Appendix A
Project Plans

MASSACHUSETTS DEPARTMENT OF TRANSPORTATION
HIGHWAY DIVISION

PLAN AND PROFILE OF

HARTFORD AVENUE (ROUTE 126)

IN THE TOWN OF

BELLINGHAM

NORFOLK COUNTY

NOTICE OF INTENT

BELLINGHAM
HARTFORD AVENUE (ROUTE 126)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	01	15
PROJECT FILE NO.	2148.00		

NOI - TITLE SHEET & INDEX
07/19/2024

THESE PLANS ARE SUPPLEMENTED BY THE 2023 CONSTRUCTION STANDARD DETAILS, THE 2015 OVERHEAD SIGNAL STRUCTURE AND FOUNDATION STANDARD DRAWINGS, MASSDOT TRAFFIC MANAGEMENT PLANS AND DETAIL DRAWINGS, THE 1990 STANDARD DRAWINGS FOR SIGNS AND SUPPORTS, THE 1968 STANDARD DRAWINGS FOR TRAFFIC SIGNALS AND HIGHWAY LIGHTING, AND THE LATEST EDITION OF THE AMERICAN STANDARD FOR NURSERY STOCK. THE COORDINATE SYSTEM OF THESE PLANS ARE BASED ON MASSACHUSETTS STATE PLANE GRID. HORIZONTAL CONTROL IS BASED ON NORTH AMERICAN DATUM OF 1983 (NAD 83). VERTICAL CONTROL IS BASED ON NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 1988).

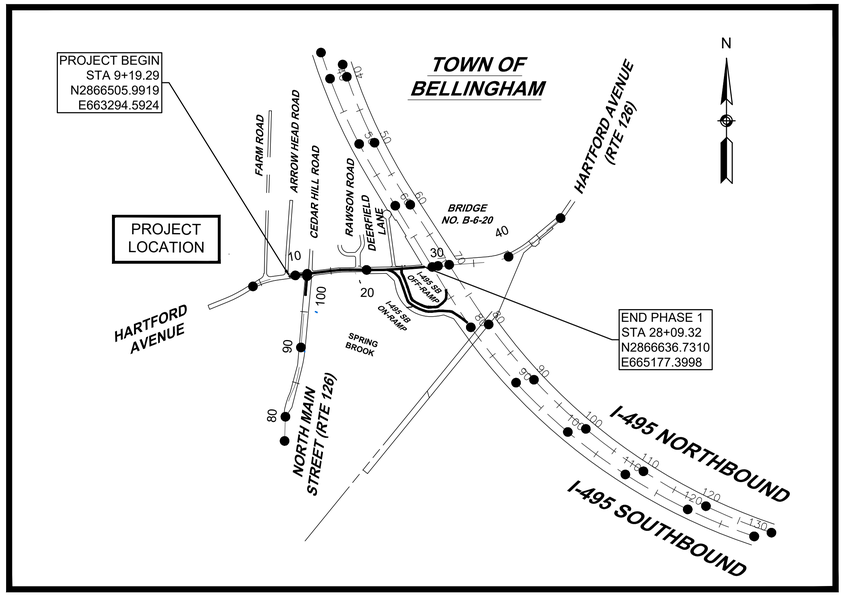
INDEX

DESIGN DESIGNATION (HARTFORD AVE)

DESIGN SPEED	35 MPH
ADT (2021)	20,800
ADT (2031)	26,300
K	8%
D	62% WB
T (PEAK HOUR)	3.0%
T (AVERAGE DAY)	5.0%
DHV	2,100
DDHV	1,302
FUNCTIONAL CLASSIFICATION	URBAN MINOR ARTERY

DESIGN DESIGNATION (HARTFORD AVE ROUTE 126)

DESIGN SPEED	45 MPH
ADT (2021)	50,400
ADT (2031)	50,400
K	7.1%
D	60%
T (PEAK HOUR)	6.0%
T (AVERAGE DAY)	10.0%
DHV	3,580
DDHV	2,148
FUNCTIONAL CLASSIFICATION	URBAN PRINCIPAL ARTERY



0 1000' 2000' 3000' 4000'

SCALE: 1" = 1000'

LENGTH OF PROJECT (PHASE 1) = 1890.03 FEET = 0.358 MILES

DESIGN DESIGNATION (NORTH MAIN STREET ROUTE 126)

DESIGN SPEED	45 MPH
ADT (2021)	16,800
ADT (2041)	21,400
K	7.1%
D	60.0%
T (PEAK HOUR)	3.0%
T (AVERAGE DAY)	5.0%
DHV	1,520
DDHV	912
FUNCTIONAL CLASSIFICATION	URBAN PRINCIPAL ARTERY

DESIGN DESIGNATION (I-495 SB ONRAMP D)

DESIGN SPEED	30 MPH
ADT (2021)	7,900
ADT (2041)	10,100
K	8.0%
D	100% SB
T (PEAK HOUR)	5.0%
T (AVERAGE DAY)	6.0%
DHV	810
DDHV	810
FUNCTIONAL CLASSIFICATION	FREEWAY & EXPRESSWAY

DESIGN DESIGNATION (I-495 SB OFFRAMP C)

DESIGN SPEED	30 MPH
ADT (2021)	7,900
ADT (2041)	10,200
K	10%
D	100% NB
T (PEAK HOUR)	5.0%
T (AVERAGE DAY)	5.0%
DHV	1,020
DDHV	1,020
FUNCTIONAL CLASSIFICATION	FREEWAY & EXPRESSWAY

WPA FORM 3 - NOTICE OF INTENT
MASSDOT PROJECT: 2148.00
HARTFORD AVENUE (RT 126)
IMPROVEMENTS
BELLINGHAM, MA
PREPARED BY:
CHAPPELL ENGINEERING ASSOCIATES, LLC
FOR: TOWN OF BELLINGHAM/MASSDOT

REVISION DATES:

07/19/2024 1ST SUBMITTAL

04/26/2024 1ST SUBMITTAL

GENERAL SYMBOLS

EXISTING	PROPOSED	DESCRIPTION
JB	JB	JERSEY BARRIER
CB	CB	CATCH BASIN
		CATCH BASIN CURB INLET
FP	FP	FLAG POLE
GP	GP	GAS PUMP
MB	MB	MAIL BOX
		POST SQUARE
		POST CIRCULAR
WELL	WELL	WELL
EHH	EHH	ELECTRIC HANDHOLE
		FENCE GATE POST
GG	GG	GAS GATE
BHL #	BHL #	BORING HOLE
MW #	MW #	MONITORING WELL
TP #	TP #	TEST PIT
		HYDRANT
		LIGHT POLE
CO.BD.		COUNTY BOUND
		GPS POINT
		CABLE MANHOLE
		DRAINAGE MANHOLE
		ELECTRIC MANHOLE
		GAS MANHOLE
		MISC MANHOLE
		SEWER MANHOLE
		TELEPHONE MANHOLE
		WATER MANHOLE
MHB	MHB	MASSACHUSETTS HIGHWAY BOUND
MON		MONUMENT
SB		STONE BOUND
TB		TOWN OR CITY BOUND
		TRAVERSE OR TRIANGULATION STATION
TPL or GUY	TPL or GUY	TROLLEY POLE OR GUY POLE
HTP		TRANSMISSION POLE
UFB	UFB	UTILITY POLE W/ FIREBOX
UPDL	UPDL	UTILITY POLE WITH DOUBLE LIGHT
ULT	ULT	UTILITY POLE W / 1 LIGHT
UPL	UPL	UTILITY POLE
		BUSH
SIZE & TYPE		TREE
		STUMP
		SWAMP / MARSH
WG	WG	WATER GATE
PM	PM	PARKING METER
		OVERHEAD CABLE/WIRE
		CURBING
100 99		CONTOURS (ON-THE-GROUND SURVEY DATA)
100 99		CONTOURS (PHOTOGRAMMETRIC DATA)
		UNDERGROUND DRAIN PIPE (DOUBLE LINE 24 INCH AND OVER)
		UNDERGROUND ELECTRIC DUCT (DOUBLE LINE 24 INCH AND OVER)
		UNDERGROUND GAS MAIN (DOUBLE LINE 24 INCH AND OVER)
		UNDERGROUND SEWER MAIN (DOUBLE LINE 24 INCH AND OVER)
		UNDERGROUND TELEPHONE DUCT (DOUBLE LINE 24 INCH AND OVER)
		UNDERGROUND WATER MAIN (DOUBLE LINE 24 INCH AND OVER)
		BALANCED STONE WALL
		GUARD RAIL - STEEL POSTS
		GUARD RAIL - WOOD POSTS
		GUARD RAIL - DOUBLE FACE - STEEL POSTS
		GUARD RAIL - DOUBLE FACE - WOOD POSTS
		CHAIN LINK OR METAL FENCE
		WOOD FENCE
		HAY BALES/SILT FENCE
		TREE LINE
		SAWCUT LINE
		TOP OR BOTTOM OF SLOPE
		LIMIT OF EDGE OF PAVEMENT OR COLD PLANE AND OVERLAY
		BANK OF RIVER OR STREAM
		BORDER OF WETLAND
		100 FT WETLAND BUFFER
		200 FT RIVERFRONT BUFFER
		STATE HIGHWAY LAYOUT
		TOWN OR CITY LAYOUT
		COUNTY LAYOUT
		RAILROAD SIDELINE
		TOWN OR CITY BOUNDARY LINE
		PROPERTY LINE OR APPROXIMATE PROPERTY LINE
		EASEMENT

TRAFFIC SYMBOLS

EXISTING	PROPOSED	DESCRIPTION
1	1	CONTROLLER PHASE ACTUATED
		TRAFFIC SIGNAL HEAD (SIZE AS NOTED)
		WIRE LOOP DETECTOR (6' x 6' TYP UNLESS OTHERWISE SPECIFIED)
		VIDEO DETECTION CAMERA
		MICROWAVE DETECTOR
		PEDESTRIAN PUSH BUTTON, SIGN (DIRECTIONAL ARROW AS SHOWN) AND SADDLE
		EMERGENCY PREEMPTION CONFIRMATION STROBE LIGHT
		VEHICULAR SIGNAL HEAD
		VEHICULAR SIGNAL HEAD, OPTICALLY PROGRAMMED
		FLASHING BEACON
		PEDESTRIAN SIGNAL HEAD, (TYPE AS NOTED OR AS SPECIFIED)
RRSG	RRSG	RAILROAD SIGNAL
OR		SIGNAL POST AND BASE (ALPHA-NUMERIC DESIGNATION NOTED)
	20'	MAST ARM, SHAFT AND BASE (ARM LENGTH AS NOTED)
		HIGH MAST POLE OR TOWER
		SIGN AND POST
		SIGN AND POST (2 POSTS)
	20'	MAST ARM WITH LUMINAIRE
		OPTICAL PRE-EMPTION DETECTOR
		CONTROL CABINET, GROUND MOUNTED
		CONTROL CABINET, POLE MOUNTED
		FLASHING BEACON CONTROL AND METER PEDESTAL
		LOAD CENTER ASSEMBLY
		PULL BOX 12"x12" (OR AS NOTED)
		ELECTRIC HANDHOLE 12"x24" (OR AS NOTED)
		TRAFFIC SIGNAL CONDUIT

PAVEMENT MARKINGS SYMBOLS

EXISTING	PROPOSED	DESCRIPTION
		PAVEMENT ARROW - WHITE
ONLY	ONLY	LEGEND "ONLY" - WHITE
	SL	STOP LINE
	CW	CROSSWALK
	SWL	SOLID WHITE LINE
	SYL	SOLID YELLOW LINE
	BWL	BROKEN WHITE LINE
	BYL	BROKEN YELLOW LINE
	DWL	DOTTED WHITE LINE
	DYL	DOTTED YELLOW LINE
	DWLEx	DOTTED WHITE LINE EXTENSION
	DYLEx	DOTTED YELLOW LINE EXTENSION
	DBWL	DOUBLE WHITE LINE
	DBYL	DOUBLE YELLOW LINE

ABBREVIATIONS

GENERAL

AADT	ANNUAL AVERAGE DAILY TRAFFIC
ABAN	ABANDON
ADJ	ADJUST
APPROX.	APPROXIMATE
A.C.	ASPHALT CONCRETE
ACCM PIPE	ASPHALT COATED CORRUGATED METAL PIPE
BIT.	BITUMINOUS
BC	BOTTOM OF CURB
BD.	BOUND
BL	BASELINE
BLDG	BUILDING
BM	BENCHMARK
BO	BY OTHERS
BOS	BOTTOM OF SLOPE
BR.	BRIDGE
CB	CATCH BASIN
CBCI	CATCH BASIN WITH CURB INLET
CC	CEMENT CONCRETE
CCM	CEMENT CONCRETE MASONRY
CEM	CEMENT
CI	CURB INLET
CIP	CAST IRON PIPE
CLF	CHAIN LINK FENCE
CL	CENTERLINE
CMP	CORRUGATED METAL PIPE
CSP	CORRUGATED STEEL PIPE
CO.	COUNTY
CONC	CONCRETE
CONT	CONTINUOUS
CONST	CONSTRUCTION
CR GR	CROWN GRADE
DHV	DESIGN HOURLY VOLUME
DI	DROP INLET
DIA	DIAMETER
DIP	DUCTILE IRON PIPE
DW	STEADY DON'T WALK - PORTLAND ORANGE
DWY	DRIVEWAY
ELEV (or EL.)	ELEVATION
EMB	EMBANKMENT
EOP	EDGE OF PAVEMENT
EXIST (or EX)	EXISTING
EXC	EXCAVATION
F&C	FRAME AND COVER
F&G	FRAME AND GRATE
FDN.	FOUNDATION
FLDSTN	FIELDSTONE
GAR	GARAGE
GD	GROUND
GG	GAS GATE
GI	GUTTER INLET
GIP	GALVANIZED IRON PIPE
GRAN	GRANITE
GRAV	GRAVEL
GRD	GUARD
HDW	HEADWALL
HMA	HOT MIX ASPHALT
HOR	HORIZONTAL
HYD	HYDRANT
INV	INVERT
JCT	JUNCTION
L	LENGTH OF CURVE
LB	LEACH BASIN
LP	LIGHT POLE
LT	LEFT
MAX	MAXIMUM
MB	MAILBOX
MH	MANHOLE
MHB	MASSACHUSETTS HIGHWAY BOUND
MIN	MINIMUM
NIC	NOT IN CONTRACT
NO.	NUMBER
PC	POINT OF CURVATURE
PCC	POINT OF COMPOUND CURVATURE
P.G.L.	PROFILE GRADE LINE
PI	POINT OF INTERSECTION
POC	POINT ON CURVE
POT	POINT ON TANGENT
PRC	POINT OF REVERSE CURVATURE
PROJ	PROJECT
PROP	PROPOSED
PSB	PLANTABLE SOIL BORROW
PT	POINT OF TANGENCY
PVC	POINT OF VERTICAL CURVATURE
PVI	POINT OF VERTICAL INTERSECTION
PVT	POINT OF VERTICAL TANGENCY
PVMT	PAVEMENT
PWW	PAVED WATER WAY

ABBREVIATIONS (cont.)

GENERAL

R	RADIUS OF CURVATURE
R&D	REMOVE AND DISPOSE
RCP	REINFORCED CONCRETE PIPE
RD	ROAD
RDWY	ROADWAY
REM	REMOVE
RET	RETAIN
RET WALL	RETAINING WALL
ROW	RIGHT OF WAY
RR	RAILROAD
R&R	REMOVE AND RESET
R&S	REMOVE AND STACK
RT	RIGHT
SB	STONE BOUND
SHLD	SHOULDER
SMH	SEWER MANHOLE
ST	STREET
STA	STATION
SSD	STOPPING SIGHT DISTANCE
SHLO	STATE HIGHWAY LAYOUT LINE
SW	SIDEWALK
T	TANGENT DISTANCE OF CURVE/TRUCK %
TAN	TANGENT
TEMP	TEMPORARY
TC	TOP OF CURB
TOS	TOP OF SLOPE
TYP	TYPICAL
UP	UTILITY POLE
VAR	VARIES
VERT	VERTICAL
VC	VERTICAL CURVE
WCR	WHEEL CHAIR RAMP
WG	WATER GATE
WIP	WROUGHT IRON PIPE
WM	WATER METER/WATER MAIN
X-SECT	CROSS SECTION

TRAFFIC SIGNAL ABBREVIATIONS

CAB	CABINET
CCVE	CLOSED CIRCUIT VIDEO EQUIPMENT
DW	STEADY UPRAISED HAND
FDW	FLASHING UPRAISED HAND
FR	FLASHING CIRCULAR RED
FRL	FLASHING RED LEFT ARROW
FRR	FLASHING RED RIGHT ARROW
FY	FLASHING CIRCULAR YELLOW
FYL	FLASHING YELLOW LEFT ARROW
FYR	FLASHING YELLOW RIGHT ARROW
G	STEADY CIRCULAR GREEN
GL	STEADY GREEN LEFT ARROW
GR	STEADY GREEN RIGHT ARROW
GSL	STEADY GREEN SLASH LEFT ARROW
GSR	STEADY GREEN SLASH RIGHT ARROW
GV	STEADY GREEN VERTICAL ARROW
OL	OVERLAP
PED	PEDESTRIAN
PTZ	PAN, TILT, ZOOM
R	STEADY CIRCULAR RED
RL	STEADY RED LEFT ARROW
RR	STEADY RED RIGHT ARROW
TR SIG	TRAFFIC SIGNAL
TSC	TRAFFIC SIGNAL CONDUIT
W	STEADY WALKING PERSON
Y	STEADY CIRCULAR YELLOW
YL	STEADY YELLOW LEFT ARROW

BELLINGHAM
HARTFORD AVENUE (ROUTE 126)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	02	15
PROJECT FILE NO.	2148.00		

NOI - LEGEND & ABBREVIATIONS
07/19/2024

BELLINGHAM
HARTFORD AVENUE (ROUTE 126)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	##	15
PROJECT FILE NO.	2148.00		

NOI - KEY PLAN & IMPACT SUMMARY TABLE
07/19/2024

2148.00_NOI-HD\KEY PLAN).DWG Plotted on 19-Jul-2024 7:36 PM

N

PROJECT BEGIN
STA 9+19.29
N2866505.9919
E663294.5924

END PHASE 1
STA 28+09.32
N2866636.7310
E665177.3998

HISTORIC BUILDING: BEL.15

FARM ROAD (PUBLIC - 33' WIDE)
ARROW HEAD ROAD (PUBLIC - 30' WIDE)
CEDAR HILL ROAD (PUBLIC - VARIABLE WIDTH)
RAWSON ROAD (PRIVATE - 30' WIDE)
DEERFIELD LANE (PUBLIC - 40' WIDE)
I-495 NORTHBOUND ROADWAY
I-495 SOUTHBOUND ROADWAY
HARTFORD AVENUE (ROUTE 126) (PUBLIC - VARIABLE WIDTH)
HARTFORD AVENUE (PUBLIC - 60'WIDE)
NORTH MAIN STREET (ROUTE 126) (PUBLIC - VARIABLE WIDTH)
I-495 NB ON-RAMP
I-495 NB OFF-RAMP
I-495 SB ON-RAMP
I-495 SB OFF-RAMP

100 FT BUFFER ZONE TO WETLAND RESOURCE AREA
WETLAND SERIES BC
WETLAND SERIES BB
WETLAND SERIES BA
WETLAND SERIES EA
WETLAND SERIES EB
WETLAND SERIES AA
PROPOSED 100' BVW BUFFER ZONE PERMANENT IMPACT AREA = 64 ± SF

B1 B2 B2A B3 B4 B5 B6 B8 B9
TP1 TP2 TP3 TP3A TP3B TP4

XX CONSTRUCTION PLANS

LEGEND
200' RIVERFRONT
100' BORDERING VEGETATED WETLANDS (BVW)

0 200 400 600 800 1000
SCALE: 1" = 200'

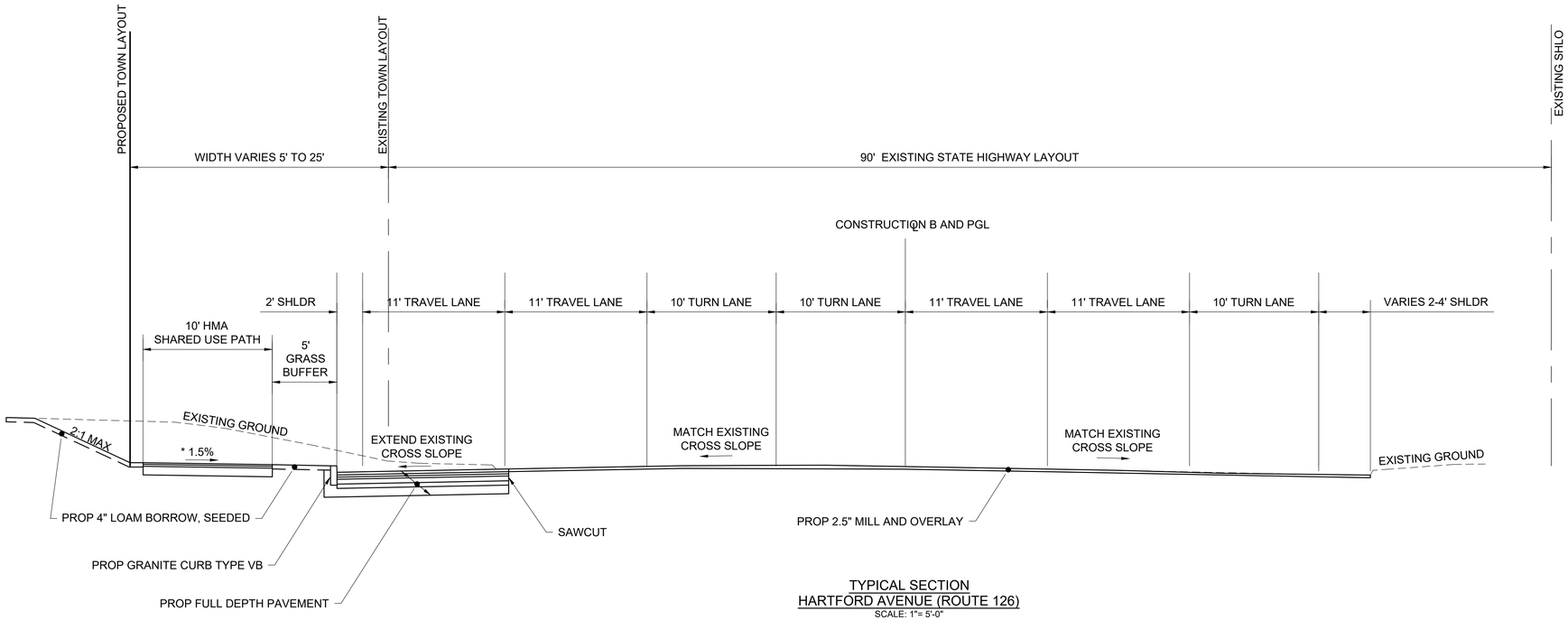
TEMPORARY & PERMANENT IMPACTS TO 100' BVW BUFFER ZONES

WETLAND LETTER	STATION, OS	PERMANENT 100' BVW BUFFER ZONE IMPACT AREA (± SF)	PERMANENT 100' BVW BUFFER ZONE IMPACT DESCRIPTION
WETLAND FLAG SERIES EB	94+17 LT, 87'	64	HYDRODNAMIC SEPARATOR STORMWATER INFILTRATION STRUCTURE
TOTAL AREA SF		64	

BELLINGHAM
HARTFORD AVENUE

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	04	15
PROJECT FILE NO.		N/A	

NOI - TYPICAL SECTIONS
SHEET 01 OF 02
07/19/2024



TYPICAL SECTION
HARTFORD AVENUE (ROUTE 126)
SCALE: 1"= 5'-0"

* CONSTRUCTION TOLERANCE ±1.5%

PAVEMENT NOTES

PROPOSED PAVEMENT MILLING AND PAVEMENT OVERLAY

SURFACE: 2.50" SUPERPAVE SURFACE COURSE - 12.5 POLYMER (SSC - 12.5 - P) OVER ASPHALT EMULSION FOR TACK COAT (RS-1h) OVER
MILLING : 2.50" PAVEMENT MILLING

BETWEEN EACH SUPERPAVE COURSE, ASPHALT EMULSION FOR TACK COAT SHALL BE SPRAY- APPLIED FOR DOUBLE OVERLAP COVERAGE OVER SMOOTH SURFACES PER SPECIFICATIONS. SEE STANDARD SPECIFICATIONS FOR RATES OF APPLICATION.

PROPOSED FULL DEPTH PAVEMENT -
FOR ROUTE 126, I-495 RAMPS, AND PERMANENT TRENCH PATCHES

SURFACE: 2.50" SUPERPAVE SURFACE COURSE - 12.5 POLYMER (SSC - 12.5 - P) OVER ASPHALT EMULSION FOR TACK COAT (RS-1h) OVER

INTERMEDIATE:
2.00" SUPERPAVE INTERMEDIATE COURSE - 19.0 - POLYMER (SIC - 19.0 - P) OVER
ASPHALT EMULSION TACK COAT (RS-1h) OVER

2.00" SUPERPAVE INTERMEDIATE COURSE - 19.0 (SIC - 19.0) OVER
ASPHALT EMULSION TACK COAT (RS-1h) OVER

BASE: 4.50" SUPERPAVE BASE COURSE - 37.5 (SBC - 37.5) OVER

SUBBASE: 4" DENSE GRADED CRUSHED STONE FOR SUB-BASE OVER
8" GRAVEL, TYPE b

BETWEEN EACH SUPERPAVE COURSE, ASPHALT EMULSION FOR TACK COAT SHALL BE SPRAY- APPLIED FOR DOUBLE OVERLAP COVERAGE OVER SMOOTH SURFACES PER SPECIFICATIONS. SEE STANDARD SPECIFICATIONS FOR RATES OF APPLICATION.

PROPOSED SHARED USE PATH, HMA WALK, AND HMA MEDIAN SURFACE

SURFACE: 1.25" SUPERPAVE SURFACE COURSE OVER
1.75" SUPERPAVE INTERMEDIATE COURSE OVER

FOUNDATION: 8" GRAVEL BORROW, TYPE b

PROPOSED HOT MIX ASPHALT DRIVEWAYS, WALKS AT DRIVEWAYS

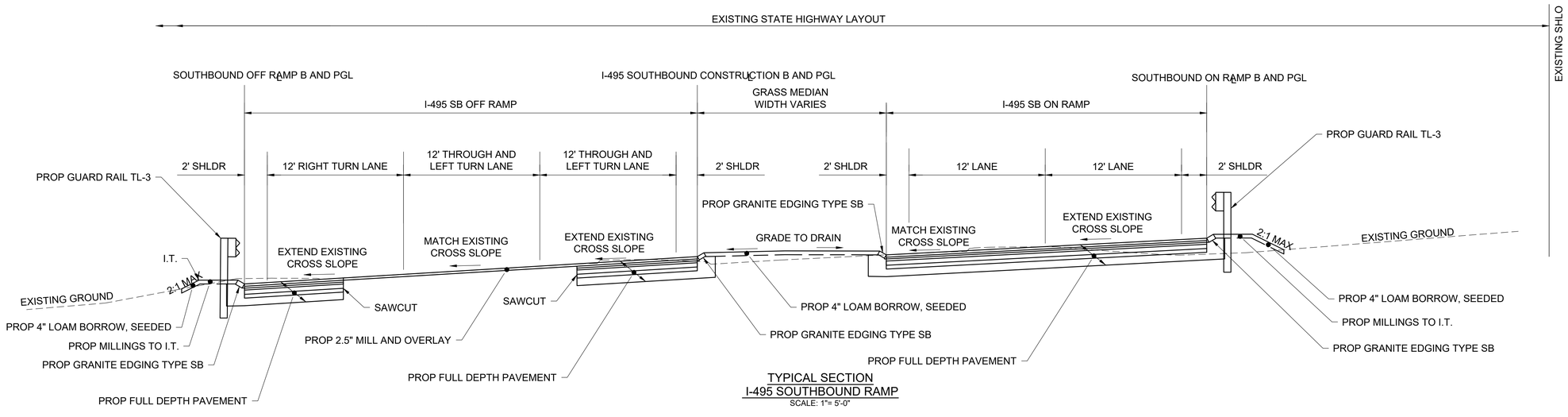
SURFACE: 1.5" SUPERPAVE SURFACE COURSE OVER
2.5" SUPERPAVE INTERMEDIATE COURSE
FOUNDATION: 8" GRAVEL BORROW, TYPE b

PROPOSED CEMENT CONCRETE SIDEWALK / WHEELCHAIR RAMP

SURFACE: 4" CEMENT CONCRETE WALK SURFACE 4000 PSI, 3/4", 610 LB OVER
FOUNDATION: 8" GRAVEL BORROW, TYPE b

NOTES

1. EXISTING PAVEMENT MARKINGS IN CONFLICT WITH PROPOSED LANE MARKINGS TO BE REMOVED, SEE SIGN AND PAVEMENT MARKING PLANS.



TYPICAL SECTION
I-495 SOUTHBOUND RAMP
SCALE: 1"= 5'-0"

BELLINGHAM
HARTFORD AVENUE (ROUTE 126)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	05	15
PROJECT FILE NO.	2148.00		

NOI - CONSTRUCTION PLANS
SHEET 01 OF 07
07/19/2024

HIGHWAY GUARD DETAILS

NONE

TRAFFIC SIGNAL CONDUIT

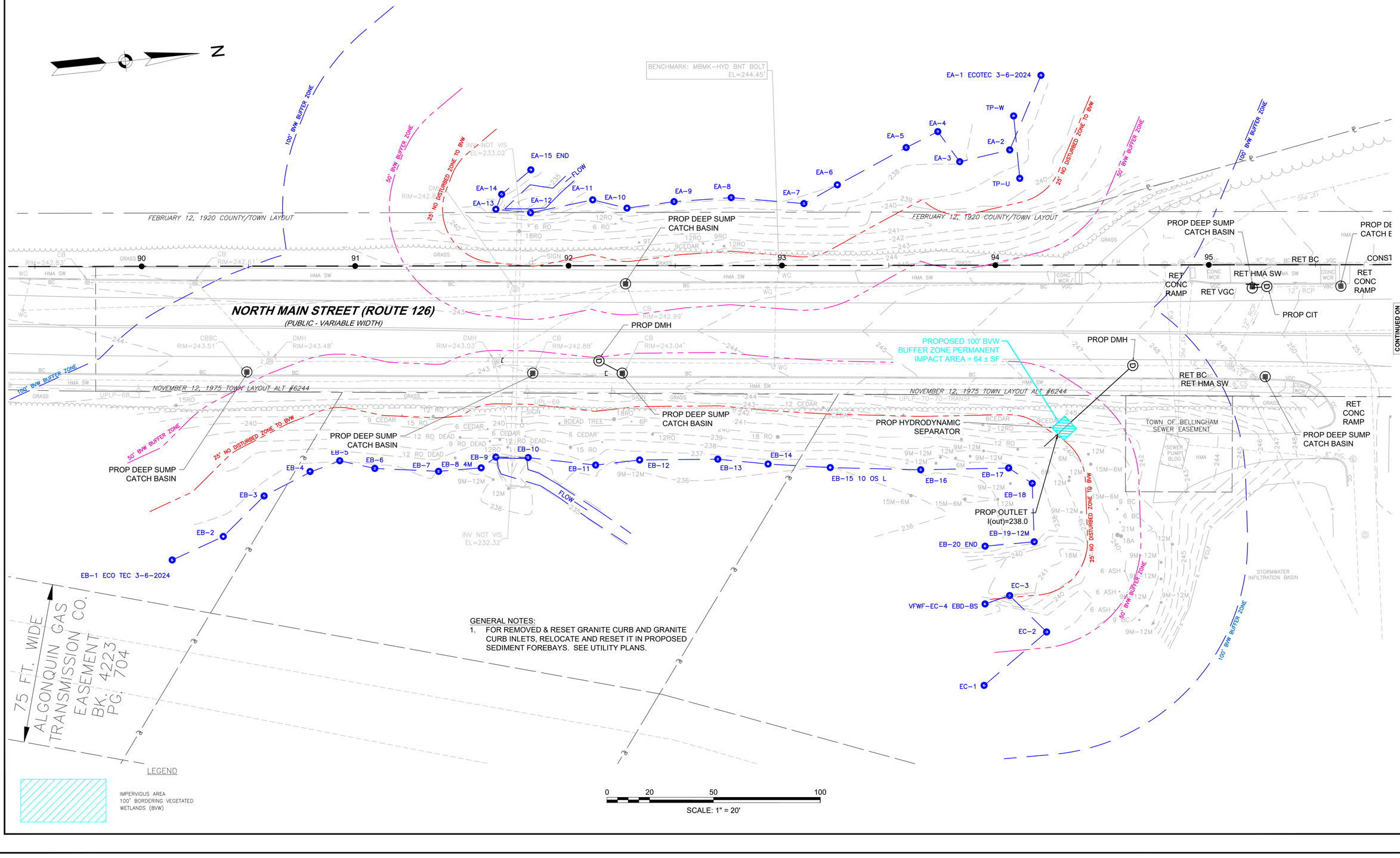
SEE TRAFFIC SIGNAL PLANS

WATER SUPPLY ALTERATIONS

SEE UTILITY PLANS

DRAINAGE DETAILS

SEE UTILITY PLANS



GENERAL NOTES:
1. FOR REMOVED & RESET GRANITE CURB AND GRANITE CURB INLETS, RELOCATE AND RESET IT IN PROPOSED SEDIMENT FOREBAYS. SEE UTILITY PLANS.

LEGEND

IMPERVIOUS AREA
100' BORDERING VEGETATED WETLANDS (BVW)

SCALE: 1" = 20'

CONTINUED ON SHEET NO. 06

2148.00_NOI-HD(CONST PLANS).DWG Plotted on 19-Jul-2024 7:15 PM

BELLINGHAM
HARTFORD AVENUE (ROUTE 126)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	06	15
PROJECT FILE NO.	2148.00		

NOI - CONSTRUCTION PLANS
SHEET 02 OF 07
07/19/2024

2148.00_NOI-HD(CONST PLANS).DWG Plotted on 19-Jul-2024 7:16 PM

HIGHWAY GUARD DETAILS

NONE

TRAFFIC SIGNAL CONDUIT

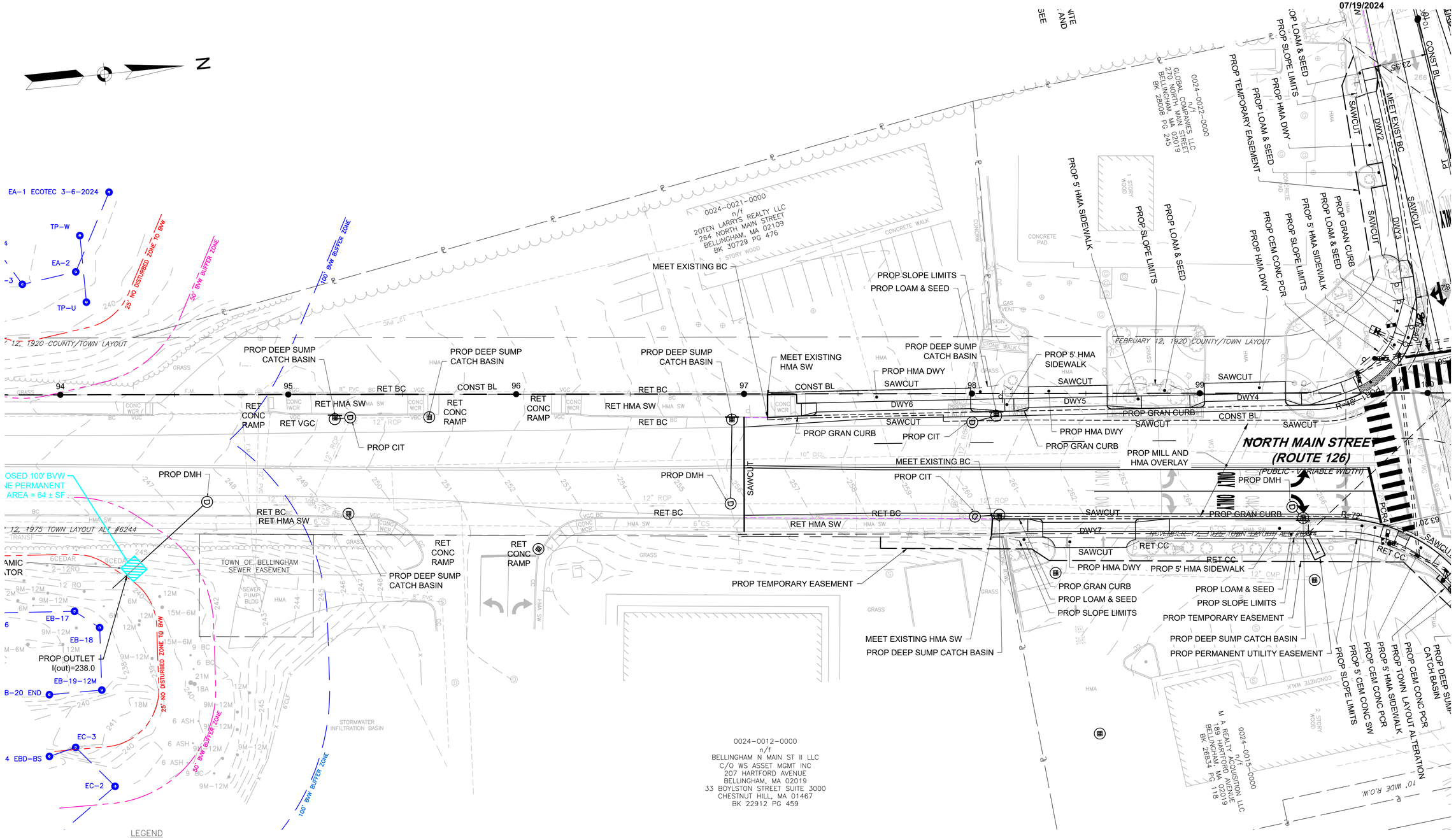
SEE TRAFFIC SIGNAL PLANS

WATER SUPPLY ALTERATIONS

SEE UTILITY PLANS

DRAINAGE DETAILS

SEE UTILITY PLANS



CONTINUED ON SHEET NO. 05

CONTINUED ON SHEET NO. 07

N

BELLINGHAM
HARTFORD AVENUE (ROUTE 126)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	07	15
PROJECT FILE NO.	2148.00		

NOI - CONSTRUCTION PLANS
SHEET 03 OF 07
07/19/2024

HIGHWAY GUARD DETAILS
NONE

TRAFFIC SIGNAL CONDUIT
SEE TRAFFIC SIGNAL PLANS

WATER SUPPLY ALTERATIONS
SEE UTILITY PLANS

DRAINAGE DETAILS
SEE UTILITY PLANS

0024-0004-0000
n/f
EFB WHITEBURN CORPORATION
178 HARTFORD AVENUE
BELLINGHAM, MA 02019
P.O. BOX 315
MILLBURY, MA 01527
BK 30847 PG 461

ARROW HEAD ROAD
(PUBLIC -40' WIDE)
(PLAN 898 OF 1956)

MAY 16, 1956 TOWN LAYOUT

0024-0005-0000
n/f
RTE. 85 REALTY CORP
182 HARTFORD AVENUE
BELLINGHAM, MA 02019
8 UXBRIDGE ROAD
MENDON, MA 01756
BK 38626 PG 186

0024-0006-0000
n/f
296 MAIN LLC
186 HARTFORD AVENUE
BELLINGHAM, MA 02019
P.O. BOX 444
MENDON, MA 01756
BK 38212 PG 2

CEDAR HILL ROAD
(PUBLIC VARIABLE WIDTH)
(PLAN 898 OF 1956)

NOVEMBER 12, 1975 TOWN LAYOUT ALT. #6244

0024-0007-0000
n/f
217 RIVER ROAD LLC
190 HARTFORD AVENUE
BELLINGHAM, MA 02019
8 UXBRIDGE ROAD
MENDON, MA 01756
BK 35064 PG 365

0024-0008-0000
n/f
217 RIVER ROAD LLC
194 HARTFORD AVENUE
BELLINGHAM, MA 02019
8 UXBRIDGE ROAD
MENDON, MA 01756
BK 35064 PG 365

MEET EXIST BC
PROP LOAM & SEED
PROP 5' HMA SIDEWALK
PROP SLOPE LIMITS
PROP PERMANENT UTILITY EASEMENT
PROP TEMPORARY EASEMENT
PROP TOWN LAYOUT ALTERATION
PROP LOAM & SEED
PROP SLOPE LIMITS
PROP 5' HMA SIDEWALK
PROP DEEP SUMP CATCH BASIN
PROP SLOPE LIMITS
PROP LOAM & SEED
PROP DEEP SUMP CATCH BASIN
PROP HMA DWY
RET
SAWCUT
PROP 5' HMA SIDEWALK
PROP GRAN CURB
REM HMA SW
R&R VGC
MEET EXIST BC
RET HMA SW
PROP GRAN CURB
SAWCUT
HARTFORD AVENUE
(PUBLIC - VARIABLE WIDTH)
10+00
CONST BL
PROP MILL AND HMA OVERLAY
PROP DMH
PROP EOP
MEET EXIST BC
SAWCUT
RET HMA SW
DWY1
DWY2
DWY3
PROP LOAM & SEED
PROP SLOPE LIMITS
PROP HMA DWY
PROP LOAM & SEED
PROP TEMPORARY EASEMENT
PROP GRAN CURB
PROP LOAM & SEED
PROP 5' HMA SIDEWALK
PROP SLOPE LIMITS
PROP CEM CONC PCR
PROP HMA DWY
PROP SLOPE LIMITS
PROP 5' HMA SIDEWALK
PROP DEEP SUMP CATCH BASIN
PROP CEM CONC PCR
PROP 5' CEM CONC SW
PROP SLOPE LIMITS
PROP CEM CONC PCR
PROP TOWN LAYOUT ALTERATION
PROP LOAM & SEED
PROP DEEP SUMP CATCH BASIN
PROP LOAM & SEED
PROP SLOPE LIMITS
PROP TOWN LAYOUT ALTERATION
PROP 8' HMA SUP
PROP GRAN CURB
REM HMA SW
REM EX CB
R&R VGC
PROP MILL AND HMA OVERLAY
HARTFORD AVENUE (ROUTE 126)
(PUBLIC - VARIABLE WIDTH)
CONST BL
PROP LOAM & SEED
PROP GRAN CURB
R&R VGC
PROP HMA DWY
PROP SLOPE LIMITS
PROP LOAM & SEED
PROP TEMPORARY EASEMEN
PROP HMA DWY
PROP 5' HMA SIDEWALK
PROP TEMPORARY EASEMENT
PROP DEEP SUMP CATCH BASIN
PROP CEM CONC PCR
PROP TOWN LAYOUT ALTERATION
PROP 5' HMA SIDEWALK
PROP CEM CONC PCR
PROP 5' CEM CONC SW
PROP SLOPE LIMITS
NORTH MAIN STREET
(ROUTE 126)
(PUBLIC - VARIABLE WIDTH)
PROP DMH
PROP GRAN CURB
PROP MILL AND HMA OVERLAY
PROP LOAM & SEED
PROP SLOPE LIMITS
PROP TEMPORARY EASEMENT
PROP DEEP SUMP CATCH BASIN
PROP PERMANENT UTILITY EASEMENT
PROP 5' HMA SIDEWALK
RET CC
PROP 5' HMA SIDEWALK
PROP SLOPE LIMITS
PROP LOAM & SEED
PROP GRAN CURB
PROP 5' HMA SIDEWALK

0024-0020-0000
n/f
HARTFORD REALTY TRUST
HARTFORD AVENUE
BELLINGHAM, MA 02109
C/O ALEXANDER HARCOVITZ
256 ORCHARD STREET
MILLIS, MA 02054
BK 4488 PG 394

BENCHMARK: MBMK-HYD BNT BOLT
EL=266.21'

0024-0022-0000
n/f
GLOBAL COMPANIES LLC
270 NORTH MAIN STREET
BELLINGHAM, MA 02019
BK 28008 PG 245

0024-0014-0000
n/f
HARTFORD REALTY LLC
193 HARTFORD AVENUE
BELLINGHAM, MA 02019
BK 32304 PG 6

BENCHMARK: MBMK-HYD-BNT BOLT
EL=273.23'

0024-0015-0000
n/f
M A REALTY ACQUISITION LLC
189 HARTFORD AVENUE
BELLINGHAM, MA 02019
BK 26834 PG 118

GENERAL NOTES:
1. FOR REMOVED & RESET GRANITE CURB AND GRANITE CURB INLETS, RELOCATE AND RESET IT IN PROPOSED SEDIMENT FOREBAYS. SEE UTILITY PLANS.

LEGEND

PROPOSED IMPERVIOUS AREA 100' BORDERING VEGETATED WETLANDS (BVW)

CONTINUED ON SHEET NO. 06

CONTINUED ON SHEET NO. 08

0 20 50 100
SCALE: 1" = 20'

2148.00_NOI-HD(CONST PLANS).DWG Plotted on 19-Jul-2024 7:18 PM

BELLINGHAM
HARTFORD AVENUE (ROUTE 126)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	08	15
PROJECT FILE NO.	2148.00		

NOI - CONSTRUCTION PLANS
SHEET 04 OF 07
07/19/2024

Plotted on 19-Jul-2024 7:19 PM
2148.00_NOI-HD(CONST PLANS).DWG

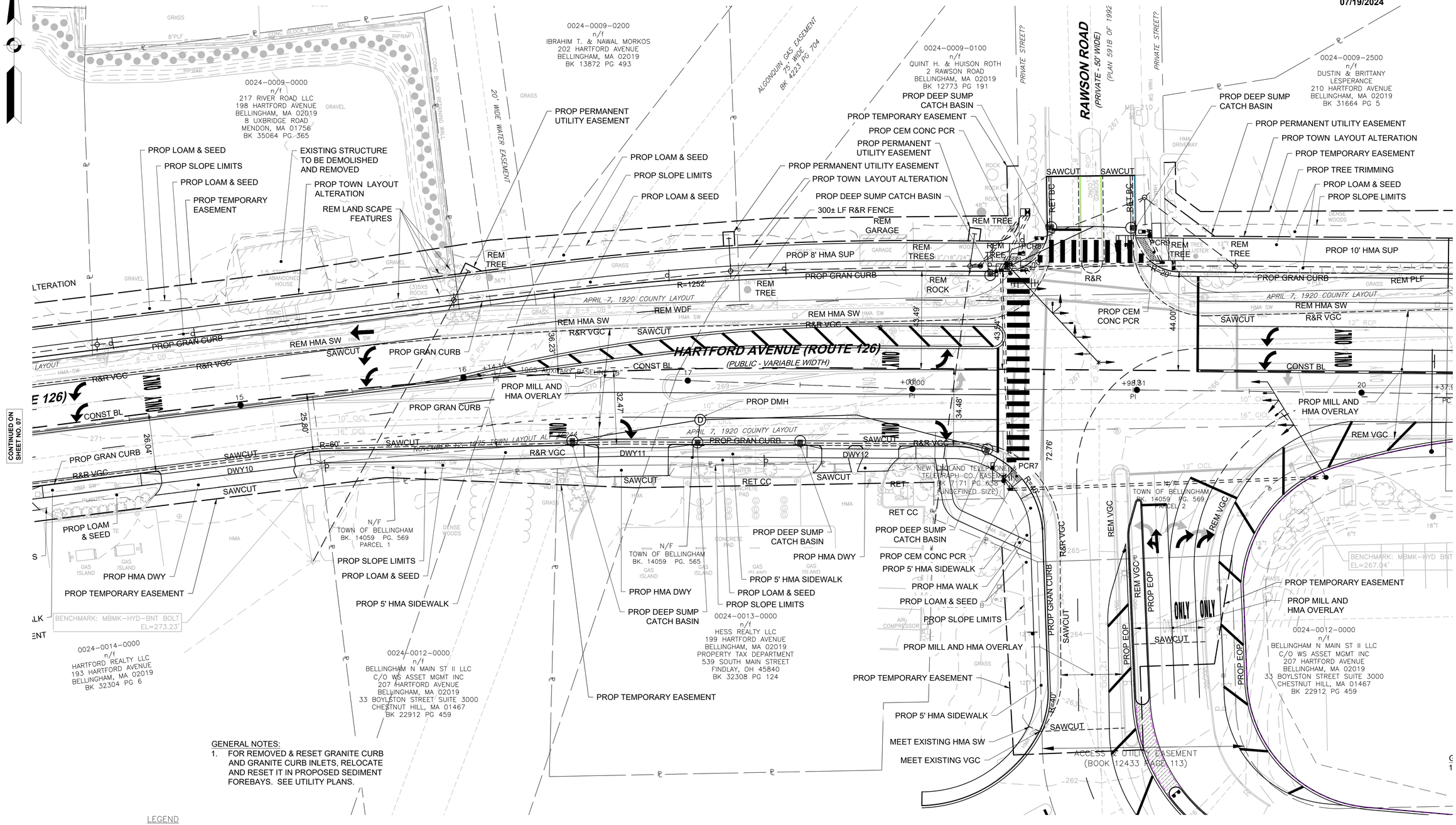
HIGHWAY GUARD DETAILS
NONE

TRAFFIC SIGNAL CONDUIT
SEE TRAFFIC SIGNAL PLANS

WATER SUPPLY ALTERATIONS
SEE UTILITY PLANS

DRAINAGE DETAILS
SEE UTILITY PLANS

N



GENERAL NOTES:
1. FOR REMOVED & RESET GRANITE CURB AND GRANITE CURB INLETS, RELOCATE AND RESET IT IN PROPOSED SEDIMENT FOREBAYS. SEE UTILITY PLANS.

LEGEND

PROPOSED IMPERVIOUS AREA 100' BORDERING VEGETATED WETLANDS (BVW)

0 20 50 100
SCALE: 1" = 20'

BELLINGHAM
HARTFORD AVENUE (ROUTE 126)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	09	15
PROJECT FILE NO.	2148.00		

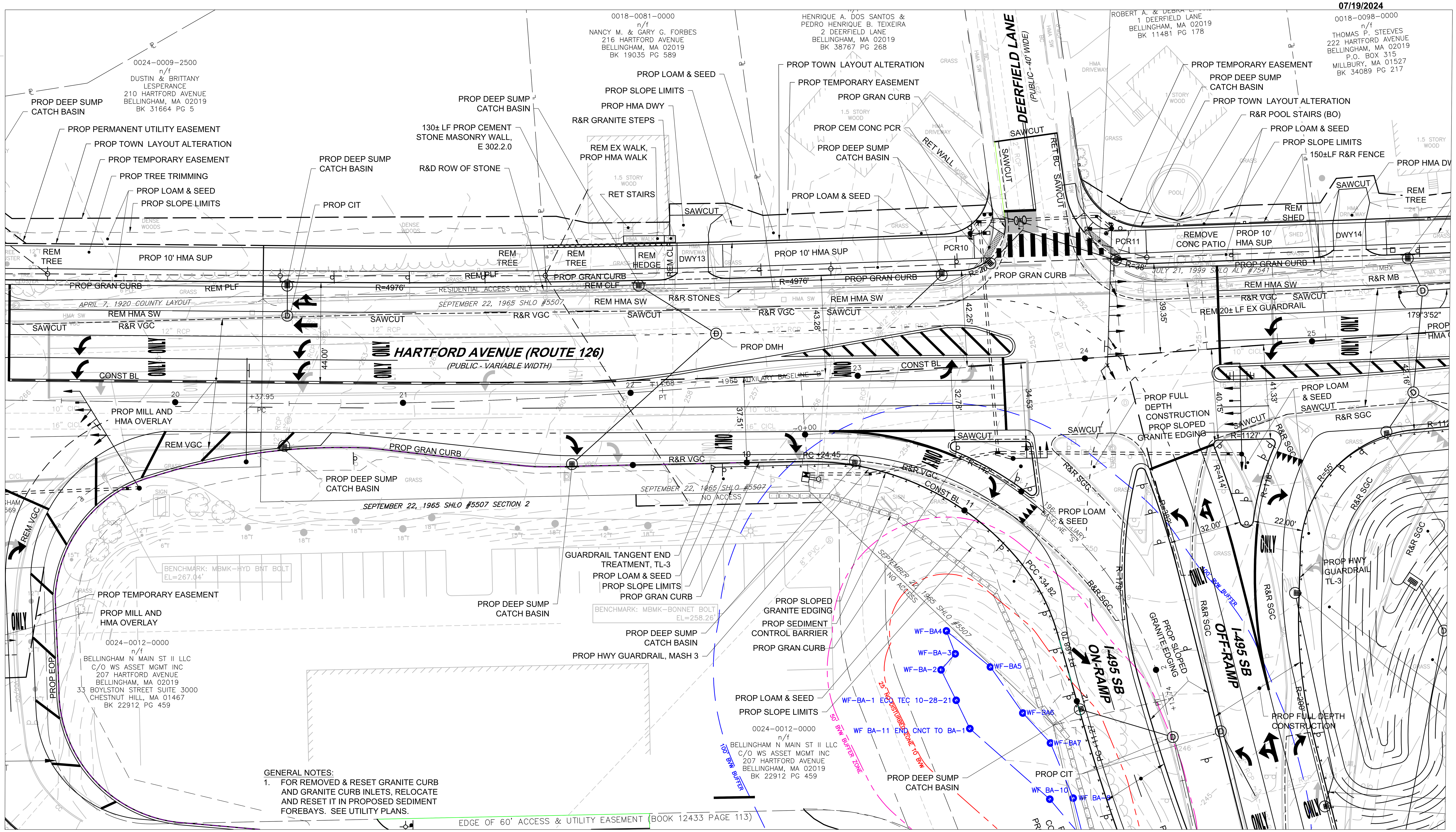
NOI - CONSTRUCTION PLANS
SHEET 05 OF 07
07/19/2024

Plotted on 19-Jul-2024 7:21 PM
2148.00_NOI-HD(CONST PLANS).DWG

HIGHWAY GUARD DETAILS	TRAFFIC SIGNAL CONDUIT	WATER SUPPLY ALTERATIONS	DRAINAGE DETAILS
SEE BELOW	SEE TRAFFIC SIGNAL PLANS	SEE UTILITY PLANS	SEE UTILITY PLANS

N

CONTINUED ON SHEET NO. 08



HARTFORD AVENUE (ROUTE 126)
(PUBLIC - VARIABLE WIDTH)
DEERFIELD LANE
(PUBLIC - 40' WIDE)
I-495 SB ON-RAMP
I-495 SB OFF-RAMP
0024-0009-2500
n/f
DUSTIN & BRITTANY LESPERANCE
210 HARTFORD AVENUE
BELLINGHAM, MA 02019
BK 31664 PG 5
0018-0081-0000
n/f
NANCY M. & GARY G. FORBES
216 HARTFORD AVENUE
BELLINGHAM, MA 02019
BK 19035 PG 589
HENRIQUE A. DOS SANTOS &
PEDRO HENRIQUE B. TEIXEIRA
2 DEERFIELD LANE
BELLINGHAM, MA 02019
BK 38767 PG 268
ROBERT A. & DEBRA L.
1 DEERFIELD LANE
BELLINGHAM, MA 02019
BK 11481 PG 178
0018-0098-0000
n/f
THOMAS P. STEEVES
222 HARTFORD AVENUE
BELLINGHAM, MA 02019
P.O. BOX 315
MILLBURY, MA 01527
BK 34089 PG 217
0024-0012-0000
n/f
BELLINGHAM N MAIN ST II LLC
C/O WS ASSET MGMT INC
207 HARTFORD AVENUE
BELLINGHAM, MA 02019
33 BOYLSTON STREET SUITE 3000
CHESTNUT HILL, MA 01467
BK 22912 PG 459
PROP DEEP SUMP CATCH BASIN
PROP PERMANENT UTILITY EASEMENT
PROP TOWN LAYOUT ALTERATION
PROP TEMPORARY EASEMENT
PROP TREE TRIMMING
PROP LOAM & SEED
PROP SLOPE LIMITS
PROP CIT
130± LF PROP CEMENT STONE MASONRY WALL, E 302.2.0
R&D ROW OF STONE
PROP HMA DWY
R&R GRANITE STEPS
REM EX WALK, PROP HMA WALK
RET STAIRS
SAWCUT
PROP GRAN CURB
PROP CEM CONC PCR
RET WALL
R&R POOL STAIRS (BO)
150±LF R&R FENCE
PROP HMA DW
REM SHED
REM TREE
REMOVE CONC PATIO
PROP 10' HMA SUP
DWY13
DWY14
PCR10
PCR11
REM HEDGE
REM CLF
REM PLF
R&R STONES
REM HMA SW
R&R VGC
R&R MB
REM 20± LF EX GUARDRAIL
PROP DMH
CONST BL
1965 AUXILARY BASELINE "S"
PROP MILL AND HMA OVERLAY
REM VGC
PROP FULL DEPTH CONSTRUCTION
PROP SLOPED GRANITE EDGING
R&R SGC
PROP HWY GUARDRAIL TL-3
GUARDRAIL TANGENT END TREATMENT, TL-3
PROP SEDIMENT CONTROL BARRIER
PROP HWY GUARDRAIL, MASH 3
PROP EOP
SEPTEMBER 22, 1965 SHLO #5507 SECTION 2
APRIL 7, 1920 COUNTY LAYOUT
JULY 21, 1999 SHLO ALT #7547
NO ACCESS
BENCHMARK: MBMK-HYD BNT BOLT EL=267.04'
BENCHMARK: MBMK-BONNET BOLT EL=258.26'
WF-BA-1 ECO TEC 10-28-21
WF BA-11 END CNCT TO BA-1
100' BVW BUFFER
50' BVW BUFFER ZONE
25' NO DISTURBANCE ZONE TO BVW
ONLY

CONTINUED ON SHEET NO. 10

GENERAL NOTES:
1. FOR REMOVED & RESET GRANITE CURB AND GRANITE CURB INLETS, RELOCATE AND RESET IT IN PROPOSED SEDIMENT FOREBAYS. SEE UTILITY PLANS.

EDGE OF 60' ACCESS & UTILITY EASEMENT (BOOK 12433 PAGE 113)

LEGEND

PROPOSED IMPERVIOUS AREA
100" BORDERING VEGETATED WETLANDS (BVW)

0 20 50 100
SCALE: 1" = 20'

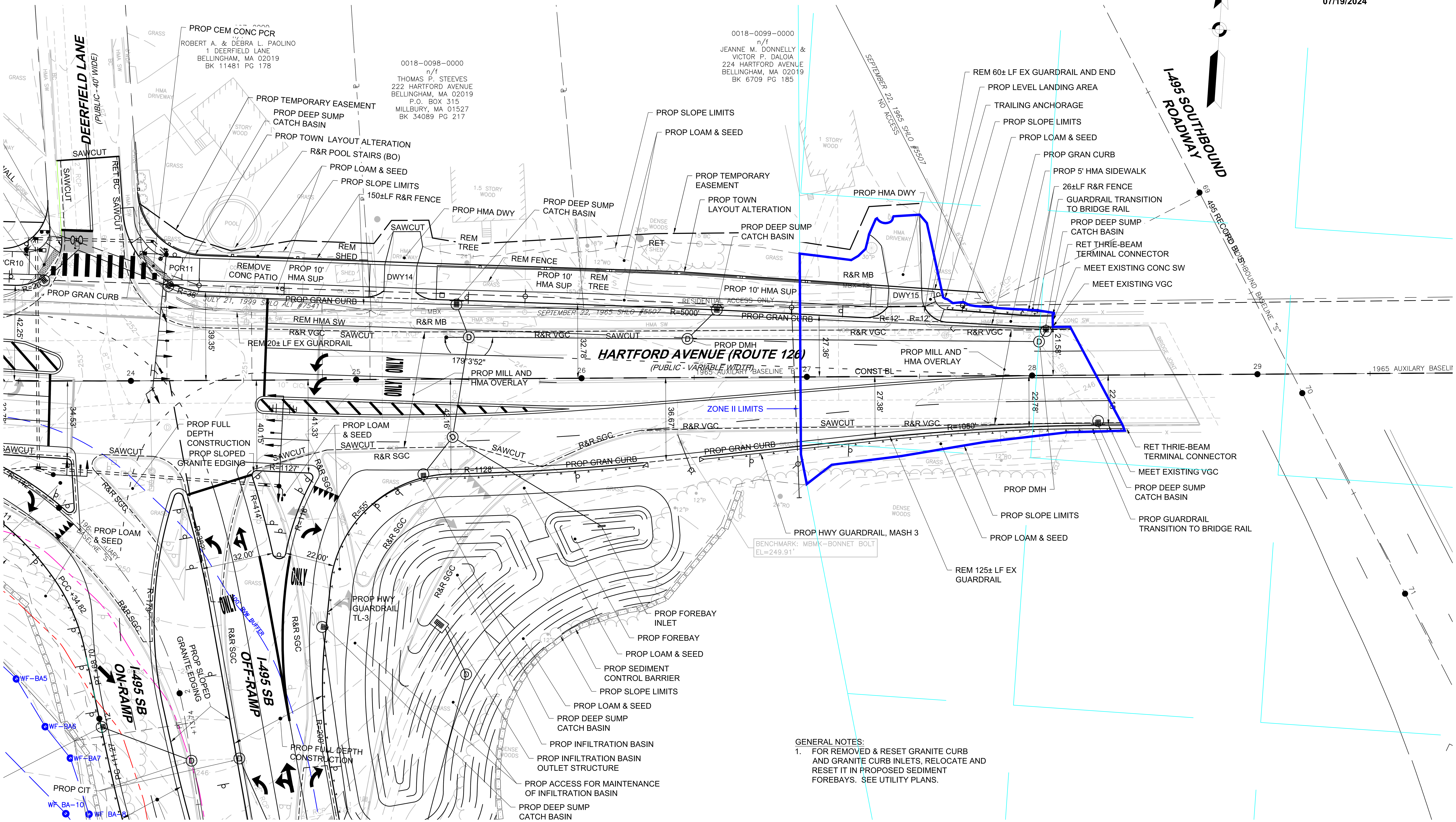
CONTINUED ON SHEET NO. 11

BELLINGHAM
HARTFORD AVENUE (ROUTE 126)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	10	15
PROJECT FILE NO.	2148.00		

NOI - CONSTRUCTION PLANS
SHEET 06 OF 07
07/19/2024

HIGHWAY GUARD DETAILS	TRAFFIC SIGNAL CONDUIT	WATER SUPPLY ALTERATIONS	DRAINAGE DETAILS
SEE BELOW	SEE TRAFFIC SIGNAL PLANS	SEE UTILITY PLANS	SEE UTILITY PLANS



N
DEERFIELD LANE
(PUBLIC - 40' WIDE)
HARTFORD AVENUE (ROUTE 126)
(PUBLIC - VARIABLE WIDTH)
I-495 SOUTHBOUND ROADWAY
I-495 SB ON-RAMP
I-495 SB OFF-RAMP
0018-0098-0000
n/f
THOMAS P. STEEVES
222 HARTFORD AVENUE
BELLINGHAM, MA 02019
P.O. BOX 315
MILLBURY, MA 01527
BK 34089 PG 217
0018-0099-0000
n/f
JEANNE M. DONNELLY &
VICTOR P. DALOIA
224 HARTFORD AVENUE
BELLINGHAM, MA 02019
BK 6709 PG 185
ROBERT A. & DEBRA L. PAOLINO
1 DEERFIELD LANE
BELLINGHAM, MA 02019
BK 11481 PG 178
PROP CEM CONC PCR
PROP TEMPORARY EASEMENT
PROP DEEP SUMP CATCH BASIN
PROP TOWN LAYOUT ALTERATION
R&R POOL STAIRS (BO)
PROP LOAM & SEED
PROP SLOPE LIMITS
150±LF R&R FENCE
PROP HMA DWY
REM TREE
REM SHED
REMOVE CONC PATIO
PROP 10' HMA SUP
DWY14
DWY15
REM FENCE
RET SHED
PROP 10' HMA SUP
PROP GRAN CURB
REM HMA SW
R&R VGC
R&R MB
REM 20± LF EX GUARDRAIL
SAWCUT
PROP DMH
ZONE II LIMITS
CONST BL
1965 AUXILARY BASELINE
SEPTEMBER 22, 1965 SHLO #5507
JULY 21, 1999 SHLO ALT #7541
PROP MILL AND HMA OVERLAY
PROP FULL DEPTH CONSTRUCTION
PROP SLOPED GRANITE EDGING
R&R SGC
PROP HWY GUARDRAIL TL-3
PROP FOREBAY INLET
PROP FOREBAY
PROP SEDIMENT CONTROL BARRIER
PROP INFILTRATION BASIN
PROP INFILTRATION BASIN OUTLET STRUCTURE
PROP ACCESS FOR MAINTENANCE OF INFILTRATION BASIN
PROP CIT
PROP HWY GUARDRAIL, MASH 3
REM 125± LF EX GUARDRAIL
REM 60± LF EX GUARDRAIL AND END
PROP LEVEL LANDING AREA
TRAILING ANCHORAGE
PROP 5' HMA SIDEWALK
26±LF R&R FENCE
GUARDRAIL TRANSITION TO BRIDGE RAIL
RET THRIE-BEAM TERMINAL CONNECTOR
MEET EXISTING CONC SW
MEET EXISTING VGC
PROP GUARDRAIL TRANSITION TO BRIDGE RAIL
BENCHMARK: MBMK-BONNET BOLT EL=249.91'
ONLY
100' BVW BUFFER
WF-BA5
WF-BA6
WF-BA7
WF-BA-10

CONTINUED ON SHEET NO. 08

CONTINUED ON SHEET NO. 11

GENERAL NOTES:
1. FOR REMOVED & RESET GRANITE CURB AND GRANITE CURB INLETS, RELOCATE AND RESET IT IN PROPOSED SEDIMENT FOREBAYS. SEE UTILITY PLANS.

SCALE: 1" = 20'

LEGEND
PROPOSED IMPERVIOUS AREA
100' BORDERING VEGETATED WETLANDS (BVW)

Plotted on 19-Jul-2024 7:24 PM
2148.00_NOI-HD(CONST PLANS).DWG

BELLINGHAM
HARTFORD AVENUE (ROUTE 126)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	11	15
	PROJECT FILE NO.	2148.00	

NOI - CONSTRUCTION PLANS
SHEET 07 OF 07
07/19/2024

Plotted on 19-Jul-2024 7:25 PM
2148.00_NOI-HD(CONST PLANS).DWG

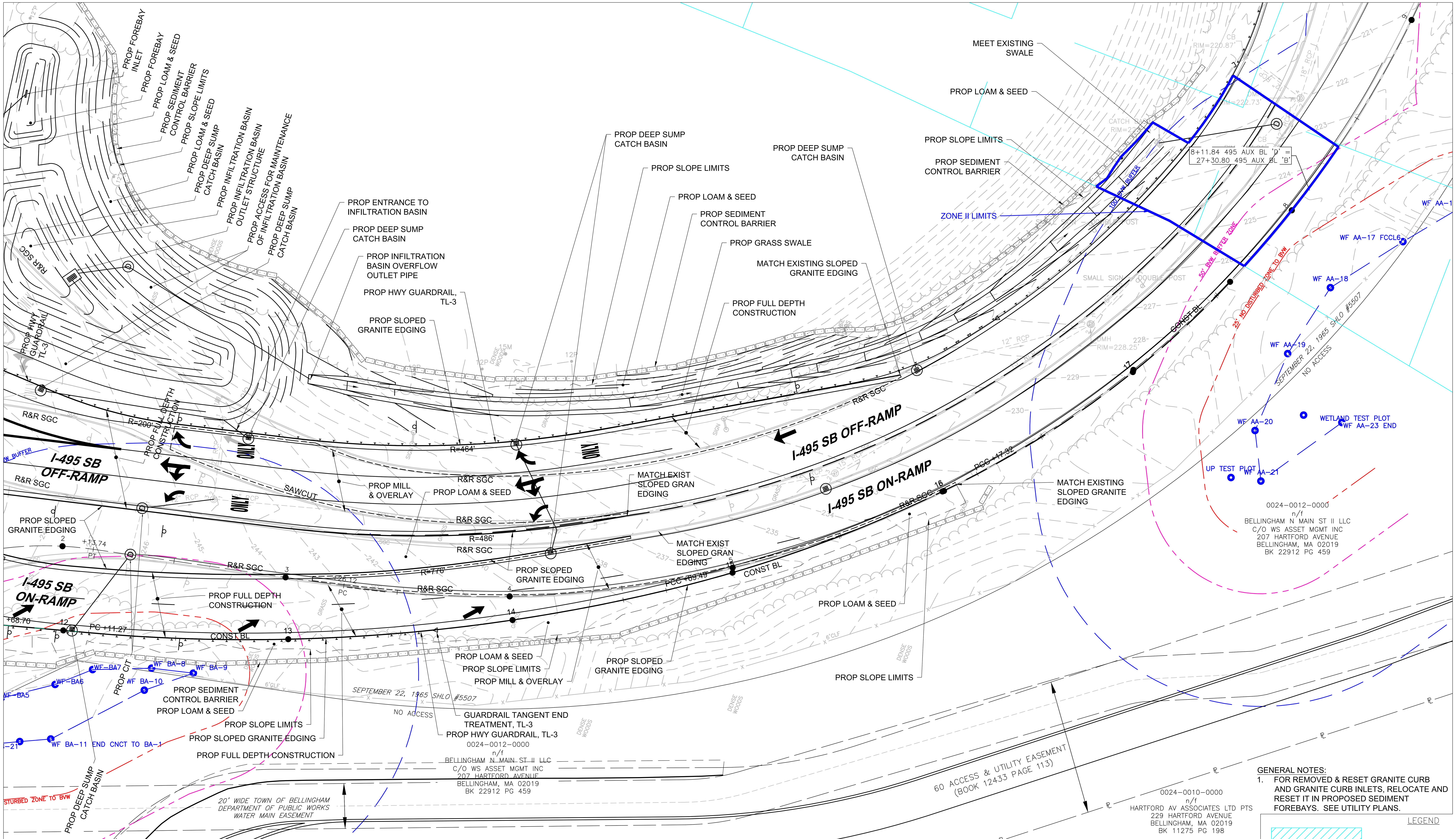
HIGHWAY GUARD DETAILS
SEE BELOW

TRAFFIC SIGNAL CONDUIT
SEE TRAFFIC SIGNAL PLANS

WATER SUPPLY ALTERATIONS
SEE UTILITY PLANS

DRAINAGE DETAILS
SEE UTILITY PLANS

CONTINUED ON SHEET NO. 09



0 20 50 100
SCALE: 1" = 20'

GENERAL NOTES:
1. FOR REMOVED & RESET GRANITE CURB AND GRANITE CURB INLETS, RELOCATE AND RESET IT IN PROPOSED SEDIMENT FOREBAYS. SEE UTILITY PLANS.

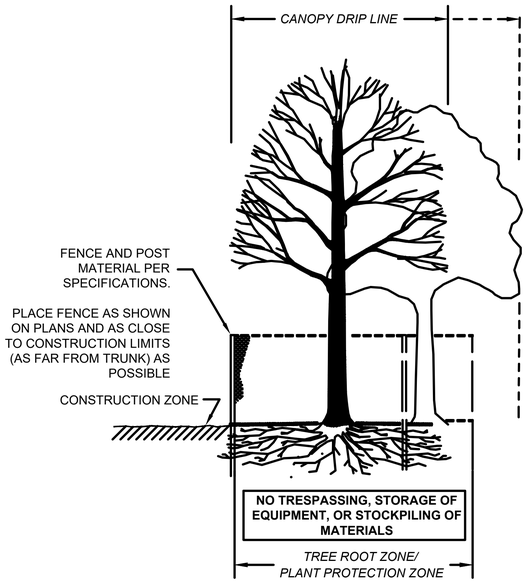
LEGEND
PROPOSED IMPERVIOUS AREA
100' BORDERING VEGETATED WETLANDS (BVW)

BELLINGHAM
HARTFORD AVENUE (ROUTE 126)

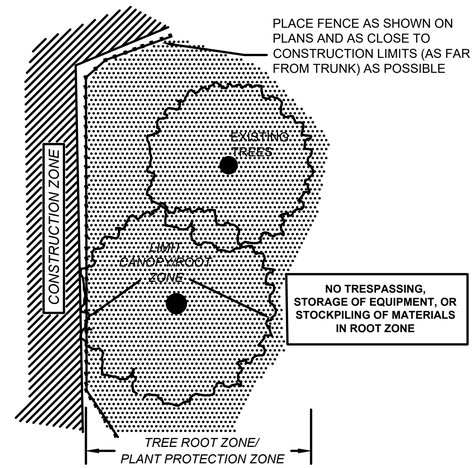
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	12	15
PROJECT FILE NO.	2148.00		

NOI - CONSTRUCTION DETAILS
SHEET 01 OF 04
07/19/2024

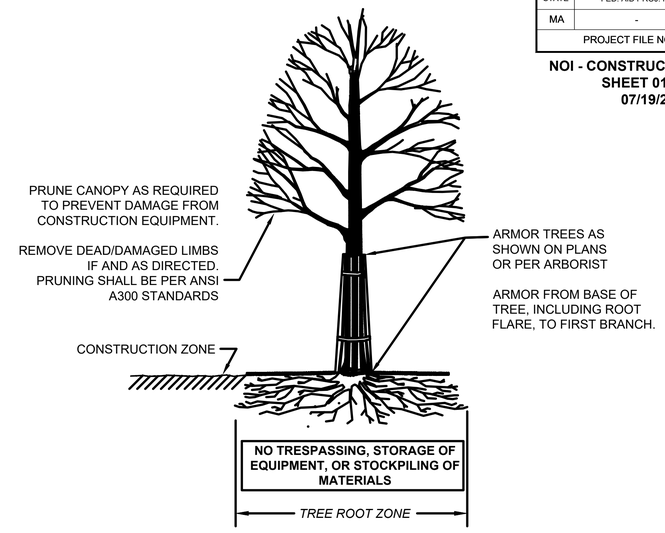
2148.00_NOI-HD(CONSTR DETAILS).DWG 19-Jul-2024



SECTION - FENCE PROTECTION OF ROOT ZONE



PLAN VIEW - FENCE PROTECTION OF ROOT ZONE

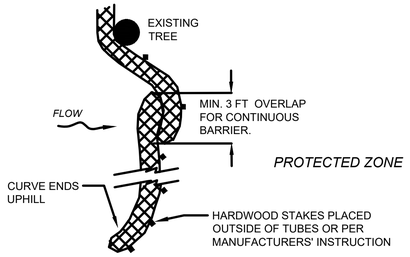


SECTION - TRUNK ARMORING & PRUNING

TREE PROTECTION - ROOT ZONE

NOT TO SCALE

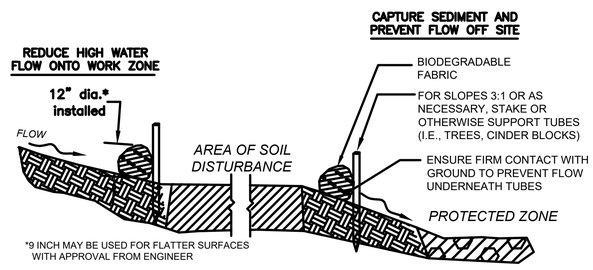
TREE PROTECTION - TRUNK



PLACE TUBE AS CLOSE TO LIMIT OF SOIL DISTURBANCE AS POSSIBLE, ALONG CONTOURS, AND PERPENDICULAR TO FLOW.

ADJUST LOCATION AS REQUIRED FOR OPTIMUM EFFECTIVENESS. DO NOT INSTALL IN WATERWAYS.

PLAN VIEW

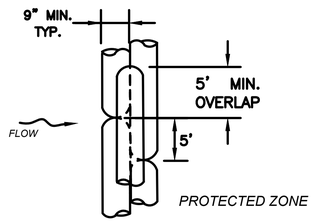


SECTION

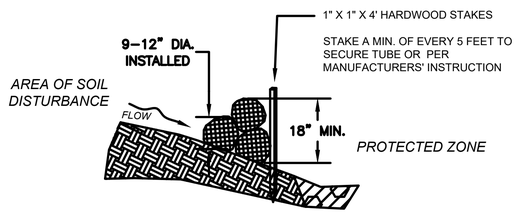
SEDIMENT BARRIER - COMPOST FILTER TUBE

NOT TO SCALE

WHERE SPECIFIED ON CONSTRUCTION PLANS OR AS REQUIRED



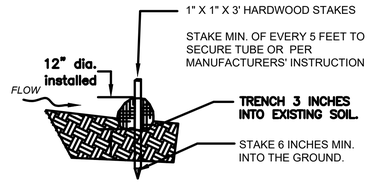
PLAN VIEW



SECTION

COMPOST FILTER TUBES STACKED

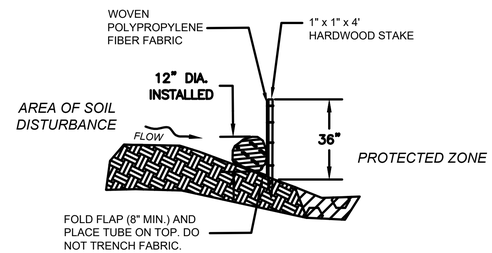
NOT TO SCALE



SECTION

12 INCH STRAW WATTLE

NOT TO SCALE



SECTION

COMPOST FILTER TUBE & SILT FENCE

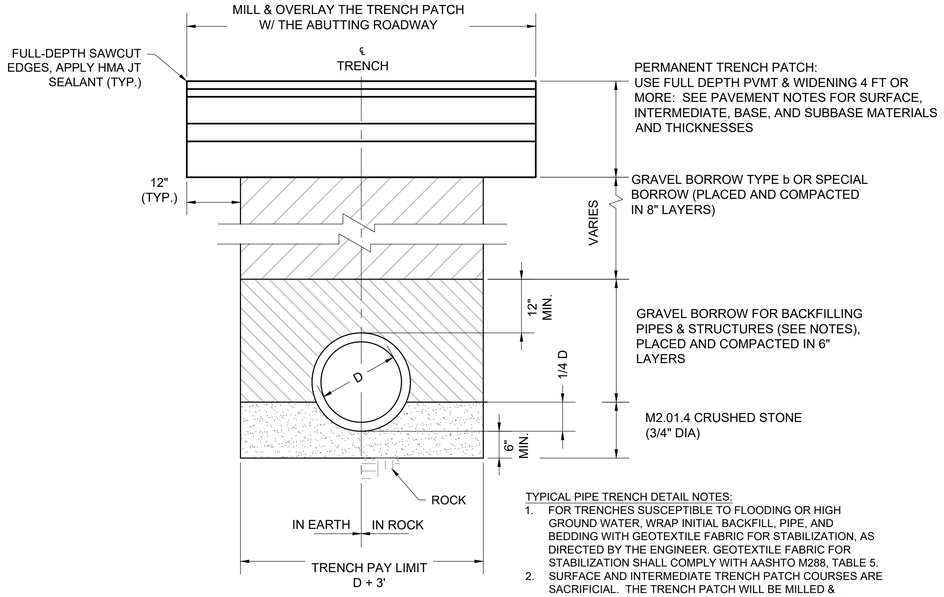
NOT TO SCALE

BELLINGHAM
HARTFORD AVENUE (ROUTE 126)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	13	15
PROJECT FILE NO.	2148.00		

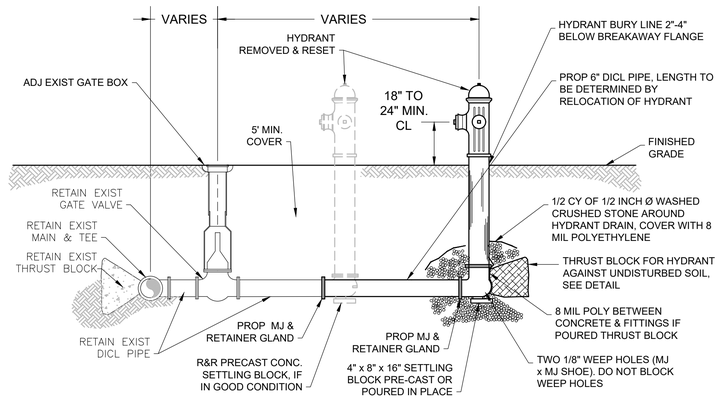
NOI - CONSTRUCTION DETAILS
SHEET 02 OF 04
07/19/2024

2148.00_NOI-HD(CONSTR DETAILS).DWG 19-Jul-2024



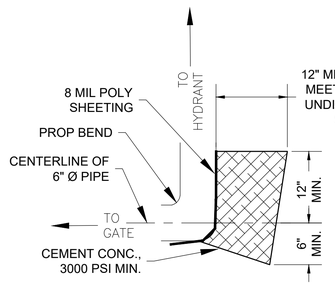
TYPICAL PIPE TRENCH NOTES:
1. FOR TRENCHES SUSCEPTIBLE TO FLOODING OR HIGH GROUND WATER, WRAP INITIAL BACKFILL, PIPE, AND BEDDING WITH GEOTEXTILE FABRIC FOR STABILIZATION, AS DIRECTED BY THE ENGINEER. GEOTEXTILE FABRIC FOR STABILIZATION SHALL COMPLY WITH AASHTO M288, TABLE 5.
2. SURFACE AND INTERMEDIATE TRENCH PATCH COURSES ARE SACRIFICIAL. THE TRENCH PATCH WILL BE MILLED & OVERLAID AT THE SAME TIME AS THE ABUTTING ROADWAY.

TYPICAL PIPE TRENCH DETAIL
SCALE: NONE



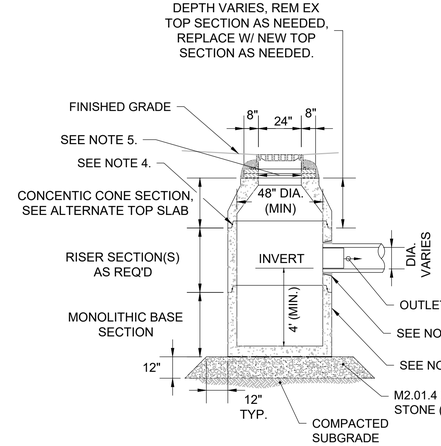
HYDRANT REMOVE & RESET NOTES:
1. ALL MATERIALS WILL CONFORM TO TOWN MATERIAL SPECIFICATIONS AND INSTALLATION PROCEDURES SHALL CONFORM TO TOWN GUIDELINES AND POLICIES.
2. ALL HYDRANT, VALVE, AND TEE JOINTS TO BE RESTRAINED MECHANICAL JOINTS
3. DEPTH OF HYDRANT BURIED SHALL SUIT INSTALLED DEPTH OF COVER OVER WATERMAIN. INSTALL RISERS AS NECESSARY AT NO ADDITIONAL COST TO THE OWNER.
4. MAKE AND MODEL OF HYDRANT SHALL BE COMPLY WITH TOWN RULES & REGULATIONS.
2. IF THRUST BLOCK IS POURED, ALL GLANDS, JOINTS, BOLTS, AND NUTS SHALL BE COVERED OR WRAPPED IN 8 MIL OR GREATER POLYETHYLENE SHEETING TO KEEP THE CONCRETE FROM BONDING TO THE PIPE AND APPURTENANCES. THE PLASTIC SHALL BE PLACED SO THAT THE PIPE JOINTS WILL BE ACCESSIBLE FOR ANY FUTURE REPAIRS. NO CONCRETE SHALL DIRECTLY COVER PIPE JOINTS, FITTING JOINTS, NUTS, BOLTS OR HYDRANT DRAIN HOLES.
4. NO TAPS SHALL BE ALLOWED BETWEEN THE HYDRANT AND THE VALVE.

HYDRANT REMOVED & RESET (STRAIGHT BACK)
SCALE: NONE

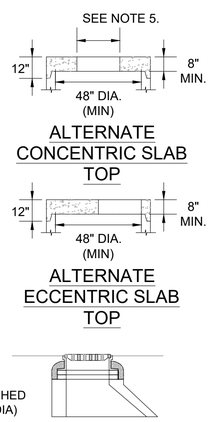


THRUST BLOCK NOTES:
1. BLOCK IS 24" MIN IN WIDTH.
2. IF THRUST BLOCK IS POURED, ALL GLANDS, JOINTS, BOLTS, AND NUTS SHALL BE COVERED OR WRAPPED IN 8 MIL OR GREATER POLYETHYLENE SHEETING TO KEEP THE CONCRETE FROM BONDING TO THE PIPE AND APPURTENANCES. THE PLASTIC SHALL BE PLACED SO THAT THE PIPE JOINTS WILL BE ACCESSIBLE FOR ANY FUTURE REPAIRS. NO CONCRETE SHALL DIRECTLY COVER PIPE JOINTS, FITTING JOINTS, NUTS, BOLTS OR HYDRANT DRAIN HOLES.
3. THIS DETAIL IS VALID ONLY WITH A 6 INCH DIAMETER SUPPLY. IF THE WATER SUPPLY IS NOT 6 INCHES IN DIAMETER, NOTIFY THE ENGINEER IMMEDIATELY.

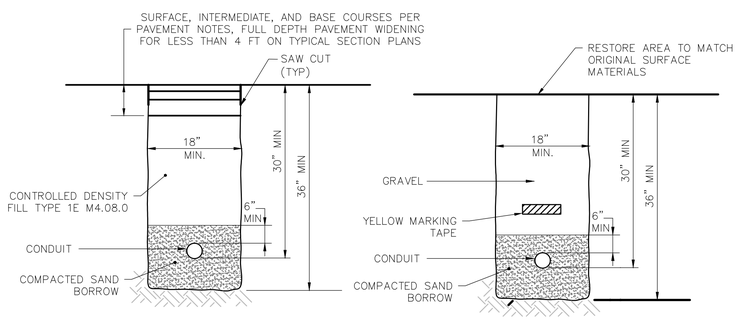
THRUST BLOCK FOR 6" DIA. SUPPLY ELEVATION DETAIL
NOT TO SCALE



CATCH BASIN
SCALE: NONE



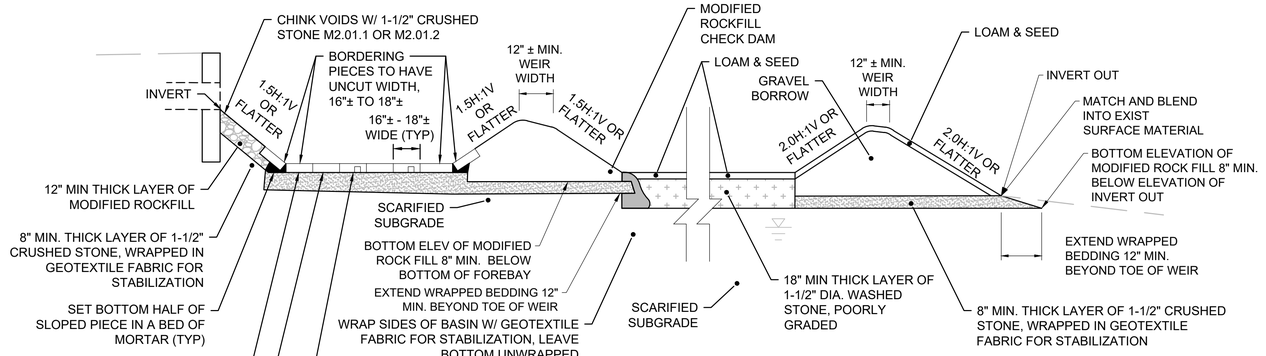
CATCH BASIN NOTES:
1. ALL SECTIONS SHALL BE DESIGNED FOR HS-20 LOADING.
2. PROVIDE "V" KNOCKOUTS FOR PIPES WITH 2" MAX. CLEARANCE TO OUTSIDE OF PIPE. MORTAR ALL PIPE CONNECTIONS.
3. JOINT SEALANT BETWEEN PRECAST SECTIONS SHALL BE PREFORMED BUTYL RUBBER.
4. CATCH BASIN FRAME AND GRATE SHALL BE SET IN FULL MORTAR BED. ADJUST TO GRADE WITH CLAY BRICK AND MORTAR (2 BRICK COURSES TYPICALLY, 5 BRICK COURSES MAXIMUM).
5. OPENING IN TOP SLAB SHALL BE 24"x27" FOR CATCH BASINS WITH CURB INLETS. OPENING SHALL BE 24"x24" AT ALL OTHER LOCATIONS.
6. EXCLUSIVE OF THE RIM, UTILIZE THIS DETAIL FOR A REMODEL WITH CHANGE IN TYPE.



CONDUIT NOTES:
1. EXISTING MATERIAL OBTAINED FROM EXCAVATION THAT IS DETERMINED TO BE SUITABLE AND APPROVED BY THE ENGINEER SHALL BE USED.
2. BACKFILL SHALL BE PLACED IN LAYERS, NO MORE THAN 6" IN DEPTH AND THOROUGHLY COMPACTED.
3. BACKFILLING TO A POINT 24" OVER THE PIPE SHALL CONTAIN NO STONES GREATER THAN 3 INCHES.
4. USE MASSDOT MATERIAL M.1.04.0 TYPE b (⅜ INCH) FOR SAND BORROW.

CONDUIT UNDER ROADWAY CONDUIT UNDER UNDER GRASS

TRAFFIC SIGNAL CONDUIT TRENCH DETAIL
SCALE: NONE

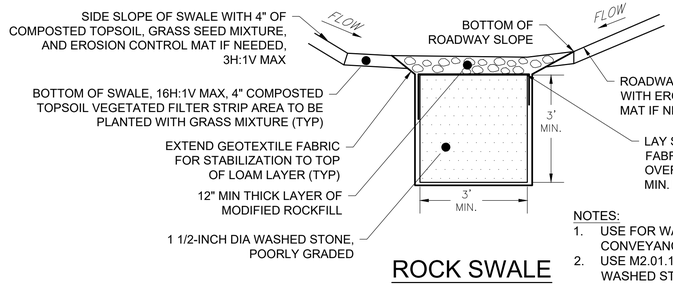


ELEVATION ALONG CENTERLINE OF CHANNEL

SEDIMENT FOREBAY AND INFILTRATION POND

SCALE: NONE

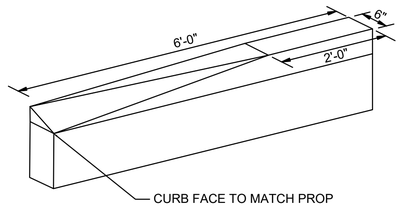
NOTES:
1. SEE CURB TIE & GRADING PLANS FOR ELEVATION OF WEIR AND CREST. SEE UTILITY PLANS FOR BASIN INVERTS.
2. VERTICAL GRANITE CURB AND GRANITE CURB INLET WHICH ARE UNSUITABLE FOR ROADWAY CURBING MAY BE USED TO LINE THE BOTTOM OF THE SEDIMENT FOREBAY.
3. PLACE FILTER FABRIC ALONG SIDES OF INFILTRATION BASIN. DO NOT PLACE FILTER FABRIC ON BOTTOM OF INFILTRATION BASIN.
4. FOR WASHED STONE, USE MASSDOT MATERIAL M2.01.1 OR M2.01.2 FOR CRUSHED STONE, WITH THE EXCEPTION THAT MATERIAL SHALL BE GAP-GRADED OR POORLY GRADED.
5. SEE MASSDOT CONSTRUCTION STANDARD DETAIL E 206.7.0 FOR PLACEMENT OF MODIFIED ROCKFILL (WHERE MODIFIED ROCKFILL IS USED IN LIEU OF STONE FOR PIPE ENDS).
6. GEOTEXTILE FABRIC FOR STABILIZATION SHALL COMPLY WITH AASHTO M288, TABLE 5.



ROCK SWALE

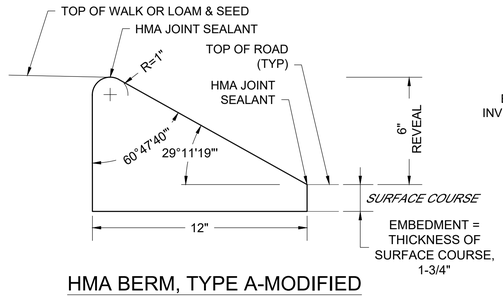
SCALE: NONE

NOTES:
1. USE FOR WATER QUALITY SWALES AND CONVEYANCE SWALES.
2. USE M2.01.1 OR M2.01.2 FOR 1 1/2-INCH DIA WASHED STONE, POORLY GRADED.
3. GEOTEXTILE FABRIC FOR STABILIZATION SHALL COMPLY WITH AASHTO M288, TABLE 5.



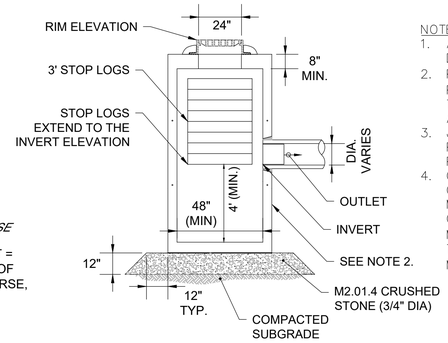
TRANSITION FROM VERTICAL GRANITE CURB TO SLOPED EDGING

SCALE: NONE

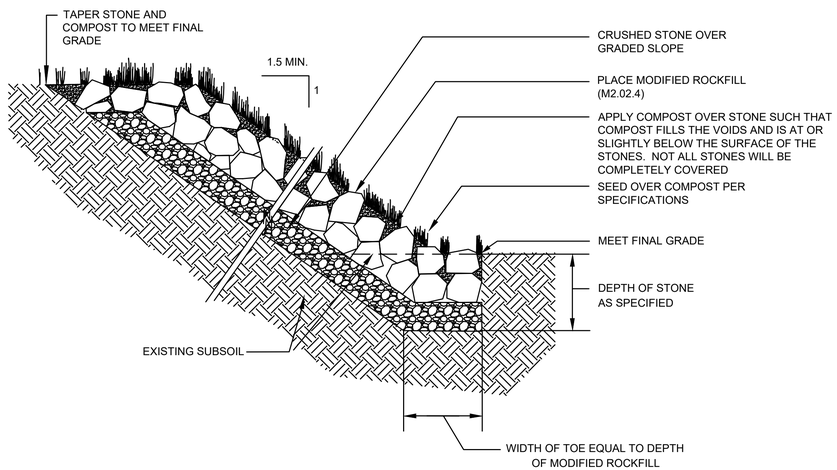


HMA BERM, TYPE A-MODIFIED

SCALE: NONE



NOTES:
1. ALL SECTIONS SHALL BE DESIGNED FOR HS-20 LOADING.
2. PROVIDE "V" KNOCKOUTS FOR PIPES WITH 2" MAX. CLEARANCE TO OUTSIDE OF PIPE. MORTAR ALL PIPE CONNECTIONS.
3. JOINT SEALANT BETWEEN PRECAST SECTIONS SHALL BE PREFORMED BUTYL RUBBER.
4. CATCH BASIN FRAME AND GRATE SHALL BE SET IN FULL MORTAR BED. ADJUST TO GRADE WITH CLAY BRICK AND MORTAR (2 BRICK COURSES TYPICALLY, 5 BRICK COURSES MAXIMUM).



COMPOST AND SEED OVER MODIFIED ROCKFILL (NON-WATERWAY)

NOT TO SCALE

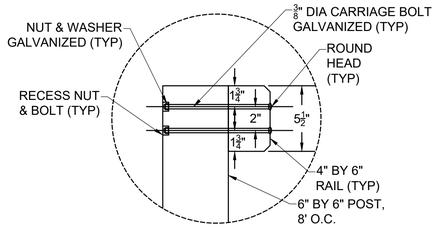
20160320_MassDOT

BELLINGHAM
HARTFORD AVENUE (ROUTE 126)

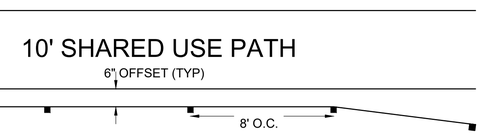
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	15	15
PROJECT FILE NO.	2148		

NOI - CONSTRUCTION DETAILS
SHEET 04 OF 04
07/19/2024

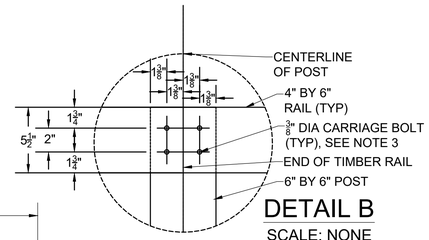
2148.00_NOI-HD\CONSTR DETAILS\.DWG 19-Jul-2024



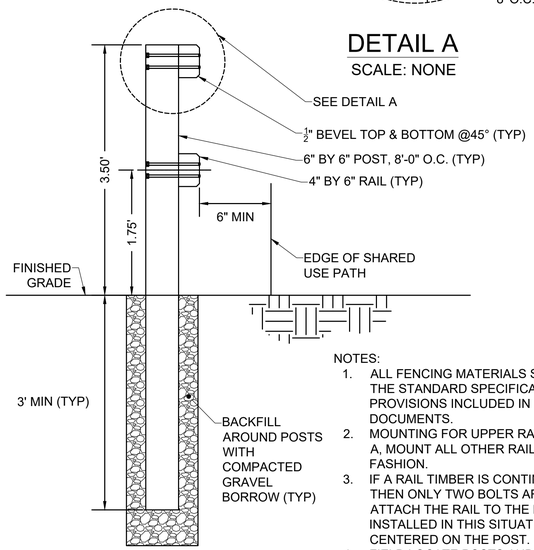
DETAIL A
SCALE: NONE



WOOD RAIL FENCE FLARED-END TREATMENT
SCALE: NONE

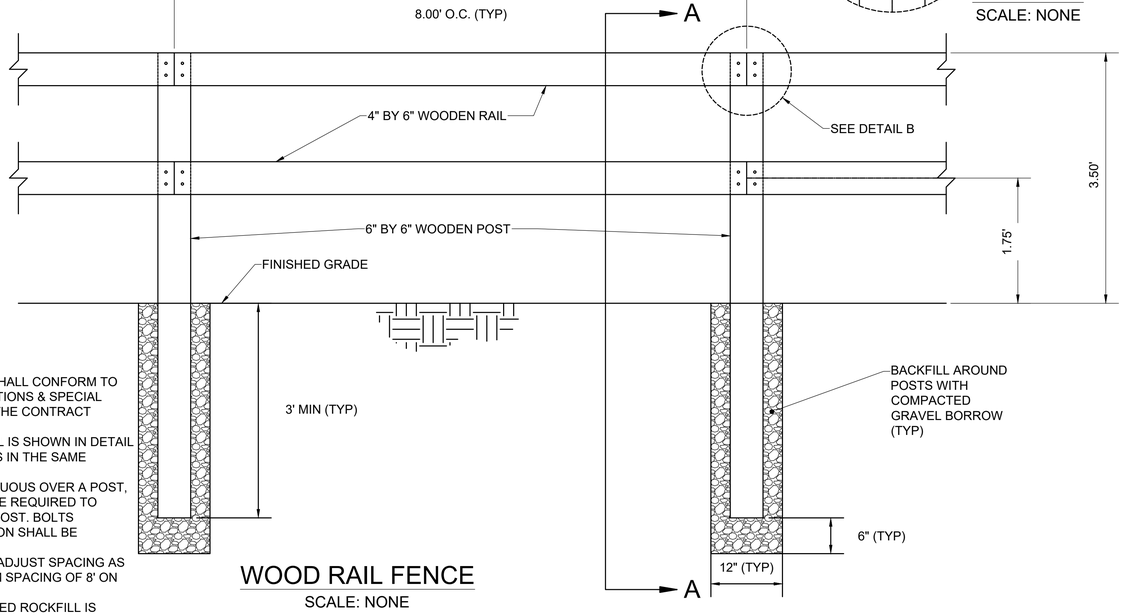


DETAIL B
SCALE: NONE

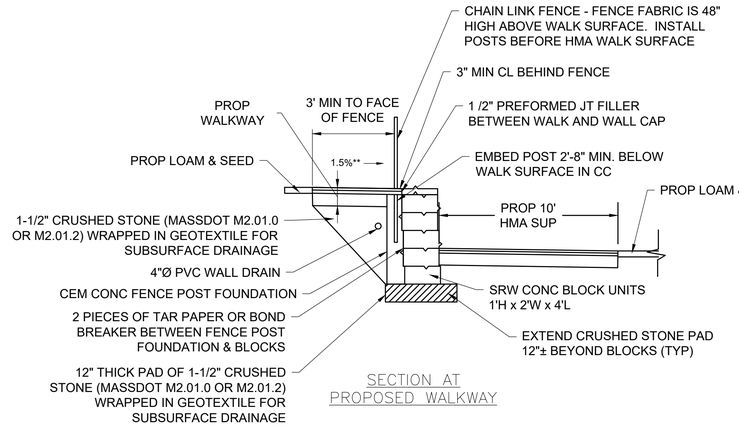


SECTION A-A
SCALE: NONE

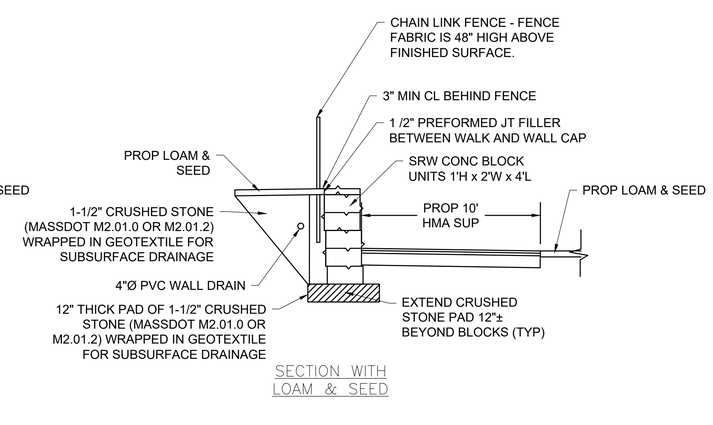
NOTES:
1. ALL FENCING MATERIALS SHALL CONFORM TO THE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS INCLUDED IN THE CONTRACT DOCUMENTS.
2. MOUNTING FOR UPPER RAIL IS SHOWN IN DETAIL A, MOUNT ALL OTHER RAILS IN THE SAME FASHION.
3. IF A RAIL TIMBER IS CONTINUOUS OVER A POST, THEN ONLY TWO BOLTS ARE REQUIRED TO ATTACH THE RAIL TO THE POST. BOLTS INSTALLED IN THIS SITUATION SHALL BE CENTERED ON THE POST.
4. FIELD LOCATE POSTS AND ADJUST SPACING AS NEEDED, GIVEN A MAXIMUM SPACING OF 8' ON CENTER.
5. IN REGIONS WHERE MODIFIED ROCKFILL IS PROPOSED IN CONJUNCTION WITH THE WOODEN FENCE, POSTS SHALL EXTEND A MINIMUM 3 FEET BELOW THE LOWER LIMIT OF THE ROCKFILL.



WOOD RAIL FENCE
SCALE: NONE



SECTION AT PROPOSED WALKWAY



SECTION WITH LOAM & SEED

CONCRETE BLOCK WALL DETAILS
SCALE: 1"=4'

STA 21+65 LT TO 22+20 LT

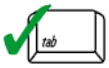
Appendix B
Stormwater Management Checklist

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

A. Introduction

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



A Stormwater Report must be submitted with the Notice of Intent permit application to document compliance with the Stormwater Management Standards. The following checklist is NOT a substitute for the Stormwater Report (which should provide more substantive and detailed information) but is offered here as a tool to help the applicant organize their Stormwater Management documentation for their Report and for the reviewer to assess this information in a consistent format. As noted in the Checklist, the Stormwater Report must contain the engineering computations and supporting information set forth in Volume 3 of the Massachusetts Stormwater Handbook. The Stormwater Report must be prepared and certified by a Registered Professional Engineer (RPE) licensed in the Commonwealth.

The Stormwater Report must include:

- The Stormwater Checklist completed and stamped by a Registered Professional Engineer (see page 2) that certifies that the Stormwater Report contains all required submittals.[1] This Checklist is to be used as the cover for the completed Stormwater Report.
- Applicant/Project Name
- Project Address
- Name of Firm and Registered Professional Engineer that prepared the Report
- Long-Term Pollution Prevention Plan required by Standards 4-6
- Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan required by Standard 8[2]
- Operation and Maintenance Plan required by Standard 9

In addition to all plans and supporting information, the Stormwater Report must include a brief narrative describing stormwater management practices, including environmentally sensitive site design and LID techniques, along with a diagram depicting runoff through the proposed BMP treatment train. Plans are required to show existing and proposed conditions, identify all wetland resource areas, NRCS soil types, critical areas, Land Uses with Higher Potential Pollutant Loads (LUHPPL), and any areas on the site where infiltration rate is greater than 2.4 inches per hour. The Plans shall identify the drainage areas for both existing and proposed conditions at a scale that enables verification of supporting calculations.

As noted in the Checklist, the Stormwater Management Report shall document compliance with each of the Stormwater Management Standards as provided in the Massachusetts Stormwater Handbook. The soils evaluation and calculations shall be done using the methodologies set forth in Volume 3 of the Massachusetts Stormwater Handbook.

To ensure that the Stormwater Report is complete, applicants are required to fill in the Stormwater Report Checklist by checking the box to indicate that the specified information has been included in the Stormwater Report. If any of the information specified in the checklist has not been submitted, the applicant must provide an explanation. The completed Stormwater Report Checklist and Certification must be submitted with the Stormwater Report.

[1] The Stormwater Report may also include the Illicit Discharge Compliance Statement required by Standard 10. If not included in the Stormwater Report, the Illicit Discharge Compliance Statement must be submitted prior to the discharge of stormwater runoff to the post-construction best management practices.

[2] For some complex projects, it may not be possible to include the Construction Period Erosion and Sedimentation Control Plan in the Stormwater Report. In that event, the issuing authority has the discretion to issue an Order of Conditions that approves the project and includes a condition requiring the proponent to submit the Construction Period Erosion and Sedimentation Control Plan before commencing any land disturbance activity on the site.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

B. Stormwater Checklist and Certification

The following checklist is intended to serve as a guide for applicants as to the elements that ordinarily need to be addressed in a complete Stormwater Report. The checklist is also intended to provide conservation commissions and other reviewing authorities with a summary of the components necessary for a comprehensive Stormwater Report that addresses the ten Stormwater Standards.

Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the item is not applicable (N.A.) and provide the reasons for that determination.

A complete checklist must include the Certification set forth below signed by the Registered Professional Engineer who prepared the Stormwater Report.

Registered Professional Engineer's Certification

I have reviewed the Stormwater Report, including the soil evaluation, computations, Long-term Pollution Prevention Plan, the Construction Period Erosion and Sedimentation Control Plan (if included), the Long-term Post-Construction Operation and Maintenance Plan, the Illicit Discharge Compliance Statement (if included) and the plans showing the stormwater management system, and have determined that they have been prepared in accordance with the requirements of the Stormwater Management Standards as further elaborated by the Massachusetts Stormwater Handbook. I have also determined that the information presented in the Stormwater Checklist is accurate and that the information presented in the Stormwater Report accurately reflects conditions at the site as of the date of this permit application.

Registered Professional Engineer Block and Signature

Signature and Date

Checklist

Project Type: Is the application for new development, redevelopment, or a mix of new and redevelopment?

☐ New development

☐ Redevelopment

☒ Mix of New Development and Redevelopment

Checklist for Stormwater Report

Checklist (continued)

LID Measures: Stormwater Standards require LID measures to be considered. Document what environmentally sensitive design and LID Techniques were considered during the planning and design of the project:

☒ No disturbance to any Wetland Resource Areas

☐ Site Design Practices (e.g. clustered development, reduced frontage setbacks)

☐ Reduced Impervious Area (Redevelopment Only)

☒ Minimizing disturbance to existing trees and shrubs

☐ LID Site Design Credit Requested:

- ☐ Credit 1
- ☐ Credit 2
- ☐ Credit 3

☐ Use of "country drainage" versus curb and gutter conveyance and pipe

☐ Bioretention Cells (includes Rain Gardens)

☐ Constructed Stormwater Wetlands (includes Gravel Wetlands designs)

☐ Treebox Filter

☐ Water Quality Swale

☒ Grass Channel

☐ Green Roof

☒ Other (describe): Forebay & Infiltration Basin, Jellyfish Cartridge Filter Stormwater Treatment System, Deep Sump Catch Basins

Standard 1: No New Untreated Discharges

☒ No new untreated discharges

☒ Outlets have been designed so there is no erosion or scour to wetlands and waters of the Commonwealth

☒ Supporting calculations specified in Volume 3 of the Massachusetts Stormwater Handbook included.

Checklist for Stormwater Report

Checklist (continued)

Standard 2: Peak Rate Attenuation

☐ Standard 2 waiver requested because the project is located in land subject to coastal storm flowage and stormwater discharge is to a wetland subject to coastal flooding.

☐ Evaluation provided to determine whether off-site flooding increases during the 100-year 24-hour storm.

☒ Calculations provided to show that post-development peak discharge rates do not exceed pre-development rates for the 2-year and 10-year 24-hour storms. If evaluation shows that off-site flooding increases during the 100-year 24-hour storm, calculations are also provided to show that post-development peak discharge rates do not exceed pre-development rates for the 100-year 24-hour storm.

Standard 3: Recharge

☒ Soil Analysis provided.

☒ Required Recharge Volume calculation provided.

☐ Required Recharge volume reduced through use of the LID site Design Credits.

☒ Sizing the infiltration, BMPs is based on the following method: Check the method used.

☒ Static ☐ Simple Dynamic ☐ Dynamic Field[1]

☐ Runoff from all impervious areas at the site discharging to the infiltration BMP.

☐ Runoff from all impervious areas at the site is *not* discharging to the infiltration BMP and calculations are provided showing that the drainage area contributing runoff to the infiltration BMPs is sufficient to generate the required recharge volume.

☐ Recharge BMPs have been sized to infiltrate the Required Recharge Volume.

☒ Recharge BMPs have been sized to infiltrate the Required Recharge Volume *only* to the maximum extent practicable for the following reason:

- ☐ Site is comprised solely of C and D soils and/or bedrock at the land surface
- ☐ M.G.L. c. 21E sites pursuant to 310 CMR 40.0000
- ☐ Solid Waste Landfill pursuant to 310 CMR 19.000
- ☒ Project is otherwise subject to Stormwater Management Standards only to the maximum extent practicable.

☒ Calculations showing that the infiltration BMPs will drain in 72 hours are provided.

☐ Property includes a M.G.L. c. 21E site or a solid waste landfill and a mounding analysis is included.

[1] 80% TSS removal is required prior to discharge to infiltration BMP if Dynamic Field method is used.

Checklist for Stormwater Report

Checklist (continued)

Standard 3: Recharge (continued)

☒ The infiltration BMP is used to attenuate peak flows during storms greater than or equal to the 10-year 24-hour storm and separation to seasonal high groundwater is less than 4 feet and a mounding analysis is provided.

☒ Documentation is provided showing that infiltration BMPs do not adversely impact nearby wetland resource areas.

Standard 4: Water Quality

The Long-Term Pollution Prevention Plan typically includes the following:

- Good housekeeping practices;
- Provisions for storing materials and waste products inside or under cover;
- Vehicle washing controls;
- Requirements for routine inspections and maintenance of stormwater BMPs;
- Spill prevention and response plans;
- Provisions for maintenance of lawns, gardens, and other landscaped areas;
- Requirements for storage and use of fertilizers, herbicides, and pesticides;
- Pet waste management provisions;
- Provisions for operation and management of septic systems;
- Provisions for solid waste management;
- Snow disposal and plowing plans relative to Wetland Resource Areas;
- Winter Road Salt and/or Sand Use and Storage restrictions;
- Street sweeping schedules;
- Provisions for prevention of illicit discharges to the stormwater management system;
- Documentation that Stormwater BMPs are designed to provide for shutdown and containment in the event of a spill or discharges to or near critical areas or from LUHPPL;
- Training for staff or personnel involved with implementing Long-Term Pollution Prevention Plan;
- List of Emergency contacts for implementing Long-Term Pollution Prevention Plan.

☒ A Long-Term Pollution Prevention Plan is attached to Stormwater Report and is included as an attachment to the Wetlands Notice of Intent.

☐ Treatment BMPs subject to the 44% TSS removal pretreatment requirement and the one inch rule for calculating the water quality volume are included, and discharge:

- ☐ is within the Zone II or Interim Wellhead Protection Area
- ☐ is near or to other critical areas
- ☐ is within soils with a rapid infiltration rate (greater than 2.4 inches per hour)
- ☐ involves runoff from land uses with higher potential pollutant loads.

☐ The Required Water Quality Volume is reduced through use of the LID site Design Credits.

☐ Calculations documenting that the treatment train meets the 80% TSS removal requirement and, if applicable, the 44% TSS removal pretreatment requirement, are provided.

Checklist for Stormwater Report

Checklist (continued)

Standard 4: Water Quality (continued)

☒ The BMP is sized (and calculations provided) based on:

- ☐ The ½" or 1" Water Quality Volume or
- ☒ The equivalent flow rate associated with the Water Quality Volume and documentation is provided showing that the BMP treats the required water quality volume.

☒ The applicant proposes to use proprietary BMPs, and documentation supporting use of proprietary BMP and proposed TSS removal rate is provided. This documentation may be in the form of the propriety BMP checklist found in Volume 2, Chapter 4 of the Massachusetts Stormwater Handbook and submitting copies of the TARP Report, STEP Report, and/or other third party studies verifying performance of the proprietary BMPs.

☐ A TMDL exists that indicates a need to reduce pollutants other than TSS and documentation showing that the BMPs selected are consistent with the TMDL is provided.

Standard 5: Land Uses With Higher Potential Pollutant Loads (LUHPPLs)

☐ The NPDES Multi-Sector General Permit covers the land use and the Stormwater Pollution Prevention Plan (SWPPP) has been included with the Stormwater Report.

☐ The NPDES Multi-Sector General Permit covers the land use and the SWPPP will be submitted ***prior to*** the discharge of stormwater to the post-construction stormwater BMPs.

☐ The NPDES Multi-Sector General Permit does ***not*** cover the land use.

☐ LUHPPLs are located at the site and industry specific source control and pollution prevention measures have been proposed to reduce or eliminate the exposure of LUHPPLs to rain, snow, snow melt and runoff, and been included in the long term Pollution Prevention Plan.

☐ All exposure has been eliminated.

☐ All exposure has ***not*** been eliminated and all BMPs selected are on MassDEP LUHPPL list.

☐ The LUHPPL has the potential to generate runoff with moderate to higher concentrations of oil and grease (e.g. all parking lots with >1000 vehicle trips per day) and the treatment train includes an oil grit separator, a filtering bioretention area, a sand filter or equivalent.

Standard 6: Critical Areas

☐ The discharge is near or to a critical area and the treatment train includes only BMPs that MassDEP has approved for stormwater discharges to or near that particular class of critical area.

☐ Critical areas and BMPs are identified in the Stormwater Report.

Checklist for Stormwater Report

Checklist (continued)

Standard 7: Redevelopments and Other Projects Subject to the Standards only to the maximum extent practicable

☒ The project is subject to the Stormwater Management Standards only to the maximum Extent Practicable as a:

- ☒ Limited Project
- ☐ Small Residential Projects: 5-9 single family houses or 5-9 units in a multi-family development provided there is no discharge that may potentially affect a critical area.
- ☐ Small Residential Projects: 2-4 single family houses or 2-4 units in a multi-family development with a discharge to a critical area
- ☐ Marina and/or boatyard provided the hull painting, service and maintenance areas are protected from exposure to rain, snow, snow melt and runoff
- ☐ Bike Path and/or Foot Path
- ☐ Redevelopment Project
- ☒ Redevelopment portion of mix of new and redevelopment.

☒ Certain standards are not fully met (Standard No. 1, 8, 9, and 10 must always be fully met) and an explanation of why these standards are not met is contained in the Stormwater Report.

☒ The project involves redevelopment and a description of all measures that have been taken to improve existing conditions is provided in the Stormwater Report. The redevelopment checklist found in Volume 2 Chapter 3 of the Massachusetts Stormwater Handbook may be used to document that the proposed stormwater management system (a) complies with Standards 2, 3 and the pretreatment and structural BMP requirements of Standards 4-6 to the maximum extent practicable and (b) improves existing conditions.

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control

A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan must include the following information:

- Narrative;
- Construction Period Operation and Maintenance Plan;
- Names of Persons or Entity Responsible for Plan Compliance;
- Construction Period Pollution Prevention Measures;
- Erosion and Sedimentation Control Plan Drawings;
- Detail drawings and specifications for erosion control BMPs, including sizing calculations;
- Vegetation Planning;
- Site Development Plan;
- Construction Sequencing Plan;
- Sequencing of Erosion and Sedimentation Controls;
- Operation and Maintenance of Erosion and Sedimentation Controls;
- Inspection Schedule;
- Maintenance Schedule;
- Inspection and Maintenance Log Form.

☒ A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan containing the information set forth above has been included in the Stormwater Report.

Checklist for Stormwater Report

Checklist (continued)

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control (continued)

☐ The project is highly complex and information is included in the Stormwater Report that explains why it is not possible to submit the Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan with the application. A Construction Period Pollution Prevention and Erosion and Sedimentation Control has ***not*** been included in the Stormwater Report but will be submitted ***before*** land disturbance begins.

☐ The project is ***not*** covered by a NPDES Construction General Permit.

☐ The project is covered by a NPDES Construction General Permit and a copy of the SWPPP is in the Stormwater Report.

☒ The project is covered by a NPDES Construction General Permit but no SWPPP been submitted. The SWPPP will be submitted BEFORE land disturbance begins.

Standard 9: Operation and Maintenance Plan

☒ The Post Construction Operation and Maintenance Plan is included in the Stormwater Report and includes the following information:

- ☒ Name of the stormwater management system owners;
- ☒ Party responsible for operation and maintenance;
- ☒ Schedule for implementation of routine and non-routine maintenance tasks;
- ☒ Plan showing the location of all stormwater BMPs maintenance access areas;
- ☐ Description and delineation of public safety features;
- ☐ Estimated operation and maintenance budget; and
- ☐ Operation and Maintenance Log Form.

☐ The responsible party is ***not*** the owner of the parcel where the BMP is located and the Stormwater Report includes the following submissions:

- ☐ A copy of the legal instrument (deed, homeowner's association, utility trust or other legal entity) that establishes the terms of and legal responsibility for the operation and maintenance of the project site stormwater BMPs;
- ☐ A plan and easement deed that allows site access for the legal entity to operate and maintain BMP functions.

Standard 10: Prohibition of Illicit Discharges

☐ The Long-Term Pollution Prevention Plan includes measures to prevent illicit discharges;

☒ An Illicit Discharge Compliance Statement is attached;

☐ NO Illicit Discharge Compliance Statement is attached but will be submitted ***prior to*** the discharge of any stormwater to post-construction BMPs.

Appendix C
Operation and Maintenance Plan
Long Term Pollution Prevention Plan

Town of Bellingham – Route 126 Proposed Improvements West of I-495.
Hartford Avenue (Route 126)
Bellingham, MA

Stormwater Management System

Operation and Maintenance Plan (O&M)
and
Long Term Pollution Prevention Plan (LTPPP)
July 2024

This Stormwater Management System Operation and Maintenance Plan provides for the inspection and maintenance of Best Management Practices (BMPs) and for measures to prevent pollution associated with the Town of Bellingham, Hartford Avenue, (Route 126) Proposed Improvements West of I-495. Hartford Avenue (Route 126) Drainage Improvements Site Work, along Hartford Avenue (Route 126) between Arrowhead Road and Interstate 495, Bellingham, MA.

This document has been prepared in accordance with the requirements of the Stormwater Regulations included in the Massachusetts Wetlands Protection Act Regulations (310 CMR 10).

Responsible Party

The Town of Bellingham and MassDOT District 3 office will be responsible for the maintenance of the property facilities and associated stormwater management features, in accordance with MassDOT standards.

Questions or concerns regarding maintenance activities may also be addressed to MassDOT through its District 3 office, or in the event of emergency at the 24-Hour Transportation Operation Center:

Town of Bellingham Department of Public Works
26 Blackstone Street
Bellingham, MA 02019
Phone: (508) 966-5816
Alternate Phone: (508) 966-5813
Fax: (508) 966-5814

District 3 Office:
499 Plantation Parkway
Worcester, MA 01605
Phone: (857) 368-3000
Fax: (508) 929-3879

24 Hour MassDOT Contact Information:
24 Hour Transportation Operation Center
1-800-227-0608

Maintenance Measures

The stormwater management system covered by this Operation and Maintenance Plan consists of the following components:

- Deep Sump Catch Basins
- Roadway Sweeping Program
- Infiltration Basin
- Sediment Forebay
- Grass Swale
- Hydrodynamic Separator Stormwater Infiltration Structure

Maintenance of these components will be conducted in accordance with Town of Bellingham standard maintenance practices and MassDOT standard maintenance practices, as noted in the attached Operation and Maintenance table summarizing the pertinent inspection and maintenance activities.

Deep Sump Catch Basins, and Hydrodynamic Separator Stormwater Infiltration Structure will be inspected by appropriately qualified personnel for structural soundness regularly and maintained as needed by the Town of Bellingham, Massachusetts Department of Public Works.

If inspection indicates the need for major repairs, the inspector should contact the Town of Bellingham, Department 0f Public Works.

Infiltration Basin, Sediment Forebay and Grass Swale inspected by appropriately qualified personnel for structural soundness regularly and maintained as needed by the Massachusetts Department of Transportation.

If inspection indicates the need for major repairs, the inspector should contact the District 3 maintenance supervisor to initiate procedures to effect repairs in accordance with MassDOT standard construction practices.

Practices for Long Term Pollution Prevention

In general, long term pollution prevention and related maintenance activities will be conducted consistent with MassDOT Highway Division's NPDES Stormwater MS4 Permit, and the measures outlined in MassDOT's Stormwater Management Plan (SWMP). Information about the permit and the SWMP are available at the following web-sites:

Stormwater Management, MassDOT Environmental Services:
https://www.mass.gov/service-details/stormwater-management-massdot-environmental-services

Federal EPA, General Permit:
https://www.epa.gov/npdes/npdes-stormwater-final-ms4-general-permit-remand-rule

For the facilities covered by this Operation and Maintenance Plan, long term pollution prevention includes the following measures:

Litter and Debris Pick-up

The Town of Bellingham Department of Public Works and MassDOT will conduct litter and debris pick-up from the stormwater management facilities in conjunction with routine facility maintenance activities.

Routine Inspection and Maintenance

The Town of Bellingham, Department of Public Works and MassDOT will conduct inspection and maintenance of the stormwater management practices in accordance with the guidelines discussed above.

The Town of Bellingham, Department of Public Works will conduct structural inspections by appropriately qualified personnel and perform maintenance of the Deep Sump Catch Basins and the hydrodynamic Separator Stormwater Infiltration Structure. MassDOT will conduct structural inspections by appropriately qualified personnel and perform maintenance of the Deep Sump Catch Basins, Infiltration Basin, Sediment Forebay and Grass Swale in accordance with MassDOT guidelines.

Spill Prevention and Response

The Town of Bellingham, Department of Public Works and MassDOT will implement response procedures for releases of significant materials such as fuels, oils, or chemical materials onto the ground or other areas that could reasonably be expected to discharge to surface or groundwater.

- Reportable quantities will immediately be reported to the applicable Federal, State, and local agencies as required by law. The applicable MassDOT District office should also be notified. Reportable quantities of chemicals, fuels, or oils are established under the Clean Water Act and enforced through MassDEP. The MassDEP Emergency Response Program shall be immediately notified in accordance with required procedures for the report of a release (telephone 888-304-1133).
- Applicable containment and cleanup procedures will be performed immediately. Impacted material collected during the response must be removed promptly and disposed of in accordance with Federal, State, and local requirements. A licensed emergency response contractor may be required to assist in cleanup of releases depending on the amount of the release and the ability of the responsible party to perform the required response.
- Reportable quantities of chemicals, fuels, or oils are established under the Clean Water Act and enforced through DEP.

Maintenance of Landscaped Areas

Routine mowing should be conducted according to The Town of Bellingham Department of Public Works and standard MassDOT practices. As indicated in the attached O&M table, embankments designed to impound water should be mowed as required to prevent establishment of woody vegetation. Where grass is thin or missing, the areas shall be reseeded to establish a healthy, uniform stand of grass.

Except in rare circumstances, The Town of Bellingham Department of Public Works and MassDOT does not use fertilizers, herbicides, and pesticides for the maintenance of facilities. Exceptions include using fertilizer to ensure the survival of new plantings, and herbicides to control invasive plants. Use of fertilizers and herbicides shall be reviewed and approved by the applicable MassDOT District Environmental Engineer and Landscape Division prior to application. The Town of Bellingham Local Conservation Commission review may also be required.

Invasive Species Management

If stormwater facility inspection notes the presence of invasive species within the best management practice measure, the inspector will notify the District Environmental Engineer, who will coordinate with the District 3 maintenance personnel and if applicable, the Landscape Division, to initiate corrective action. Control of invasive plants will be conducted in accordance with MassDOT standard specifications for this practice and will be in compliance with all state and federal regulatory requirements for such practices.

Snow and Ice Management

Snow and Ice Management shall be conducted consistent with the practices outlined in the Environmental Status and Planning Report (ESPR), formerly known as the Snow and Ice Control Generic Environmental Impact Report (GEIR).

In accordance with the Snow and Ice Control ESPR, no sand is used on MassDOT properties for snow and ice control. The exception to this rule is within reduced salt areas where high sodium levels have been found in drinking water sources.

Prohibition of Illicit Discharges

The Town of Bellingham Department of Public Works and MassDEP Stormwater Management Standards prohibit illicit discharges to the storm water management system. Illicit discharges are discharges that do not entirely consist of stormwater, except for certain specified non-stormwater discharges. Examples of discharges from the following sources are not considered illicit discharges:

Firefighting activities*	Riparian habitats/wetlands
Foundation drain lines	Potable water sources
Line flushing	Dechlorinated swimming pool water
Footing drains	Street sweeping
Irrigation systems	Wash water from buildings (without detergents)
Residential car washing	Condensation from air conditioning units
Uncontaminated groundwater	Run-on from private driveways caused by precipitation
Rising groundwater	Lawn watering

*Water from firefighting activities is allowed under this permit and need only be addressed where they are identified as significant sources of pollutants to waters of the United States.

There are no known or proposed illicit connections associated with this project. If a potential illicit discharge to the facilities covered by this plan is detected (e.g., dry weather flows at any pipe outlet, evidence of contamination of surface water discharge by non-stormwater sources), the MassDOT District Maintenance Engineer or Environmental Engineer shall be notified for assistance in determining the nature and source of the discharge, and for resolution through MassDOT's, IDDE program.

Appendix: Best Management Practices: Operation & Maintenance Measures

Best Management Practice	Sweep	Mow	Inspect	Clean	Repair	Notes
Hydrodynamic Separator Stormwater Infiltration Structure	**N/A**	**N/A**	Monthly to determine site specific inspection/maintenance schedules. Monthly during wet season and by-monthly during dry seasons. Then at least once each season and before Major rain events	As Needed Based on Inspection (ANI). Remove litter and debris. Remove sediment especially at the bottom of structure. Clean filters as needed. Replace filters as needed.	ANI-As needed	
Sediment Forebay & Infiltration Basin (Includes Outlet Structure)	N/A	**Grass – mow to maintain less than 6-inch growth**	Annually	Forebay: 4 times / yr. & when sediment depth is between 3 to 6 ft. Basin: As needed – remove litter & debris; remove sediment; remove unwanted brush & saplings. Outlet Structure: remove debris as needed.	Forebay & Basin – repair rills and gullies as needed. Basin – repair vegetation as needed. Outlet Structure - repair as needed	
Grass Swale Infiltration Trench	N/A	Mow grass to maintain 4-inch growth	Annually	As Needed Based on Inspection (ANI). Remove litter and debris. Remove sediment especially at the top of the trench (highest elevated area). Remove brush and saplings.	ANI	

Deep Sump Catch Basins	**N/A**	NA	Annually	As Needed Based on Inspection (ANI) Remove litter and debris. Remove sediment.	ANI	
Sweeping (Paved Areas) & Leaf Raking (Grassed Areas)	spring	NA	At least once each season and before major rain events	As Needed Based on Inspection (ANI). Remove and properly dispose of all sweeping & raked debris.	ANI	Pay particular attention to medians and islands, paved water ways, and paved gutters; remove debris to ensure surface runoff in the proposed direction of flow.
Site Curbing	NA	NA	At least annually	As Needed Based on Inspection (ANI)	ANI	Although curbing is not a BMP, it is a device used to direct runoff to various BMPs and the condition of curb is important for control of runoff flows.

Appendix D
Illicit Discharge Statement

Illicit Discharge Statement

Issued to the Town of Bellingham Conservation Commission

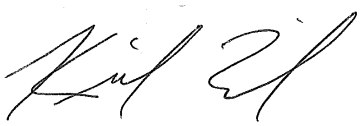
Property Owner: Town of Bellingham

Site Address: Hartford Avenue (Route 126), Bellingham, MA

MassDEP Stormwater Policy Standard No. 10 stipulates that all illicit discharges to the stormwater system are prohibited.

Statement: Chappell Engineering Associates, LLC on behalf of the Massachusetts Department of Transportation has thoroughly examined the available survey and record plans and through a combination of field reconnaissance and desktop review, there are no known illicit connections on site and if a connection is found during construction, it will be eliminated as soon as possible.

Signature/Date:



Keith Lincoln, P.E.
Chief Civil Engineer
Chappell Engineering Associates, LLC

Appendix E

Eco Tec Wetlands Evaluation Report

EcoTec, Inc.

ENVIRONMENTAL CONSULTING SERVICES
102 Grove Street
Worcester, MA 01605-2629
508-752-9666 – Fax: 508-752-9494

November 15th, 2021

Keith Lincoln, PE
Chappell Engineering Assoc., LLC
201 Boston Post Road, Suite 101
Marlborough, MA 01752

RE: Wetland Resource Evaluation, Hartford Avenue from Farm St. to the on-ramp to I-495, Bellingham, MA.

Dear Mr. Lincoln,

On October 28th, 2021, EcoTec, Inc. inspected a portion of the above-referenced roadway for the presence of wetland resources as defined by: (1) the Massachusetts Wetlands Protection Act (M.G.L. Ch. 131, § 40; the "Act") and its implementing regulations (310 CMR 10.00 *et seq.*; the "Regulations"); (2) the Town of Bellingham Wetlands Protection Bylaw and its implementing regulations; and (3) the U.S. Clean Water Act (i.e., Section 404 and 401 wetlands). Scott Morrison, PWS, Scott Jordan, and Kate O'Donnell, WPIT conducted the inspection.

The subject site consists of portion of the above-referenced roadway, from Farm St. to the on-ramp to I-495. The upland portions of the site consist of existing commercial buildings, parking lots, landscaped areas, and undeveloped forest land. Plant species observed include northern red oak (*Quercus rubra*), Norway maple (*Acer platanoides*), eastern white pine (*Pinus strobus*), black cherry (*Prunus serotina*), red maple (*Acer rubrum*), white ash (*Fraxinus americana*) trees and/or saplings; oriental bitter-sweet (*Celastrus orbiculata*) climbing woody vines; eastern red cedar (*Juniperus virginiana*) and multiflora rose (*Rosa multiflora*) shrubs; and hay-scented fern (*Dennstaedtia punctilobula*) common pokeweed (*Phytolacca americana*) ground cover. The wetland resources observed on the site are described below.

Methodology

The site was inspected, and areas suspected to qualify as wetland resources were identified. The boundary of Bordering Vegetated Wetlands and, in the absence of Bordering Vegetated Wetlands, Bank was delineated in the field in accordance with the definitions set forth in the regulations at 310 CMR 10.55(2)(c) and 310 CMR 10.54(2). Section 10.55(2)(c) states that "The boundary of Bordering Vegetated Wetlands is the line within which 50% or more of the vegetational community consists of wetland indicator plants and saturated or inundated conditions exist." Section 10.54(2)(c) states that "The upper boundary of Bank is the first observable break in the slope or the mean annual flood level, whichever is lower." The methodology used to delineate Bordering Vegetated Wetlands is further described in: (1) the BVW Policy "*BVW: Bordering Vegetated Wetlands Delineation Criteria and Methodology*," issued March 1, 1995; and (2) "*Delineating Bordering Vegetated Wetlands Under the*

Massachusetts Wetlands Protection Act: A Handbook," produced by the Massachusetts Department of Environmental Protection, dated March 1995. The plant taxonomy used in this report is based on the *National List of Plant Species that Occur in Wetlands: Massachusetts* (Fish and Wildlife Service, U.S. Department of the Interior, 1988). Federal wetlands were presumed to have boundaries conterminous with the delineated Bordering Vegetated Wetlands and Bank. One set of DEP Bordering Vegetated Wetland Delineation Field Data Forms completed for observation plots located in the wetlands and uplands near flag AA-21 is attached. The table below provides the Flag Numbers, Flag Type, and Wetland Types and Locations for the delineated wetland resources.

Flag Numbers	Flag Type	Wetland Types and Locations
Start AA1 to AA23 Stop	Blue Flags	Boundary of Bordering Vegetated Wetlands/Bank located in the southeastern portion of the site, adjacent to the on-ramp to I-495 that is associated with a mapped intermittent stream.
Start BA1 to BA11 Connect to BA1	Blue Flags	Boundary of Isolated Vegetated Wetland under the Bylaw located in the eastern portion of the site.
Start BB1 to BB10 Stop BB1 Connect to Culvert	Blue Flags	Boundary of Bordering Vegetated Wetlands located in the southwestern portion of the site, west of North Main St., that is associated with a mapped intermittent stream.
Start BC1 to BC3 Stop BC1 Connect to Culvert	Blue Flags	Boundary of Bordering Vegetated Wetlands/Top of Bank located in the northwestern portion of the site, west of Farm St., that is associated with a mapped intermittent stream.

Findings

Wetland AA (i.e., flags AA1 – AA23) consists of the northern boundary of bank and wooded swamp, located in the eastern portion of the site that is associated with an intermittent stream. Plant species observed include red maple (*Acer rubrum*) trees and/or saplings; highbush blueberry (*Vaccinium corymbosum*), common winterberry (*Ilex verticillata*), and sweet pepperbush (*Clethra alnifolia*) shrubs; and cinnamon fern (*Osmunda cinnamomea*) and sensitive fern (*Onoclea sensibilis*) ground cover.

Wetlands BB and BC (i.e., flags BB1 – BB10 and flags BC1 – BC3) consists of the eastern boundary of Bank and wooded swamp, located in the western portion of the site that is associated with an intermittent stream. Plant species observed include red maple (*Acer rubrum*) and American elm (*Ulmus americana*) trees and/or saplings; highbush blueberry (*Vaccinium corymbosum*) and American elderberry (*Sambucus canadensis*) shrubs; and poison ivy (*Toxicodendron radicans*) and sensitive fern (*Onoclea sensibilis*), ground cover. Evidence of wetland hydrology, including hydric soils, saturated soils, evidence of flooding, and drainage patterns, was observed within the delineated wetlands. These vegetated wetlands border an intermittent stream; accordingly, the vegetated wetlands would be regulated as Bordering Vegetated Wetlands and the intermittent stream would be regulated as Bank under the Act. A 100-foot Buffer Zone extends horizontally outward from the edge of Bordering Vegetated Wetlands and Bank under the Act and Bylaw.

Wetland BA (i.e., flags BA1 – BA11) consists of an isolated vegetated wetland located in the eastern central portion of the site, to the northwest of the AA flag-series. Plant species observed in this isolated vegetated wetland include red maple (*Acer rubrum*) and silver maple (*Acer saccharinum)* trees and/or saplings; and glossy buckthorn (*Rhamnus frangula*) shrubs. Buried hydric soils were observed within the delineated wetland. This wetland does not border a creek, stream, river, pond, or lake; accordingly, it would not be regulated as Bordering Vegetated Wetlands under the Act. Section 10.57(2)(b)1. states that "Isolated Land Subject to Flooding is an isolated depression or closed basin without an inlet or an outlet. It is an area that at least once per year confines standing water to a volume of at least ¼ acre-feet and to an average depth of at least six inches." Based upon field observations, the potential ponding area appears to be too small to hold the requisite volume and depth of water to be regulated as Isolated Land Subject to Flooding under the Act. Accordingly, this area would not be subject to jurisdiction under the Act. However, depending upon the proximity of this area to a Bordering Vegetated Wetlands, this area may be subject to jurisdiction as a federal wetland. Federal wetlands do not have a Buffer Zone.

The reader should note that EcoTec observed an apparent stormwater basin located adjacent to the south of flag-series AA which appears to be constructed after 1996. With regard to the jurisdictional status of constructed stormwater basins under the Act, the 2014 revisions to the Regulations at 310 CMR 10.02(2)(c) state that *"Notwithstanding the provisions of 310 CMR 10.02(1) and (2)(a) and (b), stormwater management systems designed, constructed, installed, operated, maintained, and/or improved as defined in 310 CMR 10.04 in accordance with the* Stormwater Management Standards *as provided in the* Stormwater Management Policy *(1996) or 310 CMR 10.05(6)(k) through (q) do not themselves constitute Areas Subject to Protection under M.G.L. c. 131, § 40 or Buffer Zone provided that: (1) the system was designed, constructed, installed, and/or improved as defined in 310 CMR 10.04 on or after November 18, 1996; and (2) if the system was constructed in an Area Subject to Protection under M.G.L c. 131, § 40 or Buffer Zone, the system was designed, constructed, and installed in accordance with all applicable provisions in 310 CMR 10.00."*

Bordering Land Subject to Flooding ("BLSF") is an area that floods due to a rise in floodwaters from a bordering waterway or water body. Where flood studies have been completed, the boundary of Bordering Land Subject to Flooding is based upon flood profile data prepared by the National Flood Insurance Program. Section 10.57(2)(a)3. states that "The boundary of Bordering Land Subject to Flooding is the estimated maximum lateral extent of flood water which will theoretically result from the statistical 100-year frequency storm." Based upon a review of the Flood Insurance Rate Map, Norfolk County, Massachusetts, Map Number 25021C0301E, Effective Date 7/17/2012, the site is mapped as Other Areas: Zone X, which is defined as areas located outside of the 0.2% annual chance flood (i.e., outside of 500-year floodplain) (see attached FIRMette map). The project engineer should evaluate the most recent National Flood Insurance Program flood profile data to determine if Bordering Land Subject to Flooding occurs on the site. Bordering Land Subject to Flooding would occur in areas where the 100-year flood elevation is located outside of or upgradient of the delineated Bordering Vegetated Wetlands or Bank boundary. Bordering Land Subject to Flooding does not have a Buffer Zone under the Act.

The Massachusetts Rivers Protection Act amended the Act to establish an additional wetland resource area: Riverfront Area. Based upon a review of the current USGS Map (i.e., Franklin Quadrangle, dated 1987, attached) and observations made during the site inspection, a stream that is shown as intermittent is located within flag series AA, BC, and BD. The watershed area for this stream at the site was determined to be 0.41 square miles, which is less than 0.5 square miles (see attached watershed calculations). As such, the stream would be designated intermittent under the Massachusetts Wetlands Protection Act regulations. Furthermore, based upon a review of the current USGS Map and observations made during the site inspection, there are no other mapped or unmapped streams located within 200 feet of the site. Accordingly, Riverfront Area would not occur on the site. Riverfront Area does not have a Buffer Zone under the Act.

The Regulations require that no project may be permitted that will have any adverse effect on specified habitat sites of rare vertebrate or invertebrate species, as identified by procedures set forth at 310 CMR 10.59. Based upon a review of the *Massachusetts Natural Heritage Atlas*, 15th edition, Priority Habitats and Estimated Habitats from the NHESP Interactive Viewer, valid from August 1, 2021, and Certified Vernal Pools from MassGIS, there are no Estimated Habitats [for use with the Act and Regulations (310 CMR 10.00 *et seq*.)], Priority Habitats [for use with Massachusetts Endangered Species Act (M.G.L. Ch. 131A; "MESA") and MESA Regulations (321 CMR 10.00 *et seq*.)], or Certified Vernal Pools on or in the immediate vicinity of the site. A copy of this map is attached.

The reader should be aware that the regulatory authority for determining wetland jurisdiction rests with local, state, and federal authorities. Brief descriptions of our experience and qualifications are attached. If you have any questions, please feel free to contact us at any time.

Cordially,
ECOTEC, INC.

Scott Morrison, PWS
Senior Environmental Scientist

Scott Jordan,
Senior Environmental Scientist

Kate O'Donnell, WPIT
Environmental Scientist

Attachments (6, 11 pages)

KO/D/E/P/Wet/Bellingham Hartford 495 Route 126 interchange_WETLAND_REPORT_2021.11.02

EcoTec, Inc.

ENVIRONMENTAL CONSULTING SERVICES
102 Grove Street
Worcester, MA 01605-2629
508-752-9666 – Fax: 508-752-9494

Scott M. Morrison, PWS, RPSS, SE
Senior Environmental Scientist

Scott Morrison is a Senior Environmental Scientist with EcoTec, Inc. Since joining EcoTec in 2000, Mr. Morrison's project experience include wetland resource evaluation, delineation, and permitting at the local, state, and federal levels; wildlife habitat evaluation; pond and stream evaluation; vernal pool evaluation, monitoring, and certification; wetland replacement, replication, and restoration area design, construction, and monitoring; soil evaluations to determine infiltration rates and seasonal high groundwater elevations for detention basin construction; environmental sampling and analysis tasks, including soil and groundwater sample collection and handling; and expert testimony preparation. He has conducted rare species habitat assessments for the eastern box turtle, wood turtle, Blanding's turtle, spotted turtle, and marbled salamander. He has participated in rare species studies for rare species including the marbled salamander, piping plover, eastern box turtle, and northern diamondback terrapin and developed mitigation strategies for the marbled salamander, spotted turtle, eastern box turtle and wood turtle. He has participated in visual preconstruction sweeps for the wood turtle and both preconstruction and research projects for the eastern box turtle. He has served as a consultant to municipalities, conservation commissions, engineering and survey firms. He has completed numerous wetland related projects including environmental impact assessments for proposed development, erosion control and environmental monitoring for subdivisions, commercial developments, golf courses and landfills. He has prepared Massachusetts Environmental Policy Act (MEPA) documentation, including Environmental Notification Forms (ENFs), Notice of Project Changes (NPCs), and Draft and Final Environmental Impact Reports (EIRs) including Green House Gas Assessments for various projects including subdivisions, commercial buildings, and dredging projects. Prior to joining EcoTec, Inc. Mr. Morrison worked for the Massachusetts Department of Environmental Management (currently the Department of Conservation and Recreation) where he was involved with the monitoring and protection of endangered species and rare old growth forest. He was an active member of the Spencer Conservation Commission from 1998 to 2000 where he provided oversight of proposed wetland replication projects and review of projects submitted for wetland permitting. His educational background includes courses in forestry, ecology, chemistry, soils, and natural resource policy. His prior research experience includes research on forest succession and field research on nesting piping plovers, an endangered coastal shore bird.

Education:
Graduate Soil Science Certificate Program
University of Massachusetts at Amherst, 2006
Bachelor of Science: Natural Resource Studies
University of Massachusetts at Amherst, 1998
Associate of Science: Business Administration
Quinsigamond Community College, 1996

Professional Affiliations: Registered Professional Soil Scientist, Society of Soil Scientists of Southern New England (SSSSNE)
Massachusetts Association of Conservation Commissioners
Association of Massachusetts Wetland Scientists
Society of Wetland Scientists

Certifications:
Society of Wetlands Scientists Professional Wetland Scientist, Certification Number 2583
Massachusetts Department of Environmental Protection Soil Evaluator, Certification Number SE 13766
OSHA Health and Safety Training, 40-Hour, 29 CFR 1910.120
University of Massachusetts Extension, Invasive Species Management

EcoTec, Inc.

ENVIRONMENTAL CONSULTING SERVICES
102 Grove Street
Worcester, MA 01605-2629
508-752-9666 – Fax: 508-752-9494

Scott Jordan, CPESC
Senior Environmental Scientist

Scott Jordan has been an Environmental Scientist with EcoTec, Inc. since 2000. His project experience includes wetland resource evaluation and delineation; erosion and sediment control planning and monitoring, NPDES permitting and compliance monitoring, Stormwater Pollution Prevention Plan preparation. environmental monitoring, including water quality analysis, sediment analysis and wildlife habitat impact analysis; environmental permitting at local, state, and federal level; pond and stream evaluation; wildlife habitat evaluation, vernal pool evaluation; wetland replacement, restoration, and replication area design. He has served as a consultant to the development community, engineering firms, municipalities, conservation commissions, and citizen's groups. Prior to joining EcoTec, Mr. Jordan was the Senior Laboratory Technician for GeoComp Corporation where he performed numerous physical properties analysis of soils and geosynthetic materials in accordance with ASTM, and AASHTO specifications. His seven years experience evaluating New England soils includes soil analysis and classification of site-remediated soils with oil and hazardous material contamination. His educational background includes courses in organic and inorganic chemistry, biology, botany and comparative vertebrate physiology, with extensive coursework in ecology and wildlife biology. He has completed several professional training seminars including erosion and sediment control, soil evaluation, wildlife habitat evaluation, wetland mitigation, vernal pool evaluation, water quality assessment using macro-invertebrates, and river morphology and functions. He has participated in several wildlife monitoring and inventory projects, including marsh bird surveys, marbled salamander (*Ambystoma opacum*) survey, and greater black-backed gull (*Larus marinus*) inventory. His prior research experience includes behavioral and acoustic studies of the common loon (*Gavia immer*) in northwestern Maine.

Education: Bachelor of Science: Biology - Wildlife and Environmental, *Cum Laude*
Framingham State College, 2000
Biotechnology Certificate
Middlesex Community College, 1994

Professional Affiliations:
Certified Professional in Erosion and Sediment Control (Cert. #3644)
Massachusetts Association of Conservation Commissioners
Association of Massachusetts Wetland Scientists
Society of Wetland Scientists
Society of Soil Scientists of Southern New England

EcoTec, Inc.

ENVIRONMENTAL CONSULTING SERVICES
102 Grove Street
Worcester, MA 01605-2629
508-752-9666 / Fax: 508-752-9494

Kate O'Donnell, WPIT
Environmental Scientist

Kate O'Donnell is the newest member of EcoTec, Inc. and started working in June of 2021. She received certification as a Wetland Professional In Training (WPIT) from the International Society of Wetland Scientists (SWS) in September of 2021. Her project experience with EcoTec, Inc. thusfar has primarily involved wetland delineation, identification of vegetation, and interpretation of soils. Additionally, Kate has experience in environmental sampling such as turbidity and salinity monitoring as well as experience in environmental permitting, Stormwater Pollution Prevention Plan (SWPPP) preparation, Turtle Protection Plan preparation, and Vernal Pool certification. Prior to starting at EcoTec, Kate was an undergraduate student at the College of the Holy Cross, double majoring in Biology and Environmental Studies, with a minor in geosciences. Her educational background includes courses in geoscience, biology, chemistry, and environmental law, with extensive coursework in ecology and environmental science. During her time as an undergrad, she conducted hydrologic and water quality research for her senior project to investigate the impacts of road salt on the salinity of the Middle River in Worcester, MA.

Education:

Bachelor of Arts in Biology (Ecology emphasis) and Bachelor of Arts in Environmental Studies- *Cum Laude*, College of the Holy Cross, 2021

Professional Affiliations:

Society of Wetland Scientists
Massachusetts Association of Conservation Commissioners

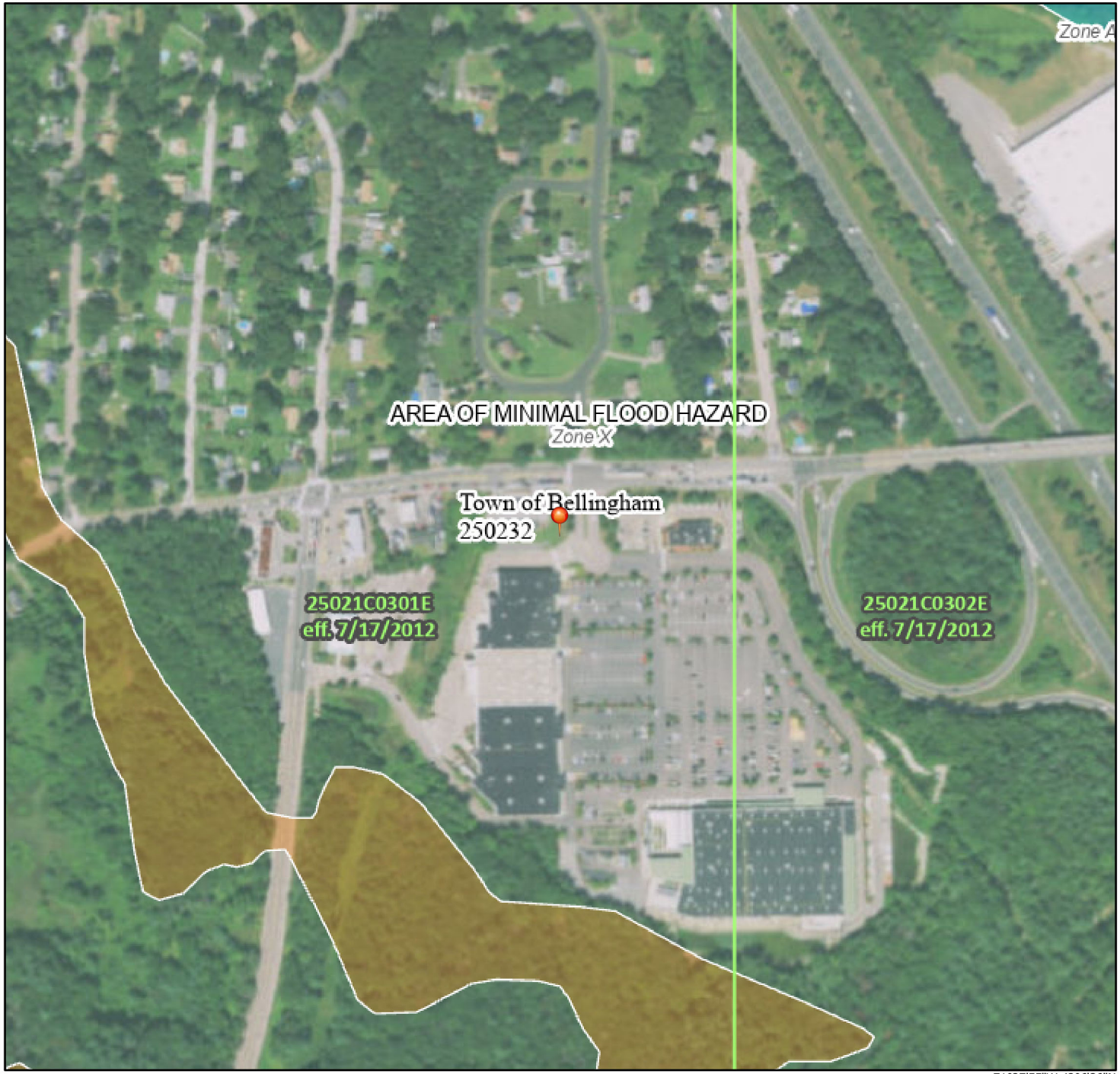
Certifications:

Society of Wetland Scientists Wetland Professional In Training

National Flood Hazard Layer FIRMette

FEMA

71°28'32"W 42°7'2"N



71°27'55"W 42°6'36"N

0 250 500 1,000 1,500 2,000 Feet

1:6,000

Basemap: USGS National Map: Orthoimagery: Data refreshed October, 2020

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 Cross Sections with 1% Annual Chance
- 17.5 Water Surface Elevation
- Coastal Transect
- 513 Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

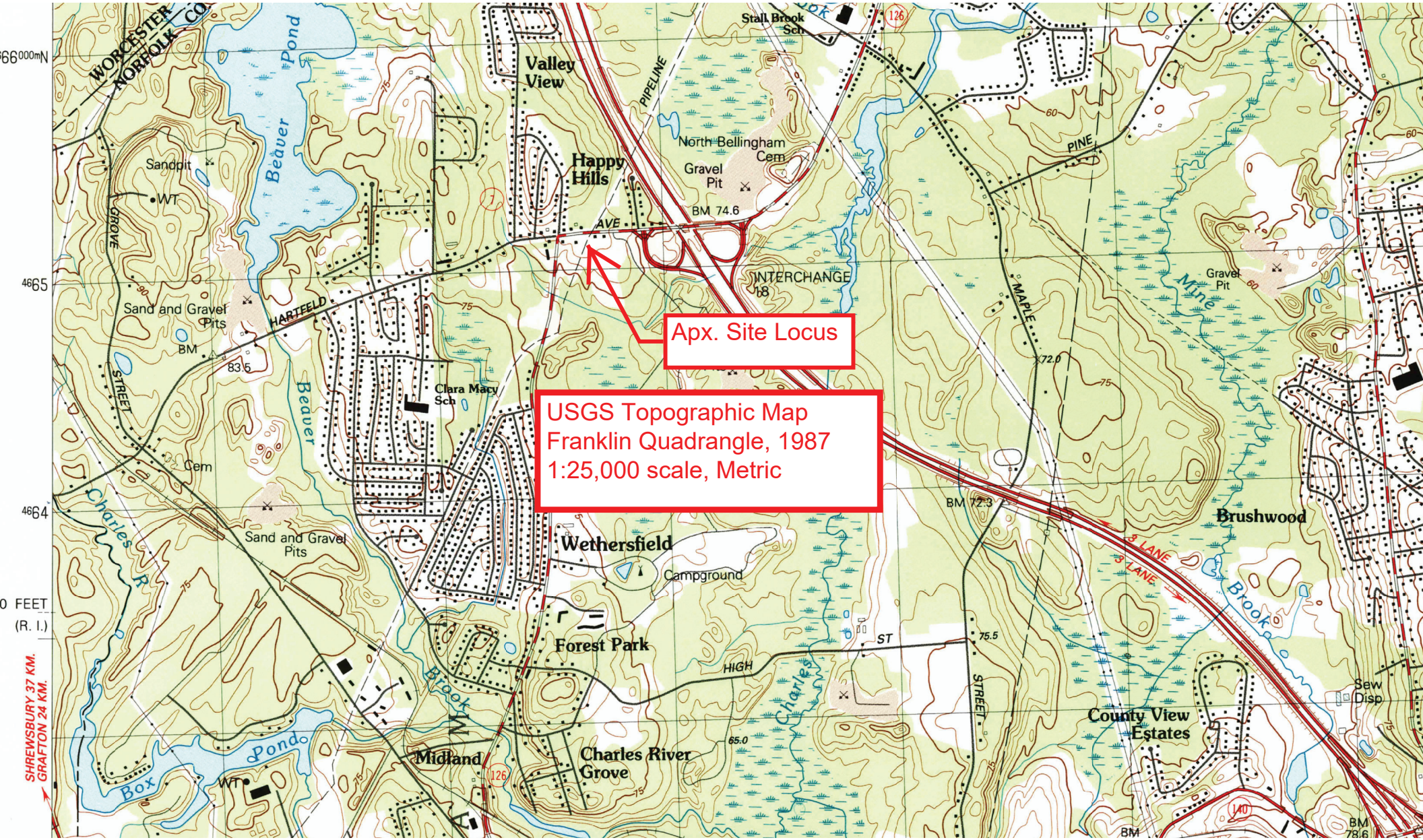
N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

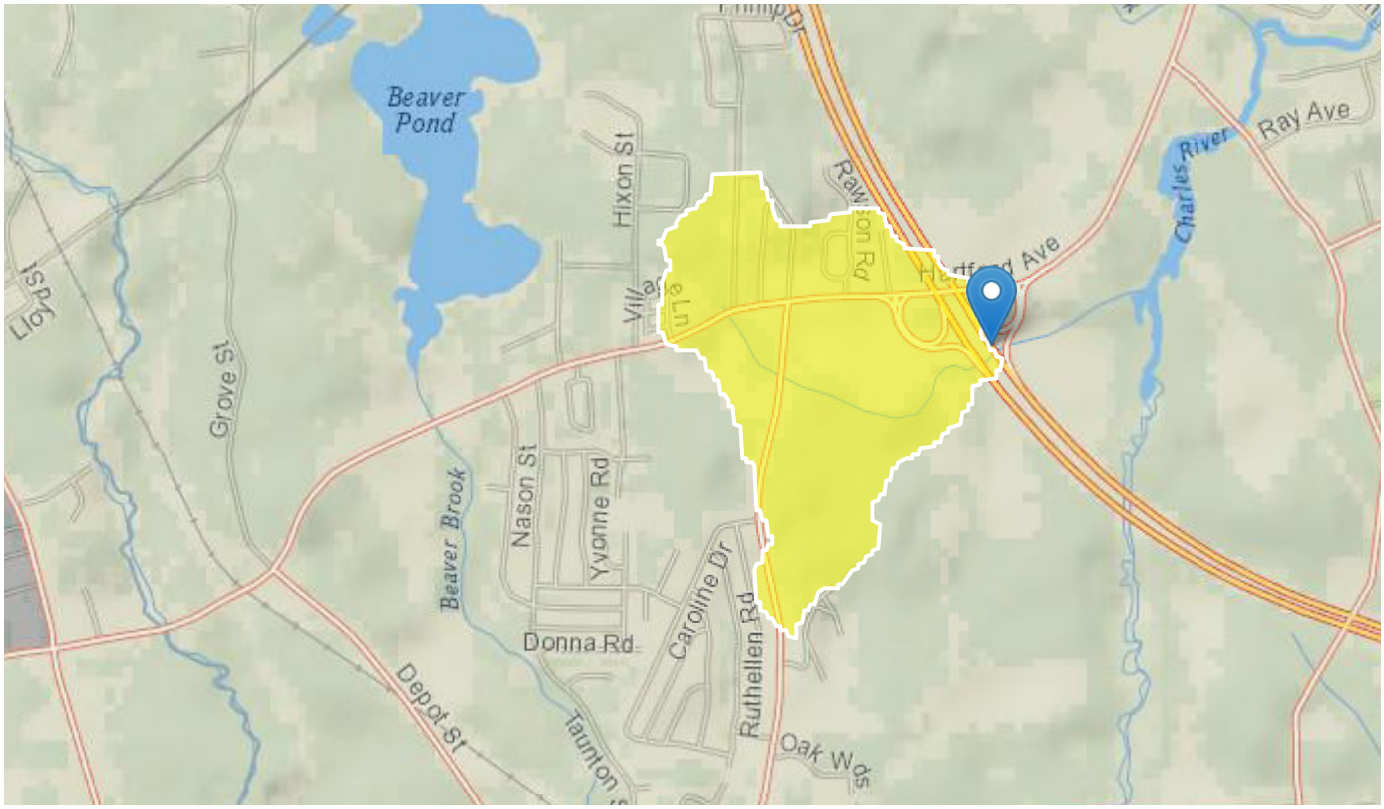
The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 10/12/2021 at 11:06 AM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.


Apx. Site Locus
USGS Topographic Map
Franklin Quadrangle, 1987
1:25,000 scale, Metric
Valley View
Happy Hills
Stall Brook Sch
North Bellingham Cem
Gravel Pit
BM 74.6
INTERCHANGE 18
PIPELINE
PINE
MAPLE
AVE
HARTFELD
STREET
GROVE
Sandpit
WT
Sand and Gravel Pits
BM 83.5
Clara Macy Sch
Cem
Beaver Pond
Beaver Brook
Charles R
Wethersfield
Campground
Forest Park
HIGH ST
Midland
Charles River Grove
Box Pond
WT
BM 72.3
3 LANE
Brushwood
Brook
County View Estates
Sew Disp
BM 78.6
WORCESTER NORFOLK CO
SHREWSBURY 37 KM.
GRAFTON 24 KM.
4665
4664
0 FEET
(R. I.)

StreamStats Report

Region ID: MA
Workspace ID: MA20211102170131676000
Clicked Point (Latitude, Longitude): 42.11249, -71.46405
Time: 2021-11-02 13:01:45 -0400



Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
DRNAREA	Area that drains to a point on a stream	0.41	square miles
PCTSNDGRV	Percentage of land surface underlain by sand and gravel deposits	73.77	percent
FOREST	Percentage of area covered by forest	51.4	percent
MAREGION	Region of Massachusetts 0 for Eastern 1 for Western	0	dimensionless

Probability Statistics Parameters [Perennial Flow Probability]

Active Data Layers

Check all | Uncheck all

Legend

NHESP Certified Vernal Pools

MassDOT Roads Street Names

Major MassDOT Routes

- Interstate Highways
- US Roads
- State

Massachusetts Towns

NHESP Estimated Habitats of Rare Wildlife

NHESP Priority Habitats of Rare Species

Natural Heritage Atlas Online Data Viewer, 15th edition, valid August 1st, 2021
created 10/12/2021
Hartford Ave. @495, Bellingham

DEP Bordering Vegetated Wetland (310 CMR 10.55) Delineation Field Form

Applicant | Prepared by: EcoTec, Inc | Project Location: Bellingham, Hartford Ave. Rt. 1 | DEP File #

Section I. Vegetation | Number: TP-Upland | Transect # AA-21 | Date of Delin: 10/28/2021

A. Sample layer and plant species (Enter largest to smallest % cover by layer)			Percent Cover (or basal area)	Percent Dominance	Dominant Plant?	Wetland Indicator Category	
Tree	red maple	Acer rubrum	60	60.0	YES	FAC	*
	white birch	Betula papyrifera	20	20.0	YES	FACU	
	black cherry	Prunus serotina	20	20.0	YES	FACU	
Sapling	black cherry	Prunus serotina	30	100.0	YES	FACU	
Shrub	winterberry	Ilex verticillata	40	80.0	YES	FACW+	*
	black cherry	Prunus serotina	10	20.0	YES	FACU	
Ground	hay-scented fern	Dennstaedtia punctilobula	60	100.0	YES	NL	
Vine	asiatic bittersweet	Celastrus orbiculata	10	100.0	YES	NL	

Vegetation Conclusions

Number of dominant wetland indicator plants **2** | Number of dominant non-wetland indicator plants **6**

Is the number of dominant wetland plants equal or greater than the number of dominant non-wetland plants? NO

DEP Bordering Vegetated Wetland (310 CMR 10.55) Delineation Field Form

Applicant | Prepared by: EcoTec, Inc | Project Location: Bellingham, Hartford Ave. Rt. 126 DEP File #

Section II. Indicators of Hydrology | Number: TP-Upland | Transect # AA-21 | Date of Delin: #########

1. Soil Survey

Is there a published soil survey for this site?

title/date
map number
soil type mapped
hydric soil inclusions

Are field observarions consistent with soil survey?

Remarks:

2. Soil Description

Horizon	Depth (inches)	Matrix Color	Mottle Color
A	0-4	10YR 3/2	
Bw	4-12+	10YR 4/6	

Remarks fine sandy loam

3. Other

Conclusion: Is the soil hydric? No

Other Indicators of hydrology (check all that apply):

- ☐ Site Inundated
- ☐ Depth to free water in observation hole
- ☐ Depth to soil saturation in observation hole
- ☐ Water marks
- ☐ Drift lines
- ☐ Sediment Deposits
- ☐ Drainage patterns in BVWs
- ☐ Oxidized rhizospheres
- ☐ Water stained leaves
- ☐ Recorded data (stream, lake, or tidal gauge; aerial photo; other):
- ☐ Other:

Vegetation and Hydrology Conclusion

	Yes	No
Number of wetland indicator plants ≥ number of non-wetland indicator plants	☐	☑
Wetland hydrology present:		
Hydric soil present	☐	☑
Other indicators of hydrology present	☐	☑
Sample Location is in a BVW	☐	☑

DEP Bordering Vegetated Wetland (310 CMR 10.55) Delineation Field Form

Applicant | Prepared by: EcoTec, Inc | Project Location: Bellingham Hartford Ave. Rt 12(| DEP File #

Section I. Vegetation | Number: TP-Wetland | Transect # AA-21 | Date of Delin: 10/28/2021

A. Sample layer and plant species (Enter largest to smallest % cover by layer)			Percent Cover (or basal area)	Percent Dominance	Dominant Plant?	Wetland Indicator Category	
Tree	red maple	Acer rubrum	60	100.0	YES	FAC	*
Sapling	white pine	Pinus strobus	30	60.0	YES	FACU	
	common buckthorn	Rhamnus cathartica	20	40.0	YES	NL	
Shrub	sweet pepperbush	Clethra alnifolia	20	33.3	YES	FAC	*
	winterberry	Ilex verticillata	20	33.3	YES	FACW+	*
	white pine	Pinus strobus	20	33.3	YES	FACU	
Ground	yellow sedge	Carex flava	30	50.0	YES	OBL	*
	cinnamon fern	Osmunda cinnamomea	20	33.3	YES	FACW	*
	glossy buckthorn	Rhamnus frangula	10	16.7	NO	FAC	*
Vine							

Vegetation Conclusions

Number of dominant wetland indicator plants **5** | Number of dominant non-wetland indicator plants **3**

Is the number of dominant wetland plants equal or greater than the number of dominant non-wetland plants? YES

DEP Bordering Vegetated Wetland (310 CMR 10.55) Delineation Field Form

Applicant | Prepared by: EcoTec, Inc | Project Location: Bellingham Hartford Ave. Rt 126 | DEP File #

Section II. Indicators of Hydrology | Number: TP-Wetland | Transect # AA-21 | Date of Delin: #########

1. Soil Survey

Is there a published soil survey for this site?

title/date
map number
soil type mapped
hydric soil inclusions

Are field observarions consistent with soil survey?

Remarks:

2. Soil Description

Horizon	Depth (inches)	Matrix Color	Mottle Color
A	0-10	10YR 2/1	
Bg	10-12+	10YR 4/1	20% 10YR 5/2

Remarks fine sandy loam

3. Other

Conclusion: Is the soil hydric? Yes

Other Indicators of hydrology (check all that apply):

- ☐ Site Inundated
- ☐ Depth to free water in observation hole
- ☐ Depth to soil saturation in observation hole
- ☐ Water marks
- ☐ Drift lines
- ☐ Sediment Deposits
- ☐ Drainage patterns in BVWs
- ☐ Oxidized rhizospheres
- ☐ Water stained leaves
- ☐ Recorded data (stream, lake, or tidal gauge; aerial photo; other):
- ☐ Other:

Vegetation and Hydrology Conclusion

	Yes	No
Number of wetland indicator plants ≥ number of non-wetland indicator plants	☑	☐
Wetland hydrology present:		
Hydric soil present	☑	☐
Other indicators of hydrology present	☐	☑
Sample Location is in a BVW	☑	☐

EcoTec, Inc.

ENVIRONMENTAL CONSULTING SERVICES
102 Grove Street, Suite 110
Worcester, MA 01605-2629
508-752-9666 / www.ecotecinc.com

April 13, 2024

Keith Lincoln, P.E.
Chappell Engineering Assoc., LLC
R.K. Executive Center
201 Boston Post Rd. West, Suite 101
Marlborough, MA 01752

RE: Wetland Resource Evaluation, North Main Street, Bellingham, MA

Dear Keith:

On March 6, 2024, EcoTec, Inc. inspected the above-referenced property for the presence of wetland resources as defined by: (1) the Massachusetts Wetlands Protection Act (M.G.L. Ch. 131, § 40; the "Act") and its implementing regulations (310 CMR 10.00 *et seq.*; the "Regulations"); and (2) the U.S. Clean Water Act (i.e., Section 404 and 401 wetlands). Arthur Allen, CPSS, CWS conducted the inspection.

The subject site consists of an approximately 0.5-mile long section of North Main Street, south of the intersection between North Main Street and Hartford Avenue. A stormwater drainage system is proposed on the site. Photos of the potential project location may be found below. The wetland resources observed on the site are also described below.

Disturbed upland area to south of existing pump station

Looking north towards pump station from wetland

Methodology

The site was inspected, and areas suspected to qualify as wetland resources were identified. The boundary of Bordering Vegetated Wetlands or, in the absence of Bordering Vegetated Wetlands, Bank was delineated in the field in accordance with the definitions set forth in the regulations at 310 CMR 10.55(2)(c) and 310 CMR 10.54(2). Section 10.55(2)(c) states that "The boundary of Bordering Vegetated Wetlands is the line within which 50% or more of the vegetational community consists of wetland indicator plants and saturated or inundated conditions exist." Section 10.54(2)(c) states that "The upper boundary of Bank is the first observable break in the slope or the mean annual flood level, whichever is lower." The methodology used to delineate Bordering Vegetated Wetlands is further described in: (1) the BVW Policy "*BVW: Bordering Vegetated Wetlands Delineation Criteria and Methodology*," issued March 1, 1995; and (2) "*Delineating Bordering Vegetated Wetlands Under the Massachusetts Wetlands Protection Act: A Handbook*," produced by the Massachusetts Department of Environmental Protection, dated March 1995. The plant taxonomy used in this report is based on the *National Wetland Plant List* (*Massachusetts 2012 Final State Wetland Plant List*), ERDC/CRREL TR-12-11 (Lichvar, 2012). Federal wetlands were presumed to have boundaries conterminous with the delineated Bordering Vegetated Wetlands and Bank. One set of MA DEP BVW Determination Data Forms completed for observation plots located in the wetlands and uplands near flag EA-2 is attached. The table below provides the Flag Numbers, Flag Type, and Wetland Types and Locations for the delineated wetland resources.

Flag Numbers	Flag Type	Wetland Types and Locations
EA-1 to EA-15	Blue Flags	Boundary of Bordering Vegetated Wetlands associated with an intermittent stream draining to a culvert on the west side of North Main Street.
EB-1 to EB-20	Blue Flags	Boundary of Bordering Vegetated Wetlands associated with an intermittent stream draining to a culvert on the east side of North Main Street.

EC-1 to EC-4	Blue Flags	Boundary of Bordering Vegetated Wetlands associated with discharge from a detention basin flowing to an intermittent stream.

Findings

Wetlands EA, EB & EC consist of wooded swamps that are associated with an intermittent streams. Plant species observed include red maple (*Acer rubrum*), green ash (*Fraxinus pensylvanica*), willow (*Salix sp*.), and American elm (*Ulmus americana*) trees, saplings, and/or shrubs; eastern poison-ivy (*Toxicodendron radicans*) and horsebrier (*Smilax rotundifolia*) climbing woody vines; highbush blueberry (*Vaccinium corymbosum*), common winterberry (*Ilex verticillata*), inkberry (*Ilex glabra*), southern arrow-wood (*Viburnum dentatum*), speckled alder (*Alnus incana*), silky dogwood (*Cornus amomum*), red osier (*Cornus alba*), gray dogwood (*Cornus racemosa*), maleberry (*Lyonia ligustrina*), European buckthorn (*Rhamnus cathartica*), glossy false buckthorn (*Frangula alnus*), coastal sweet pepperbush (*Clethra alnifolia*), Canadian service-berry (*Amelanchier canadensis*), and black elderberry (*Sambucus nigra*) shrubs; and sheep-laurel (*Kalmia angustifolia*), bristly dewberry (*Rubus hispidus*), cinnamon fern (*Osmunda cinnamomea*), royal fern (*Osmunda spectabilis*), interrupted fern (*Osmunda claytoniana*), sensitive fern (*Onoclea sensibilis*), subarctic lady fern (*Athyrium filix-femina*), eastern marsh fern (*Thelypteris palustris*), New York fern (*Parathelypteris noveboracensis*), Massachusetts/bog fern (*Parathelypteris simulata*), spinulose wood fern (*Dryopteris carthusiana*), skunk-cabbage (*Symplocarpus foetidus*), American False Hellebore (*Veratrum viride*), Jack-in-the-pulpit (*Arisaema triphyllum*), maystar (*Trientalis borealis*), spotted touch-me-not (*Impatiens capensis*) ground cover. Evidence of wetland hydrology, including hydric soils, saturated soils, pore linings, evidence of flooding, and drainage patterns, was observed within the delineated wetlands. The vegetated wetlands border an intermittent stream; accordingly, the vegetated wetlands would be regulated as Bordering Vegetated Wetlands and the intermittent streams would be regulated as Bank under the Act. A 100-foot Buffer Zone extends horizontally outward from the edge of Bordering Vegetated Wetlands and Bank under the Act.

Bordering Land Subject to Flooding is an area that floods due to a rise in floodwaters from a bordering waterway or water body. Where flood studies have been completed, the boundary of Bordering Land Subject to Flooding is based upon flood profile data prepared by the National Flood Insurance Program. Section 10.57(2)(a)3. states that "The boundary of Bordering Land Subject to Flooding is the estimated maximum lateral extent of flood water which will theoretically result from the statistical 100-year frequency storm." The project engineer should evaluate the most recent National Flood Insurance Program flood profile data to confirm the absence of Bordering Land Subject to Flooding on the site. Bordering Land Subject to Flooding would occur in areas where the 100-year flood elevation is located outside of or upgradient of the delineated Bordering Vegetated Wetlands or Bank boundary. Bordering Land Subject to Flooding does not have a Buffer Zone under the Act. A copy of the MA GIS FEMA flood map for the project area is attached.

The Massachusetts Rivers Protection Act amended the Act to establish an additional wetland resource area: Riverfront Area. Based upon a review of the current USGS Map (attached), a stream that is shown as intermittent is located within the site. Streams that are shown as intermittent on

the current USGS map are designated intermittent under the Massachusetts Wetlands Protection Act regulations unless the watershed area is 0.5 square miles or greater. The watershed area contributing to this stream, at the project site, is 0.15 square miles (see USGS StreamStats report attached). As such, the stream would be designated as intermittent and Riverfront Area would not apply. Furthermore, based upon a review of the current USGS Map and observations made during the site inspection, there are no other mapped or unmapped streams located within 200 feet of the site. Accordingly, except as noted above, Riverfront Area would not occur on the site. Riverfront Area does not have a Buffer Zone under the Act, but may overlap other wetland resources and their Buffer Zones.

The Regulations require that no project may be permitted that will have any adverse effect on specified habitat sites of rare vertebrate or invertebrate species, as identified by procedures set forth at 310 CMR 10.59. Based upon a review of the *Massachusetts Natural Heritage Atlas*, 13th edition, Priority Habitats and Estimated Habitats, valid from October 1, 2008, there are no Estimated Habitats [for use with the Act and Regulations (310 CMR 10.00 *et seq*.)], Priority Habitats [for use with Massachusetts Endangered Species Act (M.G.L. Ch. 131A; "MESA") and MESA Regulations (321 CMR 10.00 *et seq*.)], or Certified Vernal Pools on or in the immediate vicinity of the site. A copy of this map is attached.

The reader should be aware that the regulatory authority for determining wetland jurisdiction rests with local, state, and federal authorities. A brief description of my experience and qualifications is attached. If you have any questions, please feel free to contact me at any time.

Cordially,
ECOTEC, INC.

Arthur Allen, CPSS, CWS, CESSWI
Vice President

Attachments (6, 13 pages)

AA/Wet/Bellingham North Main Wetland Report

Arthur Allen, CPSS, CWS, CESSWI
Vice President
Soil & Wetland Scientist

Arthur Allen is the Vice President of EcoTec, Inc. and has been a senior environmental scientist there since 1995. His work with EcoTec has involved wetland delineation, wildlife habitat evaluation, environmental permitting (federal, state and local), environmental monitoring, expert testimony, peer reviews, contaminated site assessment and the description, mapping and interpretation of soils. His clients have included private landowners, developers, major corporations and regulatory agencies. Prior to joining EcoTec, Mr. Allen mapped and interpreted soils in Franklin County, MA for the U.S.D.A. Natural Resources Conservation Service (formerly Soil Conservation Service) and was a research soil scientist at Harvard University's Harvard Forest. Since 1994, Mr. Allen has assisted the Massachusetts Department of Environmental Protection and the Massachusetts Association of Conservation Commissions as an instructor in the interpretation of soils for wetland delineation and for the Title V Soil Evaluator program.

Mr. Allen has a civil service rating as a soil scientist, an undergraduate degree in Natural Resource Studies and a graduate certificate in Soil Studies. His work on the Franklin County soil survey involved interpretation of landscape-soil-water relationships, classifying soils and drainage, and determining use and limitation of the soil units that he delineated. As a soil scientist at the Harvard Forest, Mr. Allen was involved in identifying the legacies of historical land-use in modern soil and vegetation at a number of study sites across southern New England. He has a working knowledge of the chemical and physical properties of soil and water and how these properties interact with the plants that grow on a given site. While at Harvard Forest he authored and presented several papers describing his research results which were later published. In addition to his aforementioned experience, Mr. Allen was previously employed by the Trustees of Reservations as a land manager and by the Town of North Andover, MA as a conservation commission intern.

Education:
1993-Graduate Certificate in Soil Studies, University of New Hampshire
1982-Bachelor of Science in Natural Resource Studies, University of Massachusetts

Professional Affiliations:
Certified Professional Soil Scientist (ARCPACS CPSS #22529)
New Hampshire Certified Wetland Scientist (#19)
Registered Professional Soil Scientist – Society of Soil Scientists of SNE [Board Member (2000-2006)]
Certified Erosion, Sediment & Stormwater Inspector (#965)
Massachusetts Arborists Association-Certified Arborist (1982 – 1998)
New England Hydric Soils Technical Committee member
Massachusetts Association of Conservation Commissions member
Society of Wetland Scientists member

Refereed Publications:
Soil Science and Survey at Harvard Forest. A.Allen. *In*: Soil Survey Horizons. Vol. 36, No. 4, 1995, pp. 133-142.
Controlling Site to Evaluate History: Vegetation Patterns of a New England Sand Plain. G.Motzkin, D.Foster, A.Allen, J.Harrod, & R.Boone. *In*: Ecological Monographs 66(3), 1996, pp. 345-365.
Vegetation Patterns in Heterogeneous Landscapes: The Importance of History and Environment. G.Motzkin, P.Wilson, D.R.Foster & A.Allen. In: Journal of Vegetation Science 10, 1999, pp. 903-920.

BORDERING VEGETATED WETLAND DETERMINATION FORM

Project/Site: North Main Street City/Town: Bellingham Sampling Date: 3/6/2024

Applicant/Owner: Sampling Point or Zone: TPU @ EA-2

Investigator(s): Arthur Allen, EcoTec, Inc. Latitude / Longitude: 42.1117444 / -71.472963

Soil Map Unit Name: Hinckley 245B NWI or DEP Classification: n/a

Are climatic/hydrologic conditions on the site typical for this time of year? Yes ☐ No ☐ (If no, explain in Remarks)

Are Vegetation ☐, Soil ☐ , or Hydrology ☐ significantly disturbed? (If yes, explain in Remarks)

Are Vegetation ☐, Soil ☐ , or Hydrology ☐ naturally problematic? (If yes, explain in Remarks)

SUMMARY OF FINDINGS – Attach site map and photograph log showing sampling locations, transects, etc.

Wetland vegetation criterion met?	Yes ☐	No ✔	**Is the Sampled Area within a Wetland?**	**Yes ☐ No ✔**
Hydric Soils criterion met?	Yes ☐	No ✔		
Wetlands hydrology present?	Yes ☐	No ✔		

Remarks, Photo Details, Flagging, etc.:

HYDROLOGY

Field Observations:			
Surface Water Present?	Yes ☐	No ✔	Depth (inches) ☐
Water Table Present?	Yes ☐	No ✔	Depth (inches) ☐
Saturation Present (including capillary fringe)?	Yes ☐	No ✔	Depth (inches) ☐

Wetland Hydrology Indicators

Reliable Indicators of Wetlands Hydrology	Indicators that can be Reliable with Proper Interpretation	Indicators of the Influence of Water
☐ Water-stained leaves	☐ Hydrological records	☐ Direct observation of inundation
☐ Evidence of aquatic fauna	☐ Free water in a soil test hole	☐ Drainage patterns
☐ Iron deposits	☐ Saturated soil	☐ Drift lines
☐ Algal mats or crusts	☐ Water marks	☐ Scoured areas
☐ Oxidized rhizospheres/pore linings	☐ Moss trim lines	☐ Sediment deposits
☐ Thin muck surfaces	☐ Presence of reduced iron	☐ Surface soil cracks
☐ Plants with air-filled tissue (aerenchyma)	☐ Woody plants with adventitious roots	☐ Sparsely vegetated concave surface
☐ Plants with polymorphic leaves	☐ Trees with shallow root systems	☐ Microtopographic relief
☐ Plants with floating leaves	☐ Woody plants with enlarged lenticels	☐ Geographic position (depression, toe of slope, fringing lowland
☐ Hydrogen sulfide odor		

Remarks (describe recorded data from stream gauge, monitoring well, aerial photos, previous inspections, if available):

This form is only for BVW delineations. Other wetland resource areas may be present and should be delineated according to the applicable regulatory provisions.

Form Revised July 2023

VEGETATION – Use both common and scientific names of plants.

Tree Stratum Plot size 30 foot diameter

Common name	Scientific name	Indicator Status	Absolute % Cover	Dominant? (yes/no)	Wetland Indictor? (yes/no)
1. Red Maple	Acer rubrum	FAC	100.0	Yes	Yes
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					

100.0 = Total Cover

Shrub/Sapling Stratum Plot size 15-foot diameter

Common name	Scientific name	Indicator Status	Absolute % Cover	Dominant? (yes/no)	Wetland Indictor? (yes/no)
1. White Birch	Betula papyrifera	FACU	10.0	Yes	No
2. White Pine	Pinus strobus	FACU	60.0	Yes	No
3. Red Oak	Quercus rubra	FACU	10.0	Yes	No
4.					
5.					
6.					
7.					
8.					
9.					

80.0 = Total Cover

Herb Stratum Plot size 5 foot diameter

Common name	Scientific name	Indicator Status	Absolute % Cover	Dominant? (yes/no)	Wetland Indictor? (yes/no)
1. Japanese Knotweed	Polygonum cuspidatum	FACU	20.0	Yes	No
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					

20.0 = Total Cover

VEGETATION – continued.

Woody Vine Stratum Plot size 5 foot diameter

Common name	Scientific name	Indicator Status	Absolute % Cover	Dominant? (yes/no)	Wetland Indictor? (yes/no)
1.					
2.					
3.					
4.					
			0.0 = Total Cover		

Rapid Test: Do all dominant species have an indicator status of OBL or FACW? Yes ☐ No ☑

Dominance Test:	Number of dominant species	Number of dominant species that are wetland indicator plants	Do wetland indicator plants make up ≥ 50% of dominant plant species?
	5	1	Yes ☐ No ☑

Prevalence Index:		Total % Cover (all strata)	Multiply by:	Result
	OBL species		X 1	= 0.00
	FACW species		X 2	= 0.00
	FAC species		X 3	= 0.00
	FACU species		X 4	= 0.00
	UPL species		X 5	= 0.00
	Column Totals	(A) 0		(B) 0
	Prevalence Index	B/A = 0.00		Is the Prevalence Index ≤ 3.0? Yes ☐ No ☐

Wetland vegetation criterion met? Yes ☐ No ☑

Definitions of Vegetation Strata

Tree - Woody plants 3 in. (7.62 cm) or more in diameter at breast height (DBH), regardless of height

Shrub / Sapling - Woody plants less than 3 in. (7.62 cm) DBH and greater than or equal to 3.3 ft. (1 m) tall

Herb - All herbaceous (non-woody plants, regardless of size, and woody plants less than 3.3 ft. (1 m) tall

Woody vines - All woody vines greater than 3.3 ft. (1 m) in height

Cover Ranges	
Range	Midpoint
1-5 %	3.0 %
6-15 %	10.5 %
15-25 %	20.5 %
26-50 %	38.0 %
51-75 %	63.0 %
76-95 %	85.5 %
96-100 %	98.0 %

SOIL

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators)								
Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Location[2]	Texture	Remarks
0-12	10YR 3/2	100.00					Loamy fine sand	
12-16	10YR 5/6	95.00	7.5YR 4/6	5.00	C	M	Loamy fine sand	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains [2]Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators (Check all that apply)		**Indicators for Problematic Hydric Soils**
☐ Histosol (A1)	☐ Polyvalue Below Surface (S8)	☐ 2 cm Muck (A10)
☐ Histic Epipedon (A2)	☐ Thin Dark Surface (S9)	☐ 5 cm Mucky Peat or Peat (S3)
☐ Black Histic (A3)	☐ Loamy Gleyed Matrix (F2)	☐ Iron-Manganese Masses (F12)
☐ Hydrogen Sulfide (A4)	☐ Depleted Matrix (F3)	☐ Mesic Spodic (A17)
☐ Stratified Layers (A5)	☐ Redox Dark Surface (F6)	☐ Red Parent Material (F21)
☐ Depleted Below Dark Surface (A11)	☐ Depleted Dark Surface (F7)	☐ Very Shallow Dark Surface (F22)
☐ Thick Dark Surface (A12)	☐ Redox Depressions (F8)	
☐ Sandy Mucky Mineral (S1)		
☐ Sandy Gleyed Matrix (S4)		
☐ Sandy Redox (S5)		☐ Other (Include Explanation in Remarks)
☐ Stripped Matrix (S6)		
☐ Dark Surface (S7)		

Restrictive Layer (if observed) Type: _____ Depth (inches): _____

Remarks:

Hydric Soils criterion met? **Yes** ☐ **No** ☑

BORDERING VEGETATED WETLAND DETERMINATION FORM

Project/Site: North Main Street City/Town: Bellingham Sampling Date: 3/6/2024

Applicant/Owner: _____ Sampling Point or Zone: TPW @ EA-2

Investigator(s): Arthur Allen, EcoTec, Inc. Latitude / Longitude: 42.1117444 / -71.472963

Soil Map Unit Name: Swansea 51 NWI or DEP Classification: PFO1E

Are climatic/hydrologic conditions on the site typical for this time of year? Yes [✔] No [ ] (If no, explain in Remarks)

Are Vegetation [ ], Soil [ ], or Hydrology [ ] significantly disturbed? (If yes, explain in Remarks)

Are Vegetation [ ], Soil [ ], or Hydrology [ ] naturally problematic? (If yes, explain in Remarks)

SUMMARY OF FINDINGS – Attach site map and photograph log showing sampling locations, transects, etc.

Wetland vegetation criterion met?	Yes [✔] No [ ]	**Is the Sampled Area within a Wetland?** **Yes [✔] No [ ]**
Hydric Soils criterion met?	Yes [✔] No [ ]	
Wetlands hydrology present?	Yes [✔] No [ ]	

Remarks, Photo Details, Flagging, etc.:

HYDROLOGY

Field Observations:			
Surface Water Present?	Yes [ ]	No [✔]	Depth (inches)_____
Water Table Present?	Yes [ ]	No [✔]	Depth (inches)_____
Saturation Present (including capillary fringe)?	Yes [✔]	No [ ]	Depth (inches) 6.00

Wetland Hydrology Indicators

Reliable Indicators of Wetlands Hydrology	Indicators that can be Reliable with Proper Interpretation	Indicators of the Influence of Water
[ ] Water-stained leaves	[ ] Hydrological records	[ ] Direct observation of inundation
[ ] Evidence of aquatic fauna	[ ] Free water in a soil test hole	[ ] Drainage patterns
[ ] Iron deposits	[✔] Saturated soil	[ ] Drift lines
[ ] Algal mats or crusts	[ ] Water marks	[ ] Scoured areas
[ ] Oxidized rhizospheres/pore linings	[ ] Moss trim lines	[ ] Sediment deposits
[ ] Thin muck surfaces	[ ] Presence of reduced iron	[ ] Surface soil cracks
[ ] Plants with air-filled tissue (aerenchyma)	[ ] Woody plants with adventitious roots	[ ] Sparsely vegetated concave surface
[ ] Plants with polymorphic leaves	[ ] Trees with shallow root systems	[ ] Microtopographic relief
[ ] Plants with floating leaves	[ ] Woody plants with enlarged lenticels	[ ] Geographic position (depression, toe of slope, fringing lowland
[ ] Hydrogen sulfide odor		

Remarks (describe recorded data from stream gauge, monitoring well, aerial photos, previous inspections, if available):

This form is only for BVW delineations. Other wetland resource areas may be present and should be delineated according to the applicable regulatory provisions.

Form Revised July 2023

VEGETATION – Use both common and scientific names of plants.

Tree Stratum Plot size 30 foot diameter

Common name	Scientific name	Indicator Status	Absolute % Cover	Dominant? (yes/no)	Wetland Indictor? (yes/no)
1. Red Maple	Acer rubrum	FAC	100.0	Yes	Yes
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					

100.0 = Total Cover

Shrub/Sapling Stratum Plot size 15-foot diameter

Common name	Scientific name	Indicator Status	Absolute % Cover	Dominant? (yes/no)	Wetland Indictor? (yes/no)
1. Green Ash	Fraxinus pensylvanica	FACW	10.0	Yes	Yes
2. White Pine	Pinus strobus	FACU	30.0	Yes	No
3. Winterberry	Ilex verticillata	FACW	10.0	Yes	Yes
4.					
5.					
6.					
7.					
8.					
9.					

50.0 = Total Cover

Herb Stratum Plot size 5 foot diameter

Common name	Scientific name	Indicator Status	Absolute % Cover	Dominant? (yes/no)	Wetland Indictor? (yes/no)
1. Cinnamon Fern	Osmunda cinnamomea	FACW	40.0	Yes	Yes
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					

40.0 = Total Cover

VEGETATION – continued.

Woody Vine Stratum Plot size 5 foot diameter

Common name	Scientific name	Indicator Status	Absolute % Cover	Dominant? (yes/no)	Wetland Indictor? (yes/no)
1.					
2.					
3.					
4.					
			0.0 = Total Cover		

Rapid Test: Do all dominant species have an indicator status of OBL or FACW? Yes ☐ No ☑

Dominance Test:	Number of dominant species	Number of dominant species that are wetland indicator plants	Do wetland indicator plants make up ≥ 50% of dominant plant species?
	5	4	Yes ☑ No ☐

Prevalence Index:		Total % Cover (all strata)	Multiply by:	Result
	OBL species		X 1	= 0.00
	FACW species		X 2	= 0.00
	FAC species		X 3	= 0.00
	FACU species		X 4	= 0.00
	UPL species		X 5	= 0.00
	Column Totals	(A) 0		(B) 0
	Prevalence Index	B/A = 0.00		Is the Prevalence Index ≤ 3.0? Yes ☐ No ☐

Wetland vegetation criterion met? Yes ☑ No ☐

Definitions of Vegetation Strata

Tree - Woody plants 3 in. (7.62 cm) or more in diameter at breast height (DBH), regardless of height

Shrub / Sapling - Woody plants less than 3 in. (7.62 cm) DBH and greater than or equal to 3.3 ft. (1 m) tall

Herb - All herbaceous (non-woody plants, regardless of size, and woody plants less than 3.3 ft. (1 m) tall

Woody vines - All woody vines greater than 3.3 ft. (1 m) in height

Cover Ranges	
Range	Midpoint
1-5 %	3.0 %
6-15 %	10.5 %
15-25 %	20.5 %
26-50 %	38.0 %
51-75 %	63.0 %
76-95 %	85.5 %
96-100 %	98.0 %

SOIL

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type[1]	Location[2]		
0-16	10YR 2/1	100.00					Loamy fine sand	
16-20	10YR 5/2	90.00	10YR 4/6	10.00	C	M	Loamy fine sand	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains [2]Location: PL=Pore Lining, M=Matrix

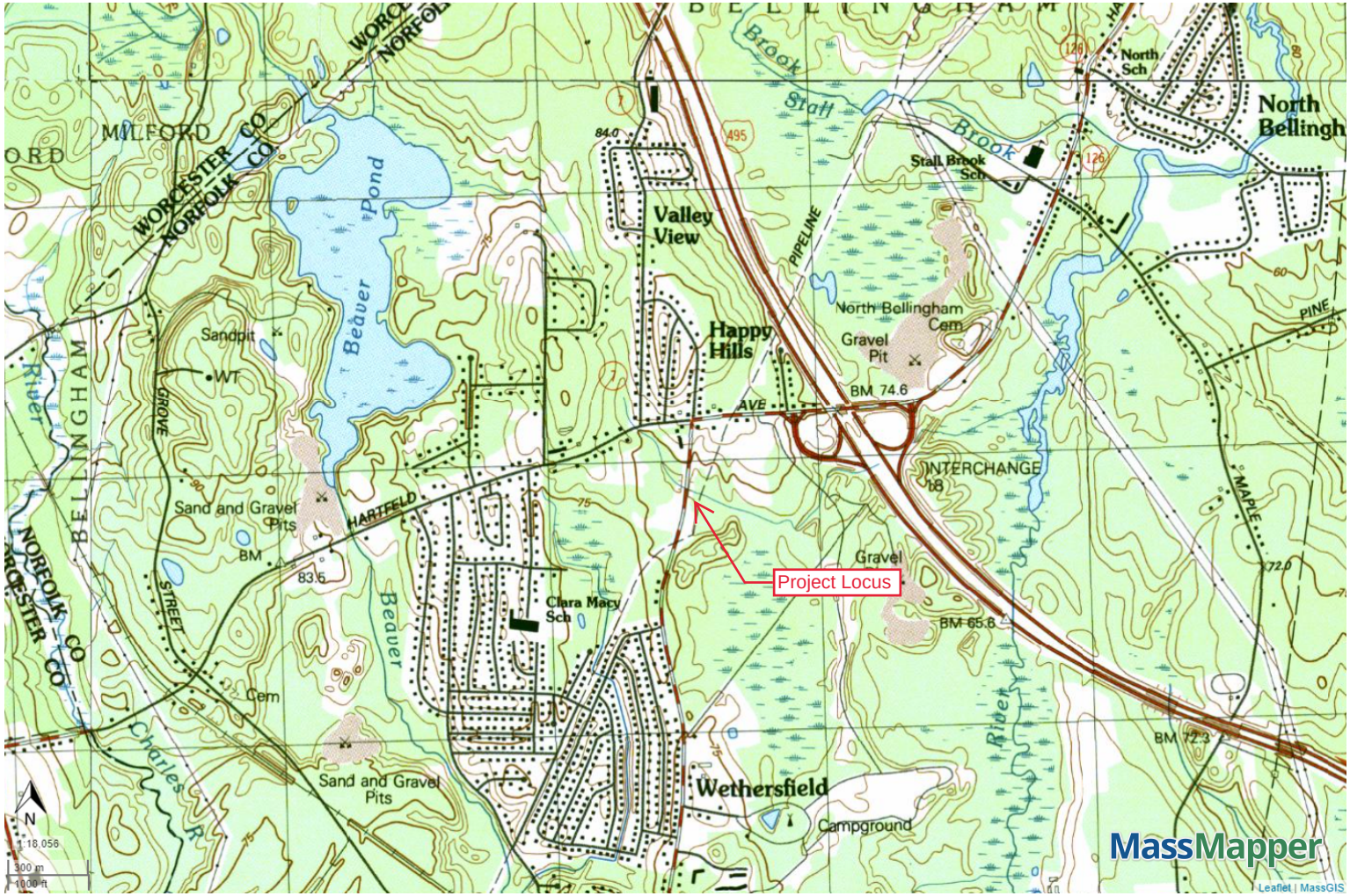
Hydric Soil Indicators (Check all that apply)		**Indicators for Problematic Hydric Soils**
☐ Histosol (A1)	☐ Polyvalue Below Surface (S8)	☐ 2 cm Muck (A10)
☐ Histic Epipedon (A2)	☐ Thin Dark Surface (S9)	☐ 5 cm Mucky Peat or Peat (S3)
☐ Black Histic (A3)	☐ Loamy Gleyed Matrix (F2)	☐ Iron-Manganese Masses (F12)
☐ Hydrogen Sulfide (A4)	☐ Depleted Matrix (F3)	☐ Mesic Spodic (A17)
☐ Stratified Layers (A5)	☐ Redox Dark Surface (F6)	☐ Red Parent Material (F21)
☑ Depleted Below Dark Surface (A11)	☐ Depleted Dark Surface (F7)	☐ Very Shallow Dark Surface (F22)
☐ Thick Dark Surface (A12)	☐ Redox Depressions (F8)	
☐ Sandy Mucky Mineral (S1)		
☐ Sandy Gleyed Matrix (S4)		
☑ Sandy Redox (S5)		☐ Other (Include Explanation in Remarks)
☑ Stripped Matrix (S6)		
☐ Dark Surface (S7)		

Restrictive Layer (if observed) Type: _____ Depth (inches): _____

Remarks:

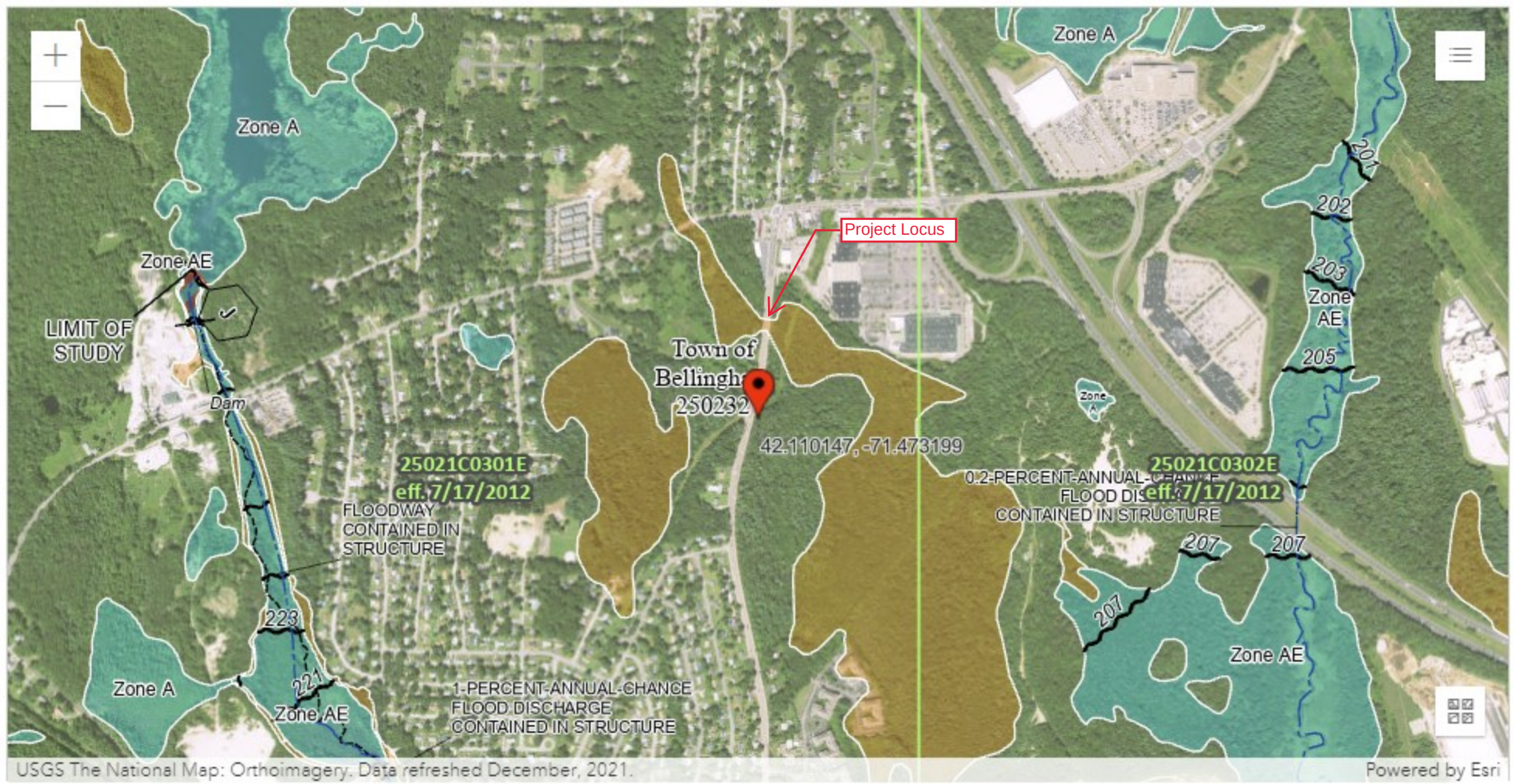
Hydric Soils criterion met? **Yes** ☑ **No** ☐

North Main Bellingham USGS



USGS Topographic Maps

Property Tax Parcels



PIN
- Approximate location based on user input and does not represent an authoritative property location

MAP PANELS
- Selected FloodMap Boundary
- Digital Data Available
- No Digital Data Available
- Unmapped

OTHER AREAS
- NO SCREEN — Area of Minimal Flood Hazard Zone X
- Effective LOMRs
- Area of Undetermined Flood Hazard Zone D
- Otherwise Protected Area
- Coastal Barrier Resource System Area

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) Zone A, V, A99
- With BFE or Depth
- Regulatory Floodway Zone AE, AO, AH, VE, AR

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile Zone X
- Future Conditions 1% Annual Chance Flood Hazard Zone X
- Area with Reduced Flood Risk due to Levee. See Notes. Zone X
- Area with Flood Risk due to Levee Zone D

OTHER FEATURES
- 20.2 — Cross Sections with 1% Annual Chance
- 17.5 — Water Surface Elevation
- Coastal Transect
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

North Main NHESP

Potential Vernal Pools

NHESP Priority Habitats of Rare Species

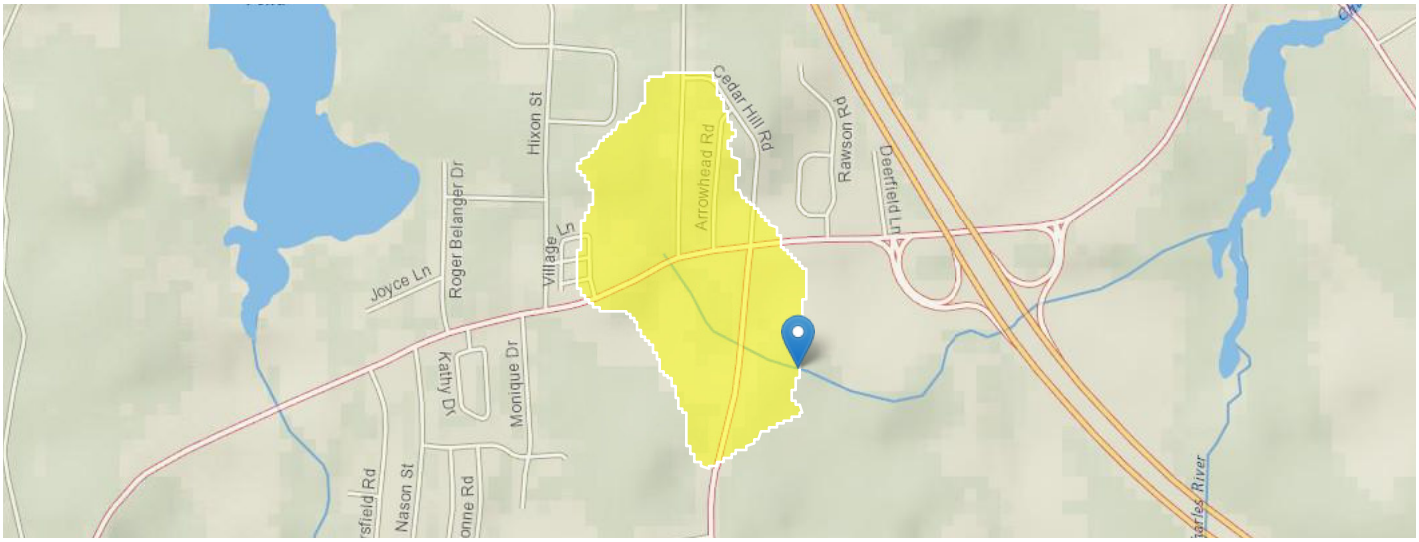
NHESP Estimated Habitats of Rare Wildlife

NHESP Certified Vernal Pools

Property Tax Parcels

StreamStats Report - North Main St., Bellingham, MA

Region ID: MA
Workspace ID: MA20240413164336979000
Clicked Point (Latitude, Longitude): 42.11099, -71.47121
Time: 2024-04-13 12:45:15 -0400



Collapse All

Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
BSLDEM250	Mean basin slope computed from 1:250K DEM	2.271	percent
DRFTPERSTR	Area of stratified drift per unit of stream length	0.18	square mile per mile
DRNAREA	Area that drains to a point on a stream	0.15	square miles
MAREGION	Region of Massachusetts 0 for Eastern 1 for Western	0	dimensionless

Low-Flow Statistics

Low-Flow Statistics Parameters [Statewide Low Flow WRIR00 4135]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.15	square miles	1.61	149
BSLDEM250	Mean Basin Slope from 250K DEM	2.271	percent	0.32	24.6
DRFTPERSTR	Stratified Drift per Stream Length	0.18	square mile per mile	0	1.29
MAREGION	Massachusetts Region	0	dimensionless	0	1

Low-Flow Statistics Disclaimers [Statewide Low Flow WRIR00 4135]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors.

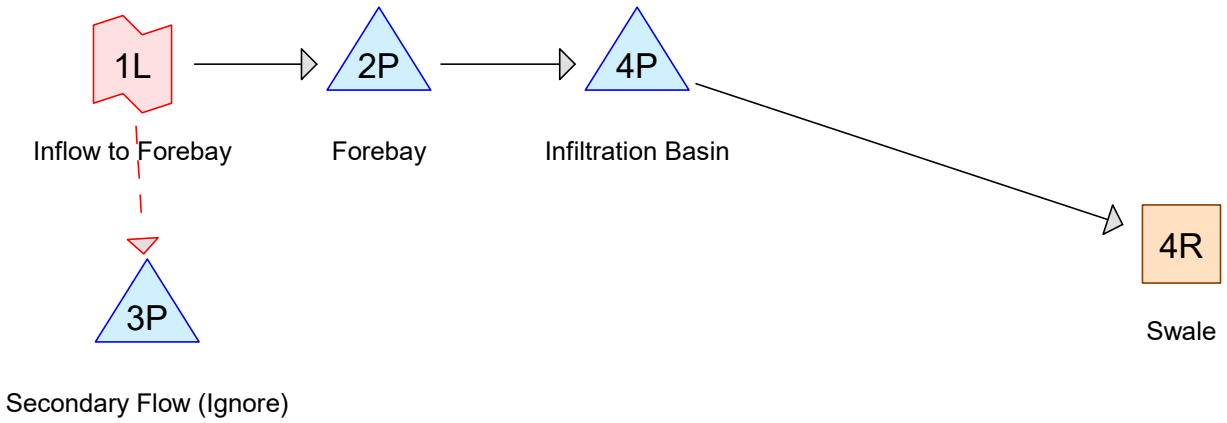
Low-Flow Statistics Flow Report [Statewide Low Flow WRIR00 4135]

Statistic	Value	Unit
7 Day 2 Year Low Flow	0.0085	ft^3/s
7 Day 10 Year Low Flow	0.00295	ft^3/s

Low-Flow Statistics Citations

Ries, K.G., III,2000, Methods for estimating low-flow statistics for Massachusetts streams: U.S. Geological Survey Water Resources Investigations Report 00-4135, 81 p. (http://pubs.usgs.gov/wri/wri004135/)

Appendix F
Stormwater Calculations



Subcat Reach Pond Link

Routing Diagram for Bellingham Pond Routing_2yr
Prepared by Chappell Engineering Associates, Printed 1/30/2024

Project Notes

Rainfall events imported from "NRCS-Rain.txt" for 4025 MA Bellingham Norfolk County

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Reach 4R: Swale Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0 cf
n=0.012 L=430.0' S=0.0439 '/' Capacity=123.66 cfs Outflow=0.00 cfs 0 cf

Pond 2P: Forebay Peak Elev=245.31' Storage=1,542 cf Inflow=6.31 cfs 25,573 cf
Outflow=6.24 cfs 24,258 cf

Pond 3P: Secondary Flow (Ignore) Peak Elev=100.01' Storage=0.000 af Inflow=0.14 cfs 25 cf
Outflow=0.00 cfs 0 cf

Pond 4P: Infiltration Basin Peak Elev=244.97' Storage=12,569 cf Inflow=6.24 cfs 24,258 cf
Discarded=0.46 cfs 19,151 cf Primary=0.00 cfs 0 cf Outflow=0.46 cfs 19,151 cf

0 Impo**Link** from 2-YR NRCC_OUTFALL INTO FOREBAY.csv after 0.05 hrs before 24.00 hrs Inflow=6.31 cfs 25,598 cf
Primary=6.31 cfs 25,573 cf Secondary=0.14 cfs 25 cf

Summary for Reach 4R: Swale

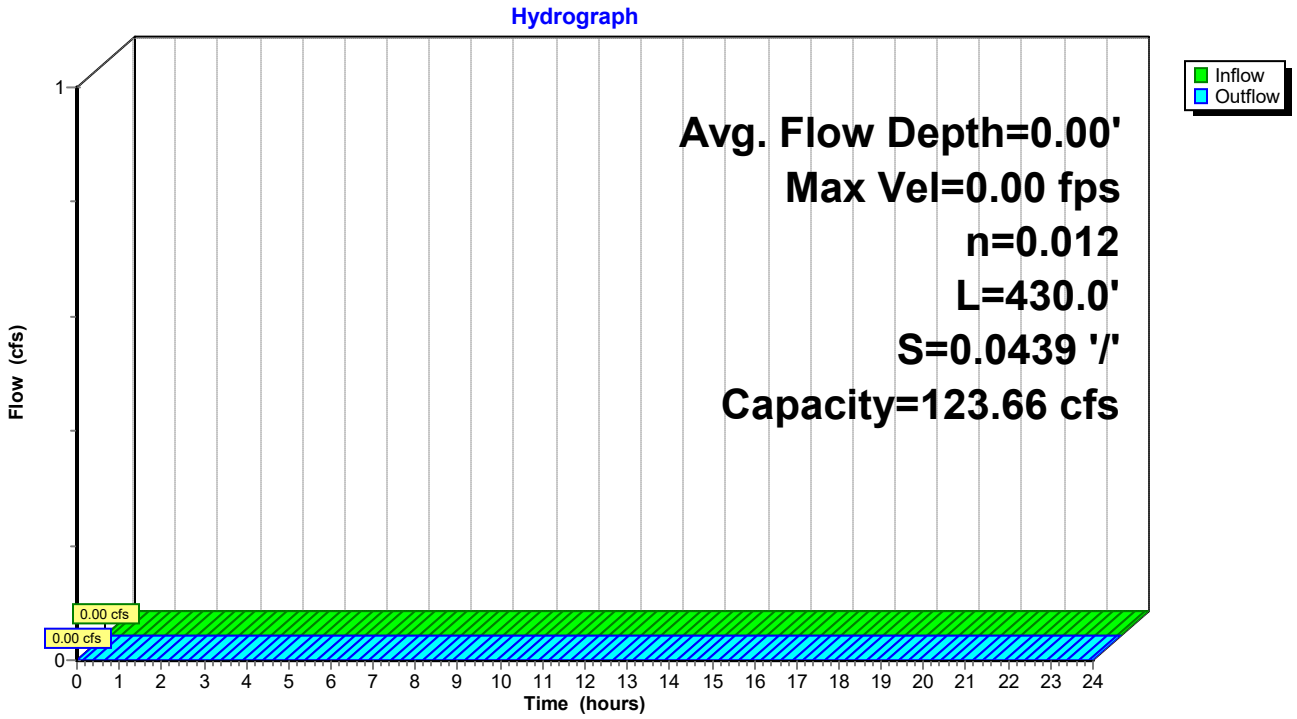
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 0.00 hrs
Average Depth at Peak Storage= 0.00'
Bank-Full Depth= 1.00' Flow Area= 6.0 sf, Capacity= 123.66 cfs

4.00' x 1.00' deep channel, n= 0.012 Wood, Planed
Side Slope Z-value= 2.0 '/' Top Width= 8.00'
Length= 430.0' Slope= 0.0439 '/'
Inlet Invert= 241.00', Outlet Invert= 222.13'

‡



Summary for Pond 2P: Forebay

Inflow = 6.31 cfs @ 12.17 hrs, Volume= 25,573 cf
Outflow = 6.24 cfs @ 12.18 hrs, Volume= 24,258 cf, Atten= 1%, Lag= 0.7 min
Primary = 6.24 cfs @ 12.18 hrs, Volume= 24,258 cf
Routed to Pond 4P : Infiltration Basin

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 245.31' @ 12.18 hrs Surf.Area= 763 sf Storage= 1,542 cf

Plug-Flow detention time= 56.4 min calculated for 24,207 cf (95% of inflow)
Center-of-Mass det. time= 26.5 min (816.9 - 790.4)

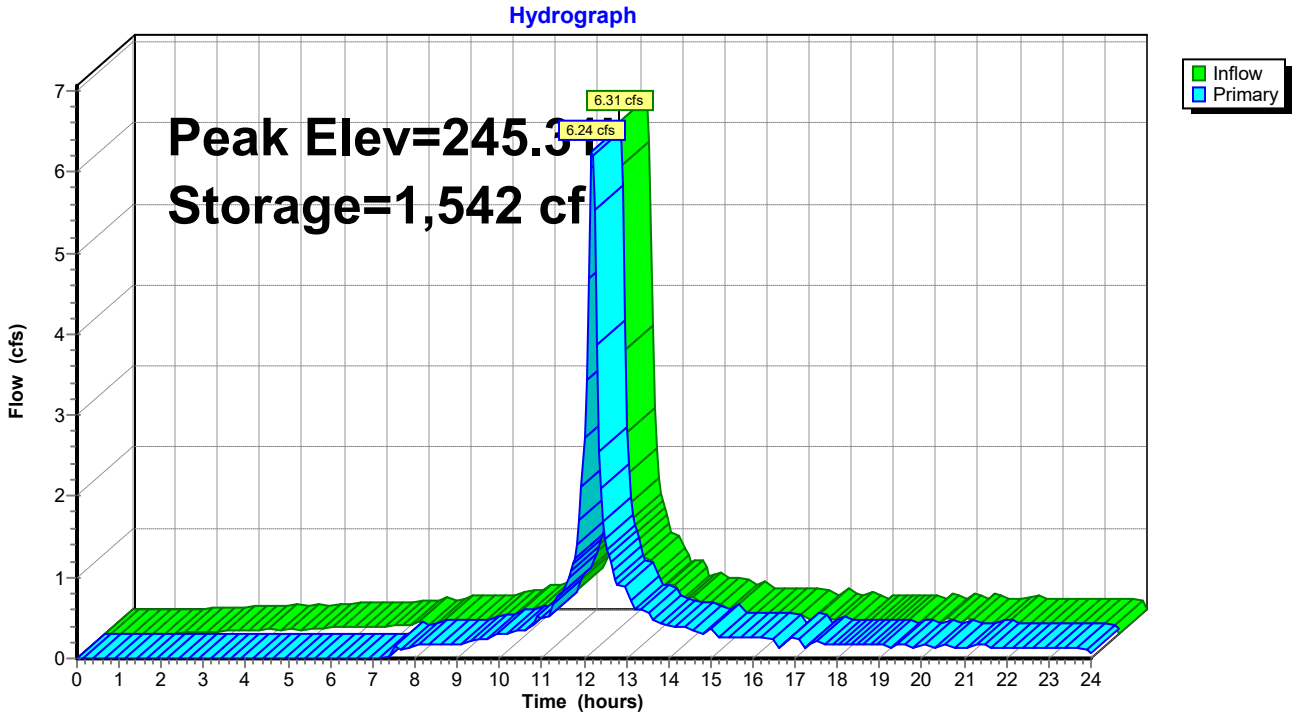
Volume	Invert	Avail.Storage	Storage Description
#1	241.00'	2,123 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
241.00	74	60.0	0	0	74
243.00	296	84.0	345	345	384
244.00	482	99.0	385	731	621
245.00	693	112.0	584	1,315	864
246.00	929	124.0	808	2,123	1,118

Device	Routing	Invert	Outlet Devices
#1	Primary	245.00'	**14.0' long + 1.5 '/' SideZ x 8.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74

Primary OutFlow Max=6.14 cfs @ 12.18 hrs HW=245.31' (Free Discharge)
1=Broad-Crested Rectangular Weir (Weir Controls 6.14 cfs @ 1.37 fps)

Pond 2P: Forebay



Summary for Pond 3P: Secondary Flow (Ignore)

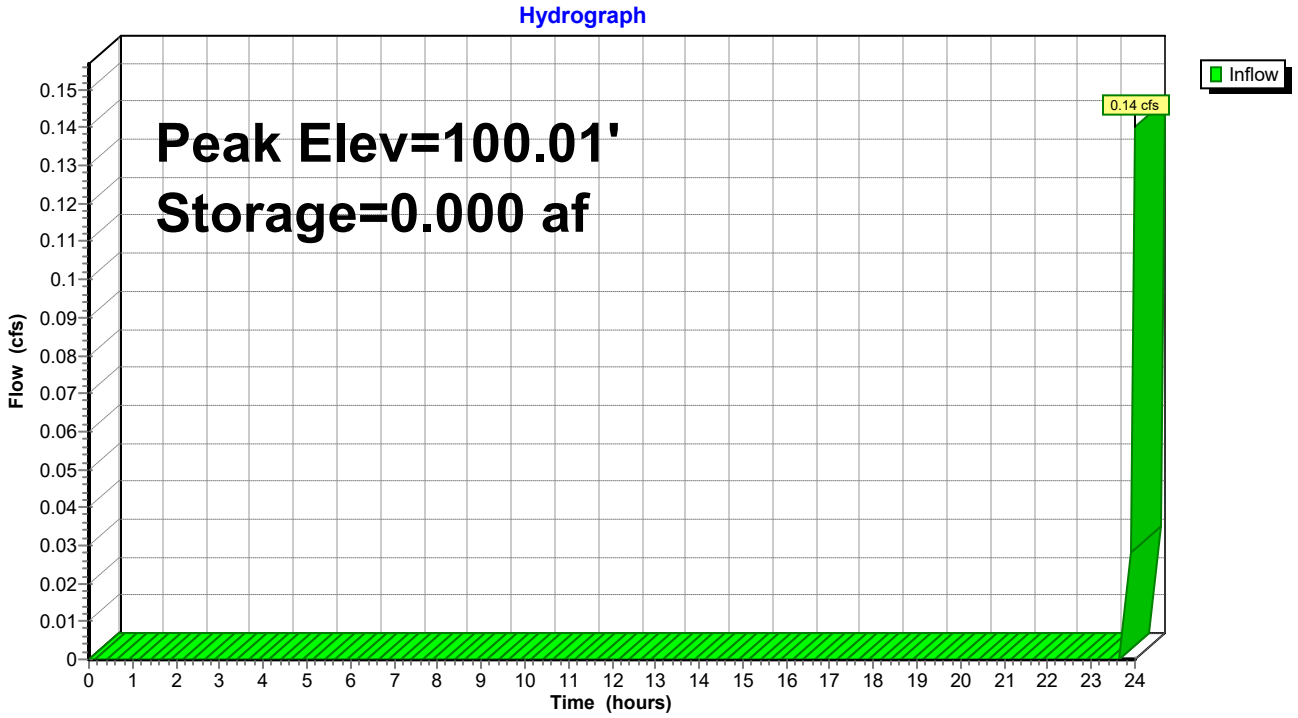
Inflow = 0.14 cfs @ 24.00 hrs, Volume= 25 cf
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 100%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 100.01' @ 24.00 hrs Surf.Area= 0.045 ac Storage= 0.000 af

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

Volume	Invert	Avail.Storage	Storage Description
#1	100.00'	922.548 af	**50.00'D x 200.00'H Vertical Cone/Cylinder Z=2.0**

Pond 3P: Secondary Flow (Ignore)



Summary for Pond 4P: Infiltration Basin

Inflow = 6.24 cfs @ 12.18 hrs, Volume= 24,258 cf
Outflow = 0.46 cfs @ 13.64 hrs, Volume= 19,151 cf, Atten= 93%, Lag= 87.3 min
Discarded = 0.46 cfs @ 13.64 hrs, Volume= 19,151 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Routed to Reach 4R : Swale

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 244.97' @ 13.64 hrs Surf.Area= 4,530 sf Storage= 12,569 cf

Plug-Flow detention time= 297.7 min calculated for 19,151 cf (79% of inflow)
Center-of-Mass det. time= 208.1 min (1,025.0 - 816.9)

Volume	Invert	Avail.Storage	Storage Description
#1	239.00'	17,748 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

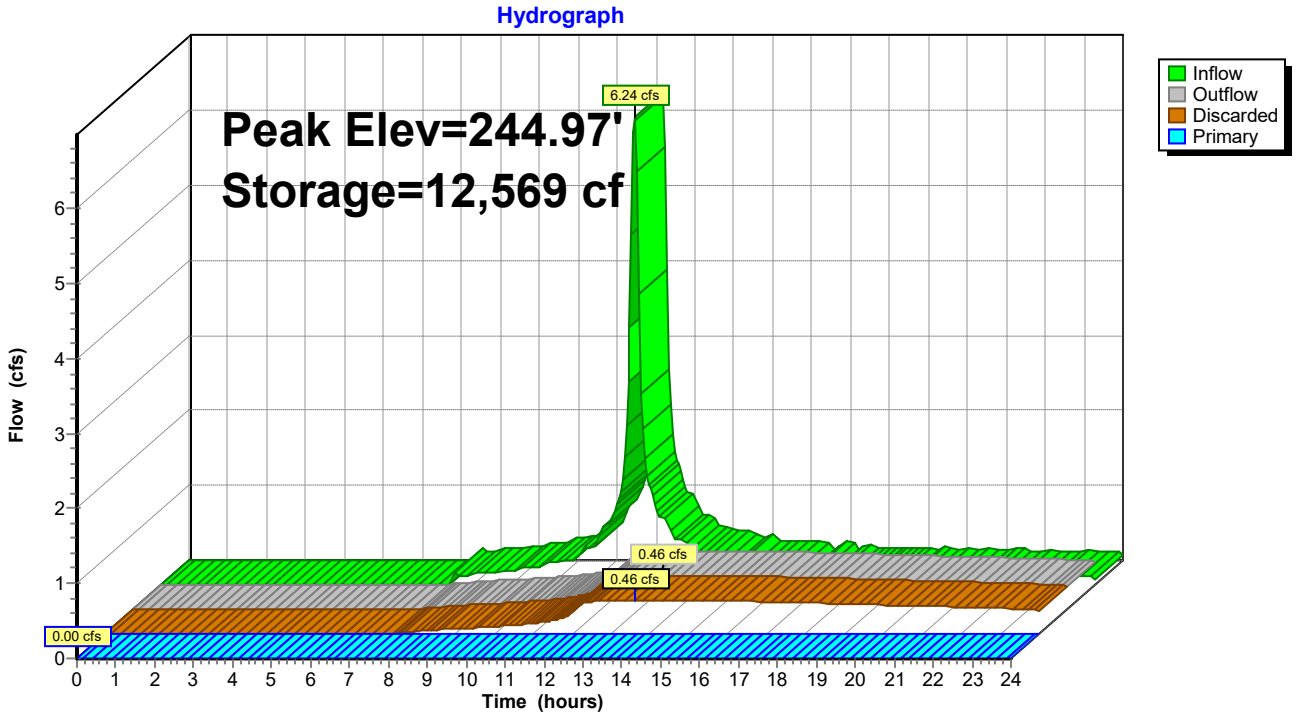
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
239.00	361	82.0	0	0	361
240.00	756	128.0	546	546	1,137
241.00	1,269	169.0	1,001	1,548	2,117
242.00	1,916	213.0	1,581	3,129	3,468
243.00	2,746	277.0	2,319	5,448	5,976
244.00	3,619	299.0	3,172	8,620	7,025
245.00	4,559	322.0	4,080	12,700	8,203
246.00	5,553	341.0	5,048	17,748	9,259

Device	Routing	Invert	Outlet Devices
#1	Primary	245.00'	**4.0" x 4.0" Horiz. Orifice/Grate X 5.00 columns** X 5 rows C= 0.600 Limited to weir flow at low heads
#2	Discarded	239.00'	**2.410 in/hr Exfiltration over Wetted area**

Discarded OutFlow Max=0.46 cfs @ 13.64 hrs HW=244.97' (Free Discharge)
↑**2=Exfiltration** (Exfiltration Controls 0.46 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=239.00' (Free Discharge)
↑**1=Orifice/Grate** (Controls 0.00 cfs)

Pond 4P: Infiltration Basin



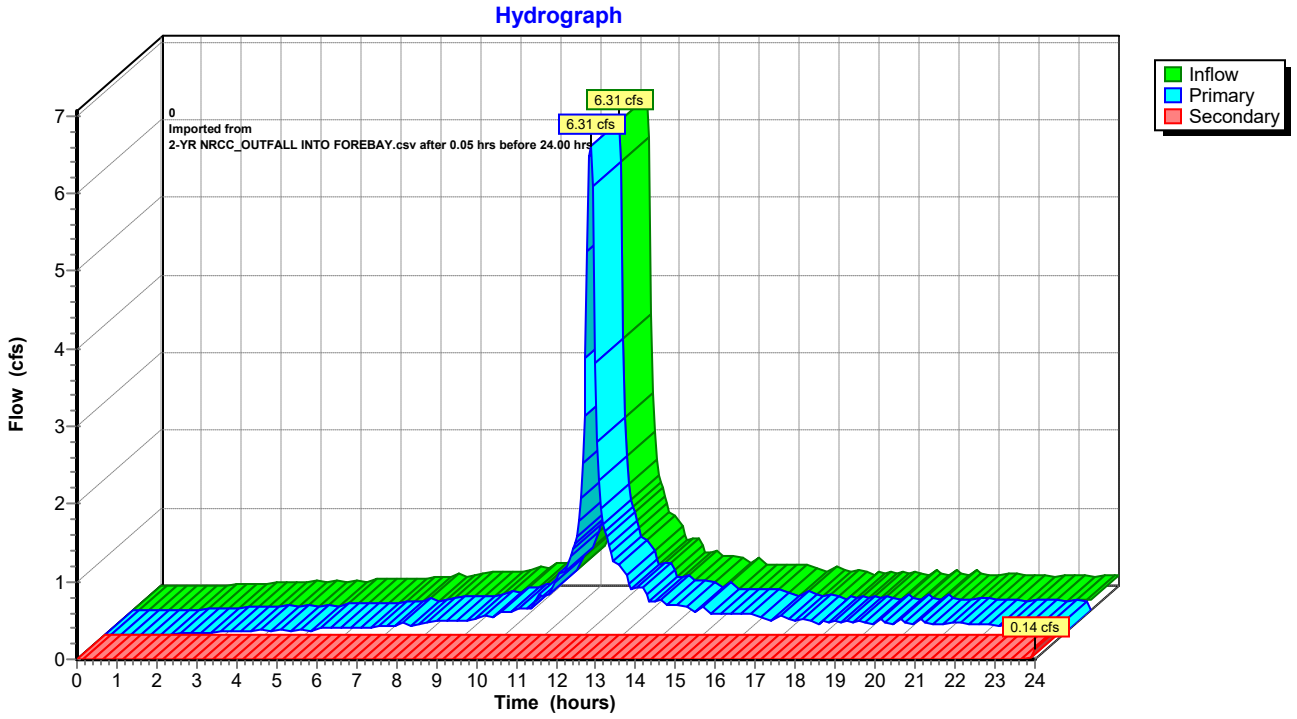
Summary for Link 1L: Inflow to Forebay

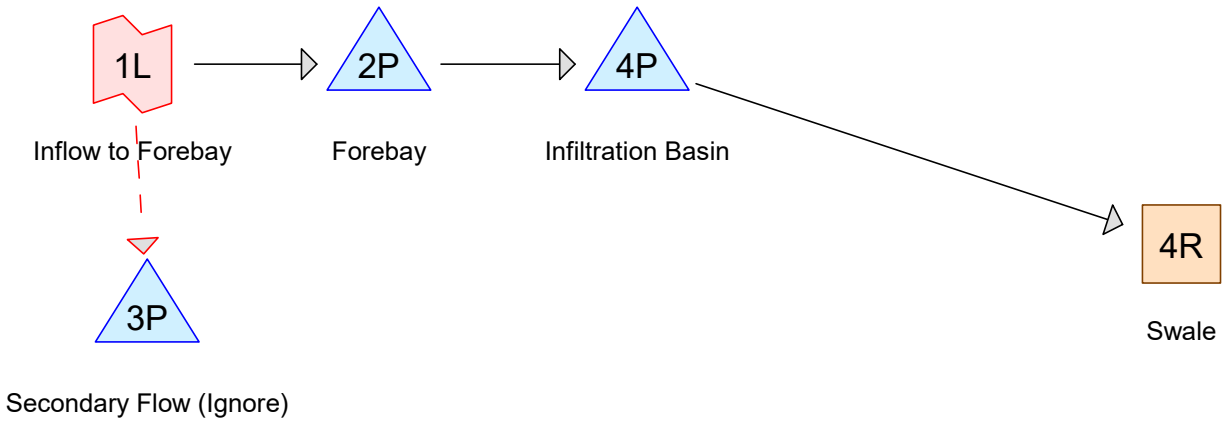
Inflow = 6.31 cfs @ 12.17 hrs, Volume= 25,598 cf
Primary = 6.31 cfs @ 12.17 hrs, Volume= 25,573 cf, Atten= 0%, Lag= 0.0 min
Routed to Pond 2P : Forebay
Secondary = 0.14 cfs @ 24.00 hrs, Volume= 25 cf
Routed to Pond 3P : Secondary Flow (Ignore)

Primary outflow = Inflow after 0.05 hrs before 24.00 hrs, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

0 Imported from 2-YR NRCC_OUTFALL INTO FOREBAY.csv

Link 1L: Inflow to Forebay





Subcat Reach Pond Link

Routing Diagram for Bellingham Pond Routing_10yr
Prepared by Chappell Engineering Associates, Printed 1/30/2024

Project Notes

Rainfall events imported from "NRCS-Rain.txt" for 4025 MA Bellingham Norfolk County

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Reach 4R: Swale Avg. Flow Depth=0.19' Max Vel=8.09 fps Inflow=6.82 cfs 10,459 cf
n=0.012 L=430.0' S=0.0439 '/' Capacity=123.66 cfs Outflow=6.72 cfs 10,459 cf

Pond 2P: Forebay Peak Elev=245.39' Storage=1,605 cf Inflow=8.98 cfs 41,729 cf
Outflow=9.08 cfs 40,414 cf

Pond 3P: Secondary Flow (Ignore) Peak Elev=100.01' Storage=0.000 af Inflow=0.18 cfs 32 cf
Outflow=0.00 cfs 0 cf

Pond 4P: Infiltration Basin Peak Elev=245.26' Storage=13,923 cf Inflow=9.08 cfs 40,414 cf
Discarded=0.47 cfs 22,272 cf Primary=6.82 cfs 10,459 cf Outflow=7.29 cfs 32,730 cf

Link 0 Imported from 10-YR NRCC_OUTFALL INTO FOREBAY.csv after 0.05 hrs before 24.00 hrs Inflow=8.98 cfs 41,762 cf
Primary=8.98 cfs 41,729 cf Secondary=0.18 cfs 32 cf

Summary for Reach 4R: Swale

Inflow = 6.82 cfs @ 12.30 hrs, Volume= 10,459 cf
Outflow = 6.72 cfs @ 12.33 hrs, Volume= 10,459 cf, Atten= 1%, Lag= 1.5 min

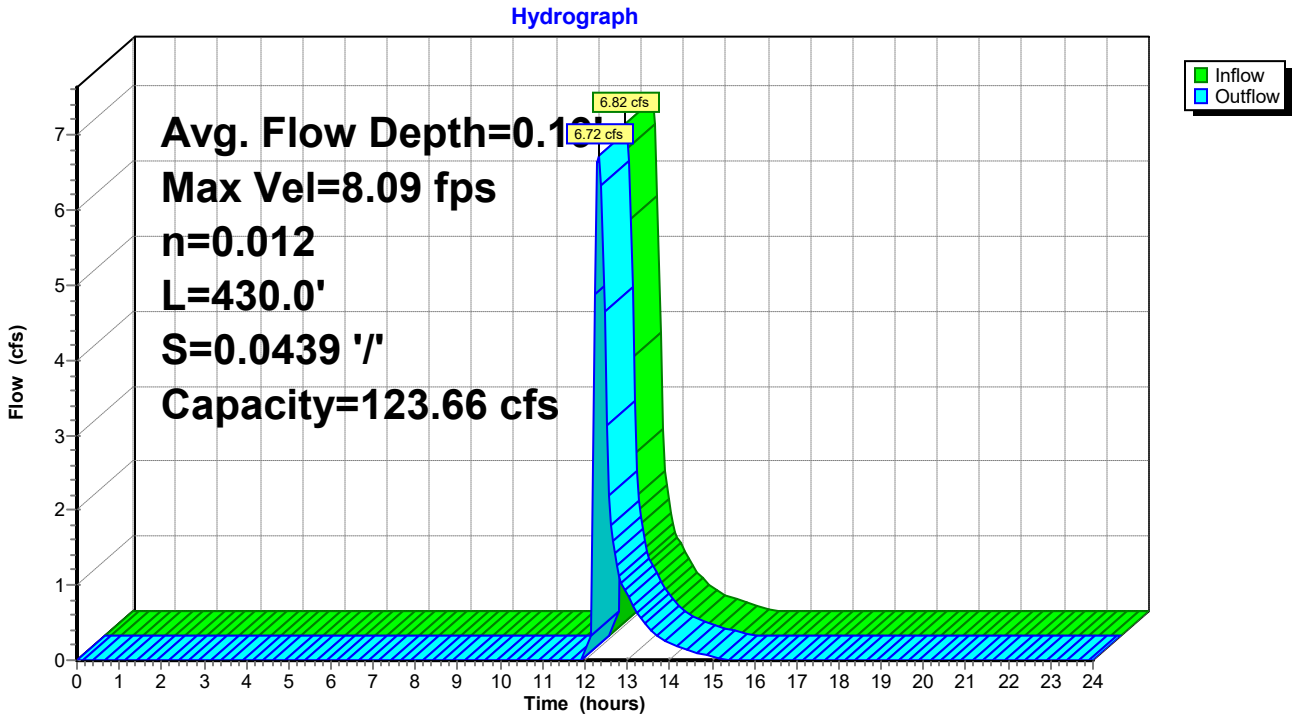
Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 8.09 fps, Min. Travel Time= 0.9 min
Avg. Velocity = 2.84 fps, Avg. Travel Time= 2.5 min

Peak Storage= 364 cf @ 12.31 hrs
Average Depth at Peak Storage= 0.19' , Surface Width= 4.77'
Bank-Full Depth= 1.00' Flow Area= 6.0 sf, Capacity= 123.66 cfs

4.00' x 1.00' deep channel, n= 0.012 Wood, Planed
Side Slope Z-value= 2.0 '/' Top Width= 8.00'
Length= 430.0' Slope= 0.0439 '/'
Inlet Invert= 241.00', Outlet Invert= 222.13'

‡

Reach 4R: Swale



Summary for Pond 2P: Forebay

[88] Warning: Qout>Qin may require smaller dt or Finer Routing

Inflow = 8.98 cfs @ 12.19 hrs, Volume= 41,729 cf
Outflow = 9.08 cfs @ 12.20 hrs, Volume= 40,414 cf, Atten= 0%, Lag= 0.5 min
Primary = 9.08 cfs @ 12.20 hrs, Volume= 40,414 cf
Routed to Pond 4P : Infiltration Basin

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 245.39' @ 12.20 hrs Surf.Area= 782 sf Storage= 1,605 cf

Plug-Flow detention time= 38.2 min calculated for 40,330 cf (97% of inflow)
Center-of-Mass det. time= 19.0 min (797.3 - 778.2)

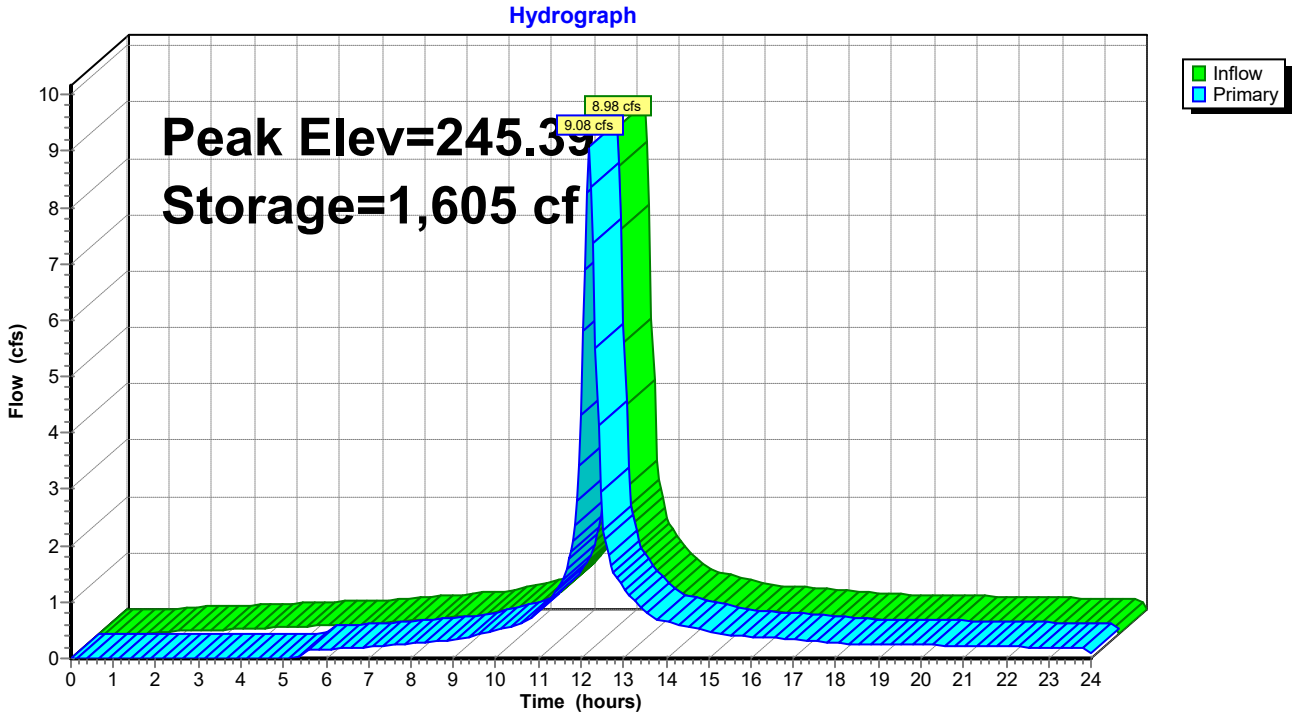
Volume	Invert	Avail.Storage	Storage Description
#1	241.00'	2,123 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
241.00	74	60.0	0	0	74
243.00	296	84.0	345	345	384
244.00	482	99.0	385	731	621
245.00	693	112.0	584	1,315	864
246.00	929	124.0	808	2,123	1,118

Device	Routing	Invert	Outlet Devices
#1	Primary	245.00'	**14.0' long + 1.5 '/' SideZ x 8.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74

Primary OutFlow Max=9.04 cfs @ 12.20 hrs HW=245.39' (Free Discharge)
1=Broad-Crested Rectangular Weir (Weir Controls 9.04 cfs @ 1.58 fps)

Pond 2P: Forebay



Summary for Pond 3P: Secondary Flow (Ignore)

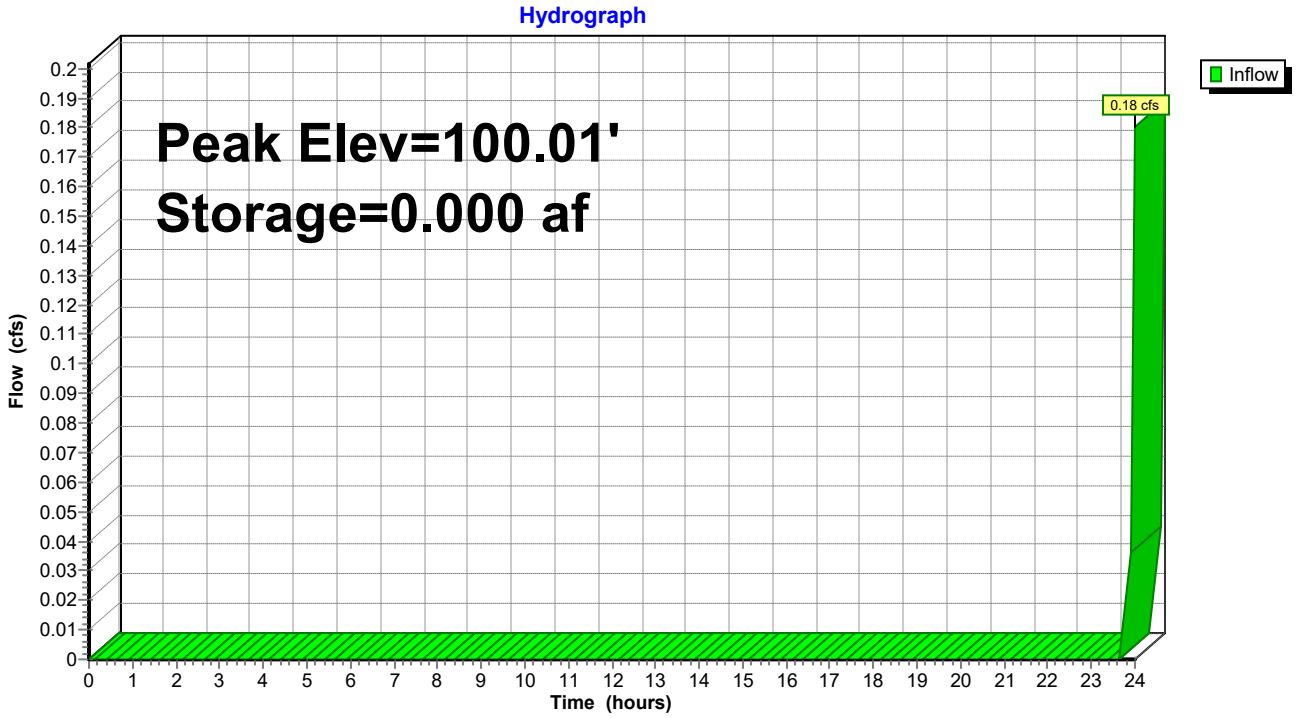
Inflow = 0.18 cfs @ 24.00 hrs, Volume= 32 cf
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 100%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 100.01' @ 24.00 hrs Surf.Area= 0.045 ac Storage= 0.000 af

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

Volume	Invert	Avail.Storage	Storage Description
#1	100.00'	922.548 af	**50.00'D x 200.00'H Vertical Cone/Cylinder Z=2.0**

Pond 3P: Secondary Flow (Ignore)



Summary for Pond 4P: Infiltration Basin

[79] Warning: Submerged Pond 2P Primary device # 1 by 0.26'

Inflow = 9.08 cfs @ 12.20 hrs, Volume= 40,414 cf
Outflow = 7.29 cfs @ 12.30 hrs, Volume= 32,730 cf, Atten= 20%, Lag= 6.0 min
Discarded = 0.47 cfs @ 12.30 hrs, Volume= 22,272 cf
Primary = 6.82 cfs @ 12.30 hrs, Volume= 10,459 cf
Routed to Reach 4R : Swale

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 245.26' @ 12.30 hrs Surf.Area= 4,809 sf Storage= 13,923 cf

Plug-Flow detention time= 205.9 min calculated for 32,662 cf (81% of inflow)
Center-of-Mass det. time= 121.4 min (918.7 - 797.3)

Volume	Invert	Avail.Storage	Storage Description
#1	239.00'	17,748 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

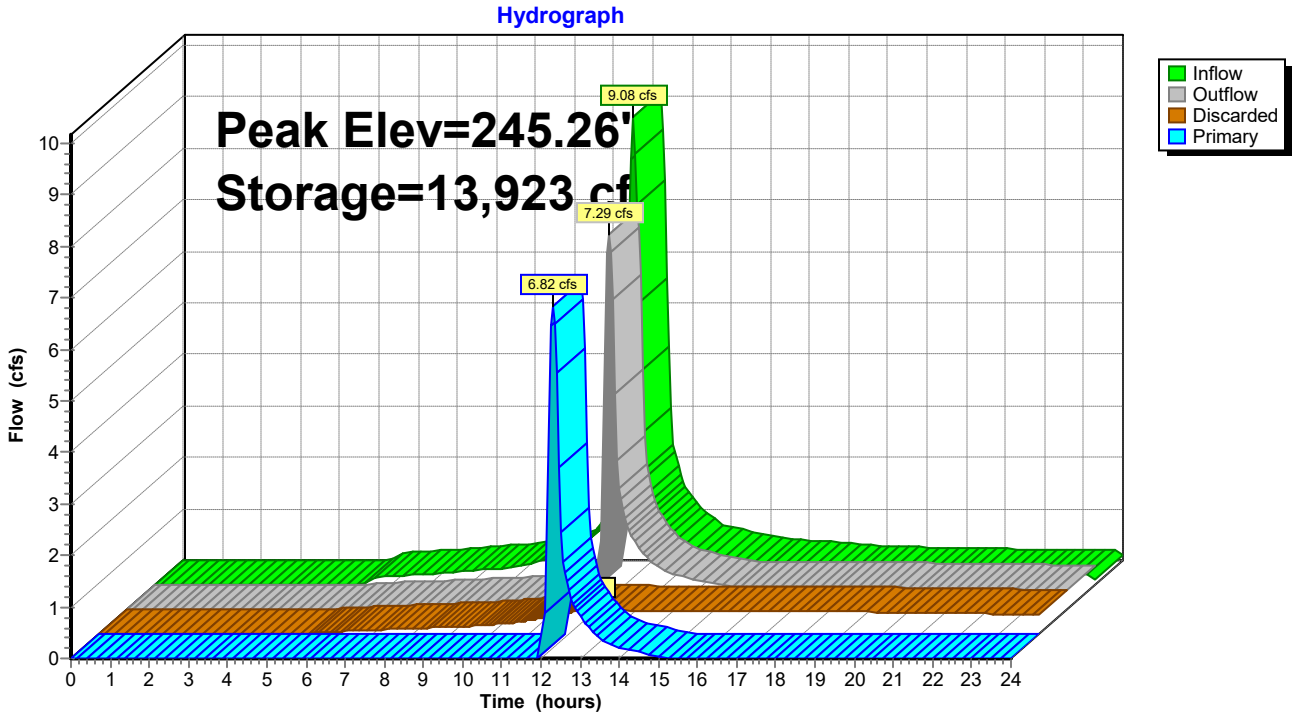
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
239.00	361	82.0	0	0	361
240.00	756	128.0	546	546	1,137
241.00	1,269	169.0	1,001	1,548	2,117
242.00	1,916	213.0	1,581	3,129	3,468
243.00	2,746	277.0	2,319	5,448	5,976
244.00	3,619	299.0	3,172	8,620	7,025
245.00	4,559	322.0	4,080	12,700	8,203
246.00	5,553	341.0	5,048	17,748	9,259

Device	Routing	Invert	Outlet Devices
#1	Primary	245.00'	**4.0" x 4.0" Horiz. Orifice/Grate X 5.00 columns** X 5 rows C= 0.600 Limited to weir flow at low heads
#2	Discarded	239.00'	**2.410 in/hr Exfiltration over Wetted area**

Discarded OutFlow Max=0.47 cfs @ 12.30 hrs HW=245.26' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 0.47 cfs)

Primary OutFlow Max=6.82 cfs @ 12.30 hrs HW=245.26' (Free Discharge)
↑—**1=Orifice/Grate** (Orifice Controls 6.82 cfs @ 2.46 fps)

Pond 4P: Infiltration Basin



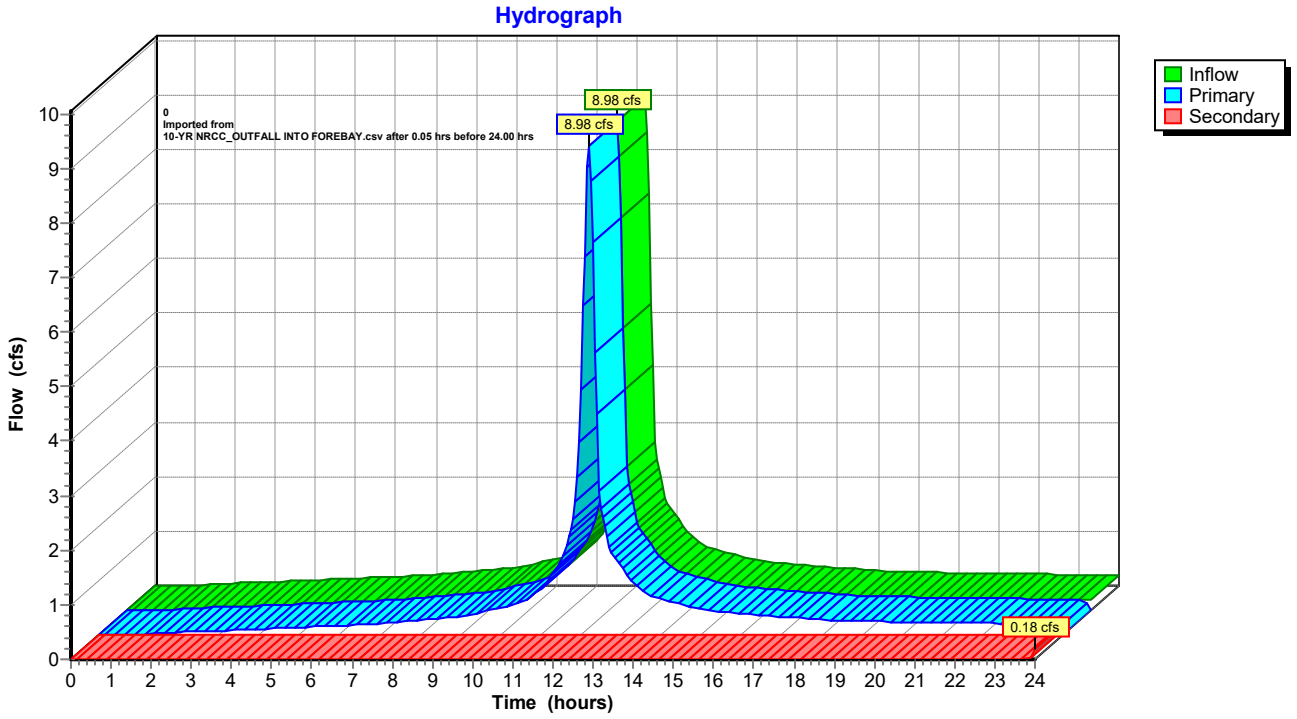
Summary for Link 1L: Inflow to Forebay

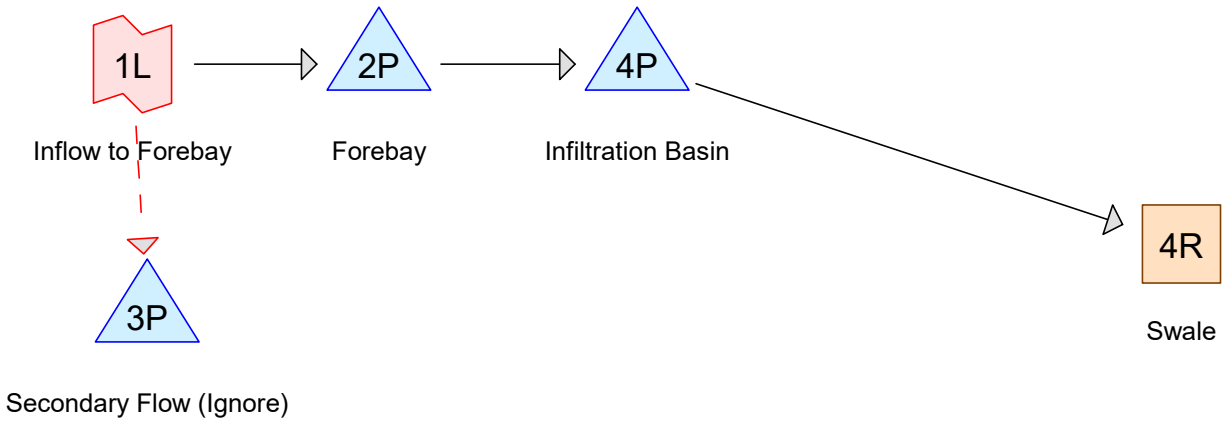
Inflow = 8.98 cfs @ 12.19 hrs, Volume= 41,762 cf
Primary = 8.98 cfs @ 12.19 hrs, Volume= 41,729 cf, Atten= 0%, Lag= 0.0 min
Routed to Pond 2P : Forebay
Secondary = 0.18 cfs @ 24.00 hrs, Volume= 32 cf
Routed to Pond 3P : Secondary Flow (Ignore)

Primary outflow = Inflow after 0.05 hrs before 24.00 hrs, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

0 Imported from 10-YR NRCC_OUTFALL INTO FOREBAY.csv

Link 1L: Inflow to Forebay





Subcat Reach Pond Link

Routing Diagram for Bellingham Pond Routing_100yr
Prepared by Chappell Engineering Associates, Printed 1/30/2024

Project Notes

Rainfall events imported from "NRCS-Rain.txt" for 4025 MA Bellingham Norfolk County

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Reach 4R: Swale Avg. Flow Depth=0.25' Max Vel=9.34 fps Inflow=10.29 cfs 37,375 cf
n=0.012 L=430.0' S=0.0439 '/' Capacity=123.66 cfs Outflow=10.23 cfs 37,375 cf

Pond 2P: Forebay Peak Elev=245.51' Storage=1,699 cf Inflow=14.22 cfs 78,055 cf
Outflow=14.11 cfs 76,740 cf

Pond 3P: Secondary Flow (Ignore) Peak Elev=100.02' Storage=0.001 af Inflow=0.43 cfs 77 cf
Outflow=0.00 cfs 0 cf

Pond 4P: Infiltration Basin Peak Elev=245.59' Storage=15,568 cf Inflow=14.11 cfs 76,740 cf
Discarded=0.49 cfs 27,541 cf Primary=10.29 cfs 37,375 cf Outflow=10.78 cfs 64,916 cf

Link 0 Imported 100-YR NRCC_OUTFALL INTO FOREBAY.csv after 0.05 hrs before 24.00 hrs Inflow=14.22 cfs 78,133 cf
Primary=14.22 cfs 78,055 cf Secondary=0.43 cfs 77 cf

Summary for Reach 4R: Swale

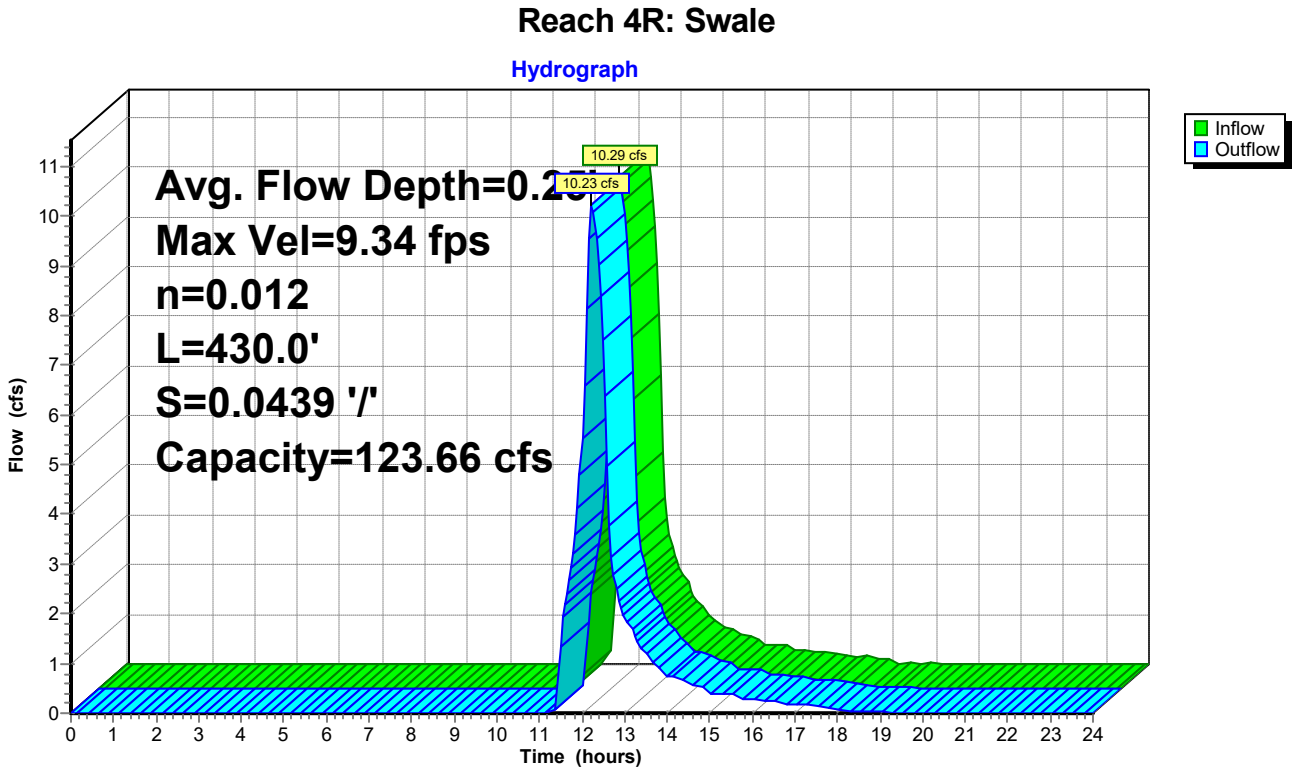
Inflow = 10.29 cfs @ 12.21 hrs, Volume= 37,375 cf
Outflow = 10.23 cfs @ 12.23 hrs, Volume= 37,375 cf, Atten= 1%, Lag= 1.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 9.34 fps, Min. Travel Time= 0.8 min
Avg. Velocity = 3.08 fps, Avg. Travel Time= 2.3 min

Peak Storage= 474 cf @ 12.22 hrs
Average Depth at Peak Storage= 0.25' , Surface Width= 4.98'
Bank-Full Depth= 1.00' Flow Area= 6.0 sf, Capacity= 123.66 cfs

4.00' x 1.00' deep channel, n= 0.012 Wood, Planed
Side Slope Z-value= 2.0 '/' Top Width= 8.00'
Length= 430.0' Slope= 0.0439 '/'
Inlet Invert= 241.00', Outlet Invert= 222.13'

‡



Summary for Pond 2P: Forebay

Inflow = 14.22 cfs @ 12.10 hrs, Volume= 78,055 cf
Outflow = 14.11 cfs @ 12.11 hrs, Volume= 76,740 cf, Atten= 1%, Lag= 0.3 min
Primary = 14.11 cfs @ 12.11 hrs, Volume= 76,740 cf
Routed to Pond 4P : Infiltration Basin

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 245.51' @ 12.11 hrs Surf.Area= 810 sf Storage= 1,699 cf

Plug-Flow detention time= 22.6 min calculated for 76,580 cf (98% of inflow)
Center-of-Mass det. time= 11.8 min (776.3 - 764.5)

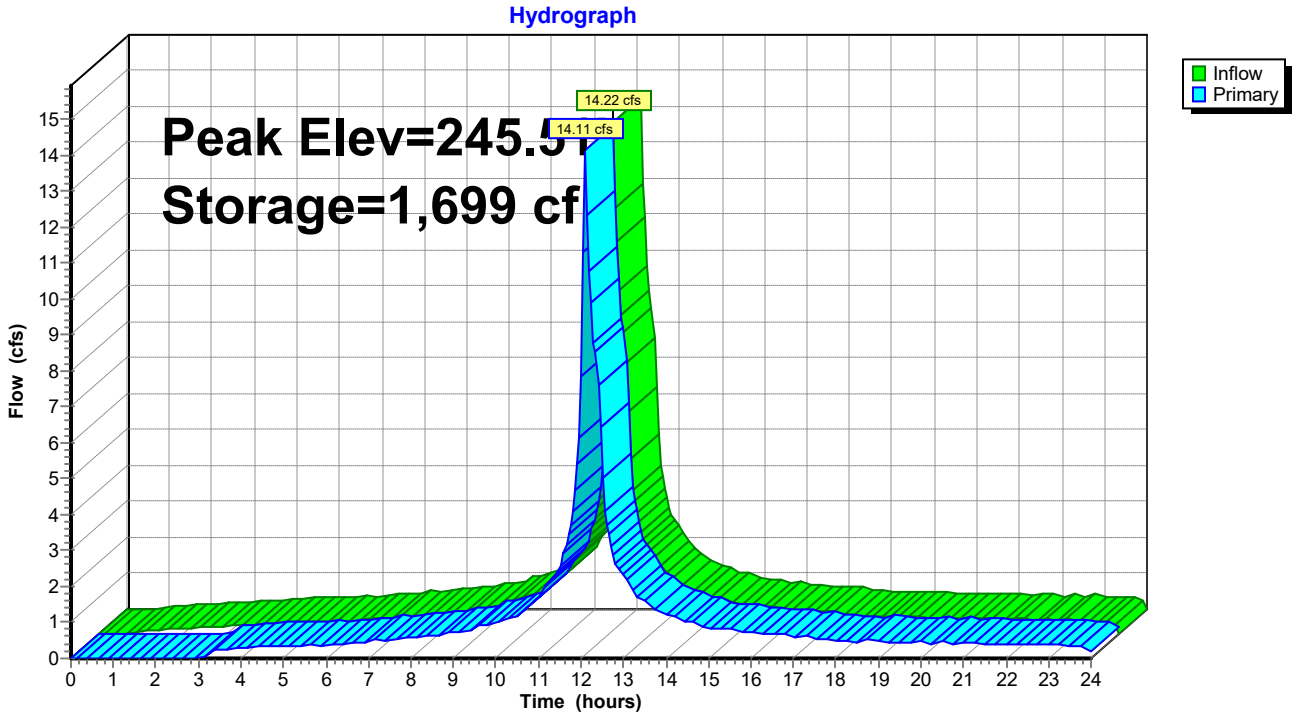
Volume	Invert	Avail.Storage	Storage Description
#1	241.00'	2,123 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
241.00	74	60.0	0	0	74
243.00	296	84.0	345	345	384
244.00	482	99.0	385	731	621
245.00	693	112.0	584	1,315	864
246.00	929	124.0	808	2,123	1,118

Device	Routing	Invert	Outlet Devices
#1	Primary	245.00'	**14.0' long + 1.5 '/' SideZ x 8.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74

Primary OutFlow Max=13.87 cfs @ 12.11 hrs HW=245.51' (Free Discharge)
1=Broad-Crested Rectangular Weir (Weir Controls 13.87 cfs @ 1.85 fps)

Pond 2P: Forebay



Summary for Pond 3P: Secondary Flow (Ignore)

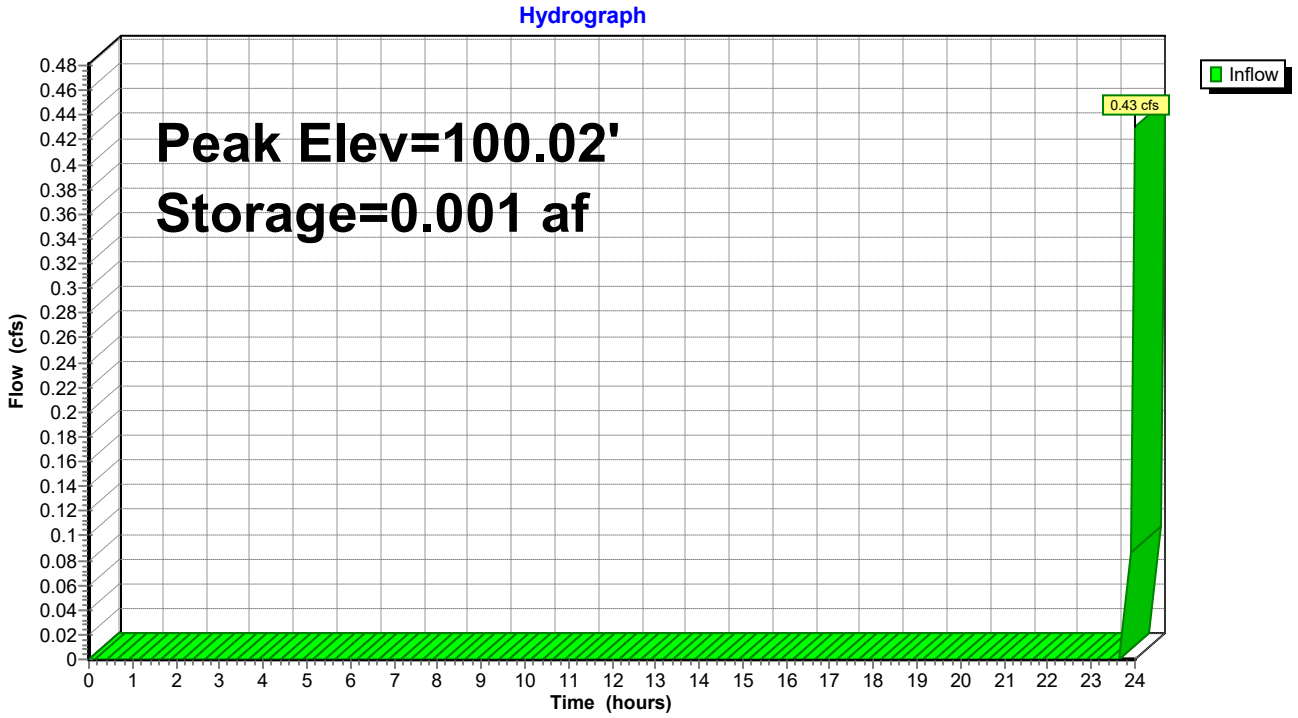
Inflow = 0.43 cfs @ 24.00 hrs, Volume= 77 cf
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 100%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 100.02' @ 24.00 hrs Surf.Area= 0.045 ac Storage= 0.001 af

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

Volume	Invert	Avail.Storage	Storage Description
#1	100.00'	922.548 af	**50.00'D x 200.00'H Vertical Cone/Cylinder Z=2.0**

Pond 3P: Secondary Flow (Ignore)



Summary for Pond 4P: Infiltration Basin

[81] Warning: Exceeded Pond 2P by 0.16' @ 12.25 hrs

Inflow	=	14.11 cfs @	12.11 hrs,	Volume=	76,740 cf
Outflow	=	10.78 cfs @	12.21 hrs,	Volume=	64,916 cf, Atten= 24%, Lag= 6.3 min
Discarded	=	0.49 cfs @	12.21 hrs,	Volume=	27,541 cf
Primary	=	10.29 cfs @	12.21 hrs,	Volume=	37,375 cf

Routed to Reach 4R : Swale

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 245.59' @ 12.21 hrs Surf.Area= 5,135 sf Storage= 15,568 cf

Plug-Flow detention time= 136.2 min calculated for 64,916 cf (85% of inflow)
Center-of-Mass det. time= 59.0 min (835.3 - 776.3)

Volume	Invert	Avail.Storage	Storage Description
#1	239.00'	17,748 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

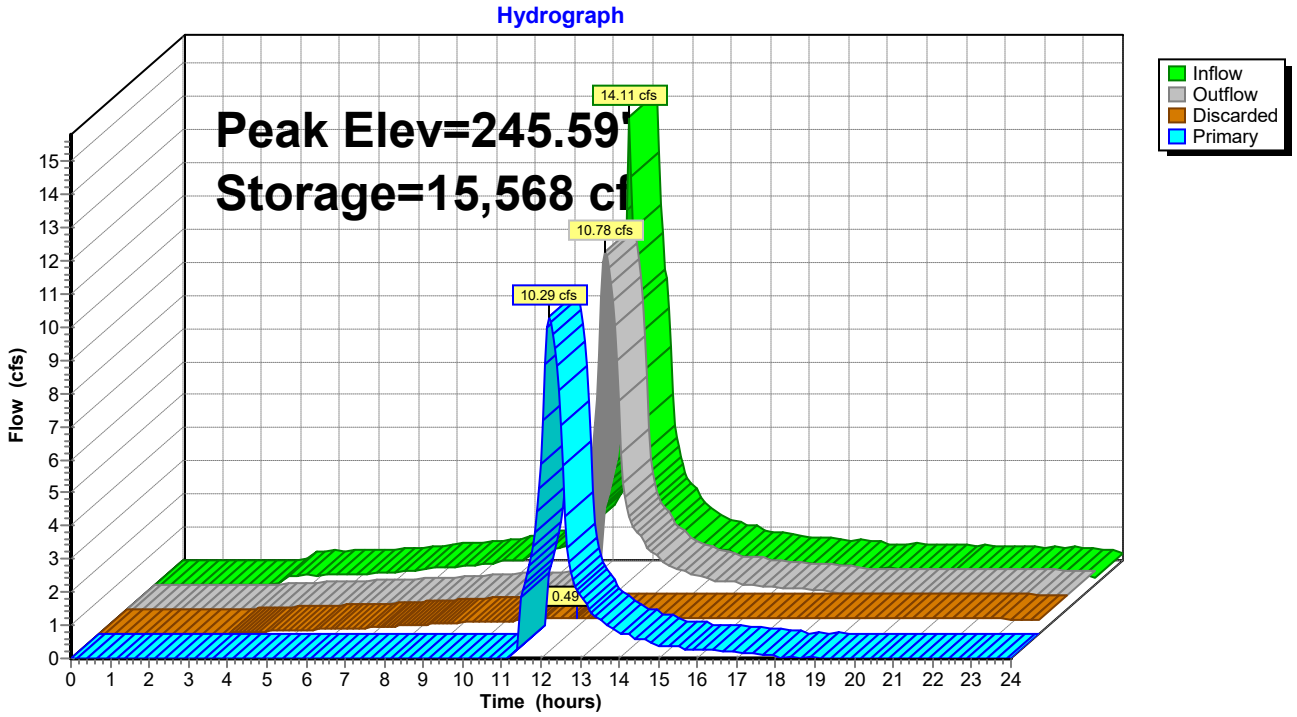
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
239.00	361	82.0	0	0	361
240.00	756	128.0	546	546	1,137
241.00	1,269	169.0	1,001	1,548	2,117
242.00	1,916	213.0	1,581	3,129	3,468
243.00	2,746	277.0	2,319	5,448	5,976
244.00	3,619	299.0	3,172	8,620	7,025
245.00	4,559	322.0	4,080	12,700	8,203
246.00	5,553	341.0	5,048	17,748	9,259

Device	Routing	Invert	Outlet Devices
#1	Primary	245.00'	**4.0" x 4.0" Horiz. Orifice/Grate X 5.00 columns** X 5 rows C= 0.600 Limited to weir flow at low heads
#2	Discarded	239.00'	**2.410 in/hr Exfiltration over Wetted area**

Discarded OutFlow Max=0.49 cfs @ 12.21 hrs HW=245.59' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 0.49 cfs)

Primary OutFlow Max=10.26 cfs @ 12.21 hrs HW=245.59' (Free Discharge)
↑—**1=Orifice/Grate** (Orifice Controls 10.26 cfs @ 3.69 fps)

Pond 4P: Infiltration Basin



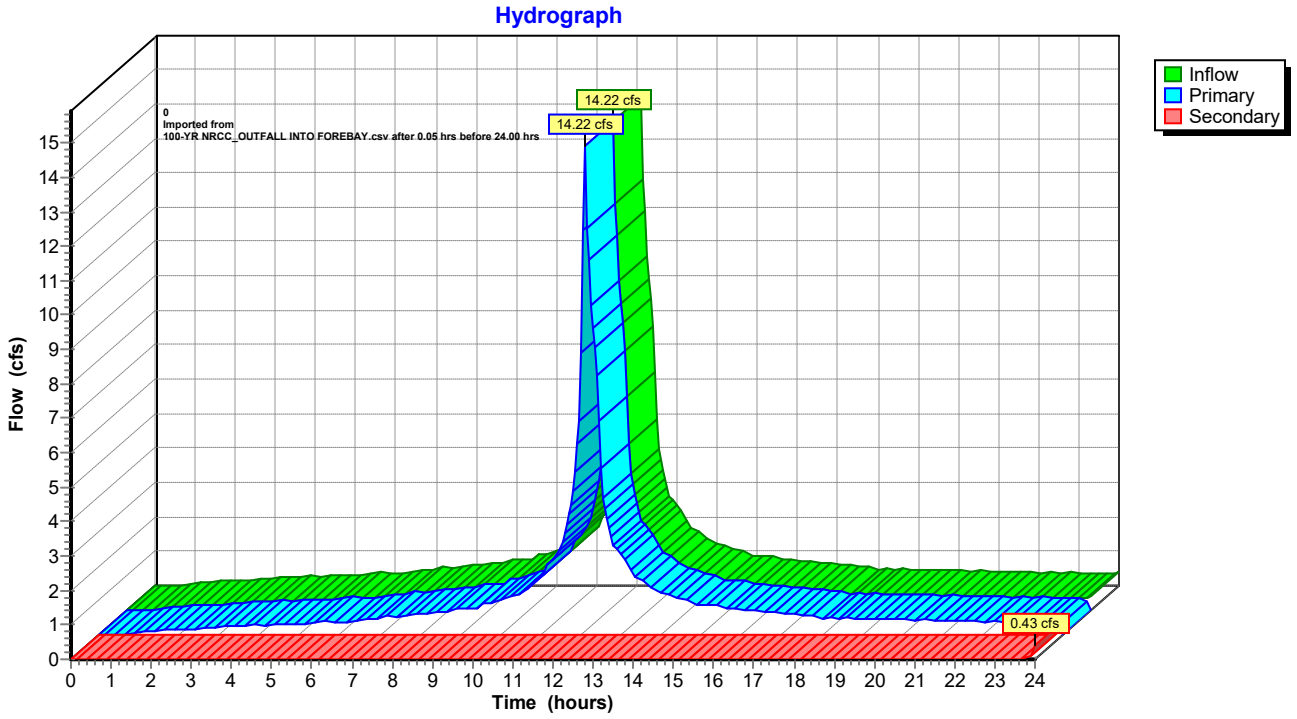
Summary for Link 1L: Inflow to Forebay

Inflow = 14.22 cfs @ 12.10 hrs, Volume= 78,133 cf
Primary = 14.22 cfs @ 12.10 hrs, Volume= 78,055 cf, Atten= 0%, Lag= 0.0 min
Routed to Pond 2P : Forebay
Secondary = 0.43 cfs @ 24.00 hrs, Volume= 77 cf
Routed to Pond 3P : Secondary Flow (Ignore)

Primary outflow = Inflow after 0.05 hrs before 24.00 hrs, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

0 Imported from 100-YR NRCC_OUTFALL INTO FOREBAY.csv

Link 1L: Inflow to Forebay



Appendix G

Hydrodynamic Separator Information

John Salisbury

From: Keith Lincoln
Sent: Wednesday, July 10, 2024 2:55 PM
To: Joshua Stackhouse; Philippe Jean-Baptiste
Cc: John Salisbury
Subject: RE: [EXTERNAL] Updated Drainage Info

Thank you! This is very helpful!

Keith Lincoln, PE
Chappell Engineering Associates, LLC
Chief Civil Engineer
201 Boston Post Road West, Suite 101
Marlboro, MA 01752
(857)998-2577 (Cell)
(508)481-7400 (office)

CEA Secure Upload

From: Joshua Stackhouse <Joshua.Stackhouse@ContechES.com>
Sent: Wednesday, July 10, 2024 2:54 PM
To: Keith Lincoln <klincoln@chappellengineering.com>; Philippe Jean-Baptiste <pjeanbaptiste@chappellengineering.com>
Cc: John Salisbury <jsalisbury@chappellengineering.com>
Subject: RE: [EXTERNAL] Updated Drainage Info

Hi Keith,

Please see attached details of the different models referenced below – I forgot to include these to aid in your conversation with the Town.

Thanks,

Josh Stackhouse
Stormwater Consultant

Mob: 207.219.9110
www.conteches.com

Book time to meet with me

From: Keith Lincoln <klincoln@chappellengineering.com>
Sent: Wednesday, July 10, 2024 2:51 PM
To: Joshua Stackhouse <Joshua.Stackhouse@ContechES.com>; Philippe Jean-Baptiste <pjeanbaptiste@chappellengineering.com>

Cc: John Salisbury <jsalisbury@chappellengineering.com>
Subject: RE: [EXTERNAL] Updated Drainage Info

Thank you Josh! I will be back in touch after reviewing this with the Town.
Keith

Keith Lincoln, PE
Chappell Engineering Associates, LLC
Chief Civil Engineer
201 Boston Post Road West, Suite 101
Marlboro, MA 01752
(857)998-2577 (Cell)
(508)481-7400 (office)

CEA Secure Upload

From: Joshua Stackhouse <Joshua.Stackhouse@ContechES.com>
Sent: Wednesday, July 10, 2024 2:48 PM
To: Keith Lincoln <klincoln@chappellengineering.com>; Philippe Jean-Baptiste <pjeanbaptiste@chappellengineering.com>
Cc: John Salisbury <jsalisbury@chappellengineering.com>
Subject: RE: [EXTERNAL] Updated Drainage Info

Hi Keith,

I can understand the maintenance concern, as long as the Town understands that a hydrodynamic separator will not provide appreciable nutrient reductions. I have a couple of options for HDS practices. To treat 1.52 cfs and provide 80% TSS reduction, I would propose the following:

Cascade CS-4, rated for 2.0 cfs, with a budget cost of $13k. Sediment storage capacity of 19 CF.
Cascade CS-5, rated for 3.5 cfs, with a budget cost of $17.5k. Sediment storage capacity of 29 CF.
CDS2020-5, rated for 2.2 cfs, with a budget cost of $21k. Sediment storage capacity of 39 CF.
Stormceptor STC2400, rated for 1.58 cfs, with a budget cost of $32k. Sediment storage capacity of 205 CF.

Let me know what option you would like to move forward with and I can pull together TSS calcs to support that system for you.

Thanks,

Josh Stackhouse
Stormwater Consultant

Mob: 207.219.9110
www.conteches.com

Book time to meet with me

From: Keith Lincoln <klincoln@chappellengineering.com>
Sent: Wednesday, July 10, 2024 7:43 AM

To: Joshua Stackhouse <Joshua.Stackhouse@ContechES.com>; Philippe Jean-Baptiste <pjeanbaptiste@chappellengineering.com>
Cc: John Salisbury <jsalisbury@chappellengineering.com>
Subject: RE: [EXTERNAL] Updated Drainage Info

Good Morning Josh,
We have made a little progress with the Town of Bellingham and the project continues to move forward. We have been asked to change to a hydrodynamic separator by the Town for maintenance reasons. They are currently equipped to maintain the Stormceptor model and have asked that we switch from the jellyfish to stormceptor. Could you please provide us with the model number that we should use based upon the flows we had previously provided?

Here is the updated drainage info you requested:

- Peak flow in pipe: 1.52 cfs (based on 1" storm)
- Contributing Impervious Area: 135087 SF
- Contributing Total Area: 358817 SF

Thank you!
Keith

Keith Lincoln, PE
Chappell Engineering Associates, LLC
Chief Civil Engineer
201 Boston Post Road West, Suite 101
Marlboro, MA 01752
(857)998-2577 (Cell)
(508)481-7400 (office)

CEA Secure Upload

From: Joshua Stackhouse <Joshua.Stackhouse@ContechES.com>
Sent: Monday, April 1, 2024 2:39 PM
To: Philippe Jean-Baptiste <pjeanbaptiste@chappellengineering.com>; Keith Lincoln <klincoln@chappellengineering.com>
Subject: RE: [EXTERNAL] Updated Drainage Info

Hi Phil,

I don't see any immediate red flags in this layout. I sketched in the center wall of the vault, and adjusted the inlet location to be on the upslope side, but it could easily be on the other side as well. The ideal grade to outlet invert depth is 6', so if you want to move the unit up or down the pipe to achieve this it will help keep the costs lower. For that matter, given the location, the top of the vault could likely be above grade a little to provide the inside height needed for maintenance if your elevations are shallow. The wooded location would make this less of an aesthetic issue.

Thanks,

Josh Stackhouse
Stormwater Consultant

Mob: 207.219.9110
www.conteches.com

From: Philippe Jean-Baptiste <pjeanbaptiste@chappellengineering.com>
Sent: Monday, April 1, 2024 1:58 PM
To: Joshua Stackhouse <Joshua.Stackhouse@ContechES.com>; Keith Lincoln <klincoln@chappellengineering.com>
Subject: RE: [EXTERNAL] Updated Drainage Info

Hello Josh,

Based on the facts you provided in your email; it seems that the jellyfish is the way to go. Keith and I are now wondering if the jellyfish would work based on our site conditions.

I attached a PDF with existing grades and proposed locations for the jellyfish, please take a look at it and let us know your thoughts. The work we are concerned with is on the bottom left on the PDF. Based on the jellyfish design (inlet and outlet locations), would it work in this location? Please markup the PDF as much as you would like, it was just something quick I drew for us all to look at.

Thank you,
Phil

Philippe Jean-Baptiste, E.I.T.
Project Engineer
Chappell Engineering Associates, LLC
201 Boston Post Road West, Suite 101
Marlboro, MA 01752
(508)481-7400
(774)242-4333

From: Joshua Stackhouse <Joshua.Stackhouse@ContechES.com>
Sent: Thursday, March 28, 2024 3:18 PM
To: Philippe Jean-Baptiste <pjeanbaptiste@chappellengineering.com>; Keith Lincoln <klincoln@chappellengineering.com>
Subject: RE: [EXTERNAL] Updated Drainage Info

Keith and Phil,

Here is what I came up with for this. For the Jellyfish, the large contributing drainage area will generate a significant mass load to be captured, such that it necessitates more cartridges than treating the 1.52 cfs, but not by much. As a result, I would recommend the larger Jellyfish – this would be a JFPD0806-10-2, and could treat up to 1.96 cfs before bypassing internally. This option would have a budget cost of $90k - $95k, depending on elevations.

The Filterra option would be a Bioscape system that is built in the field. I modified the Tc in HydroCAD to arrive at the same incoming flow rate and arrived at a 10’ x 39’ system. Budget cost for this would be significantly more, around $140k or so, making the Jellyfish option better for both cost and space requirements.

Let me know what else you need to finalize a direction to proceed, and what other things I can provide.

Thanks,

Josh Stackhouse
Stormwater Consultant

Mob: 207.219.9110
www.conteches.com

From: Philippe Jean-Baptiste <pjeanbaptiste@chappellengineering.com>
Sent: Thursday, March 28, 2024 10:32 AM
To: Joshua Stackhouse <Joshua.Stackhouse@ContechES.com>
Cc: Keith Lincoln <klincoln@chappellengineering.com>
Subject: [EXTERNAL] Updated Drainage Info

Good Morning Josh,

Here is the updated drainage info you requested:

- Peak flow in pipe: 1.52 cfs (based on 1" storm)
- Contributing Impervious Area: 135087 SF
- Contributing Total Area: 358817 SF

Please let us know if you have any questions or if you need anything else.

Thanks,
Phil

Philippe Jean-Baptiste, E.I.T.
Project Engineer
Chappell Engineering Associates, LLC
201 Boston Post Road West, Suite 101
Marlboro, MA 01752
(508)481-7400
(774)242-4333

SWEMA FACT SHEET

Hydrodynamic Separators

www.stormwaterassociation.com

Hydrodynamic separators (HDS), also known as oil/grit separators (OGS), are widely deployed as stormwater treatment BMPs, both in stand-alone applications and as pretreatment devices in a treatment train. HDS target the removal of high specific gravity suspended solids (such as sand, grit, and degraded asphalt), as well as free-floating oil and grease and trash and debris.

HDS are typically vertically oriented cylinders (manholes) or multi-chambered rectangular vaults that contain a permanent pool of water in the treatment chamber. HDS may use special components such as baffles, weirs, and screens to direct the flow path, attenuate water velocity, and enhance the settling of particulates and the capture of oil and other floatables. Often HDS utilize internal bypass features to prevent or minimize resuspension and washout of previously captured pollutants.

The primary treatments mechanisms used in HDS are gravity separation and spill capture. High specific gravity particulates settle by gravity to the sump of the device, with low specific gravity oil, trash, and debris float to the surface and are trapped. Normally there is sufficient floatables storage for the device to capture and retain an oil or fuel spill of substantial volume until maintenance can be performed to recover the spilled hydrocarbons.

Maintenance of HDS is typically performed with a vacuum truck to evacuate captured sediment and floatables from the unit. Maintenance is normally performed from the surface, without need for confined space entry. Depending on the loading from the site, maintenance frequency will typically range from once per year to once every 3-5 years. For the longer maintenance intervals, it is important to ensure that there is adequate storage capacity for accumulated sediment, and annual inspection is highly recommended.

The primary advantages HDS include good capture of sand and grit at relatively high surface loading rates, capture of floatable pollutants, capture of oil and fuel spills, and relatively simple and low cost maintenance. Additionally, since HDS are typically installed underground, treatment can be provided without consuming valuable developable land. Internal bypass features also reduce the total system footprint since additional manholes and diversions structures are not required for external bypassing of very high flow rates during the most intense storms. HDS are very effective pretreatment for other BMPs such as stormwater ponds, bioretention, filter devices, detention structures, and infiltration, and can significantly extend the maintenance interval for these downstream measures.

There are limitations to HDS treatment effectiveness. TSS and floatables capture is sensitive to the flow rate and detention time within the device, as longer detention time results in better removal of pollutants. Generally, HDS provides relatively low and variable capture of fine particulates (< 50 microns) and particulate-bound pollutants (metals, nutrients, hydrocarbons, bacteria) that are concentrated on the fine particle fractions, except at low surface loading rates during low intensity storms and during inter-event settling periods. HDS can be conservatively sized with a larger structure to provide additional detention time and improved capture of the fine particu-

Hydrodynamic Separators

late fractions. Neutrally buoyant pollutants (specific gravity similar to water, typically organic particulates) are difficult to remove with HDS.

Hydrodynamic Separator Maintenance

Before commencing maintenance activities contact the manufacturer of the device to be maintained for any specific maintenance instructions. Prior to conducting any work on site all personnel must don appropriate high visibility vests, and as required, hard hats, steel-toed safety boots and safety glasses. Immediately upon arrival at the work site position all traffic control devices to ensure safety for motorists and pedestrians.

Remove any and all manhole covers to access the units being maintained. On a pre-prepared inspection report note all site conditions and device conditions. The report should include observations regarding the stability of the watershed contributing to the device in regards to landscaped areas, i.e. is there erosion occurring? Or are there any conditions present that may bring large quantities of sediment and debris to the unit? Observations should also be made in regards to the construction of the unit and notes taken if there is damage, undue wear or any other noteworthy items. Using the manhole frame as a reference point, a tape measure or other graduated measuring device should be used to take note of the depth to any accumulated sediment pile.

Typically the maintenance of most hydrodynamic separators requires the use of a vacuum truck equipped with a water supply and a high pressure water spray. With that type of equipment the accumulated solids may be removed through the manufacturer supplies access to the sump of the device. During and after the vacuum operation a high pressure water spray should be used to wash sediment and debris from all surfaces of the device into the sump where it may be vacuumed out.

After all surfaces have been washed clean and the debris and sediment has been removed from the unit a measurement from the same reference point used above should be made to the bottom of the device. Subtracting the first measurement from the top of the sediment pile from the total unit depth will result in the depth of accumulated sediment. This depth should be noted on the inspection report.

Return manhole covers to their original position, sweep and remove any sediment and debris from the maintenance area and remove all traffic control devices.

Appendix H
Abutter Notification

CHAPPELL ENGINEERING ASSOCIATES, LLC
Civil • Structural • Land Surveying

January 22, 2024

Assessment Administration Office
Municipal Center – 10 Mechanic Street
Bellingham, MA 02019
508-657-2862 * FAX 508-657-2894
Email: Assessors@bellinghamma.org

Dear Sir or Madam:

Chappell Engineering Associates, LLC, on behalf of the Town of Bellingham is the Design Engineers for the Hartford Avenue at Main Street (Route 126) intersection widening. In part of the 75% design and because of the Adjacent Bordering Vegetation Wetlands (BVW) resources areas, a Notice of Intent (NOI) must be filed with Massachusetts Department of Environmental Protection and the Town of Bellingham Conservation Commission. As part of the Town of Bellingham local by-laws, Abutter notification is required of the project.

The Town of Bellingham is proposing safety improvements along the corridor of Hartford Avenue (Route 126) starting at the intersection of Hartford Avenue at Cedar Hill Road and North Main Street and ending at the Route 126 bridge over I-495 southbound in the Town of Bellingham. The project proposes safety and capacity improvements to the corridor and interchange ramps as well through this very congested section of roadway.

The attached are copies of the Request List of Abutters, USGS Topo and Aerial maps identified by Chappell Engineering Associates, LLC within the project limits and the 100-foot buffer zone. Since we are working for the town on this project, can the $20.00 fee please be waived? For more information or questions please contact John Salisbury at 617-335-4093.

Sincerely,

MMorris

Mortee Morris
Assistant Engineer

TOWN OF BELLINGHAM

ASSESSMENT ADMINISTRATION OFFICE
Bellingham Municipal Center
10 Mechanic St.
BELLINGHAM, MA 02019
PHONE (508) 657-2862 FAX (508) 657-2894

Date of Application January 22, 2024

REQUEST FOR LIST OF ABUTTERS

A $20.00 Fee PER LIST is required to process your request. Payment is due at the time of submission of this form. Fees apply to the preparation of a new list or verification or reverification on an existing or expired list. Please allow up to 10 business days from the date of payment and submission of the form for the Assessors office to complete the processing of your request. Checks/Money Orders are made out to: "The Town of Bellingham". Cash payments are accepted in person.

Please indicate with a check

- [ ] **Immediate Abutters-Selectboard**
- [ ] **Abutter to Abutter within 300 feet -Zoning Board**
- [ ] **Abutter to Abutter within 300 feet -Planning Board**
- [x] **Abutters withing 100 feet - Conservation Commission**
- [ ] **Other – please specify:** _____

Map 24 **Parcel(s)** 4,5,6,7,8,9,9-200,9-100,9-2500,12,13,14,15,21,22

Chappell Engineering Associates, LLC
Applicant (please print)

Hartford Ave (Route 126)
Location of Property

Mortee Morris
Signature of Applicant

201 Boston Post Road, Suite 101, Marlborough, MA 01752
Mailing Address of Applicant

617-335-4093 or 508-481-7400
Telephone Number

ABUTTERS LIST IS VALID FOR THIRTY (30) DAYS AFTER COMPLETION

TOWN OF BELLINGHAM

ASSESSMENT ADMINISTRATION OFFICE
Bellingham Municipal Center
10 Mechanic St.
BELLINGHAM, MA 02019
PHONE (508) 657-2862 FAX (508) 657-2894

Date of Application January 22, 2024

REQUEST FOR LIST OF ABUTTERS

A $20.00 Fee PER LIST is required to process your request. Payment is due at the time of submission of this form. Fees apply to the preparation of a new list or verification or reverification on an existing or expired list. Please allow up to 10 business days from the date of payment and submission of the form for the Assessors office to complete the processing of your request. Checks/Money Orders are made out to: "The Town of Bellingham". Cash payments are accepted in person.

Please indicate with a check

- [ ] **Immediate Abutters-Selectboard**
- [ ] **Abutter to Abutter within 300 feet -Zoning Board**
- [ ] **Abutter to Abutter within 300 feet -Planning Board**
- [x] **Abutters withing 100 feet - Conservation Commission**
- [ ] **Other – please specify:** _____

Map 24 **Parcel(s)** 4,5,6,7,8,9,9-200,9-100,9-2500,12,13,14,15,21,22

Chappell Engineering Associates, LLC
Applicant (please print)

Hartford Ave (Route 126)
Location of Property

Mortee Morris
Signature of Applicant

201 Boston Post Road, Suite 101, Marlborough, MA 01752
Mailing Address of Applicant

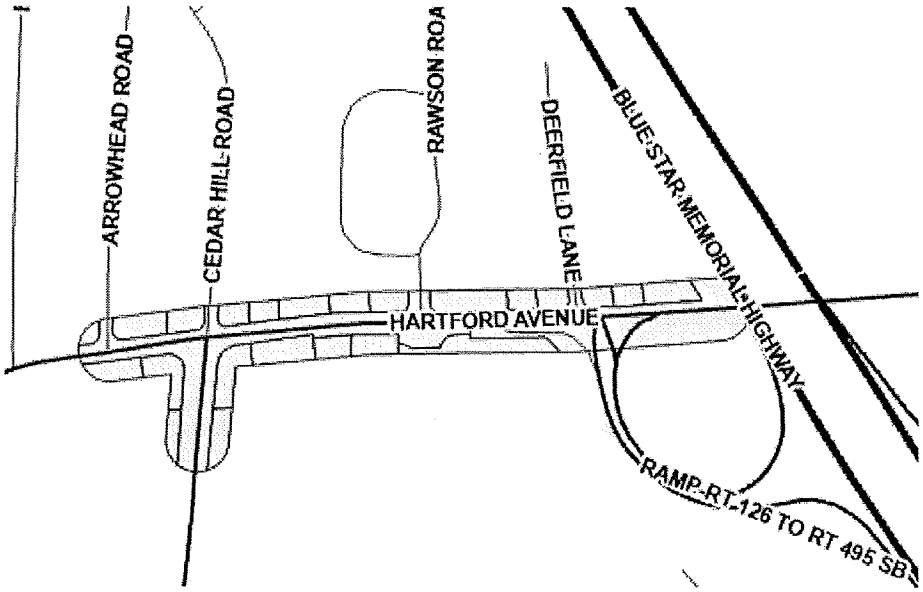
617-335-4093 or 508-481-7400
Telephone Number

ABUTTERS LIST IS VALID FOR THIRTY (30) DAYS AFTER COMPLETION

Cournoyer, Betsy

From: David Ahnert
Sent: Tuesday, January 30, 2024 11:00 AM
To: Riedle, Jesse
Cc: Cournoyer, Betsy; Sean Harrington
Subject: RE: Request List of Abutters
Attachments: Par23poly_Hartf100.xlsx

Betsy,
Here is the listing we spoke about. Let me know if you need more information.



Thanks,

David R. Ahnert - GIS Coordinator, MS4-SCP
Town of Bellingham-DPW
O: 508-966-5813
C: 339-229-3690
Extension: 2723

From: Riedle, Jesse <JRiedle@bellinghamma.org>
Sent: Wednesday, January 24, 2024 6:03 PM
To: David Ahnert <DAhnert@bellinghamma.org>
Cc: Cournoyer, Betsy <BCournoyer@bellinghamma.org>; Sean Harrington <SHarrington@bellinghamma.org>
Subject: FW: Request List of Abutters

David,

Please provide Betsy with assistance on obtaining a list of abutters.

Thank you,

167 HARTFORD AVE BELLINGH
52 MILLBURY ST
GRAFTON, MA 01519

CHAUVIN, ALLANNA M & PETE
149 HARTFORD AV
BELLINGHAM, MA 02019

CONDON, JOSEPH C SR
6 ARROWHEAD RD
BELLINGHAM, MA 02019

CORMIER, FRED H
THOMAS, DARLENE R
159 HARTFORD AV
BELLINGHAM, MA 02019

GAUCHER, JENNIFER
17 DEERFIELD LN
BELLINGHAM, MA 02019

GRAHAM, CHRISTOPHER & KAR
1 RAWSON RD
BELLINGHAM, MA 02019

HARTFORD AV ASSOCIATES LT
C/O WS ASSET MGMT INC
33 BOYLSTON ST SUITE 3000
CHESTNUT HILL, MA 02467

HARTFORD REALTY TRUST
C/O ALEXANDER HARCOVITZ
256 ORCHARD ST
MILLIS, MA 02054

LADOUCEUR FAM REV LIV TRU
LADOUCEUR, KIMBERLY ANN
4 SAGAMORE RD
BELLINGHAM, MA 02019

MENDEZ JORGE ALBERTO & MA
6 DEERFIELD LN
BELLINGHAM, MA 02019

MONTEIRO, LINDO F & MICHE
4 CEDAR HILL RD
BELLINGHAM, MA 02019

MURRAY, NICHOLAS ROBERT &
BEITER, LYDIA
7 FARM ST
BELLINGHAM, MA 02019

NORTON, TIMOTHY M
7 CEDAR HILL RD
BELLINGHAM, MA 02019

OBRIEN, TIMOTHY C
3 FARM ST
BELLINGHAM, MA 02019

PERRY RANDAL S-L/E
PERRY WALTER A
5 DEERFIELD LN
BELLINGHAM, MA 02019

PINEAU, LOUIS W + JOYCE C
13 DEERFIELD LN
BELLINGHAM, MA 02019

RTE. 85 REALTY CORP.
8 UXBRIDGE RD
MENDON, MA 01756

SCHIAVUZZO CATALDO & CARO
9 DEERFIELD LN
BELLINGHAM, MA 02019

VARNEY BROS SAND + GRAVEL
PO BOX 94
BELLINGHAM, MA 02019

WRIGHT, BRADLEY W
NAVA-WRIGHT, LESLIE M
5 WELKER WY
BELLINGHAM, MA 02019

8 foot Abutters List Report

Bellingham, MA
January 30, 2024

Subject Properties:

Parcel Number: 0018-0081-0000
CAMA Number: 0018-0081-0000
Property Address: 216 HARTFORD AV

Mailing Address: VIANA, CELSO C
216 HARTFORD AV
BELLINGHAM, MA 02019

Parcel Number: 0018-0082-0000
CAMA Number: 0018-0082-0000
Property Address: 2 DEERFIELD LN

Mailing Address: DOS SANTOS, HENRIQUE A TEIXEIRA, PEDRO HENRIQUE B
2 DEERFIELD LN
BELLINGHAM, MA 02019

Parcel Number: 0018-0097-0000
CAMA Number: 0018-0097-0000
Property Address: 1 DEERFIELD LN

Mailing Address: PAOLINO, ROBERT A + DEBRA L
1 DEERFIELD LN
BELLINGHAM, MA 02019

Parcel Number: 0018-0098-0000
CAMA Number: 0018-0098-0000
Property Address: 222 HARTFORD AV

Mailing Address: DESOUSA, ELDINEI R
222 HARTFORD AV
BELLINGHAM, MA 02019

Parcel Number: 0018-0099-0000
CAMA Number: 0018-0099-0000
Property Address: 224 HARTFORD AV

Mailing Address: DONNELLY, JEANNE M DALOIA, VICTOR P
224 HARTFORD AV
BELLINGHAM, MA 02019

Parcel Number: 0024-0004-0000
CAMA Number: 0024-0004-0000
Property Address: 178 HARTFORD AV

Mailing Address: EFB WHITEBURN CORPORATION
PO BOX 315
MILBURY, MA 01527

Parcel Number: 0024-0006-0000
CAMA Number: 0024-0006-0000
Property Address: 186 HARTFORD AV

Mailing Address: 296 MAIN LLC
PO BOX 444
MENDON, MA 01756

Parcel Number: 0024-0007-0000
CAMA Number: 0024-0007-0000
Property Address: 190 HARTFORD AV

Mailing Address: 217 RIVER ROAD LLC
8 UXBRIDGE RD
MENDON, MA 01756

Parcel Number: 0024-0008-0000
CAMA Number: 0024-0008-0000
Property Address: 194 HARTFORD AV

Mailing Address: 217 RIVER ROAD LLC
8 UXBRIDGE RD
MENDON, MA 01756

Parcel Number: 0024-0009-0000
CAMA Number: 0024-0009-0000
Property Address: 198 HARTFORD AV

Mailing Address: 217 RIVER ROAD LLC
8 UXBRIDGE RD
MENDON, MA 01756

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8 foot Abutters List Report

Bellingham, MA
January 30, 2024

Parcel Number:	0024-0009-0100	Mailing Address:	ROTH, QUINT H + HUISON
CAMA Number:	0024-0009-0100		2 RAWSON RD
Property Address:	2 RAWSON RD		BELLINGHAM, MA 02019

Parcel Number:	0024-0009-0200	Mailing Address:	MORKOS IBRAHIM T & NAWAL
CAMA Number:	0024-0009-0200		202 HARTFORD AV
Property Address:	202 HARTFORD AV		BELLINGHAM, MA 02019

Parcel Number:	0024-0009-2500	Mailing Address:	RUELAS, EMMANUEL MARTINEZ
CAMA Number:	0024-0009-2500		210 HARTFORD AV
Property Address:	210 HARTFORD AV		BELLINGHAM, MA 02019

Parcel Number:	0024-0012-0000	Mailing Address:	BELLINGHAM N MAIN ST II LLC C/O WS
CAMA Number:	0024-0012-0000		ASSET MGMT INC
Property Address:	217 HARTFORD AV		33 BOYLSTON ST SUITE 3000
			CHESTNUT HILL, MA 02467

Parcel Number:	0024-0013-0000	Mailing Address:	HESS REALTY LLC PROPERTY TAX
CAMA Number:	0024-0013-0000		DEPT
Property Address:	199 HARTFORD AV		539 SOUTH MAIN ST
			FINDLAY, OH 45840

Parcel Number:	0024-0014-0000	Mailing Address:	193 HARTFORD AVE REALTY LLC
CAMA Number:	0024-0014-0000		193 HARTFORD AV
Property Address:	193 HARTFORD AV		BELLINGHAM, MA 02019

Parcel Number:	0024-0015-0000	Mailing Address:	M A REALTY ACQUISITION LLC
CAMA Number:	0024-0015-0000		141 FAIRWAY DR
Property Address:	189 HARTFORD AV		ATTLEBORO, MA 02703

Parcel Number:	0024-0020-0000	Mailing Address:	HARTFORD REALTY TRUST C/O
CAMA Number:	0024-0020-0000		ALEXANDER HARCOVITZ
Property Address:	HARTFORD AV		256 ORCHARD ST
			MILLIS, MA 02054

Parcel Number:	0024-0021-0000	Mailing Address:	20TEN LARRYS REALTY LLC
CAMA Number:	0024-0021-0000		264 NORTH MAIN ST
Property Address:	264 NORTH MAIN ST		BELLINGHAM, MA 02019

Parcel Number:	0024-0022-0000	Mailing Address:	GLOBAL COMPANIES LLC 800 SOUTH
CAMA Number:	0024-0022-0000		ST SUITE 500
Property Address:	270 NORTH MAIN ST		PO BOX 9161
			WALTHAM, MA 02454-9161

8 foot Abutters List Report

Bellingham, MA
January 30, 2024

Abutters:

Parcel Number:	0018-0038-0000	Mailing Address:	NORTON, TIMOTHY M
CAMA Number:	0018-0038-0000		7 CEDAR HILL RD
Property Address:	7 CEDAR HILL RD		BELLINGHAM, MA 02019
Parcel Number:	0018-0039-0000	Mailing Address:	MONTEIRO, LINDO F & MICHELLE A
CAMA Number:	0018-0039-0000		4 CEDAR HILL RD
Property Address:	4 CEDAR HILL RD		BELLINGHAM, MA 02019
Parcel Number:	0018-0056-0000	Mailing Address:	CONDON, JOSEPH C SR
CAMA Number:	0018-0056-0000		6 ARROWHEAD RD
Property Address:	6 ARROWHEAD RD		BELLINGHAM, MA 02019
Parcel Number:	0018-0080-0000	Mailing Address:	MURRAY, NICHOLAS ROBERT &
CAMA Number:	0018-0080-0000		BEITER, LYDIA
Property Address:	7 FARM ST		7 FARM ST
			BELLINGHAM, MA 02019
Parcel Number:	0018-0083-0000	Mailing Address:	MENDEZ JORGE ALBERTO & MARIA M
CAMA Number:	0018-0083-0000		6 DEERFIELD LN
Property Address:	6 DEERFIELD LN		BELLINGHAM, MA 02019
Parcel Number:	0018-0093-0000	Mailing Address:	GAUCHER, JENNIFER
CAMA Number:	0018-0093-0000		17 DEERFIELD LN
Property Address:	17 DEERFIELD LN		BELLINGHAM, MA 02019
Parcel Number:	0018-0094-0000	Mailing Address:	PINEAU, LOUIS W + JOYCE C
CAMA Number:	0018-0094-0000		13 DEERFIELD LN
Property Address:	13 DEERFIELD LN		BELLINGHAM, MA 02019
Parcel Number:	0018-0095-0000	Mailing Address:	SCHIAVUZZO CATALDO & CAROL
CAMA Number:	0018-0095-0000		9 DEERFIELD LN
Property Address:	9 DEERFIELD LN		BELLINGHAM, MA 02019
Parcel Number:	0018-0096-0000	Mailing Address:	PERRY RANDAL S-L/E PERRY WALTER
CAMA Number:	0018-0096-0000		A
Property Address:	5 DEERFIELD LN		5 DEERFIELD LN
			BELLINGHAM, MA 02019
Parcel Number:	0023-0007-0000	Mailing Address:	CORMIER, FRED H THOMAS, DARLENE
CAMA Number:	0023-0007-0000		R
Property Address:	159 HARTFORD AV		159 HARTFORD AV
			BELLINGHAM, MA 02019
Parcel Number:	0023-0010-0001	Mailing Address:	CHAUVIN, ALLANNA M & PETER G
CAMA Number:	0023-0010-0001		149 HARTFORD AV
Property Address:	149 HARTFORD AV		BELLINGHAM, MA 02019
Parcel Number:	0023-0010-0004	Mailing Address:	WRIGHT, BRADLEY W NAVA-WRIGHT,
CAMA Number:	0023-0010-0004		LESLIE M
Property Address:	5 WELKER WY		5 WELKER WY
			BELLINGHAM, MA 02019

8 foot Abutters List Report

Bellingham, MA
January 30, 2024

Parcel Number:	0024-0003-0000	Mailing Address:	OBRIEN, TIMOTHY C
CAMA Number:	0024-0003-0000		3 FARM ST
Property Address:	3 FARM ST		BELLINGHAM, MA 02019
Parcel Number:	0024-0005-0000	Mailing Address:	RTE. 85 REALTY CORP.
CAMA Number:	0024-0005-0000		8 UXBRIDGE RD
Property Address:	182 HARTFORD AV		MENDON, MA 01756
Parcel Number:	0024-0009-0300	Mailing Address:	LADOUCEUR FAM REV LIV TRUST
CAMA Number:	0024-0009-0300		LADOUCEUR, KIMBERLY ANN
Property Address:	4 SAGAMORE RD		4 SAGAMORE RD
			BELLINGHAM, MA 02019
Parcel Number:	0024-0009-2400	Mailing Address:	GRAHAM, CHRISTOPHER & KARA
CAMA Number:	0024-0009-2400		1 RAWSON RD
Property Address:	1 RAWSON RD		BELLINGHAM, MA 02019
Parcel Number:	0024-0010-0000	Mailing Address:	HARTFORD AV ASSOCIATES LTD PTS
CAMA Number:	0024-0010-0000		C/O WS ASSET MGMT INC
Property Address:	229 HARTFORD AV		33 BOYLSTON ST SUITE 3000
			CHESTNUT HILL, MA 02467
Parcel Number:	0024-0017-0000	Mailing Address:	VARNEY BROS SAND + GRAVEL
CAMA Number:	0024-0017-0000		PO BOX 94
Property Address:	HARTFORD AV		BELLINGHAM, MA 02019
Parcel Number:	0024-0023-0000	Mailing Address:	167 HARTFORD AVE BELLINGHAM LL
CAMA Number:	0024-0023-0000		52 MILLBURY ST
Property Address:	167 HARTFORD AV		GRAFTON, MA 01519
Parcel Number:	0024-018+-0000	Mailing Address:	HARTFORD REALTY TRUST C/O
CAMA Number:	0024-018+-0000		ALEXANDER HARCOVITZ
Property Address:	NORTH MAIN ST		256 ORCHARD ST
			MILLIS, MA 02054
Parcel Number:	0031-0003-0000	Mailing Address:	VARNEY BROS SAND + GRAVEL
CAMA Number:	0031-0003-0000		PO BOX 94
Property Address:	MAPLE ST		BELLINGHAM, MA 02019

CHAPPELL ENGINEERING ASSOCIATES, LLC
Civil • Structural • Land Surveying

April 26, 2024

Hanna Crawford - Conservation Administrator
Bellingham Conservation Commission
10 Mechanic Street
Bellingham, MA 02019

Reference: Town of Bellingham Project Number 2148_008 – Bellingham – Route 126 Proposed Improvements West of I-495. NOI - Notice of Intent

Dear Ms./Mrs. Crawford:

The Town of Bellingham along with the Massachusetts Department of Transportation is proposing improvements along the project corridor of Hartford Avenue (Route 126) starting at the intersection of Hartford Avenue at Cedar Hill Road and North Main Street and ending at the Route 126 bridge over I-495. Portions of the project are split between the jurisdictions of both the Massachusetts Department of Transportation (MassDOT) and the Town of Bellingham. For the purpose of presenting the complete project, descriptions and pictures are provided for the project in its entirety, however, application of the controlling criteria and justifications are presented for the portions of work under the jurisdiction of MassDOT only.

The project will be funded through the Town of Bellingham and the State of Massachusetts, MassWorks Infrastructure Grant Program. The project mainly focuses on capacity and safety improvements within the project corridor and interchange ramps as well as pedestrian and bicycle accommodations through this very congested section of roadway. The enclosed project information is provided for the Town of Bellingham, Conservation Commission Department's review in compliance with the regulations governing Massachusetts Wetlands Protection Act M.G.L. c. 131, 40.

Purpose and Need

In part of the MassWorks Infrastructure Grant program, the purpose of this project is to increase vehicular capacity by widening the existing roadway to improve roadway safety conditions within the project corridor, intersecting streets and the surrounding area for vehicular, bicycle and pedestrian traffic. The improvements are intended to provide enhanced safety, mobility and improved vehicular, bicycle and pedestrian accommodations with specific emphasis on increasing the capacity and flow of traffic within this congested area of roadway. Currently there are no bicycle accommodations throughout the project limits.

Safety Improvements include the widening of the existing roadway on the northern side of the road and several intersecting areas adding additional travel and turning lanes to increase vehicular capacity within the project limits. The safety improvements include the widening of Hartford Avenue (Route 126) west to add an additional travel lane on the north side of Hartford Avenue (Route 126). This will provide an additional left turn lane onto the Interstate Rt 495 south on ramp, an additional left turn lane into the Crossroads Shopping Plaza and an additional left turn lane onto North Main Street

(Route 126) south. Proposed is a Shared-Use-Path along the west bound side of Hartford Avenue (Route 126).

In part of this project is to also provide a safe sidewalk for use by pedestrians and bicyclists in accordance with the requirements of the Americans with Disabilities Act and the Architectural Access Board. Additionally, the project proposes new advance warming signage, new traffic signals and the restriping of the Hartford Avenue corridor within the project limits.

Existing Conditions

Hartford Avenue (Route 126) is a two-way, four-lane roadway that runs in the east-west direction through the Town of Bellingham, separated by a double-yellow lane line with a posted speed limit of 25 miles per hour to the west and a speed limit of 40 miles per hour to the east of Crossroads Plaza. Hartford Avenue (Route 126) is classified as a Urban Principal Arterial roadway under MassDOT jurisdiction between the I-495 Northbound ramp and the Crossroads Plaza intersection west of I-495 with an Average Daily Traffic (ADT) of about 25,000 vehicles per day and posted speed limit of 40 mph within the state-controlled section of Hartford Avenue and 25 mph in the town-controlled portion of the road. Hartford Avenue is part of the National Highway System. At the intersections with North Main Street and Stallbrook Marketplace/Charles River Center, west of this location, Route 126 is under Town jurisdiction. Additionally, to the west of North Main Street, Hartford Avenue is no longer a state numbered route as Route 126 continues south on North Main Street. The travel lanes on Hartford Avenue vary in width throughout the corridor but are typically between 10-12 feet wide. Sidewalks are located along both sides of the road. The sidewalks, approximately 5-feeet wide on the northern side of the road is located within the entire project limits beginning long before Farm Road, continuing past Hartford Avenue over Interstate Route 495 overpass bridge. The sidewalk on the southern side of Hartford Avenue begins at the opposite side of Arrowhead Road, ending at the entrance to Crossroads Shopping Plaza. The layout width of Hartford Avenue is variable and is between 60 and 100 feet wide. There is no existing sidewalk on the south side of Route 126 bridges over I-495 nor is there a sidewalk on the east side of the Crossroads Driveway. There is an embankment of approximately five to ten feet about the parking lot at the Uno's Pizzeria preventing pedestrians from walking from the parking lot to Route 126. Furthermore, there is no sidewalk on the south side of Route 126 east of I-495.

Pedestrian accommodations are provided on both sides of Route 126 through the project area with the exception of the south side of Route 126 within the I-495 interchange. In this location there are no accessible means of pedestrian access. There is no sidewalk access to the southeast side of the Crossroads/Rawson Road intersection from within the Crossroads development. At the easterly project limit, there is no sidewalk on the bridges over I-495 to provide any continuance or point of access. It would also potentially compromise pedestrian and vehicular safety to introduce a sidewalk having no connectivity or practical purpose through an interchange with four separate points of conflict. If it is determined at a future time that the bridge, can we widened to accommodate pedestrians and bicyclists on the south side of Route 126, the interchange can be signalized in a way that safely provides signalized pedestrian crossing across all four legs of the intersection with the ramp connections and can also provide the necessary vehicular capacity improvements.

North Main Street (Route 126) is a two-lane roadway that begins at Hartford Avenue to the north and extends south through the Town of Bellingham to Route 140. North Main Street is classified as an Urban Principal Arterial Roadway under Town of Bellingham jurisdiction. North Main Street is part of the National Highway System (NHTS). North Main Street is approximately 44 feet wide with a 14-foot-wide travel lanes and 8-foot-wide shoulders that provides one lane of travel in either direction for the majority of the roadway but provides two auxiliary turn lanes at the intersection with Hartford Avenue. Sidewalks are provided on both sides of the roadway between Hartford Avenue and Oakwoods Road. The layout width of North Main Street is variable between 68 and 89 feet wide.

Interstate 495 is a six-lane divided interstate that generally runs in a north/south direction through Bellingham. I-495 begins at the junction with I-195 and Route 25 in Wareham, MA and extends northwest towards Worcester, making a broad loop around greater Boston before turning northeast and linking to I-93 north of Boston in Andover. I-495 is classified as an Interstate Roadway under the jurisdiction of the Massachusetts Department of Transportation. The exit from I495 to Hartford Avenue (Route 126) is Exit 18, which connects to Hartford Avenue (Route 126) in both the eastbound and westbound directions via signalized intersections with the off-ramps. The median dividing the I-495 northbound and southbound lanes is approximately 175 feet wide and consists of grass and shrubbery. Both the northbound and southbound through lanes are 12 feet wide with 11-foot shoulders along the outside edge and five-foot shoulders along the median edge. The shared acceleration/deceleration lane is approximately 11 feet wide for both the northbound and southbound lanes. The posted speed limit along I-495 is 65 mph in both directions.

Cedar Hill Road, Rawson Road, and Deerfield Lane are all local roads under the Town of Bellingham jurisdiction. Cedar Hill Road is a one-way roadway connecting to Hartford Avenue opposite North Main Street with one-way circulation allowing vehicles to exit Cedar Hill Road to Hartford Avenue. Rawson Road and Deerfield Lane both connect Hartford Avenue to the south and terminate in cul-de-sacs to the north. All three of these roadways provide access to residential properties. Cedar Hill Road and Rawson Road both have 4.5-feet wide sidewalks on the eastern side of the roadway only while Deerfield Lane provides a 4.5-feet wide sidewalk on both sides of the roadway. The roadway layout width of Cedar Hill Road is variable, between 40 and 50 feet wide. The roadway layout width of Rawson Road is 65-feet wide, and the roadway layout width of Deerfield Lane is 40-feet wide.

This project would be served well by shared transportation improvements for the local residential, commercial, and the local communities from an improved pedestrian, bicycle and vehicular transportation corridor between the towns of Bellingham, Medon and Medway and local communities. The primary asset along this stretch of roadway is the Crossroads Shopping Plaza, local single family, residential property, local commercial and light industrial properties, utility, prime forest and non-forested land, and forested wetlands. North main Street, Hartford Avenue and Interstate Route 495 serves as a connector road between the Town of Medon, Medway and the Town of Millis. Hartford Avenue, North Main Street and Interstate 495 are part of the National Highway System (NHS). The project length is approximately 3,200 feet (0.61 miles).

Proposed Design

The reconstruction of the existing roadway will occupy a similar footprint to the existing infrastructure, located within the existing roadway footprint. The roadway horizontal and vertical geometry will remain similar to existing. Roadway widening will be necessary on the north side of Hartford Avenue to provide an additional west bound travel lane along Hartford Road (Route 126) and widening on the west side of North Main Street to provide an additional left turn lane onto North Main Street, leading south. A hot mix asphalt shared-use-path is proposed along the north side of Hartford Avenue. The shared-use-path will begin at the northeastern side of the intersection of Hartford Avenue at Cedar Hill Road. The proposed SUP will be 8 feet wide from Cedar Street to Rawson Road. After Rawson Road, the SUP will increase to 10-feet wide, tapering back to 5-feet wide just before Hartford Avenue over I-495 overpass bridge. The shared-use path will add bicycle accommodations to the project, currently there are no accommodations for bicyclists within the project limits. Widening is also proposed on the east side of the entrance to the Crossroads Shopping Plaza to provide additional turning clearance for the exiting right-turn lane onto Hartford Avenue.

Sidewalks are not proposed on the south side of Route 126 between the Crossroads Driveway and the easterly limit of work at the Route 126 bridge over I-495 southbound. It is not practical to introduce a sidewalk in this portion of the project between the Crossroads Driveway and the southbound interchange ramps, given that access is not available, and a crossing would be needed across Route 126, creating an additional conflict between pedestrians, bicyclists and vehicles, further compromising signal operations. Given that there is no sidewalk on the bridges over I-495 at the easterly project limit it would be extremely dangerous for pedestrians to be forced into the eastbound travel lane of Route 126 across the two bridges over I-495 and beyond that to the east, across the I-495 northbound ramps. A signalized crossing across Route 126 is proposed at the Crossroads Driveway intersection to provide access to the shared use path on the north side of Route 126 which connects to the existing sidewalk on the bridges over I-495.

Proposed for the roadway surface is Mill and Overlay. Proposed along the project limits are 11 feet wide travel lanes and 2 feet wide shoulders. Sidewalks and wheelchair ramps will be constructed to meet the latest ADA design standards. New Pedestrian Curb Ramps are proposed throughout the project corridor. In areas where sidewalks are proposed and there will be conflicts with existing structures, the structure will be adjusted and/or relocated to provide the clearance necessary to construct the sidewalks and shared use path. At all crosswalk locations, markings will be new and 10 feet wide to improve pedestrian safety and connectivity.

Storm water runoff will be diverted to the existing drainage systems along the project corridor. All existing catch basin structures within the project limits will be replaced with Deep Sump Catch Basins. The proposed 43 deep sump catch basins will aid in the treatment of stormwater runoff before discharging to adjacent resource areas. All existing points of discharge will remain. There is one new point of discharge that will be located on the easter side of North Main Street adjacent to the forced main sewer pumping station. At this location, a Jellyfish stormwater cartridge filter system is proposed to treat roadway stormwater runoff for Cedar Street, a portion of Harford Avenue and North Main Street. Currently, there are no methods in place to treat this stormwater. Also proposed for stormwater treatment is an infiltration basin and sediment forebay at the apex of the southeast

intersection of Hartford Avenue at I-495 to Route 126 off ramp. An overflow structure is included within the infiltration basin designed to diverted overflows of stormwater to a proposed grass swale approximately 400 feet long to provide additional treatment before entering the existing drainage system and discharging to adjacent resources. If further modifications to the existing drainage system are required, appropriate alterations and upgrades including new structures, pipes, pipe extensions, or trunk lines will be provided as required for treatment of storm water runoff to the maximum extent practicable.

Given that the project proposes an increase in impervious cover, subject to treatment under the wetlands protection act, there is no work proposed within Bordering Vegetated Wetlands (BVW). Work is proposed within the 100' Buffer Zone to Bordering Vegetated Wetlands only. The project is considered a redevelopment and required to meet the following Stormwater Management Standards only to the maximum extent practicable.

The project proposes new signals at the intersections of Route 126 with the I-495 Southbound ramps and Hartford Avenue at the North Main Street. A one traffic sign pole outside the Crossroad Center and one potential retaining wall/embankment for roadway widening near the on-ramp. There will be safety for pedestrians and bicycle accommodations through very congested section of roadway at the interchange ramp and corridor. North Main Street will be widened along the West side to receive dual left-turn lanes from Hartford Avenue before merging back to a single lane.

This project focuses primarily on vehicular capacity within the project limits while improving pedestrian and bicycle accessibility improvements.

Bicycle and Pedestrian Accommodation

A variable width 8' to 10' wide shared-use-path is proposed along the northern side of Hartford Avenue (Route 126). The proposed roadway will be widened along Hartford Avenue to accommodate the SUP. New signal design, advanced warning signage and pavement markings are proposed in addition to bicycle lane symbols.

The new signals and crosswalks are proposed at all intersecting streets within the project limits. This will aid in the crossings of all streets within the project limits.

Safety Enhancements

This project is mainly focused on vehicular, bicycle and pedestrian capacity and safety enhancements in part of the MassWorks Infrastructure Grant Program. Sidewalks and bike lanes will be constructed to the latest ADA design standards and in accordance with the State of Massachusetts Healthy Transportation Policy. New signal design and advanced warning signage will also promote pedestrian safety by visually drawing driver's attention to crossing pedestrians.

Traffic Calming

Traffic calming measures discussed as part of the scope of this project are the proposal of additional travel lanes to increase vehicular traffic capacity while increasing the flow of traffic within the project limits. The addition of an 8' to 10' wide, shared-use-path to encourage the use of bicycle and pedestrian traffic. The extended width of the SUP will providing additional safety enhancements throughout the project corridor. New signal design and advanced warning signage at all intersecting streets will aid in the flow of traffic within the project limits.

Avoidance, Minimization and Mitigation Measures

Hartford Avenue, North Main Street and all other adjacent roadways will remain open to traffic during construction with traffic, re-routed along the existing roadway adjacent to the work zones. At a minimum, access to all adjacent properties must be maintained during the school year. A TTCP will be utilized to control traffic around active work zones.

Although full mitigation of storm water runoff during construction is not anticipated, it will be treated to the maximum extent practicable. Alternatives for permanent treatment will be evaluated. Overland flows during construction may also be mitigated by use of compost filter tubes and by protecting grates with filter fabric and/or surrounding them with compost filter tubes.

Permitting Status

There are jurisdictional wetland resource areas located within the project limits so it is anticipated that permitting is required under the Wetland Protection Act.

The Town of Bellingham along with MassDOT requests that the Department review the enclosed materials at their earliest convenience and solicit any comments that you wish to make regarding this project. Written comments should be submitted to: Jessie Riedle, Director, Town of Bellingham Department of Public Works, Municipal Center, 10 Mechanic Street, Bellingham, MA 02019

If you have any questions concerning the enclosed project information, please feel free to contact me by phone at 617-335-4093 or by email at jsalisbury@chappellengineering.com.

Very truly yours,
CHAPPELL ENGINEERING ASSOCIATES, LLC
John N. Salisbury
Civil Engineering Department

Attachments: Notice of Intent and accompanying documentation

cc: J. Schmitz, MassDEP, Central Region
Jessie Riedle, Director, Town of Bellingham, Department of Public Works

Appendix I
Drainage Photo Report

Sta. 10+65. Begin project, View looking West down Hartford Avenue (Route 126). Stormwater system 1 begins here and flows towards both Farm Road and Arrow Road intersections on the right shown in this picture.

Sta. 9+19. Stormwater system 1. Two catch basins located curb side at intersection of Hartford Avenue (Route 126) and Arrowhead Road. System 1 flows west along Hartford Avenue to Farm Road.

Sta. 6+40. Stormwater system 1. Four catch basins that capture stormwater located at intersection of Hartford Avenue (Route 126) and Farm Road. System 1 outfalls east of picture at the bottom of slope.

Sta. 5+50. Outfall of stormwater system 1 12” RCP. Inlet 18” RCP cross culvert located at the north side of Hartford Avenue looking south. Wetland flag series BC flows south beneath Hartford Avenue (Route 126).

Sta. 5+30. Outfall end of Stormwater system 1. 18" RCP masonry headwall located at the bottom slope at the south side on Hartford Avenue (Route 126). Stormwater flows downstream. Note: Poor condition of masonry headwall and extensive bank erosion because of stormwater flows at roadside country drainage.

Sta. 12+00. Beginning of Stormwater system 2. Stormwater flows south along North Main Street (Route 126) from intersection of Hartford Avenue (Route 126), North Main Street and Cedar Hill Road looking south of North Main Street (Route 126).

Sta. 12+00. Beginning stormwater system 2. View looking north along Cedar Hill Road. Two drainage catch basins located curbside capture stormwater flows along Cedar Hill Road. System 2 flows south along North Main Street (Route 126).

Sta. 13+00. Stormwater system 2. Hartford Avenue (Route 126). Two stormwater drainage catch basins are located along both sides of the curbline on Hartford Avenue (Route 126). Stormwater runoff is carried along the existing curb to existing catch basins. System 2 flows south along North Main Street (Route 126).

Sta. 98+20. View looking south along North Main Street (Route 126). Stormwater system 2. Two drainage catch basins capture stormwater flowing south downhill along curbline on North Main Street (Route 126).
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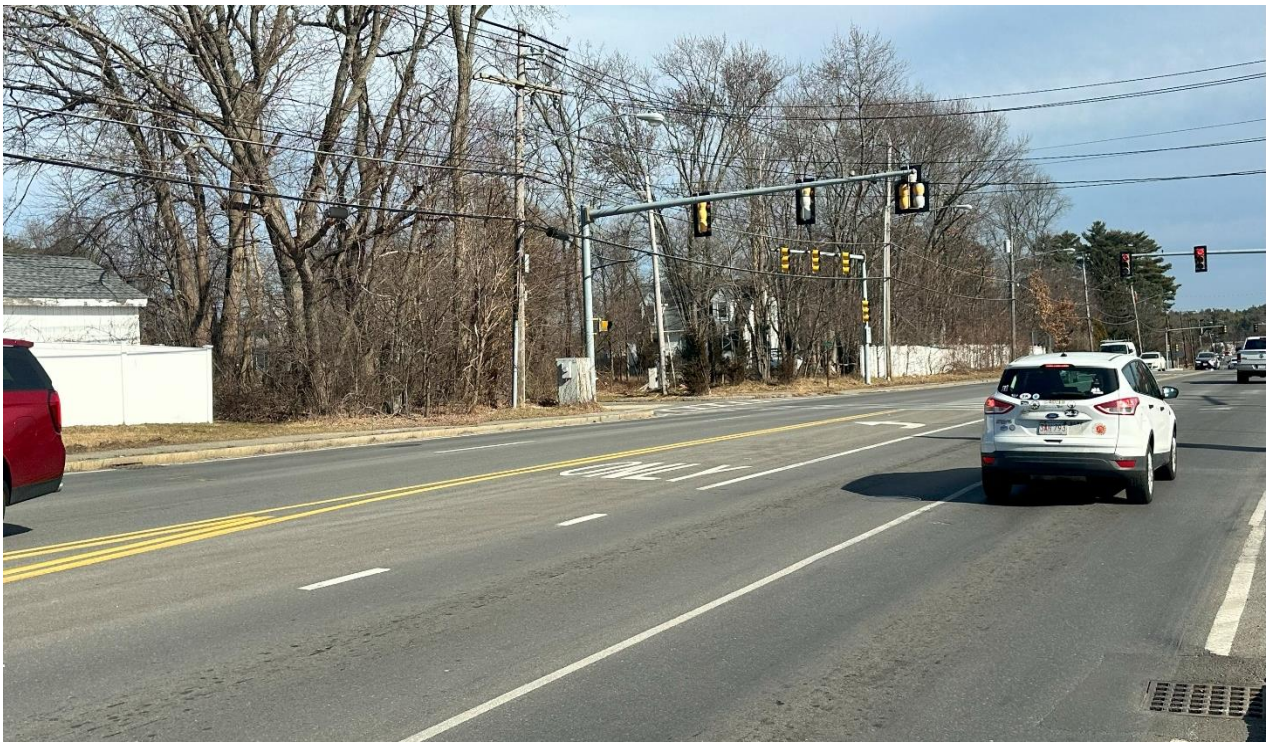
Sta. 95+40. Stormwater system 2. Two catch basins capture Stormwater runoff that flows south along the curbline on North Main Street (Route 126).

Sta. 93+00. Stormwater system 2. View looking south along North Main Street (Route 126). Three catch basins located along both curbline capture stormwater runoff.

Sta. 92+00. Outfall end of Stormwater system 2. View looking south of exiting cross-culvert beneath North Main Street (Route 126).

Sta. 92+00. Outfall end of Stormwater system 2. View looking east after exiting cross-culvert beneath North Main Street (Route 126).



Sta. 17+00. Beginning of Stormwater system 3. View looking east along Hartford Avenue (Route 126) towards Interstate 495. There are two drainage catch basins along both curbline. Stormwater flows east along Hartford Avenue (126).

Sta. 20+00. Stormwater system 3. Hartford Avenue (126) looking east. Stormwater drainage structures are located at both curblines. Stormwater flows east along Hartford Avenue (Route 126).

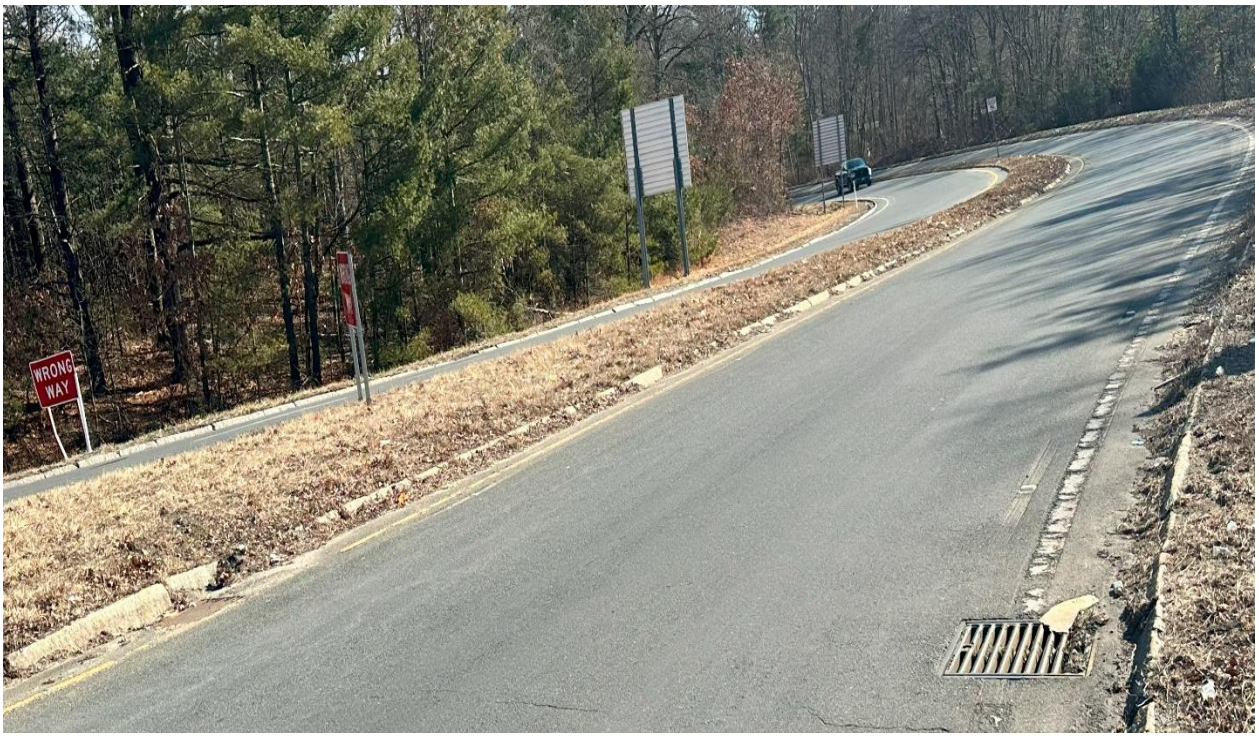
Sta. 22+50. Stormwater system 3. One drainage catch basin located at the curb line on Hartford Avenue (Route 126) entering on ramp of Interstate 495. Stormwater runoff flows east along Hartford Avenue (Route 126).

Sta. 25+00. Stormwater system 3. View looking east along Hartford Avenue (Route 126) adjacent to Interstate 495 south off/on ramp. Two catch basins located along the exit curbline. System 3 flows east along Hartford Avenue (Route 126).

Sta. 27+00. Stormwater system 3. View looking east along Hartford Avenue (Route 126) at the end of the project. Two drainage catch basins located along both sides of the road near the bridge capture stormwater runoff. Stormwater flows north along I-495.

Sta. 11+00. Wetland area, series BA. Intersection of Hartford Avenue (Route 126) and Interstate 495 Southbound on-ramp. View looking south along Interstate 495 Southbound on-ramp.

Sta. 11+00. Wetland area, series BA. Intersection of Hartford Avenue (Route 126) and Interstate 495 Southbound on-ramp. View looking south along Interstate 495 Southbound on-ramp.



Sta. 12+00. Beginning of Stormwater system 4. View looking south along Interstate 495 southbound on-ramp. Two catch basins located along curbline capture stormwater runoff. System 4 flows south along the ramp.

Sta. 16+00. Stormwater system 4. View looking north along Interstate 495 southbound off/on-ramp. Two catch basins located along curbline capture stormwater runoff. Stormwater flows along the ramp.

Stormwater system 4. View looking south along the I-495 on/off ramp. One catch basin along the eastern curbline. Storm-water system flows south along ramp.

Sta. 12+55. View looking up at Apex of I-495 Southbound off ramp exit. Location of proposed sediment forebay and infiltration basin.

Sta. 19+00. Stormwater system 5. Two stormwater catch basins are located at both sides of the curb of Rawson Road. Stormwater runoff flows north along Rawson Road.

Sta. 24+00. Stormwater system 6. Two catch basins located both curb side at intersection of Hartford Avenue (Route 126) and Deerfield Lane. System 6 flows north along Deerfield Lane.