estimate the trip generation for the Project, the following ITE land use codes (LUCs) were used:

- **Land Use Code 221 – Multifamily Housing Mid-Rise Residential**. Mid-rise multifamily housing includes apartments, townhouses, and condominiums located within the same building with at least three other dwelling units and that have between three and 10 levels (floors).
- **LUC 820 – Shopping Center "Retail"**. A shopping center is an integrated group of commercial establishments that is planned, developed, owner, and managed as a unit. A shopping center's composition is related to its market area in terms of size, location, and type of store. A shopping center also provides on-site parking facilities sufficient to serve its own parking demands.

Travel Mode Shares

Travel mode shares reflect the distribution of person trips among automobiles, transit, and walking/bicycling. The Project area is within a 10-minute walk to the MBTA Weymouth Landing Station and several bus routes. The transit-oriented nature of the Project Site will allow some residents to choose to forego auto ownership and rely on public transit for many of their daily trips.

The American Census Survey (ACS) provides travel mode share rates for residents traveling from home to work and back via walking/biking, transit, and vehicles by census tract. The Project Site is located within Census Tract 4224.02. An average of the travel mode shares from the census tract were adopted for the Project's residential and retail uses.

The unadjusted vehicular trips were converted to person-trips by using vehicle occupancy rates published by the Federal Highway Administration (FHWA)[1]. The person-trips were then distributed to different modes according to the mode shares shown in **Table 2.**

[1] Summary of Travel Trends: 2017 National Household Travel Survey; FHWA; Washington, D.C.; July 2018

Table 2. Peak Hour Travel Mode Shares and Vehicle Occupancy

Land Use	Travel Mode Share			Average Vehicle Occupancy (AVO)
	Vehicle	Transit	Walk/Bicycle	
Residential/Retail	82%	16%	2%	1.18/1.82

Project Trip Generation

The travel mode share percentages shown in **Table 2** were applied to the number of person trips to develop walk/bicycle, transit, and vehicle trip generation estimates for the Project. Vehicle trips include automobiles, taxicabs, and transportation network company (TNC) services, such as Uber and Lyft. Uber/Lyft activity, included as 2% of vehicle trips, is comprised of both an arriving trip and departing trip during the same time period, as opposed to the single trip generated by vehicles that are parking. The trip generation of the Project by travel mode is shown in **Table 3**. The detailed trip generation information is provided in the **Appendix C**.

Table 3. Project Trip Generation

Land Use/ Direction		Walk/Bike Trips	Transit Trips	Vehicle Trips
Daily				
Residential 27 units	In	1	12	50
	Out	1	12	50
	Subtotal	**2**	**24**	**100**
Retail 4,285 sf	In	3	23	65
	Out	3	23	65
	Subtotal	**6**	**46**	**130**
	Total	**8**	**70**	**230**
a.m. Peak Hour				
Residential 27 units	In	0	1	3
	Out	0	1	6
	Subtotal	**0**	**2**	**9**
Retail 4,285 sf	In	0	1	2
	Out	0	0	1
	Subtotal	**0**	**1**	**3**
	Total	**0**	**3**	**12**
p.m. Peak Hour				
Residential 27 units	In	0	1	5
	Out	0	1	3
	Subtotal	**0**	**2**	**8**
Retail 4,285 sf	In	0	2	6
	Out	0	2	7
	Subtotal	**0**	**4**	**13**
	Total	**0**	**6**	**21**

As shown in **Table 3**, the Project Site is expected to generate approximately 12 vehicle trips during the weekday a.m. peak hour and 21 vehicle trips during the weekday p.m. peak hour. The Project Site is expected to generate approximately three transit person trips during the a.m. peak hour and approximately six transit person trips during the p.m. peak hour. These new transit person trips are expected to primarily use the MBTA's bus routes to access the commuter rail and Red Line to commute in and out of Boston and other points north and south of the Project Site.

Vehicle Trip Distribution

A vehicle trip distribution pattern identifies the various travel paths for vehicles arriving at a destination and the corresponding departure travel paths. New vehicle trips generated to the Project site will include mostly residents. The trip distribution for the new Project trips was based on a review of previous studies done in the Town of Weymouth, existing counts patterns, and Journey-to-Work data obtained from the U.S. Census for persons residing in the Town of Weymouth. **Figure 9** shows the trip distribution pattern for Project trips entering and exiting the Site.

Build (2029) Condition Traffic Volumes

The trip distribution patterns were applied to the new Project trips to develop the Project-generated Vehicle Trips shown in **Figure 10.** Then, the Project-generated trips were added to the No-build (2029) Condition traffic volumes to develop the Build (2029) Condition traffic volumes shown in **Figure 11** for the weekday a.m. and p.m. peak hours.

Figure 9. ***Vehicle Trip Distribution, Residential and Retail***

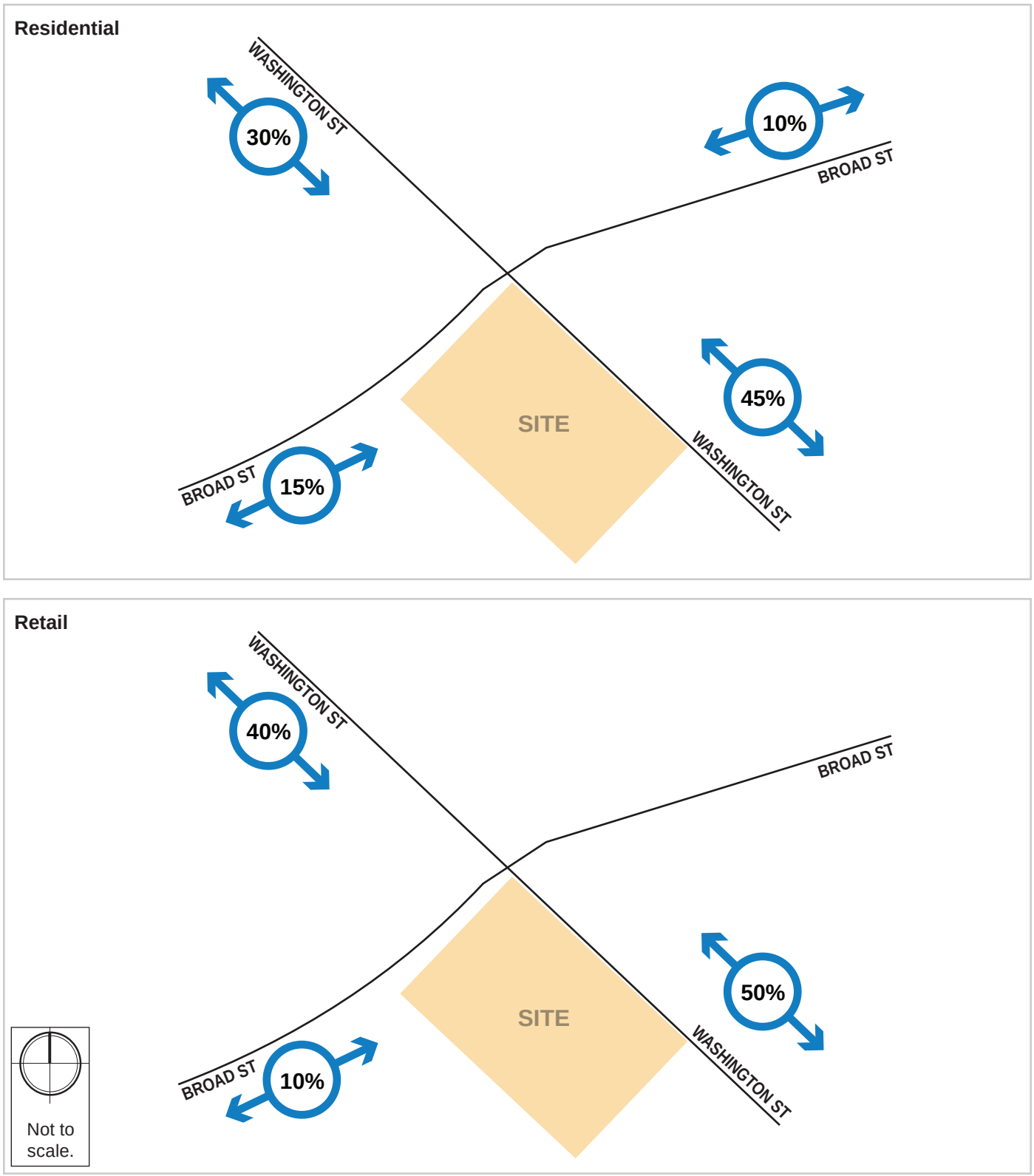


Figure 10. ***Project-generated Vehicle Trips, Weekday a.m. and p.m Peak Hours***

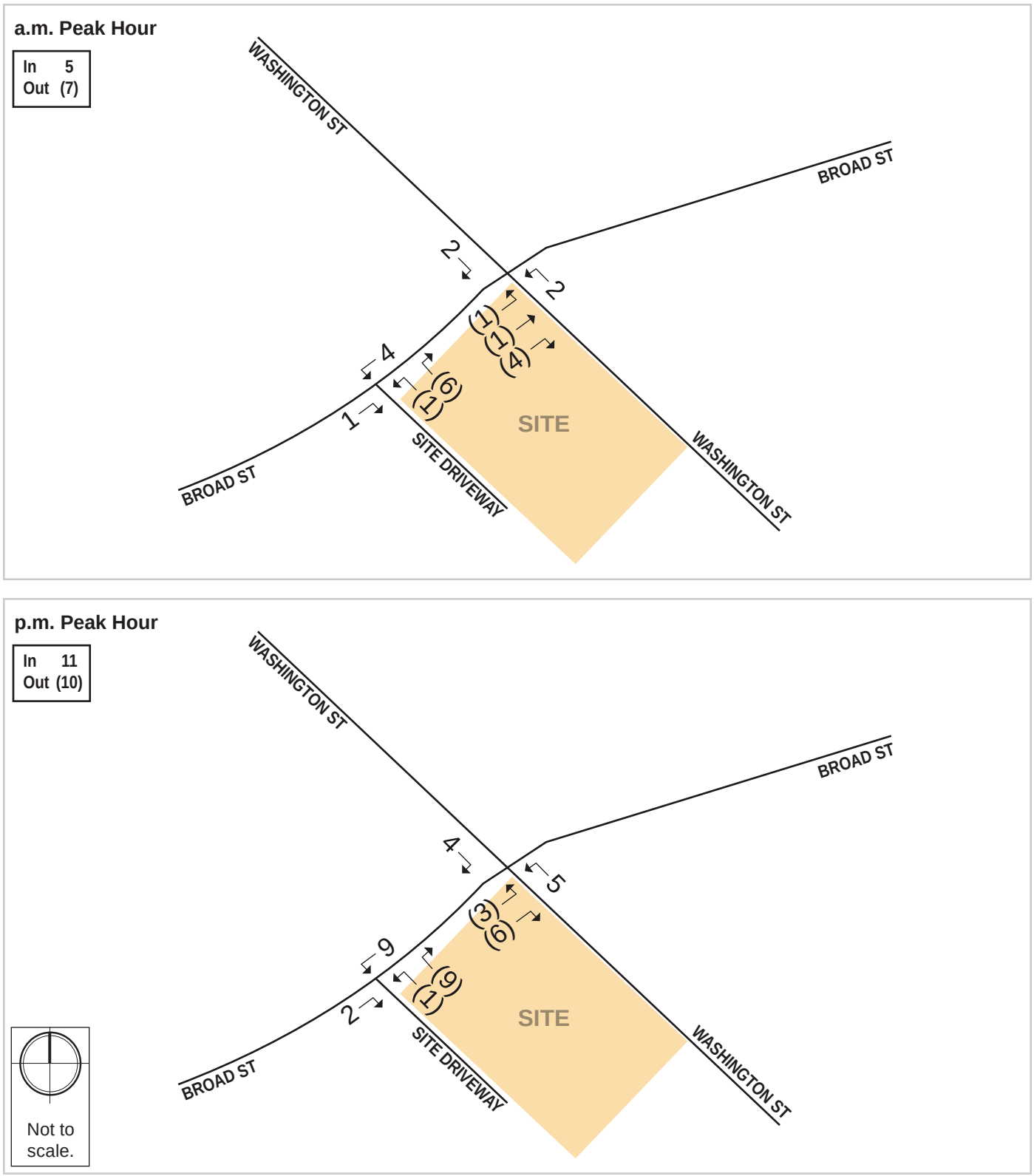
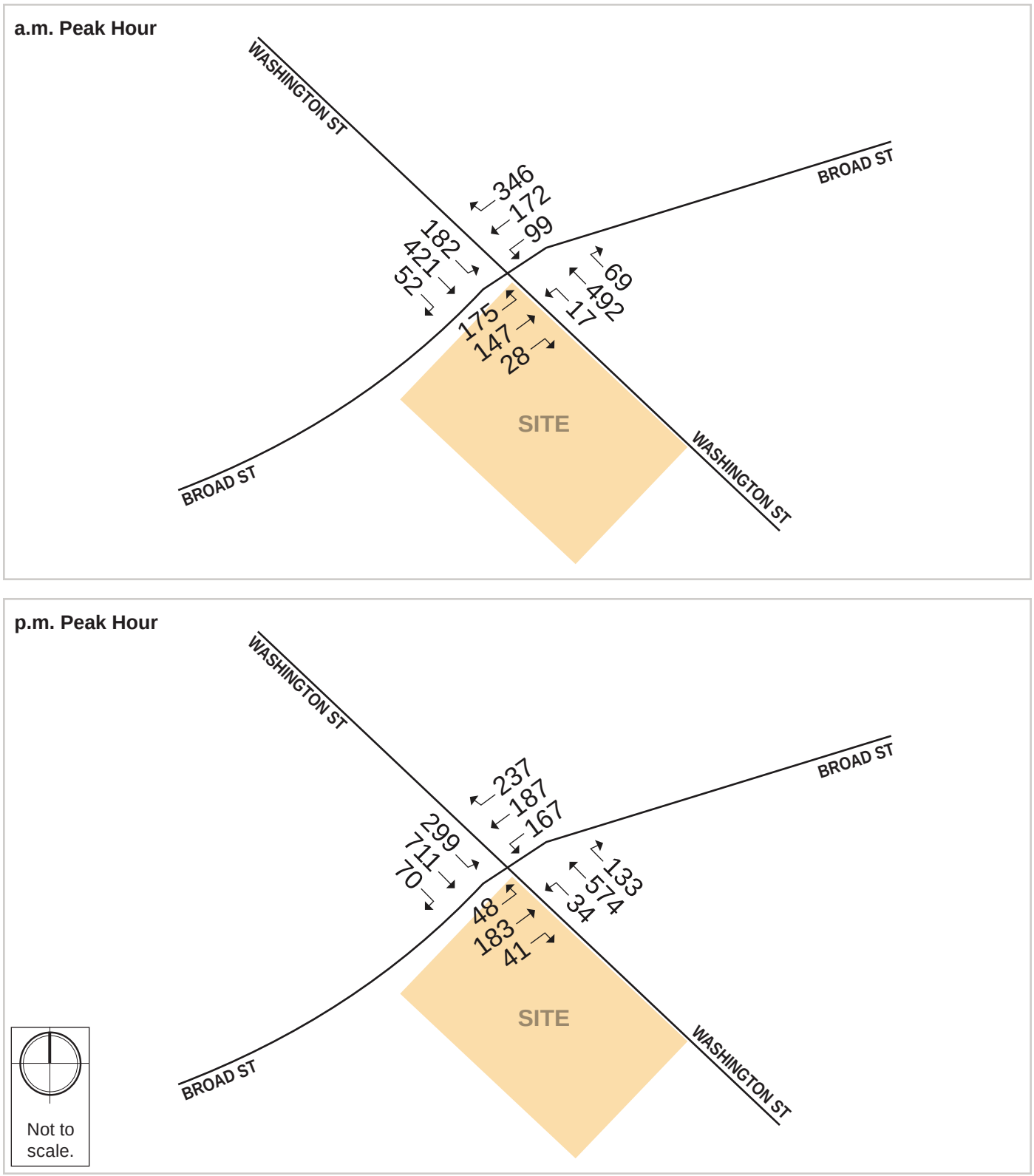


Figure 11. ***Build (2029) Condition Vehicle Volumes, Weekday a.m. and p.m. Peak Hours***



Traffic Operations Analysis

Trafficware's Synchro (version 11) software package was used to calculate average delay and associated level of service (LOS) at the study area intersection. This software is based on the traffic operational analysis methodology of the Transportation Research Board's (TRB's) *Highway Capacity Manual (HCM),* 6th Edition.

LOS designations are based on average delay per vehicle for all vehicles entering an intersection. **Table 4** displays the intersection LOS criteria. LOS A indicates the most favorable condition, with minimum traffic delay, while LOS F represents the worst condition, with significant traffic delay. LOS D or better is typically considered acceptable. However, LOS E or F is often typical for a stop-controlled minor street that intersects a major roadway.

Table 4. Vehicle Level of Service (LOS) Criteria

Level of Service	Average Stopped Delay (sec/vehicle)	
	Signalized Intersection	Unsignalized Intersection
A	≤10	≤10
B	>10 and ≤20	>10 and ≤15
C	>20 and ≤35	>15 and ≤25
D	>35 and ≤55	>25 and ≤35
E	>55 and ≤80	>35 and ≤50
F	>80	>50

Source: 2010 Highway Capacity Manual, Transportation Research Board.

In addition to delay and LOS, the operational capacity and vehicular queues are calculated and used to further quantify traffic operations at intersections. The volume-to-capacity (v/c) ratio is a measure of congestion at an intersection approach. A v/c ratio below one indicates that the intersection approach has adequate capacity to process the arriving traffic volumes over the course of an hour. A v/c ratio of one or greater indicates that the traffic volume on the intersection approach exceeds capacity. The 95th percentile queue length, measured in feet, represents the farthest extent of the vehicle queue (to the last stopped vehicle) upstream from the stop line during five percent of all signal cycles. The 95th percentile queue will not be seen during each cycle. The queue would be this long only 5% of the time and would typically not occur during off-peak hours. Since volumes fluctuate throughout the hour, the 95th percentile queue represents what can be considered a "worst case" scenario. Queues at the intersection are generally below the 95th percentile queue throughout

the course of the peak hour. It is also unlikely that the 95th percentile queues for each approach to the intersection will occur simultaneously.

Table 5 summarizes the Existing Condition, the No-build (2029) Condition, and the Build (2029) Condition capacity analysis for the study area intersection during the weekday a.m. and p.m. peak hours, respectively. **Table 5** shows that the signalized intersection of Washington Street/Broad Street currently operates at an acceptable LOS during the a.m. peak hour and at a LOS E during the p.m. peak hour. The Broad Street eastbound approach currently operates at LOS F during both the a.m. and p.m. peak hour. The Broad Street westbound approach and Washington Street southbound left-turn approach currently operate at a LOS F during the p.m. peak hour.

Under the No-build condition, the intersection decreases to a LOS E during the a.m. peak hour and to a LOS F during the p.m. peak hour. The Broad Street eastbound approach improves to a LOS E from a LOS F during the p.m. peak hour with the proposed signal timing improvements. The Washington Street northbound through approach decreases from LOS C to a LOS E during the p.m. peak hour. The Washington Street southbound left-turn approach decreases from LOS C to LOS E during the a.m. peak hour.

Under the Build Condition, all approaches continue to operate at the same LOS as the No-build condition, indicating that the Project will not affect traffic operations in the area. The detailed Synchro results are provided in **Appendix D**.

Table 5. Capacity Analysis Summary, Weekday a.m. and p.m. Peak Hours

Intersection/Movement	Existing Condition					No-build (2029) Condition					Build (2029) Condition				
	LOS	Delay (s)	V/C ratio	50th % Queue Length	95th % Queue Length	LOS	Delay (s)	V/C ratio	50th % Queue Length	95th % Queue Length	LOS	Delay (s)	V/C ratio	50th % Queue Length	95th % Queue Length
Weekday a.m. Peak Hour															
Washington Street/Broad Street	**D**	**48.8**	**-**	**-**	**-**	**E**	**73.1**	**-**	**-**	**-**	**E**	**75.4**	**-**	**-**	**-**
Broad Street EB left/thru/right	F	>80.0	>1.00	~186	#542	F	>80.0	>1.00	~331	#667	F	>80.0	>1.00	~340	#677
Broad Street WB left/thru	D	35.4	0.67	90	#369	C	33.3	0.59	135	#364	C	33.4	0.59	135	#365
Broad Street WB right	A	5.7	0.42	17	72	A	6.8	0.44	34	99	A	6.8	0.48	34	99
Washington Street NB left	B	18.3	0.04	3	20	C	23.8	0.06	5	27	C	23.9	0.07	7	30
Washington Street NB thru	C	33.7	0.81	158	#474	D	40.7	0.83	259	#650	D	40.7	0.83	259	#650
Washington Street NB right	A	3.0	0.12	0	17	A	0.8	0.12	0	4	A	0.8	0.12	0	4
Washington Street SB left	C	25.3	0.64	33	#169	E	61.3	0.90	58	#276	E	61.3	0.90	58	#276
Washington Street SB thru/right	B	16.5	0.55	105	339	C	24.0	0.61	189	481	C	24.1	0.62	190	485
Weekday p.m. Peak Hour															
Washington Street/Broad Street	**E**	**56.3**	**-**	**-**	**-**	**F**	**100.0**	**-**	**-**	**-**	**F**	**105.0**	**-**	**-**	**-**
Broad Street EB left/thru/right	F	>80.0	1.00	120	#421	E	66.2	0.88	163	#442	E	72.3	0.91	170	#465
Broad Street WB left/thru	F	>80.0	>1.00	~206	#566	F	>80.0	>1.00	~314	#673	F	>80.0	>1.00	~314	#673
Broad Street WB right	A	8.2	0.34	26	68	A	8.1	0.33	36	76	A	8.1	0.33	36	76
Washington Street NB left	B	19.2	0.13	8	34	D	39.0	0.37	14	55	D	44.8	0.45	18	#73
Washington Street NB thru	C	31.0	0.80	239	#569	E	58.1	0.97	394	#793	E	58.1	0.97	394	#793
Washington Street NB right	A	8.1	0.20	14	58	A	7.7	0.23	12	54	A	7.7	0.23	12	54
Washington Street SB left	F	>80.0	>1.00	56	#354	F	>80.0	>1.00	~210	#526	F	>80.0	>1.00	~210	#526
Washington Street SB thru/right	B	19.8	0.70	199	#696	C	34.9	0.87	371	#970	D	35.2	0.87	374	#975

Grey Shading indicates LOS E or F in the Existing Condition or a decrease to LOS E or LOS F in the No-build (2029) Condition and Build (2029) Condition.
~ 50th Percentile volume exceeds capacity, queue shown after two cycles
 # 95th Percentile volume exceeds capacity, queue shown after two cycles

Transportation Demand Management

The Proponent is committed to implementing Transportation Demand Management (TDM) measures to minimize automobile usage and Project-related traffic impacts. TDM will be facilitated by the nature of the Project and its proximity to public transit alternatives. The Proponent will work with the Town of Weymouth to develop a TDM program appropriate to the Project and consistent with its level of impact. The TDM measures for the Project may include, but are not limited, to the following:

- ***Transportation Coordinator:*** The property manager will be the transportation coordinator for the site. The transportation coordinator will oversee all transportation issues, including parking, service and loading, deliveries, move-in/move-out operations, and all TDM programs.
- ***Transit Information:*** The property manager will keep a supply of transit information (schedules, maps, and fare information) to be made available to the residents and patrons of the Project site.
- ***Orientation Packets:*** The Proponent will provide orientation packets to new tenants containing information on available transportation choices, including transit routes/schedules. On-site management will work with residents and tenants as they move in to help facilitate transportation for new arrivals.
- ***Newsletter:*** Provide an annual (or more frequent) newsletter or bulletin summarizing transit, ridesharing, bicycling, alternative work schedules, and other travel options.
- ***Bicycle Accommodation:*** The Proponent will provide approximately 25 secure, covered bicycle parking spaces for residents to encourage bicycling as an alternative mode of transportation.

Conclusion

The Project is located 10 minutes walking from the Weymouth Landing/East Braintree commuter rail station and approximately a nine-minute drive from the Braintree MBTA station, with easy access to downtown Boston. Weymouth Landing is a walkable area, with various nearby amenities, where new residents will be able to accomplish errands without relying only on the automobile as their sole means for transportation. According to the trip generation and traffic operations analysis, the Project generated trips will have a minimal impact on traffic at the nearby intersections and roadways.

HOWARD STEIN HUDSON

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Appendix A

Traffic Counts

Client:	Emma Parisi
Project #:	946_001_HSH
BTD #:	Location 1
Location:	Weymouth, MA
Street 1:	Washington Street
Street 2:	Broad Street
Count Date:	5/24/2022
Day of Week:	Tuesday
Weather:	Clouds & Sun, 60°F

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PO BOX 1723, Framingham, MA 01701
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PASSENGER CARS & HEAVY VEHICLES COMBINED

	Washington Street Northbound				Washington Street Southbound				Broad Street Eastbound				Broad Street Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
7:00 AM	0	2	98	10	0	23	66	13	0	12	18	1	0	25	12	64
7:15 AM	0	2	121	9	0	24	60	16	0	13	20	2	0	19	26	64
7:30 AM	0	2	105	11	0	35	85	16	0	17	26	7	0	11	38	86
7:45 AM	0	4	102	10	0	42	79	6	0	11	26	4	0	21	37	62
8:00 AM	0	2	82	15	0	31	77	7	0	3	36	4	0	17	21	59
8:15 AM	0	2	79	17	0	32	79	10	0	4	25	3	0	28	37	62
8:30 AM	0	3	105	20	0	31	112	7	0	14	24	5	0	20	23	37
8:45 AM	0	1	94	23	0	49	106	17	0	10	26	4	0	31	25	44

	Washington Street Northbound				Washington Street Southbound				Broad Street Eastbound				Broad Street Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
4:00 PM	0	8	123	28	0	49	127	14	0	9	33	9	0	29	40	41
4:15 PM	0	4	97	15	0	52	125	13	0	4	30	4	0	34	32	46
4:30 PM	0	3	90	25	0	62	114	14	0	13	29	6	0	20	36	36
4:45 PM	0	4	85	26	0	44	125	6	0	6	37	5	0	35	24	43
5:00 PM	0	7	95	34	0	53	148	6	0	4	40	7	0	22	31	40
5:15 PM	0	4	96	32	0	45	121	10	0	2	34	4	0	37	19	51
5:30 PM	0	7	99	34	0	43	113	9	0	6	31	1	0	26	23	42
5:45 PM	0	5	110	23	0	58	105	8	0	7	23	5	0	30	20	24

AM PEAK HOUR 7:30 AM to 8:30 AM	Washington Street Northbound				Washington Street Southbound				Broad Street Eastbound				Broad Street Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	0	**10**	**368**	**53**	**0**	**140**	**320**	**39**	**0**	**35**	**113**	**18**	**0**	**77**	**133**	**269**
PHF	**0.91**				**0.92**				**0.83**				**0.89**			
HV %	**0.0%**	**0.0%**	**7.1%**	**5.7%**	**0.0%**	**9.3%**	**8.1%**	**5.1%**	**0.0%**	**5.7%**	**1.8%**	**5.6%**	**0.0%**	**1.3%**	**0.0%**	**3.0%**

PM PEAK HOUR 4:00 PM to 5:00 PM	Washington Street Northbound				Washington Street Southbound				Broad Street Eastbound				Broad Street Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	0	**19**	**395**	**94**	**0**	**207**	**491**	**47**	**0**	**32**	**129**	**24**	**0**	**118**	**132**	**166**
PHF	**0.80**				**0.98**				**0.91**				**0.93**			
HV %	**0.0%**	**0.0%**	**3.5%**	**0.0%**	**0.0%**	**1.0%**	**4.3%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**1.7%**	**2.3%**	**3.0%**

Client:	Emma Parisi
Project #:	946_001_HSH
BTD #:	Location 1
Location:	Weymouth, MA
Street 1:	Washington Street
Street 2:	Broad Street
Count Date:	5/24/2022
Day of Week:	Tuesday
Weather:	Clouds & Sun, 60°F

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HEAVY VEHICLES

	Washington Street Northbound				Washington Street Southbound				Broad Street Eastbound				Broad Street Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
7:00 AM	0	0	8	0	0	3	6	0	0	0	0	0	0	0	1	0
7:15 AM	0	0	7	0	0	2	2	0	0	0	0	0	0	0	0	2
7:30 AM	0	0	4	0	0	3	5	1	0	0	1	0	0	0	0	0
7:45 AM	0	0	7	2	0	5	8	0	0	0	0	0	0	1	0	4
8:00 AM	0	0	6	1	0	1	9	0	0	0	0	1	0	0	0	3
8:15 AM	0	0	9	0	0	4	4	1	0	2	1	0	0	0	0	1
8:30 AM	0	1	6	2	0	2	3	0	0	0	1	0	0	1	0	1
8:45 AM	0	0	8	0	0	5	7	2	0	1	0	0	0	2	1	2

	Washington Street Northbound				Washington Street Southbound				Broad Street Eastbound				Broad Street Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
4:00 PM	0	0	5	0	0	1	4	0	0	0	0	0	0	1	1	3
4:15 PM	0	0	6	0	0	0	5	0	0	0	0	0	0	0	1	1
4:30 PM	0	0	1	0	0	1	5	0	0	0	0	0	0	0	1	1
4:45 PM	0	0	2	0	0	0	7	0	0	0	0	0	0	1	0	0
5:00 PM	0	0	3	0	0	1	1	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	3	0	0	0	5	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	3	0	0	0	1	0	0	0	0	0	0	0	1	1
5:45 PM	0	0	2	0	0	0	2	0	0	0	0	0	0	1	0	1

AM PEAK HOUR 8:00 AM to 9:00 AM	Washington Street Northbound				Washington Street Southbound				Broad Street Eastbound				Broad Street Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	0	**1**	**29**	**3**	**0**	**12**	**23**	**3**	**0**	**3**	**2**	**1**	**0**	**3**	**1**	**7**
PHF	**0.92**				**0.68**				**0.50**				**0.55**			

PM PEAK HOUR 4:00 PM to 5:00 PM	Washington Street Northbound				Washington Street Southbound				Broad Street Eastbound				Broad Street Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	0	**0**	**14**	**0**	**0**	**2**	**21**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**3**	**5**
PHF	**0.58**				**0.82**				**0.00**				**0.50**			

Client:	Emma Parisi
Project #:	946_001_HSH
BTD #:	Location 1
Location:	Weymouth, MA
Street 1:	Washington Street
Street 2:	Broad Street
Count Date:	5/24/2022
Day of Week:	Tuesday
Weather:	Clouds & Sun, 60°F

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PEDESTRIANS & BICYCLES

	Washington Street Northbound				Washington Street Southbound				Broad Street Eastbound				Broad Street Westbound			
Start Time	Left	Thru	Right	PED	Left	Thru	Right	PED	Left	Thru	Right	PED	Left	Thru	Right	PED
7:00 AM	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
7:15 AM	0	0	0	1	0	0	0	2	0	0	0	0	0	0	0	0
7:30 AM	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
7:45 AM	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	1
8:00 AM	0	0	0	2	0	0	0	1	0	0	0	0	0	0	0	0
8:15 AM	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0
8:30 AM	0	1	0	0	0	0	0	2	0	0	0	0	0	0	0	0
8:45 AM	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0

	Washington Street Northbound				Washington Street Southbound				Broad Street Eastbound				Broad Street Westbound			
Start Time	Left	Thru	Right	PED	Left	Thru	Right	PED	Left	Thru	Right	PED	Left	Thru	Right	PED
4:00 PM	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
4:15 PM	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
4:30 PM	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	3
4:45 PM	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0
5:00 PM	0	0	0	2	0	0	0	1	0	0	0	0	0	0	1	1
5:15 PM	0	0	0	2	1	0	0	0	0	0	0	0	0	0	0	2
5:30 PM	0	0	0	2	1	0	0	0	0	0	0	0	0	0	1	0
5:45 PM	0	0	0	5	0	1	0	0	0	0	0	0	0	0	0	1

AM PEAK HOUR[1] 7:30 AM to 8:30 AM	Washington Street Northbound				Washington Street Southbound				Broad Street Eastbound				Broad Street Westbound			
	Left	Thru	Right	PED	Left	Thru	Right	PED	Left	Thru	Right	PED	Left	Thru	Right	PED
	0	0	0	4	0	0	0	4	0	0	0	0	0	0	0	1

PM PEAK HOUR[1] 4:00 PM to 5:00 PM	Washington Street Northbound				Washington Street Southbound				Broad Street Eastbound				Broad Street Westbound			
	Left	Thru	Right	PED	Left	Thru	Right	PED	Left	Thru	Right	PED	Left	Thru	Right	PED
	0	0	0	7	0	1	0	0	0	1	0	0	0	0	0	3

[1] *NOTE: Peak hour summaries here correspond to peak hours identified for passenger cars and heavy vehicles combined.*

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Appendix B

Crash Data and Worksheets

INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Weymouth COUNT DATE : 5/24/2022

DISTRICT : 6 UNSIGNALIZED : SIGNALIZED : X

~ INTERSECTION DATA ~

MAJOR STREET : Washington Street

MINOR STREET(S) : Broad Street

INTERSECTION DIAGRAM
(Label Approaches)

PEAK HOUR VOLUMES

APPROACH :	1	2	3	4	5	Total Peak Hourly Approach Volume
DIRECTION :	NB	SB	EB	WB		
PEAK HOURLY VOLUMES :	670	983	244	549		2,446

" K " FACTOR : **0.090**

INTERSECTION ADT (**V**) = TOTAL DAILY APPROACH VOLUME : **27,178**

TOTAL # OF CRASHES : 37

OF YEARS : 5

AVERAGE # OF CRASHES PER YEAR (**A**) : **7.40**

CRASH RATE CALCULATION : **0.75**

RATE = $\frac{(A * 1{,}000{,}000)}{(V * 365)}$

Comments :

Project Title & Date: 213 Washington Street, Weymouth MA

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Appendix C

Trip Generation

213-217 Washington Street

Proposed Trip Generation Assessment

HOWARD STEIN HUDSON

8-Jun-2022

Land Use	Size	Category	Directional Split	Average Trip Rate	Unadjusted Vehicle Trips	Assumed National Vehicle Occupancy Rate[1]	Unadjusted Person-Trips	Primary Person-Trips	Transit Share[2]	Transit Person-Trips	Walk/Bike/ Other Share[2]	Walk/ Bike/ Other Trips	Auto Share[2]	Auto Person-Trips	Private Auto Person-Trips	Assumed Local Auto Occupancy Rate[3]	Taxi/TNC Auto Trips	Primary Non-Taxi Auto Trips	Total AutoTrips
Daily Peak Hour																			
Multifamily Housing (Mid Rise)[4]	27	Total		4.540	122	1.18	**144**	**144**	16%	**24**	2%	**2**	82%	**118**	118	1.18	**0**	**100**	**100**
	units	In	50%	2.270	61	1.18	**72**	**72**	16%	**12**	2%	**1**	82%	**59**	59	1.18	**0**	**50**	**50**
		Out	50%	2.270	61	1.18	**72**	**72**	16%	**12**	2%	**1**	82%	**59**	59	1.18	**0**	**50**	**50**
Shopping Center[5]	4.285	Total		37.010	158	1.82	**288**	**288**	16%	**46**	2%	**6**	82%	**236**	236	1.82	**0**	**130**	**130**
	KSF	In	50%	18.505	79	1.82	**144**	**144**	16%	**23**	2%	**3**	82%	**118**	118	1.82	**0**	**65**	**65**
		Out	50%	18.505	79	1.82	**144**	**144**	16%	**23**	2%	**3**	82%	**118**	118	1.82	**0**	**65**	**65**
Total		Total			**280**		**432**	**432**		**70**		**8**		**354**			**0**	**230**	**230**
		In			**140**		**216**	**216**		**35**		**4**		**177**			**0**	**115**	**115**
		Out			**140**		**216**	**216**		**35**		**4**		**177**			**0**	**115**	**115**
AM Peak Hour																			
Multifamily Housing (Mid Rise)[4]	27	Total		0.360	10	1.18	**12**	**12**		**2**		**0**		**10**	10	1.18	**0**	**9**	**9**
	units	In	26%	0.094	3	1.18	**4**	**4**	16%	**1**	2%	**0**	82%	**3**	3	1.18	**0**	**3**	**3**
		Out	74%	0.266	7	1.18	**8**	**8**	16%	**1**	2%	**0**	82%	**7**	7	1.18	**0**	**6**	**6**
Shopping Center[5]	4.285	Total		0.84	3	1.82	**6**	**6**		**1**		**0**		**5**	5	1.82	**0**	**3**	**3**
	KSF	In	62%	0.521	2	1.82	**4**	**4**	16%	**1**	2%	**0**	82%	**3**	3	1.82	**0**	**2**	**2**
		Out	38%	0.319	1	1.82	**2**	**2**	16%	**0**	2%	**0**	82%	**2**	2	1.82	**0**	**1**	**1**
Total		Total			**13**		**18**	**18**		**3**		**0**		**15**			**0**	**12**	**12**
		In			**5**		**8**	**8**		**2**		**0**		**6**			**0**	**5**	**5**
		Out			**8**		**10**	**10**		**1**		**0**		**9**			**0**	**7**	**7**
PM Peak Hour																			
Multifamily Housing (Mid Rise)[4]	27	Total		0.390	10	1.18	**12**	**12**		**2**		**0**		**10**	10	1.18	**0**	**8**	**8**
	units	In	61%	0.238	6	1.18	**7**	**7**	16%	**1**	2%	**0**	82%	**6**	6	1.18	**0**	**5**	**5**
		Out	39%	0.152	4	1.18	**5**	**5**	16%	**1**	2%	**0**	82%	**4**	4	1.18	**0**	**3**	**3**
Shopping Center[5]	4.285	Total		3.40	15	1.82	**28**	**28**		**4**		**0**		**24**	24	1.82	**0**	**13**	**13**
	KSF	In	48%	1.632	7	1.82	**13**	**13**	16%	**2**	2%	**0**	82%	**11**	11	1.82	**0**	**6**	**6**
		Out	52%	1.768	8	1.82	**15**	**15**	16%	**2**	2%	**0**	82%	**13**	13	1.82	**0**	**7**	**7**
Total		Total			**25**		**40**	**40**		**6**		**0**		**34**			**0**	**21**	**21**
		In			**13**		**20**	**20**		**3**		**0**		**17**			**0**	**11**	**11**
		Out			**12**		**20**	**20**		**3**		**0**		**17**			**0**	**10**	**10**

1. 2017 National vehicle occupancy rates - 1.18:home to work; 1.82: family/personal business; 1.82: shopping; 2.1 social/recreational
2. Mode shares based on peak-hour BTD Data for Area 1
3. Local vehicle occupancy rates based on 2017 National vehicle occupancy rates
4. ITE Trip Generation Manual, 11th Edition, LUC 221 (Multifamily Housing Mid-Rise (3-10 floors)), average rate
5. ITE Trip Generation Manual, 11th Edition, LUC 820 (Shopping Center), average rate

HOWARD STEIN HUDSON

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Appendix D

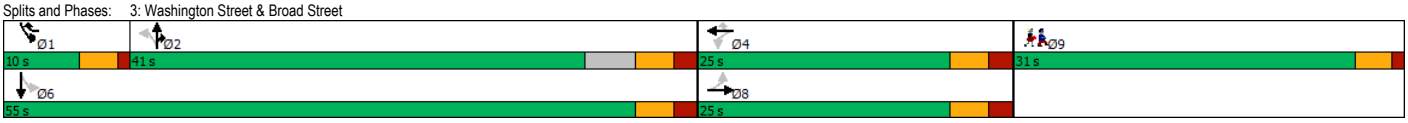
Synchro Analysis

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Ø9
Lane Configurations													
Traffic Volume (vph)	162	136	22	92	160	323	12	442	64	168	384	47	
Future Volume (vph)	162	136	22	92	160	323	12	442	64	168	384	47	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Storage Length (ft)	0		0	0		100	75		120	100		0	
Storage Lanes	0		0	0		1	1		1	1		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	1.00	1.00	1.00	1.00	1.00	
Frt		0.991				0.850			0.850		0.984		
Flt Protected		0.975			0.982		0.950			0.950			
Satd. Flow (prot)	0	1760	0	0	1859	1568	1805	1776	1524	1656	1742	0	
Flt Permitted		0.547			0.740		0.495			0.190			
Satd. Flow (perm)	0	987	0	0	1401	1568	940	1776	1524	331	1742	0	
Right Turn on Red			Yes			Yes			Yes			Yes	
Satd. Flow (RTOR)		3				275			98		7		
Link Speed (mph)		30			30			30			30		
Link Distance (ft)		436			689			227			460		
Travel Time (s)		9.9			15.7			5.2			10.5		
Peak Hour Factor	0.83	0.83	0.83	0.89	0.89	0.89	0.91	0.91	0.91	0.92	0.92	0.92	
Heavy Vehicles (%)	6%	2%	6%	1%	0%	3%	0%	7%	6%	9%	8%	2%	
Adj. Flow (vph)	195	164	27	103	180	363	13	486	70	183	417	51	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	0	386	0	0	283	363	13	486	70	183	468	0	
Turn Type	Perm	NA		Perm	NA	pm+ov	Perm	NA	Prot	pm+pt	NA		
Protected Phases		8			4	1		2	2	1	6		9
Permitted Phases	8			4		4	2			6			
Detector Phase	8	8		4	4	1	2	2	2	1	6		
Switch Phase													
Minimum Initial (s)	6.0	6.0		6.0	6.0	6.0	10.0	10.0	10.0	6.0	6.0		1.0
Minimum Split (s)	11.0	11.0		11.0	11.0	10.0	15.0	15.0	15.0	10.0	11.0		31.0
Total Split (s)	25.0	25.0		25.0	25.0	10.0	41.0	41.0	41.0	10.0	55.0		31.0
Total Split (%)	22.5%	22.5%		22.5%	22.5%	9.0%	36.9%	36.9%	36.9%	9.0%	49.5%		28%
Maximum Green (s)	20.0	20.0		20.0	20.0	6.0	36.0	36.0	36.0	6.0	50.0		27.0
Yellow Time (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0
All-Red Time (s)	2.0	2.0		2.0	2.0	1.0	2.0	2.0	2.0	1.0	2.0		1.0
Lost Time Adjust (s)		0.0			0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Total Lost Time (s)		5.0			5.0	4.0	5.0	5.0	5.0	4.0	5.0		
Lead/Lag						Lead	Lag	Lag	Lag	Lead			
Lead-Lag Optimize?						Yes	Yes	Yes	Yes	Yes			
Vehicle Extension (s)	3.0	3.0		3.0	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	None	Min		None
Walk Time (s)													5.0
Flash Dont Walk (s)													20.0
Pedestrian Calls (#/hr)													9
Act Effct Green (s)		21.1			21.1	32.1	23.7	23.7	23.7	35.3	34.2		
Actuated g/C Ratio		0.30			0.30	0.46	0.34	0.34	0.34	0.51	0.49		
v/c Ratio		1.29			0.67	0.42	0.04	0.81	0.12	0.64	0.55		
Control Delay		178.2			35.4	5.7	18.3	33.7	3.0	25.3	16.5		
Queue Delay		0.0			0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Total Delay		178.2			35.4	5.7	18.3	33.7	3.0	25.3	16.5		
LOS		F			D	A	B	C	A	C	B		
Approach Delay		178.2			18.7			29.5			19.0		
Approach LOS		F			B			C			B		
Queue Length 50th (ft)		~186			90	17	3	158	0	33	105		
Queue Length 95th (ft)		#542			#369	72	20	#454	17	#169	339		
Internal Link Dist (ft)		356			609			147			380		
Turn Bay Length (ft)						100	75		120	100			
Base Capacity (vph)		300			423	871	568	1074	960	287	1319		
Starvation Cap Reductn		0			0	0	0	0	0	0	0		
Spillback Cap Reductn		0			0	0	0	0	0	0	0		
Storage Cap Reductn		0			0	0	0	0	0	0	0		
Reduced v/c Ratio		1.29			0.67	0.42	0.02	0.45	0.07	0.64	0.35		

Intersection Summary			
Area Type:	Other		
Cycle Length: 111			
Actuated Cycle Length: 69.7			
Natural Cycle: 150			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 1.29			
Intersection Signal Delay: 48.8		Intersection LOS: D	
Intersection Capacity Utilization 79.4%		ICU Level of Service D	
Analysis Period (min) 15			

~ 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.

Splits and Phases: 3: Washington Street & Broad Street

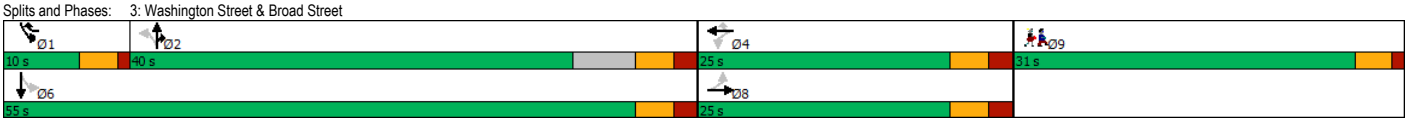


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Ø9
Lane Configurations													
Traffic Volume (vph)	42	170	32	156	174	219	25	521	124	273	648	62	
Future Volume (vph)	42	170	32	156	174	219	25	521	124	273	648	62	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Storage Length (ft)	0		0	0		100	75		120	100		0	
Storage Lanes	0		0	0		1	1		1	1		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	1.00	1.00	1.00	1.00	1.00	
Frt		0.982				0.850			0.850		0.987		
Flt Protected		0.991			0.977		0.950			0.950			
Satd. Flow (prot)	0	1849	0	0	1820	1568	1805	1827	1615	1787	1809	0	
Flt Permitted		0.562			0.588		0.275			0.143			
Satd. Flow (perm)	0	1049	0	0	1095	1568	522	1827	1615	269	1809	0	
Right Turn on Red			Yes			Yes			Yes			Yes	
Satd. Flow (RTOR)		6				142			98		6		
Link Speed (mph)		30			30			30			30		
Link Distance (ft)		436			689			227			460		
Travel Time (s)		9.9			15.7			5.2			10.5		
Peak Hour Factor	0.91	0.91	0.91	0.93	0.93	0.93	0.80	0.80	0.80	0.98	0.98	0.98	
Heavy Vehicles (%)	0%	0%	0%	2%	2%	3%	0%	4%	0%	1%	4%	0%	
Adj. Flow (vph)	46	187	35	168	187	235	31	651	155	279	661	63	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	0	268	0	0	355	235	31	651	155	279	724	0	
Turn Type	Perm	NA		Perm	NA	pm+ov	Perm	NA	Prot	pm+pt	NA		
Protected Phases		8			4	1		2	2	1	6		9
Permitted Phases	8			4		4	2			6			
Detector Phase	8	8		4	4	1	2	2	2	1	6		
Switch Phase													
Minimum Initial (s)	6.0	6.0		6.0	6.0	6.0	10.0	10.0	10.0	6.0	10.0		1.0
Minimum Split (s)	11.0	11.0		11.0	11.0	10.0	15.0	15.0	15.0	10.0	15.0		31.0
Total Split (s)	25.0	25.0		25.0	25.0	10.0	40.0	40.0	40.0	10.0	55.0		31.0
Total Split (%)	22.5%	22.5%		22.5%	22.5%	9.0%	36.0%	36.0%	36.0%	9.0%	49.5%		28%
Maximum Green (s)	20.0	20.0		20.0	20.0	6.0	35.0	35.0	35.0	6.0	50.0		27.0
Yellow Time (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0
All-Red Time (s)	2.0	2.0		2.0	2.0	1.0	2.0	2.0	2.0	1.0	2.0		1.0
Lost Time Adjust (s)		0.0			0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Total Lost Time (s)		5.0			5.0	4.0	5.0	5.0	5.0	4.0	5.0		
Lead/Lag						Lead	Lag	Lag	Lag	Lead			
Lead-Lag Optimize?						Yes	Yes	Yes	Yes	Yes			
Vehicle Extension (s)	3.0	3.0		3.0	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	None	Min		None
Walk Time (s)													7.0
Flash Dont Walk (s)													20.0
Pedestrian Calls (#/hr)													10
Act Effct Green (s)		20.5			20.5	31.2	36.4	36.4	36.4	47.7	46.6		
Actuated g/C Ratio		0.25			0.25	0.38	0.44	0.44	0.44	0.58	0.57		
v/c Ratio		1.00			1.30	0.34	0.13	0.80	0.20	1.03	0.70		
Control Delay		90.6			187.3	8.2	19.2	31.0	8.1	82.3	19.8		
Queue Delay		0.0			0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Total Delay		90.6			187.3	8.2	19.2	31.0	8.1	82.3	19.8		
LOS		F			F	A	B	C	A	F	B		
Approach Delay		90.6			115.9			26.3			37.2		
Approach LOS		F			F			C			D		
Queue Length 50th (ft)		120			~206	26	8	239	14	56	199		
Queue Length 95th (ft)		#421			#566	68	34	#569	58	#354	#696		
Internal Link Dist (ft)		356			609			147			380		
Turn Bay Length (ft)						100	75		120	100			
Base Capacity (vph)		267			274	684	261	914	857	270	1134		
Starvation Cap Reductn		0			0	0	0	0	0	0	0		
Spillback Cap Reductn		0			0	0	0	0	0	0	0		
Storage Cap Reductn		0			0	0	0	0	0	0	0		
Reduced v/c Ratio		1.00			1.30	0.34	0.12	0.71	0.18	1.03	0.64		

Intersection Summary			
Area Type:	Other		
Cycle Length: 111			
Actuated Cycle Length: 82			
Natural Cycle: 150			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 1.30			
Intersection Signal Delay: 56.3		Intersection LOS: E	
Intersection Capacity Utilization 93.9%		ICU Level of Service F	
Analysis Period (min) 15			

~ 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.

Splits and Phases: 3: Washington Street & Broad Street

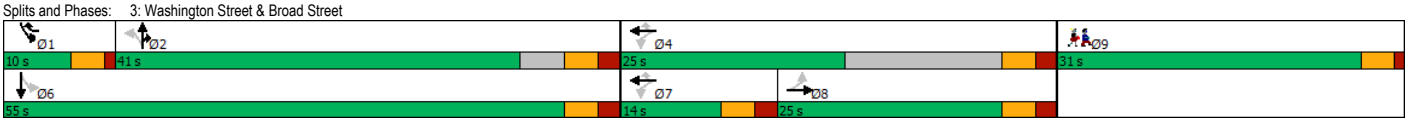


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Ø4	Ø7	Ø9
Lane Configurations															
Traffic Volume (vph)	174	146	24	99	172	346	15	492	69	182	421	50			
Future Volume (vph)	174	146	24	99	172	346	15	492	69	182	421	50			
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900			
Storage Length (ft)	0		0	0		100	75		120	100		0			
Storage Lanes	0		0	0		1	1		1	1		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	1.00	1.00	1.00	1.00	1.00			
Frt		0.991				0.850			0.850		0.984				
Flt Protected		0.975			0.982		0.950			0.950					
Satd. Flow (prot)	0	1760	0	0	1859	1568	1805	1776	1524	1656	1741	0			
Flt Permitted		0.690			0.745		0.395			0.154					
Satd. Flow (perm)	0	1246	0	0	1410	1568	750	1776	1524	268	1741	0			
Right Turn on Red			Yes			Yes			Yes			Yes			
Satd. Flow (RTOR)		3				274			131		6				
Link Speed (mph)		30			30			30			30				
Link Distance (ft)		436			689			227			460				
Travel Time (s)		9.9			15.7			5.2			10.5				
Peak Hour Factor	0.83	0.83	0.83	0.89	0.89	0.89	0.91	0.91	0.91	0.92	0.92	0.92			
Heavy Vehicles (%)	6%	2%	6%	1%	0%	3%	0%	7%	6%	9%	8%	2%			
Adj. Flow (vph)	210	176	29	111	193	389	16	541	76	198	458	54			
Shared Lane Traffic (%)															
Lane Group Flow (vph)	0	415	0	0	304	389	16	541	76	198	512	0			
Turn Type	Perm	NA		Perm	NA	pm+ov	Perm	NA	Prot	pm+pt	NA				
Protected Phases		8			4 7	1		2	2	1	6		4	7	9
Permitted Phases	8			4 7		4 7	2			6					
Detector Phase	8	8		4 7	4 7	1	2	2	2	1	6				
Switch Phase															
Minimum Initial (s)	6.0	6.0				6.0	10.0	10.0	10.0	6.0	10.0		6.0	5.0	1.0
Minimum Split (s)	11.0	11.0				10.0	15.0	15.0	15.0	10.0	15.0		11.0	10.0	31.0
Total Split (s)	25.0	25.0				10.0	41.0	41.0	41.0	10.0	55.0		25.0	14.0	31.0
Total Split (%)	20.0%	20.0%				8.0%	32.8%	32.8%	32.8%	8.0%	44.0%		20%	11%	25%
Maximum Green (s)	20.0	20.0				6.0	36.0	36.0	36.0	6.0	50.0		20.0	9.0	27.0
Yellow Time (s)	3.0	3.0				3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
All-Red Time (s)	2.0	2.0				1.0	2.0	2.0	2.0	1.0	2.0		2.0	2.0	1.0
Lost Time Adjust (s)		0.0				0.0	0.0	0.0	0.0	0.0	0.0				
Total Lost Time (s)		5.0				4.0	5.0	5.0	5.0	4.0	5.0				
Lead/Lag	Lag	Lag				Lead	Lag	Lag	Lag	Lead				Lead	
Lead-Lag Optimize?	Yes	Yes				Yes	Yes	Yes	Yes	Yes				Yes	
Vehicle Extension (s)	3.0	3.0				3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Recall Mode	None	None				None	Min	Min	Min	None	Min		None	None	None
Walk Time (s)															7.0
Flash Dont Walk (s)															20.0
Pedestrian Calls (#/hr)															9
Act Effct Green (s)		20.4			34.8	45.4	35.0	35.0	35.0	46.2	45.2				
Actuated g/C Ratio		0.21			0.37	0.48	0.37	0.37	0.37	0.49	0.48				
v/c Ratio		1.54			0.59	0.44	0.06	0.83	0.12	0.90	0.62				
Control Delay		287.6			33.3	6.8	23.8	40.7	0.8	61.3	24.0				
Queue Delay		0.0			0.0	0.0	0.0	0.0	0.0	0.0	0.0				
Total Delay		287.6			33.3	6.8	23.8	40.7	0.8	61.3	24.0				
LOS		F			C	A	C	D	A	E	C				
Approach Delay		287.6			18.4			35.5			34.4				
Approach LOS		F			B			D			C				
Queue Length 50th (ft)		~331			135	34	5	259	0	58	189				
Queue Length 95th (ft)		#667			#364	99	27	#650	4	#276	481				
Internal Link Dist (ft)		356			609			147			380				
Turn Bay Length (ft)						100	75		120	100					
Base Capacity (vph)		270			516	893	323	765	731	220	940				
Starvation Cap Reductn		0			0	0	0	0	0	0	0				
Spillback Cap Reductn		0			0	0	0	0	0	0	0				
Storage Cap Reductn		0			0	0	0	0	0	0	0				
Reduced v/c Ratio		1.54			0.59	0.44	0.05	0.71	0.10	0.90	0.54				

Intersection Summary			
Area Type:	Other		
Cycle Length: 125			
Actuated Cycle Length: 94.9			
Natural Cycle: 150			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 1.54			
Intersection Signal Delay: 73.1		Intersection LOS: E	
Intersection Capacity Utilization 85.1%		ICU Level of Service E	
Analysis Period (min) 15			

~ 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.

Splits and Phases: 3: Washington Street & Broad Street

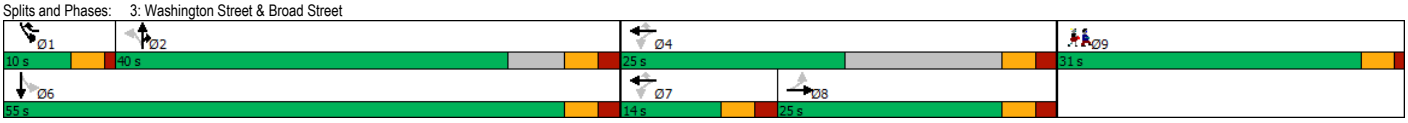


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Ø4	Ø7	Ø9
Lane Configurations															
Traffic Volume (vph)	45	183	35	167	187	237	29	574	133	299	711	66			
Future Volume (vph)	45	183	35	167	187	237	29	574	133	299	711	66			
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900			
Storage Length (ft)	0		0	0		100	75		120	100		0			
Storage Lanes	0		0	0		1	1		1	1		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	1.00	1.00	1.00	1.00	1.00			
Frt		0.982				0.850			0.850		0.987				
Flt Protected		0.992			0.977		0.950			0.950					
Satd. Flow (prot)	0	1851	0	0	1820	1568	1805	1827	1615	1787	1809	0			
Flt Permitted		0.864			0.386		0.128			0.090					
Satd. Flow (perm)	0	1612	0	0	719	1568	243	1827	1615	169	1809	0			
Right Turn on Red			Yes			Yes			Yes			Yes			
Satd. Flow (RTOR)		5				143			131		4				
Link Speed (mph)		30			30			30			30				
Link Distance (ft)		436			689			227			460				
Travel Time (s)		9.9			15.7			5.2			10.5				
Peak Hour Factor	0.91	0.91	0.91	0.93	0.93	0.93	0.80	0.80	0.80	0.98	0.98	0.98			
Heavy Vehicles (%)	0%	0%	0%	2%	2%	3%	0%	4%	0%	1%	4%	0%			
Adj. Flow (vph)	49	201	38	180	201	255	36	718	166	305	726	67			
Shared Lane Traffic (%)															
Lane Group Flow (vph)	0	288	0	0	381	255	36	718	166	305	793	0			
Turn Type	Perm	NA		Perm	NA	pm+ov	Perm	NA	Prot	pm+pt	NA				
Protected Phases		8			4 7	1		2	2	1	6		4	7	9
Permitted Phases	8			4 7		4 7	2			6					
Detector Phase	8	8		4 7	4 7	1	2	2	2	1	6				
Switch Phase															
Minimum Initial (s)	6.0	6.0				6.0	10.0	10.0	10.0	6.0	10.0		6.0	6.0	1.0
Minimum Split (s)	11.0	11.0				10.0	15.0	15.0	15.0	10.0	15.0		11.0	11.0	31.0
Total Split (s)	25.0	25.0				10.0	40.0	40.0	40.0	10.0	55.0		25.0	14.0	31.0
Total Split (%)	20.0%	20.0%				8.0%	32.0%	32.0%	32.0%	8.0%	44.0%		20%	11%	25%
Maximum Green (s)	20.0	20.0				6.0	35.0	35.0	35.0	6.0	50.0		20.0	9.0	27.0
Yellow Time (s)	3.0	3.0				3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
All-Red Time (s)	2.0	2.0				1.0	2.0	2.0	2.0	1.0	2.0		2.0	2.0	1.0
Lost Time Adjust (s)		0.0				0.0	0.0	0.0	0.0	0.0	0.0				
Total Lost Time (s)		5.0				4.0	5.0	5.0	5.0	4.0	5.0				
Lead/Lag	Lag	Lag				Lead	Lag	Lag	Lag	Lead				Lead	
Lead-Lag Optimize?	Yes	Yes				Yes	Yes	Yes	Yes	Yes				Yes	
Vehicle Extension (s)	3.0	3.0				3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Recall Mode	None	None				None	Min	Min	Min	None	Min		None	None	None
Walk Time (s)															7.0
Flash Dont Walk (s)															20.0
Pedestrian Calls (#/hr)															10
Act Effct Green (s)		20.3			34.4	44.9	40.5	40.5	40.5	51.7	50.7				
Actuated g/C Ratio		0.20			0.34	0.45	0.40	0.40	0.40	0.52	0.51				
v/c Ratio		0.88			1.54	0.33	0.37	0.97	0.23	1.66	0.87				
Control Delay		66.2			290.7	8.1	39.0	58.1	7.7	337.7	34.9				
Queue Delay		0.0			0.0	0.0	0.0	0.0	0.0	0.0	0.0				
Total Delay		66.2			290.7	8.1	39.0	58.1	7.7	337.7	34.9				
LOS		E			F	A	D	E	A	F	C				
Approach Delay		66.2			177.4			48.3			119.0				
Approach LOS		E			F			D			F				
Queue Length 50th (ft)		163			~314	36	14	394	12	~210	371				
Queue Length 95th (ft)		#442			#673	76	55	#793	54	#526	#970				
Internal Link Dist (ft)		356			609			147			380				
Turn Bay Length (ft)						100	75		120	100					
Base Capacity (vph)		329			247	782	98	738	731	184	916				
Starvation Cap Reductn		0			0	0	0	0	0	0	0				
Spillback Cap Reductn		0			0	0	0	0	0	0	0				
Storage Cap Reductn		0			0	0	0	0	0	0	0				
Reduced v/c Ratio		0.88			1.54	0.33	0.37	0.97	0.23	1.66	0.87				

Intersection Summary			
Area Type:	Other		
Cycle Length: 125			
Actuated Cycle Length: 100.2			
Natural Cycle: 150			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 1.66			
Intersection Signal Delay: 104.3		Intersection LOS: F	
Intersection Capacity Utilization 99.8%		ICU Level of Service F	
Analysis Period (min) 15			

~ 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.

Splits and Phases: 3: Washington Street & Broad Street



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Ø4	Ø7	Ø9
Lane Configurations															
Traffic Volume (vph)	175	147	28	99	172	346	17	492	69	182	421	52			
Future Volume (vph)	175	147	28	99	172	346	17	492	69	182	421	52			
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900			
Storage Length (ft)	0		0	0		100	75		120	100		0			
Storage Lanes	0		0	0		1	1		1	1		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	1.00	1.00	1.00	1.00	1.00			
Frt		0.989				0.850			0.850		0.983				
Flt Protected		0.976			0.982		0.950			0.950					
Satd. Flow (prot)	0	1758	0	0	1859	1568	1805	1776	1524	1656	1740	0			
Flt Permitted		0.692			0.741		0.391			0.154					
Satd. Flow (perm)	0	1246	0	0	1403	1568	743	1776	1524	268	1740	0			
Right Turn on Red			Yes			Yes			Yes			Yes			
Satd. Flow (RTOR)		3				274			131		6				
Link Speed (mph)		30			30			30			30				
Link Distance (ft)		436			689			227			460				
Travel Time (s)		9.9			15.7			5.2			10.5				
Peak Hour Factor	0.83	0.83	0.83	0.89	0.89	0.89	0.91	0.91	0.91	0.92	0.92	0.92			
Heavy Vehicles (%)	6%	2%	6%	1%	0%	3%	0%	7%	6%	9%	8%	2%			
Adj. Flow (vph)	211	177	34	111	193	389	19	541	76	198	458	57			
Shared Lane Traffic (%)															
Lane Group Flow (vph)	0	422	0	0	304	389	19	541	76	198	515	0			
Turn Type	Perm	NA		Perm	NA	pm+ov	Perm	NA	Prot	pm+pt	NA				
Protected Phases		8			4 7	1		2	2	1	6		4	7	9
Permitted Phases	8			4 7		4 7	2			6					
Detector Phase	8	8		4 7	4 7	1	2	2	2	1	6				
Switch Phase															
Minimum Initial (s)	6.0	6.0				6.0	10.0	10.0	10.0	6.0	10.0		6.0	5.0	1.0
Minimum Split (s)	11.0	11.0				10.0	15.0	15.0	15.0	10.0	15.0		11.0	10.0	31.0
Total Split (s)	25.0	25.0				10.0	41.0	41.0	41.0	10.0	55.0		25.0	14.0	31.0
Total Split (%)	20.0%	20.0%				8.0%	32.8%	32.8%	32.8%	8.0%	44.0%		20%	11%	25%
Maximum Green (s)	20.0	20.0				6.0	36.0	36.0	36.0	6.0	50.0		20.0	9.0	27.0
Yellow Time (s)	3.0	3.0				3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
All-Red Time (s)	2.0	2.0				1.0	2.0	2.0	2.0	1.0	2.0		2.0	2.0	1.0
Lost Time Adjust (s)		0.0				0.0	0.0	0.0	0.0	0.0	0.0				
Total Lost Time (s)		5.0				4.0	5.0	5.0	5.0	4.0	5.0				
Lead/Lag	Lag	Lag				Lead	Lag	Lag	Lag	Lead				Lead	
Lead-Lag Optimize?	Yes	Yes				Yes	Yes	Yes	Yes	Yes				Yes	
Vehicle Extension (s)	3.0	3.0				3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Recall Mode	None	None				None	Min	Min	Min	None	Min		None	None	None
Walk Time (s)															7.0
Flash Dont Walk (s)															20.0
Pedestrian Calls (#/hr)															9
Act Effct Green (s)		20.4			34.8	45.4	35.0	35.0	35.0	46.2	45.2				
Actuated g/C Ratio		0.21			0.37	0.48	0.37	0.37	0.37	0.49	0.48				
v/c Ratio		1.56			0.59	0.44	0.07	0.83	0.12	0.90	0.62				
Control Delay		298.4			33.4	6.8	23.9	40.7	0.8	61.3	24.1				
Queue Delay		0.0			0.0	0.0	0.0	0.0	0.0	0.0	0.0				
Total Delay		298.4			33.4	6.8	23.9	40.7	0.8	61.3	24.1				
LOS		F			C	A	C	D	A	E	C				
Approach Delay		298.4			18.5			35.5			34.4				
Approach LOS		F			B			D			C				
Queue Length 50th (ft)		~340			135	34	7	259	0	58	190				
Queue Length 95th (ft)		#677			#365	99	30	#650	4	#276	485				
Internal Link Dist (ft)		356			609			147			380				
Turn Bay Length (ft)						100	75		120	100					
Base Capacity (vph)		270			514	893	320	765	731	220	940				
Starvation Cap Reductn		0			0	0	0	0	0	0	0				
Spillback Cap Reductn		0			0	0	0	0	0	0	0				
Storage Cap Reductn		0			0	0	0	0	0	0	0				
Reduced v/c Ratio		1.56			0.59	0.44	0.06	0.71	0.10	0.90	0.55				

Intersection Summary			
Area Type:	Other		
Cycle Length: 125			
Actuated Cycle Length: 94.9			
Natural Cycle: 150			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 1.56			
Intersection Signal Delay: 75.4		Intersection LOS: E	
Intersection Capacity Utilization 85.5%		ICU Level of Service E	
Analysis Period (min) 15			

~ Volume exceeds capacity, queue is theoretically infinite.
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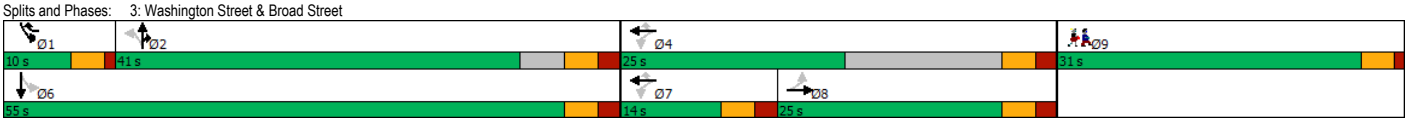
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3: Washington Street & Broad Street



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Ø4	Ø7	Ø9
Lane Configurations															
Traffic Volume (vph)	48	183	41	167	187	237	34	574	133	299	711	70			
Future Volume (vph)	48	183	41	167	187	237	34	574	133	299	711	70			
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900			
Storage Length (ft)	0		0	0		100	75		120	100		0			
Storage Lanes	0		0	0		1	1		1	1		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	1.00	1.00	1.00	1.00	1.00			
Frt		0.980				0.850			0.850		0.987				
Flt Protected		0.991			0.977		0.950			0.950					
Satd. Flow (prot)	0	1845	0	0	1820	1568	1805	1827	1615	1787	1809	0			
Flt Permitted		0.857			0.385		0.124			0.090					
Satd. Flow (perm)	0	1596	0	0	717	1568	236	1827	1615	169	1809	0			
Right Turn on Red			Yes			Yes			Yes			Yes			
Satd. Flow (RTOR)		6				143			131		5				
Link Speed (mph)		30			30			30			30				
Link Distance (ft)		436			689			227			460				
Travel Time (s)		9.9			15.7			5.2			10.5				
Peak Hour Factor	0.91	0.91	0.91	0.93	0.93	0.93	0.80	0.80	0.80	0.98	0.98	0.98			
Heavy Vehicles (%)	0%	0%	0%	2%	2%	3%	0%	4%	0%	1%	4%	0%			
Adj. Flow (vph)	53	201	45	180	201	255	43	718	166	305	726	71			
Shared Lane Traffic (%)															
Lane Group Flow (vph)	0	299	0	0	381	255	43	718	166	305	797	0			
Turn Type	Perm	NA		Perm	NA	pm+ov	Perm	NA	Prot	pm+pt	NA				
Protected Phases		8			4 7	1		2	2	1	6		4	7	9
Permitted Phases	8			4 7		4 7	2			6					
Detector Phase	8	8		4 7	4 7	1	2	2	2	1	6				
Switch Phase															
Minimum Initial (s)	6.0	6.0				6.0	10.0	10.0	10.0	6.0	10.0		6.0	6.0	1.0
Minimum Split (s)	11.0	11.0				10.0	15.0	15.0	15.0	10.0	15.0		11.0	11.0	31.0
Total Split (s)	25.0	25.0				10.0	40.0	40.0	40.0	10.0	55.0		25.0	14.0	31.0
Total Split (%)	20.0%	20.0%				8.0%	32.0%	32.0%	32.0%	8.0%	44.0%		20%	11%	25%
Maximum Green (s)	20.0	20.0				6.0	35.0	35.0	35.0	6.0	50.0		20.0	9.0	27.0
Yellow Time (s)	3.0	3.0				3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
All-Red Time (s)	2.0	2.0				1.0	2.0	2.0	2.0	1.0	2.0		2.0	2.0	1.0
Lost Time Adjust (s)		0.0				0.0	0.0	0.0	0.0	0.0	0.0				
Total Lost Time (s)		5.0				4.0	5.0	5.0	5.0	4.0	5.0				
Lead/Lag	Lag	Lag				Lead	Lag	Lag	Lag	Lead				Lead	
Lead-Lag Optimize?	Yes	Yes				Yes	Yes	Yes	Yes	Yes				Yes	
Vehicle Extension (s)	3.0	3.0				3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Recall Mode	None	None				None	Min	Min	Min	None	Min		None	None	None
Walk Time (s)															7.0
Flash Dont Walk (s)															20.0
Pedestrian Calls (#/hr)															10
Act Effct Green (s)		20.3			34.4	44.9	40.5	40.5	40.5	51.7	50.7				
Actuated g/C Ratio		0.20			0.34	0.45	0.40	0.40	0.40	0.52	0.51				
v/c Ratio		0.91			1.55	0.33	0.45	0.97	0.23	1.66	0.87				
Control Delay		72.3			292.9	8.1	44.8	58.1	7.7	337.7	35.2				
Queue Delay		0.0			0.0	0.0	0.0	0.0	0.0	0.0	0.0				
Total Delay		72.3			292.9	8.1	44.8	58.1	7.7	337.7	35.2				
LOS		E			F	A	D	E	A	F	D				
Approach Delay		72.3			178.7			48.5			118.9				
Approach LOS		E			F			D			F				
Queue Length 50th (ft)		170			~314	36	18	394	12	~210	374				
Queue Length 95th (ft)		#465			#673	76	#73	#793	54	#526	#975				
Internal Link Dist (ft)		356			609			147			380				
Turn Bay Length (ft)						100	75		120	100					
Base Capacity (vph)		327			246	782	95	738	731	184	916				
Starvation Cap Reductn		0			0	0	0	0	0	0	0				
Spillback Cap Reductn		0			0	0	0	0	0	0	0				
Storage Cap Reductn		0			0	0	0	0	0	0	0				
Reduced v/c Ratio		0.91			1.55	0.33	0.45	0.97	0.23	1.66	0.87				

Intersection Summary			
Area Type:	Other		
Cycle Length: 125			
Actuated Cycle Length: 100.2			
Natural Cycle: 150			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 1.66			
Intersection Signal Delay: 105.0		Intersection LOS: F	
Intersection Capacity Utilization 100.5%		ICU Level of Service G	
Analysis Period (min) 15			

~ Volume exceeds capacity, queue is theoretically infinite.
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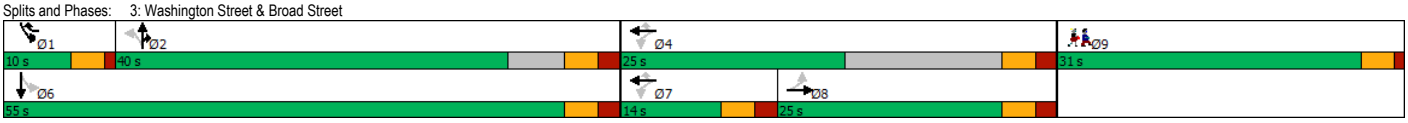
Splits and Phases: 3: Washington Street & Broad Street



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