MASSACHUSETTS DEPARTMENT OF TRANSPORTATION
HIGHWAY DIVISION

PLAN AND PROFILE OF

ROUTE 2A (AYER ROAD)

IN THE TOWNS OF

LITTLETON/AYER

MIDDLESEX COUNTY

FEDERAL AID PROJECT NO.

LITTLETON/AYER
ROUTE 2A (AYER ROAD)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	1	78
PROJECT FILE NO.	608443		

TITLE AND INDEX SHEET

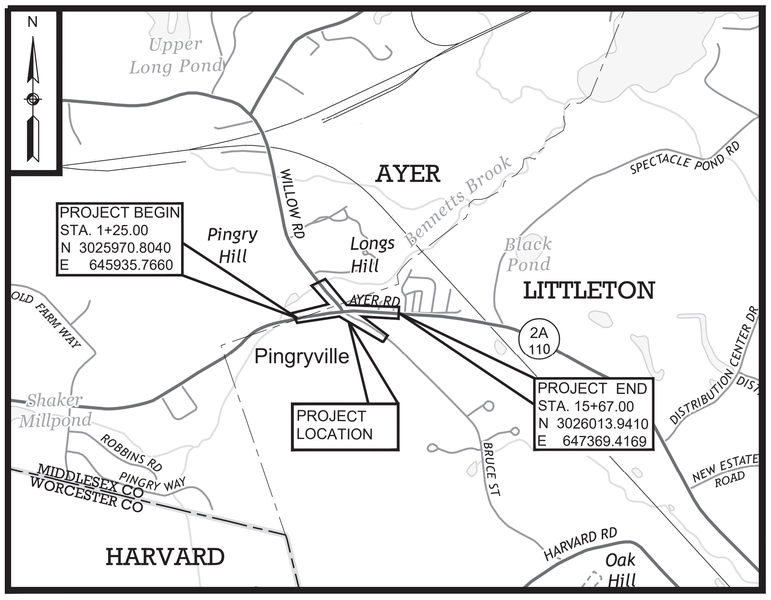
THESE PLANS ARE SUPPLEMENTED BY THE OCTOBER 2017 CONSTRUCTION STANDARD DETAILS, THE 2015 OVERHEAD SIGNAL STRUCTURE AND FOUNDATION STANDARD DRAWINGS, MASSDOT TRAFFIC MANAGEMENT PLANS AND DETAIL DRAWINGS, THE 1990 STANDARD DRAWINGS FOR SIGNS AND SUPPORTS, THE 1968 STANDARD DRAWINGS FOR TRAFFIC SIGNALS AND HIGHWAY LIGHTING, AND THE LATEST EDITION OF THE AMERICAN STANDARD FOR NURSERY STOCK.

INDEX

SHEETS TO BE INCLUDED IN THE 100% DESIGN SUBMISSION

BORING LOGS

100% SUBMITTAL



0 2000 4000 6000 8000

SCALE: 1" = 2000'

LENGTH OF PROJECT = 1442.00 FEET = 0.273 MILES

DESIGN DESIGNATION (ROUTE 2A (AYER ROAD))

DESIGN SPEED	50 MPH
ADT (2017)	14,460
ADT (2037)	15,980
K	7.7%
D	65.7%
T (PEAK HOUR)	7.2%
T (AVERAGE DAY)	10.7%
DHV	1,230
DDHV	810
FUNCTIONAL CLASSIFICATION	URBAN PRINCIPAL ARTERIAL

NOTICE OF INTENT SUBMISSION DATE

10/13/2021

COMMONWEALTH OF MASSACHUSETTS
DANIELLE H SPICER
CIVIL
No. 46067
REGISTERED PROFESSIONAL ENGINEER
10/14/2021

7/8/2021	75% SUBMISSION	REV 0

MassDOT Massachusetts Department of Transportation Highway Division

PREPARED BY

GREEN INTERNATIONAL AFFILIATES, INC.
Civil and Structural Engineers Westford, Massachusetts

APPROVED

CHIEF ENGINEER **DATE**

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
x	x	CHAIN LINK OR METAL FENCE
		WOOD FENCE
		HAY BALES/SILT FENCE
		TREE LINE
		SAWCUT LINE
		TOP OR BOTTOM OF SLOPE
		EDGE OF PAVEMENT
		LIMIT OF MICROMILLING 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 - 12"
	CW	CROSSWALK
	SWL	SOLID WHITE LINE - 6"
	SYL	SOLID YELLOW LINE - 6"
	BWL	BROKEN WHITE LINE - 6" (10' LINE SEGMENT AND 30' GAP)
	BYL	BROKEN YELLOW LINE - 6" (10' LINE SEGMENT AND 30' GAP)
	DWL	DOTTED WHITE LINE - 6" (3' LINE SEGMENT AND 9' GAP)
	DYL	DOTTED YELLOW LINE - 6" (3' LINE SEGMENT AND 9' GAP)
	DWLEx	DOTTED WHITE LINE EXTENSION - 6" (2' LINE SEGMENT AND 6' GAP)
	DYLEx	DOTTED YELLOW LINE EXTENSION - 6" (2' LINE SEGMENT AND 6' GAP)
	DBWL	DOUBLE WHITE LINE - 6"
	DBYL	DOUBLE YELLOW LINE - 6"
		12" SOLID YELLOW GORE LINES @ 10' O.C. @ 45°

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

LITTLETON/AYER
ROUTE 2A (AYER ROAD)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	2	78
PROJECT FILE NO.	608443		

LEGEND & ABBREVIATIONS

GENERAL NOTES

1. THE LOCATIONS OF THE EXISTING UTILITIES SHOWN ARE APPROXIMATE AND HAVE NOT BEEN INDEPENDENTLY VERIFIED BY THE OWNER OR ITS REPRESENTATIVE. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES AND SUBSURFACE STRUCTURES. THE CONTRACTOR IS RESPONSIBLE FOR MAKING FIELD INVESTIGATIONS AND OBTAINING INFORMATION FROM UTILITY COMPANIES AND INDIVIDUALS TO PINPOINT THE LOCATION AND ELEVATION OF ALL SUBSURFACE UTILITIES AND STRUCTURES. DIG-SAFE SHALL BE CONTACTED 72 HOURS PRIOR TO THE START OF CONSTRUCTION. DIG-SAFE TELEPHONE: 1-888-344-7233.
2. ALL DRAINAGE STRUCTURES, WATER GATES, AND CURB STOPS ARE TO BE ADJUSTED TO FINISHED GRADE UNLESS OTHERWISE NOTED.
3. ALL GAS GATES, TELEPHONE MANHOLES, ELECTRIC MANHOLES AND ELECTRIC HANDHOLES ARE TO BE ADJUSTED TO FINISHED GRADE BY OTHERS UNLESS OTHERWISE NOTED.
4. ALL UTILITY POLES REQUIRING RELOCATION ARE TO BE RELOCATED BY OTHERS.
5. MINIMUM CLEAR PATH ON THE SHARED USE PATHS SHALL BE 8'-0" EXCLUDING THE SURFACE OF THE CURB.
6. WHEELCHAIR RAMPS AND DRIVEWAYS SHALL CONFORM TO THE CURRENT MASSDOT STANDARDS, ADA REQUIREMENTS AND MASSACHUSETTS ARCHITECTURAL ACCESS BOARD REQUIREMENTS.
7. THE CONTRACTOR SHALL RETAIN ALL CURBS, FENCES, WALLS, TREES, SHRUBS, POSTS, LANDSCAPE FEATURES, AND OTHER MISCELLANEOUS ITEMS WITHIN ABUTTING PROPERTIES, UNLESS OTHERWISE NOTED. WHEN RETAINING THOSE ITEMS IS NOT PRACTICAL IN THE OPINION OF THE ENGINEER, THE CONTRACTOR SHALL REMOVE, STOCKPILE, PROTECT AND RESET THE ITEMS. THE CONTRACTOR SHALL REPLACE ITEMS DAMAGED DURING REMOVAL, STOCKPILING, OR RESETTING DUE TO NEGLIGENCE, CARELESSNESS, OR MISHANDLING WITH EQUIVALENT NEW ITEMS AT NO COST TO THE OWNER.
8. ALL TREES WITHIN THE SLOPE LIMIT SHALL BE RETAINED AND PROTECTED UNLESS OTHERWISE NOTED.
9. CONTRACTOR SHALL PROTECT ALL PROPERTY MARKERS UNLESS OTHERWISE NOTED IN THE PLANS. THE CONTRACTOR IS HEREBY RESPONSIBLE FOR REPLACING ANY EXISTING MASSACHUSETTS HIGHWAY BOUND OR PRIVATE PROPERTY PIN DAMAGED OR DESTROYED DURING CONSTRUCTION TO ITS PRE-CONSTRUCTION LOCATION.
10. TREATMENT OF SLOPE AREAS SHALL BE REPLACEMENT IN KIND UNLESS OTHERWISE NOTED.
11. THE RIGHT OF WAY LINES SHOWN ON THIS PLAN ARE THE DIRECT RESULT OF AN INSTRUMENT SURVEY PERFORMED ON THE GROUND IN MAY OF 2016 BY GREEN INTERNATIONAL AFFILIATES, INC. (GREEN) WITH AN ERROR OF CLOSURE LESS THAN 1:15,000, AND FROM PLANS AND DEEDS OF RECORD. PROPERTY LINES SHOWN HEREON ARE APPROXIMATE ONLY AND ARE BASED UPON RECORD DEEDS, PLANS AND ASSESSORS INFORMATION.
12. HORIZONTAL AND VERTICAL CONTROL WAS ESTABLISHED BY MASSDOT SURVEY, IN BOOK 41023, PAGE 109, ON MAY 31, 2016. HORIZONTAL DATUM IS BASED ON THE MASSACHUSETTS STATE PLANE COORDINATE SYSTEM (MAINLAND) NAD83 (2011), 2010.00 EPOCH. VERTICAL DATUM IS NAVD88. THE UNIT OF MEASUREMENTS IS US SURVEY FEET.
13. OWNERSHIP AND DEED INFORMATION WAS OBTAINED FROM THE TOWNS OF LITTLETON AND AYER ASSESSORS OFFICES AND THE MIDDLESEX(SOUTH) COUNTY REGISTRY OF DEEDS. ALL INFORMATION WAS CURRENT AS OF THE DATE OF THE JUNE 2021 GREEN SURVEY.
14. THE SAID PARCELS SHOWN HEREIN ARE SUBJECT TO RIGHTS AND EASEMENTS AS CONTAINED WITHIN THE VARIOUS DEEDS OF RECORD DESCRIBING SAID PREMISES. THE LOCATIONS AND EXTENT OF SAID RIGHTS AND EASEMENTS ARE NOT THE SUBJECT OF THIS SURVEY.
15. EXTRA CARE SHALL BE TAKEN BY THE CONTRACTOR WHEN PERFORMING WORK IN CLOSE PROXIMITY (I.E. EXCAVATION WITH HAND TOOLS) TO THE EXISTING SEPTIC SYSTEM AT 254 AYER ROAD TO PREVENT ANY DAMAGE TO THE SEPTIC SYSTEM. ANY DAMAGE TO THE EXISTING SEPTIC SYSTEM DUE TO THE NEGLIGENCE OR CARELESSNESS OF THE CONTRACTOR SHALL BE REPAIRED AT NO ADDITIONAL COST TO THE OWNER.
16. THE REMOVAL OF THE STONE WALL FROM STATION 13+31 RT TO STATION 13+79 RT SHALL BE PAID FOR UNDER ITEM 120, EARTH EXCAVATION.

DRAINAGE NOTES

1. ALL REINFORCED CONCRETE (RCP) PIPE SHALL BE CLASS III UNLESS OTHERWISE NOTED.
2. THE CONTRACTOR SHALL NOTIFY THE ENGINEER OF ALL CONFLICTS BETWEEN THE EXISTING UTILITIES AND THE PROPOSED WORK. THE ENGINEER RESERVES THE RIGHT TO MODIFY THE DESIGN TO REALIGN THE PIPE AND STRUCTURE LOCATIONS AND INVERTS TO SUIT ACTUAL FIELD CONDITIONS ENCOUNTERED AT NO ADDITIONAL COST.
3. ALL OFFSETS TO THE CATCH BASINS ARE TO THE CENTER OF THE GRATE. THE LOCATION AND ORIENTATION OF THE BELOW GRADE STRUCTURE SHALL BE FIELD COORDINATED BY THE CONTRACTOR TO AVOID CONFLICTS WITH EXISTING UTILITIES.
4. ALL EXISTING AND PROPOSED CATCH BASINS SHALL BE PROTECTED FROM SEDIMENT INUNDATION DURING ALL CONSTRUCTION ACTIVITIES.
5. ALL EXISTING DRAIN PIPES UNDER THE PROPOSED ROAD OR SIDEWALK SHALL BE RETAINED UNLESS OTHERWISE NOTED. IF THE EXISTING PIPE IS TO BE REMOVED TO ACCOMMODATE THE WORK OR ABANDONED AND IT EXTENDS OUTSIDE THE PROPOSED ROADWAY OR SIDEWALK LIMIT IT SHALL BE CUT AND CAPPED AT THE RESPECTIVE LIMIT AT NO ADDITIONAL COST. REMOVAL AND DISPOSAL OF THESE PIPES ARE INCIDENTAL TO THE DRAINAGE ITEMS.
6. ALL PROPOSED CATCH BASINS SHALL BE DEEP SUMP CATCH BASINS WITH HOOD.
7. DRAINAGE ELEVATIONS ARE PROVIDED FOR DESIGN PURPOSES ONLY. THE CONTRACTOR SHALL VERIFY BY TEST PIT, THE LOCATIONS OF EXISTING UTILITIES WHICH MAY CONFLICT WITH THE PROPOSED DRAINAGE DESIGN. FIELD ADJUSTMENTS WILL BE MADE AS APPROVED OR AS REQUIRED BY THE ENGINEER. ONLY AFTER THE CONTRACTOR VERIFIES ELEVATIONS FOR CONSTRUCTABILITY OF THE DRAINAGE SYSTEM SHALL STRUCTURES BE ORDERED. ANY FIELD ADJUSTMENTS TO DRAIN LINE UP TO A DEPTH OF 5 FEET SHALL BE INCLUDED IN THE COST OF THE PIPE.
8. ALL SINGLE GRATE CATCH BASINS AND DRAIN MANHOLE STRUCTURES ARE ECCENTRIC, UNLESS OTHERWISE NOTED.
9. USE FLAT TOP SLAB MANHOLE AND CATCH BASIN WHERE NEEDED AND APPROVED BY THE ENGINEER.
10. IN INSTANCES WHERE AN EXISTING MANHOLE, HANDHOLE OR "SURFACE" TYPE STRUCTURE THAT CANNOT BE REMOVED OR RESET IS WITHIN THE PROPOSED OR EXISTING ACCESSIBLE SURFACE, THE STRUCTURE SHALL BE CAREFULLY ADJUSTED SUCH THAT THE TOPMOST SURFACES OF THE STRUCTURE COVER SHALL BE FLUSH WITH THE CURB RAMP SURFACE.
11. A MINIMUM OF 12" OF SEPARATION BETWEEN THE EXISTING 8" HP GAS MAIN AND ALL IMPROVEMENTS MUST BE MAINTAINED. THE CONTRACTOR SHALL NOTIFY THE ENGINEER IF EXISTING FIELD CONDITIONS DO NOT ALLOW FOR THIS SEPARATION REQUIREMENT TO BE MAINTAINED.
12. ALL EXISTING CATCH BASINS TO BE RETAINED WITHIN THE LIMIT OF WORK SHALL BE CLEANED AS DIRECTED BY THE ENGINEER.
13. BICYCLE SAFE CASCADE GRATE SHALL BE USED FOR ALL THE INLETS ON CONTINUOUS GRADES. AT LOW POINTS RECTANGULAR BAR GRATES SHALL BE USED.
14. A TEST PIT SHOULD BE PREFORMED AT PROPOSED DRAIN MANHOLE (1-26) TO VERIFY INVERTS OF THE EXISTING 12" CMP BEFORE THE STRUCTURE IS ORDERED.

UTILITY NOTES:

1. THE CONTRACTOR IS HEREBY MADE AWARE THAT EXISTING UTILITIES, INCLUDING BUT NOT LIMITED TO EXISTING WATER AND DRAIN PIPES; DRAINAGE AND SEWER STRUCTURES; GAS LINES, COMMUNICATION LINES AND UTILITY POLES, MAY NEED TO BE PROTECTED AND/OR SHORED UP DURING THE CONSTRUCTION OF THE PROPOSED IMPROVEMENTS UNDER THIS PROJECT. THE COST OF THE WORK REQUIRED FOR THE PROTECTION, MAINTENANCE AND SUPPORT OF THESE OR OTHER EXISTING ABOVEGROUND OR UNDERGROUND UTILITIES IN THE VICINITY OF THE PROPOSED WORK SHALL NOT BE PAID FOR SEPARATELY BUT SHALL BE CONSIDERED INCIDENTAL TO THE WORK UNDER THIS CONTRACT.
2. THIS PLAN WAS PREPARED IN CONFORMANCE WITH AMERICAN SOCIETY OF CIVIL ENGINEERS STANDARD CI/ASCE 38-02 "STANDARD GUIDELINE FOR THE COLLECTION AND DEPICTION OF EXISTING SUBSURFACE UTILITY DATA", QL"C". REFER TO UTILITY QUALITY LEVEL INFORMATION INDEX. ACCURACY OF UTILITY LOCATIONS IS NOT GUARANTEED.
3. BELOW GROUND STRUCTURES, UNLESS DIMENSIONED, ARE SYMBOLIC ONLY.
4. ALL UTILITY COMPANIES, PUBLIC AND PRIVATE, MUST BE NOTIFIED INCLUDING THOSE IN CONTROL OF UTILITIES NOT SHOWN ON THIS PLAN (SEE CHAPTER 370, ACTS OF 1963, MASSACHUSETTS) PRIOR TO DESIGNING, EXCAVATING, BLASTING, INSTALLING, BACKFILLING, GRADING, PAVEMENT RESTORING, OR REPAVING.
5. THE EXISTING CONDITIONS PLAN IS TO BE USED FOR THE SPECIFIED PROJECT ONLY AND IS NOT WARRANTED TO BE COMPLETE FOR ANY OTHER FUTURE PROJECTS.

SUMMARY OF UTILITY MAPPING QUALITY LEVELS:

THE FOLLOWING IS A SUMMARY OF THE SURVEY MAPPING LEVELS FOR UTILITIES AS DESCRIBED IN ASCE STANDARD 38-02, "STANDARD GUIDELINE FOR THE DEPICTION OF EXISTING SUBSURFACE UTILITY DATA". THESE GUIDELINES ARE MORE FULLY DESCRIBED IN THE ASCE STANDARD.

UTILITY QUALITY LEVEL A:
PRECISE HORIZONTAL AND VERTICAL LOCATION OF UTILITIES OBTAINED BY THE ACTUAL EXPOSURE (OR VERIFICATION OF PREVIOUSLY EXPOSED AND SURVEYED UTILITIES) AND SUBSEQUENT MEASUREMENT OF SUBSURFACE UTILITIES, USUALLY AT A SPECIFIC POINT. MINIMALLY INTRUSIVE EXCAVATION EQUIPMENT IS TYPICALLY USED TO MINIMIZE THE POTENTIAL FOR UTILITY DAMAGE. A PRECISE HORIZONTAL AND VERTICAL LOCATION, AS WELL AS OTHER UTILITY ATTRIBUTES, IS SHOWN ON PLAN DOCUMENTS. ACCURACY IS TYPICALLY SET TO 15-MM VERTICAL AND TO APPLICABLE HORIZONTAL SURVEY AND MAPPING ACCURACY AS DEFINED OR EXPECTED BY THE PROJECT OWNER.

UTILITY QUALITY LEVEL B:
INFORMATION OBTAINED THROUGH THE APPLICATION OF APPROPRIATE SURFACE GEOPHYSICAL METHODS TO DETERMINE THE EXISTENCE AND APPROXIMATE HORIZONTAL POSITION OF SUBSURFACE UTILITIES. QUALITY LEVEL B DATA SHOULD BE REPRODUCIBLE BY SURFACE GEOPHYSICS AT ANY POINT OF THEIR DEPICTION. THIS INFORMATION IS SURVEYED TO APPLICABLE TOLERANCES DEFINED BY THE PROJECT AND REDUCED ONTO PLAN DOCUMENTS.

UTILITY QUALITY LEVEL C:
INFORMATION OBTAINED BY SURVEYING AND PLOTTING VISIBLE ABOVE-GROUND UTILITY FEATURES AND BY USING PROFESSIONAL JUDGMENT IN CORRELATING THIS INFORMATION TO QUALITY LEVEL D INFORMATION.

UTILITY QUALITY LEVEL D:
INFORMATION DERIVED FROM EXISTING RECORDS OR ORAL RECOLLECTIONS.

EROSION AND SEDIMENT CONTROL NOTES:

1. ALL EROSION CONTROL MEASURES MUST BE INSTALLED PRIOR TO THE START OF ANY LAND DISTURBANCE / EARTHWORK ACTIVITIES.
2. CONTRACTOR SHALL BE RESPONSIBLE FOR THE REPAIR, REPLACEMENT AND MAINTENANCE OF ALL SEDIMENTATION / EROSION CONTROL MEASURES UNTIL ALL DISTURBED AREAS ARE STABILIZED.

LITTLETON/AYER
ROUTE 2A (AYER ROAD)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	4	78
PROJECT FILE NO.	608443		

KEY PLAN

608443_HD04(KEY).DWG Plotted on 13-Oct-2021 1:35 PM

N

(10) 14 23 33

(8) 12 21 31

(9) 13 22 32

(7) 11 20 30

LIMIT OF WORK
END FINE MILLING AND RESURFACING
STA. 14+90.00

WILLOW ROAD

BEGIN PROJECT
BEGIN FINE MILLING AND RESURFACING
STATION 1+25.00
COORD. N 3025970.8040
E 645935.7660

APPROX. TOWN LINE

AYER
LITTLETON

END PROJECT
END FINE MILLING AND RESURFACING
STATION 15+67.00
COORD. N 3026013.9410
E 647369.4169

ROUTE 2A/110
(AYER ROAD)

ROUTE 2A/110
(AYER ROAD)

LIMIT OF WORK
END FINE MILLING AND RESURFACING
STA. 23+16.00

BRUCE STREET

0+00 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16+00

14+00 15 16 17 17+40 18 19 27 22 23 23+60

LEGEND

(7) CONSTRUCTION PLANS

11 PROFILES

20 DRAINAGE AND UTILITY PLANS

30 TRAFFIC SIGNS & PAVEMENT MARKINGS PLANS

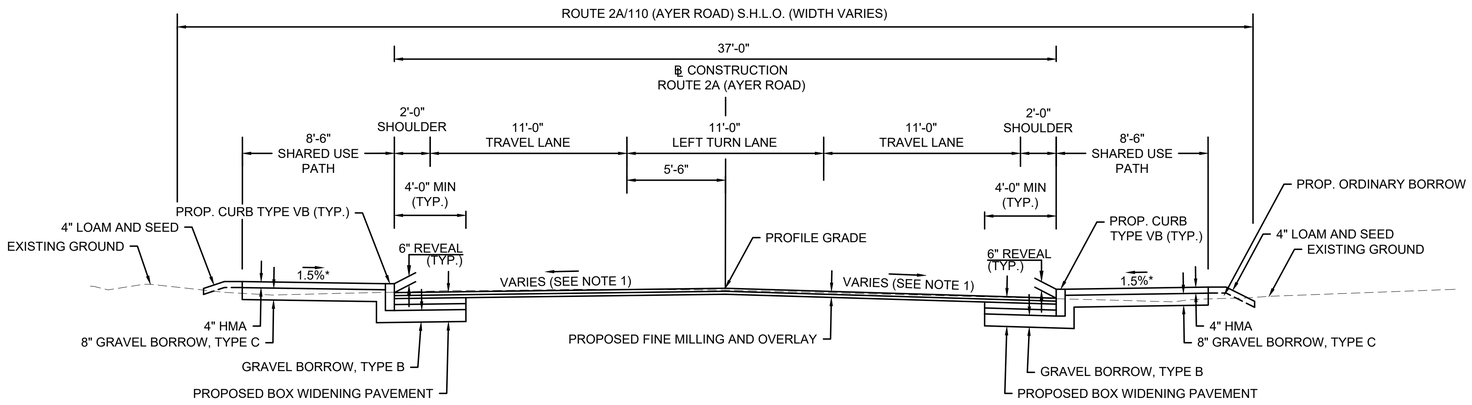
0 60 120 240

SCALE: 1"=60'

LITTLETON/AYER
ROUTE 2A (AYER ROAD)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	5	78
PROJECT FILE NO.	608443		

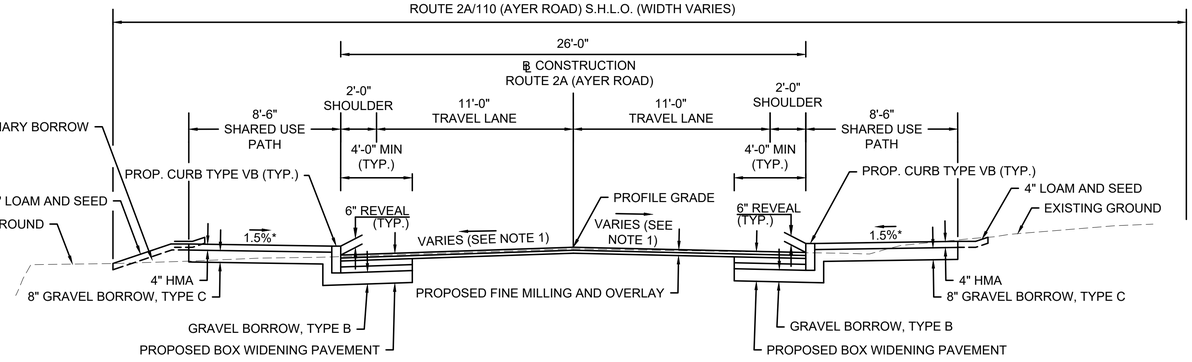
TYPICAL SECTIONS (1 OF 2)



* TOLERANCE FOR CONSTRUCTION = ±0.5%

TYPICAL ROUTE 2A/110 (AYER ROAD) SECTION

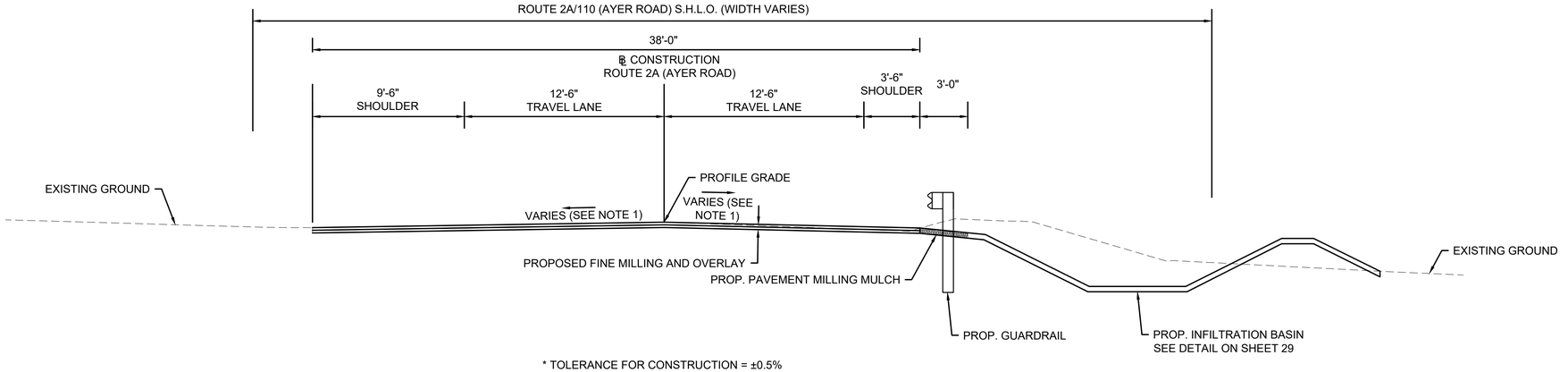
STA. 3+50.00 - STA. 9+90.00
SCALE 1"=4'



* TOLERANCE FOR CONSTRUCTION = ±0.5%

TYPICAL ROUTE 2A/110 (AYER ROAD) SECTION

STA. 1+25.00 - STA. 3+50.00
STA. 9+90.00 - STA. 13+25.00
SCALE 1"=4'



* TOLERANCE FOR CONSTRUCTION = ±0.5%

TYPICAL ROUTE 2A/110 (AYER ROAD) SECTION

STA. 13+25.00 - STA. 15+67.00
SCALE 1"=4'

PAVEMENT NOTES:

PROPOSED BOX WIDENING PAVEMENT

PAVEMENT: 2" SUPERPAVE SURFACE COURSE 12.5 (SSC-12.5-P) OVER ASPHALT EMULSION FOR TACK COAT RS-1H AT 0.08 GAL/SY OVER 2.25" SUPERPAVE INTERMEDIATE COURSE 19.0 (SIC-19.0) OVER ASPHALT EMULSION FOR TACK COAT RS-1H AT 0.08 GAL/SY OVER

BASE: 4" SUPERPAVE BASE COURSE 37.5 (SBC-37.5)

SUBBASE: 4" DENSE GRADED CRUSHED STONE OVER EXISTING SUBBASE MEETING MATERIAL SPECIFICATION M1.03.0 GRAVEL BORROW, TYPE B OR 8" GRAVEL BORROW, TYPE B

PROPOSED FINE MILLING AND OVERLAY

PAVEMENT FINE MILLING: 3" VARIABLE PAVEMENT FINE MILLING (SEE NOTE 1)

SURFACE: 2" SUPERPAVE SURFACE COURSE 12.5 (SSC-12.5-P) OVER ASPHALT EMULSION FOR TACK COAT RS-1H AT 0.08 GAL/SY OVER 2.25" SUPERPAVE INTERMEDIATE COURSE 19.0 (SIC-19.0) OVER ASPHALT EMULSION FOR TACK COAT RS-1H AT 0.09 GAL/SY

HMA SHARED USE PATH

SURFACE 1.5" SUPERPAVE SURFACE COURSE 12.5(SSC-12.5) OVER ASPHALT EMULSION FOR TACK COAT (RS-1) AT 0.08 GAL/SY OVER 2.5" SUPERPAVE INTERMEDIATE COURSE 19.0 (SIC-19.0)

SUBBASE: 8" GRAVEL BORROW, TYPE C

CEM. CONC. DRIVEWAY

TOP COURSE: 6" CEMENT CONCRETE

SUBBASE: 8" GRAVEL BORROW, TYPE C

NOTES:

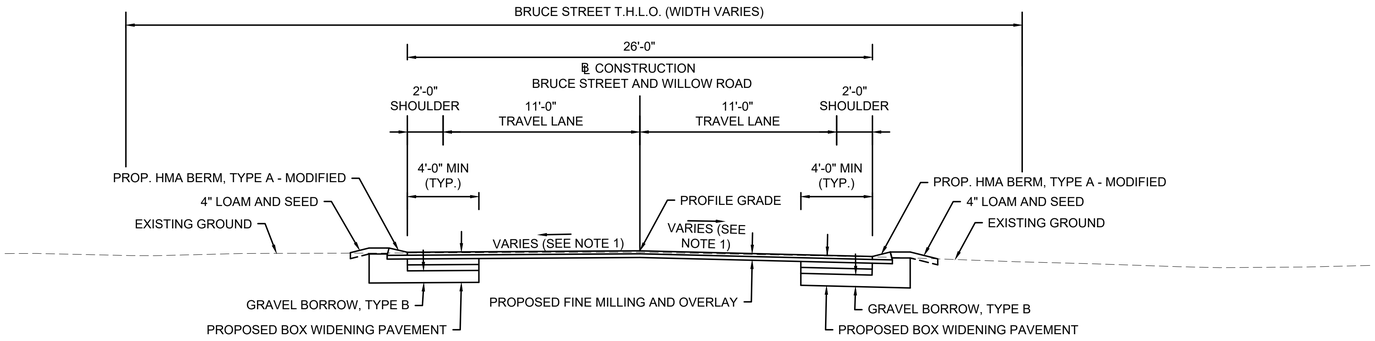
1. PAVEMENT MILLING TO MATCH EXISTING CROSS SLOPE OR ESTABLISH 2% CROSS SLOPE WHERE POSSIBLE AS SHOWN ON THE CROSS SECTIONS.

2. ALL HMA SHALL BE PER SECTION 450 HOT MIX ASPHALT AND SECTION M3 ASPHALTIC MATERIALS.

LITTLETON/AYER
ROUTE 2A (AYER ROAD)

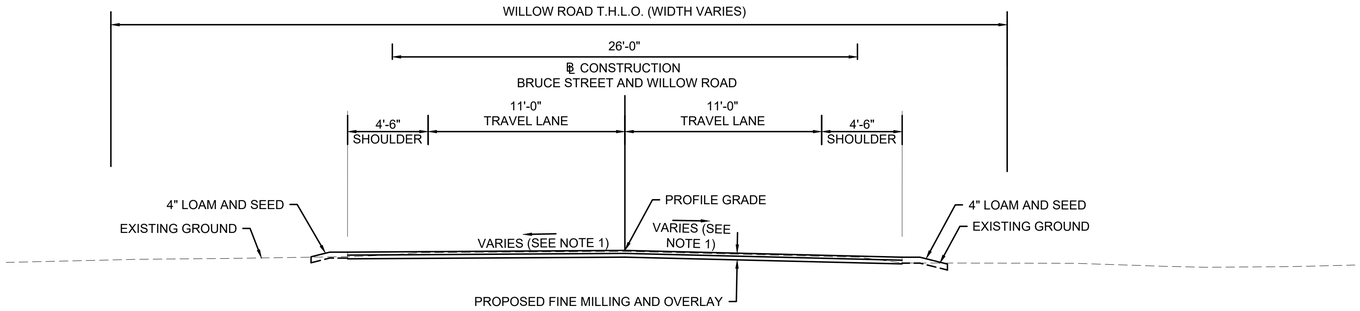
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	6	78
PROJECT FILE NO.	608443		

TYPICAL SECTIONS (2 OF 2)



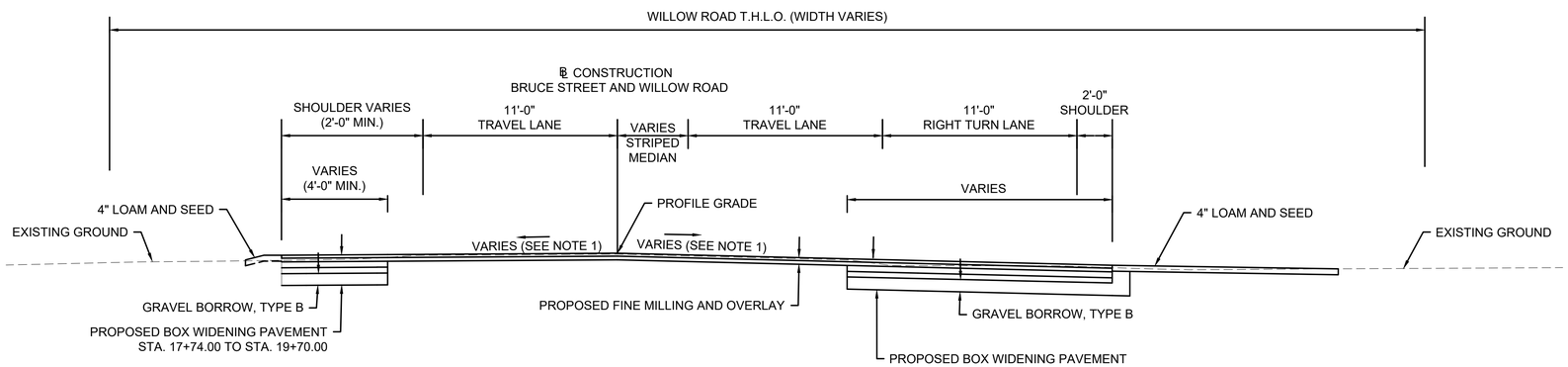
TYPICAL BRUCE STREET SECTION

STA. 20+30.00 - STA. 23+16.00
SCALE 1"=4'



TYPICAL WILLOW ROAD SECTION

STA. 14+90.00 - STA. 18+00.00
SCALE 1"=4'



TYPICAL WILLOW ROAD SECTION (RIGHT TURN)

STA. 18+00.00 - STA. 19+70.00
SCALE 1"=4'

LITTLETON/AYER
ROUTE 2A (AYER ROAD)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	7	78
PROJECT FILE NO.	608443		

CONSTRUCTION PLANS (1 OF 4)

HIGHWAY GUARD DETAILS
NONE

TRAFFIC SIGNAL CONDUIT
SEE BELOW

WATER SUPPLY ALTERATIONS
NONE

DRAINAGE DETAILS
SEE SHEET NO. 20

BEGIN PROJECT
BEGIN FINE MILLING AND RESURFACING
STATION 1+25.00
COORD. N 3025970.8040 E 645935.7660

ROUTE 2A (AYER ROAD)
(PUBLIC - VARIABLE WIDTH) N 79° 29' 37" E 445.41'

AYER
LITTLETON

1926 SHLO NO. 2331

N/F
JOSEPH P.A. ROUTHIER
PARCEL ID 30-9
BOOK 59354 PAGE 438
0 LITTLETON RD

N/F
PINGRYVILLE REALTY TRUST
BRENT C. ROUTHIER, TRUSTEE
PARCEL ID 30-12
BOOK 70372 PAGE 268
186 LITTLETON RD

N/F
PINGRYVILLE REALTY TRUST
PARCEL ID 30-13
BOOK 70655 PAGE 130
190 LITTLETON RD
TOWN OF AYER

N/F
PINGRYVILLE REALTY TRUST
PARCEL ID 30-14
BOOK 70655 PAGE 133
192 LITTLETON RD
TOWN OF AYER

N/F
PINGRYVILLE REALTY TRUST
PARCEL ID U45 9 0
BOOK 70655 PAGE 130
AYER RD
TOWN OF LITTLETON

N/F
PINGRYVILLE REALTY TRUST
PARCEL ID U45 10 0
BOOK 70655 PAGE 133
192 AYER RD
TOWN OF LITTLETON

N/F
THE THEODORE W. NUSSDORFER
2007 REVOCABLE TRUST,
THEODORE W. NUSSDORFER AND
MAUREEN M. NUSSDORFER TRUSTEES
PARCEL ID U45 8 0
BOOK 50576 PAGE 223
264 AYER RD

N/F
260 AYER RD TRUST,
RONALD J RAFFI TRUSTEE
PARCEL ID U45 8 A
BOOK 21527 PAGE 232
260 AYER RD

PROP. TEMP. EASEMENT (TYP.)
PROP. PERM. EASEMENT
RET. LP
RET. BENCH
RET. AND PROTECT 4" DIA. TREES
RET. BLDR
PROP. SLOPE LIMIT (TYP.)
PROP. CLEARING AND GRUBBING
LIMIT OF BOX WIDENING STA. 3+33.00
RET. FENCE
R&S MEMORIAL
PROP. SAWCUT AND MATCH EXISTING
PROP. HMA DRIVEWAY
PROP. GRANITE CURB TYPE VB
PROP. LOAM AND SEED
PROP. HMA DRIVEWAY
PROP. CEM. CONC. DRIVEWAY
R&R MB
RET. FENCE
RET. TIMBER WALL
PROP. HMA DRIVEWAY
SAWCUT AND MATCH EXISTING
PROP. HMA SHARED USE PATH
PROP. GRANITE CURB TYPE VB
R&R MB
RET. BLDR
PROP. FINE MILLING AND RESURFACING
PC +45.41
PROP. GRANITE CURB TYPE VB
PROP. HMA SHARED USE PATH
PROP. SLOPE LIMIT
R&S. BLDR.
PROP. TREE PROTECTION - ARMORING & PRUNING
RET. BRICK WALL
RET. BRICK WALL
PROP. HMA DRIVEWAY
SAWCUT AND MATCH EXISTING
NEAT CUTLINE (TYP.)
LIMIT OF BOX WIDENING STA. 2+47.00
PROP. MATTING FOR EROSION CONTROL
R&S ROCKS
PROP. LOAM AND SEED
PROP. CLEARING AND GRUBBING
R&S BLDRS
R&S BLDRS
RET. PLANTER AND SIGN
PROP. PERM. EASEMENT

8.50'
8.50'

200 FT RIVERFRONT AREA

CONTINUED ON SHEET NO. 8

0 20 50 100
SCALE: 1" = 20'

FOR PROFILE: SEE SHEET NO. 11

608443_HD06(CONSTRUCTION PLAN).DWG Plotted on 13-Oct-2021 1:35 PM

LITTLETON/AYER
ROUTE 2A (AYER ROAD)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	8	78
PROJECT FILE NO.	608443		

CONSTRUCTION PLANS (2 OF 4)

CONTINUED ON SHEET NO. 10

HIGHWAY GUARD DETAILS
NONE

TRAFFIC SIGNAL CONDUIT
SEE BELOW

WATER SUPPLY ALTERATIONS
NONE

DRAINAGE DETAILS
SEE SHEET NO. 26

N

LIMIT OF BOX WIDENING STA. 17+74.00
LIMIT OF BOX WIDENING STA. 17+80.00
RET. STONE WALL
S 42° 11' 45" E 207.08'
RET. BLDR.
N/F WATTS FAMILY TRUST, ELIZABETH M. WATTS TRUSTEE PARCEL ID 30–15 BOOK 25290 PAGE 543 59 WILLOW RD
1967 MIDDLESEX COUNTY LAYOUT
N/F 256 AYER ROAD TRUST PARCEL ID 30–16 BOOK 70655 PAGE 127 0 LITTLETON ROAD TOWN OF AYER
PROP. BOUND
R&S BLDRS
PROP. BOUND
PROP. LOAM AND SEED
PROP. PERM. EASEMENT
PROP. TEMP. EASEMENT (TYP.)
PROP. SAWCUT AND MATCH EXISTING
PROP. HMA DRIVEWAY
PROP. CLEARING AND GRUBBING
N/F 256 AYER ROAD TRUST PARCEL ID U45 11 0 BOOK 70655 PAGE 127 AYER RD TOWN OF LITTLETON
R&S. BLDR.
PROP. BOUND
R&S POST
R&S. BLDR.
PROP. LOAM AND SEED
WILLOW ROAD (PUBLIC - VARIABLE WIDTH)
SAWCUT AND MATCH EXISTING
PROP. HMA DRIVEWAY
R&S. GRANITE BLOCK
RET. SHRUBS
PROP. AGED PINE BARK MULCH
R&R MB
1967 MIDDLESEX COUNTY LAYOUT
N/F CLARISSA A. EATON PARCEL ID 31–2 BOOK 30815 PAGE 287 64 WILLOW RD TOWN OF AYER
PROP. HMA DRIVEWAY
SAWCUT AND MATCH EXISTING
R&S. BLDR.
R&S GRANITE BLOCK
RET. 5" TREE
RET. 24" TREE
R&S STONE WALL
R&S FENCE
N/F CLARISSA A. EATON PARCEL ID U45 12 0 BOOK 30815 PAGE 287 64 WILLOW RD TOWN OF LITTLETON
AYER
LITTLETON
N/F CHIP SHOTS REALTY LLC PARCEL ID U45 14 0 BOOK 46676 PAGE 280 245 AYER RD
PROP. GRANITE CURB TYPE VB
PROP. LOAM AND SEED
R&S. FLAG POLE
PROP. TEMP. EASEMENT (TYP.)
STA. 6+84.87 ROUTE 2A/110 (AYER ROAD) ℄ =
STA. 20+00.00 WILLOW ROAD/BRUCE STREET ℄
PROP. GRANITE TRANSITION CURB TYPE VB
PROP. CEM. CONC. DRIVE (TYP.)
PROP. HMA DRIVEWAY
SAWCUT AND MATCH EXISTING
REM. BLDR
R&S. BLDR
PROP. GRASS SWALE
R&S TIMBER
RET. LANDSCAPING
RET. SIGN
RET. POST
R&S FENCE
R&S BOLLARD
R&S FENCE
RET. BOLLARD
HMA BERM TYPE A, MODIFIED
SAWCUT AND MATCH EXISTING
PROP. HMA DRIVEWAY
PROP. LOAM AND SEED
PROP. SLOPE LIMIT
R&S BOLLARD
RET. BERM
RET. FENCE
R&S POST
R&R MB
PC +45.37
L=215.28'
R=550.00'
Δ=22° 25' 36"
PROP. HMA SHARED USE PATH
PROP. GRANITE CURB TYPE VB
PROP. CLEARING AND GRUBBING
PROP. BOUND
Δ=13° 48' 19"
L=409.61' R=1700.00'
NEAT CUT LINE (TYP.)
PROP. GRANITE TRANSITION CURB TYPE VB
PROP. BOUND
1912 SHLO NO. 1433
PT +55.02
PROP. BOUND
PROP. FINE MILLING AND RESURFACING
ROUTE 2A (AYER ROAD)
(PUBLIC - VARIABLE WIDTH)
PC-2
R&S. ROCKS
R&S. ROCKS
PROP. GRANITE CURB TYPE VB
PROP. HMA SHARED USE PATH
PROP. GRANITE CURB TYPE VB
1926 SHLO NO. 2330
R&S POST
PC +45.41
PC-1
HMA BERM TYPE A, MODIFIED
REM. CURB
PROP. GRANITE CURB TYPE VB
PROP. HMA SHARED USE PATH
REM. BERM
R&S. BLDR
HMA BERM TYPE A, MODIFIED
REM. CURB
SAWCUT AND MATCH EXISTING
PROP. HMA DRIVEWAY
PROP. AGED PINE BARK MULCH
RET. PLANTER AND SIGN
RET. BERM
PROP. PERM. EASEMENT
PROP. AGED PINE BARK MULCH
MATTING EROSION CONTROL
N/F AYER HOUSE TRUST, JOSEPH PAUL ROUTHIER TRUSTEE PARCEL ID U45 7 0 BOOK 14463 PAGE 422 256 AYER RD
DRIVEWAY EASEMENT TO PASS AND REPASS BOOK 14407 PG 382
REM. BERM
HMA BERM TYPE A, MODIFIED
SAWCUT AND MATCH EXISTING
PROP. HMA DRIVEWAY
PROP. TEMP. EASEMENT (TYP.)
HMA BERM TYPE A, MODIFIED
POLYETHELENE BARRIER
PUMP STATION
SEPTIC TANK
GREASE TRAP
DRAINFIELD
N/F 256 AYER ROAD TRUST, JOSEPH PAUL ROUTHIER TRUSTEE PARCEL ID U45 7 B BOOK 14407 PAGE 382 254 AYER RD
N/F AYER HOUSE TRUST, JOSEPH PAUL ROUTHIER TRUSTEE PARCEL ID U45 7 0 BOOK 14463 PAGE 422 256 AYER RD
PROP. BOUND
PROP. SLOPE LIMIT
PROP. LOAM AND SEED
LIMIT OF BOX WIDENING STA. 7+11.00
PROP. PERM. EASEMENT
PROP. CLEARING AND GRUBBING
PROP. BOUND
R&D BUSHES
SAWCUT AND MATCH EXISTING
REM. BIT. CONC. DRIVEWAY
REM. BIT. BERM
PROP. TEMP. EASEMENT (TYP.)
R&D BUSHES
HMA BERM TYPE A, MODIFIED
R&R MB
PROP. BOUND
SAWCUT AND MATCH EXISTING
PROP. HMA DRIVEWAY
TOWN OF LITTLETON EASEMENT LINE
R&R MB
PROP. BOUND
PROP. FINE MILLING AND RESURFACING
R&S POSTS
LIMIT OF BOX WIDENING STA. 7+97.00
RET. POSTS
RET. STUMP
R&S POST
PROP. GRANITE TRANSITION CURB TYPE VB
LIMIT OF BOX WIDENING STA. 21+48.00
PROP. CLEARING AND GRUBBING
RET. ROCK
R&S POSTS
RET
HMA BERM TYPE A, MODIFIED
PT +60.65
LIMIT OF BOX WIDENING STA. 22+60.00
N/F FRANK W. MATHESON JR PARCEL ID U45 2 0 BOOK 64522 PAGE 122 2 BRUCE ST
PROP. HMA DRIVEWAY MATCH EXISTING
S 64° 37' 20" E 198.35'
BRUCE STREET
(PUBLIC - VARIABLE WIDTH)
LIMIT OF WORK END FINE MILLING AND RESURFACING STA. 23+16.00
ACCESS EASEMENT BOOK 16348 PG 141
N/F CHRISTOPHER SNAY PARCEL ID U45 7 A BOOK 70787 PAGE 593 5 BRUCE ST
RET. 20" TREE
HMA BERM TYPE A, MODIFIED
RET. 28" TREE
RET. STONE WALL
PROP. CLEARING AND GRUBBING
R&S POST
LIMIT OF BOX WIDENING STA. 22+60.00
RET. 28" TREE
N/F GEORGE MATHEW ROBINSON PARCEL ID U45 7 C BOOK 63285 PAGE 19 7 BRUCE ST
23+60

0 20 50 100
SCALE: 1" = 20'

FOR PROFILE: SEE SHEETS NO. 12, 15

CONTINUED ON SHEET NO. 7
CONTINUED ON SHEET NO. 9

608443_HD06(CONSTRUCTION PLAN).DWG Plotted on 13-Oct-2021 1:36 PM

LITTLETON/AYER
ROUTE 2A (AYER ROAD)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	9	78
PROJECT FILE NO.	608443		

CONSTRUCTION PLANS (3 OF 4)

608443_HD06(CONSTRUCTION PLAN).DWG Plotted on 13-Oct-2021 1:36 PM

HIGHWAY GUARD DETAILS

STA 13+03 - 13+40 RT (GUARDRAIL FLARED END TREATMENT, TL-3)
STA 13+40 - 15+56 RT (GUARDRAIL, TL-3(SINGLE FACED))
STA 15+56 - 15+65 RT (TRAILING ANCHORAGE)

TRAFFIC SIGNAL CONDUIT

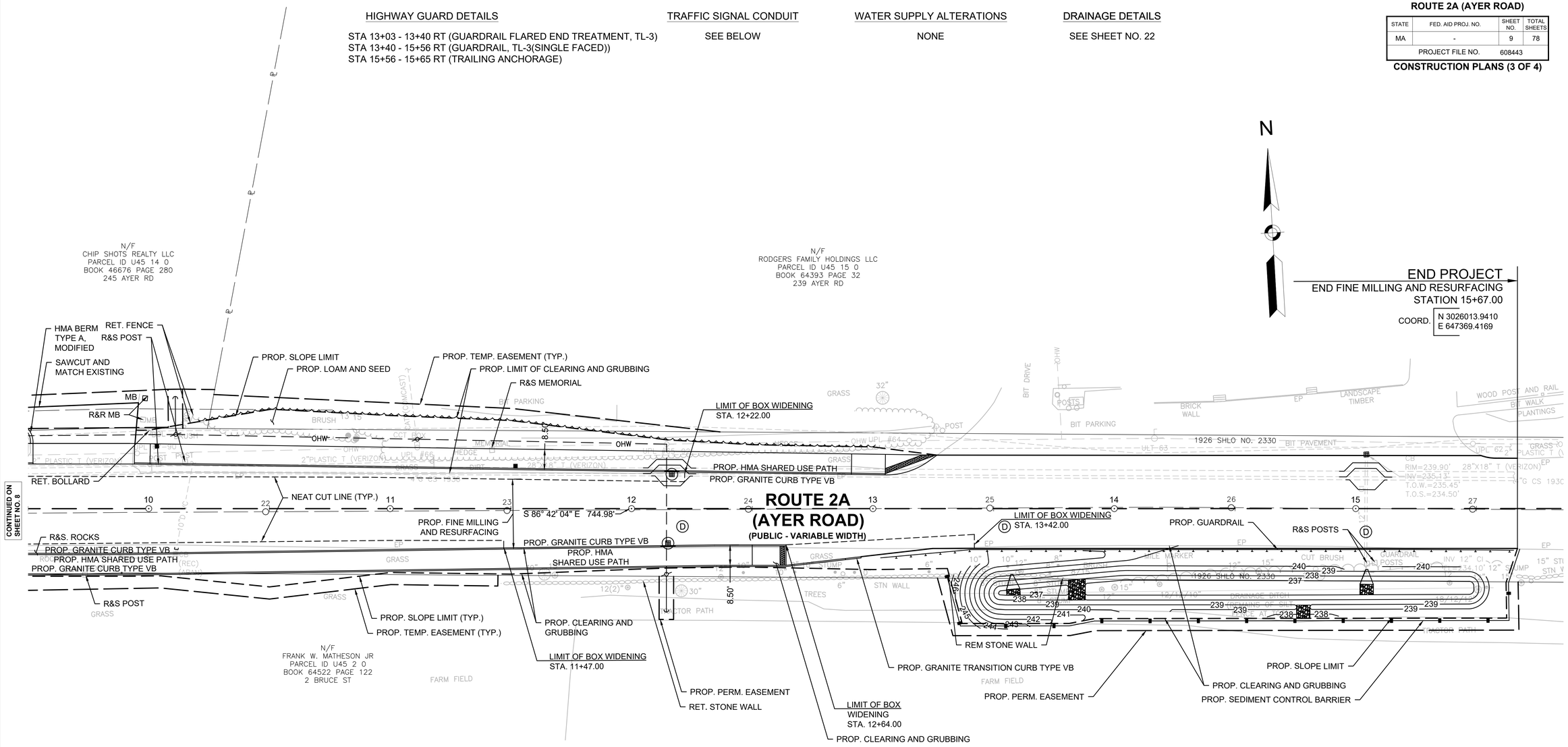
SEE BELOW

WATER SUPPLY ALTERATIONS

NONE

DRAINAGE DETAILS

SEE SHEET NO. 22



NOTE:
1. SEE SHEET 29 FOR ADDITIONAL GRADING INFORMATION.

FOR PROFILE: SEE SHEET NO. 13

LITTLETON/AYER
ROUTE 2A (AYER ROAD)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	10	78
PROJECT FILE NO.	608443		

CONSTRUCTION PLANS (4 OF 4)

HIGHWAY GUARD DETAILS
NONE

TRAFFIC SIGNAL CONDUIT
NONE

WATER SUPPLY ALTERATIONS
NONE

DRAINAGE DETAILS
SEE SHEET NO. 23

WILLOW ROAD
(PUBLIC - VARIABLE WIDTH)

LIMIT OF WORK
BEGIN FINE MILLING
AND RESURFACING
STA. 14+90.00

N/F
WILLOWS CONDOMINIUM
PARCEL ID 30-24
BOOK 50661 PAGE 255
WILLOW ROAD

N/F
JAMES P. DRISCOLL
PARCEL ID 31-1
BOOK 63699 PAGE 383
62A WILLOW RD

N/F
MALLARD REALTY TRUST,
RONALD E. MALLARD, TRUSTEE
PARCEL ID 30-18
BOOK 68327 PAGE 521
60 WILLOW RD

N/F
TIMOTHY W. HILL
PARCEL ID 30-19
BOOK 28280 PAGE 469
62 WILLOW RD

N/F
ERIC F. ROBINSON
AND CHERYL A. ROBINSON
PARCEL ID 30-7
BOOK 53725 PAGE 508
55 WILLOW RD

N/F
WATTS FAMILY TRUST,
ELIZABETH M. WATTS TRUSTEE
PARCEL ID 30-15
BOOK 25290 PAGE 543
59 WILLOW RD

NORTH COUNTRY DEVELOPERS LLC
PARCEL ID 30-8
BOOK 68351 PAGE 399
53 WILLOW RD

BENNET'S BROOK

100-YEAR FLOOD LINE
ELEV. 239.0'

100-YEAR FLOOD LINE
ELEV. 243.4'

100 FT BUFFER ZONE

200 FT RIVERFRONT AREA

15' ROW EASEMENT

1963 MIDDLESEX COUNTY LAYOUT

PROP. STONE FOR PIPE ENDS
RET. AND PROTECT 12" DIA. TREE
PROP. SEDIMENT CONTROL BARRIER
PROP. SLOPE LIMIT
PROP. PERM. EASEMENT
PROP. CLEARING AND GRUBBING
RET. STONE WALL
RET. MB
R&S. BLDR
RET. POSTS
RET. BRICK SIDEWALK
PROP. LOAM AND SEED
S38°26'02"E
213.54'
PC +13.54
PROP. FINE MILLING
AND RESURFACING
Δ=3° 45' 43"
L=124.75' R=1900.00'
PT +38.29
S 42° 11' 45" E 207.08'
SAWCUT AND MATCH EXISTING
PROP. HMA DRIVEWAY
LIMIT OF BOX WIDENING
STA. 17+74.00
PROP. SLOPE LIMIT
PROP. CLEARING AND GRUBBING
PROP. LOAM AND SEED
SAWCUT AND MATCH EXISTING
PROP. HMA DRIVEWAY
PROP. SLOPE LIMIT
PROP. CLEARING AND GRUBBING
PROP. LOAM AND SEED
RET. STONE WALL
LIMIT OF BOX WIDENING
STA. 17+80.00

CONTINUED ON SHEET NO. 8

FOR PROFILE: SEE SHEET NO. 14

0 20 50 100
SCALE: 1" = 20'

608443_HD06(CONSTRUCTION PLAN).DWG Plotted on 13-Oct-2021 1:36 PM

LITTLETON/AYER
ROUTE 2A (AYER ROAD)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	20	78
PROJECT FILE NO.	608443		

DRAINAGE AND UTILITY PLANS (1 OF 4)

608443_HDXX(D&U PLAN).DWG Plotted on 13-Oct-2021 1:36 PM

N

BEGIN PROJECT
BEGIN FINE MILLING AND RESURFACING
STATION 1+25.00
COORD. N 3025970.8040
E 645935.7660

AYER
LITTLETON

ROUTE 2A (AYER ROAD)
(PUBLIC - VARIABLE WIDTH)

1926 SHLO NO. 2331

0+00
+18.68 PI

N/F
JOSEPH P.A. ROUTHIER
PARCEL ID 30-9
BOOK 59354 PAGE 438
0 LITTLETON RD

N/F
PINGRYVILLE REALTY TRUST
BRENT C. ROUTHIER, TRUSTEE
PARCEL ID 30-12
BOOK 70372 PAGE 268
186 LITTLETON RD

N/F
PINGRYVILLE REALTY TRUST
PARCEL ID 30-13
BOOK 70655 PAGE 130
190 LITTLETON RD
TOWN OF AYER

N/F
PINGRYVILLE REALTY TRUST
PARCEL ID 30-14
BOOK 70655 PAGE 133
192 LITTLETON RD
TOWN OF AYER

N/F
PINGRYVILLE REALTY TRUST
PARCEL ID U45 9 0
BOOK 70655 PAGE 130
AYER RD
TOWN OF LITTLETON

N/F
PINGRYVILLE REALTY TRUST
PARCEL ID U45 10 0
BOOK 70655 PAGE 133
192 AYER RD
TOWN OF LITTLETON

N/F
THE THEODORE W. NUSSDORFER
2007 REVOCABLE TRUST,
THEODORE W. NUSSDORFER AND
MAUREEN M. NUSSDORFER TRUSTEES
PARCEL ID U45 8 0
BOOK 50576 PAGE 223
264 AYER RD

N/F
260 AYER RD TRUST,
RONALD J RAFFI TRUSTEE
PARCEL ID U45 8 A
BOOK 21527 PAGE 232
260 AYER RD

R&R UP(50') (BO)
R&R UP(50') & GUYS (2) (BO)
PROP. PERM. EASEMENT
PROP. TEMP. EASEMENT (TYP.)
PROP. CBCI (1-2)
15 LF - 12" RCP
PROP. DMH (1-3)
REM 12" D RCP
245 LF - 12" RCP
29 LF - 12" RCP
PROP CUT AND PLUG (TYP.)
PROP. GI (1-1)
8 LF - 12" DIP
PROP. CB W FRAME AND COVER (1-24)
DRIVEWAY EASEMENT TO PASS AND REPASS BOOK 14407 PG 382

CB
RIM=253.47
INV.(A)=250.12
INV.(B)=250.16
T.O.W.=250.22
T.O.S.=248.37
SUMP=248.07

CONTINUED ON SHEET NO. 21

0 20 50 100
SCALE: 1" = 20'

LITTLETON/AYER
ROUTE 2A (AYER ROAD)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	21	78
PROJECT FILE NO.	608443		

DRAINAGE AND UTILITY PLANS (2 OF 4)

608443_HDXX(D&U PLAN).DWG Plotted on 13-Oct-2021 1:52 PM

CONTINUED ON SHEET NO. 23

UPGRADE UP(45') (BO)
PROP. PUSH BRACE (BO)
I-440
284 LF - 18" RCP
PROP. PERM. EASEMENT
PROP. WATER SERVICE RELOCATION
ADJ. WATER GATE
1967 MIDDLESEX COUNTY LAYOUT
N/F
WATTS FAMILY TRUST,
ELIZABETH M. WATTS TRUSTEE
PARCEL ID 30-15
BOOK 25290 PAGE 543
59 WILLOW RD
N/F
256 AYER ROAD TRUST
PARCEL ID 30-16
BOOK 70655 PAGE 127
0 LITTLETON ROAD
TOWN OF AYER
N/F
CLARISSA A. EATON
PARCEL ID 31-2
BOOK 30815 PAGE 287
64 WILLOW RD
TOWN OF AYER
AYER
LITTLETON
N/F
CLARISSA A. EATON
PARCEL ID U45 12 0
BOOK 30815 PAGE 287
64 WILLOW RD
TOWN OF LITTLETON
N/F
CHIP SHOTS REALTY LLC
PARCEL ID U45 14 0
BOOK 46676 PAGE 280
245 AYER RD
WILLOW ROAD
(PUBLIC - VARIABLE WIDTH)
REM. UP (BO)
PROP GUY (3) (BO)
PROP. PERM. EASEMENT
R&R UP(50') & GUY (BO)
N/F
256 AYER ROAD TRUST
PARCEL ID U45 11 0
BOOK 70655 PAGE 127
AYER RD
TOWN OF LITTLETON
R&R UP(50') (BO)
R&R FLOODLIGHTS
PROP. DMH (1-4)
69 LF - 12" RCP
ADJ. TMH (BO)
245 LF - 12" RCP
ADJ. GAS GATE (BO)
PROP CUT AND PLUG (TYP.)
55 LF - 18" RCP
PROP. TEMP. EASEMENT (TYP.)
ADJ. WATER GATE
PROP. 5' DIA. DMH (1-20)
R&R UP(50') & GUY (BO)
R&R COBRA HEAD LIGHT (BO)
ADJ. WATER GATE
ADJ. GAS GATE (BO)
ADJ. WATER GATE
PROP. ELECTRIC SERVICE RISER RELOCATION
REMOVE AND RELOCATE SIGN - BY OTHERS
PROP. CBCI (1-8)
29 LF - 12" RCP
PROP. DMH (1-10)
10 LF - 12" RCP
PROP. PERM. EASEMENT
PROP. 6" DIP
PROP. HYDRANT
ADJ. WATER GATE
PROP. 28" X 18" DUCT BANK RELOCATION (BO)
R&R UP(50') (BO)
PROP. CBCI (1-5)
PROP. 2" PL TELE. LINE RELOCATION (BO)
PROP. GUY (BO)
R&R UP(50') (BO)
ADJ. WATER GATE
R&R UP(50') (BO)
R&R FLOOD LIGHTS
1912 SHLO NO. 1433
R&S. EXISTING HYDRANT
PROP. 6" SOLID SLEEVE
27 LF - 12" RCP
121 LF - 12" RCP
PROP. DMH (1-16)
50 LF - 18" RCP
62 LF - 12" RCP
TOWN OF LITTLETON EASEMENT LINE
23 LF - 12" RCP
ADJ. MONITORING WELL
PROP. CBCI (1-18)
ADJ. MONITORING WELL
20 LF - 12" RCP
PROP. 5' DIA DMH (1-19)
10 LF - 12" RCP
PROP. CBCI (1-17)
PROP. PERM. EASEMENT
ADJ. WATER GATE
R&R UP(50') & GUY (BO)
PROP. CB (1-14)
R&R COBRA HEAD LIGHT (BO)
24 LF - 12" RCP
PROP. CB (1-13)
PROP. TEMP. EASEMENT (TYP.)
39 LF - 12" RCP
PROP. 5' DIA DMH (1-15)
23 LF - 12" RCP
15 LF - 12" RCP
PROP. CB (1-9)
PROP. CBCI (1-11)
14 LF - 12" RCP
PROP. DMH (1-12)
6 LF - 12" RCP
CONNECT TO EXISTING 12"D RCP
PROP. LEACHING BASIN (1-25)
PROP. DMH (1-7)
8 LF - 12" RCP
PROP. TEMP. EASEMENT (TYP)
PROP. CBCI (1-6)
PROP CUT AND PLUG (TYP.)
ADJ. WATER GATE
ADJ. GAS GATE (BO)
UPGRADE UP(45') (BO)
ADJ. GAS GATE (BO)
ADJ. WATER GATE
TOWN LOCATION LINE
N/F
FRANK W. MATHESON JR
PARCEL ID U45 2 0
BOOK 64522 PAGE 122
2 BRUCE ST
BRUCE STREET
(PUBLIC - VARIABLE WIDTH)
LIMIT OF WORK
END FINE MILLING AND RESURFACING
STA. 23+16.00
ROUTE 2A (AYER ROAD)
(PUBLIC - VARIABLE WIDTH)
PROP. UP & GUY (BO)
PROP. PERM. EASEMENT
DRIVEWAY EASEMENT TO PASS AND REPASS
BOOK 14407 PG 382
N/F
256 AYER ROAD TRUST,
JOSEPH PAUL ROUTHIER TRUSTEE
PARCEL ID U45 7 B
BOOK 14407 PAGE 382
254 AYER RD
N/F
AYER HOUSE TRUST,
JOSEPH PAUL ROUTHIER TRUSTEE
PARCEL ID U45 7 0
BOOK 14463 PAGE 422
256 AYER RD
N/F
CHRISTOPHER SNAY
PARCEL ID U45 7 A
BOOK 70787 PAGE 593
5 BRUCE ST
ACCESS EASEMENT
BOOK 16348 PG 141
N/F
GEORGE MATHEW ROBINSON
PARCEL ID U45 7 C
BOOK 63285 PAGE 19
7 BRUCE ST
0 20 50 100
SCALE: 1" = 20'

CONTINUED ON SHEET NO. 20
CONTINUED ON SHEET NO. 22

LITTLETON/AYER
ROUTE 2A (AYER ROAD)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	22	78
PROJECT FILE NO.	608443		

DRAINAGE AND UTILITY PLANS (3 OF 4)

608443_HDXX(D&U PLAN).DWG Plotted on 13-Oct-2021 2:50 PM

N

ROUTE 2A (AYER ROAD)

(PUBLIC - VARIABLE WIDTH)

END PROJECT
END FINE MILLING AND RESURFACING
STATION 15+67.00
COORD. N 3026013.9410, E 647369.4169

N/F
CHIP SHOTS REALTY LLC
PARCEL ID U45 14 0
BOOK 46676 PAGE 280
245 AYER RD

N/F
RODGERS FAMILY HOLDINGS LLC
PARCEL ID U45 15 0
BOOK 64393 PAGE 32
239 AYER RD

N/F
FRANK W. MATHESON JR
PARCEL ID U45 2 0
BOOK 64522 PAGE 122
2 BRUCE ST

PROP. PERM. EASEMENT
PROP. GUY (BO)
RET. BOLLARD
R&R UP(50') (BO)
PROP. TEMP. EASEMENT (TYP.)
R&R UP(50') (BO)
R&R PRIMARY RISER (BO)
RET. UP
PROP. CBCI (2-1)
PROP. 28" X 18" DUCT BANK RELOCATION (BO)
PROP. 4" GAS LINE RELOCATION (BO)
RET. UP
PROP. 28" X 18" DUCT BANK RELOCATION (BO)
R&R COBRA HEAD LIGHT (BO)
PROP. GI (2-7)
30 LF - 12" DIP
22 LF - 12" RCP
133 LF - 12" RCP
22 LF - 12" RCP
PROP. 4" GAS LINE RELOCATION (BO)
PROP CUT AND PLUG (TYP.)
REM
PROP. TEMP. EASEMENT (TYP.)
PROP. UP & GUY (BO)
PROP. DMH (2-4)
9 LF - 12" RCP
PROP. CBCI (2-3)
PROP. PERM. EASEMENT
PROP. DMH (2-5)
PROP. FES (2-9)
PROP. INFILTRATION BASIN
PROP. PERM. EASEMENT
PROP. CB W FRAME AND COVER (2-6)
16 LF - 12" RCP CLASS V
PROP. FES (2-8)

CONTINUED ON SHEET NO. 21

NOTE:
1. SEE SHEET 29 FOR ADDITIONAL GRADING INFORMATION.

0 20 50 100
SCALE: 1" = 20'

LITTLETON/AYER
ROUTE 2A (AYER ROAD)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	23	78
PROJECT FILE NO.	608443		

DRAINAGE AND UTILITY PLANS (4 OF 4)

608443_HDXX(D&U PLAN).DWG Plotted on 13-Oct-2021 2:50 PM

N

LIMIT OF WORK
BEGIN FINE MILLING
AND RESURFACING
STA. 14+90.00

N/F
WILLOWS CONDOMINIUM
PARCEL ID 30-24
BOOK 50661 PAGE 255
WILLOW ROAD

100 FT BUFFER ZONE

1963 MIDDLESEX COUNTY LAYOUT

WILLOW ROAD
(PUBLIC - VARIABLE WIDTH)

14+00

200 FT RIVERFRONT AREA

15' ROW EASEMENT

100-YEAR FLOOD LINE
ELEV. 239.0'

100-YEAR FLOOD LINE
ELEV. 243.4'

BF#1-4 BF#1-5 BF#1-6 BF#1-7 BF#1-8 BF#1-9 BF#1-10 BF#1-100 BF#1-101 BF#1-102 BF#1-103 BF#1-104 BF#1-105 BF#1-106 BF#1-107 BF#1-108 BF#1-109 BF#1-110 BF#1-111 BF#1-12 BF#1-13 BF#1-14 BF#1-15 BF#1-16 BF#1-17 STOP

WF#A-1 WF#A-2 WF#A-3 WF#A-4 WF#A-5 WF#A-8 STOP WF#A-10 WF#A-11 WF#A-12 WF#A-13 STOP

WF#B-1 WF#B-2 WF#B-3 WF#B-4 WF#B-5 WF#B-6 WF#B STOP WF#B-8 START WF#B-9 WF#B-10 WF#B-11 STOP

INV 12" RCP
EL=235.24'

RIM=243.57
INV.(A)=236.17
INV.(B)=236.27

CB
RIM=243.82
INV=239.32

INV 12"
EL=237.73

PROP. STONE FOR PIPE ENDS
PROP. PERM. EASEMENT
PROP. FLARED END
INV=240.30
PROP. FES (1-23)
21 LF - 18" RCP
158 LF - 18" RCP
PROP. DMH (1-22)
PROP. DMH (1-21)
284 LF - 18" RCP
PROP. TEST PIT
126 LF - 12" RCP
RET.
ADJ.
EXIST. CB (1-27)
R&R COBRA HEAD
LIGHT (BO)
UPGRADE UP(45') (BO)
PROP. PUSH BRACE (BO)
UPGRADE UP(40') (BO)
PROP. PERM. EASEMENT
PROP. DMH(1-26)
4 LF - 12" RCP
RET UP

15 16 17 17+40

100 FT BUFFER ZONE

N/F
MALLARD REALTY TRUST,
RONALD E. MALLARD, TRUSTEE
PARCEL ID 30-18
BOOK 68327 PAGE 521
60 WILLOW RD

N/F
JAMES P. DRISCOLL
PARCEL ID 31-1
BOOK 63699 PAGE 383
62A WILLOW RD

N/F
TIMOTHY W. HILL
PARCEL ID 30-19
BOOK 28280 PAGE 469
62 WILLOW RD

2 STORY BRICK AND VINYL
2 STORY WOOD

N/F
ERIC F. ROBINSON
AND CHERYL A. ROBINSON
PARCEL ID 30-7
BOOK 53725 PAGE 508
55 WILLOW RD

NORTH COUNTRY DEVELOPERS LLC
PARCEL ID 30-8
BOOK 6838 PAGE 399
53 WILLOW RD

N/F
WATTS FAMILY TRUST,
ELIZABETH M. WATTS TRUSTEE
PARCEL ID 30-15
BOOK 25290 PAGE 543
59 WILLOW RD

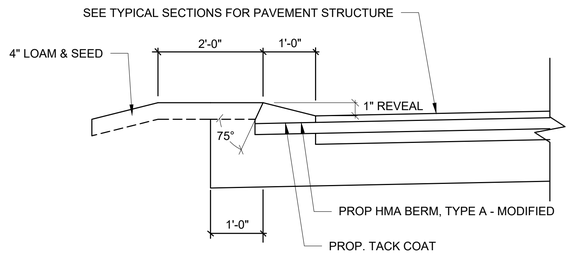
CB
RIM=246.52
INV.(A)=241.39
INV.(B)241.40
T.O.S.=242.02

1967 MIDDLESEX
COUNTY LAYOUT

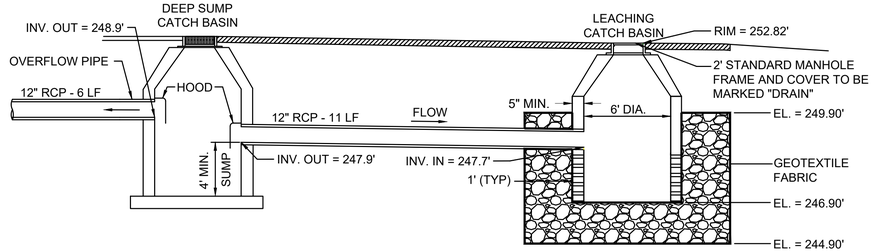
N/F
256 AYER ROAD TRUS
PARCEL ID 30-16
BOOK 70655 PAGE 12
0 LITTLETON ROAD
TOWN OF AYER

CONTINUED ON SHEET NO. 21

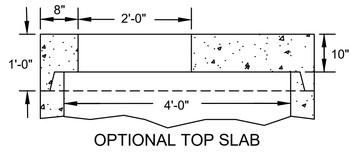
0 20 50 100
SCALE: 1" = 20'



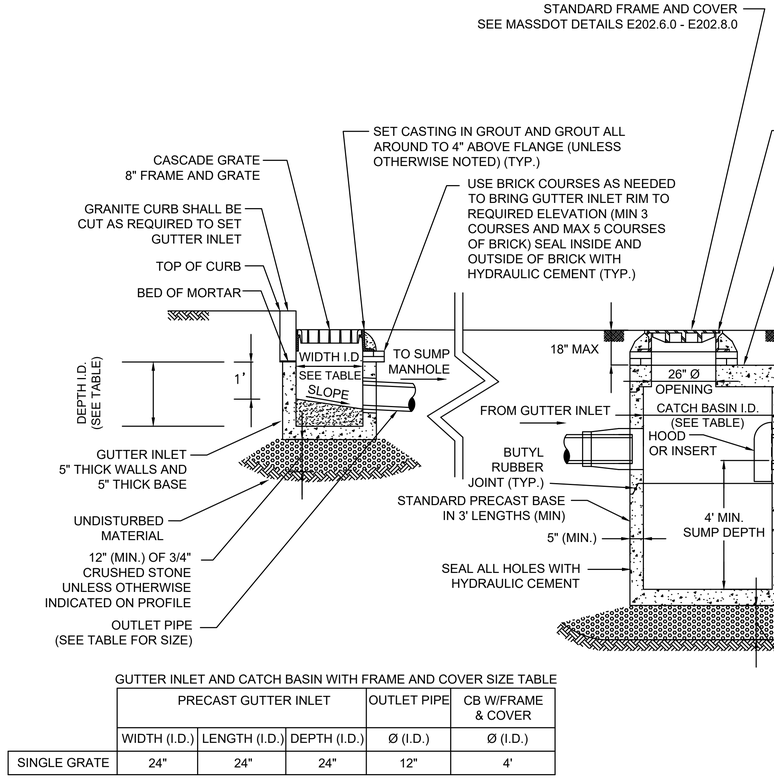
HMA BERM, TYPE A - MODIFIED
NOT TO SCALE



TYPICAL CATCH BASIN/LEACHING CATCH BASIN CONNECTION DETAIL
NOT TO SCALE



OPTIONAL TOP SLAB

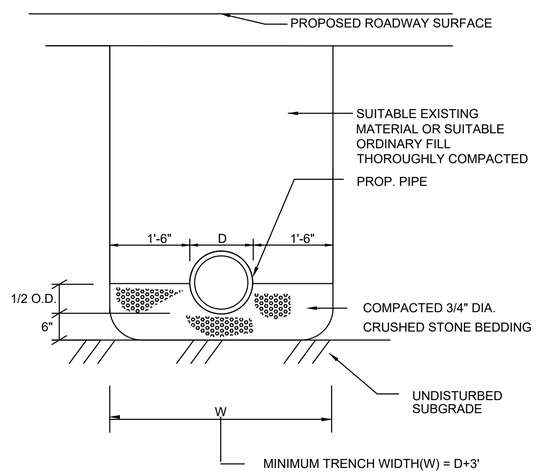


GUTTER INLET AND CATCH BASIN WITH FRAME AND COVER SIZE TABLE

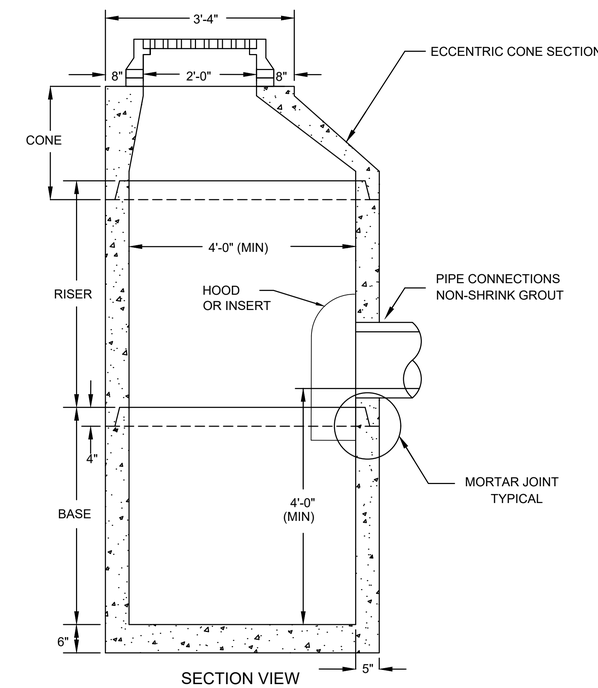
	PRECAST GUTTER INLET			OUTLET PIPE	CB W/FRAME & COVER
	WIDTH (I.D.)	LENGTH (I.D.)	DEPTH (I.D.)	Ø (I.D.)	Ø (I.D.)
SINGLE GRATE	24"	24"	24"	12"	4'

I.D. = INSIDE DIMENSION

GUTTER INLET AND CATCH BASIN WITH FRAME AND COVER
NOT TO SCALE



TYPICAL PIPE TRENCH
NOT TO SCALE

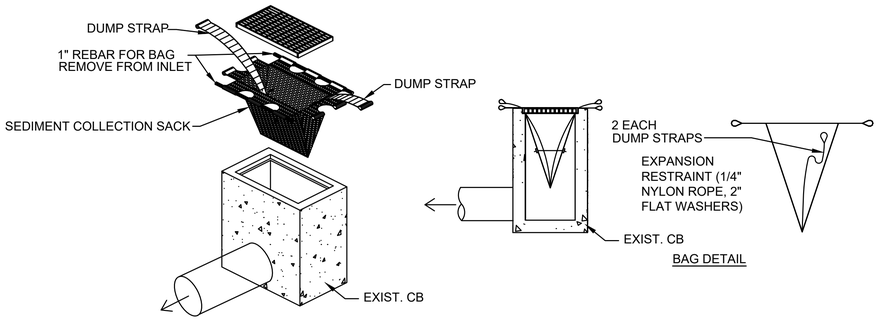


SECTION VIEW

NOTES:

1. CONCRETE: 4,000PSI MINIMUM AFTER 28 DAYS.
2. REINFORCED STEEL CONFORMS TO LATEST ASTM A185 SPEC. 0.12 SQ. IN/LINEAL FT. AND 0.12 SQ. IN. (BOTH WAYS) BASE BOTTOM.
3. H-20 DESIGN LOADING PER AASHTO HS-20-44; ASTM C478 SPEC FOR "PRECAST REINFORCED CONCRETE MANHOLE SECTIONS."
4. BASED ON ACTUAL FIELD CONDITIONS; THE CONTRACTOR SHALL DETERMINE WHICH TYPE OF TOP SECTION SHOULD BE USED. FLAT TOP SECTIONS SHALL ONLY BE INSTALLED WHEN APPROVED BY THE ENGINEER.

ECCENTRIC CATCH BASIN DETAIL
NOT TO SCALE

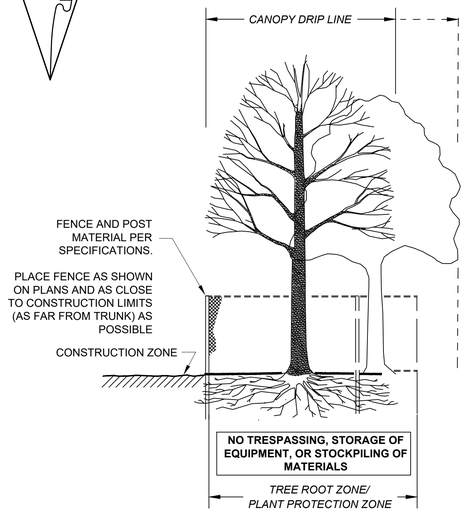


TEMPORARY INLET FILTER BAG DETAIL

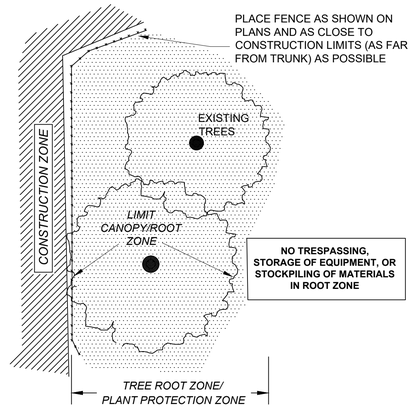
SCALE: NOT TO SCALE

EROSION AND SEDIMENT CONTROLS

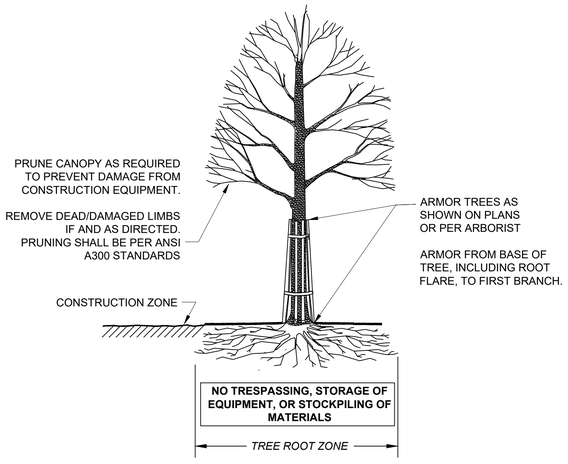
1. THE CONTRACTOR IS RESPONSIBLE FOR CONTROLLING THE EROSION AND SEDIMENT DURING THE CONSTRUCTION PROCESS. SITE SPECIFIC CONDITIONS MAY REQUIRE MODIFICATIONS IN THE FIELD, BUT THE CONTRACTOR MUST ENSURE THAT THE CHANGES MEET THE MINIMUM REQUIREMENTS OF THIS PLAN AND ARE APPROVED BY THE ENGINEER.
2. IN ORDER TO MINIMIZE EROSION AND SEDIMENT RUNOFF FROM THE SITE, THE CONTRACTOR SHALL MAINTAIN EXISTING VEGETATION WHERE POSSIBLE AND STABILIZE THE DISTURBED PORTIONS OF THE SITE AS QUICKLY AS POSSIBLE. THIS MAY INCLUDE PHASING THE PROJECT AS NEEDED TO MINIMIZE THE SIZE OF THE DISTURBED AREAS ON THE SITE. THE COST OF PHASING THE PROJECT IS INCIDENTAL TO THE CONTRACT.
3. THE CONTRACTOR MUST ALSO ANTICIPATE INCREASED RUNOFF FROM STEEPER SLOPES AND DURING HIGH GROUNDWATER CONDITIONS. THIS MAY OCCUR DURING THE WET SEASON (TYPICALLY MARCH THROUGH APRIL) OR AFTER SIGNIFICANT PRECIPITATION EVENTS.
4. ALL DISTURBED SURFACES SHALL BE STABILIZED WITHIN 14 DAYS AFTER CONSTRUCTION IN ANY PORTION OF THE SITE THAT HAS BEEN COMPLETED OR WHERE CONSTRUCTION HAS TEMPORARILY CEASED.
5. THE CONTRACTOR SHALL, AT ALL TIMES, HAVE A STOCKPILE OF COMPOST FILTER TUBES ADEQUATE TO REINFORCE/REPLACE EROSION AND SEDIMENT CONTROL AS NEEDED.



SECTION - FENCE PROTECTION OF ROOT ZONE



PLAN VIEW - FENCE PROTECTION OF ROOT ZONE

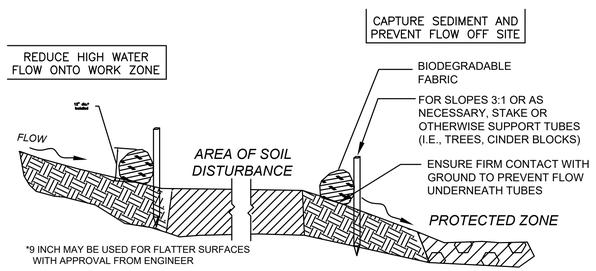


SECTION - TRUNK ARMORING & PRUNING

TREE PROTECTION DETAILS

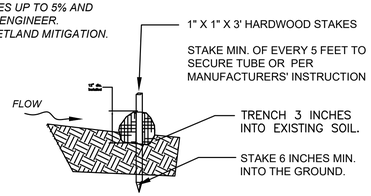
NOT TO SCALE

SEDIMENT BARRIER - COMPOST FILTER TUBE

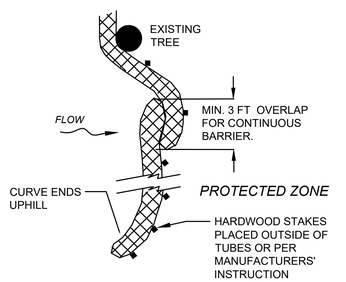


12 INCH STRAW WATTLE

FOR USE ONLY ON SLOPES UP TO 5% AND WITH APPROVAL OF THE ENGINEER. NOT TO BE USED FOR WETLAND MITIGATION.



SECTION



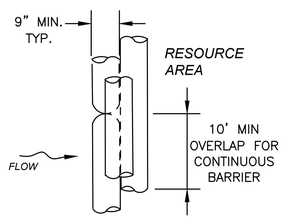
PLACE TUBE AS CLOSE TO LIMIT OF SOIL DISTURBANCE AS POSSIBLE, ALONG CONTOURS, AND PERPENDICULAR TO FLOW.

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

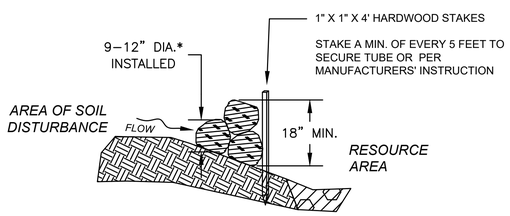
PLAN VIEW

SEDIMENT BARRIERS - COMPOST FILTER TUBES & STRAW WATTLES

SCALE: NOT TO SCALE



PLAN VIEW



SECTION

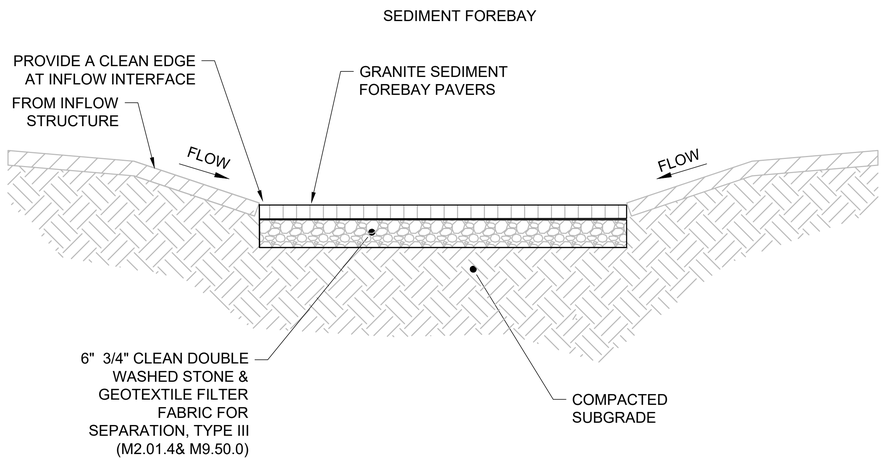
COMPOST FILTER TUBE BERM (SLOPES 2:1 OR STEEPER)

SCALE: NOT TO SCALE

LITTLETON/AYER
ROUTE 2A (AYER ROAD)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	27	78
PROJECT FILE NO.	608443		

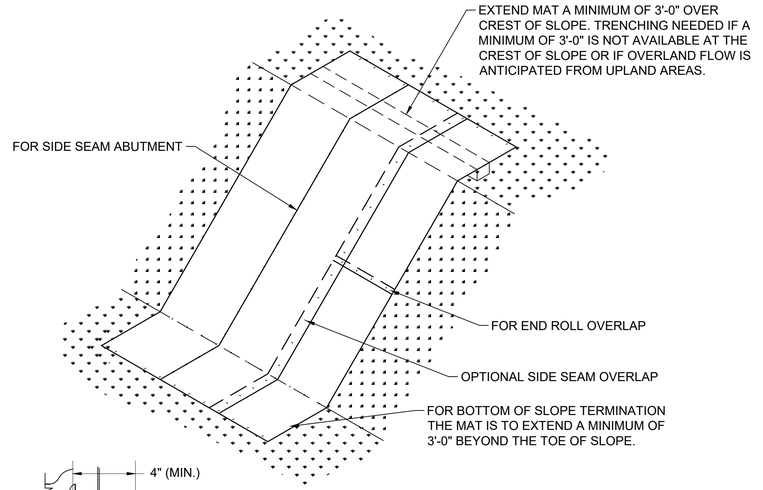
CONSTRUCTION DETAILS (3 OF 5)

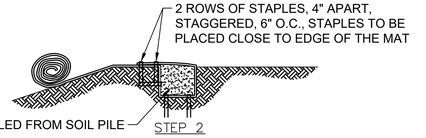


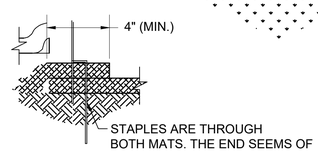
NOTES:
1. SEE SPECIFICATIONS FOR SEDIMENT FOREBAY PAVER REQUIREMENTS.
2. SEE PLANS FOR DIMENSIONS GRADING AND ELEVATIONS FOR SEDIMENT FOREBAY

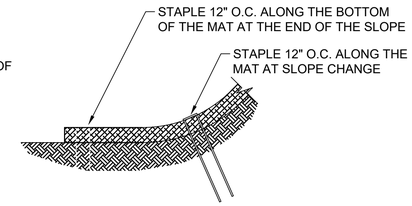
SEDIMENT FOREBAY PAVERS

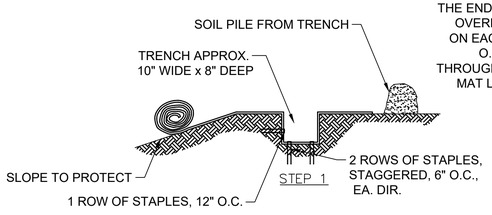
NOT TO SCALE









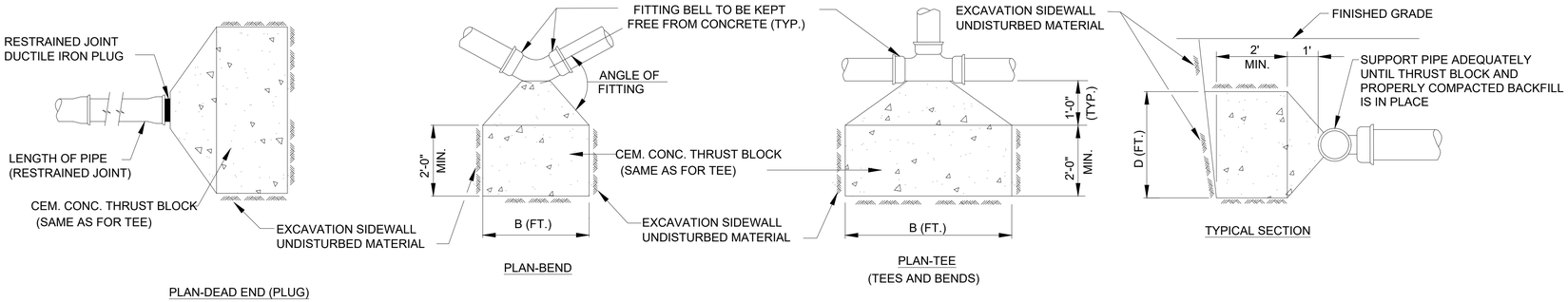


THE END SEAMS OF THE MATS SHALL OVERLAP 4". PLACE STAPLES, ONE ON EACH CORNER OF BLANKET, 12" O.C. ALONG THE BLANKET END THROUGH BOTH MATS. THE UPSLOPE MAT LAPS OVER THE DOWNSLOPE MAT IN A SHINGLE AFFECT.

NOTES:
1. SEE MANUFACTURER'S STAPLE PATTERN GUIDE FOR DETAILS.
2. INSTALL EROSION CONTROL MATTING IN LOCATIONS SHOWN ON THE PLANS.
3. AREAS WITH EROSION CONTROL MATS SHALL BE SEEDED.
4. STAPLES SHALL BE BIODEGRADABLE
5. EROSION CONTROL MATS SHALL BE BIODEGRADABLE.

EROSION CONTROL MATTING

NOT TO SCALE

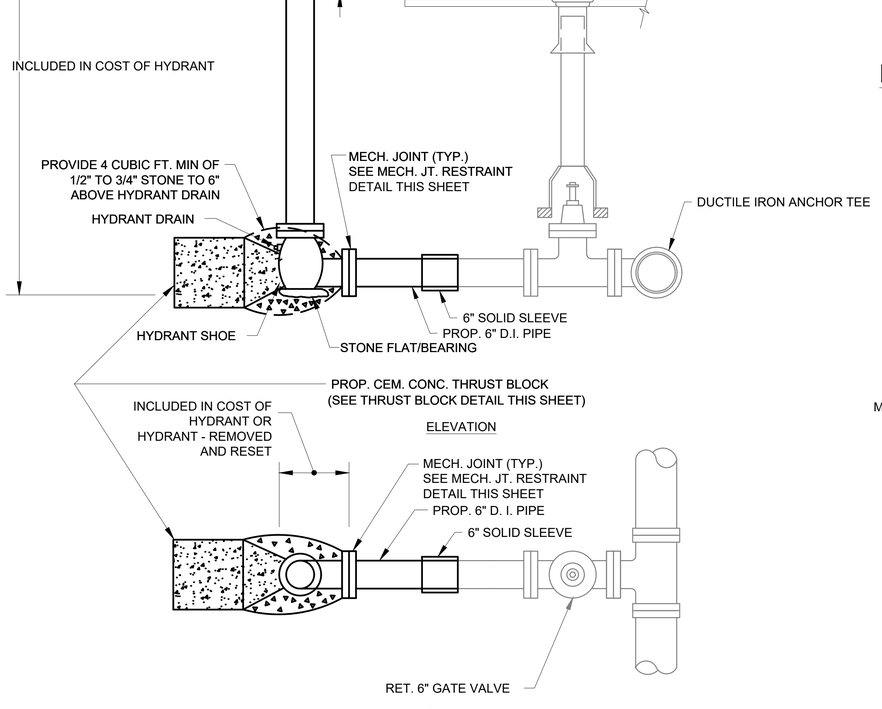


PIPE SIZE	6"		8"		12"	
DIMENSION	B	D	B	D	B	D
TEE/PLUG	2	2	3	3	4	4
90°	2	2	3	3	4	4
45°	2	2	2	2	4	4
22 1/2°	2	2	2	2	3	3
11 1/4°	N/A	N/A	N/A	N/A	N/A	N/A

THRUST BLOCK SCHEDULE

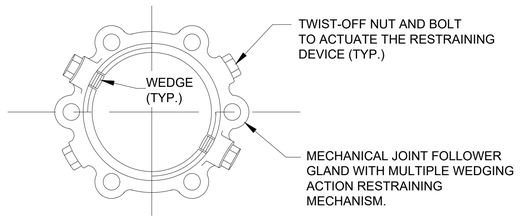
THRUST BLOCK DETAILS

NOT TO SCALE



TYPICAL FIRE HYDRANT CONNECTION DETAIL

NOT TO SCALE

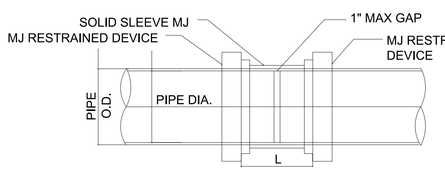


NOTES:

1. GLANDS SHALL BE DUCTILE IRON CONFORMING TO A.S.T.M A536-80 STEEL.
2. DIMENSIONS OF THE GLAND SHALL BE SUCH THAT IT CAN BE USED WITH THE STANDARDIZED MECHANICAL JOINT BELL AND TEE-HEAD BOLTS CONFORMING TO A.N.S.I/A.W.W.A. C111/A21.11 AND A.N.S.A/A.W.W.A C153/A21.53 OF THE LATEST REVISION.

MECHANICAL JOINT RESTRAINT DETAIL

NOT TO SCALE

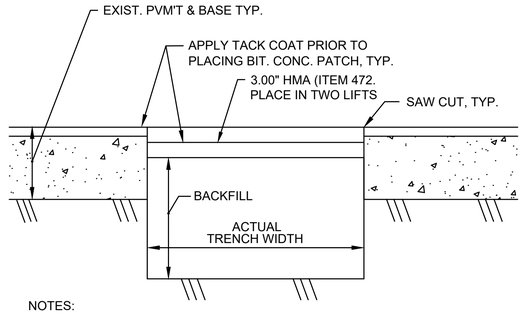


SOLID SLEEVE CONNECTION WITH MJ RESTRAINT DEVICE
FOR NEW DI PIPE TO EXISTING DI PIPE

SOLID SLEEVE		
PIPE DIA.	PIPE O.D.	L
6"	6.9"	12"

SOLID SLEEVE CONNECTION DETAIL

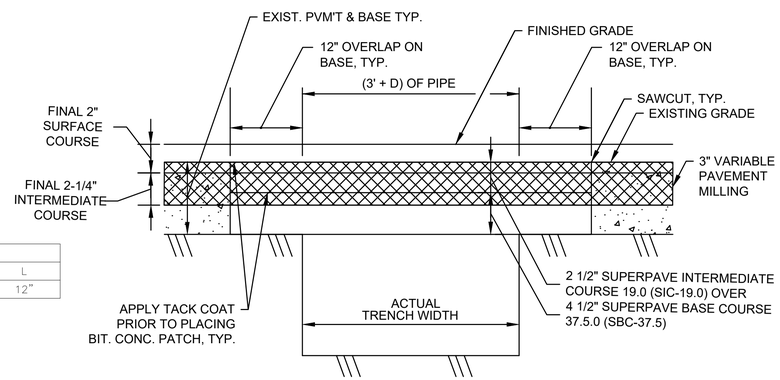
NOT TO SCALE



NOTES:
1. PERMANENT HMA PATCH SHALL BE USED IN ALL AREAS THAT WILL BE MILLED & OVERLAID. PERMANENT HMA PATCH IS NOT REQUIRED WITHIN THE LIMITS OF BOX WIDENING, TEMPORARY HMA PATCH SHALL BE MAINTAINED UNTIL PERMANENT PATCH IS PERFORMED IN THESE AREAS.
2. PAVEMENT FOR TEMPORARY HMA PATCH SHALL BE PAID FOR UNDER ITEM 472. HOT MIX ASPHALT FOR MISCELLANEOUS WORK.

TEMPORARY HMA PATCH DETAIL

SCALE: NOT TO SCALE



NOTES:
1. PERMANENT HMA PATCH SHALL BE USED IN ALL AREAS THAT WILL BE MILLED & OVERLAID. PERMANENT HMA PATCH IS NOT REQUIRED WITHIN THE LIMITS OF BOX WIDENING. TEMPORARY HMA PATCH SHALL BE MAINTAINED UNTIL PERMANENT PATCH IS INSTALLED IN THESE AREAS.

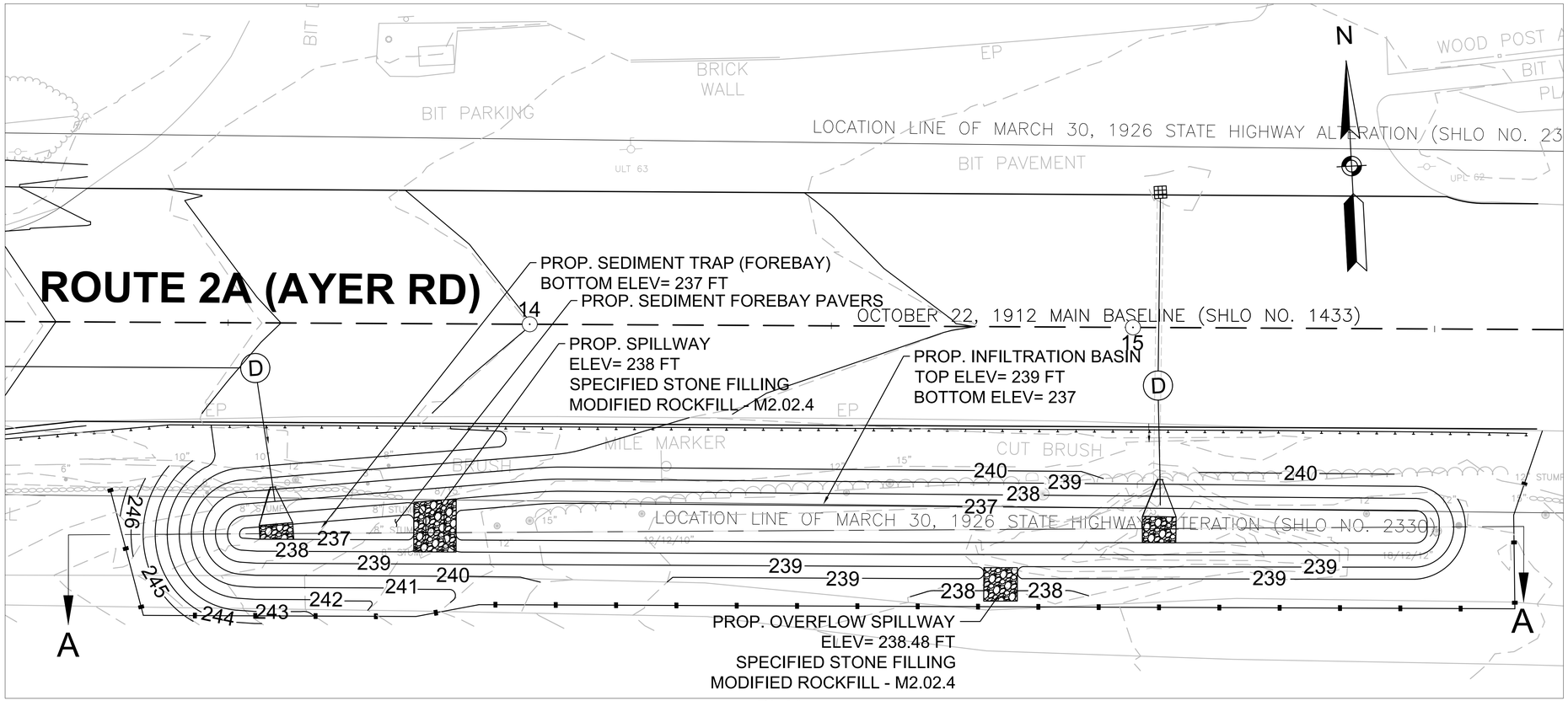
PERMANENT HMA PATCH DETAIL

SCALE: NOT TO SCALE

LITTLETON/AYER
ROUTE 2A (AYER ROAD)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	29	78
PROJECT FILE NO.	608443		

CONSTRUCTION DETAILS (5 OF 5)



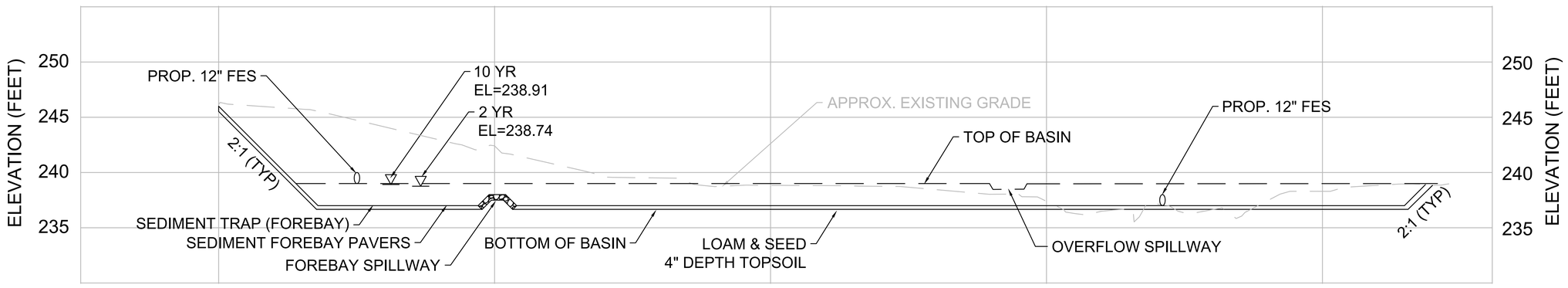
PLAN

SCALE: 1" = 10'

0 10 20 30 40

SCALE: 1" = 10'

INFILTRATION BASIN



SECTION A - A

SCALE: HOR: 1" = 10'
VERT: 1" = 5'

NOTE: FOR PROPOSED SEDIMENT FOREBAY PAVERS SEE DETAIL ON SHEET 27.

NOTICE OF INTENT

Intersection Improvements on Route 2A At Willow Road and Bruce Street Ayer and Littleton, Massachusetts

MassDOT Contract No. 608443

Prepared for

Massachusetts Department of Transportation

October 13, 2021

Prepared by

GREEN INTERNATIONAL AFFILIATES, INC.

Building Strong Client Relationships Through Engineering Excellence

GREEN INTERNATIONAL AFFILIATES, INC.
239 LITTLETON ROAD, SUITE 3 WESTFORD, MA 01886
T: (978) 923-0400 | F: (978) 399-0033 | WWW.GREENINTL.COM

October 13, 2021

Ms. Jo-Anne Crystoff, Ayer Conservation Administrator
Ayer Conservation Commission
Town Hall
1 Main Street
Ayer, MA 01432

Subject: **Intersection Improvements on Route 2A at Willow Road and Bruce Street Littleton/Ayer, Massachusetts Notice of Intent Submittal**

Dear Ms. Crystoff:

On behalf of the Massachusetts Department of Transportation – Highway Division (MassDOT), Green International Affiliates, Inc. is pleased to submit the enclosed Notice of Intent (NOI) application pursuant to the Massachusetts Wetlands Protection Act (WPA) and 310 CMR 10.00, which is administered by the Ayer Conservation Commission. This NOI Application has been prepared for the roadway and intersection improvements on Route 2A, Willow Road and Bruce Street.

This Notice of Intent (NOI) is being submitted to the Ayer Conservation Commission pursuant to the Massachusetts Wetlands Protection Act (WPA) Regulations and its implementing regulations 310 CMR 10.00 for work within the Bordering Land Subject to Flooding (BLSF), the 100-foot Buffer Zones and the 200-foot Riverfront Area.

This NOI is being submitted for the purpose of receiving an Order of Conditions under the Massachusetts WPA for the proposed work within these resource areas. As this is a MassDOT project, the project is not subject to local wetlands bylaw and abutters notification is not required per 310 CMR 10.05(4)(b). The project is categorized as a "Redevelopment" project under the Massachusetts Stormwater Management Standards and thus needs to meet the Stormwater Standards to the maximum extent practicable. Though the project is located both in Littleton and in Ayer, no OOC will be sought from the Littleton Conservation Commission as there are no resource areas under the jurisdiction of the WPA within or adjacent to the limit of work in the Town of Littleton. However, a copy of this NOI will be sent to the Littleton Conservation Commission as a courtesy.

This project meets the criteria of the Limited Project provisions of the WPA listed in the 310 CMR 10.53(3)(f): *Maintenance and improvement of existing public roadways, but limited to widening less than a single lane, adding shoulders, correcting substandard intersections, and improving inadequate drainage systems.*

The following items are included with this submission:

- Six (6) hard copies of the NOI Application Report with Forms, Locus Map, Narrative, Stormwater Checklist, Stormwater Management Report, Figures
- Six (6) half-size (12"x18") plan sets
- Two (2) full-size (24"x36") plan sets

We are also emailing a PDF file of the submittal materials to email concom@ayer.ma.us (and a copy to agreen@littletonma.org).

As required by regulations, one (1) copy of the above submittal is being provided concurrently to the Massachusetts DEP Central Regional Office (CERO_NOI@mass.gov)

We respectfully request that this project be placed on the Conservation Commission agenda for the hearing scheduled on November 18, 2021. Should you have any questions regarding this submittal, please do not hesitate to contact me.

Sincerely,

Green International Affiliates, Inc.

Danielle Spicer, P.E., LEED AP, ENV SP
Stormwater & Permitting Group Leader

cc: DEP – Central Region
Kim Sloane, MassDOT Project Manager
Tom Bigelow, P.E., Green International Affiliates, Inc., Project Manager

F:\Projects\2013\13033\13033.11X - Littleton Route 2A\Documents\Environmental\NOI\NOI_Letter_Ayer.Docx

TABLE OF CONTENTS

APPENDICES

NOTICE OF INTENT FORMS

(This page is left blank for double sided printing)

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

WPA Form 3 – Notice of Intent

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

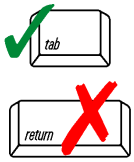
Provided by MassDEP:

MassDEP File Number

Document Transaction Number

Ayer
City/Town

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



Note: Before completing this form consult your local Conservation Commission regarding any municipal bylaw or ordinance.

A. General Information

1. Project Location (**Note:** electronic filers will click on button to locate project site):

Willow Road north of Rt 2A/Willow St/Bruce Rd — a. Street Address
Ayer — b. City/Town
01432 — c. Zip Code

Latitude and Longitude:
42°33'09"N (in Ayer) — d. Latitude
71°32'13"W (in Ayer) — e. Longitude

N/A — f. Assessors Map/Plat Number
g. Parcel /Lot Number

2. Applicant:

Melissa — a. First Name
Lenker — b. Last Name
Massachusetts Department of Transportation Highway Division — c. Organization
10 Park Plaza, Room 4260 — d. Street Address
Boston — e. City/Town
MA — f. State
02116 — g. Zip Code
978-429-1772 — h. Phone Number
i. Fax Number
Melissa.Lenker@dot.state.ma.us — j. Email Address

3. Property owner (required if different from applicant): ☐ Check if more than one owner

a. First Name
b. Last Name
Massachusetts Department of Transportation Highway Division — c. Organization
10 Park Plaza, Room 4260 — d. Street Address
Boston — e. City/Town
MA — f. State
02116 — g. Zip Code
h. Phone Number
i. Fax Number
j. Email address

4. Representative (if any):

Danielle — a. First Name
Spicer — b. Last Name
Green International Affiliates, Inc. — c. Company
239 Littleton Road, Suite 3 — d. Street Address
Westford — e. City/Town
MA — f. State
01886 — g. Zip Code
(978) 923-0400 — h. Phone Number
(978) 923-0033 — i. Fax Number
dspicer@greenintl.com — j. Email address

5. Total WPA Fee Paid (from NOI Wetland Fee Transmittal Form):

$750.00 — a. Total Fee Paid
$362.50 — b. State Fee Paid
$376.50 — c. City/Town Fee Paid

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

WPA Form 3 – Notice of Intent

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

Provided by MassDEP:

MassDEP File Number

Document Transaction Number

Ayer
City/Town

A. General Information (continued)

6. General Project Description:

The project proposes to perform roadway and intersection improvements on Route 2A/110, Willow Road and Bruce Street in Littleton and Ayer, MA. The project will replace the existing interim traffic signal with a permanent traffic signal, will provide improvements to geometry, pedestrian and bicycle accommodations as well as drainage improvements. (See Project Narrative for details).

7a. Project Type Checklist: (Limited Project Types see Section A. 7b.)

1. ☐ Single Family Home
2. ☐ Residential Subdivision
3. ☐ Commercial/Industrial
4. ☐ Dock/Pier
5. ☐ Utilities
6. ☐ Coastal engineering Structure
7. ☐ Agriculture (e.g., cranberries, forestry)
8. ☒ Transportation
9. ☐ Other

7b. Is any portion of the proposed activity eligible to be treated as a limited project (including Ecological Restoration Limited Project) subject to 310 CMR 10.24 (coastal) or 310 CMR 10.53 (inland)?

1. ☒ Yes ☐ No

If yes, describe which limited project applies to this project. (See 310 CMR 10.24 and 10.53 for a complete list and description of limited project types)

310 CMR 10.53(3)(f). See narrative for full description.

2. Limited Project Type

If the proposed activity is eligible to be treated as an Ecological Restoration Limited Project (310 CMR10.24(8), 310 CMR 10.53(4)), complete and attach Appendix A: Ecological Restoration Limited Project Checklist and Signed Certification.

8. Property recorded at the Registry of Deeds for:

Middlesex	
a. County	b. Certificate # (if registered land)
N/A	N/A
c. Book	d. Page Number

B. Buffer Zone & Resource Area Impacts (temporary & permanent)

1. ☐ Buffer Zone Only – Check if the project is located only in the Buffer Zone of a Bordering Vegetated Wetland, Inland Bank, or Coastal Resource Area.
2. ☒ Inland Resource Areas (see 310 CMR 10.54-10.58; if not applicable, go to Section B.3, Coastal Resource Areas).

Check all that apply below. Attach narrative and any supporting documentation describing how the project will meet all performance standards for each of the resource areas altered, including standards requiring consideration of alternative project design or location.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

WPA Form 3 – Notice of Intent

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

Provided by MassDEP:
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B. Buffer Zone & Resource Area Impacts (temporary & permanent) (cont'd)

For all projects affecting other Resource Areas, please attach a narrative explaining how the resource area was delineated.

Resource Area	Size of Proposed Alteration	Proposed Replacement (if any)
a. ☐ Bank	1. linear feet	2. linear feet
b. ☐ Bordering Vegetated Wetland	1. square feet	2. square feet
c. ☐ Land Under Waterbodies and Waterways	1. square feet 3. cubic yards dredged	2. square feet

Resource Area	Size of Proposed Alteration	Proposed Replacement (if any)
d. ☒ Bordering Land Subject to Flooding	58 (temp.) 1. square feet 0 3. cubic feet of flood storage lost	0 2. square feet 0 4. cubic feet replaced
e. ☐ Isolated Land Subject to Flooding	1. square feet 2. cubic feet of flood storage lost	3. cubic feet replaced
f. ☒ Riverfront Area	Bennetts Brook - inland 1. Name of Waterway (if available) - **specify coastal or inland**	

2. Width of Riverfront Area (check one):

☐ 25 ft. - Designated Densely Developed Areas only

☐ 100 ft. - New agricultural projects only

☒ 200 ft. - All other projects

3. Total area of Riverfront Area on the site of the proposed project: 21,748 square feet

4. Proposed alteration of the Riverfront Area:

a. total square feet	b. square feet within 100 ft.	c. square feet between 100 ft. and 200 ft.
6,990	3,127	3,863

5. Has an alternatives analysis been done and is it attached to this NOI? ☐ Yes ☒ No

6. Was the lot where the activity is proposed created prior to August 1, 1996? ☒ Yes ☐ No

3. ☐ Coastal Resource Areas: (See 310 CMR 10.25-10.35)

Note: for coastal riverfront areas, please complete **Section B.2.f**. above.

Massachusetts Department of Environmental Protection
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Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

Provided by MassDEP:
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Ayer
City/Town

B. Buffer Zone & Resource Area Impacts (temporary & permanent) (cont'd)

Check all that apply below. Attach narrative and supporting documentation describing how the project will meet all performance standards for each of the resource areas altered, including standards requiring consideration of alternative project design or location.

Online Users: Include your document transaction number (provided on your receipt page) with all supplementary information you submit to the Department.

Resource Area	Size of Proposed Alteration	Proposed Replacement (if any)
a. ☐ Designated Port Areas	Indicate size under Land Under the Ocean, below	
b. ☐ Land Under the Ocean	1. square feet 2. cubic yards dredged	
c. ☐ Barrier Beach	Indicate size under Coastal Beaches and/or Coastal Dunes below	
d. ☐ Coastal Beaches	1. square feet	2. cubic yards beach nourishment
e. ☐ Coastal Dunes	1. square feet	2. cubic yards dune nourishment

Resource Area	Size of Proposed Alteration	Proposed Replacement (if any)
f. ☐ Coastal Banks	1. linear feet	
g. ☐ Rocky Intertidal Shores	1. square feet	
h. ☐ Salt Marshes	1. square feet	2. sq ft restoration, rehab., creation
i. ☐ Land Under Salt Ponds	1. square feet 2. cubic yards dredged	
j. ☐ Land Containing Shellfish	1. square feet	
k. ☐ Fish Runs	Indicate size under Coastal Banks, inland Bank, Land Under the Ocean, and/or inland Land Under Waterbodies and Waterways, above 1. cubic yards dredged	
l. ☐ Land Subject to Coastal Storm Flowage	1. square feet	

4. ☐ Restoration/Enhancement
If the project is for the purpose of restoring or enhancing a wetland resource area in addition to the square footage that has been entered in Section B.2.b or B.3.h above, please enter the additional amount here.

a. square feet of BVW
b. square feet of Salt Marsh

5. ☐ Project Involves Stream Crossings

a. number of new stream crossings
b. number of replacement stream crossings

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

WPA Form 3 – Notice of Intent

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

Provided by MassDEP:

MassDEP File Number

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Ayer
City/Town

C. Other Applicable Standards and Requirements

☐ This is a proposal for an Ecological Restoration Limited Project. Skip Section C and complete Appendix A: Ecological Restoration Limited Project Checklists – Required Actions (310 CMR 10.11).

Streamlined Massachusetts Endangered Species Act/Wetlands Protection Act Review

1. Is any portion of the proposed project located in **Estimated Habitat of Rare Wildlife** as indicated on the most recent Estimated Habitat Map of State-Listed Rare Wetland Wildlife published by the Natural Heritage and Endangered Species Program (NHESP)? To view habitat maps, see the *Massachusetts Natural Heritage Atlas* or go to http://maps.massgis.state.ma.us/PRI_EST_HAB/viewer.htm.

   a. ☐ Yes ☒ No

   If yes, include proof of mailing or hand delivery of NOI to:

   Natural Heritage and Endangered Species Program
   Division of Fisheries and Wildlife
   1 Rabbit Hill Road
   Westborough, MA 01581

   2017
   b. Date of map

   If *yes*, the project is also subject to Massachusetts Endangered Species Act (MESA) review (321 CMR 10.18). To qualify for a streamlined, 30-day, MESA/Wetlands Protection Act review, please complete Section C.1.c, and include requested materials with this Notice of Intent (NOI); *OR* complete Section C.2.f, if applicable. *If MESA supplemental information is not included with the NOI, by completing Section 1 of this form, the NHESP will require a separate MESA filing which may take up to 90 days to review (unless noted exceptions in Section 2 apply, see below).*

   c. Submit Supplemental Information for Endangered Species Review*

      1. ☐ Percentage/acreage of property to be altered:

         (a) within wetland Resource Area _____ percentage/acreage

         (b) outside Resource Area _____ percentage/acreage

      2. ☐ Assessor's Map or right-of-way plan of site

2. ☐ Project plans for entire project site, including wetland resource areas and areas outside of wetlands jurisdiction, showing existing and proposed conditions, existing and proposed tree/vegetation clearing line, and clearly demarcated limits of work **

   (a) ☐ Project description (including description of impacts outside of wetland resource area & buffer zone)

   (b) ☐ Photographs representative of the site

* Some projects **not** in Estimated Habitat may be located in Priority Habitat, and require NHESP review (see https://www.mass.gov/ma-endangered-species-act-mesa-regulatory-review).
Priority Habitat includes habitat for state-listed plants and strictly upland species not protected by the Wetlands Protection Act.
** MESA projects may not be segmented (321 CMR 10.16). The applicant must disclose full development plans even if such plans are not required as part of the Notice of Intent process.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands
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Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

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C. Other Applicable Standards and Requirements (cont'd)

(c) ☐ MESA filing fee (fee information available at https://www.mass.gov/how-to/how-to-file-for-a-mesa-project-review).
Make check payable to "Commonwealth of Massachusetts - NHESP" and ***mail to NHESP*** at above address

*Projects altering **10 or more acres** of land, also submit:*

(d) ☐ Vegetation cover type map of site

(e) ☐ Project plans showing Priority & Estimated Habitat boundaries

(f) OR Check One of the Following

1. ☐ Project is exempt from MESA review.
Attach applicant letter indicating which MESA exemption applies. (See 321 CMR 10.14, https://www.mass.gov/service-details/exemptions-from-review-for-projectsactivities-in-priority-habitat; the NOI must still be sent to NHESP if the project is within estimated habitat pursuant to 310 CMR 10.37 and 10.59.)

2. ☐ Separate MESA review ongoing. a. NHESP Tracking # b. Date submitted to NHESP

3. ☐ Separate MESA review completed.
Include copy of NHESP "no Take" determination or valid Conservation & Management Permit with approved plan.

3. For coastal projects only, is any portion of the proposed project located below the mean high water line or in a fish run?

a. ☒ Not applicable – project is in inland resource area only b. ☐ Yes ☐ No

If yes, include proof of mailing, hand delivery, or electronic delivery of NOI to either:

South Shore - Cohasset to Rhode Island border, and the Cape & Islands:

Division of Marine Fisheries -
Southeast Marine Fisheries Station
Attn: Environmental Reviewer
836 South Rodney French Blvd.
New Bedford, MA 02744
Email: dmf.envreview-south@mass.gov

North Shore - Hull to New Hampshire border:

Division of Marine Fisheries -
North Shore Office
Attn: Environmental Reviewer
30 Emerson Avenue
Gloucester, MA 01930
Email: dmf.envreview-north@mass.gov

Also if yes, the project may require a Chapter 91 license. For coastal towns in the Northeast Region, please contact MassDEP's Boston Office. For coastal towns in the Southeast Region, please contact MassDEP's Southeast Regional Office.

c. ☐ Is this an aquaculture project? d. ☐ Yes ☐ No

If yes, include a copy of the Division of Marine Fisheries Certification Letter (M.G.L. c. 130, § 57).

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Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

Provided by MassDEP:
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C. Other Applicable Standards and Requirements (cont'd)

4. Is any portion of the proposed project within an Area of Critical Environmental Concern (ACEC)?

a. ☐ Yes ☒ No If yes, provide name of ACEC (see instructions to WPA Form 3 or MassDEP Website for ACEC locations). **Note:** electronic filers click on Website.

b. ACEC

Online Users: Include your document transaction number (provided on your receipt page) with all supplementary information you submit to the Department.

5. Is any portion of the proposed project within an area designated as an Outstanding Resource Water (ORW) as designated in the Massachusetts Surface Water Quality Standards, 314 CMR 4.00?

a. ☐ Yes ☒ No

6. Is any portion of the site subject to a Wetlands Restriction Order under the Inland Wetlands Restriction Act (M.G.L. c. 131, § 40A) or the Coastal Wetlands Restriction Act (M.G.L. c. 130, § 105)?

a. ☐ Yes ☒ No

7. Is this project subject to provisions of the MassDEP Stormwater Management Standards?

a. ☒ Yes. Attach a copy of the Stormwater Report as required by the Stormwater Management Standards per 310 CMR 10.05(6)(k)-(q) and check if:

1. ☐ Applying for Low Impact Development (LID) site design credits (as described in Stormwater Management Handbook Vol. 2, Chapter 3)
2. ☒ A portion of the site constitutes redevelopment
3. ☐ Proprietary BMPs are included in the Stormwater Management System.

b. ☐ No. Check why the project is exempt:

1. ☐ Single-family house
2. ☐ Emergency road repair
3. ☐ Small Residential Subdivision (less than or equal to 4 single-family houses or less than or equal to 4 units in multi-family housing project) with no discharge to Critical Areas.

D. Additional Information

☐ This is a proposal for an Ecological Restoration Limited Project. Skip Section D and complete Appendix A: Ecological Restoration Notice of Intent – Minimum Required Documents (310 CMR 10.12).

Applicants must include the following with this Notice of Intent (NOI). See instructions for details.

Online Users: Attach the document transaction number (provided on your receipt page) for any of the following information you submit to the Department.

1. ☒ USGS or other map of the area (along with a narrative description, if necessary) containing sufficient information for the Conservation Commission and the Department to locate the site. (Electronic filers may omit this item.)
2. ☒ Plans identifying the location of proposed activities (including activities proposed to serve as a Bordering Vegetated Wetland [BVW] replication area or other mitigating measure) relative to the boundaries of each affected resource area.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

WPA Form 3 – Notice of Intent

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Provided by MassDEP:

MassDEP File Number

Document Transaction Number

Ayer
City/Town

D. Additional Information (cont'd)

3. ☒ Identify the method for BVW and other resource area boundary delineations (MassDEP BVW Field Data Form(s), Determination of Applicability, Order of Resource Area Delineation, etc.), and attach documentation of the methodology.

4. ☒ List the titles and dates for all plans and other materials submitted with this NOI.

See Attached List
a. Plan Title

Green International Affiliates, Inc
b. Prepared By

Tom Bigelow, P.E.
c. Signed and Stamped by

As shown on each plan
d. Final Revision Date

As shown on each plan
e. Scale

f. Additional Plan or Document Title

g. Date

5. ☐ If there is more than one property owner, please attach a list of these property owners not listed on this form.

6. ☐ Attach proof of mailing for Natural Heritage and Endangered Species Program, if needed.

7. ☐ Attach proof of mailing for Massachusetts Division of Marine Fisheries, if needed.

8. ☒ Attach NOI Wetland Fee Transmittal Form

9. ☒ Attach Stormwater Report, if needed.

E. Fees

1. ☐ Fee Exempt: No filing fee shall be assessed for projects of any city, town, county, or district of the Commonwealth, federally recognized Indian tribe housing authority, municipal housing authority, or the Massachusetts Bay Transportation Authority.

Applicants must submit the following information (in addition to pages 1 and 2 of the NOI Wetland Fee Transmittal Form) to confirm fee payment:

TBD
2. Municipal Check Number

TBD
3. Check date

TBD
4. State Check Number

TBD
5. Check date

6. Payor name on check: First Name

7. Payor name on check: Last Name

Massachusetts Department of Environmental Protection
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WPA Form 3 – Notice of Intent

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

Provided by MassDEP:

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F. Signatures and Submittal Requirements

I hereby certify under the penalties of perjury that the foregoing Notice of Intent and accompanying plans, documents, and supporting data are true and complete to the best of my knowledge. I understand that the Conservation Commission will place notification of this Notice in a local newspaper at the expense of the applicant in accordance with the wetlands regulations, 310 CMR 10.05(5)(a).

I further certify under penalties of perjury that all abutters were notified of this application, pursuant to the requirements of M.G.L. c. 131, § 40. Notice must be made by Certificate of Mailing or in writing by hand delivery or certified mail (return receipt requested) to all abutters within 100 feet of the property line of the project location.

Melissa Lenker

1. Signature of Applicant

October 14, 2021
2. Date

3. Signature of Property Owner (if different)

4. Date

10/14/2021

5. Signature of Representative (if any) Danielle Spicer, P.E.

6. Date

For Conservation Commission:
Two copies of the completed Notice of Intent (Form 3), including supporting plans and documents, two copies of the NOI Wetland Fee Transmittal Form, and the city/town fee payment, to the Conservation Commission by certified mail or hand delivery.

For MassDEP:
One copy of the completed Notice of Intent (Form 3), including supporting plans and documents, one copy of the NOI Wetland Fee Transmittal Form, and a **copy** of the state fee payment to the MassDEP Regional Office (see Instructions) by certified mail or hand delivery.

Other:
If the applicant has checked the “yes” box in any part of Section C, Item 3, above, refer to that section and the Instructions for additional submittal requirements.

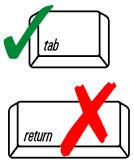
The original and copies must be sent simultaneously. Failure by the applicant to send copies in a timely manner may result in dismissal of the Notice of Intent.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

NOI Wetland Fee Transmittal Form

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

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



A. Applicant Information

1. Location of Project:

Willow Road north of Rt 2A/Willow St/Bruce Rd	Ayer
a. Street Address	b. City/Town
TBD	$750.00
c. Check number	d. Fee amount

2. Applicant Mailing Address:

Melissa		Lenker	
a. First Name		b. Last Name	
Massachusetts Department of Transportation Highway Division			
c. Organization			
10 Park Plaza, Room 4260			
d. Mailing Address			
Boston	MA	02116	
e. City/Town	f. State	g. Zip Code	
978-429-1772		Melissa.Lenker@dot.state.ma.us	
h. Phone Number	i. Fax Number	j. Email Address	

3. Property Owner (if different):

a. First Name		b. Last Name	
same			
c. Organization			
d. Mailing Address			
e. City/Town	f. State	g. Zip Code	
h. Phone Number	i. Fax Number	j. Email Address	

B. Fees

To calculate filing fees, refer to the category fee list and examples in the instructions for filling out WPA Form 3 (Notice of Intent).

Fee should be calculated using the following process & worksheet. ***Please see Instructions before filling out worksheet.***

Step 1/Type of Activity: Describe each type of activity that will occur in wetland resource area and buffer zone.

Step 2/Number of Activities: Identify the number of each type of activity.

Step 3/Individual Activity Fee: Identify each activity fee from the six project categories listed in the instructions.

Step 4/Subtotal Activity Fee: Multiply the number of activities (identified in Step 2) times the fee per category (identified in Step 3) to reach a subtotal fee amount. Note: If any of these activities are in a Riverfront Area in addition to another Resource Area or the Buffer Zone, the fee per activity should be multiplied by 1.5 and then added to the subtotal amount.

Step 5/Total Project Fee: Determine the total project fee by adding the subtotal amounts from Step 4.

Step 6/Fee Payments: To calculate the state share of the fee, divide the total fee in half and subtract $12.50. To calculate the city/town share of the fee, divide the total fee in half and add $12.50.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

NOI Wetland Fee Transmittal Form

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

B. Fees (continued)

Step 1/Type of Activity	Step 2/Number of Activities	Step 3/Individual Activity Fee	Step 4/Subtotal Activity Fee
(e) Inland Limited Projects (with Riverfront Area)	1.5	$500.00	$750.00

Step 5/Total Project Fee: $750.00

Step 6/Fee Payments:

Total Project Fee:	$750.00 a. Total Fee from Step 5
State share of filing Fee:	$362.50 b. 1/2 Total Fee **less $**12.50
City/Town share of filling Fee:	$376.50 c. 1/2 Total Fee **plus** $12.50

C. Submittal Requirements

a.) Complete pages 1 and 2 and send with a check or money order for the state share of the fee, payable to the Commonwealth of Massachusetts.

Department of Environmental Protection
Box 4062
Boston, MA 02211

b.) **To the Conservation Commission:** Send the Notice of Intent or Abbreviated Notice of Intent; a **copy** of this form; and the city/town fee payment.

To MassDEP Regional Office (see Instructions): Send a copy of the Notice of Intent or Abbreviated Notice of Intent; a **copy** of this form; and a **copy** of the state fee payment. (E-filers of Notices of Intent may submit these electronically.)

1.0 PROJECT DESCRIPTION

This Notice of Intent Application has been prepared on behalf of the Massachusetts Department of Transportation, Highway Division (MassDOT) for proposed roadway and intersection improvements on Route 2A/110 (Ayer Road) at the intersection of Willow Road and Bruce Street in the Town of Littleton with a portion of the project extending into the Town of Ayer. The project starts on Route 2A/110 (Ayer Road) near the Littleton/Ayer town line and extends approximately 1,450 feet in the easterly direction. The project proposes to replace the existing temporary traffic signal equipment with a permanent traffic signal at the intersection of Route 2A/110(Ayer Road) with Willow Road and Bruce Street. The design also includes the addition of pedestrian activated crosswalks, roadway widening for dedicated left turn lanes with Advanced Vehicle Detection system and new Mast Arms, and an 8' wide shared-use path on both sides of Route 2A/110 (Ayer Road). The shared-use path will provide pedestrian and bicycle accommodations within the project limits in accordance with current MassDOT design standards and guidelines, as well as provide connections for the local residential properties, businesses and truck layover area at the northwest quadrant of the intersection. The proposed improvements include fine milling and overlay, improved intersection geometry, and adequate turning movements. Drainage improvements will also be constructed throughout the project, including replacement of the portion of the existing CMP drain line in Ayer. New signage and pavement markings are proposed to improve driver safety along the project corridor and to enhance safety for bicyclists and pedestrians near the intersection. The project limits extend approximately 500 feet along Willow Road and 300 feet along Bruce Street.

The purpose of the project is to provide roadway and intersection improvements on Route 2A/110, Bruce Street, and Willow Road by reducing congestion, improving pedestrian and bicycle safety, improving the roadway infrastructure, and upgrading the existing drainage system. The existing traffic signal was installed on an interim basis in the Summer of 2016 after a safety issue was identified by MassDOT and the Towns of Littleton and Ayer. It has been recommended that the interim signal be replaced with permanent signal equipment and a new lane configuration. The proposed improvements intend to provide increased safety for all roadway users, including drivers, bicyclists, and pedestrians, and thereby, promote future commercial and residential development along the project intersection.

This project consists of maintenance and improvement of an existing roadway (including widening of less than a single lane, improvements to existing drainage systems and repaving). As the proposed project is a roadway project, which is increasing in impervious area by less than one lane, it is therefore categorized as a "Redevelopment Project" under the Massachusetts Stormwater Management Standards. The project is therefore designed to meet the Standards to the maximum extent practicable. A stormwater report is attached demonstrating the compliance of the project with the ten state stormwater standards.

This Notice of Intent (NOI) is being submitted to the Ayer Conservation Commission pursuant to the Massachusetts Wetlands Protection Act (WPA) Regulations and its implementing regulations 310 CMR 10.00 for work within the Bordering Land Subject to Flooding (BLSF), 200-foot Riverfront Area and the 100-foot Buffer Zones. As stated in 310 CMR 10.05(4)(b), projects proposed by the MassDOT Highway Division are not subject to local wetlands bylaws or regulations and do not require individual abutter notification. Though the project is located both in Littleton and in Ayer, no OOC will be sought from the Littleton Conservation Commission as there are no resource areas under the jurisdiction of the WPA within or adjacent to the limit of work in the Town of Littleton. However, a copy of this NOI will be sent to the Littleton Conservation Commission as a courtesy.

Limited Project Provisions

This Project meets the criteria of the Limited Project provisions of the WPA listed in the 310 CMR 10.53(3)(f): *Maintenance and improvement of existing public roadways, but limited to widening less than a single lane, adding shoulders, correcting substandard intersections, and improving inadequate drainage systems.*

1.1 Existing Conditions

The signalized intersection of Route 2A/110 (Ayer Road) at Willow Road/Bruce Street is located in the northwest corner of the Town of Littleton in the close vicinity of the Ayer town line, providing east-west movements at the intersection and surrounded primarily by commercial, low-,medium-, and high-density residential properties with a few undeveloped forested areas. The Boston Minuteman campground is located to the southwest of the intersection.

Route 2A/110 (Ayer Road) is classified as an Urban Principal Arterial and is owned and maintained by the Massachusetts Department of Transportation (MassDOT). This roadway connects downtown Ayer to downtown Littleton, and eventually I-495. Route 2A/110 (Ayer Road) is a two-lane, two-way roadway and is typically 25 – 30 feet wide with 11 – 12 foot travel lanes. Shoulders vary from 2 to 4.5 feet in width. There are neither bicycle nor pedestrian accommodations along the project corridor; no sidewalk exists along either side of the roadway. The posted speed limit in the vicinity of the intersection is 45 mph in both directions.

Both Willow Road and Bruce Street are classified as Urban Collectors, and both are under municipal jurisdictions. In the vicinity of the intersection, Willow Road is approximately 28 feet wide striped with double yellow center lines and single white edge lines. The lane widths range from 10.5-12 feet, with shoulders on both sides less than 2 feet wide. The posted speed limit on Willow Road in the vicinity of the study intersection is 35 mph. Willow Road continues the path of Bruce Street north from the intersection into Ayer, providing access to residences and businesses (commercial and industrial) before curving toward downtown Ayer. Bruce Street is approximately 20 feet wide, and consists of two 10-foot travel lanes, one in each direction, with no shoulders and no pavement markings. There are berms on both sides of the road in the vicinity of the intersection. The posted speed limit near the subject intersection is 30 mph. Bruce Street generally runs southeast-northwest, and mostly provides residential access.

There are neither bicycle nor pedestrian accommodations along the project corridor. Prior to the installation of the temporary traffic signal at the intersection during summer 2016, both Willow Road and Bruce Street provided the northwest and southwest “STOP” controlled approaches to the unsignalized intersection, respectively.

The protected wetland resources areas exist adjacent to Bennetts Brook, flowing in the west-to-east direction, and crossing Route 2A/110 approximately 900 feet east and crossing Willow Road approximately 450 feet north of the project intersection (see section 2.1 of this report for detailed description of each protected resource area). Riverfront Area associated with Bennetts Brook, Buffer Zones as well as 100-year floodplain extend into the Willow Road northern project limits, where the new stormwater outfall into Bennetts Brook is proposed. There is also a 12-inch CMP drain line on Willow Road that leaves the catch basin a little over 200 feet south of the Willow Road crossing over Bennetts Brook and it appears to discharge on the east side of the upstream headwall.

Surface runoff on Route 2A/110 is distributed via a combination of the existing closed drainage system and "country drainage" off the pavement edges. There are currently no private treatment systems, seven (7) watershed areas contributing runoff to six (6) discharge points, and two (2) natural low points within the limit of work where stormwater leaves the project site. The protected wetland recourse areas adjacent to the project limits can be seen on Figure 3 in Appendix C - Figures.

1.2 Proposed Conditions

The proposed project provides roadway and intersection improvements along Route 2A/110, Willow Road and Bruce Street in the Town of Littleton and Willow Road portion in the Town of Ayer, which include minor roadway widening, new permanent traffic signal and turn lanes with Advanced Vehicle Detection system and new Mast Arms, improved intersection geometry and adequate turning movements. The project will provide new bicycle and pedestrian accommodations by constructing 8-foot shared use paths on both sides of Route 2A/110 and ADA complaint and signalized pedestrian crossings throughout the intersection. The project also proposes improvements to the existing roadway signage and pavement markings. The existing closed drainage system is proposed to be upgraded to meet current design standards, while new infiltration basin is proposed to control stormwater discharges from the added impervious surface within the project limit. Utility pole relocations will be required as part of the project scope.

The proposed Route 2A/110 roadway within the intersection will include two 11-foot travel lanes, one 11-foot left turn lanes on the east- and west-bound sides, 2-foot shoulders on both sides of the roadway as well as two 8-foot shared-use paths on both sides of Route 2A/110. ADA-compliant pedestrian ramps and crosswalks will also be added at the intersection as part of the proposed improvements. A new permanent traffic signal with optimized timing to reduce congestion will be installed at the intersection in place of the existing temporary traffic signal. The improvements on Willow Road will include 11-foot travel lanes and 2-foot shoulders while Bruce Street will include 11-foot travel lanes and 2-foot shoulders. The project will also incorporate improvements to the existing closed drainage system, including the construction of one new outfall on the east side of Willow Road in the vicinity of Bennetts Brook in the Town of Ayer, and an infiltration basin on the south side of Route 2A/110 on the east end of the project.

This project will include fine milling and resurfacing within the project limits; no full depth reconstruction is proposed at any of the project segments. Box widening along both sides of Route 2A/110 is proposed in order to accommodate the new turn lanes and to construct the 8-foot wide shared-use paths along the project corridor. Minor box widening is also proposed on Willow Road and Bruce Street as part of this project. Overhead and underground utility relocations are required to construct the project improvements.

The proposed drainage improvements include new catch basins, leaching basins, drain manholes, two (2) new drainage outfalls, and one (1) infiltration basin; in addition, a portion of the existing 12-inch CMP drain line on Willow Road in Ayer from the existing catch basin on Willow Road to the proposed drain manhole within the existing Right-of-Way is proposed to be replaced. Under proposed conditions, there will be nine (9) watershed areas contributing runoff to six (6) discharge points. Therefore, the proposed improvements will not result in new untreated point source discharges created as a result of this project. All work will be done in a manner that will limit the impacts to adjacent resource areas.

The proposed roadway and intersection improvements will benefit safety for all roadway users including vehicles, pedestrians, and bicyclists.

1.3 Construction Phasing

Construction phasing will ultimately be determined by the project contractor. Construction is anticipated to be completed in a period of 20 months. The construction phasing is assumed to generally include the following items:

1. Installation of sediment and erosion control measures.
2. Tree removal and the clearing and grubbing of trees in sections along Route 2A/110, Willow Road and Bruce Street.
3. Overhead and underground utility relocations.
4. Clearing and rough grading of the area for installation of the infiltration basin.
5. Construction of the infiltration basin.
6. Construction of new catch basins and drainage improvements including a new outfall to Bennetts Brook form Willow Road.
7. Installation of the new traffic signal system.
8. Box widening along Route 2A/110, Willow Road and Bruce Street within and adjacent to the project intersections.
9. Construction of shared use-paths on both sides of Route 2A/110
10. Milling of pavement in sections along Route 2A/110, Willow Road and Bruce Street within the project limits.
11. Installation of the ADA compliant pedestrian ramps and crosswalks at the intersection.
12. Installation of the HMA surface course.
13. Completing roadway construction, upgrading signage and pavement markings.
14. Installation of loam and seed to restore disturbed areas.
15. Removal and disposal of sediment and erosion control measures.

Equipment that is likely to be utilized for this project includes dump trucks, flatbed trucks, front-end loader(s), backhoe(s), skid steer(s), excavator, hoe rams, drilling rigs, concrete pumpers, boom trucks, air hammers, air compressor(s), and a crane. Equipment can be parked on roadway pavements off-limits for construction staging purposes. Staging equipment in BVWs, intermittent streams and/or Waterways shall be prohibited.

1.4 Project Plan List

The following plan sheets are included with this Notice of Intent in Appendix E:

Sheet	Title	Prepared by	Date
1	Title Sheet & Index	Green International Affiliates, Inc	10/13/2021
2	Legend & Abbreviations	Green International Affiliates, Inc	10/13/2021
3	General Notes	Green International Affiliates, Inc	10/13/2021
4	Key Plan	Green International Affiliates, Inc	10/13/2021
5-6	Typical Sections	Green International Affiliates, Inc	10/13/2021
7-10	Construction Plans	Green International Affiliates, Inc	10/13/2021
20-23	Drainage & Utility Plans	Green International Affiliates, Inc	10/13/2021
25-27	Construction Details	Green International Affiliates, Inc	10/13/2021

2.0 PROJECT IMPACTS

2.1 WETLAND RESOURCE AREAS

The wetland resource areas on the project site are regulated under Federal, State and Local regulatory programs including:

- Section 404 of the Clean Water Act (CWA) which is administered by the U.S. Army Corps of Engineers (ACOE)
- Section 401 of the CWA which is overseen by the Massachusetts Department of Environmental Protection (DEP)
- Massachusetts Wetlands Protection Act (WPA) and 310 CMR 10.00 which is administered by the local Conservation Commission or (upon appeal) by DEP
- The Town of Littleton and the Town of Ayer have their own local Wetlands Bylaws (hereinafter referred to as the local bylaws), however, as stated above MassDOT projects are not subject to local wetlands bylaws or regulations

There are protected wetland resource areas that exist adjacent to Willow Road on north of the project intersection. These areas are identified on Figure 3, Protected Resource Area Map, attached to this application in Appendix C.

The following sections describe jurisdictional areas adjacent to the project:

2.1.1 Bordering Vegetated Wetlands (BVW)

Per 310 CMR 10.55(1), Bordering Vegetated Wetlands (BVWs) are likely to be significant to public or private water supply, to ground water supply, to flood control, to storm damage prevention, to prevention of pollution, to the protection of fisheries and to wildlife habitat.

A delineation of the wetland boundaries in the vicinity of the project site was completed by Green International Affiliates, Inc. on December 15, 2020, in accordance with the methodology outlined in the Regulations at 310 CMR 10.55 and the DEP handbook *Delineating Bordering Vegetated Wetlands Under Massachusetts Wetlands Protection Act*. Hydrophytic vegetation was based upon the *US Fish and Wildlife Service National List of Plant Species That Occur in Wetlands*, as well as all plant species listed in the Act. Wetland hydrology includes hydric soils, which were determined based upon the interagency document *Field Indicators for Identifying Hydric Soils in New England*. This methodology is consistent with the three-parameter approach required for the delineation of federal wetlands as outlined in the Corps of Engineers *Wetland Delineation Manual*. These wetlands are identified as Bank Flags ”1” series on both sides of Route 2A and Willow Road and Wetland Flags “A” and “B” series on both sides of Willow Road near the northern project limit, and are described in further detail in Appendix A.

No work is proposed within Bordering Vegetated Wetlands as a result of this project.

2.1.2 Inland Bank

Per 310 CMR 10.54(1), Banks are likely to be significant to public or private water supply, to ground water supply, to flood control, to storm damage prevention, to the prevention of pollution and to the protection of fisheries and wildlife habitat.

Bennetts Brook, crossing Willow Road approximately 450 feet northwest of the Route 2A/Willow Road intersection, has an associated Bank. The brook is flowing in the west-to-east direction and is identified on Figure 3, Protected Resource Area Map, and described in further detail in Appendix A.

]No impacts to the Bank of Bennetts Brook are proposed as a result of this project.

2.1.3 Land Under Water Bodies and Waterways (LUW)

Land under Water Bodies and Waterways (under any Creek, River, Stream, Pond or Lake), established through 310 CMR 10.56, is likely to be significant to public and private water supply, to ground water supply, to flood control, to storm damage prevention, to prevention of pollution and to protection of fisheries and wildlife habitat.

There is one perennial stream, Bennetts Brook, crossing Willow Road approximately 450 feet northwest of the Route 2A/Willow Road intersection. No work is proposed within LUW will occur as part of this project.

2.1.4 Buffer Zone

The 100-foot Buffer Zone (established through 310 CMR 10.02) is a 100-foot offset from any area subject to protection under M.G.L. c. 131, § 40 specified in 310 CMR 10.02(1)(a), including BVWs and Bank of the stream present in the vicinity of the subject project.

The Buffer Zones within the project area consist of existing paved roadway as well as adjacent landscaped areas and some wooded areas. Portion of Willow Road within the project limit is located within the Buffer Zones associated with the Bank of Bennets Brook, and adjacent BVW A and BVW B. 4. No trees are being proposed to be removed in the wetland buffer zone.

2.1.5 Bordering Land Subject to Flooding (BLSF)

Per the Flood Insurance Rate Maps (FIRM) for the Town of Ayer, Massachusetts, Middlesex County, Panels 25017C0216E, dated 06/04/2010, the northern limit of the project on Willow Road is located adjacent to the 100-year flood plain associated with Bennetts Brook. The flood plain areas are shown on Figure 4 – FEMA Map. The Flood Insurance Study, by the Federal Management Agency and last revised on July 6, 2016, includes a detailed study of the project area, showing the 100-year floodplain elevations in the project vicinity. Bennetts Brook is crossing Route 2A outside of the project limit and crossing Willow Road within the northern end of the project approximately 450 feet northwest of the Route 2A/Willow Road intersection. Bennetts Brook has a determined 100-year flood elevation of 243.4 feet (NAVD 88) on the west side, and 239 feet (NAVD 88) on the east side of Willow Road. The majority of the project components will not encroach into these floodplain areas, while the proposed work associated with the installation of the outfall into Bennetts Brook on the east side of Willow Road will occur within 58 square feet of the floodplain area (Zone AE) on the east side of Willow Road, which is defined as Bordering Land Subject to Flooding (BLSF), an area subject to protection under 310 CMR 10.57.

2.1.6 Riverfront Area

Per 310 CMR 10.58(1), Riverfront areas are likely to be significant to protect the private or public water supply, to protect groundwater, to provide flood control, to prevent storm damage, to prevent pollution, to protect land containing shellfish, to protect wildlife habitat and fisheries.

Bennetts Brook is a perennial stream crossing the project limits in the Town of Ayer; it has a 200-foot Riverfront Area associated with it. Portion of the project is located within its 200-foot Riverfront Area.

2.2 REGULATORY COMPLIANCE

Pursuant to 310 CMR 10.53(3), the project has been designed to avoid wetland resource area impacts to the maximum extent practicable and will mitigate unavoidable resource area impacts in accordance with state regulations. Since the proposed project qualifies as a limited project, it will meet the performance standards for each resource area to the maximum extent practicable. No replication is required for the proposed project, since there are no direct impacts to BVWs. Restoration of the impacted resource areas is provided to contribute to the protection of the interests identified in M.G.L. c. 131, § 40.

2.2.1 Resource Areas Impacts

The proposed roadway and intersection improvements will result in direct impacts to the Bordering Land Subject to Flooding (BLSF), the 100-foot Buffer Zones and the 200-foot Riverfront Area associated with Bennetts Brook crossing Willow Road north of the northern project limit; there are no other direct impacts to wetland resource areas. To minimize the impacts to the wetland area buffer zones, proper erosion and sediment controls will be installed during construction.

In addition to the minimum control measures included in the plan set, a Stormwater Pollution Prevention Plan (SWPPP) for construction activities will be prepared by the Contractor for the site in compliance with the EPA's Construction General Permit. It will include measures to minimize exposed soil areas through sequencing and temporary stabilization and establish a permanent vegetative cover or other forms of stabilization as soon as practicable.

BLSF

Portions of the project on Willow Road at the northern limit of work are located within the 100-year floodplain with an established elevation of 243.4 feet (NAVD 88) on the west side, and 239 feet (NAVD 88) on the east side of Willow Road. The installation of the proposed new outfall to Bennetts Brook will impact the BLSF resource area.

The proposed project activities will occur within approximately 58 square feet of BLSF area, due to the construction of the new outfall and placement of riprap at pipe end on the east side of Willow Road in the vicinity of Bennetts Brook; the existing grades will be reestablished following the installation of these new features. Since the project will not result in the placement of fill within a floodplain, there will be no flood storage loss in complying with the BLSF performance standards (see Figure 8 for details). The proposed outfall will be installed at elevation

100-foot Buffer Zone

Portions of the project on Willow Road at the northern limits of work are located within the 100-foot Buffer Zone to the BVWs under WPA jurisdiction. Erosion and sediment control Best Management

Practices (BMPs) will be installed during construction to protect adjacent resource areas, which will temporarily impact the buffer zones. These BMPs ensure the land disturbance within the Buffer Zone does not negatively impact resource areas and will secure the protection of those interests.

200-foot Riverfront Area

Riverfront Area associated with Bennetts Brook extends over 6,990 square feet of the project area on Willow Road at the northern limit of work in Ayer. The work proposed in the Riverfront Area includes minor box widening, fine milling and resurfacing on Willow Road, replacement of a portion of the existing 12-inch CMP drain line on Willow Road and construction of the new drainage outfall into Bennetts Brook. Majority of work within the Riverfront Area will take place in existing developed areas and is considered as redevelopment. Small portion of work associated with construction of the new outfall will occur within the undeveloped Riverfront Area.

General Performance Standards for Riverfront Area, as set forth in 310 CMR 10.58(4), are addressed as described below:

a) *Protection of other Resource Areas*: The affected Riverfront Area does not include any other resource areas under WPA jurisdiction.

b) *Protection of Rare Species:* As indicated previously in this Narrative, there are no threatened or endangered species, or species of concern, in the project area.

c) *Practicable and Substantially Equivalent Economic Alternative:* Since this project will occur within the previously developed Riverfront Area created prior to August 7, 1996, it does not need to document equivalent economic alternatives.

d) *No Significant Adverse Impact:* The work within Riverfront Area will occur within previously developed paved and landscaped areas. Small portion of work associated with construction of the new outfall will occur within the undeveloped Riverfront Area. No significant adverse impacts are anticipated, since all impacts have been minimized to the maximum extent practicable and the area will be stabilized upon completion of construction.

When work that redevelops previously developed Riverfront Areas is proposed, the following criteria from 310 CMR 10.58(5) need to be complied with:

a) At a minimum, proposed work shall result in an improvement over existing conditions of the capacity of the Riverfront Area to protect the interests identified in M.G.L. c.131,§40. When a lot is previously developed but no portion of the Riverfront Area is degraded, the requirements of 310 CMR 10.58(4) shall be met.

This roadway and intersection improvement project is intended to improve existing substandard conditions to promote safety for various roadway users and provide drainage improvements. The project mostly alters previously disturbed and degraded Riverfront Area (RA), and within the limits of the project area, minimal space is present where improvements to the Riverfront Area could be realized. Where possible, disturbed areas will be loamed and seeded. Some degraded areas will be improved near the culvert crossings. Most of the Riverfront Area within parcels containing the project is degraded with pavement and unpaved shoulders. The work within small undeveloped portions of the Riverfront Area is

unavoidable due to the need to construct new drainage outfall, associated regrading and placement of the erosion and sediments controls to protect nearby resource areas.

b) Stormwater management is provided according to Massachusetts Stormwater Management Standards, as can be seen in the Appendix D to this Application.

The project will provide improvements to the existing drainage system and improve the quality of stormwater runoff discharged to adjacent wetlands. The proposed new outfall will have stone at the pipe end to provide splash pads for stormwater discharges and to reduce erosion and movement of sediment into the resource areas. Construction of subsurface drainage improvements will extend pavement life spans, and will result in improved safety by reducing stormwater ponding on reconstructed roadway pavements. An infiltration basin is proposed to treat and mitigate stormwater runoff as the result of increased impervious area. In addition, catch basins will be added throughout the project. These improvements will result in improved water quality and drainage characteristics; therefore, contributing to the interests of the WPA (public or private water supply, to ground water supply, to flood control, to storm damage prevention, to the prevention of pollution and to the protection of fisheries and wildlife habitat).

c) Within 200-foot Riverfront Areas, proposed work shall not be located closer to the river than existing conditions or 100 feet, whichever is less, or not closer than existing conditions within 25 foot Riverfront Areas, except in accordance with 310 CMR 10.58(5)(f) or (g).

Majority of proposed work will occur as close to the river as the present limits of areas degraded by pavement, shoulders and landscaped areas. However, due to the proposed drainage improvements, small portions of this work associated with the proposed new outfall will be located closer to the river than existing conditions. The limit of work has been minimized to the maximum extent practicable, and the area will be stabilized and restored to the maximum extent feasible upon completion of work.

d) Proposed work, including expansion of existing structures, shall be located outside the riverfront area or toward the riverfront area boundary and away from the river, except in accordance with 310 CMR 10.58(5)(f) or (g).

Most of the permanent work will be located within the area previously disturbed, due to existing roadway shoulder or embankment. Areas disturbed by construction of the new drainage outfall within the Riverfront Area will be stabilized upon completion of construction to the maximum extent practicable.

e) The area of proposed work shall not exceed the amount of degraded area, provided that the proposed work may alter up to 10% if the degraded area is less than 10% of the riverfront area, except in accordance with 310 CMR 10.58(5)(f) or (g).

The amount of work in the Riverfront Area is 6,990 square feet of the 21,748 square feet of the total Riverfront Area on site. Approximately 32% percent of the Riverfront Area will be affected by the proposed work. Of the 6,990 square feet of Riverfront Area within the project area, most of the resource area is already degraded with pavement, shoulders, landscape areas or embankments. The 97.6% of the riverfront area within the limit of work is degraded; only 2.4% where the new outfall will be constructed is undeveloped. Disturbances within the Riverfront Area associated with the proposed new drainage outfall have been minimized to the maximum extent practicable and the area will be stabilized upon completion of construction.

f) When an applicant proposes restoration on-site of degraded riverfront area alteration may be allowed notwithstanding the criteria of 310 CMR 10.58(5)(c), (d), and (e) at a ratio in square feet of at least 1:1 of restored area to area of alteration not conforming to the criteria. Areas immediately along the river shall be selected for restoration. Alteration not conforming to the criteria shall begin at the riverfront area boundary. Restoration shall include:

1. removal of all debris, but retaining any trees or other mature vegetation;
2. grading to a topography which reduces runoff and increases infiltration;
3. coverage by topsoil at a depth consistent with natural conditions at the site; and
4. seeding and planting with an erosion control seed mixture followed by plantings of herbaceous and woody species appropriate to the site;

No mitigation is needed since the project is comprised of the reconstruction of a road and structure owned by the Town prior to August 7, 1996, and as such activities to maintain these facilities are grandfathered from Requirements for the Riverfront Area.

g) When an applicant proposes mitigation either on-site or in the riverfront area within the same general area of the river basin, alteration may be allowed notwithstanding the criteria of 310 CMR 10.58(5)(c), (d), or (e) at a ratio in square feet of at least 2:1 of mitigation area to area of alteration not conforming to the criteria or an equivalent level of environmental protection where square footage is not a relevant measure. Alteration not conforming to the criteria shall begin at the riverfront area boundary. Mitigation may include off-site restoration of riverfront areas, conservation restrictions under M.G.L. c. 184, §§ 31 to 33 to preserve undisturbed riverfront areas that could be otherwise altered under 310 CMR 10.00, the purchase of development rights within the riverfront area, the restoration of bordering vegetated wetland, projects to remedy an existing adverse impact on the interests identified in M.G.L. c. 131, § 40 for which the applicant is not legally responsible, or similar activities undertaken voluntarily by the applicant which will support a determination by the issuing authority of no significant adverse impact. Preference shall be given to potential mitigation projects, if any, identified in a River Basin Plan approved by the Secretary of the Executive Office of Environmental Affairs.

No mitigation is needed since the project is comprised of the reconstruction of a road and structure owned by the Town prior to August 7, 1996, and as such activities to maintain these facilities are grandfathered from Requirements for the Riverfront Area.

h) The issuing authority shall include a continuing condition in the Certificate of Compliance for projects under 310 CMR 10.58(5)(f) or (g) prohibiting further alteration within the restoration or mitigation area, except as may be required to maintain the area in its restored or mitigated condition. Prior to requesting the issuance of the Certificate of Compliance, the applicant shall demonstrate the restoration or mitigation has been successfully completed for at least two growing seasons.

No mitigation is needed since the project is comprised of the reconstruction of a road and structure owned by the Town prior to August 7, 1996, and as such activities to maintain these facilities are grandfathered from Requirements for the Riverfront Area.

2.2.2 Stormwater Management

Stormwater management for this project has been designed in compliance with the Stormwater Management Standards as outlined in 310 CMR 10.05(6)(k) through (q) and defined in detail in the DEP's

Stormwater Management Handbook. The project has been designed to improve upon existing stormwater conditions while minimizing impacts to nearby resource areas from both the construction and operation of the proposed project. A full Stormwater Management Report documenting compliance with the DEP's Stormwater Management Standards, including required calculations and description of methodology, is attached as Appendix D to this report.

2.2.3 Rare Species

The project site is not located within an area designated as a Priority Habitat of Rare Species or Estimated Habitat of Rare Wildlife by the Natural Heritage & Endangered Species Program (NHESP) 2017 Maps. There are no Certified or Potential Vernal Pools in the vicinity of the project area.

2.2.4 Water Quality

Per MassGIS online data mapping, there are no Outstanding Resource Waters (ORW) or cold water fisheries either crossing or located adjacent to the project area. The project is located within Zone II Wellhead Protection Area (See Figure 3 in Appendix C).

2.2.5 Area of Critical Environmental Concern

Per MassGIS online data mapping, the project site is not located within an Area of Critical Environmental Concern (ACEC). (See Figure 3 in Appendix C).

2.3 AVOIDANCE, MINIMIZATION AND MITIGATION MEASURES

In addition to the above described avoidance, minimization and mitigation measures, some project activities will contribute to the interests of the WPA:

- Construction of subsurface drainage improvements will extend pavement life spans, and will contribute to the enhanced flood control and storm damage prevention.
- This project provides an opportunity to improve the existing drainage system and improve the quality of stormwater runoff discharged to adjacent resource areas.
- The proposed design aims to improve the water quality by installing a new infiltration BMP.

As a result of the projects activities, there will be new catch basins, leaching basins, drain manholes, two (2) new drainage outfalls, and one (1) infiltration basin; in addition, a portion of the existing 12-inch CMP drain line on Willow Road in Ayer from the existing catch basin on Willow Road to the proposed drain manhole within the existing Right-of-Way is proposed to be replaced. The proposed improvements will not result in new untreated point source discharges created as a result of this project. All work will be done in a manner that will limit the impacts to adjacent resource areas.

The proposed improvements to the existing drainage system will result in enhanced quality of the runoff that will, in turn, result in the improved water quality (surface and ground),and drainage characteristics; therefore, contributing to the interests of the WPA (public or private water supply, to ground water supply, to flood control, to storm damage prevention, to the prevention of pollution and to the protection of fisheries and wildlife habitat).

There are no fisheries, land containing shellfish or significant wildlife habitat located within or in close proximity to the project area, therefore the project will not negatively impact these interests of the WPA.

2.3.1 Construction Mitigation Measures

Erosion and Sediment Control

To protect the resource areas and interests of the WPA during construction, a combination of erosion and sediment control BMPs will be installed as shown on the attached plan set. Erosion control techniques may include compost filter tubes, sedimentation fence barriers and floating silt fence. The Contractor will have a stockpile of materials required to control erosion on-site to be used to supplement or repair erosion control devices. Means and methods of erosion and sediment controls are left to the contractor. The erosion controls will be maintained in good condition until on-site soils are stabilized. All areas will be permanently stabilized following the completion of construction work. For additional information on erosion and sediment controls, please see the attached Stormwater Management Report in Appendix D of this report.

Trench Dewatering

It is anticipated that a NPDES Construction General Permit (CGP) will be required for the project; therefore, if trench dewatering is needed, all pumped effluent will be done in compliance with the dewatering requirements within the CGP. There will be no direct discharge of pumped water into any wetland, resource area, or closed drainage system.

2.3.2 Wetland Mitigation

Wetland mitigation is not required since the project will not result in work within BVWs as discussed in detail above under item 2.2.1 Resource Areas Impacts/Bordering Vegetated Wetland.

2.3.3 Flood Storage Compensation

Flood storage compensation is not required since the project will not result in a loss of flood storage, as discussed in detail above under item 2.2.1 Resource Areas Impacts/Bordering Land Subject to Flooding.

APPENDICES

Appendix A – Wetland Resource Area Identification/Delineations Memo
Appendix B – Photo Log
Appendix C – Figures
Appendix D – Stormwater Management Report (bound separately)
Appendix E – Drawing for NOI Submission (bound separately)

APPENDIX A

Wetland Resource Area Identification/Delineations Memo

WETLAND SUMMARY REPORT

Route 2A & Willow Road Project
Route 2A, Littleton, Massachusetts
Willow Road, Ayer, Massachusetts

PREPARED FOR:
Green International Affiliates, Inc.
239 Littleton Road, Suite 3
Westford, Massachusetts 01886

PREPARED BY:
Lucas Environmental, LLC
500A Washington Street
Quincy, Massachusetts 02169

REPORT DATE: July 13, 2021

LUCAS ENVIRONMENTAL, LLC

LUCAS ENVIRONMENTAL, LLC

500A Washington Street, Quincy, MA 02169

July 13, 2021

Green International Affiliates, Inc.
Attn: Danielle Spicer, P.E.
239 Littleton Road, Suite 3
Westford, MA 01886

Re: Wetland Summary Report
Route 2A &Willow Road Project
Route 2A, Littleton, MA
Willow Road, Ayer, MA

Dear Ms. Spicer,

A Professional Wetland Scientist (PWS) from Lucas Environmental, LLC (LE) conducted site investigations along Route 2A and Willow Road in Littleton and Ayer, Massachusetts on December 14 and 15, 2020. The purpose of the site investigation was to investigate and delineate wetland resources along the portion of Route 2A (Ayer Road) between the intersection with 3rd Street to the east and the municipal boundary with Ayer to the west. This does not include the portion of Route 2A located west of Bennetts Brook. It also includes Willow Road in Ayer from Route 2A to approximately 200 feet north of Bennetts Brook. The site investigation was limited to wetland areas within 100 feet of and perennial streams within 200 feet of Route 2A and Willow Road. This investigation included both a field and office-based component. Please note that this due diligence effort is specific to environmental resources; it does not evaluate constraints related to local planning or zoning requirements.

MassDEP Bordering Vegetated Wetland Delineation Field Data Forms were completed as described herein and are included with this report.

If you have any questions, please do not hesitate to contact me at 617.405.4140 or cml@lucasenvironmetnal.net. Thank you for your consideration in this matter.

Sincerely,
LUCAS ENVIRONMENTAL, LLC

Christopher M. Lucas, PWS, CWS, RPSS
Environmental Consultant/Soil Scientist

Joseph H. Orzel, PWS
Project Manager/Wetland Scientist

Enclosures: Photographic Documentation
Wetland Delineation Field Data Forms

LUCAS ENVIRONMENTAL, LLC

TABLE OF CONTENTS

SECTION I – NARRATIVE

1.0 INTRODUCTION

A Professional Wetland Scientist (PWS) from Lucas Environmental, LLC (LE) conducted site investigations along Route 2A and Willow Road in Littleton and Ayer, Massachusetts on December 14 and 15, 2020. The wetland investigation was performed in accordance with the Massachusetts Wetlands Protection Act (M.G.L. Ch. 131, § 40) and regulations (310 CMR 10.00 *et seq*.); Section 404 of the Clean Water Act (33 U.S.C. 1344); Massachusetts Department of Environmental Protection (MassDEP) publication "Delineating Bordering Vegetated Wetlands" under the Massachusetts Wetlands Protection Act (1995); and the U.S. Army Corp of Engineers (USACE) Wetland Delineation Manual (1987); the Northcentral and Northeast Regional Supplement (2012); the Ayer Wetlands Protection Bylaw (Article XXVI) and Regulations; and the Littleton Wetlands Protection Bylaw (Chapter 171) and Regulations.

The following data sources were examined in addition to the site investigation:

- Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map;
- United States Geological Survey Topographic Quadrangle (Wilmington, 2018);
- MassGIS MassDEP Wetland and Hydrography Datalayers;
- National Wetland Inventory (NWI) Maps;
- MassGIS Natural Heritage Atlas Datalayers; and
- United States Department of Agriculture, Natural Resources Conservation Service (USDA-NRCS) Soil Survey.

2.0 EXISTING CONDITIONS

The area under investigation includes wetland areas within 100 feet and perennial streams within 200 feet of the portion of Route 2A (Ayer Road) in Littleton, Massachusetts between the intersection with 3rd Street to the east and the municipal boundary with Ayer to the west, as well as Willow Road in Ayer, Massachusetts from Route 2A to approximately 200 feet north of Bennetts Brook (the Study Area). Within the Study Area, Route2A and Willow road are generally bounded by a mix of commercial, residential, and agricultural properties, as well as forested land. Bennetts Brook is a perennial stream in the Merrimack River Basin that flows from west to east through the Study Area and is crossed by both Route 2A and Willow Road.

A review of the current MassGIS data layer for the Massachusetts Natural Heritage Atlas (effective August 1, 2017) under the Natural Heritage and Endangered Species Program (NHESP) indicates that no portion of the site is located within Estimated Habitat of Rare Wildlife or Priority Habitat of Rare Species under the Massachusetts Endangered Species Act (321 CMR 10.00 et seq.). No Certified Vernal Pools under the jurisdiction of the Wetlands Protection Act Regulations (310 CMR 10.00 et seq.) are present near the Study Area, nor are any mapped Potential Vernal Pools. The Mass CAPS Important Wildlife Habitat Maps for Littleton and Ayer indicate a potential area of important habitat wildlife within approximately 800 feet to the south of Route 2A, south of the Bennetts Brook crossing.

The Study Area is not located within an Area of Critical Environmental Concern (ACEC), Outstanding Resource Water (ORW), or Watershed Protection Area. The Study Area is located within a MassDEP Zone II Wellhead Protection Area (Zone II #429, Ayer DPW Water Division) as well as within the Town of Ayer Aquifer Protection Zone and Town of Littleton Water Resource Zoning Overlay District.

Bennetts Brook within the Study Area (Segment ID MA84B-06) is identified as a Category 5 water requiring a Total Maximum Daily Load (TMDL) per the Final MassDEP 2016 Integrated List of Waters (305(b)/303(d)). Waters are listed in Category 5 if they were identified as impaired (i.e., not supporting one or more intended uses), the impairment was related to the presence of one or more "pollutants", and the source of those pollutants was not considered to be natural. The cause of impairment in Bennetts Brook has been identified as *E. Coli*.

3.0 ENVIRONMENTAL RESOURCE AREAS

Wetland resource areas identified within the Study Area include Inland Bank, Bordering Vegetated Wetland (BVW), Land Under Water Bodies and Waterways (LUWW), Bordering Land Subject to Flooding (BLSF), and Riverfront Area. Under the Massachusetts Wetlands Protection Act (WPA), the Ayer Wetlands Protection Bylaw (Article XXVI) and Regulations, and the Littleton Wetlands Protection Bylaw (Chapter 171) and Regulations, the wetlands in the Study Area are defined as follows.

3.1 Inland Bank – 310 CMR 10.54

Section 310 CMR 10.54 of the WPA defines a Bank *as the portion of the land surface which normally abuts and confines a water body. It occurs between a water body and a vegetated bordering wetland and adjacent flood plain, or, in the absence of these, it occurs between a water body and an upland. The upper boundary of a Bank is the first observable break in the slope or the mean annual flood level, whichever is lower. The lower boundary of a Bank is the mean annual low flow level*. Under the Ayer Wetlands Protection Bylaw, the upper boundary is the first observable break in the slope or the mean annual flood level, whichever is *higher*. The delineated Banks are described below.

3.2 Bordering Vegetated Wetlands – 310 CMR 10.55

Section 310 CMR 10.55 of the WPA defines BVW *as freshwater wetlands which border on creeks, rivers, streams, ponds and lakes. The types of freshwater wetlands are wet meadows, marshes, swamps and bogs. Bordering Vegetated Wetlands are areas where the soils are saturated and/or inundated such that they support a predominance of wetland indicator plants. 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. Wetland indicator plants are also those classified in the indicator categories of Facultative, Facultative+, Facultative Wetland-, Facultative Wetland, Facultative Wetland+, or Obligate Wetland in the National List of Plant Species That Occur in Wetlands: Massachusetts (Fish & Wildlife Service, U.S. Department of the Interior, 1988) or plants exhibiting physiological or morphological adaptations to life in saturated or inundated conditions.* Under the Ayer Wetlands Protection Bylaw, all *Freshwater Wetlands* are protected whether or not they border on a waterbody. The delineated BVWs are described below.

3.3 Land Under Water Bodies and Waterways – 310 CMR 10.56

Section 310 CMR 10.56(2) of the WPA defines LUWW *as the land beneath any creek, river, stream, pond or lake. Said land may be composed of organic muck or peat, fine sediments, rocks or bedrock. The boundary of Land under Water Bodies and Waterways is the mean annual low water level.* LUWW is present within Bennetts Brook within the Study Area. This resource area is located below the edge of Bank or the Mean Annual High Water (MAHW) mark of perennial streams, therefore it is not field delineated.

3.4 Bordering Land Subject to Flooding – 310 CMR 10.57

Section 310 CMR 10.57(2)(a) of the WPA defines BLSF as *an area with low, flat topography adjacent to and inundated by flood waters rising from creeks, rivers, streams, ponds or lakes. It extends from the banks of these waterways and water bodies; where a bordering vegetated wetland occurs, it extends from said wetland. 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.*

Flood zones are present within the Study Area. According to the FEMA Flood Insurance Rate Maps (FIRM) for Middlesex County, Massachusetts, Map Number 25017C0216E effective June 4, 2010, areas designated as Zone AE are present within and along Bennetts Brook. Zone AE is classified as an area subject to the 1% annual chance flood (100-year flood), where base flood elevations have been determined. The flood elevations at Bennetts Brook vary from 249 feet (NAVD 88) immediately upstream (south) of Route 2A to 239 feet immediately downstream (east) of Willow Road.

Bennetts Brook is also a mapped Regulatory Floodway, which is classified as the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights. The section of Bennetts Brook south of Route 2A and within Littleton lies outside the Limit of the FEMA Detailed Study. The remainder of the Study Area is designated as a Zone X which is classified as an Area of Minimal Flood Hazard. The boundary of BLSF was not delineated in the field and should be identified on the plans.

3.5 Riverfront Area – 310 CMR 10.58

Section 310 CMR 10.58(2)(a)(3) of the WPA defines Riverfront Area *as the area of land between a river's mean annual high water line measured horizontally outward from the river and a parallel line located 200 feet away.* Bennetts Brook is mapped as perennial on the current USGS topographic map (Ayer, Massachusetts Quadrangle, 2021) and is therefore presumed to be perennial. No other perennial or intermittent streams are mapped or were observed within the Study Area. The MAHW line along Bennetts Brook was delineated in the field as described for Stream 1 in the following below.

3.6 Local Wetlands Protection Bylaws

Both Littleton and Ayer have local Wetlands Protection Bylaws and Regulations. Under the Littleton Wetlands Protection Bylaw (Chapter 171) and Regulations, any area within a BVW or Bank and the first 50 feet of the Buffer Zone from BVW or Bank is protected as a No-Disturbance Area.

Under the Ayer Wetlands Protection Bylaw (Article XXVI) and Regulations, the 100-Foot Buffer Zone is considered a jurisdictional resource area referred to as the Adjacent Upland Resource Area. The 200-Foot Riverfront Area is also considered Adjacent Upland Resource Area. Within Undisturbed Lands, the inner 50 feet of the 100-Foot Adjacent Resource Area is a protected No-Disturbance Zone (Undisturbed Land is land determined by the Commission to be of a predominantly natural character or to have been altered after May 1996 without a permit from the Commission).

3.7 Wetland Descriptions

The following describes each of the wetlands identified in the Study Area. This description includes BVW only as no isolated wetlands were identified within the Study Area. A jurisdictional 100-Foot Buffer Zone extends from the delineated wetland boundary.

Wetland A & B

Wetland A is a BVW bordering on the south Bank of Bennetts Brook at Willow Road. The BVW boundary was delineated with pink survey tape numbered sequentially with flag series WFA-1 to WFA-13. Flags WFA-1 to WFA-8 are on the east side of the road and WFA-9 to WFA-13 are on the west side. Common vegetation observed within this wetland includes red maple (*Acer rubrum*), American elm (*Ulmus americana*), speckled alder (*Alnus incana*), silky dogwood (*Cornus amomum*), bristly dewberry *(Rubus hispidus*), and goldenrods (*Solidago* spp.). Upland vegetation includes Norway maple (*Acer platanoides*), sugar maple (*Acer saccharum*), white pine (*Pinus strobus*), white oak (*Quercus alba*), black cherry (*Prunus serotina*), staghorn sumac (*Rhus typhina*), multiflora rose (*Rosa multiflora*), honeysuckle (*Lonicera sp*.), privet (*Ligustrum vulgare*), Oriental bittersweet (*Celastrus orbiculatus*), and Virginia creeper (*Parthenocissus quinquefolia*). Soil within the wetland is a deep, dark silt loam with shallow high chroma mottles and oxidized rhizospheres. Upland soils are fine sandy loam with a four chroma B-horizon. Indicators of wetland hydrology included saturation at the soil surface and buttressed tree roots. State and federal boundaries are coincident.

Wetland B is a BVW bordering on the north Bank of Bennetts Brook at Willow Road. The BVW boundary was delineated with pink survey tape numbered sequentially with flag series WFB-1 to WFB-11. Flags WFB-1 to WFB-7 are on the east side of the road and WFB-8 to WFB-11 are on the west side. Common vegetation observed within this wetland includes red maple, American elm, silky dogwood, sensitive fern (*Onoclea sensibilis*), jewelweed (*Impatiens capensis*), and bristly dewberry. Upland vegetation includes Norway maple, multiflora rose, and privet. Soil and indicators of hydrology are similar to those within Wetland A. State and federal boundaries are coincident.

Wetland C

Wetland C is located along Bennetts Brook on the south side of Route 2A, just west of the road crossing. The BVW boundary was delineated with pink survey tape numbered sequentially with flag series WFC-1 to WFC-7. Common vegetation in this forested wetlands includes red maple, green ash (*Fraxinus pennsylvanica*), black elderberry (*Sambucus nigra*), cinnamon fern (*Osmundastrum cinnamomeum*), and sensitive fern. Common vegetation within the upland includes red oak (*Quercus rubra*), shagbark hickory (*Carya ovata*), and poison ivy (*Toxicodendron radicans*).

Soils within the wetlands consist of a deep, dark silty loam over dark coarse sand to refusal at approximately 17 inches. Saturation occurred at ten inches and free water was at a depth of fourteen inches. Upland soils were fine sandy loam to loamy fine sand with a three chroma B-horizon without redoximorphic features and no saturation to refusal at thirteen inches. State and federal boundaries are coincident.

3.8 Watercourse Descriptions

The following describes the watercourses identified in the Study Area. The only watercourse identified was Bennetts Brook, a perennial stream.

Stream 1 – Bennetts Brook

The MAHW of Bennetts Brook upstream and downstream of the crossings at Route 2A and Willow Road was delineated with blue survey flagging numbered sequentially from BF1-1 to BF1-17, BF1-100 to BF1-111, BF1-200 to BF1-217, and BF1-300 to BF1-315, as described below. In many locations MAHW is coincident with the Bank; however, in some locations the delineated MAHW line is upgradient of the first break in slope and the delineation was based on apparent evidence of high water, such as water or sediment staining of rocks, soil, leaves, or vegetation.

Flags BF1-1 through BF1-17 and BF1-100 to BF1-111 are located on the south and north Banks of Bennetts Brook, respectively, at the Willow Road crossing. East of Willow Road the southern Bank is comprised primarily of rocks and boulders and is well defined. The northern Bank is a mix of rocks, boulders, and vegetated areas. Common vegetation includes multiflora rose, silky dogwood, speckled alder, and sensitive fern. West of Willow Road the northern Bank is rock lined and well defined whereas the southern Bank is less well defined and vegetated primarily with silky dogwood.

Flags BF1-200 through BF1-217 and BF1-300 to BF1-315 are located on the east and west Banks of Bennetts Brook, respectively, at the Route 2A crossing. North of Route 2A the Bank is fairly well defined and thickly vegetated with species such as grape (*Vitis* sp.), black elderberry, and silky dogwood. South of Route 2A the Bank is well defined and vegetated, with rock armoring in the vicinity of the road culvert.

The Riverfront Area extends 200 feet horizontally from the delineated Inland Bank/MAHW line along Bennetts Brook and includes all of Wetlands A, B, and C described above, as well as adjacent uplands.

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SECTION II – APPENDICES

LUCAS ENVIRONMENTAL, LLC

APPENDIX A

PHOTOGRAPHIC DOCUMENTATION

PHOTOGRAPHIC DOCUMENTATION

DATE: December 14, 2020

Photograph 1: Bennetts Brook near flag BF1-2.

Photograph 2: Bennetts Brook near flag BF1-112.

Photograph 3: Bennetts Brook near flag BF1-209.

Photograph 4: Bennetts Brook near flag BF1-310.

Photograph 5: Wetland A near flag WFA-5.

Photograph 6: Wetland A near flag WFA-13.

Photograph 7: Wetland B near flag WFB-4.

Photograph 8: Wetland C near flag WFC-4.

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APPENDIX B

WETLAND DELINEATION FIELD DATA FORMS

LUCAS ENVIRONMENTAL, LLC

WETLAND DELINEATION FIELD DATA FORM

Observation Plot Number: WFA-5 Transect Number: WET-1

Applicant: **MassDOT** Prepared by: **Lucas Environmental, LLC** Project Location: **Route 2A & Willow Road, Littleton/Ayer, MA**

☐ Vegetation alone presumed adequate to delineate BVW boundary: fill out Section I only

☑ Vegetation and other indicators of hydrology used to delineate BVW boundary: fill out Sections I and II

☐ Method other than dominance test used (attach additional information)

SECTION I. VEGETATION

Date of Delineation: **December 14, 2020**

A. Sample Layer and Plant Species (by common/scientific name)	B. Percent Cover (or basal area)	C. Percent Dominance	D. Dominant Plant (yes or no)	E. Wetland Indicator Category*
Tree				
American elm (*Ulmus americana*)	38.0	65.0%	YES	FACW*
Red maple (*Acer rubrum*)	20.5	35.0%	YES	FAC*
Saplings				
None				
Shrubs				
Multiflora rose (*Rosa multiflora*)	3.0	100%	YES	FACU
Privet (*Ligustrum vulgare*)	T	NA	NO	FACU
Herbaceous				
Sensitive fern (*Onoclea sensibilis*)	20.5	77.4%	YES	FACW*
Tussock sedge (*Carex stricta*)	3.0	11.3%	NO	OBL*
Wrinkleleaf goldenrod (*Solidago rugosa*)	3.0	11.3%	NO	FAC*
Vines				
Oriental bittersweet (*Celastrus orbiculatus*)	T			

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

Vegetation conclusion:

Number of dominant wetland indicator plants: 3 **Number of dominant non-wetland indicator plants: 1**

Is the number of dominant wetland plants equal to or greater than the number of dominant non-wetland plants: YES ☑ NO ☐

LUCAS ENVIRONMENTAL, LLC

WETLAND DELINEATION FIELD DATA FORM

Observation Plot Number: WFA-5 | Transect Number: WET-1

SECTION II. INDICATORS OF HYDROLOGY

Hydric Soil Interpretation

1. Soil Survey

Is there a published soil survey for this site? YES ☑ NO ☐

Title/Date: **Custom Soil Resource Report for Middlesex County, Massachusetts. (GIS Data from the Soil Survey Geographic - SSURGO data base produced by the USDA, NRCS) Accessed online June 29, 2021.**

Map Number/Soil Type Mapped**:**

53A – Freetown muck, ponded, 0 to 1%slopes
307E - Paxton fine sandy loam, 25 to 35% slopes, extremely stony
311B – Woodbridge fine sandy loam, 0 to 8 % slopes, very stony
629C - Canton-Charlton-Urban land complex, 3 to 15% slopes

Hydric Soil Inclusions: **Whitman, Swansea, Scarboro, Ridgebury,**

Are field observations consistent with soil survey? YES ☐ NO ☑

Remarks: **The soils are silty loam.**

2. Soil Description

Horizon	Depth	Matrix Color	Mottles Color
O (leaf litter)			
A (silt loam)	**0-4”**	**10YR 2/1**	
	4-12”	**10YR 2/1**	**7.5YR 4/4 (5%)**
Refusal at 12”			

Remarks:

3. Other:

Conclusion: Is soil hydric? YES ☑ NO ☐

Other Indicators of Hydrology:

- ☐ Site inundated: _____
- ☑ Depth to free water in observation hole: **12 inches**
- ☑ Depth to soil saturation in observation hole: **At surface**
- ☐ Water marks: _____
- ☐ Drift lines: _____
- ☐ Sediment deposits: _____
- ☐ Drainage patterns in BVW: _____
- ☐ Oxidized rhizospheres: _____
- ☐ Water-stained leaves: _____
- ☐ Recorded data (stream, lake, or tidal gauge; aerial photo; other): _____
- ☑ Other: **Buttressed tree roots**

Vegetation and Hydrology Conclusion

	YES	NO
Number of wetland indicator plants greater than or equal to number of non-wetland indicator plants	☑	☐
Hydric soils present	☑	☐
Other indicators of hydrology present	☑	☐
Sample location is in BVW	☑	☐

LUCAS ENVIRONMENTAL, LLC

WETLAND DELINEATION FIELD DATA FORM

Observation Plot Number: WFA-5 Transect Number: UPL-1

Applicant: **MassDOT** Prepared by: **Lucas Environmental, LLC** Project Location: **Route 2A & Willow Road, Littleton/Ayer, MA**

☐ Vegetation alone presumed adequate to delineate BVW boundary: fill out Section I only

☑ Vegetation and other indicators of hydrology used to delineate BVW boundary: fill out Sections I and II

☐ Method other than dominance test used (attach additional information)

SECTION I. VEGETATION

Date of Delineation: **December 14, 2020**

A. Sample Layer and Plant Species (by common/scientific name)	B. Percent Cover (or basal area)	C. Percent Dominance	D. Dominant Plant (yes or no)	E. Wetland Indicator Category*
Tree				
Sugar maple (*Acer saccharum*)	38.0	73.1%	YES	FACU
White pine (*Pinus strobus*)	10.5	20.2%	YES	FACU
Red oak (*Quercus rubra*)	3.5	6.7%	NO	FACU
Saplings				
None				
Shrubs				
Multiflora rose (*Rosa multiflora*)	10.5	43.8%	YES	FACU
Staghorn sumac (*Rhus typhina*)	10.5	43.8%	YES	UPL
White oak (*Quercus alba*)	3.0	12.5%	NO	FACU
Herbaceous				
Grass sp.	63.0	100%	YES	NA (*)
Wrinkleleaf goldenrod (*Solidago rugosa*)	T	NA	NO	FAC*
Vines				
Virginia creeper (*Parthenocissus quinquefolia*)	T	NA	NO	FACU

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

Vegetation conclusion:

Number of dominant wetland indicator plants: 0 or 1 **Number of dominant non-wetland indicator plants: 5 or 4**

Is the number of dominant wetland plants equal to or greater than the number of dominant non-wetland plants: YES ☑ NO ☐

LUCAS ENVIRONMENTAL, LLC

WETLAND DELINEATION FIELD DATA FORM

Observation Plot Number: WFA-5 | Transect Number: UPL-1

SECTION II. INDICATORS OF HYDROLOGY

Hydric Soil Interpretation

1. Soil Survey

Is there a published soil survey for this site? YES ☑ NO ☐

Title/Date: **Custom Soil Resource Report for Middlesex County, Massachusetts. (GIS Data from the Soil Survey Geographic - SSURGO data base produced by the USDA, NRCS) Accessed online June 29, 2021.**

Map Number/Soil Type Mapped**:**

53A – Freetown muck, ponded, 0 to 1%slopes
307E - Paxton fine sandy loam, 25 to 35% slopes, extremely stony
311B – Woodbridge fine sandy loam, 0 to 8 % slopes, very stony
629C - Canton-Charlton-Urban land complex, 3 to 15% slopes

Hydric Soil Inclusions: **Whitman, Swansea, Scarboro, Ridgebury,**

Are field observations consistent with soil survey? YES ☐ NO ☑

Remarks:

2. Soil Description

Horizon	Depth	Matrix Color	Mottles Color
O (leaf litter)			
A	**0-10”**	**10YR 3/1**	
B	**10-12”**	**7.5YR 4/4**	
Refusal at 12”			

Remarks: **Fine sandy loam**

3. Other:

Conclusion: Is soil hydric? YES ☐ NO ☑

Other Indicators of Hydrology:

- ☐ Site inundated: _____
- ☐ Depth to free water in observation hole: _____
- ☐ Depth to soil saturation in observation hole: **None to refusal at 12”**
- ☐ Water marks: _____
- ☐ Drift lines: _____
- ☐ Sediment deposits: _____
- ☐ Drainage patterns in BVW: _____
- ☐ 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 greater than or equal to number of non-wetland indicator plants	☑	☐
Hydric soils present	☐	☑
Other indicators of hydrology present	☐	☑
Sample location is in BVW	☐	☑

LUCAS ENVIRONMENTAL, LLC

WETLAND DELINEATION FIELD DATA FORM

Observation Plot Number: WFC-3/4 Transect Number: WET-2

Applicant: **MassDOT** Prepared by: **Lucas Environmental, LLC** Project Location: **Route 2A & Willow Road, Littleton/Ayer, MA**

☐ Vegetation alone presumed adequate to delineate BVW boundary: fill out Section I only

☑ Vegetation and other indicators of hydrology used to delineate BVW boundary: fill out Sections I and II

☐ Method other than dominance test used (attach additional information)

SECTION I. VEGETATION

Date of Delineation: **December 15, 2020**

A. Sample Layer and Plant Species (by common/scientific name)	B. Percent Cover (or basal area)	C. Percent Dominance	D. Dominant Plant (yes or no)	E. Wetland Indicator Category*
Tree				
Red maple (*Acer rubrum*)	20.5	66.1%	YES	FAC*
Green ash (*Fraxinus pennsylvanica*)	10.5	33.9%	YES	FACW*
Saplings				
Red maple (*Acer rubrum*)	T	NA	NO	FAC*
Shrubs				
Black elderberry (*Sambucus nigra*)	20.5	77.4%	YES	FACW*
Multiflora rose (*Rosa multiflora*)	3.0	11.3%	NO	FACU
Tatarian honeysuckle (*Lonicera tatarica*)	3.0	11.3%	NO	FACU
Red oak (*Quercus rubra*)	T	NA	NO	FACU
Herbaceous				
Cinnamon fern (*Osmunda cinnamomea*)	20.5	30.4%	YES	FACW*
New York fern (*Thelypteris noveboracensis*)	20.5	30.4%	YES	FAC*
Grass sp.	20.5	30.4%	YES	NA (*)
Poison ivy (*Toxicodendron radicans*)	3.0	4.4%	NO	FAC*
Sensitive fern (*Onoclea sensibilis*)	3.0	4.4%	NO	FACW*
Vines				
None				

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

Vegetation conclusion:

Number of dominant wetland indicator plants: 5 or 6 **Number of dominant non-wetland indicator plants: 1 or 0**

Is the number of dominant wetland plants equal to or greater than the number of dominant non-wetland plants: YES ☑ NO ☐

LUCAS ENVIRONMENTAL, LLC

WETLAND DELINEATION FIELD DATA FORM

Observation Plot Number: WFC-3/4 Transect Number: WET-2

SECTION II. INDICATORS OF HYDROLOGY

Hydric Soil Interpretation

1. Soil Survey

Is there a published soil survey for this site? YES ☑ NO ☐

Title/Date: **Custom Soil Resource Report for Middlesex County, Massachusetts. (GIS Data from the Soil Survey Geographic - SSURGO data base produced by the USDA, NRCS) Accessed online June 29, 2021.**

Map Number/Soil Type Mapped**:**

53A – Freetown muck, ponded, 0 to 1%slopes
104C - Hollis-Rock outcrop-Charlton complex, 0 to 15% slopes
307E - Paxton fine sandy loam, 25 to 35% slopes, extremely stony

Hydric Soil Inclusions: **Whitman, Swansea, Scarboro**

Are field observations consistent with soil survey? YES ☑ NO ☐

Remarks:

2. Soil Description

Horizon	Depth	Matrix Color	Mottles Color
O (leaf litter)			
A (mucky fs loam)	**0-15”**	**10YR 2/1**	
B (coarse sand)	**15-17”**	**10YR 3/2**	
Refusal at 17”			

Remarks:

3. Other:

Conclusion: Is soil hydric? YES ☑ NO ☐

Other Indicators of Hydrology:

- ☐ Site inundated: _____
- ☑ Depth to free water in observation hole: **14 inches**
- ☑ Depth to soil saturation in observation hole: **10 inches**
- ☐ Water marks: _____
- ☐ Drift lines: _____
- ☐ Sediment deposits: _____
- ☐ Drainage patterns in BVW: _____
- ☐ 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 greater than or equal to number of non-wetland indicator plants	☑	☐
Hydric soils present	☑	☐
Other indicators of hydrology present	☑	☐
Sample location is in BVW	☑	☐

LUCAS ENVIRONMENTAL, LLC

WETLAND DELINEATION FIELD DATA FORM

Observation Plot Number: WFC-3/4 Transect Number: UPL-2

Applicant: **MassDOT** Prepared by: **Lucas Environmental, LLC** Project Location: **Route 2A & Willow Road, Littleton/Ayer, MA**

☐ Vegetation alone presumed adequate to delineate BVW boundary: fill out Section I only

☑ Vegetation and other indicators of hydrology used to delineate BVW boundary: fill out Sections I and II

☐ Method other than dominance test used (attach additional information)

SECTION I. VEGETATION

Date of Delineation: **December 15, 2020**

A. Sample Layer and Plant Species (by common/scientific name)	B. Percent Cover (or basal area)	C. Percent Dominance	D. Dominant Plant (yes or no)	E. Wetland Indicator Category*
Tree				
Red oak (*Quercus rubra*)	20.5	49.4%	YES	FACU
Green ash (*Fraxinus pennsylvanica*)	10.5	25.3%	YES	FAC*
Shagbark hickory (*Carya ovata*)	10.5	25.3%	YES	FACU
Saplings				
Red oak (*Quercus rubra*)	10.5	100%	YES	FACU
Shrubs				
Poison ivy (*Toxicodendron radicans*)	20.5	100%	YES	FAC*
Herbaceous				
Poison ivy (*Toxicodendron radicans*)	20.5	100%	YES	FAC*
Vines				
None				

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

Vegetation conclusion:

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

Is the number of dominant wetland plants equal to or greater than the number of dominant non-wetland plants: YES ☑ NO ☐

LUCAS ENVIRONMENTAL, LLC

WETLAND DELINEATION FIELD DATA FORM

Observation Plot Number: WFC-3/4 Transect Number: UPL-2

SECTION II. INDICATORS OF HYDROLOGY

Hydric Soil Interpretation

1. Soil Survey

Is there a published soil survey for this site? YES ☑ NO ☐

Title/Date: **Custom Soil Resource Report for Middlesex County, Massachusetts. (GIS Data from the Soil Survey Geographic - SSURGO data base produced by the USDA, NRCS) Accessed online June 29, 2021.**

Map Number/Soil Type Mapped**:**

53A – Freetown muck, ponded, 0 to 1%slopes
104C - Hollis-Rock outcrop-Charlton complex, 0 to 15% slopes
307E - Paxton fine sandy loam, 25 to 35% slopes, extremely stony

Hydric Soil Inclusions: **Whitman, Swansea, Scarboro**

Are field observations consistent with soil survey? YES ☑ NO ☐

Remarks:

2. Soil Description

Horizon	Depth	Matrix Color	Mottles Color
Oe	**2-0”**	**7.5YR 2.5/2**	
A (loamy fine sand)	**0-4”**	**10YR 3/2**	
B (fine sandy loam)	**4-13”**	**2.5Y 5/3**	
Refusal at 13”			

Remarks: No redoximorphic features to refusal.

3. Other:

Conclusion: Is soil hydric? YES ☐ NO ☑

Other Indicators of Hydrology:

☐ Site inundated: _____

☐ Depth to free water in observation hole: _____

☐ Depth to soil saturation in observation hole: **None to refusal at 13”**

☐ Water marks: _____

☐ Drift lines: _____

☐ Sediment deposits: _____

☐ Drainage patterns in BVW: _____

☐ 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 greater than or equal to number of non-wetland indicator plants	☑	☐
Hydric soils present	☐	☑
Other indicators of hydrology present	☐	☑
Sample location is in BVW	☐	☑

APPENDIX B

Photo Log

Photo Log – September 2019, August - September 2020, July 2021

Photo 01 – Approx. Sta. 8+00, View West on Route 2A from westbound stop line at the intersection

Photo 02 – Approx. Sta. 3+50, View East on Route 2A towards the intersection

Photo 03 – Approx. Sta. 18+00, View northwest down Willow Road towards Bennetts Brook crossing

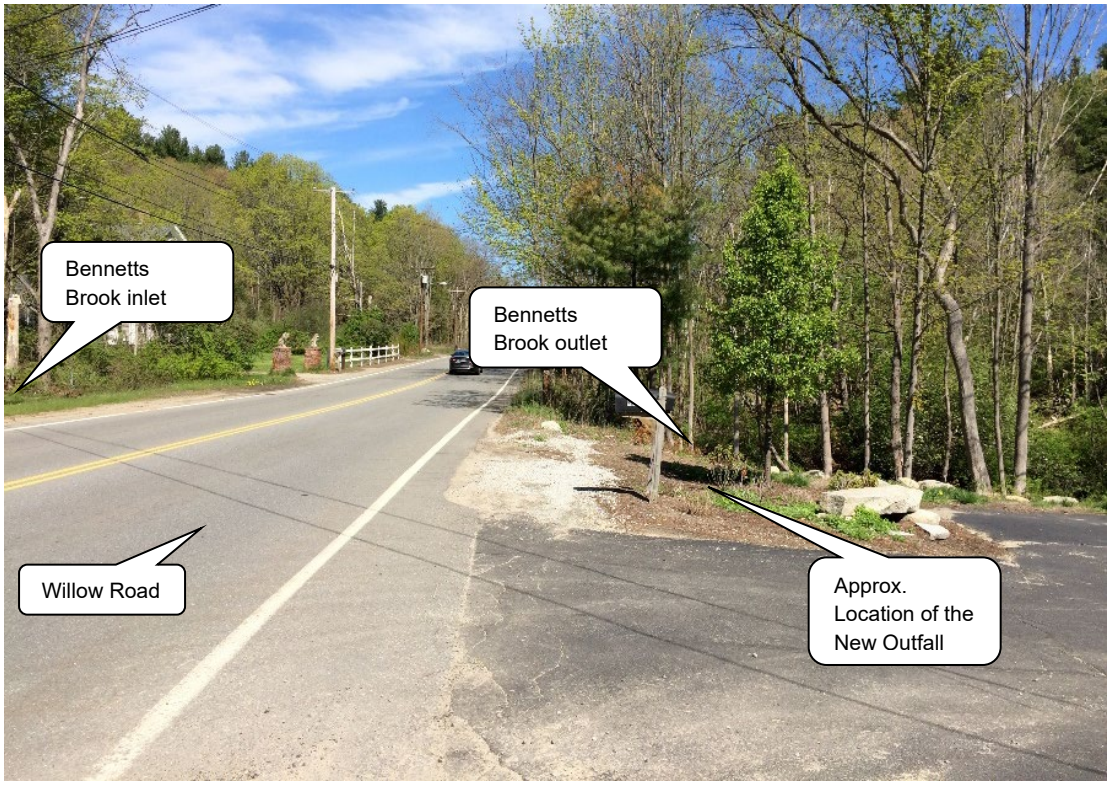


Photo 04 – Approx. Sta. 16+00, Willow Road crossing over Bennetts Brook, view from northbound shoulder

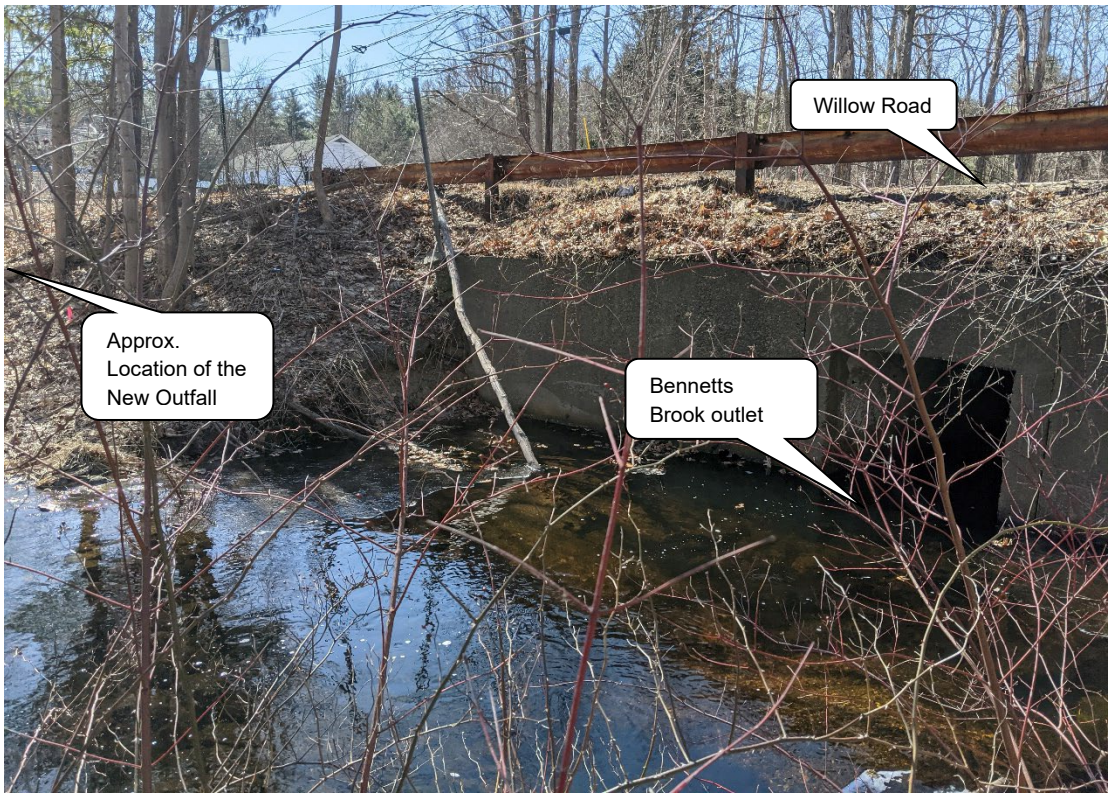


Photo 05 – View South at the Bennetts Brook Outlet

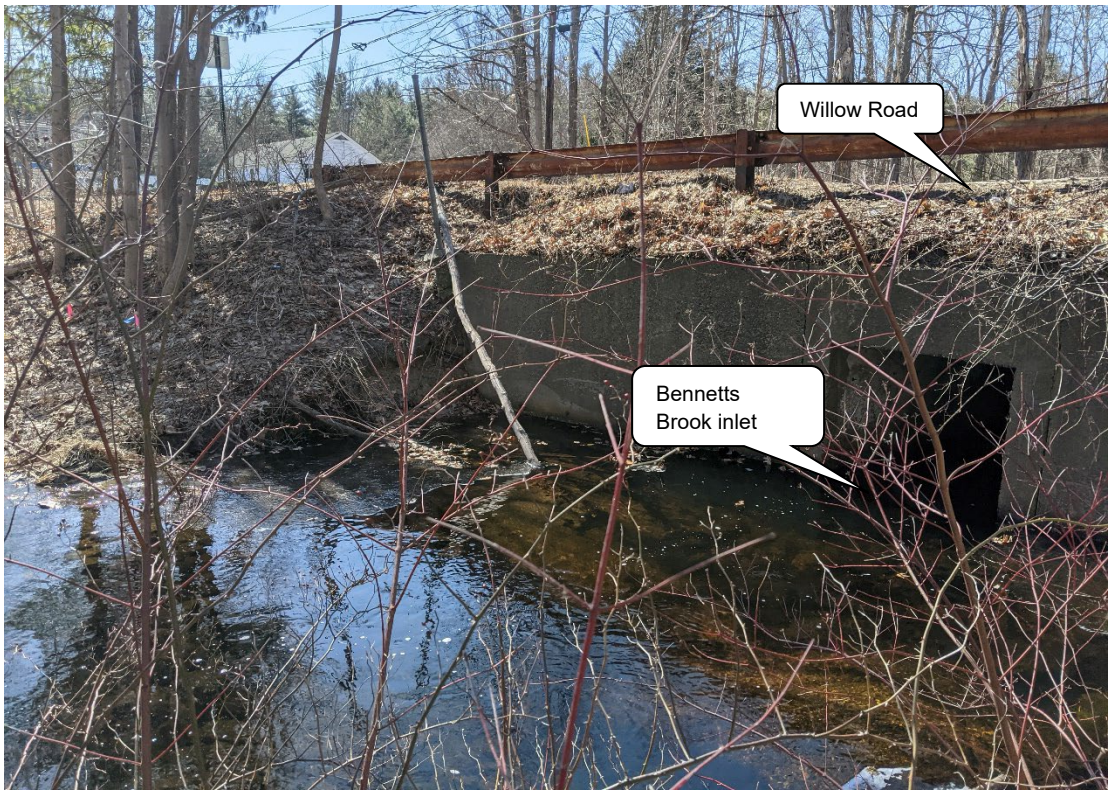
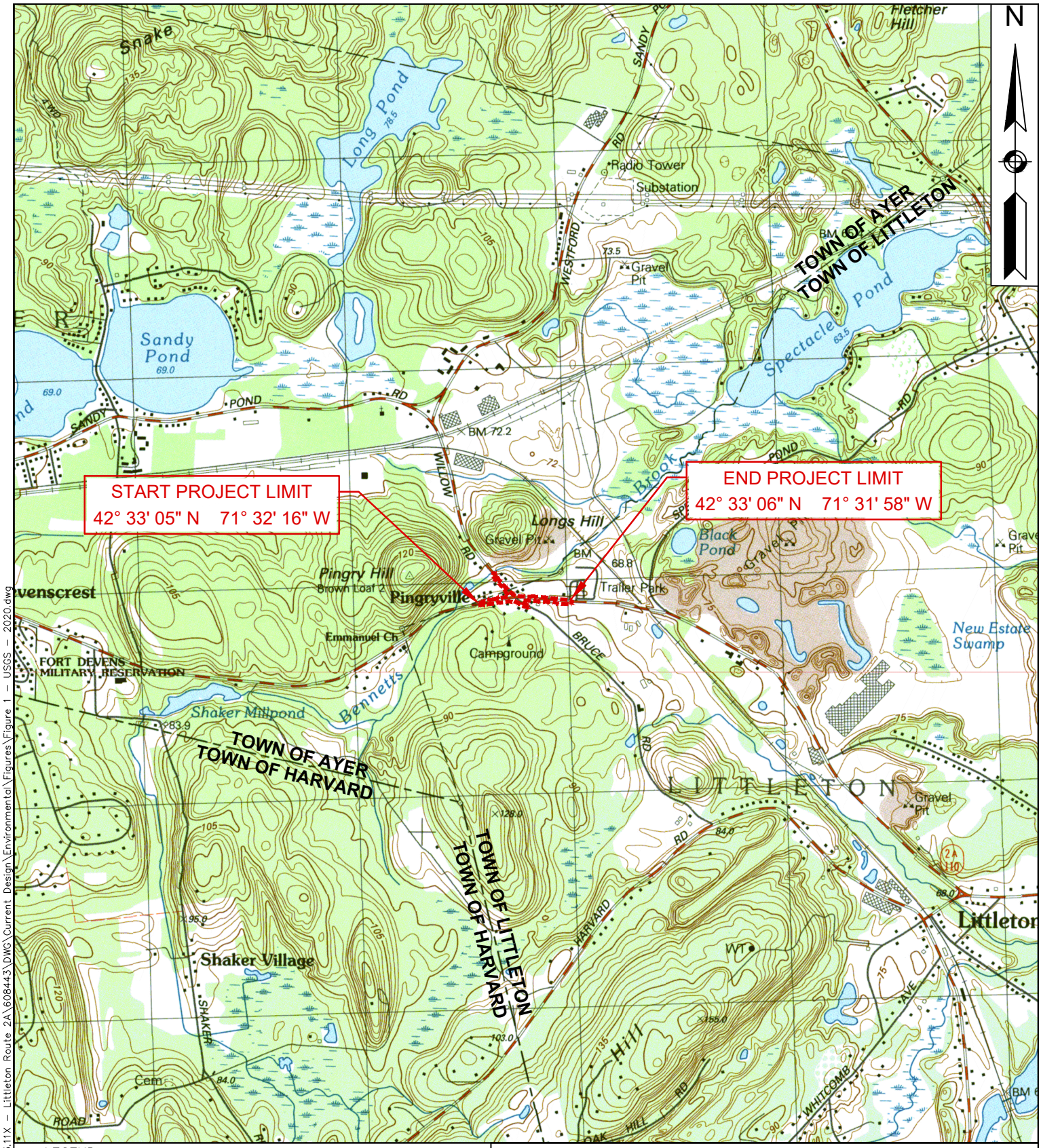


Photo 06 –View east at the Bennetts Brook Inlet

APPENDIX C

Figures



LEGEND

APPROXIMATE PROJECT LOCATION

SCALE IN FEET

1000 0 1000 2000

1" = 2000'

ELEVATIONS IN METERS

NOTE: DATA TAKEN FROM MASSGIS

USGS LOCUS MAP

LITTLETON – AYER – INTERSECTION IMPROVEMENTS ON ROUTE 2A AT WILLOW ROAD AND BRUCE STREET, MASSDOT FILE 608443

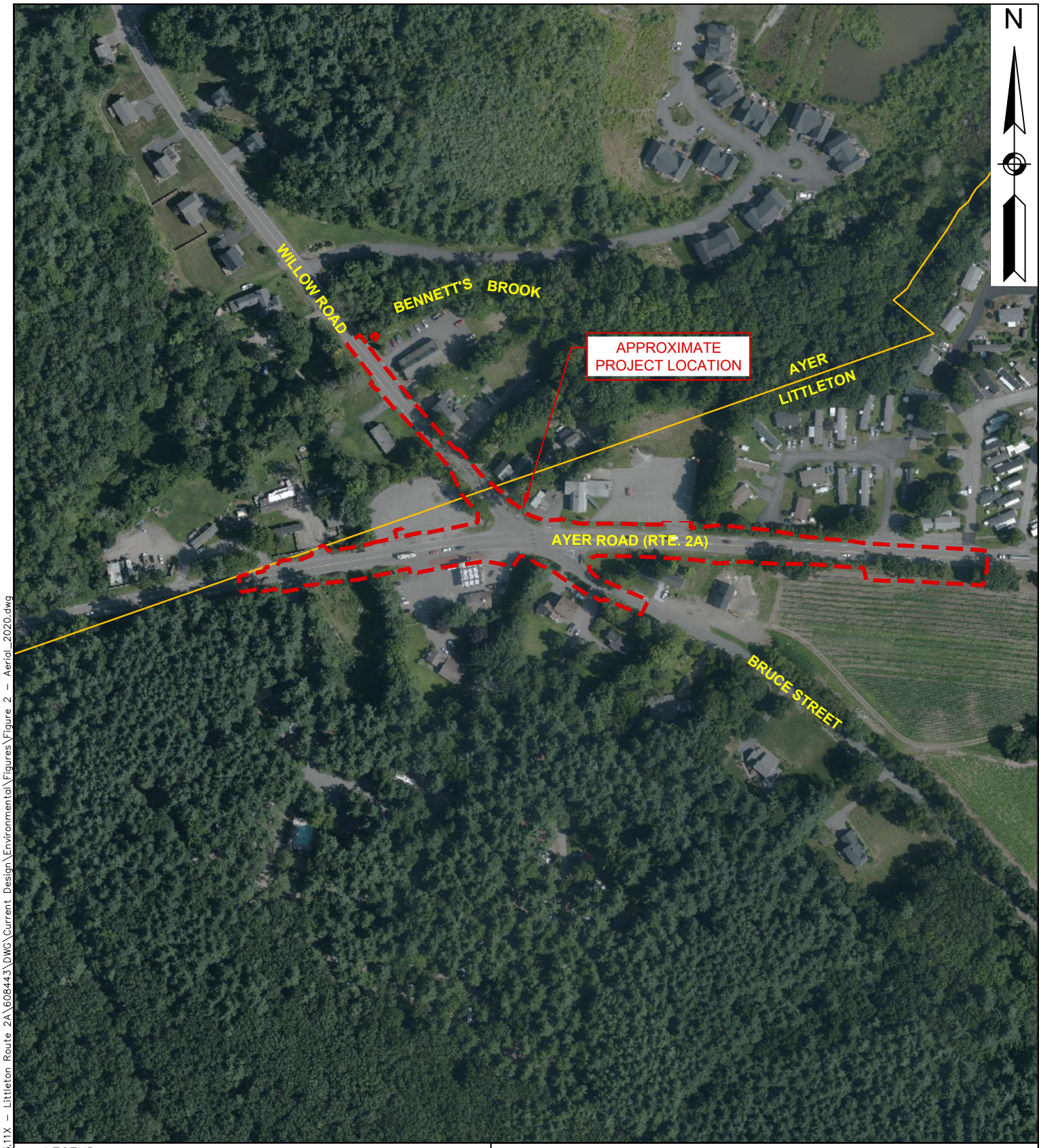
PREPARED BY:
GREEN INTERNATIONAL AFFILIATES, INC.
CIVIL AND STRUCTURAL ENGINEERS
239 LITTLETON RD, WESTFORD, MA (978) 923-0400
24 ALBION RD, LINCOLN, RI (401) 305-7895

PREPARED FOR:
massDOT
Massachusetts Department of Transportation
Highway Division

SCALE: AS NOTED	PROJECT NO. 13033.114
DATE: 10/08/2020 REVISED:	DRAWN BY: AE/OF CHECKED BY: MC

FIGURE 1

\\fs1\engineering\Projects\2013\13033\13033.11X – Littleton Route 2A\608443\DWG\Current Design\Environmental\Figures\Figure 1 – USGS – 2020.dwg



\\fs1\engineering\Projects\2013\13033\13033.11X - Littleton Route 2A\608443\DWG\Current Design\Environmental\Figures\Figure 2 - Aerial_2020.dwg

LEGEND

LIMIT OF WORK

MUNICIPAL BOUNDARY

SCALE IN FEET

125 0 125 250

1" = 250'

NOTE: DATA TAKEN FROM MASSGIS

AERIAL MAP

LITTLETON – AYER – INTERSECTION IMPROVEMENTS ON ROUTE 2A AT WILLOW ROAD AND BRUCE STREET, MASSDOT FILE 608443

PREPARED BY:

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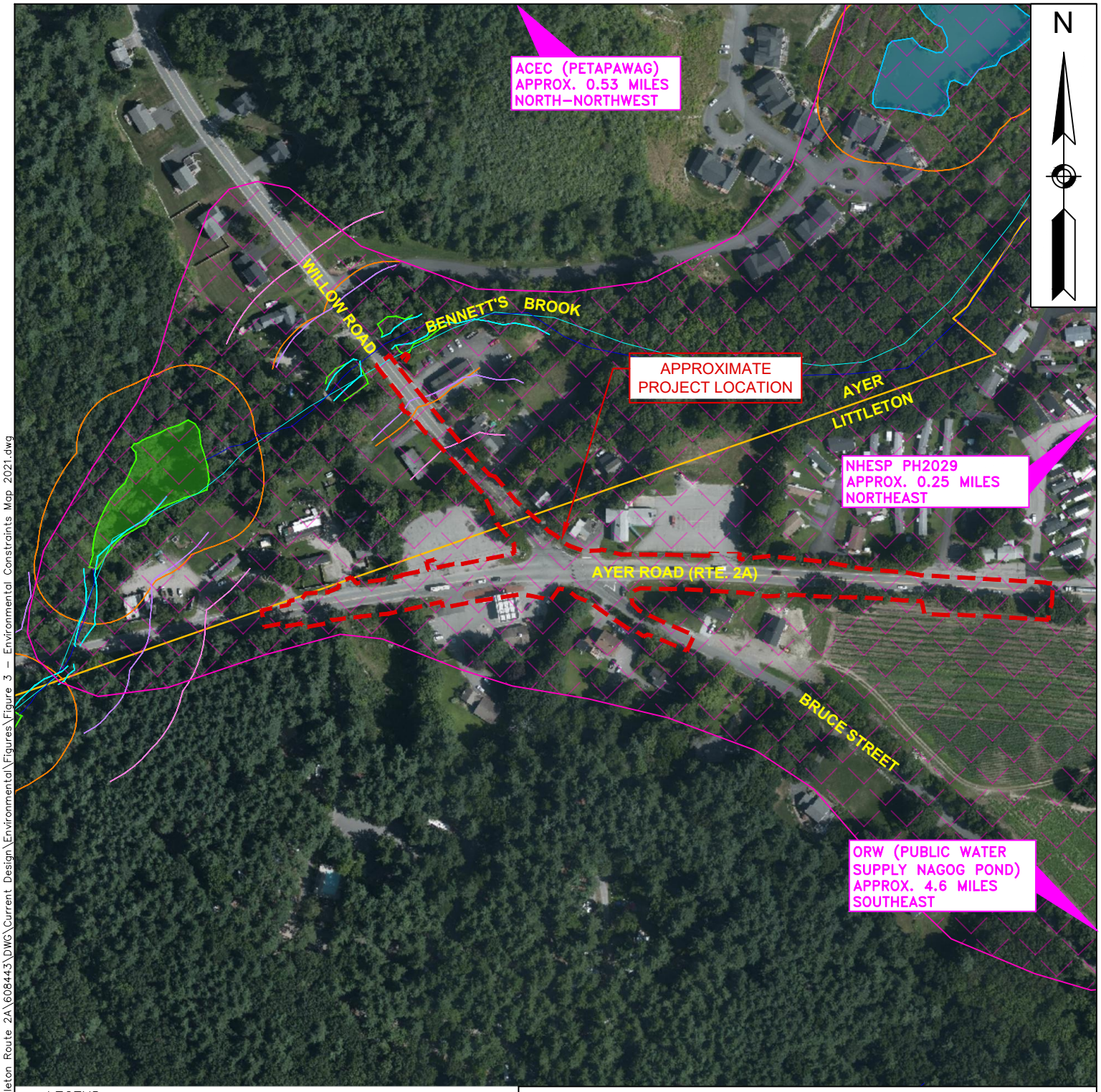
24 ALBION RD, LINCOLN, RI (401) 305-7895

PREPARED FOR:

massDOT
Massachusetts Department of Transportation
Highway Division

SCALE: AS NOTED	PROJECT NO. 13033.114	FIGURE 2
DATE: 10/08/2021 REVISED:	DRAWN BY: AE/OF CHECKED BY: MC	



LEGEND

- LIMIT OF WORK
- DEP & SURVEYED WETLANDS
- DEP HYDROLOGIC CONNECTIONS
- PERENNIAL STREAM/MAHW
- 100' BUFFER ZONE
- 100' RIVERFRONT AREA
- 200' RIVERFRONT AREA
- WELLHEAD PROTECTION AREA ZONE II
- POTENTIAL VERNAL POOLS
- CERTIFIED VERNAL POOLS

SCALE IN FEET

125 0 125 250

1" = 250'

NOTE: DATA TAKEN FROM MASSGIS

RESOURCE AREA MAP

LITTLETON – AYER – INTERSECTION IMPROVEMENTS ON ROUTE 2A AT WILLOW ROAD AND BRUCE STREET, MASSDOT FILE 608443

PREPARED BY:
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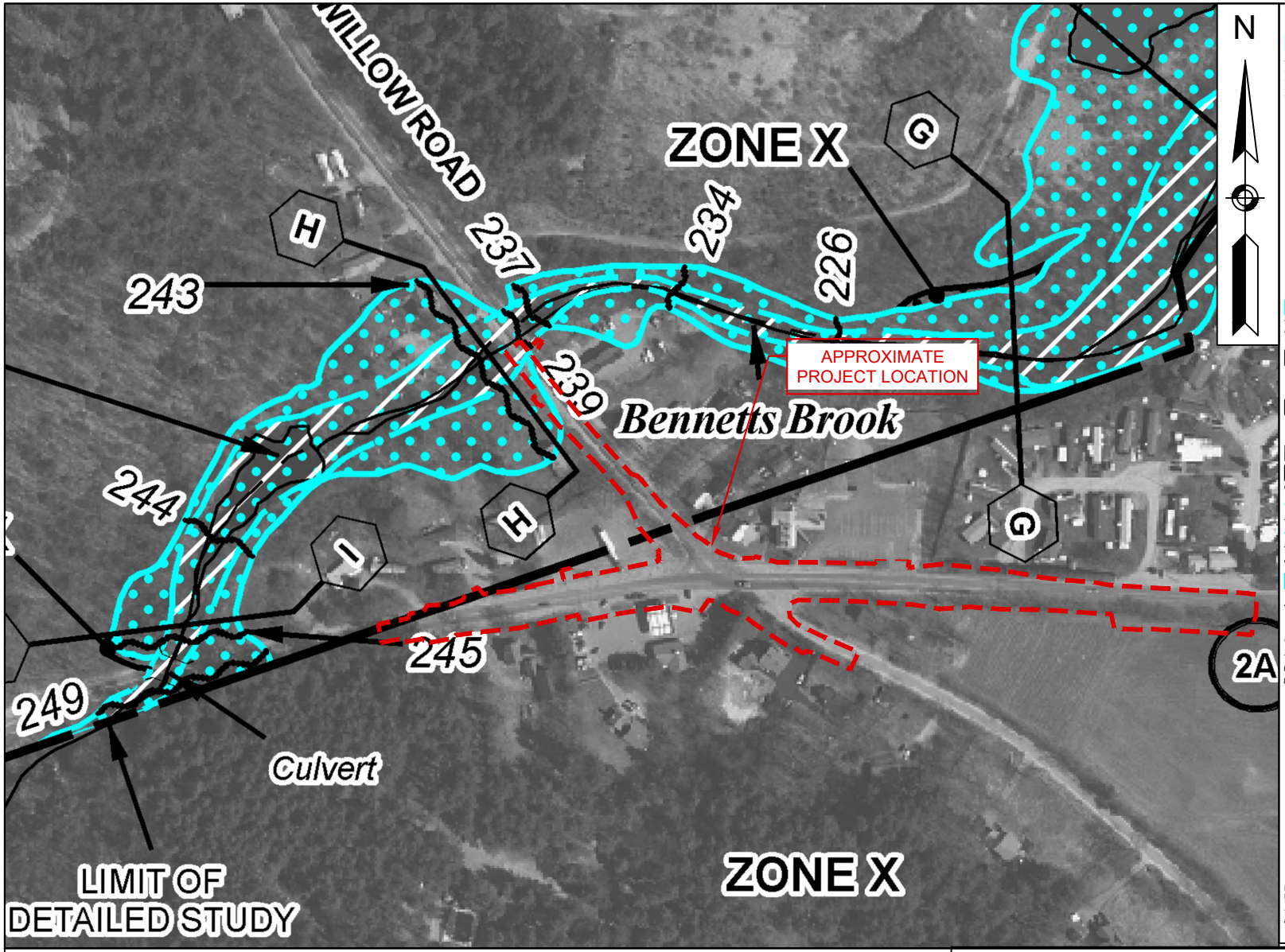
24 ALBION RD, LINCOLN, RI (401) 305-7895

PREPARED FOR:
massDOT
Massachusetts Department of Transportation
Highway Division

SCALE: AS NOTED	PROJECT NO. 13033.114
DATE: 10/08/2021	DRAWN BY: OF
REVISED:	CHECKED BY: DS

FIGURE 3

\\fs1\engineering\Projects\2013\13033\13033.11X - Littleton Route 2A\608443\DWG\Current Design\Environmental\Figures\Figure 3 - Environmental Constraints Map 2021.dwg



LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X — Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X — Areas determined to be outside the 0.2% annual chance floodplain.

ZONE D — Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

1% annual chance floodplain boundary

0.2% annual chance floodplain boundary

Floodway boundary

Zone D boundary

CBRS and OPA boundary

Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.

513 (EL 987) — Base Flood Elevation line and value; elevation in feet* / Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988

Cross section line

Transect line

87°07'45", 32°22'30" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere

4476000mN — 1000-meter Universal Transverse Mercator grid values, zone 19

600000 FT — 5000-foot grid values: Massachusetts State Plane coordinate system, Mainland zone (FIPSZONE 2001), Lambert Conformal Conic projection

DX5510 × — Bench mark (see explanation in Notes to Users section of this FIRM panel)

M1.5 — River Mile

MAP REPOSITORY
Refer to listing of Map Repositories on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
June 4, 2010

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your Insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

LEGEND:

APPROXIMATE LIMIT OF WORK

SCALE IN FEET

125 0 125 250

1" = 250'

NOTE:
THE FLOOD ZONE DATA SHOWN IS TAKEN FROM THE (FEDERAL EMERGENCY MANAGEMENT AGENCY) FEMA FOR THE TOWN OF LITTLETON, MA (FIRM COMMUNITY PANEL 25017C0216E, DATED 06/04/2010)

FEMA MAP

LITTLETON – AYER – INTERSECTION IMPROVEMENTS ON ROUTE 2A AT WILLOW ROAD AND BRUCE STREET, MASSDOT FILE 608443

PREPARED BY:
GREEN INTERNATIONAL AFFILIATES, INC.
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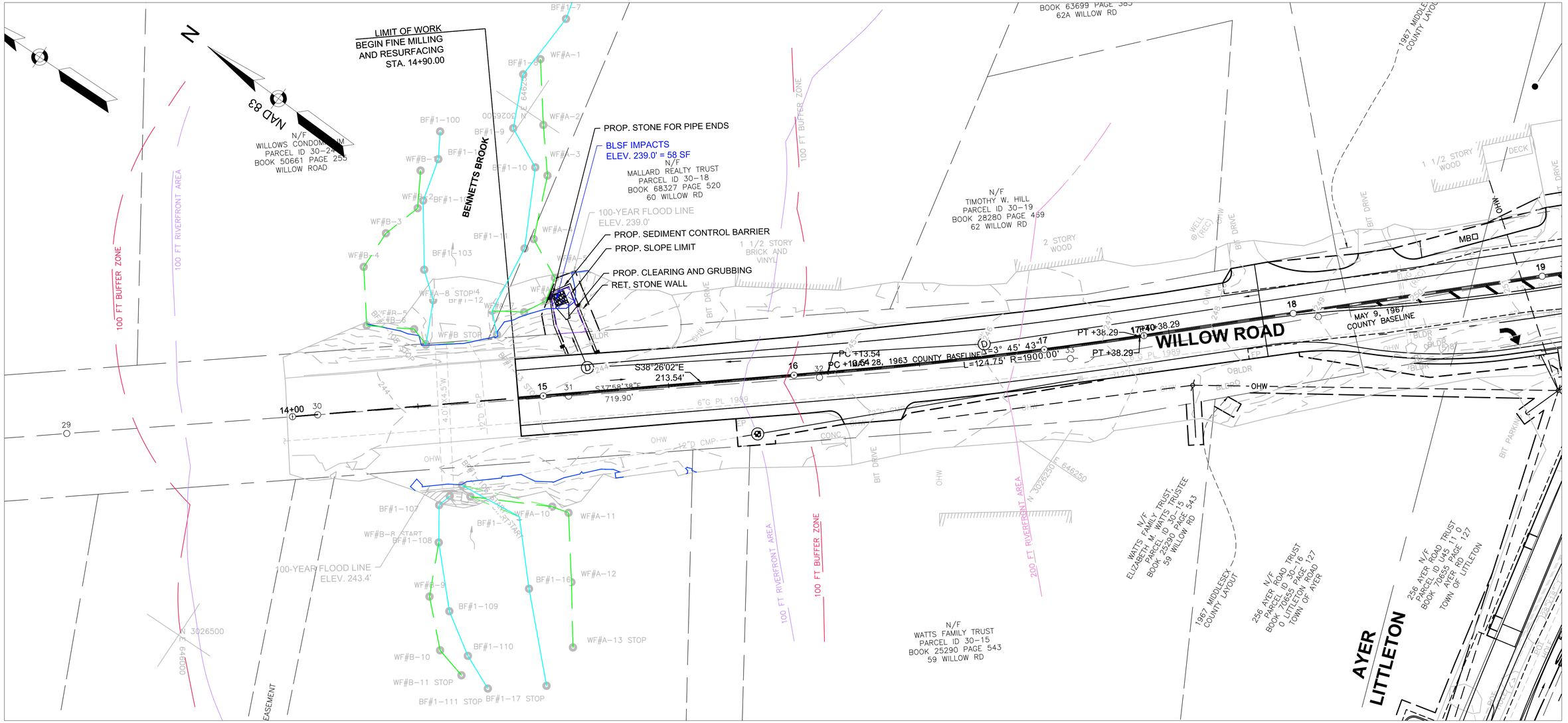
24 ALBION RD, LINCOLN, RI (401) 305-7895

PREPARED FOR:
massDOT
Massachusetts Department of Transportation
Highway Division

SCALE: AS NOTED	PROJECT NO. 13033.114	FIGURE 4
DATE: 10/08/2021	DRAWN BY: EY/OF	
REVISED:	CHECKED BY: MC	

\\fs1\engineering\Projects\2013\13033\13033.11X – Littleton Route 2A\608443\DWG\Current Design\Environmental\Figures\Figure 4 – FEMA – 2020.dwg



LEGEND

- BORDERING VEGETATED WETLAND (BVW)
- 100-FOOT BUFFER ZONE
- 200-FOOT RIVERFRONT AREA
- 100-FOOT RIVERFRONT AREA
- PERENNIAL STREAM/BANK (MAHW)
- 100-YEAR FLOODPLAIN LINE

RESOURCE AREA IMPACTS	TOTAL IMPACTS
BORDERING LAND SUBJECT TO FLOODING (SF)	58
BLSF STORAGE (NET CUT/FILL) (CY)	0
RIVERFRONT AREA (SF)	6,350
0-100 (SF)	3,127
100-200 (SF)	3,863
100-FT BUFFER ZONES (SF)	3,841

SCALE IN FEET

10 0 10 20 30 40

RESOURCE AREA IMPACTS

INTERSECTION IMPROVEMENTS ON ROUTE 2A
AT WILLOW ROAD AND BRUCE
LITTLETON/AYER, MA

PREPARED BY:
GREEN INTERNATIONAL AFFILIATES, INC.
CIVIL AND STRUCTURAL ENGINEERS
239 LITTLETON RD, WESTFORD, MA (978) 923-0400
24 ALBION RD, LINCOLN, RI (401) 305-7895

PREPARED FOR:
massDOT
Massachusetts Department of Transportation
Highway Division

SCALE: AS NOTED
PROJECT NO. 13033.11X
DATE: 07/02/2021
REVISED: 10/08/2021
DRAWN BY: OF
CHECKED BY: DS

FIGURE 8A

APPENDIX D

Stormwater Management Report (bound separately)

APPENDIX E

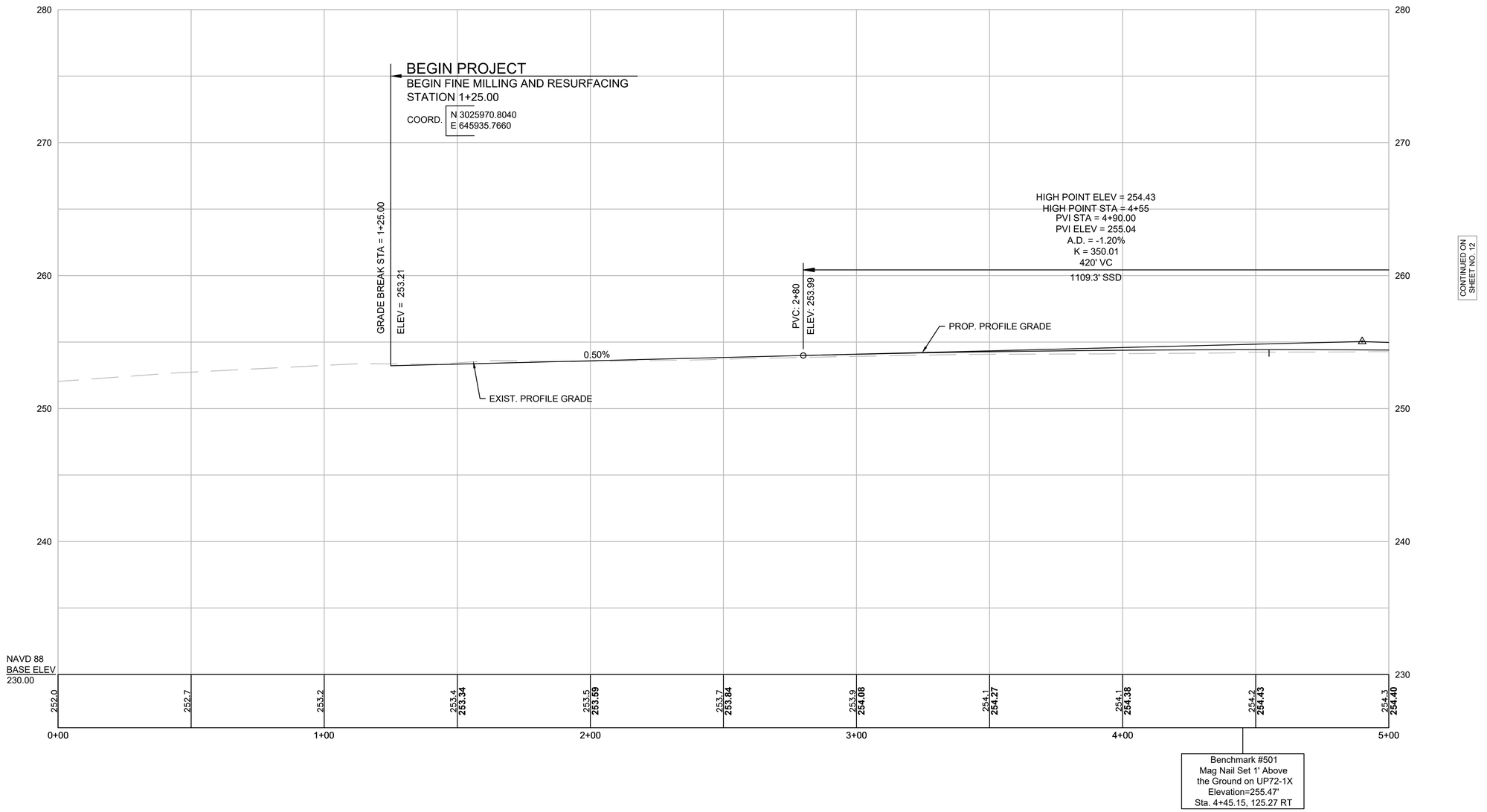
Drawing for NOI Submission (bound separately)

LITTLETON/AYER
ROUTE 2A (AYER ROAD)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	11	78
PROJECT FILE NO.	608443		

PROFILES (1 OF 5)

ROUTE 2A/110 (AYER ROAD)



HOR. SCALE IN FEET
20 0 20 40
4 0 4 8
VER. SCALE IN FEET

FOR CONSTRUCTION PLAN:
SEE SHEET NO. 7

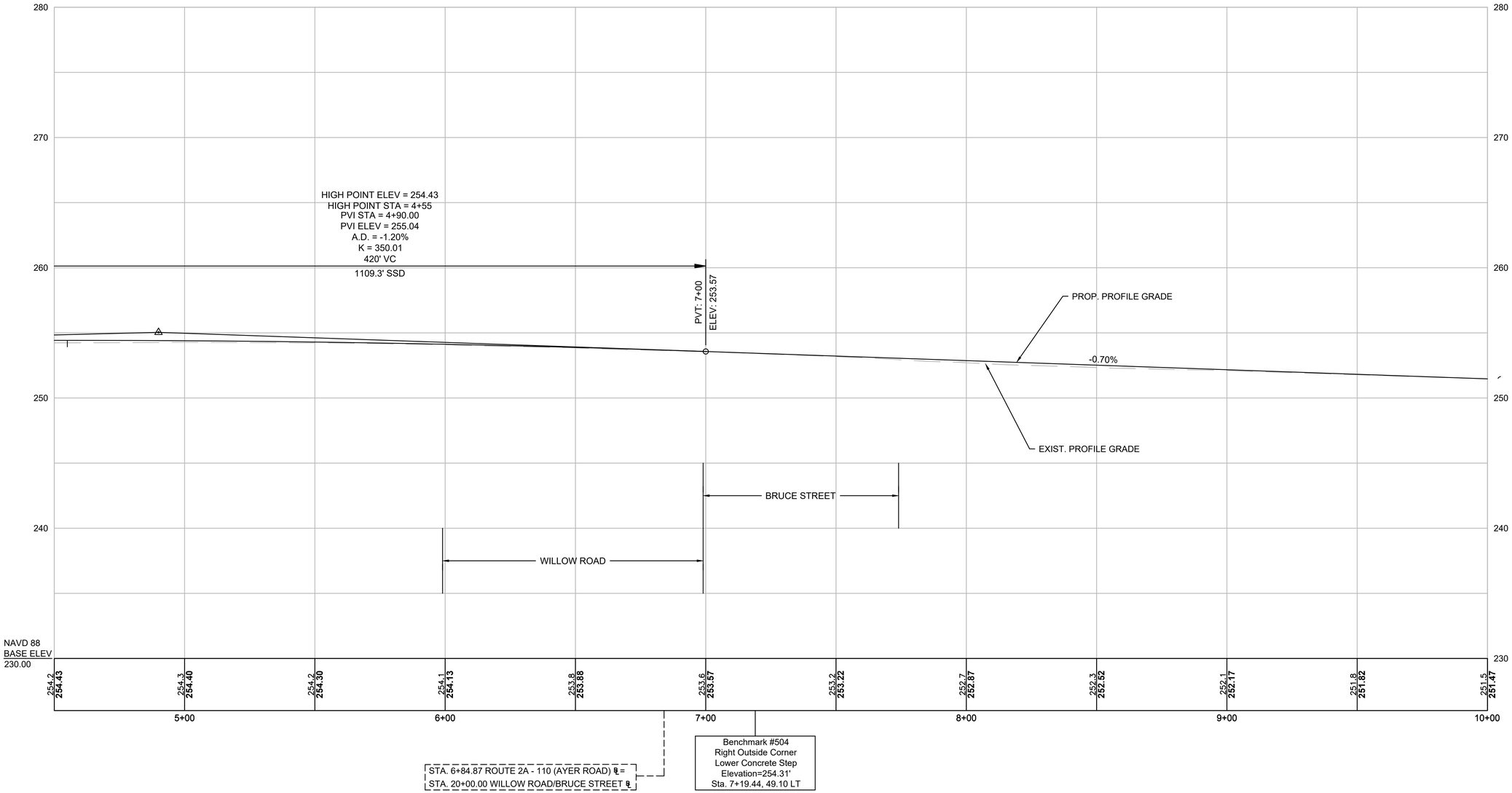
LITTLETON/AYER
ROUTE 2A (AYER ROAD)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	12	78
PROJECT FILE NO.	608443		

PROFILES (2 OF 5)

608443_HD07(PROFILES).DWG Plotted on 30-Nov-2021 10:52 AM

ROUTE 2A/110 (AYER ROAD)



CONTINUED ON SHEET NO. 11

CONTINUED ON SHEET NO. 13

HOR. SCALE IN FEET
20 0 20 40
4 0 4 8
VER. SCALE IN FEET

FOR CONSTRUCTION PLAN:
SEE SHEET NO. 8

LITTLETON/AYER
ROUTE 2A (AYER ROAD)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	13	78
PROJECT FILE NO.	608443		

PROFILES (3 OF 5)

ROUTE 2A/110 (AYER ROAD)

CONTINUED ON SHEET NO. 12

PVI STA = 11+10.00
PVI ELEV = 250.70
A.D. = -2.50%
K = 84.00
210' VC
536.7' SSD

PVC: 10+05
ELEV: 251.43

PVT: 12+15
ELEV: 247.34

PROP. PROFILE GRADE

PVI STA = 13+30.00
PVI ELEV = 243.66
A.D. = 0.84%
K = 106.74
90' VC
300.0' (MIN.) HSD

PVC: 12+85
ELEV: 245.10

PVT: 13+75
ELEV: 242.60

-3.20%
-2.36%
-1.34%
-0.54%
-0.03%

EXIST. PROFILE GRADE

END PROJECT
END FINE MILLING AND RESURFACING
STATION 15+67.00
COORD. N 3026013.9410
E 647369.4169

NAVD 88
BASE ELEV
230.00

10+00	11+00	12+00	13+00	14+00	15+00	16+00
251.5 **251.47**	251.0 **251.00**	250.2 **250.23**	249.0 **249.17**	247.7 **247.81**	246.1 **246.22**	244.5 **244.63**	243.1 **243.22**	242.0 **242.00**	241.3 **240.80**	240.9 **240.20**	240.6 **240.59**	240.4

280 270 260 250 240 230

HOR. SCALE IN FEET
20 0 20 40
VER. SCALE IN FEET
4 0 4 8

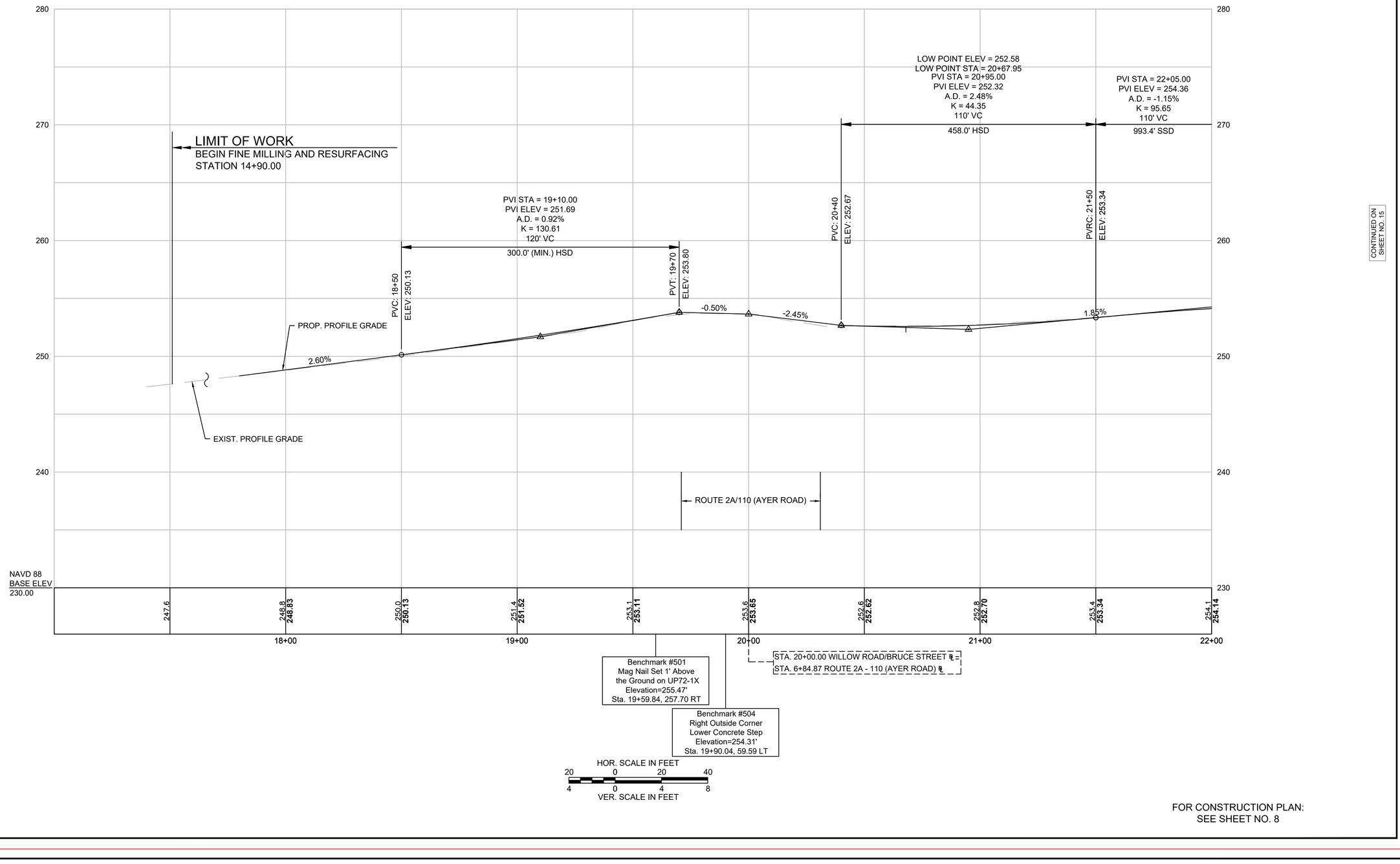
FOR CONSTRUCTION PLAN:
SEE SHEET NO. 9

LITTLETON/AYER
ROUTE 2A (AYER ROAD)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	14	78
PROJECT FILE NO.	608443		

PROFILES (4 OF 5)

WILLOW ROAD AND BRUCE STREET



CONTINUED ON SHEET NO. 15

FOR CONSTRUCTION PLAN:
SEE SHEET NO. 8

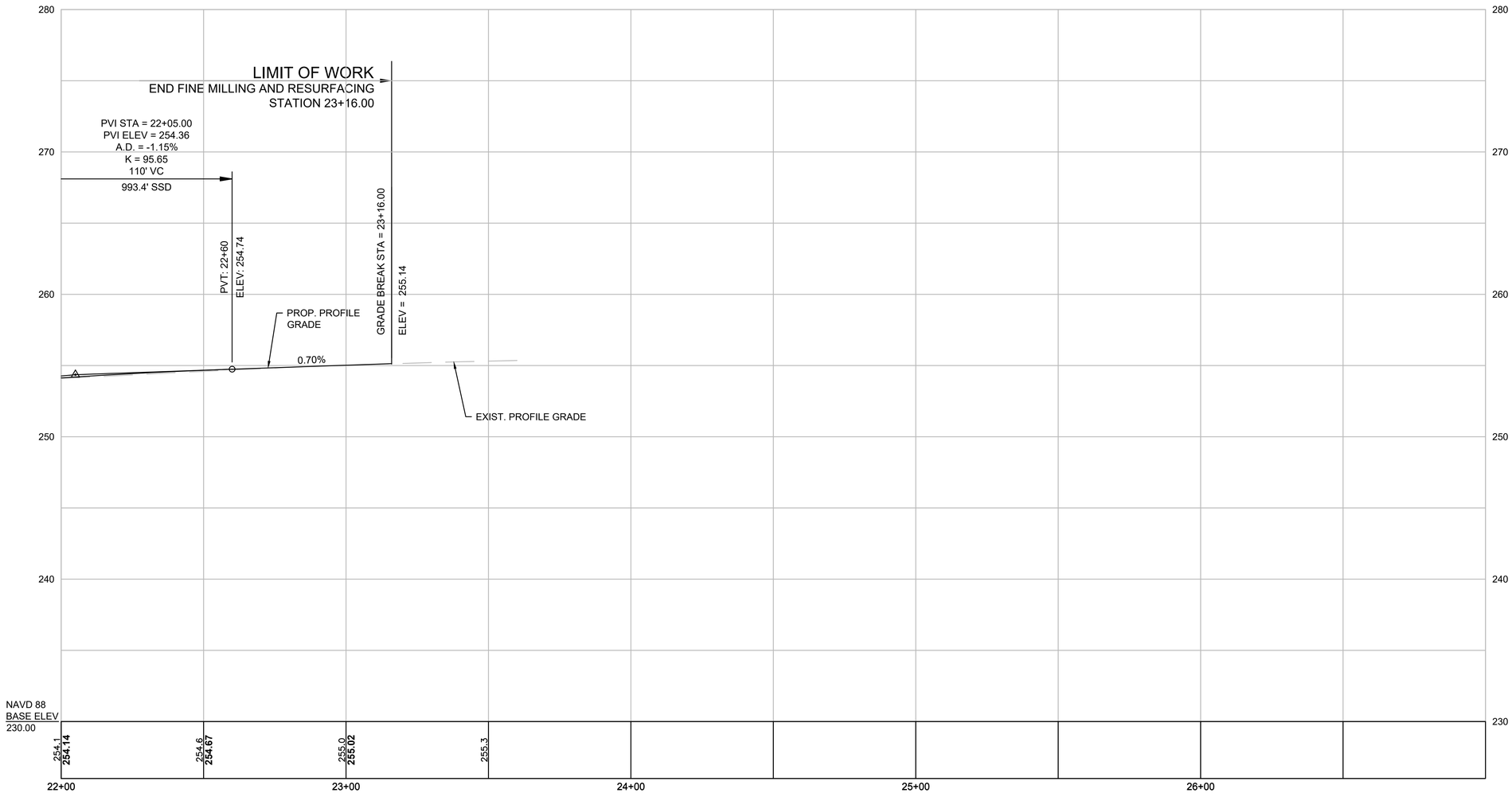
LITTLETON/AYER
ROUTE 2A (AYER ROAD)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	15	78
PROJECT FILE NO.	608443		

PROFILES (5 OF 5)

608443_HD07(PROFILES).DWG Plotted on 30-Nov-2021 10:53 AM

WILLOW ROAD AND BRUCE STREET



CONTINUED ON SHEET NO. 14

HOR. SCALE IN FEET
20 0 20 40
4 0 4 8
VER. SCALE IN FEET

FOR CONSTRUCTION PLAN:
SEE SHEET NO. 8

LITTLETON/AYER
ROUTE 2A (AYER ROAD)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	22	78
PROJECT FILE NO.	608443		

DRAINAGE AND UTILITY PLANS (3 OF 4)

608443_HDXX(D&U PLAN).DWG Plotted on 30-Nov-2021 10:53 AM

N

N/F
CHIP SHOTS REALTY LLC
PARCEL ID U45 14 0
BOOK 46676 PAGE 280
245 AYER RD

N/F
RODGERS FAMILY HOLDINGS LLC
PARCEL ID U45 15 0
BOOK 64393 PAGE 32
239 AYER RD

END PROJECT
END FINE MILLING AND RESURFACING
STATION 15+67.00
COORD. N 3026013.9410
E 647369.4169

PROP. PERM. EASEMENT
PROP. GUY (BO)
RET. BOLLARD
R&R UP(50') (BO)
PROP. TEMP. EASEMENT (TYP.)
R&R UP(50') (BO)
R&R PRIMARY RISER (BO)
RET. UP
PROP. CBCI (2-1)
PROP. 28" X 18" DUCT BANK RELOCATION (BO)
PROP. 4" GAS LINE RELOCATION (BO)
RET. UP
PROP. 28" X 18" DUCT BANK RELOCATION (BO)
R&R COBRA HEAD LIGHT (BO)
PROP. GI (2-7)
30 LF - 12" DIP

ROUTE 2A (AYER ROAD)
(PUBLIC - VARIABLE WIDTH)

22 LF - 12" RCP
133 LF - 12" RCP
22 LF - 12" RCP
BORING B-4
BORING B-5
PROP. 4" GAS LINE RELOCATION (BO)
PROP CUT AND PLUG (TYP.)
REM
PROP. TEMP. EASEMENT (TYP.)
PROP. UP & GUY (BO)
PROP. DMH (2-4)
9 LF - 12" RCP
PROP. CBCI (2-3)
PROP. PERM. EASEMENT
PROP. DMH (2-5)
PROP. FES (2-9)
PROP. INFILTRATION BASIN
PROP. PERM. EASEMENT
PROP. CB W FRAME AND COVER (2-6)
16 LF - 12" RCP CLASS V
PROP. FES (2-8)

N/F
FRANK W. MATHESON JR
PARCEL ID U45 2 0
BOOK 64522 PAGE 122
2 BRUCE ST

CONTINUED ON SHEET NO. 21

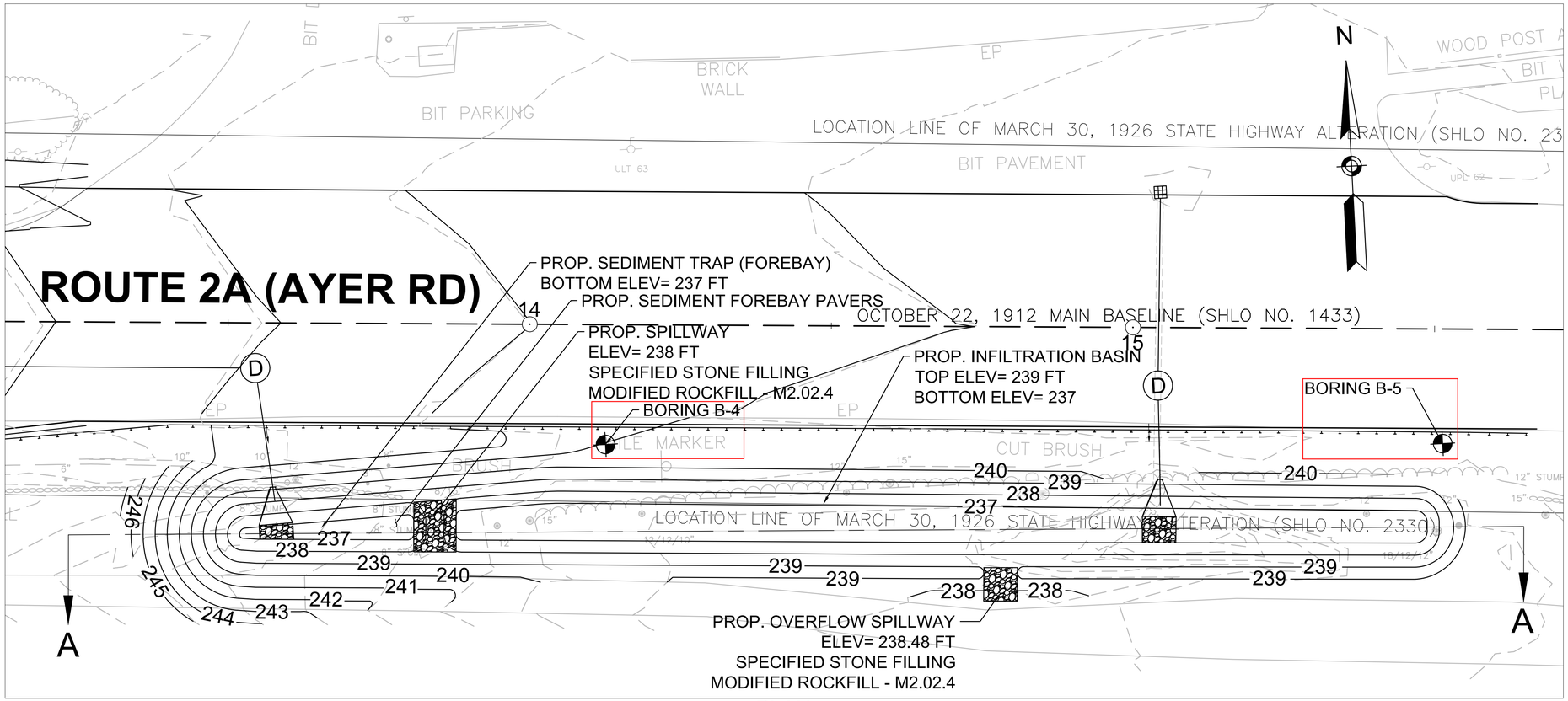
0 20 50 100
SCALE: 1" = 20'

NOTE:
1. SEE SHEET 29 FOR ADDITIONAL GRADING INFORMATION.

LITTLETON/AYER
ROUTE 2A (AYER ROAD)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	29	78
PROJECT FILE NO.	608443		

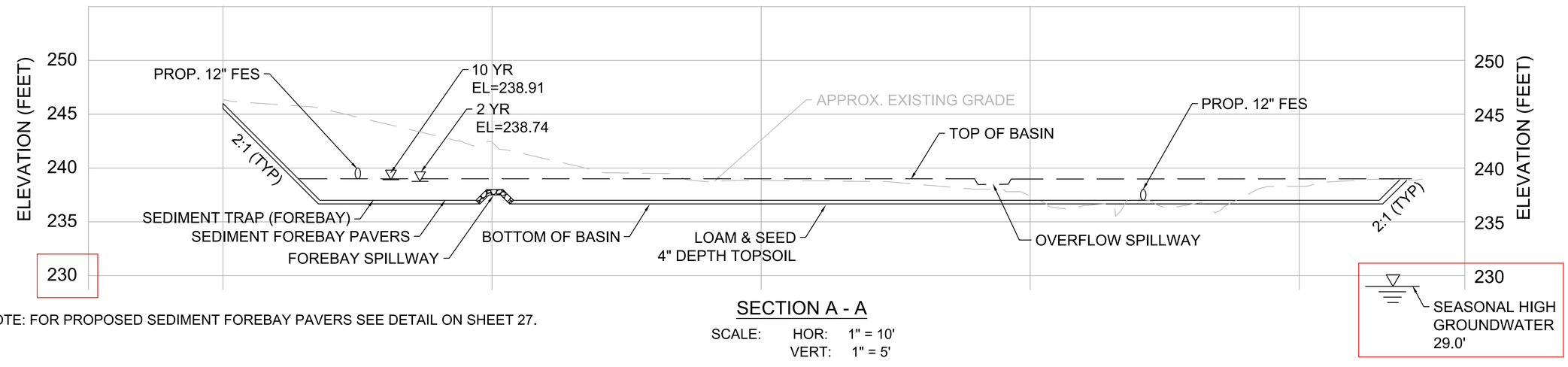
CONSTRUCTION DETAILS (5 OF 5)



PLAN

SCALE: 1" = 10'

INFILTRATION BASIN



SECTION A - A

SCALE: HOR: 1" = 10'
VERT: 1" = 5'

NOTE: FOR PROPOSED SEDIMENT FOREBAY PAVERS SEE DETAIL ON SHEET 27.

GREEN INTERNATIONAL AFFILIATES, INC.
100 AMES POND DRIVE, SUITE 200 TEWKSBURY, MA 01876
T: (978) 923-0400 | F: (978) 399-0033 | WWW.GREENINTL.COM

MEMORANDUM

December 10, 2021

To:	Heidi Davis, DEP (cero_noi@state.ma.us; heidi.davis@state.ma.us)
Cc:	Melissa Lenker, MassDOT (melissa.lenker@state.ma.us) Timothy Dexter, MassDOT (timothy.dexter@state.ma.us) Ryan Hale, DEP (ryan.hale@state.ma.us) Ayer Conservation Commission (concom@ayer.ma.us)
From:	Danielle Spicer, P.E., Green International Affiliates, Inc.
Date:	December 10, 2021
Project Name:	Intersection Improvements on Route 2A at Willow Road and Bruce Street, Ayer and Littleton, MA
Project Number:	Green No. 13033.11X
Subject:	**Route 2A - Ayer NOI Review - DEP Comment Responses (DEP No. 100-0477)**

This memorandum provides the responses to DEP comments on the Notice of Intent that was submitted on 10/18/2021 for the roadway improvements along Route 2A in Littleton, MA (DEP File No. 100-0477). DEP's comments were received on 11/18/2021 and are copied below in *italics*. Responses to each comment are noted below in **Bold**.

1. *Project plans should depict existing and proposed topography with elevations.*

Typical roadway plans do not include existing and proposed topography; however, we have attached the profile sheets to show change in elevations for the project.

2. *The project would result in a significant increase in peak rate discharge to Bennett's Brook and a decrease in groundwater recharge. Locations and types of stormwater Best Management Practices (BMPs) rejected as part of the complete evaluation must be thoroughly discussed and depicted. Opportunities to subdivide the proposed watersheds that would drain to Design Points (DPs) 3 and 4 at Bennett's Brook and direct flow to stormwater BMPs needs to be fully evaluated. This includes routing portions of the watersheds to the proposed infiltration basin and/or exploring Low Impact Development (LID) techniques.*

As noted in the Stormwater Report on page 15, *there is an increase in peak flow rates for DP-3 and DP-4 for all storm events due to the proposed increase in impervious area. The increase of peak rates for DP-3, which is the upstream side of the culvert for Bennetts Brook along Ayer Street, is approximately a quarter cfs for all storm events, which is considered negligible. In addition, when DP-1, which is the discharge point further upstream of DP-3, is combined with DP-3 using the Macro Approach, there is a net reduction in peak rates for the 10- and 100-year storm events. The 2-year storm results in a 0.04 cfs increase, which is negligible.*

There is an increase in peak rates to DP-4, downstream side of Bennetts Brook Culvert, due to the revised drainage system now discharging more runoff to the downstream side of the culvert. While this increase in peak rates varies from 1.31cfs to 4.24cfs, no change to the effective FEMA base flood

elevation is anticipated since the roadway stormwater runoff will discharge at DP-4 prior to Bennetts Brook reaching its peak. To emphasize, the effective FEMA FIS lists the 100-year peak discharge at 330 cfs and the watershed area of Bennetts Brook at DP-4 is 3.46 sq. miles (2214 acres). The roadway drainage area is 2.399 acres, with a discharge rate of 16.23 cfs for the 100-year storm event. Because the project site is located on the lower end of the watershed, the stormwater runoff from the roadway will reach its peak, which is negligible, prior to Bennetts Brook (the combination of DP-1, 3, and 4) reaching its peak at DP-4, resulting in no change in flood elevations for any storm event.

In addition, using Stream Stats, an analysis was performed along the downstream side of the culvert analyzing the surface elevation change of Bennett's Brook between existing and proposed that notes there will be a 0.03' increase in the surface elevation for the 10- and 100-year elevations, which is negligible. Therefore, no adverse impacts are anticipated by the increase in peak rates as a result of the roadway improvements. Calculations are included in the Stormwater Report that was submitted as part of the NOI.

Overall Project Benefit to the Interests of the WPA

The majority of the existing runoff from Route 2A discharges with little to no treatment to Bennett's Brook. While there is a peak rate increase to DP-4, the overall project provides a significant improvement in water quality runoff and recharge to Bennett's Brook. The overall project proposes the construction of subsurface drainage improvements that are necessary with a Shared use path, which will extend pavement life spans and will result in improved safety by reducing stormwater ponding on reconstructed roadway pavements. As proposed under the scope of this project, the infiltration basin in the Town of Littleton will fully treat and mitigate stormwater runoff from DP-5 watershed. While this watershed doesn't directly discharge to Bennet's Brook, it promotes recharge as well as provides significant water quality treatment within its larger watershed.

In addition, the proposed closed drainage system will have catch basins with deep sumps and plastic hoods to provide additional treatment at curb inlets and in close proximity to commercial land-use properties. The proposed closed drainage system capturing and conveying runoff from the western portion of the project to the proposed outfall near Bennett's Brook will be designed with a flared end section and rip rap protection to prevent erosion to Bennett's Brook. The above improvements proposed under this project will result in improved water quality and drainage characteristics in the area; therefore, contributing to the interests of the WPA (public or private water supply, to groundwater supply, to flood control, to storm damage prevention, to the prevention of pollution and to the protection of fisheries and wildlife habitat).

3. *Please clarify if there will be two (2) leaching basins as noted, as the plans only depict one (1). Opportunities to increase the size of the watershed that flows to the leaching basin if capacity allows, and/or increase the number of leaching basins throughout the project should be evaluated. Although online leaching basins are not credited under the Stormwater Management Standards, they would provide some groundwater recharge.*

There is only 1 leaching basin. The SW report incorrectly noted there were two. The SW report has been revised to reflect this. We reviewed the entire project for areas where additional leaching basins could be added; however, given the tight ROW and the existing utilities, it was not feasible to add more than one.

4. *The proposed outlet at Bennett's Brook is not considered Redevelopment, and therefore alternatives must be evaluated for the outfall per 310 CMR 10.58(4).*

There is a 200-foot Riverfront Area (RA) associated with Bennett's Brook, measured horizontally from the brook's Mean Annual High Water Line (MAHW). The temporary work within the Riverfront Area is required for minor box widening, fine milling and resurfacing on Willow Road and drainage improvements, which include construction of the new drainage outfall into Bennett's Brook and replacement of a portion of the existing 12-inch CMP drain line on Willow Road in Ayer within the existing Right-of-Way. The table below summarizes temporary impacts noted in the NOI to the RA:

Table 2.2.2 – Riverfront Area Impacts

Resource Area	Total area on Site of the Proposed Project (sf)	Temporary Impact Area (sf)	Percentage Disturbed
Riverfront Area		3,127 sf (0 – 100')	14%
		3,863 sf (100 – 200')	18%
	21,748 sf (Total)	6,990 sf (Total)	32%

While the majority of the work within the riverfront area is within degraded RA (97.6%), there is a small portion (2.6%) of it that is considered new development and is regulated by 310 CMR 10.58(4), which provides that there are no practicable and substantially equivalent economic alternatives with less adverse effects and there will be no significant adverse impact on the riverfront area. The following section describes how the proposed work within the Riverfront Area meets general performance standards for 10.58(4)(c) Alternatives Analysis:

No-Build Alternative

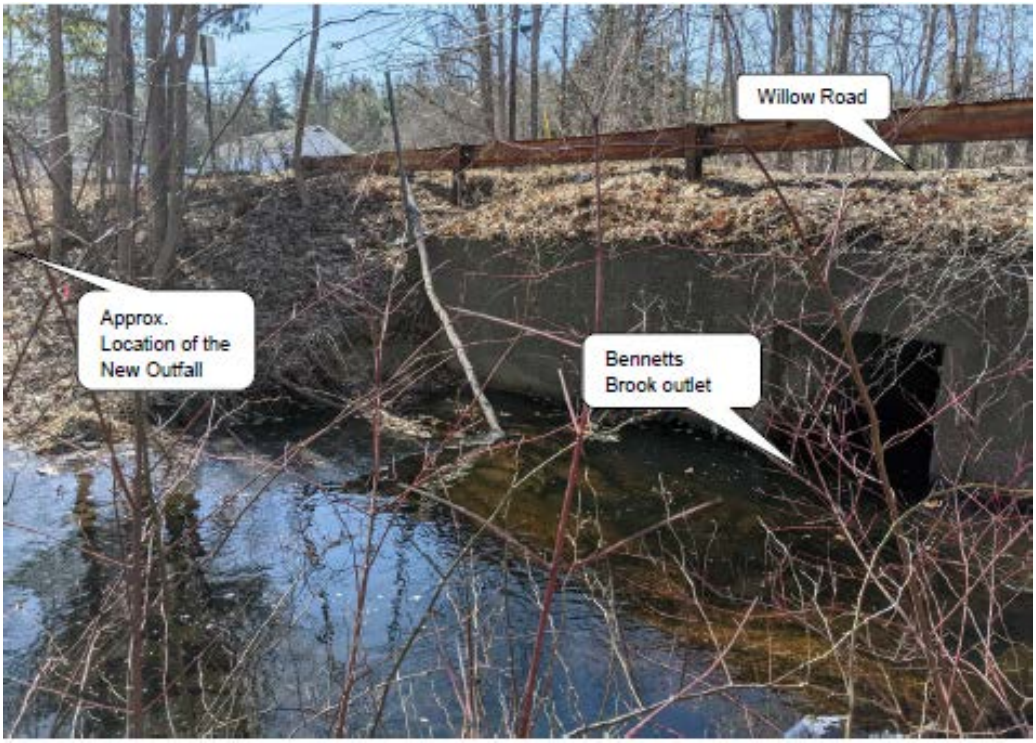
The project cannot achieve its purpose and need of increasing safety at the project intersection, improving operations, and providing multimodal accommodations along the Route 2A corridor in the vicinity of the project intersection without installation of the proposed closed drainage system on Willow Road and a new outfall to Bennett's Brook. The proposed closed drainage system and a new outfall are required in order to collect and capture additional runoff from the increased impervious area on Route 2A caused by the proposed new share-use path (SUP); therefore, this is not a viable alternative.

Alternative 1 (Preferred) - New Outfall on the downstream side of Bennett's Brook

As mentioned in the NOI, out of 6,990 sf of the riverfront area on site, 97.6% of this work will be a temporary disturbance to the land within existing developed areas and is considered as redevelopment. Only 2.6% of the RA where the new outfall is proposed to be installed is located within an undeveloped RA.

The Preferred Alternative subject to this NOI proposes a new outfall to be located just outside of the BVW A-series and MAHW line of Bennett's Brook (downstream); therefore, avoiding direct permanent and temporary impacts to these resource areas. The proposed layout was selected in order to daylight the closed drainage system while avoiding work within BVW and LUW and minimize the disturbances to all resource areas within the Riverfront Area and Buffer Zones to the maximum extent feasible. The affected Riverfront Area includes Buffer Zones only with a negligible part (58 SF) within BLSF on the downstream side of the Bennett Brook crossing. Therefore, the preferred alternative design minimizes the disturbances within the Riverfront Area associated with the

installation of the new outfall and regrading to the maximum extent practicable and the area will be stabilized upon completion of construction.



<u>Alternative 2 – New connection to 12" Existing pipe</u>

This alternative would connect the proposed new closed drainage system to the existing 12" pipe that discharges directly into Bennett's Brook north of the Preferred Alternative's proposed outfall. This alternative would require the existing 12-inch Reinforced Concrete Pipe (RCP) to be replaced with a an 18-inch pipe which would result in direct impacts to Land Under Water and Waterways (LUW) and work within the FEMA Floodway. In addition, since the existing outfall is located immediately adjacent to the edge of the brook, there isn't room to install energy dissipation methods without increasing impacts to the project. A direct discharge of runoff with no energy dissipation installed into the Brook could negatively affect the water quality.

<u>Alternative 3 – New connection to the Existing Cross Box Culvert</u>

This alternative would connect the proposed new closed drainage system to the existing box culvert, which most likely would also require box culvert replacement with the additional flows resulting in significant direct impacts to LUW, BLSF and work directly within the Floodway, which are avoided under the Preferred Alternative. This alternative would also have the same issues as Alternative 2, in that no energy dissipation would be installed, which could negatively affect the water quality.

5. *Measures to improve existing conditions per 310 CMR 10.58(5)(a) and the Stormwater Management Standards beyond meeting Standards 2 and 3, and the pretreatment and structural stormwater best management practice requirements of Standards 4, 5 and 6 to the maximum extent practicable, must be demonstrated.*

As noted in response No. 2 and No. 3 above, the project provides a significant improvement in water quality runoff and recharge to Bennett's Brook through the implementation of BMPs, However, there was only one feasible location within the project limits at DP-5 that can meet the full Stormwater Standards. The project includes installing an infiltration basin with a forebay that is part of the MassDEP's Volume 2 Chapter 2 Handbook which will provide groundwater recharge to the area, treat 80% of Total Suspended Solids even though this is not a typical option within a redevelopment area due to ROW constraints for DP-5. Since this is a redevelopment project and given the limited space within the ROW, existing utilities, and proximity to waterbodies, it was not feasible to propose structural stormwater control measures to within all the drainage areas of the project.

6. *Test pit location(s) at the proposed infiltration basin and leaching basin must be depicted. The estimated seasonal high groundwater elevation should be identified on the plans.*

Test Pit locations and seasonal high groundwater are now shown on Drainage & Utility Plan (sheet 3 of 4) and Construction Detail (sheet 5 of 5), attached to this memorandum.

7. *Specific source control and pollution prevention measures to be implemented in the Zone II Wellhead Protection Area need to be identified.*

Catch Basins with plastic hoods and 4' sumps are proposed throughout the project. The hoods will provide some volume to capture floatable oil, grease, and petroleum hydrocarbons if a spill occurs. In addition, it is assumed the local Fire Department has spill kits and/or booms on hand to respond as necessary.

In addition, MassDOT follows established Best Management Practices (BMPs) and operational procedures and has implemented a range of strategies statewide to reduce the amount of road salt used and minimize its environmental impact. Such strategies include the increased use of liquid deicers to pre-wet dry material in order to reduce bounce and scatter and for pre-treating roadways prior to storms when conditions allow. Both of these techniques have been shown to reduce the overall application of sodium chloride. In addition, the use of closed loop controllers, pavement sensors and other equipment allow for more efficient operations.

Enclosed with this letter response are the following documents:

- Profile Sheets (1 – 6)
- Revised Drainage & Utility Plan (sheet 3 of 4)
- Revised Construction Detail (sheet 5 of 5)