MASSACHUSETTS DEPARTMENT OF TRANSPORTATION
RAIL & TRANSIT DIVISION

MASSDOT CAPE MAIN
ROCHESTER & BARNSTABLE, MA
IMPROVEMENTS AT MP 44.27, 44.29, 68.00 & 71.66

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA		1	51
PROJECT FILE NO.	614096		

TITLE SHEET

CAPE MAIN
IMPROVEMENTS AT MP 44.27, 44.29, 68.00 & 71.66

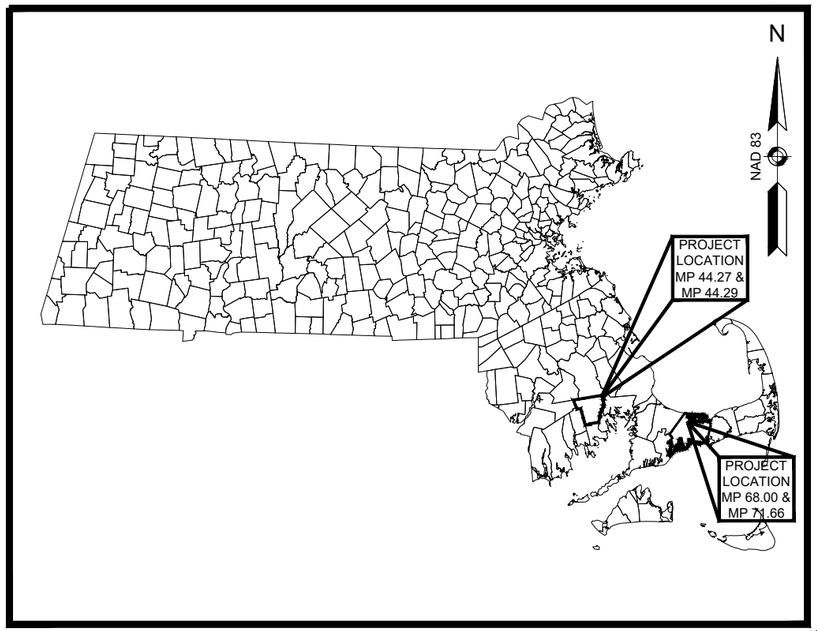
IN THE TOWNS OF

ROCHESTER & BARNSTABLE

PLYMOUTH & BARNSTABLE COUNTIES

PS&E SUBMISSION

1/9/2026



0 100,000 200,000 300,000 400,000
SCALE: 1" = 100,000 FEET

COMMONWEALTH OF MASSACHUSETTS
NIKOLE A. BULGER
CIVIL
No. 48598
REGISTERED PROFESSIONAL ENGINEER

Culvert Replacements

COMMONWEALTH OF MASSACHUSETTS
BENNY R. D'ARTISTA
CIVIL
No. 48658
REGISTERED PROFESSIONAL ENGINEER

1/9/2026

Culvert Structure

COMMONWEALTH OF MASSACHUSETTS
CHRISTOPHER C. BENDA
No. 55279
REGISTERED PROFESSIONAL ENGINEER

Boring Logs and Retaining Wall Sheets

DATE	DESCRIPTION	REV #

WSP USA Inc.
100 SUMMER ST. 13TH FLR.
BOSTON, MA 02110

CHIEF ENGINEER **DATE**

MASSDOT CAPE MAIN
ROCHESTER & BARNSTABLE, MA
IMPROVEMENTS AT MP 44.27, 44.29, 68.00 & 71.66

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	2	51
PROJECT FILE NO.	614096		

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MASSDOT CAPE MAIN
ROCHESTER & BARNSTABLE, MA
IMPROVEMENTS AT MP 44.27, 44.29, 68.00 & 71.66

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA		3	51
PROJECT FILE NO.	614096		

LEGEND & ABBREVIATIONS FOR CULVERTS AT MP 44.27, 44.29 & RET WALL

GENERAL SYMBOLS

EXISTING	PROPOSED	DESCRIPTION
JB		JERSEY BARRIER
CB		CATCH BASIN
		CATCH BASIN CURB INLET
FP		FLAG POLE
GP		GAS PUMP
MB		MAIL BOX
		POST SQUARE
		POST CIRCULAR
WELL		WELL
EHH	EHH	ELECTRIC HANDHOLE
		FENCE GATE POST
GG		GAS GATE
BHL #		BORING HOLE
MW #		MONITORING WELL
TP #		TEST PIT
		HYDRANT
		LIGHT POLE
CO.BD.		COUNTY BOUND
		GPS POINT
C		CABLE MANHOLE
D		DRAINAGE MANHOLE
E		ELECTRIC MANHOLE
G		GAS MANHOLE
M		MISC MANHOLE
S		SEWER MANHOLE
T		TELEPHONE MANHOLE
W		WATER MANHOLE
MHB		MASSACHUSETTS HIGHWAY BOUND
MON		MONUMENT
SB		STONE BOUND
TB		TOWN OR CITY BOUND
		TRAVERSE OR TRIANGULATION STATION
TPL or GUY		TROLLEY POLE OR GUY POLE
HTP		TRANSMISSION POLE
UFB		UTILITY POLE W/ FIREBOX
UPDL		UTILITY POLE WITH DOUBLE LIGHT
ULT		UTILITY POLE W / 1 LIGHT
UPL		UTILITY POLE
		BUSH
SIZE & TYPE		TREE
		STUMP
		SWAMP / MARSH
WG		WATER GATE
PM		PARKING METER
		OVERHEAD CABLE/WIRE
		CURBING
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)
E E E		UNDERGROUND ELECTRICAL
C C C		UNDERGROUND COMMUNICATIONS
		BALANCED STONE WALL
		GUARD RAIL - STEEL POSTS
		GUARD RAIL - WOOD POSTS
		GUARD RAIL - DOUBLE FACE - STEEL POSTS
		GUARD RAIL - DOUBLE FACE - WOOD POSTS
x		CHAIN LINK OR METAL FENCE
		WOOD FENCE
		SANDBAG COFFERDAM
		COMPOST FILTER TUBE
		EROSION CONTROLS (COIR LOGS)
		TREE LINE
		SAWCUT LINE
		BANK OF RIVER OR STREAM
		BORDER OF WETLAND
		100 FT WETLAND BUFFER
BLSF BLSF		BORDERING LAND SUBJECT TO FLOODING (BLSF) FEMA 100 YEAR FLOOD (TEXT UNDERLINE INDICATES SIDE OF LINE WHERE BLSF EXISTS)
		STATE HIGHWAY LAYOUT
		TOWN OR CITY LAYOUT
		COUNTY LAYOUT
		RAILROAD SIDELINE

GENERAL SYMBOLS

EXISTING	PROPOSED	DESCRIPTION
		TOWN OR CITY BOUNDARY LINE
		PROPERTY LINE OR APPROXIMATE PROPERTY LINE
646		RECORD BASELINE
		EASEMENT
FO		BURIED INNERDUCT & FIBER (PLOW OR TRENCH)
		INNERDUCT & FIBER INSTALLED IN EXISTING CONDUIT
		INNERDUCT & FIBER INSTALLED IN NEW CONDUIT/CASING PIPE OVER UTILITIES OR STRUCTURES BELOW GRADE
I-F		INNERDUCT & FIBER INSTALLED IN NEW SURFACE MOUNTED CONDUIT
UC		FIBER INSTALLED IN NEW UNDERGROUND CONDUIT
		EXISTING CONDUIT WITH PROPOSED FIBER

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
BD.	BOUND
BL	BASELINE
BLDG	BUILDING
BM	BENCHMARK
BO	BY OTHERS
BOS	BOTTOM OF SLOPE
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
DI	DROP INLET
DIA	DIAMETER
DIP	DUCTILE IRON PIPE
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
HDW	HEADWALL
HMA	HOT MIX ASPHALT
HOR	HORIZONTAL
HYD	HYDRANT
INV	INVERT
ITS	INTELLIGENT TRANSPORTATION SYSTEM
JCT	JUNCTION
L	LENGTH OF CURVE
LB	LEACH BASIN
LP	LIGHT POLE
LT	LEFT
MAX	MAXIMUM

ABBREVIATIONS (cont.)

GENERAL

MH	MANHOLE
MHB	MASSACHUSETTS HIGHWAY BOUND
MHW	MEAN HIGH WATER
MIN	MINIMUM
NIC	NOT IN CONTRACT
NO.	NUMBER
OHW	OBSERVED HIGH WATER
PC	POINT OF CURVATURE
PCC	POINT OF COMPOUND CURVATURE
P.G.L.	PROFILE GRADE LINE
PI	POINT OF INTERSECTION
POC	POINT ON CURVE
POL	POINT ON LINE
POT	POINT ON TANGENT
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
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 OR SWITCH
TAN	TANGENT
TEMP	TEMPORARY
TC	TOP OF CURB
TOS	TOP OF SLOPE
TYP	TYPICAL
UP	UTILITY POLE
VAR	VARIES
VERT	VERTICAL
VC	VERTICAL CURVE
WG	WATER GATE
WIP	WROUGHT IRON PIPE
WM	WATER METER/WATER MAIN
X-SECT	CROSS SECTION

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA		4	51
PROJECT FILE NO.	614096		

GENERAL NOTES FOR CULVERTS AT MP 44.27, 44.29 & RET WALL

GENERAL NOTES:

1. ALL WORK SHALL BE PERFORMED DURING SCHEDULED RAILROAD SHUTDOWN PERIODS NOT TO EXCEED 4 DAYS IN TOTAL UNLESS A LONGER SHUTDOWN IS AUTHORIZED BY MASSACHUSETTS COASTAL RAILROAD (MCRR). ALL WORK SHALL BE COORDINATED WITH MCRR AT LEAST 30 DAYS IN ADVANCE.

2. ALL CONSTRUCTION INDICATED ON THESE PLANS SHALL BE IN ACCORDANCE WITH:
   - THE SPECIFICATIONS ACCOMPANYING THESE PLANS
   - MASSDOT STANDARD SPECIFICATIONS FOR HIGHWAY AND BRIDGES, DATED 2025, AND SUPPLEMENTAL SPECIFICATIONS TO DATE.
   - AREMA MANUAL OF RAILWAY ENGINEERING, 2025 EDITION

3. THE CONTRACTOR SHALL CONDUCT A PRECONSTRUCTION SURVEY AND VERIFY ALL EXISTING DIMENSIONS AND MATERIAL TYPES IN THE FIELD BEFORE COMMENCING WORK AND IMMEDIATELY NOTIFY THE ENGINEER OF ANY DISCREPANCIES. WHERE THE CLEAR INTENT OF THE PROPOSED WORK IS TO MATCH EXISTING CONDITIONS, THE FIELD DATA SHALL GOVERN.

4. TOPOGRAPHIC SURVEY PERFORMED BY WSP IN DECEMBER 2024. ADDITIONAL SURVEY DATA INCORPORATED PERFORMED BY JACOBS AND PROVIDED BY MASSDOT/MBTA FOR USE ON THIS PROJECT.

5. VERTICAL ELEVATIONS REFER TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88), AND HORIZONTAL LOCATIONS REFER TO THE NORTH AMERICAN DATUM OF 1983 (NAD 83).

6. THE CONTRACTOR SHALL COORDINATE AND COMPLY WITH MASSDOT RAIL & TRANSIT DIVISION (MASSDOT) AND MCRR WORK REQUIREMENTS AND RESTRICTIONS. THE CONTRACTOR SHALL ALSO COORDINATE ALL CONSTRUCTION ACTIVITIES WITH THE APPROPRIATE LOCAL, STATE AND FEDERAL AGENCIES AND SHALL AVOID CONSTRUCTION RELATED IMPACTS TO THE ADJACENT AND ADJOINING AREAS.

7. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL LOCAL, STATE, AND FEDERAL PERMITS (INCLUDING INSPECTIONS AND SIGN-OFFS FROM APPLICABLE TOWN DEPARTMENTS) FOR THE CONSTRUCTION, UNLESS NOTED OTHERWISE.

8. THE LIMITS OF WORK ARE GENERALLY DEFINED BY THE RAILROAD RIGHT-OF-WAY AND THE LIMITS SHOWN ON THE PLANS. WHERE ENCROACHMENT ONTO ADJACENT PROPERTY NOT OWNED BY MASSDOT IS NECESSARY OR REQUIRED FOR EXECUTION OF THE WORK, THE CONTRACTOR SHALL SEEK THE APPROPRIATE APPROVALS FROM THE LAND OWNERS AND NOTIFY THE RAILROAD PRIOR TO COMMENCEMENT OF THE WORK.

9. ANY DAMAGE TO EXISTING FEATURES AT THE PROJECT SITE INTENDED TO REMAIN CAUSED BY THE CONTRACTOR SHALL BE REPAIRED BY THE CONTRACTOR AT NO ADDITIONAL COST TO MASSDOT OR MCRR.

10. ALL WORK PERFORMED, AND MATERIALS INSTALLED IN THE EXECUTION OF THE WORK SHALL BE UNDERTAKEN IN STRICT ADHERENCE TO ALL APPLICABLE CODES, STANDARDS, REGULATIONS, AND ORDINANCES OF GOVERNMENT AGENCIES HAVING JURISDICTION AT THE PROJECT SITE.

11. THE CONTRACTOR SHALL PROVIDE THE ENGINEER WITH REASONABLE ACCESS TO THE WORK SITE FOR IN-PROCESS AND FINAL INSPECTIONS.

12. THE CONTRACTOR SHALL DESIGN AND PROVIDE ALL TEMPORARY SUPPORT OF EXCAVATION REQUIRED TO COMPLETE THE WORK.

13. CONTRACTOR SHALL COORDINATE AND NOTIFY MASSDOT, MCRR AND THE TOWN (IF REQUIRED) ON ALL UTILITY WORK WITHIN THE PROJECT LIMITS.

14. CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING THE WORK OF THIS CONTRACT WITH THE LOCAL UTILITY COMPANIES FOR RELOCATION OF THEIR FACILITIES AS REQUIRED FOR THE CONSTRUCTION AND/OR OTHER APPROPRIATE PARTIES PRIOR TO THE START OF EXCAVATION WORK.

15. IF THE CONTRACTOR IDENTIFIES SPECIAL CONDITIONS THAT WERE OTHERWISE NOT ANTICIPATED, AND REQUIRE AN ALTERNATIVE UTILITY LAYOUT OTHER THAN THAT AS SHOWN ON THE PLANS, SUCH ALTERNATIVES SHALL BE SUBMITTED FOR REVIEW AND APPROVAL BY MASSDOT/MCRR PRIOR TO INITIATING ANY WORK.

16. CONTRACTOR SHALL VERIFY LOCATION AND DEPTH OF ANY AND ALL EXISTING DRAINAGE AND UTILITY STRUCTURES.

GENERAL NOTES (CONTINUED):

17. ALL EXISTING RAIL, OTM, AND ALL SWITCH PARTS THAT ARE DEEMED SALVAGEABLE BY MCRR/MASSDOT WILL NEED TO BE DELIVERED TO A MCRR/MASSDOT STORAGE FACILITY WITHIN 75 MILES OF THE WORK AREA. ALL OTM AND SWITCH PARTS SHALL BE LABELED AND KEPT TOGETHER AND PALLETS FOR DELIVERY TO THE STORAGE FACILITY. ALL NON-SALVAGABLE STEEL TRACK MATERIALS (OTM) ITEMS SUCH AS TIE PLATES, RAIL ANCHORS, NUTS, WASHERS, ETC. AND TRACK SPIKES/SCREWS ARE TO BE COLLECTED BY THE CONTRACTOR AND PLACED IN A SCRAP CONTAINER ON SITE FOR PICK UP BY A SCRAP DEALER DESIGNATED BY MCRR. CONTRACTOR WILL BE RESPONSIBLE FOR THE COLLECTION AND DISPOSAL OF ALL SCRAP CROSSTIES AND SWITCH TIMBERS WITHIN THE LIMITS OF THE WORK.

18. THE CONTRACTOR WILL NOT BE ALLOWED TO WORK WITHIN THE "FOUL" AREA OF THE RAILROAD (15 FEET FROM CENTERLINE OF TRACK) WITHOUT FIRST OBTAINING ROADWAY WORKER PROTECTION (RWP) SAFETY TRAINING FROM MCRR, FOR ALL PERSONNEL WORKING WITHIN THE RAILROAD RIGHT-OF-WAY (ROW). THE CONTRACTOR SHALL COORDINATE APPROPRIATE PROTECTION FROM THE OPERATING RAILROAD.

19. THE CONTRACTOR SHALL CONTACT MASSDOT, MCRR AND OTHER APPROPRIATE PARTIES (DIG SAFE, ETC.) PRIOR TO THE START OF EXCAVATION WORK.

20. ALL EXCAVATED MATERIAL SHALL BE HANDLED, TRANSPORTED AND GRADED TO THE SATISFACTION OF THE ENGINEER, WITHIN MASSDOT RAILROAD RIGHT-OF-WAY WITHIN 5 MILES OF THE WORK SITE AS DESIGNATED BY MCRR/MASSDOT.

21. THE CONTRACTOR SHALL TAKE ALL REASONABLE MEASURES TO MINIMIZE THE NOISE LEVELS ASSOCIATED WITH THE WORK AND WILL SCHEDULE WORK SO AS TO MINIMIZE THE EFFECTS OF THE NOISE ON THE LOCAL ABUTTERS.

22. THE CONTRACTOR SHALL SET BARRICADES, WARNING LIGHTS, AND OTHER PROTECTIVE DEVICES THAT ARE NECESSARY, IN THE JUDGMENT OF THE ENGINEER, FOR THE PROTECTION OF THE PUBLIC IN ACCORDANCE WITH M.U.T.C.D. LATEST EDITION.

23. THE CONTRACTOR WILL BE RESPONSIBLE FOR THE COLLECTION AND DISPOSAL OF ALL SCRAP CROSSTIES, TIMBERS, ASPHALT, CONCRETE, AND RUBBER MATERIAL WITHIN THE LIMITS OF THE WORK. ALL MATERIAL SHALL BE DISPOSED OF IN ACCORDANCE WITH STATE, LOCAL AND MASSDEP REQUIREMENTS.

24. THE CONTRACTOR SHALL BE RESPONSIBLE FOR LEASING OR OTHERWISE OBTAINING TEMPORARY RIGHTS TO LANDS NECESSARY FOR AREAS OF CONSTRUCTION STAGING AND/OR STORING CONSTRUCTION MATERIALS AND EQUIPMENT.

25. AT THE END OF EACH WORK DAY, THE CONTRACTOR WILL MAKE REASONABLE EFFORTS TO KEEP THE WORK SITE CLEAN AND FREE OF CONSTRUCTION DEBRIS, RUBBISH, SPOILS, TRASH, AND OTHER FOREIGN MATERIALS. ALL SUCH RUBBISH, DEBRIS AND LIKE MATERIALS SHALL BE DISPOSED OF IN ACCORDANCE WITH ALL ORDINANCES, RULES AND REGULATIONS OF THE JURISDICTIONAL AUTHORITY, INCLUDING ENVIRONMENTAL REGULATIONS.

26. THE CONTRACTOR SHALL SUPERVISE AND EXECUTE THE WORK USING THE HIGHEST QUALITY CONSTRUCTION SKILLS AND ATTENTION TO DETAIL. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR, AND HAVE CONTROL OVER, THE CONSTRUCTION MEANS, METHODS, TECHNOLOGIES, SEQUENCES, AND PROCEDURES, AS LONG AS APPROPRIATELY COORDINATED WITH THE RAILROAD.

27. ALL MATERIALS AND CONSTRUCTION SHALL CONFORM TO MASSDOT STANDARDS, MBTA COMMUTER RAIL STANDARDS AND AREMA SPECIFICATIONS FOR RAILROAD CONSTRUCTION, WHICHEVER IS MORE STRINGENT.

CULVERT NOTES:

1. THE CONTRACT PLANS REPRESENT THE FINAL COMPLETED STRUCTURE AND DO NOT INDICATE THE METHOD OF CONSTRUCTION. THE CONTRACTOR IS RESPONSIBLE FOR DESIGNING AND PROVIDING ALL SHORING, BRACING, AND ALL OTHER TEMPORARY SUPPORTS NECESSARY TO PERFORM THE WORK.

2. ALL CONCRETE SHALL BE PRECAST FOR THE CULVERT COMPONENTS. ALL REINFORCEMENT AND CONNECTIONS SHALL BE DESIGNED BY THE PRECAST MANUFACTURER. ALL DESIGN CALCULATIONS, DETAILS, PLANS AND PRODUCT LITERATURE SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL.

3. THE PRECAST CONCRETE COMPONENTS ARE SHOWN FOR REFERENCE ONLY. THE ACTUAL DIMENSIONS WILL BE DEPENDENT ON THE PRECAST MANUFACTURER. THE INSIDE DIMENSIONS OF THE PIPE SHALL BE AS SHOWN ON THE PLANS.

4. LIFTING ANCHORS FOR PRECAST CONCRETE COMPONENTS SHALL BE DESIGNED BY THE CONTRACTOR. ALL LIFTING HOLES AND CONNECTION POCKETS SHALL BE FILLED WITH 5,000 PSI GROUT AFTER BEING SET IN THEIR FINAL POSITION.

5. ALL CORNERS OF PRECAST CONCRETE HEADWALL AND WINGWALLS SHALL RECEIVE A 3/4" CHAMFER.

SUGGESTED CONSTRUCTION SEQUENCE:

1. PRIOR TO COMMENCING WORK, THE CONTRACTOR SHALL SUBMIT A DETAILED SEQUENCE OF CONSTRUCTION OPERATIONS FOR REVIEW AND APPROVAL BY THE ENGINEER, MCRR AND/OR MASSDOT.

2. INSTALL DEWATERING EQUIPMENT, COFFERDAMS AND EROSION CONTROL MEASURES AS REQUIRED FOR CONSTRUCTION.

3. INSTALL SHEET PILES AND ANCHOR PILES FOR RETAINING WALL.

4. REMOVE EXISTING TRACKS (TIES AND RAILS) AND STORE SAFELY ON-SITE.

5. EXCAVATE FOR PROPOSED CULVERT. EXCAVATED SOIL SHALL BE STOCKPILED FOR POTENTIAL REUSE. EXCAVATED EXISTING BALLAST AND SUBBALLAST SHALL BE STOCKPILED SEPARATELY.

6. PREPARE PIPE BEDDING AND RIPRAP APRON.

7. INSTALL PROPOSED HEADWALL, WINGWALLS, CULVERT PIPE AND INLET STRUCTURE AS SHOWN IN THE CONTRACT PLANS.

8. INSTALL STOCKPILED STREAMBED SUBSTRATE INSIDE OF PIPES.

9. INSTALL (PLACE AND COMPACT) BACKFILL IN LIFTS, FINE GRADE, AND INSTALL REMAINING RIPRAP.

10. ALL MATERIAL SHALL BE PLACED IN HORIZONTAL LAYERS NOT EXCEEDING EIGHT (8) INCHES (AFTER COMPACTION) AND SHALL BE COMPACTED AS SPECIFIED BEFORE THE NEXT LAYER IS PLACED.

11. REMOVE DEWATERING EQUIPMENT AND COFFERDAMS.

12. ONCE THE PROPOSED CULVERT IS ACTIVELY PASSING WATER, REMOVE AND DISPOSE OF EXISTING CULVERT PIPE EXTENSIONS. REMOVE EXISTING STONE BOX ROOF AND BACKFILL AND COMPACT ENTIRE REMAINING CULVERT VOID.

13. INSTALL AND COMPACT EIGHT (8) INCHES OF SUBBALLAST.

14. INSTALL AND COMPACT EIGHT (8) INCHES OF BALLAST.

15. RE-INSTALL TRACK (TIES AND RAILS) AND INSTALL REMAINING BALLAST.

16. TAMP, LIFT AND SURFACE TO FINAL ELEVATION AND ALIGNMENT.

17. INSTALL TIE-RODS FOR RETAINING WALL.

18. REMOVE EROSION CONTROL AND CLEAN WORK SITE.

TRACK NOTES:

1. PRIOR TO COMMENCING WORK, THE CONTRACTOR SHALL SUBMIT A PHASING PLAN FOR TRACK CONSTRUCTION FOR REVIEW AND APPROVAL BY THE ENGINEER, MCRR AND/ OR MASSDOT.

TRACK NOTES (CONTINUED):

2. MCRR FLAGGING SUPPORT SHALL BE ARRANGED BY THE CONTRACTOR, AND AT THE EXPENSE OF MASSDOT. THESE SERVICES WILL BE PROVIDED AS SPECIFIED HEREIN AND AS APPROVED BY THE MCRR AND MASSDOT TO ALLOW THE CONTRACTOR TO CARRY OUT THEIR WORK ACTIVITIES SAFELY AND WITHOUT ADVERSE IMPACTS TO RAILROAD OPERATIONS.

ENVIRONMENTAL NOTES:

1. IF ANY UNKNOWN HAZARDOUS MATERIALS ARE ENCOUNTERED IN THE SOILS DURING EXCAVATION OPERATIONS, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER AND SUSPEND EXCAVATION OPERATIONS UNTIL THE SITUATION CAN BE PROPERLY EVALUATED.

2. IN ORDER TO PROTECT WILDLIFE WITHIN THE WATERWAY, WORK ACTIVITIES WITHIN THE WATERWAY MAY BE LIMITED BY A TIME OF YEAR RESTRICTION AS SPECIFIED IN THE PROJECT PERMITS.

3. EXTREME CARE SHALL BE EXERCISED TO PREVENT ANY DEMOLITION AND CONSTRUCTION DEBRIS FROM FALLING INTO WETLAND RESOURCES. IF ANY MATERIAL/EQUIPMENT FALLS IN WETLAND RESOURCES, IT SHALL BE IMMEDIATELY REMOVED.

4. CONTRACTOR TO STOCKPILE EXISTING STREAMBED SUBSTRATE FOR PLACEMENT INSIDE OF PIPES TO ELEVATIONS INDICATED ON THE CONTRACT PLANS.

DESIGN DATA:

1. DESIGN SPECIFICATIONS: AREMA MANUAL OF RAILWAY ENGINEERING, 2025 EDITION.

2. DESIGN LIVE LOADS: AREMA COOPER E-80 LOCOMOTIVE WITH FULL IMPACT. STRESSES INDUCED BY TRANSPORTATION AND HANDLING.

3. SEISMIC DESIGN DATA: SEISMIC ANALYSIS AND DESIGN SHALL BE IN ACCORDANCE WITH THE AREMA MANUAL OF RAILWAY ENGINEERING.

4. GEOTECHNICAL DATA:
   - MINIMUM LATERAL EARTH PRESSURE COEFFICIENT = 0.33.
   - MAXIMUM LATERAL EARTH PRESSURE COEFFICIENT = 1.00.
   - MOIST UNIT WEIGHT OF SOIL = 120 PCF
   - ALLOWABLE BEARING CAPACITY:
   - AREMA LOAD GROUP I: 4 KSF (F.S. = 3)
   - AREMA LOAD GROUP II: 6 KSF (F.S. = 2)

5. PROPOSED EAST HEADWALL OF MP 44.29: SHALL BE DESIGNED TO ACCOMODATE TRAIN DESIGN LIVE LOADS AT 8'-6" FROM THE FACE OF THE HEADWALL.

MATERIALS:

1. PRECAST REINFORCED CONCRETE PIPE:
   - CLASS V
   - GASKET JOINTS

2. PRECAST CONCRETE (HEADWALLS, WINGWALLS AND FOOTINGS):
   - f'c = 5000 PSI AT 28 DAYS WITH 3/4" MAX. AGGREGATE.
   - AIR ENTRAINED

3. REINFORCING STEEL (HEADWALLS, WINGWALLS AND FOOTINGS):
   - ASTM A615, GRADE 60, EPOXY COATED.
   - MINIMUM 2" COVER UNLESS NOTED OTHERWISE.

4. MISCELLANEOUS METALS (HANDRAILS):
   - HOT-DIP GALVANIZED IN ACCORDANCE WITH ASTM A153.

5. STEEL SHEET PILE WALL:
   - SHEET PILES: ASTM A572, GRADE 50
   - WALER CHANNELS: ASTM A992, GRADE 50
   - ANCHOR PILES: ASTM A572, GRADE 50
   - TIE RODS: ASTM A615, GRADE 75
   - PLATES: ASTM A572, GRADE 50
   - CONN. BOLTS: ASTM F3125, TYPE 1
   - WASHERS: ASTM F436, TYPE 1

6. FOR ADDITIONAL MATERIAL REQUIREMENTS, SEE THE CONTRACT SPECIFICATIONS.

MASSDOT CAPE MAIN
ROCHESTER & BARNSTABLE, MA
IMPROVEMENTS AT MP 44.27, 44.29, 68.00 & 71.66

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA		5	51
PROJECT FILE NO.	614096		

BORING LOGS
SHEET 1 OF 7

NOTES:

1. LOCATION OF BORINGS SHOWN ON THE PLANS THUS: ◕B-1,◕B-2, ◕B-3,◕B-4,◕B-5,◕B-6,◕B-7.
2. BORINGS ARE TAKEN FOR THE PURPOSE OF DESIGN AND SHOW CONDITIONS AT THE BORING POINTS ONLY, BUT DO NOT NECESSARILY SHOW THE NATURE OF THE MATERIALS TO BE ENCOUNTERED DURING CONSTRUCTION.
3. WATER LEVELS SHOWN ON THE BORING LOGS WERE OBSERVED AT THE TIME OF TAKING BORINGS AND DO NOT NECESSARILY SHOW THE TRUE GROUND WATER LEVEL.
4. FIGURES IN COLUMNS INDICATE THE NUMBER OF BLOWS REQUIRED TO DRIVE A 1 3/8" I.D. SPILT SPOON SAMPLER 6" USING A 140 POUND WEIGHT FALLING 30".
5. BORING DRILLING WAS PERFORMED BY GEOLOGIC EARTH EXPLORATIONS, INC. OF NORFOLK, MA IN JANUARY AND APRIL 2025.
6. REFER TO THE GEOTECHNICAL REPORTS PROVIDED IN CDSP-A00903 OF THE CONTRACT DOCUMENTS, PREPARED BY WSP, DATED 8/7/2025 AND 9/12/2025 FOR ADDITIONAL INFORMATION.

RECORD OF BOREHOLE: B-1

Sheet 1 of 2

CLIENT: MassDOT Rail
PROJECT: MassDOT Rail Culvert Rochester
PROJECT NO: US0035009.6582
LOCATION: Cape Main MP 44.27 & 44.29
DATE: January 17, 2025
CONTRACTOR: GeoLogic Earth Explorations, Inc.
ELEVATION: 73.6 ft (Ground)
COORDINATES: N: 2753078.9 ft E: 850384.4 ft
COORD SYS: SP MA Mainland FIPS 2001 Ft
HORZ DATUM: NAD83

DEPTH (ft)	DRILL RIG	DRILL METHOD	MATERIAL PROFILE: DESCRIPTION	USCS	STRATA PLOT	ELEV. / DEPTH (ft)	SAMPLES: NUMBER	TYPE	REC.%	BLOWS N-VALUE	SOIL SAMPLE DESCRIPTION	ADDITIONAL LAB TESTING	GROUNDWATER OBSERVATIONS	ADDITIONAL OBSERVATIONS
0	CME-45C	Cased Washed - 4.50-in Hole Dia.	Ballast	GP		0.0								
1			Fill			73.3 / 0.3	S-1	SS	60	5-8-10-18 / 18	0 - 0.3 ft bgs: Grey, dry, medium dense, coarse GRAVEL, little silt. (Railroad Ballast) 0.3 - 2.0 ft bgs (S-1): Brown to tan, fine to coarse SAND, little coarse gravel, little silt, poorly-graded.			
2														
3														
4				SP										
5							S-2	SS	20	11-5-4-3 / 9	Olive brown, wet, loose, fine SAND, little fine to coarse gravel, trace silt, poorly-graded.	MC = 15.1%		
6														
7													17-Jan-26 ▼ 13.09	
8														
9			Silty Sand	SM		64.6 / 9.0	S-3A	SS	50	2-2-3-5 / 5	9.0 - 9.4 and 9.7 - 11.0 ft bgs (S-3A): Very dark grey, wet, loose, fine to medium SAND, little silt, trace fine gravel. 9.4 - 9.7 ft bgs (S-3B): Dark brown, moist, loose, PEAT, some woody debris, trace sand.	MC = 33.4% Fines = 12.2% A-2-4		
10			Peat	PT		64.2 / 9.4								
11			Silty Sand	SM		63.9 / 9.7								
12				SW-SM										
13														
14			Well-graded Sands and Gravels			59.6 / 14.0	S-4	SS	70	9-15-16-17 / 31	Greyish brown, moist, dense, fine to coarse SAND, little fine to coarse gravel, trace silt, well-graded.	MC = 12.5% Fines = 6.5% A-1-b (1)		
15														
16														
17														
18														
19														
20				SW			S-5	SS	0	5-5-5-4 / 10	No Recovery.			
21														
22							S-6	SS	55	3-4-3-4 / 7	Tan, wet, loose, medium to coarse SAND, little fine gravel, well-graded.			
23														
24														
25							S-7	SS	45	4-3-3-5 / 6	Tan, wet, loose, Sandy fine GRAVEL, trace silt, well-graded.			
26			Continued on Next Page											

HAMMER TYPE: Automatic, 140lb, 30" drop

REV:

LOGGED: R. Nagle DATE: Jan 17, 2025
CHECKED: L. Nunez DATE: Feb 04, 2025

RECORD OF BOREHOLE: B-1

Sheet 2 of 2

CLIENT: MassDOT Rail
PROJECT: MassDOT Rail Culvert Rochester
PROJECT NO: US0035009.6582
LOCATION: Cape Main MP 44.27 & 44.29
DATE: January 17, 2025
CONTRACTOR: GeoLogic Earth Explorations, Inc.
ELEVATION: 73.6 ft (Ground)
COORDINATES: N: 2753078.9 ft E: 850384.4 ft
COORD SYS: SP MA Mainland FIPS 2001 Ft
HORZ DATUM: NAD83

DEPTH (ft)	DRILL RIG	DRILL METHOD	MATERIAL PROFILE: DESCRIPTION	USCS	STRATA PLOT	ELEV. / DEPTH (ft)	SAMPLES: NUMBER	TYPE	REC.%	BLOWS N-VALUE	SOIL SAMPLE DESCRIPTION	ADDITIONAL LAB TESTING	GROUNDWATER OBSERVATIONS	ADDITIONAL OBSERVATIONS
27	CME-45C	Cased Washed - 4.50-in Hole Dia.	Well-graded Sands and Gravels	SW		44.6 / 29.0								
28														
29			Low Plasticity Silt	ML		39.6 / 34.0	S-8	SS	95	5-5-4-4 / 10	Light olive brown, wet, stiff, SILT, trace fine sand, low plasticity.	Fines = 91.2% A-4		
30														
31														
32														
33														
34			Well-graded Sands and Gravels				S-9	SS	60	8-4-5-9 / 13	Tan, wet, loose, fine to coarse GRAVEL, some fine to coarse sand, little silt, well-graded.			
35														
36														
37														
38														
39														
40							S-10	SS	70	15-13-10-9 / 23	Tan, wet, medium dense, fine to medium SAND, some fine to coarse gravel, trace silt, well-graded.			
41														
42														
43														
44														
45							S-11	SS	0	30-16-13-10 / 29	No Recovery.			
46														
47							S-12	SS	65	10-13-16-17 / 29	Tan, wet, dense, fine Sandy fine to coarse GRAVEL, little silt, poorly-graded.			
48														
49							S-13	SS	90	21-16-18-17 / 35	Light olive brown, wet, dense, fine to coarse SAND, some fine to coarse gravel, trace silt, well-graded.	Fines = 9.4% A-1-b (1)		
50			Boring was terminated at 50.0 ft bgs and backfilled with drill cuttings.			23.6 / 50.0								
51			End of hole at 50.00 ft.											
52														

HAMMER TYPE: Automatic, 140lb, 30" drop

REV:

LOGGED: R. Nagle DATE: Jan 17, 2025
CHECKED: L. Nunez DATE: Feb 04, 2025

MASSDOT CAPE MAIN
ROCHESTER & BARNSTABLE, MA
IMPROVEMENTS AT MP 44.27, 44.29, 68.00 & 71.66

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA		6	51
PROJECT FILE NO.	614096		

BORING LOGS
SHEET 2 OF 7

NOTES:

1. SEE SHEET 5 FOR BORING NOTES.

RECORD OF BOREHOLE: B-2

Sheet 1 of 2

CLIENT: MassDOT Rail | START DATE: January 17, 2025 | ELEVATION: 73.2 ft (Ground)
PROJECT: MassDOT Rail Culvert Rochester | END DATE: January 20, 2025 | COORDINATES: N: 2753006.9 ft E: 850522.6 ft
PROJECT NO: US0035009.6582 | COORD SYS: SP MA Mainland FIPS 2001 Ft
LOCATION: Cape Main MP 44.27 & 44.29 | CONTRACTOR: GeoLogic Earth Explorations, Inc. | HORZ DATUM: NAD83

DEPTH (ft)	DRILL RIG	DRILL METHOD	MATERIAL PROFILE DESCRIPTION	USCS	STRATA PLOT	ELEV. DEPTH (ft)	SAMPLES NUMBER	TYPE	REC.%	BLOWS N-VALUE	SOIL SAMPLE DESCRIPTION	ADDITIONAL LAB TESTING	GROUNDWATER OBSERVATIONS	ADDITIONAL OBSERVATIONS
0	CME-45C	Cased Washed - 4.50-in Hole Dia.	Ballast	GP		0.0	S-1A				0 - 0.4 ft bgs (S-1A): Grey, dry, loose, coarse GRAVEL and topsoil. (Railroad Ballast).			
			Fill			72.8 0.4	S-1B	SS	35	2-3-3-4 6	0.4 - 2.0 ft bgs (S-1B): Tan, loose, dry, fine SAND, little silt, trace gravel, poorly graded.			
5				SP			S-2	SS	0	8-8-5-4 13	No Recovery.		20Jan25 ▼ 14.17	
10			Peat	PT		63.2 10.0	S-3A	SS	65	1-2-1-1 3	9.0 - 10.0 ft bgs (S-3A): Light olive brown, wet, very loose, fine SAND, little silt, poorly graded.	MC = 24.5% Fines = 11.9% A-2-4		
							S-3B				10.0 -11.0 ft bgs (S-3B): Brown, wet, very loose, PEAT, some woody debris. Driller Note: Wash water stayed a blackish color for approximately one foot to 12 ft bgs before turning to a grey color.			
15			Well-graded Sands and Gravels			62.2 11.0	S-4	SS	65	8-7-7-10 14	Tan to grey, wet, medium dense, fine to coarse SAND, little coarse gravel, trace silt, well graded. Little organics in top two inches.			
				SW										
20							S-5	SS	40	5-4-3-6 7	Tan to grey, wet, loose, fine to coarse SAND, trace silt, trace fine gravel, poorly graded.			
25							S-6	SS	80	6-8-8-17 14	Grey, wet, medium dense, fine to coarse SAND, trace silt, trace fine gravel, poorly graded.	MC = 16.6% Fines =		

Continued on Next Page

HAMMER TYPE: Automatic, 140lb, 30" drop

REV:

LOGGED: R. Nagle | DATE: Jan 17, 2025
CHECKED: L. Nunez | DATE: Feb 04, 2025

RECORD OF BOREHOLE: B-2

Sheet 2 of 2

CLIENT: MassDOT Rail | START DATE: January 17, 2025 | ELEVATION: 73.2 ft (Ground)
PROJECT: MassDOT Rail Culvert Rochester | END DATE: January 20, 2025 | COORDINATES: N: 2753006.9 ft E: 850522.6 ft
PROJECT NO: US0035009.6582 | COORD SYS: SP MA Mainland FIPS 2001 Ft
LOCATION: Cape Main MP 44.27 & 44.29 | CONTRACTOR: GeoLogic Earth Explorations, Inc. | HORZ DATUM: NAD83

DEPTH (ft)	DRILL RIG	DRILL METHOD	MATERIAL PROFILE DESCRIPTION	USCS	STRATA PLOT	ELEV. DEPTH (ft)	SAMPLES NUMBER	TYPE	REC.%	BLOWS N-VALUE	SOIL SAMPLE DESCRIPTION	ADDITIONAL LAB TESTING	GROUNDWATER OBSERVATIONS	ADDITIONAL OBSERVATIONS
27	CME-45C	Cased Washed - 4.50-in Hole Dia.	Well-graded Sands and Gravels	SW								8.0% A-3 (1)		
30							S-7	SS	40	39-22-25-20 47	Tan, wet, dense, fine to coarse Gravelly fine to coarse SAND, trace silt, trace cobbles, well graded.			
35							S-8	SS	95	4-3-4-8 7	Tan, wet, loose, fine to coarse Sandy fine to coarse Gravel, trace silt, well graded.			
40							S-9	SS	45	23-31-43-36 74	Olive grey, wet, very dense, fine to coarse Gravelly fine to coarse SAND, little silt, well graded.	Fines = 19.4% A-1-b		
45							S-10	SS	95	22-21-18-19 39	Dark greyish brown, wet, dense, fine to coarse GRAVEL, some fine to coarse sand, trace silt, well graded.	Fines = 5.4% A-1-a (1)		
						26.7 46.5					Driller Note: Potential bedrock or boulder encountered at 46.5 ft bgs. Advanced roller bit to 49.0 ft bgs without getting past the obstruction.			
50			Potential Bedrock			24.2								
			Boring terminated in potential bedrock or boulder and backfilled with cuttings. End of hole at 49.00 ft.			24.2 49.0								

HAMMER TYPE: Automatic, 140lb, 30" drop

REV:

LOGGED: R. Nagle | DATE: Jan 17, 2025
CHECKED: L. Nunez | DATE: Feb 04, 2025

MASSDOT CAPE MAIN
ROCHESTER & BARNSTABLE, MA
IMPROVEMENTS AT MP 44.27, 44.29, 68.00 & 71.66

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA		7	51
PROJECT FILE NO.	614096		

BORING LOGS
SHEET 3 OF 7

Plotted on 9-Jan-2026 2:07 PM

NOTES:

1. SEE SHEET 5 FOR BORING NOTES.

RECORD OF BOREHOLE: B-3

Sheet 1 of 2

CLIENT: MassDOT Rail
PROJECT: Cape Main Culverts & Retain. Wall
PROJECT NO: US0035009.6582
LOCATION: MP44.27/44.29, Rochester MA
DATE: April 07, 2025
CONTRACTOR: GeoLogic Earth Explorations, Inc.
ELEVATION: 73.4 ft (Ground)
COORDINATES: N: 2752866.1 ft E: 850702.2 ft
COORD SYS: SP MA Mainland FIPS 2001 Ft
HORZ DATUM: NAD83

DRILL RIG: CME-45C
DRILL METHOD: Cased Wash - 4.50-in Hole Dia.

DEPTH (ft)	MATERIAL PROFILE: DESCRIPTION	USCS	STRATA PLOT	ELEV. / DEPTH (ft)	SAMPLES: NUMBER	TYPE	REC.%	BLOWS / N-VALUE	SOIL SAMPLE DESCRIPTION	ADDITIONAL LAB TESTING	GROUNDWATER OBSERVATIONS	ADDITIONAL OBSERVATIONS
0	Ballast	GP		0.0 / 73.9	S-1A	SS	62	3-8-8-8 / 16	0 - 0.4 ft bgs (S-1A): Grey to brown, dry, medium dense, coarse GRAVEL, some sand, little silt (Railroad Ballast). 0.4 - 2.0 ft bgs (S-1B): Tan, dry, medium dense, fine to coarse SAND, little fine to medium gravel, little silt.		07/4@25 14:00 ▼	7.33 ft: Observed water level at end of drilling. 8.00 ft: Brown to black wash water return.
0.4	Fill	SP			S-1B	SS						
5					S-2	SS	34	4-4-7-4 / 11	Tan, moist, medium dense, fine to medium SAND, little silt, trace fine gravel.			
8.0	Peat	PT		65.4								
9.0	Sands and Gravels			64.4	S-3	SS	54	7-8-11-12 / 19	Tan, wet, medium dense, fine SAND, trace silt, poorly graded.	MC = 24.5% Fines = 6.9% SP-SM, A-3		
15		SP-SM			S-4	SS	58	7-7-9-7 / 15	Tan, wet, medium dense, fine to medium SAND, little silt, trace fine gravel.			
20					S-5	SS	16	5-6-6-5 / 12	Tan to grey, wet, medium dense, fine to coarse SAND, little silt, trace fine gravel.			
25					S-6	SS	29	10-11-12-14 / 23	Tan, wet, medium dense, Gravelly fine to coarse SAND, little silt, well graded.	MC = 13.9% Fines =		

Continued on Next Page

HAMMER TYPE: Automatic, 140lb, 30" drop

REV:

LOGGED: K. Wheeler DATE: Apr 07, 2025
CHECKED: K. Roth DATE: Apr 28, 2025

RECORD OF BOREHOLE: B-3

Sheet 2 of 2

CLIENT: MassDOT Rail
PROJECT: Cape Main Culverts & Retain. Wall
PROJECT NO: US0035009.6582
LOCATION: MP44.27/44.29, Rochester MA
DATE: April 07, 2025
CONTRACTOR: GeoLogic Earth Explorations, Inc.
ELEVATION: 73.4 ft (Ground)
COORDINATES: N: 2752866.1 ft E: 850702.2 ft
COORD SYS: SP MA Mainland FIPS 2001 Ft
HORZ DATUM: NAD83

DRILL RIG: CME-45C
DRILL METHOD: Cased Wash - 4.50-in Hole Dia.

DEPTH (ft)	MATERIAL PROFILE: DESCRIPTION	USCS	STRATA PLOT	ELEV. / DEPTH (ft)	SAMPLES: NUMBER	TYPE	REC.%	BLOWS / N-VALUE	SOIL SAMPLE DESCRIPTION	ADDITIONAL LAB TESTING	GROUNDWATER OBSERVATIONS	ADDITIONAL OBSERVATIONS
27	Sands and Gravels	SP-SM			S-7	SS	79	12-9-5-6 / 14	Tan to grey, wet, medium dense, fine to coarse SAND, some fine to medium gravel, trace silt.	11.8% SW-SM, A-1-a		
35					S-8	SS	90	6-13-21-19 / 34	Tan to brown, wet, dense, fine to coarse SAND, some fine to medium gravel, little silt.			
33.6					S-9	SS	100	11 blows/	Tan, wet, very dense, Gravelly fine to coarse SAND, little silt.			
39.8	Boulders or Cobbles											39.75 ft: Driller notes boulders or cobbles from 39.75 to 43 ft bgs.
30.4												
43.0	Sands and Gravels	SP-SM			S-10	SS	47	25-18-18-50/5" / 36	Tan, wet, dense, Sandy GRAVEL, little silt, poorly graded.	MC = 6.0% Fines = 15.0% GM, A-1-b		47.00 ft: Advanced roller bit into hard material 47 to 48 ft bgs; rig chattering.
26.4												
47.0	Potential Bedrock											
25.4	End of hole at 48.00 ft. Backfilled with drill cuttings.											

HAMMER TYPE: Automatic, 140lb, 30" drop

REV:

LOGGED: K. Wheeler DATE: Apr 07, 2025
CHECKED: K. Roth DATE: Apr 28, 2025

NOTES:

1. SEE SHEET 5 FOR BORING NOTES.

RECORD OF BOREHOLE: B-4

Sheet 1 of 2

CLIENT: MassDOT Rail
PROJECT: Cape Main Culverts & Retain. Wall
PROJECT NO: US0035009.6582
LOCATION: MP44.27/44.29, Rochester MA
DATE: April 08, 2025
CONTRACTOR: GeoLogic Earth Explorations, Inc.
ELEVATION: 73.8 ft (Ground)
COORDINATES: N: 2752758.5 ft E: 850872.1 ft
COORD SYS: SP MA Mainland FIPS 2001 Ft
HORZ DATUM: NAD83

DEPTH (ft)	DRILL RIG	DRILL METHOD	MATERIAL PROFILE: DESCRIPTION	USCS	STRATA PLOT	ELEV. / DEPTH (ft)	SAMPLES: NUMBER	TYPE	REC.%	BLOWS / N-VALUE	SOIL SAMPLE DESCRIPTION	ADDITIONAL LAB TESTING	GROUNDWATER OBSERVATIONS	ADDITIONAL OBSERVATIONS
0	CME-45C	Cased Wash - 4.50-in hole Dia.	Ballast	GP		0.0	S-1A	SS	29	2-6-8-11	0 - 0.4 ft bgs (S-1A): Grey, moist, medium dense, fine to coarse GRAVEL, some sand, little silt (Railroad Ballast).			
1			Fill			73.4	S-1B			14	0.4 - 2.0 ft bgs (S-1B): Dark brown, moist, medium dense, fine to medium SAND, some fine gravel, little silt, poorly graded.			
2						0.4								
3				SP										
4														
5							S-2	SS	42	4-5-5-7 10	Tan, moist, medium dense, fine to coarse SAND, trace fine to medium gravel, trace silt, poorly graded.	MC = 16.3% Fines = 8.0% SP-SM, A-3	08/04/25 14:50 ▼	6.10 ft: Observed water level at end of drilling.
6														
7														
8														
9			Sands and Gravels			64.8 9.0	S-3	SS	46	6-8-11-10 20	Tan to orange, wet, medium dense, fine to coarse SAND, little gravel, trace silt, poorly graded.			
10														
11														
12														
13							S-4	SS	54	5-12-16-14 26	Tan to grey, wet, medium dense, fine SAND, little silt, little gravel, poorly graded.			
14														
15														
16														
17				SP-SM										
18														
19														
20							S-5	SS	34	6-7-5-8 12	Tan to grey, wet, medium dense, fine to coarse SAND, little gravel, trace silt, poorly graded.	MC = 12.1% Fines = 9.6% SP-SM, A-1-b		
21														
22														
23														
24														
25							S-6	SS	71	21-22-28-22 48	Tan, wet, dense, fine to coarse SAND, some gravel, little silt, well-graded.			
26			Continued on Next Page											

HAMMER TYPE: Automatic, 140lb, 30" drop

REV:

LOGGED: K. Wheeler DATE: Apr 08, 2025
CHECKED: K. Roth DATE: Apr 28, 2025

RECORD OF BOREHOLE: B-4

Sheet 2 of 2

CLIENT: MassDOT Rail
PROJECT: Cape Main Culverts & Retain. Wall
PROJECT NO: US0035009.6582
LOCATION: MP44.27/44.29, Rochester MA
DATE: April 08, 2025
CONTRACTOR: GeoLogic Earth Explorations, Inc.
ELEVATION: 73.8 ft (Ground)
COORDINATES: N: 2752758.5 ft E: 850872.1 ft
COORD SYS: SP MA Mainland FIPS 2001 Ft
HORZ DATUM: NAD83

DEPTH (ft)	DRILL RIG	DRILL METHOD	MATERIAL PROFILE: DESCRIPTION	USCS	STRATA PLOT	ELEV. / DEPTH (ft)	SAMPLES: NUMBER	TYPE	REC.%	BLOWS / N-VALUE	SOIL SAMPLE DESCRIPTION	ADDITIONAL LAB TESTING	GROUNDWATER OBSERVATIONS	ADDITIONAL OBSERVATIONS
27	CME-45C	Cased Wash - 4.50-in hole Dia.	Sands and Gravels	SP-SM										
28														
29														
30							S-7	SS	25	12-29-56-15 85	Tan to grey, wet, very dense, fine to coarse SAND, some silt, some gravel, well-graded.			
31														
32														
33														
34														
35							S-8	SS	100	16-26-30-29 56	Tan, wet, very dense, fine to coarse SAND, some fine to medium gravel, little silt, well-graded.			
36														
37														
38														
39														
40							S-9	SS	50	19-27-24-26 51	Tan, wet, very dense, Sandy GRAVEL, little silt, poorly graded.	MC = 4.5% Fines = 18.6% GM, A-1-b		43.00 ft: Advanced roller bit into hard material 43 to 44 ft bgs.
41														
42														
43			Potential Bedrock			30.8 43.0								
44			End of hole at 44.00 ft. Backfilled with drill cuttings.			29.8								
45														
46														
47														
48														
49														
50														
51														
52														

HAMMER TYPE: Automatic, 140lb, 30" drop

REV:

LOGGED: K. Wheeler DATE: Apr 08, 2025
CHECKED: K. Roth DATE: Apr 28, 2025

MASSDOT CAPE MAIN
ROCHESTER & BARNSTABLE, MA
IMPROVEMENTS AT MP 44.27, 44.29, 68.00 & 71.66

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA		9	51
PROJECT FILE NO.		614096	

BORING LOGS
SHEET 5 OF 7

Plotted on 9-Jan-2026 2:07 PM

NOTES:

1. SEE SHEET 5 FOR BORING NOTES.

RECORD OF BOREHOLE: B-5

CLIENT: MassDOT Rail DATE: April 09, 2025 ELEVATION: 74.0 ft (Ground)
PROJECT: Cape Main Culverts & Retain. Wall COORDINATES: N: 2752647.7 ft E: 851039.8 ft
PROJECT NO: US0035009.6582 COORD SYS: SP MA Mainland FIPS 2001 Ft
LOCATION: MP44.27/44.29, Rochester MA CONTRACTOR: GeoLogic Earth Explorations, Inc. HORZ DATUM: NAD83

Drill rig: CME-45C; Drill method: Cased Wash - 4.50-in Hole Dia.

Description (Material Profile)	USCS	Elev. / Depth (ft)
Ballast	GP	0.0
Fill	SP	73.7 / 0.3
Sands and Gravels	SP-SM	65.0 / 9.0
Fine Sand	SM	60.0 / 14.0
Sands and Gravels	SP-SM	59.6 / 14.4

Number	Type	Rec %	Blows	N-Value	Soil Sample Description	Additional Lab Testing
S-1A / S-1B	SS	34	3-3-8-10	11	0 - 0.3 ft bgs (S-1A): Grey, dry, medium dense, fine to coarse GRAVEL, some fine to coarse sand, little silt. 0.3 - 2.0 ft bgs (S-1B): Dark brown, moist, medium dense, fine to medium SAND, little gravel, little silt, poorly graded.	
S-2	SS	21	8-8-12-11	20	Tan, wet, medium dense, Sandy GRAVEL, trace silt, poorly graded.	MC = 9.1% Fines = 5.9% GP-GM, A-1-a
S-3	SS	42	7-8-6-5	14	Tan to brown, wet, medium dense, fine to coarse, SAND, little gravel, little silt, well-graded.	
S-4A / S-4B	SS	38	5-7-7-6	14	14.0 - 14.4 ft bgs (S-4A): Grey, wet, medium dense, fine SAND, little silt, poorly graded. 14.4 - 16.0 ft bgs (S-4B): Tan to orange, wet, medium dense, Silty fine to coarse SAND, trace gravel, poorly graded.	MC = 20.1% Fines = 46.2% SM, A-4
S-5	SS	25	8-6-6-8	12	Tan to orange, wet, medium dense, fine to coarse SAND, little silt, well-graded.	
S-6	SS	21	8-6-4-6	10	Tan, wet, loose, fine to coarse SAND, trace silt, well-graded.	

Groundwater observations: 09Apr25 13:33 — 8.50 ft: Observed water level at end of drilling.

Continued on Next Page

HAMMER TYPE: Automatic, 140lb, 30" drop

REV:

LOGGED: K. Wheeler DATE: Apr 09, 2025
CHECKED: K. Roth DATE: Apr 28, 2025

Golder Log Imperial / Soil-General 7 w Sample Description / Golder - 3 Imperial US / Golder US Auto (common in US) / 2025-05-09

RECORD OF BOREHOLE: B-5

CLIENT: MassDOT Rail DATE: April 09, 2025 ELEVATION: 74.0 ft (Ground)
PROJECT: Cape Main Culverts & Retain. Wall COORDINATES: N: 2752647.7 ft E: 851039.8 ft
PROJECT NO: US0035009.6582 COORD SYS: SP MA Mainland FIPS 2001 Ft
LOCATION: MP44.27/44.29, Rochester MA CONTRACTOR: GeoLogic Earth Explorations, Inc. HORZ DATUM: NAD83

Drill rig: CME-45C; Drill method: Cased Wash - 4.50-in Hole Dia.

Description (Material Profile)	USCS	Elev. / Depth (ft)
Sands and Gravels	SP-SM	
Cobbles		31.5 / 42.5
Weathered Rock		31.0 / 43.0
Potential Bedrock		29.0 / 45.0
End of hole at 46.50 ft. Backfilled with drill cuttings		27.5

Number	Type	Rec %	Blows	N-Value	Soil Sample Description	Additional Lab Testing	Additional Observations
S-7	SS	12	35-28-21-12	49	Tan, wet, dense, Gravelly fine to coarse SAND, little silt, well-graded.		
S-8	SS	46	7-22-32-29	54	Grey, wet, very dense, Gravelly fine to coarse SAND, little silt, poorly graded.	MC = 8.2% Fines = 16.9% SM, A-1-b	
S-9	SS	42	22-24-17-16	41	Tan to grey, wet, dense, fine to coarse SAND, some gravel, some silt, well-graded.		
							42.50 ft: Rig grinding on cobbles from 42.5 to 43 ft bgs.
S-10	SS	100			44.0 - 44.1 ft bgs (S-10): Grey, wet, very dense, Silty fine to medium SAND, little gravel. Recovery 100%. Hammer blows 100/1".		45.00 ft: Advanced roller bit into hard material 45 to 46.5 ft bgs; rig chattering.

HAMMER TYPE: Automatic, 140lb, 30" drop

REV:

LOGGED: K. Wheeler DATE: Apr 09, 2025
CHECKED: K. Roth DATE: Apr 28, 2025

Golder Log Imperial / Soil-General 7 w Sample Description / Golder - 3 Imperial US / Golder US Auto (common in US) / 2025-05-09

Last Saved by: USTD094214 on: Jan 9, 2026 1:10 PM File: c:\bms\wsp-us-pw-02\d1006043\TO3-MP44.2X_HD(BORINGS).dwg

MASSDOT CAPE MAIN
ROCHESTER & BARNSTABLE, MA
IMPROVEMENTS AT MP 44.27, 44.29, 68.00 & 71.66

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA		10	51
PROJECT FILE NO.	614096		

BORING LOGS
SHEET 6 OF 7

NOTES:

1. SEE SHEET 5 FOR BORING NOTES.

RECORD OF BOREHOLE: B-6

Sheet 1 of 2

CLIENT: MassDOT Rail
PROJECT: Cape Main Culverts & Retain. Wall
PROJECT NO: US0035009.6582
LOCATION: MP44.27/44.29, Rochester MA
DATE: April 10, 2025
CONTRACTOR: GeoLogic Earth Explorations, Inc.
ELEVATION: 73.6 ft (Ground)
COORDINATES: N: 2752513.1 ft E: 851238.9 ft
COORD SYS: SP MA Mainland FIPS 2001 Ft
HORZ DATUM: NAD83

DEPTH (ft)	DRILL RIG	DRILL METHOD	MATERIAL PROFILE: DESCRIPTION	USCS	STRATA PLOT	ELEV. / DEPTH (ft)	SAMPLES: NUMBER	TYPE	REC.%	BLOWS / N-VALUE	SOIL SAMPLE DESCRIPTION	ADDITIONAL LAB TESTING	GROUNDWATER OBSERVATIONS	ADDITIONAL OBSERVATIONS
0	CME-45C	Cased Wash - 4.50-in Hole Dia.	Ballast			0.0								
0			Fill	SP		73.4 / 0.2	S-1B	SS	29	4-4-7-9 / 11	0 - 0.2 ft bgs (S-1A): Grey, moist, medium dense, fine to coarse GRAVEL, little sand, trace silt, organics, wood. 0.2 - 2.0 ft bgs (S-1B): Dark brown, moist, medium dense, fine to medium SAND, some silt, little gravel, organics, poorly graded.			
5							S-2	SS	29	6-5-5-8 / 10	Tan, wet, medium dense, fine to coarse SAND, little gravel, trace silt.			
7			Peat grading to Silty Sand with Organics	PT		66.6 / 7.0							10/4/25 ▼ 13.12	7.00 ft: Dark brown to black wash water return. 7.10 ft: Observed water level at end of drilling.
9			Sands and Gravels	SP-SM		64.3 / 9.3	S-3B	SS	71	3-5-10-15 / 16	9.0 - 9.3 ft bgs (S-3A): Dark brown, wet, medium dense, Silty fine to medium SAND, roots, organics. 9.3 - 11.0 ft bgs (S-3B): Tan, wet, medium dense, fine to medium SAND, trace gravel, trace silt, trace organics, poorly graded.	MC = 19.5% Fines = 5.6% SP-SM, A-3		
15							S-4	SS	34	20-25-38-38 / 61	Grey, wet, very dense, Gravelly fine to coarse SAND, little silt, well-graded.			
20							S-5	SS	0	23-15-12-7 / 27	No Recovery.			
24			Sandy Silt and Silty Sand	ML		49.6 / 24.0	S-6	SS	46	8-8-9-19 / 15	Grey, wet, medium dense, Silty fine to medium SAND, trace gravel, poorly graded.	MC = 23.4% Fines =		

Continued on Next Page

HAMMER TYPE: Automatic, 140lb, 30" drop

REV:

LOGGED: K. Wheeler DATE: Apr 10, 2025
CHECKED: K. Roth DATE: Apr 28, 2025

RECORD OF BOREHOLE: B-6

Sheet 2 of 2

CLIENT: MassDOT Rail
PROJECT: Cape Main Culverts & Retain. Wall
PROJECT NO: US0035009.6582
LOCATION: MP44.27/44.29, Rochester MA
DATE: April 10, 2025
CONTRACTOR: GeoLogic Earth Explorations, Inc.
ELEVATION: 73.6 ft (Ground)
COORDINATES: N: 2752513.1 ft E: 851238.9 ft
COORD SYS: SP MA Mainland FIPS 2001 Ft
HORZ DATUM: NAD83

DEPTH (ft)	DRILL RIG	DRILL METHOD	MATERIAL PROFILE: DESCRIPTION	USCS	STRATA PLOT	ELEV. / DEPTH (ft)	SAMPLES: NUMBER	TYPE	REC.%	BLOWS / N-VALUE	SOIL SAMPLE DESCRIPTION	ADDITIONAL LAB TESTING	GROUNDWATER OBSERVATIONS	ADDITIONAL OBSERVATIONS
27	CME-45C	Cased Wash - 4.50-in Hole Dia.	Sandy Silt and Silty Sand	ML								36.5% SM, A-4		
30							S-7	SS	29	9-7-10-10 / 17	Grey, wet, very stiff, Sandy SILT, trace gravel, low plasticity.	MC = 13.9% Fines = 55.0% ML, A-4		
34			Sands and Gravels	SP-SM		39.6 / 34.0	S-8	SS	93	16-11-26-47 / 73	Grey, wet, dense, fine to coarse SAND, some gravel, some silt, well-graded.			
37			Bedrock			36.6 / 37.0								37.00 ft: Advanced roller bit into hard material 37 to 39 ft bgs. 39.00 - 44.00 ft: Rock Core Rate (min:sec per foot) 1:50 2:15 2:26 2:37 2:10
42	CME-45C	NX Rock Core - 2.92-in Hole Dia.					C-1	SS	93		Light grey, fine to medium grained, very strong (R5), GNEISS, fresh (W1); discontinuities shallowly dipping (35°), moderately closely spaced, open, planar, average 1 fracture per foot, infilling with sand. RQD = 83.3%.			
44			End of hole at 44.00 ft. Backfilled with bentonite chips and drill cuttings.			29.6								

HAMMER TYPE: Automatic, 140lb, 30" drop

REV:

LOGGED: K. Wheeler DATE: Apr 10, 2025
CHECKED: K. Roth DATE: Apr 28, 2025

MASSDOT CAPE MAIN
ROCHESTER & BARNSTABLE, MA
IMPROVEMENTS AT MP 44.27, 44.29, 68.00 & 71.66

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA		11	51
PROJECT FILE NO.	614096		

BORING LOGS
SHEET 7 OF 7

NOTES:

1. SEE SHEET 5 FOR BORING NOTES.

RECORD OF BOREHOLE: B-7

CLIENT: MassDOT Rail | DATE: April 11, 2025 | ELEVATION: 73.2 ft (Ground)
PROJECT: Cape Main Culverts & Retain. Wall | COORDINATES: N: 2752394.5 ft E: 851429.6 ft
PROJECT NO: US0035009.6582 | COORD SYS: SP MA Mainland FIPS 2001 Ft
LOCATION: MP44.27/44.29, Rochester MA | CONTRACTOR: GeoLogic Earth Explorations, Inc. | HORZ DATUM: NAD83

DRILL RIG: CME-45C — DRILL METHOD: Cased Wash - 4.50-in Hole Dia.

MATERIAL PROFILE – DESCRIPTION	USCS	ELEV. / DEPTH (ft)
Ballast	GP	73.0 / 0.0
Fill	SP	0.2
Sands and Gravels	SP-SM	64.2 / 9.0

SAMPLE NUMBER	TYPE	REC %	BLOWS	N-VALUE	SOIL SAMPLE DESCRIPTION	ADDITIONAL LAB TESTING	GROUNDWATER OBSERVATIONS	ADDITIONAL OBSERVATIONS
S-1	SS	25	1-4-4-4	8	Dark brown, moist, loose, Sandy GRAVEL, trace silt, trace organics, poorly graded.	MC = 9.8% Fines = 4.5% GP, A-1-a		
S-2	SS	38	3-4-5-5	9	Light brown, moist, loose, fine to medium SAND, trace silt, poorly graded.		11Apr25 ▼ 11:00	6.60 ft: Observed water level at end of drilling.
S-3	SS	29	21-11-8-8	19	Tan, wet, medium dense, fine to coarse SAND, little gravel, little silt, well-graded.			
S-4	SS	50	5-4-4-5	8	Tan, wet, loose, fine to coarse SAND, little gravel, trace silt, well-graded.			
S-5	SS	42	5-5-6-5	11	Tan, wet, medium dense, fine to coarse SAND, trace gravel, trace silt, poorly graded.	MC = 22.1% Fines = 9.0% SP-SM, A-3		
S-6	SS	92	10-8-8-6	16	Tan, wet, medium dense, fine to coarse SAND, some gravel, trace silt, well-graded.			

Continued on Next Page

HAMMER TYPE: Automatic, 140lb, 30" drop

REV:

LOGGED: K. Wheeler — DATE: Apr 11, 2025
CHECKED: K. Roth — DATE: Apr 28, 2025

RECORD OF BOREHOLE: B-7

CLIENT: MassDOT Rail | DATE: April 11, 2025 | ELEVATION: 73.2 ft (Ground)
PROJECT: Cape Main Culverts & Retain. Wall | COORDINATES: N: 2752394.5 ft E: 851429.6 ft
PROJECT NO: US0035009.6582 | COORD SYS: SP MA Mainland FIPS 2001 Ft
LOCATION: MP44.27/44.29, Rochester MA | CONTRACTOR: GeoLogic Earth Explorations, Inc. | HORZ DATUM: NAD83

DRILL RIG: CME-45C — DRILL METHOD: Cased Wash - 4.50-in Hole Dia. (to 36 ft); NX Rock Core - 2.92-in Hole Dia. (36 to 41 ft)

MATERIAL PROFILE – DESCRIPTION	USCS	ELEV. / DEPTH (ft)
Sands and Gravels	SP-SM	
Bedrock		39.2 / 34.0
End of hole at 41.00 ft. Backfilled with bentonite chips and drill cuttings		32.2

SAMPLE NUMBER	TYPE	REC %	BLOWS	N-VALUE	SOIL SAMPLE DESCRIPTION	ADDITIONAL LAB TESTING	GROUNDWATER OBSERVATIONS	ADDITIONAL OBSERVATIONS
S-7	SS	29	12-8-15-9	23	Tan, wet, medium dense, fine to coarse SAND, some gravel, some silt, poorly graded.	MC = 10.3% Fines = 21.6% SM, A-1-b		34.00 ft: Advanced roller bit into hard material 34 to 36 ft bgs.
C-1		82			Light grey, fine to medium grained , extremely strong (R6), GNEISS, fresh to slightly weathered (W1 to W2); discontinuities moderately dipping (60°), widely spaced, open, planar to stepped, average 0.5 fractures per foot, infilling with sand. RQD = 81.7%.			36.00 - 41.00 ft: Rock Core Rate (min:sec per foot) 3:07 3:07 2:28 0:56 2:32

HAMMER TYPE: Automatic, 140lb, 30" drop

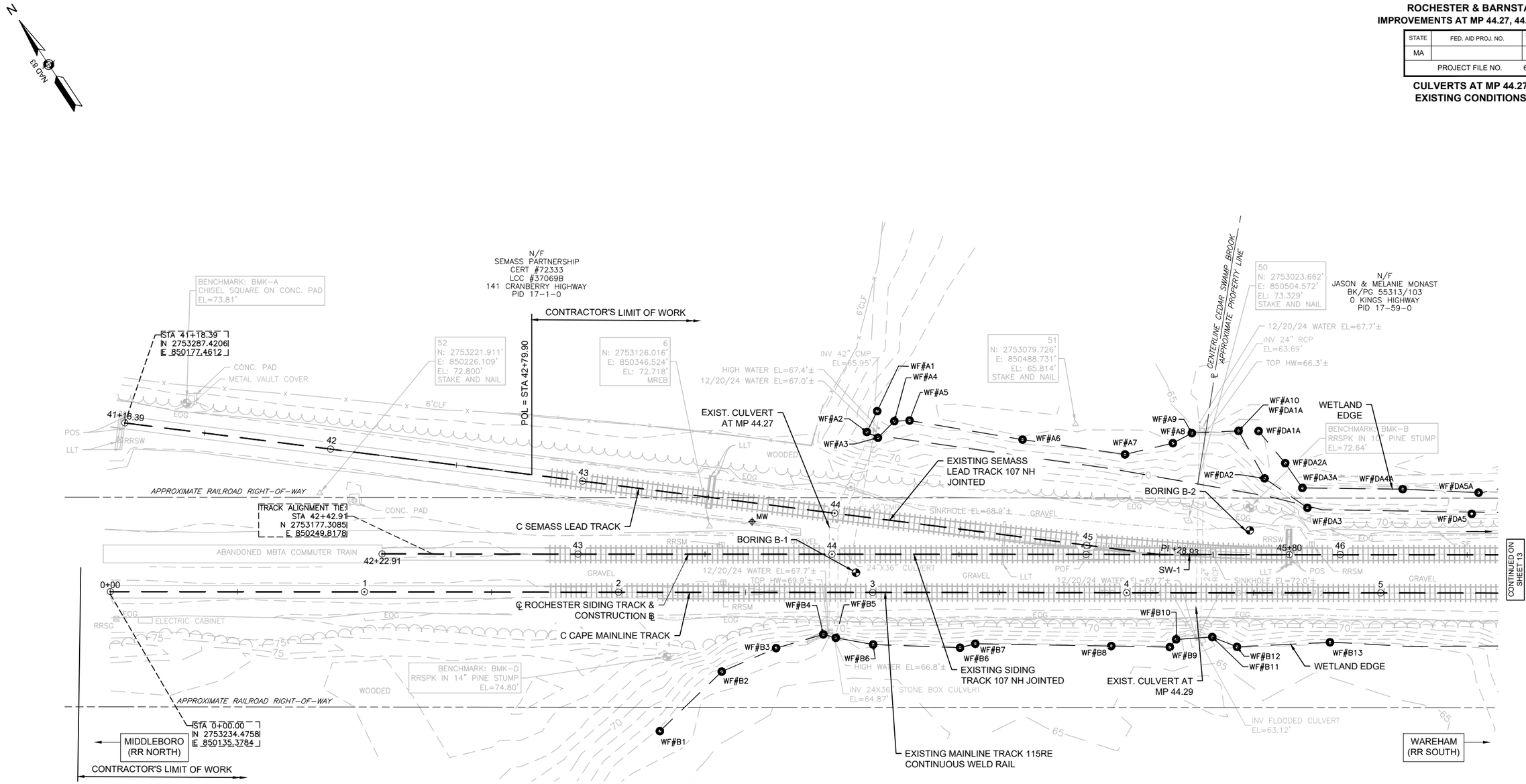
REV:

LOGGED: K. Wheeler — DATE: Apr 11, 2025
CHECKED: K. Roth — DATE: Apr 28, 2025

MASSDOT CAPE MAIN
ROCHESTER & BARNSTABLE, MA
IMPROVEMENTS AT MP 44.27, 44.29, 68.00 & 71.66

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA		12	51
PROJECT FILE NO.	614096		

CULVERTS AT MP 44.27 & 44.29
EXISTING CONDITIONS PLAN 1



NOTES:

1. WETLAND DELINEATION SHOWN ON THIS SHEET WAS PERFORMED BY WSP IN NOVEMBER 2024 AND LOCATED VIA CONVENTIONAL FIELD SURVEY IN DECEMBER 2024.
2. SEE SHEET 33 FOR EROSION PROTECTION AND WETLAND MITIGATION DETAILS.
3. SEE SHEET 34 FOR EROSION CONTROL, WETLAND REPLICATION AND PLANTING NOTES.

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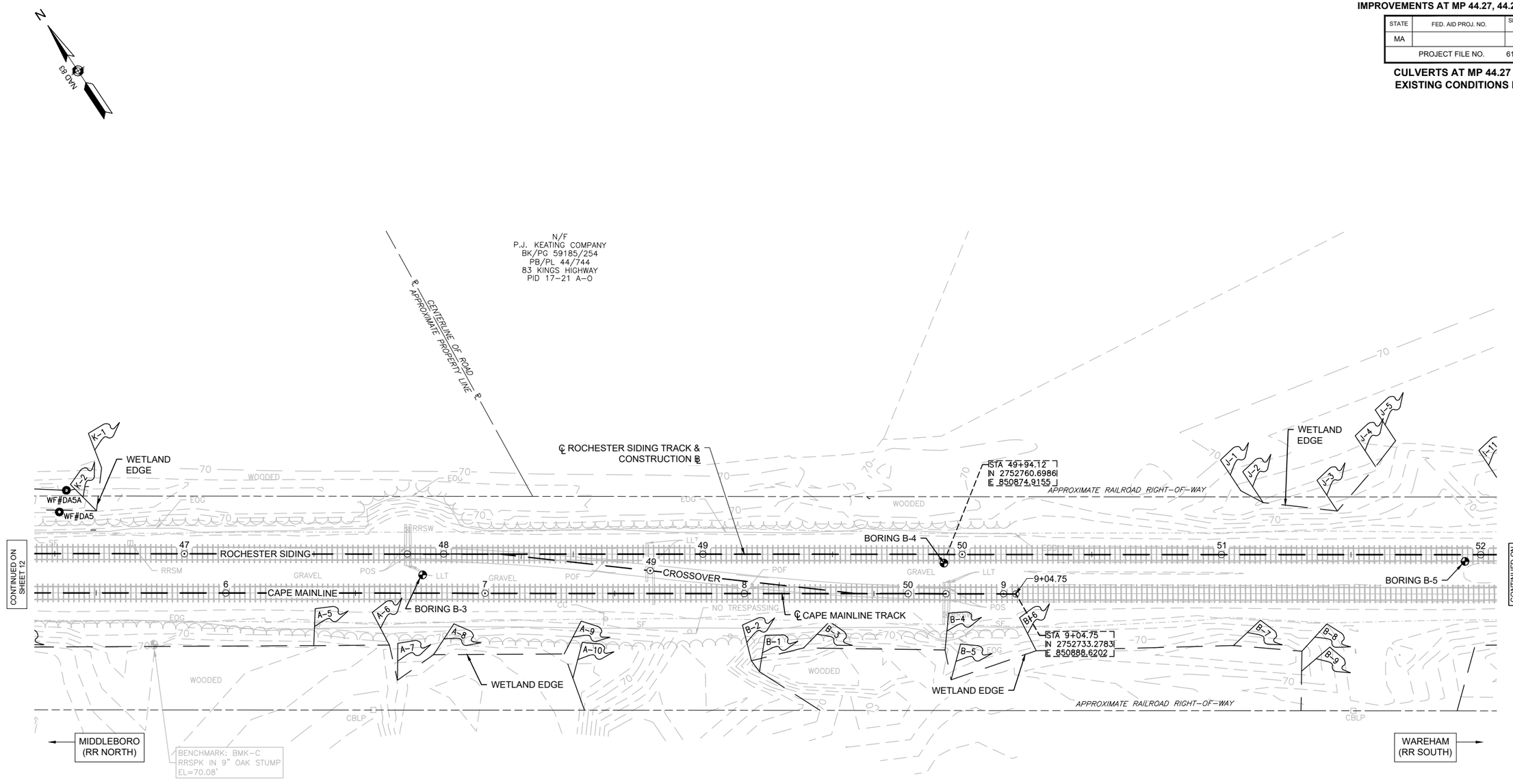
MASSDOT CAPE MAIN
ROCHESTER & BARNSTABLE, MA
IMPROVEMENTS AT MP 44.27, 44.29, 68.00 & 71.66

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA		13	51
PROJECT FILE NO.	614096		

CULVERTS AT MP 44.27 & 44.29
EXISTING CONDITIONS PLAN 2



0 20 40 80
HORIZONTAL SCALE IN FEET

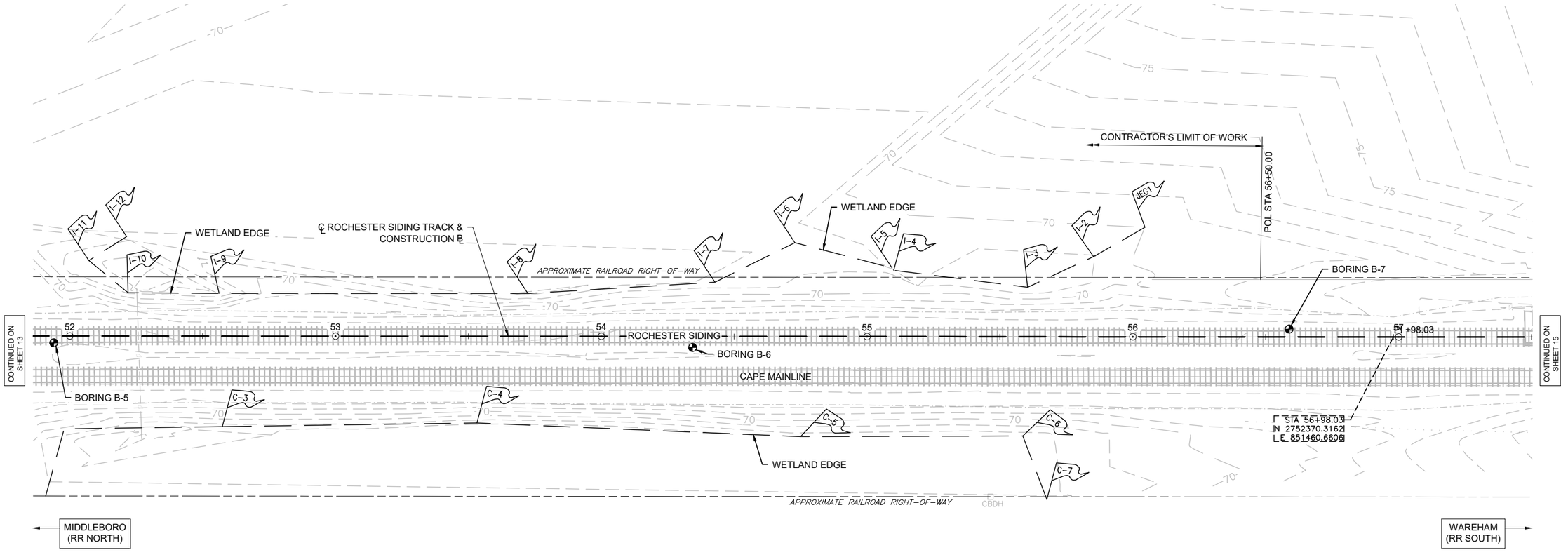
NOTES:

1. WETLAND DELINEATION SHOWN ON THIS SHEET WAS PERFORMED BY JACOBS IN APRIL 2019 AND PROVIDED BY MASSDOT/MBTA FOR USE ON THIS PROJECT. WETLAND DELINEATION VERIFICATION CONDUCTED BY WSP IN MARCH 2025.
2. SEE SHEET 33 FOR EROSION PROTECTION AND WETLAND MITIGATION DETAILS.
3. SEE SHEET 34 FOR EROSION CONTROL, WETLAND REPLICATION AND PLANTING NOTES.

MASSDOT CAPE MAIN
ROCHESTER & BARNSTABLE, MA
IMPROVEMENTS AT MP 44.27, 44.29, 68.00 & 71.66

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA		14	51
PROJECT FILE NO.	614096		

CULVERTS AT MP 44.27 & 44.29
EXISTING CONDITIONS PLAN 3



0 20 40 80
HORIZONTAL SCALE IN FEET

Plotted on 9-Jan-2026 2:07 PM

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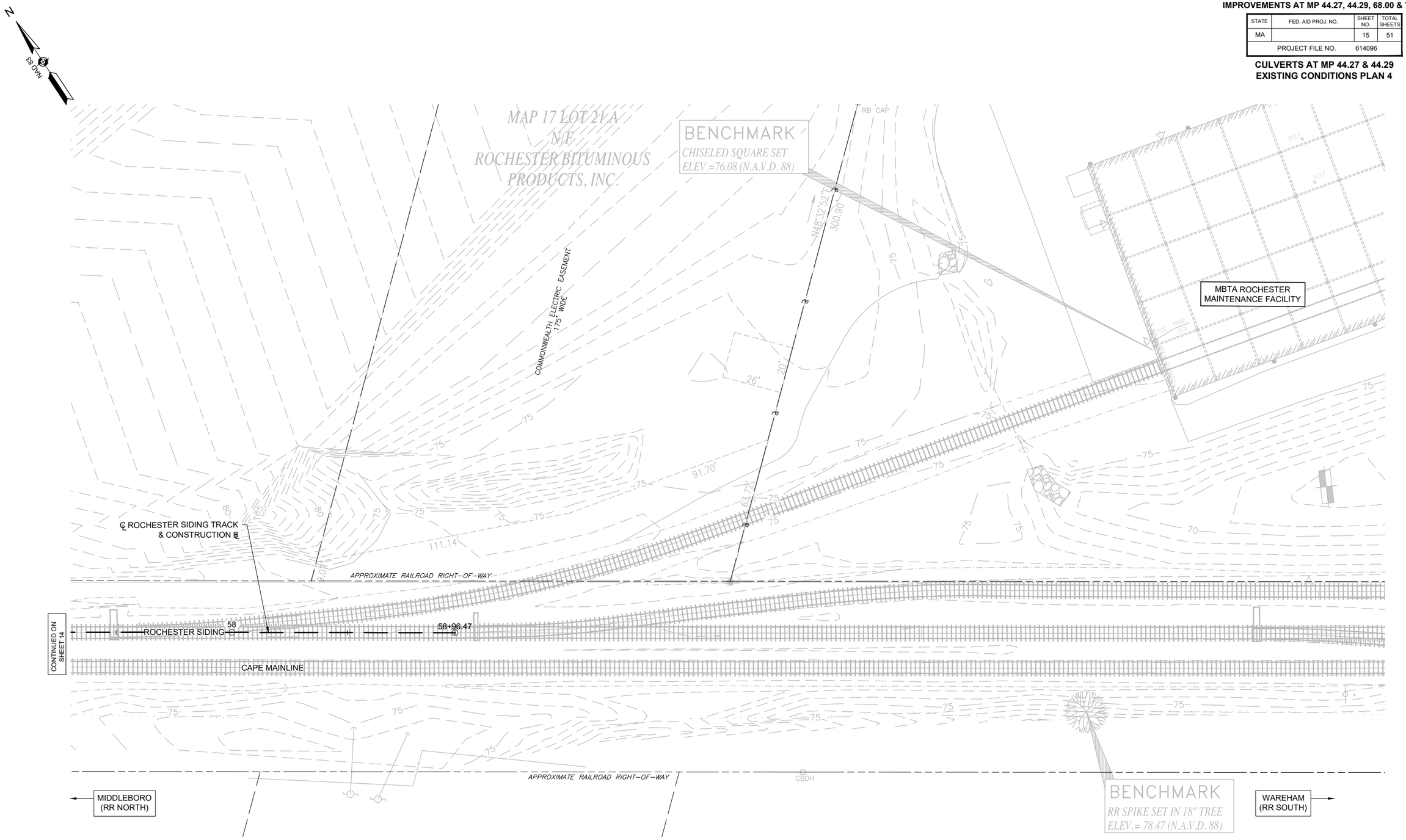
MASSDOT CAPE MAIN
ROCHESTER & BARNSTABLE, MA
IMPROVEMENTS AT MP 44.27, 44.29, 68.00 & 71.66

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA		15	51
PROJECT FILE NO.	614096		

CULVERTS AT MP 44.27 & 44.29
EXISTING CONDITIONS PLAN 4

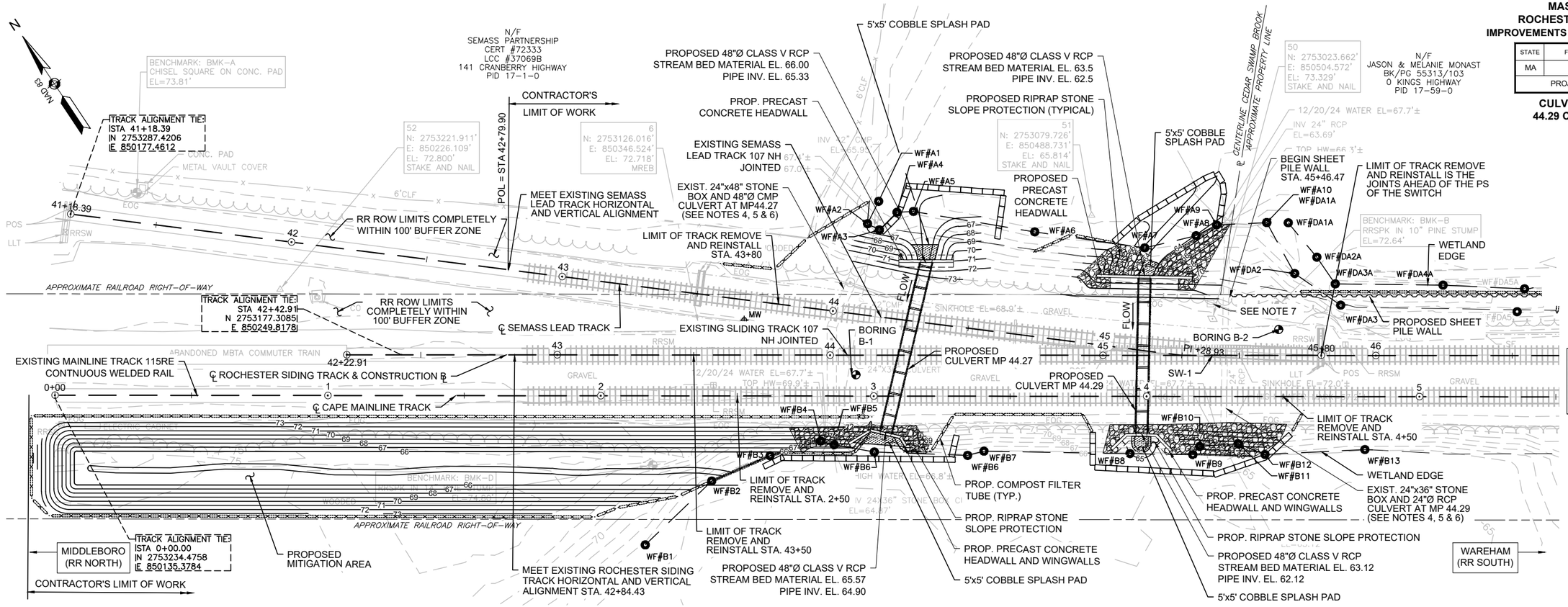


0 20 40 80
HORIZONTAL SCALE IN FEET

MASSDOT CAPE MAIN
ROCHESTER & BARNSTABLE, MA
IMPROVEMENTS AT MP 44.27, 44.29, 68.00 & 71.66

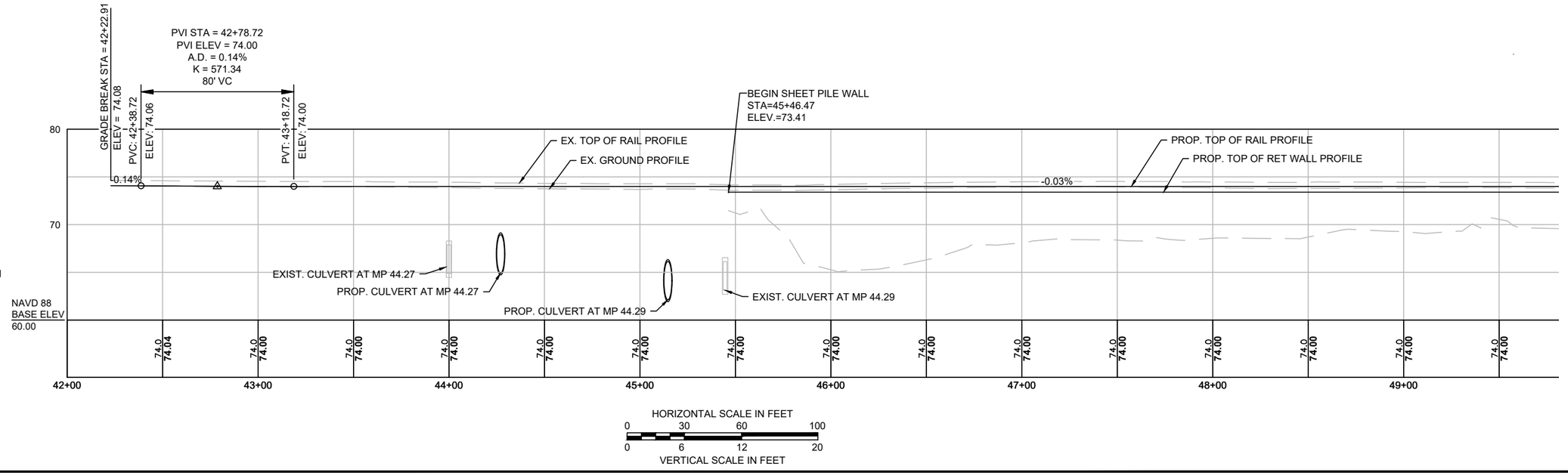
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA		16	51
PROJECT FILE NO.	614096		

CULVERTS AT MP 44.27 & 44.29 CONSTRUCTION PLAN & PROFILE 1



NOTES:

1. SEE SHEET 4 FOR GENERAL NOTES.
2. SEE SHEETS 20 & 21 FOR THE PROPOSED LONGITUDINAL AND TRANVERSE CROSS SECTIONS.
3. SEE EROSION CONTROL AND WETLAND IMPACT PLANS.
4. THROUGHOUT THE CONSTRUCTION DURATION, THE CONTRACTOR SHALL PROTECT THE EXISTING CULVERT ENDS AND INSPECT THE OPENINGS DAILY TO ASSURE THERE IS NO BLOCKAGE AND THAT WATER FLOWS FREELY.
5. EXISTING CULVERT TO REMAIN ACTIVE AND ALLOW WATER PASSAGE DURING CONSTRUCTION UNTIL THE FLOW IS DIVERTED TO THE NEW CULVERT. THE CONTRACTOR SHALL INCLUDE IN THE WORK PLAN SUBMITTAL THE INTENDED MEANS OF WATER CONTROL INCLUDING THE DESIGN, LAYOUT AND SEQUENCING OF THE TEMPORARY COFFERDAMS.
6. EXISTING CULVERTS AT MP 44.27 AND MP 44.29 TO BE RETIRED ONCE THE PROPOSED CULVERT HAS BEEN CONSTRUCTED AND IS IN ACTIVE USE. CONTRACTOR SHALL REMOVE THE ROOF OF THE STONE BOX PORTION AND FILL IN WITH COMPACTED REUSED STOCKPILED FILL. CONTRACTOR SHALL ALSO REMOVE AND DISPOSE OF THE PIPE EXTENSION.
7. EXISTING ITS POLE TO BE REMOVED AND RELOCATED BY OTHERS.



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Plotted on 9-Jan-2026 3:45 PM

MASSDOT CAPE MAIN
ROCHESTER & BARNSTABLE, MA
IMPROVEMENTS AT MP 44.27, 44.29, 68.00 & 71.66

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA		17	51
PROJECT FILE NO.	614096		

CULVERTS AT MP 44.27 & 44.29 CONSTRUCTION PLAN & PROFILE 2

Plotted on 9-Jan-2026 2:08 PM

N
GRID
MAG DEC

N/F
P.J. KEATING COMPANY
BK/PG 59185/254
PB/PL 44/744
83 KINGS HIGHWAY
PID 17-21 A-O

℄ APPROXIMATE PROPERTY LINE ℄
℄ CENTERLINE OF ROAD

5
N: 2752944.917'
E: 850612.485'
EL: 73.114'
MREB

4
N: 2752740.171'
E: 850922.754'
EL: 72.588'
SPK

PROPOSED SHEET PILE WALL

℄ ROCHESTER SIDING TRACK & CONSTRUCTION ℄

MEET EXISTING ROCHESTER SIDING TRACK HORIZONTAL AND VERTICAL ALIGNMENT

TRACK ALIGNMENT TIE:
STA 49+94.12
N 2752760.6986
E 850874.9155

PROP. COMPOST FILTER TUBE (TYP.)

WETLAND EDGE

SUGGESTED CONSTRUCTION ACCESS

WETLAND EDGE

APPROXIMATE RAILROAD RIGHT-OF-WAY

ROCHESTER SIDING

CAPE MAINLINE

℄ CAPE MAINLINE TRACK

℄ CROSSOVER

BORING B-3

BORING B-4

BORING B-5

9+04.75

TRACK ALIGNMENT TIE:
STA 9+04.75
N 2752733.2783
E 850888.6202

WETLAND EDGE

APPROXIMATE RAILROAD RIGHT-OF-WAY

CBLP

WOODED

NO TRESPASSING

BENCHMARK: BMK-C
RRSPK IN 9" OAK STUMP
EL=70.08'

CONTINUED ON SHEET NO. 16

CONTINUED ON SHEET NO. 18

MIDDLEBORO (RR NORTH)

WAREHAM (RR SOUTH)

EX. TOP OF RAIL PROFILE
EX. GROUND PROFILE
-0.03%

NAVD 88
BASE ELEV
60.00

46+50 47+00 48+00 49+00 50+00 51+00 52+00

80 70 60

HORIZONTAL SCALE IN FEET
0 20 40 80
VERTICAL SCALE IN FEET
0 4 8 16

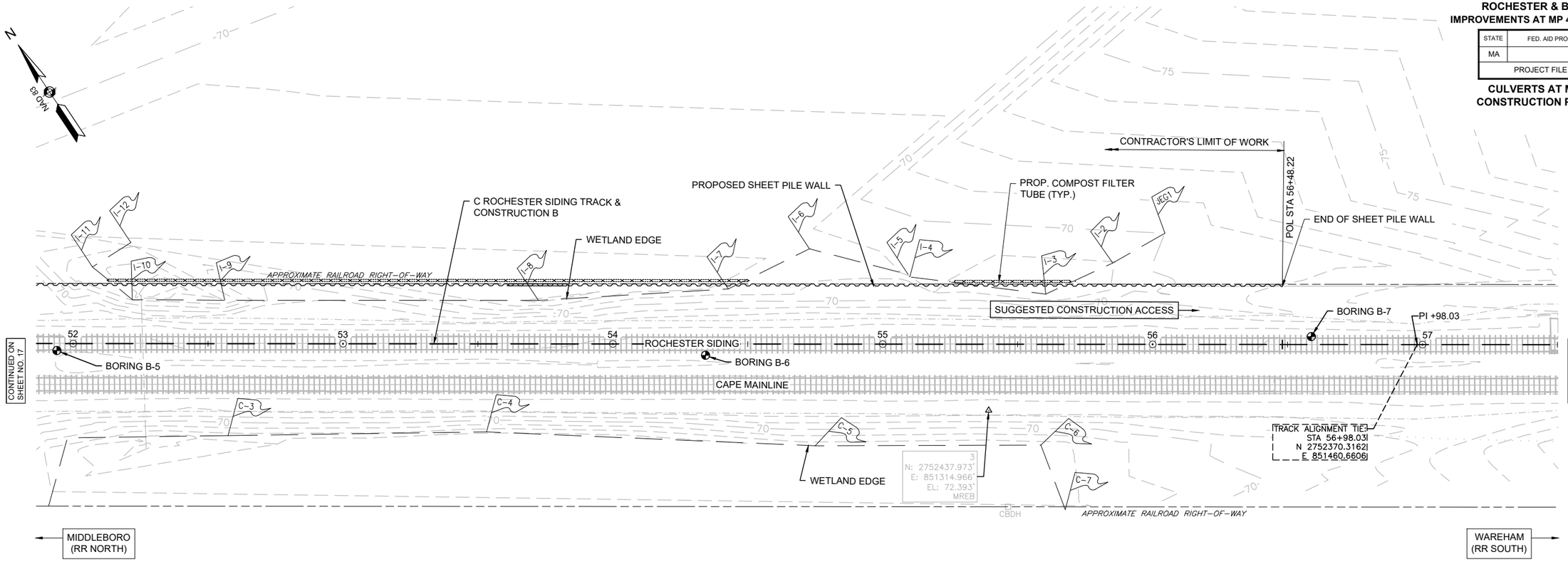
Last Saved by: USTD094214 on: Jan 9, 2026 1:25 PM File: c:\bms\wsp-us-pw-02\d10060431\TO3-MP44.2X_HD\(CONST-PLANS).dwg

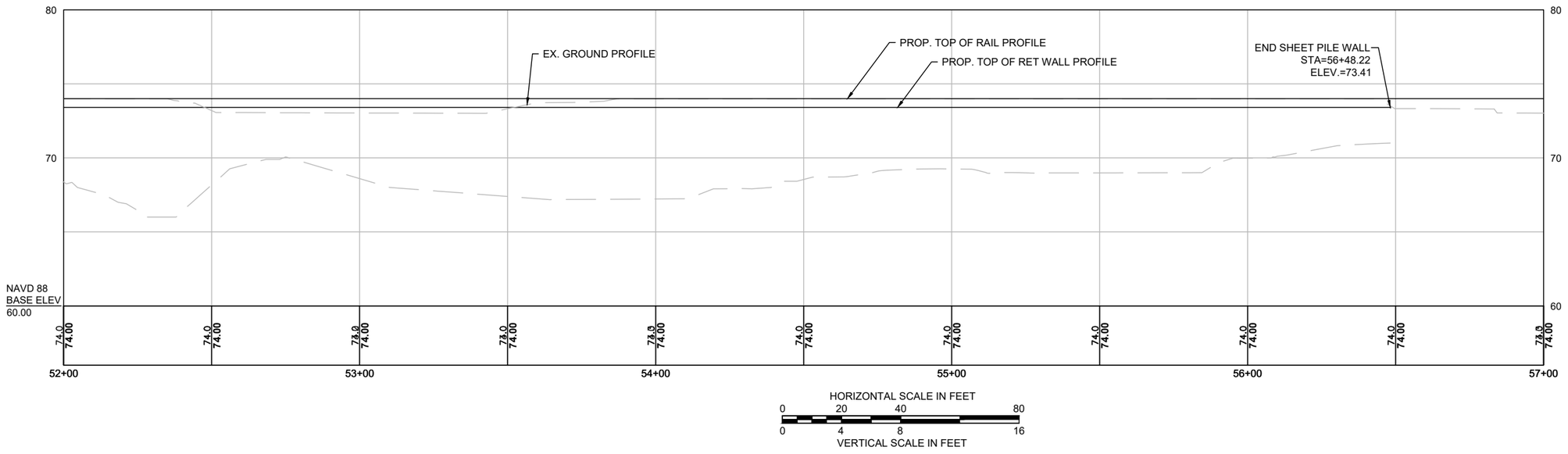
MASSDOT CAPE MAIN
ROCHESTER & BARNSTABLE, MA
IMPROVEMENTS AT MP 44.27, 44.29, 68.00 & 71.66

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA		18	51
PROJECT FILE NO.	614096		

CULVERTS AT MP 44.27 & 44.29
CONSTRUCTION PLAN & PROFILE 3

Plotted on 9-Jan-2026 2:08 PM





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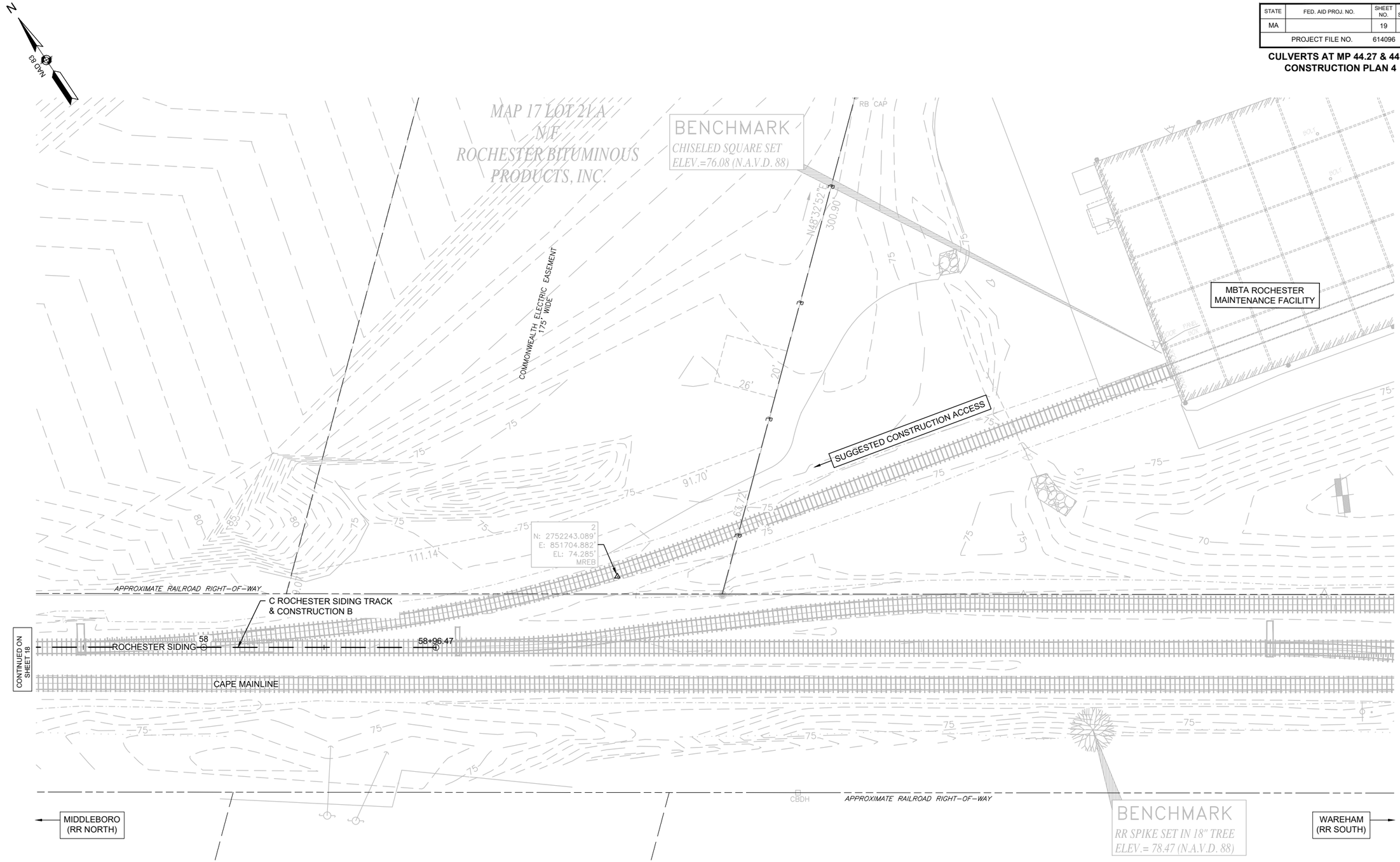
MASSDOT CAPE MAIN
ROCHESTER & BARNSTABLE, MA
IMPROVEMENTS AT MP 44.27, 44.29, 68.00 & 71.66

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA		19	51
PROJECT FILE NO.	614096		

CULVERTS AT MP 44.27 & 44.29
CONSTRUCTION PLAN 4



Plotted on 9-Jan-2026 2:08 PM

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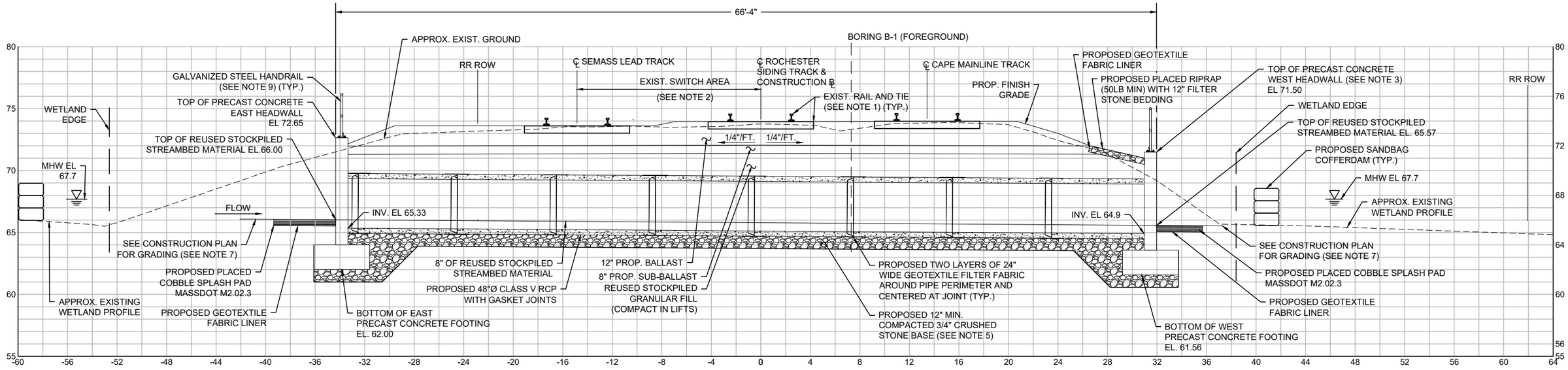
MASSDOT CAPE MAIN
ROCHESTER & BARNSTABLE, MA
IMPROVEMENTS AT MP 44.27, 44.29, 68.00 & 71.66

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA		20	51
PROJECT FILE NO.	614096		

CULVERT AT MP 44.27
SECTION



44+27

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

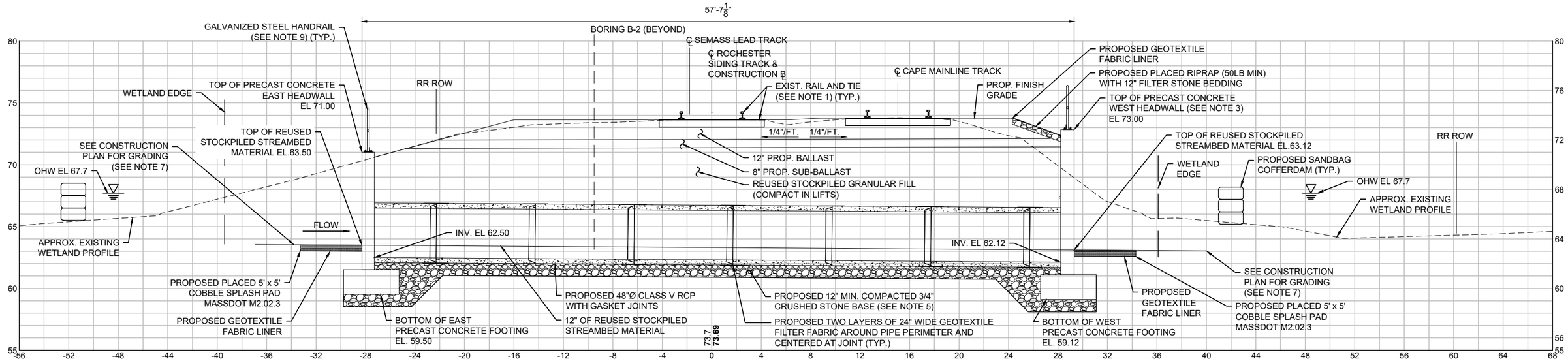
NOTES:

1. EXISTING TRACKS (RAILS AND TIES) TO BE REMOVED AND RE-INSTALLED AS NECESSARY FOR CULVERT CONSTRUCTION.
2. EXISTING TRACK SWITCH TO BE REMOVED AND RESET AS NECESSARY FOR CULVERT CONSTRUCTION.
3. PROPOSED WINGWALLS ARE NOT SHOWN FOR CLARITY.
4. THE CONTRACTOR SHALL CONTROL THE GROUNDWATER DEPTH TO A LEVEL OF 2'-0" BELOW THE BASE OF EXCAVATION.
5. THE CONTRACTOR SHALL PREPARE THE SUBGRADE BY COMPACTING THE SOIL WITH STATIC (NON-VIBRATORY) EQUIPMENT PER CONSTRUCTION SPECIFICATION. SOFT OR YIELDING AREAS OF SOIL SHALL BE EXCAVATED AND REPLACED WITH COMPACTED CRUSHED STONE OVER A NON-WOVEN GEOTEXTILE FABRIC. THE DEPTH OF CRUSHED STONE MAY VARY.
6. SEE SHEET 4 FOR GENERAL NOTES.
7. SEE SHEET 16 FOR THE CONSTRUCTION PLAN.
8. SEE SHEET 21 FOR THE PROPOSED TRANSVERSE CROSS SECTION.
9. SEE SHEET 22 FOR HEADWALL AND WINGWALL ELEVATIONS AND SECTION.
10. SEE SHEET 24 FOR HANDRAIL DETAILS AND NOTES.

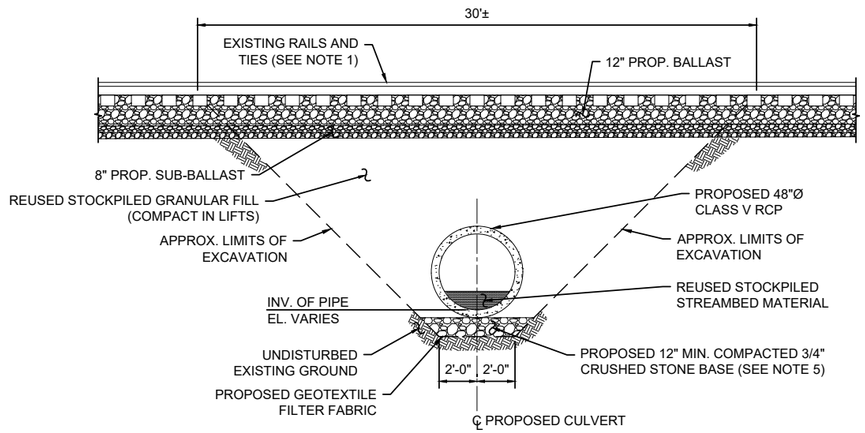
MASSDOT CAPE MAIN
ROCHESTER & BARNSTABLE, MA
IMPROVEMENTS AT MP 44.27, 44.29, 68.00 & 71.66

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA		21	51
PROJECT FILE NO.	614096		

CULVERT AT MP 44.29
SECTION



45+16



PROPOSED TRANSVERSE SECTION
NOT TO SCALE

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

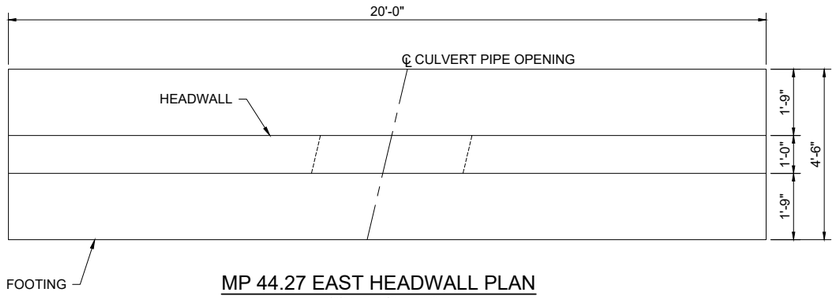
NOTES:

1. EXISTING TRACKS (RAILS AND TIES) TO BE REMOVED AND RE-INSTALLED AS NECESSARY FOR CULVERT CONSTRUCTION.
2. EXISTING TRACK SWITCH TO BE REMOVED AND RESET AS NECESSARY FOR CULVERT CONSTRUCTION.
3. PROPOSED WINGWALLS ARE NOT SHOWN FOR CLARITY.
4. THE CONTRACTOR SHALL CONTROL THE GROUNDWATER DEPTH TO A LEVEL OF 2'-0" BELOW THE BASE OF EXCAVATION.
5. THE CONTRACTOR SHALL PREPARE THE SUBGRADE BY COMPACTING THE SOIL WITH STATIC (NON-VIBRATORY) EQUIPMENT PER CONSTRUCTION SPECIFICATION. SOFT OR YIELDING AREAS OF SOIL SHALL BE EXCAVATED AND REPLACED WITH COMPACTED CRUSHED STONE OVER A NON-WOVEN GEOTEXTILE FABRIC. THE DEPTH OF CRUSHED STONE MAY VARY.
6. SEE SHEET 4 FOR GENERAL NOTES.
7. SEE SHEET 16 FOR THE CONSTRUCTION PLAN.
8. SEE SHEET 23 FOR HEADWALL AND WINGWALL ELEVATIONS AND SECTION.
9. SEE SHEET 24 FOR HANDRAIL DETAILS AND NOTES.

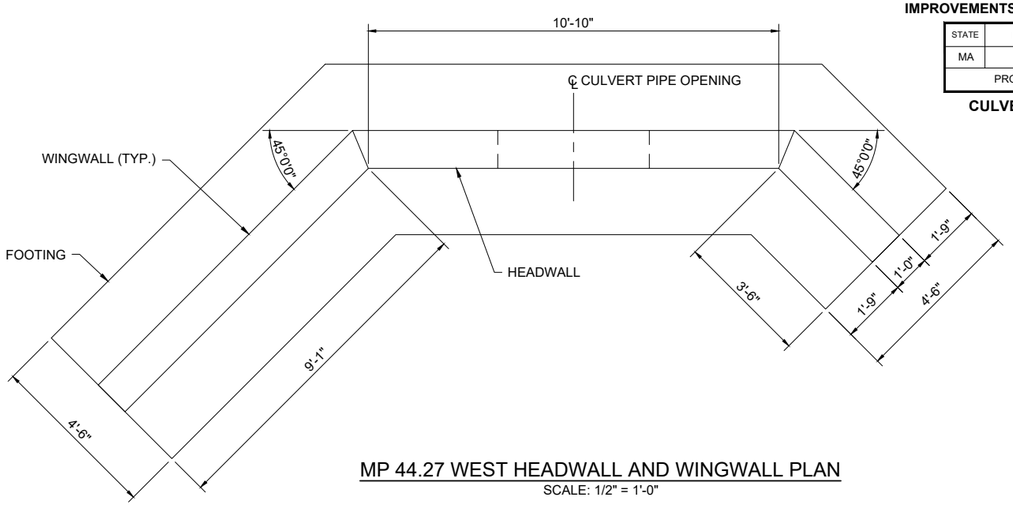
MASSDOT CAPE MAIN
ROCHESTER & BARNSTABLE, MA
IMPROVEMENTS AT MP 44.27, 44.29, 68.00 & 71.66

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA		22	51
PROJECT FILE NO.	614096		

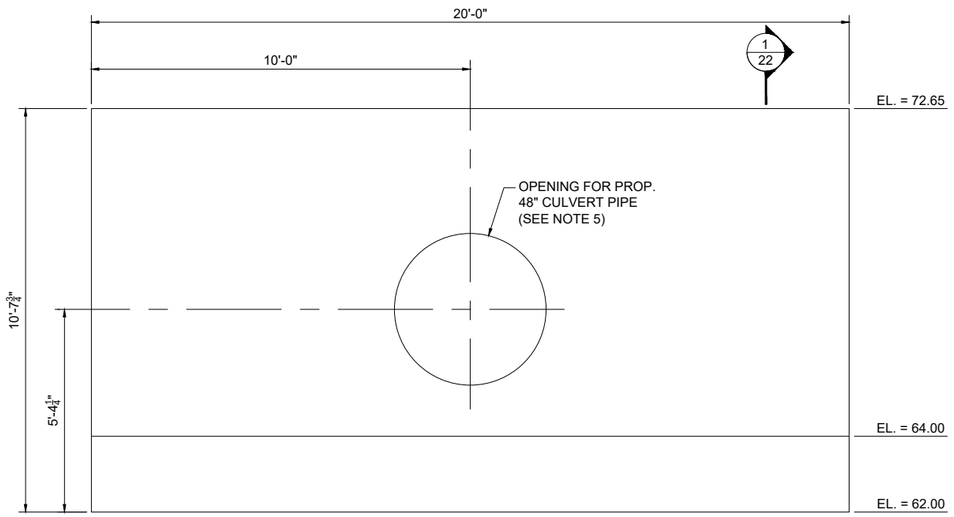
CULVERT DETAILS MP 44.27



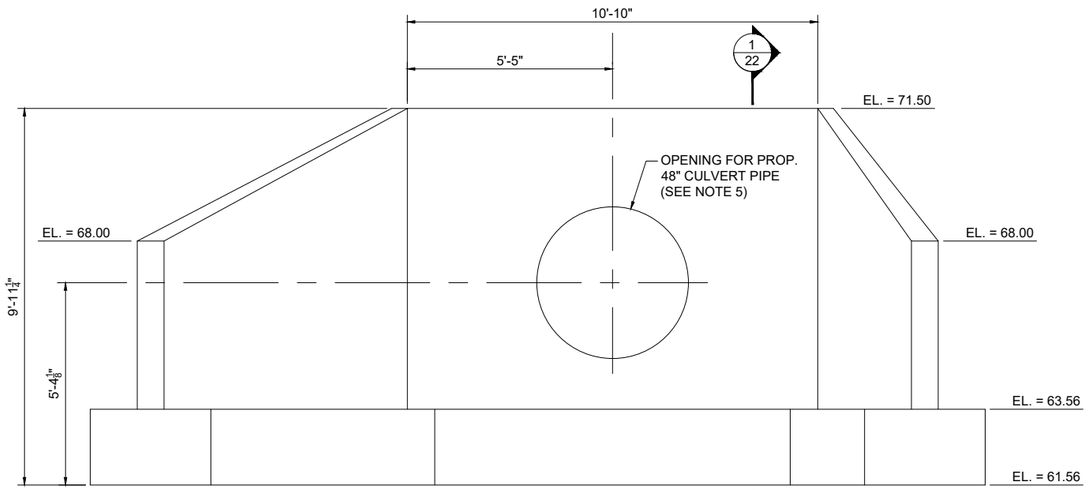
MP 44.27 EAST HEADWALL PLAN
SCALE: 1/2" = 1'-0"



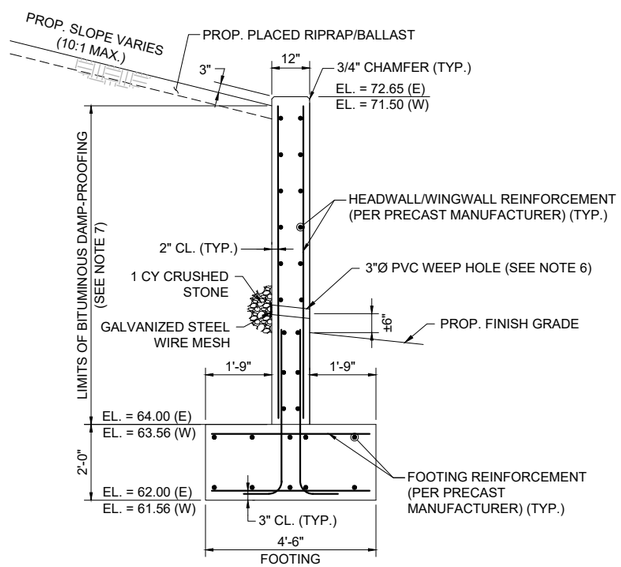
MP 44.27 WEST HEADWALL AND WINGWALL PLAN
SCALE: 1/2" = 1'-0"



MP 44.27 EAST HEADWALL ELEVATION
SCALE: 1/2" = 1'-0"



MP 44.27 WEST HEADWALL AND WINGWALL ELEVATION
SCALE: 1/2" = 1'-0"



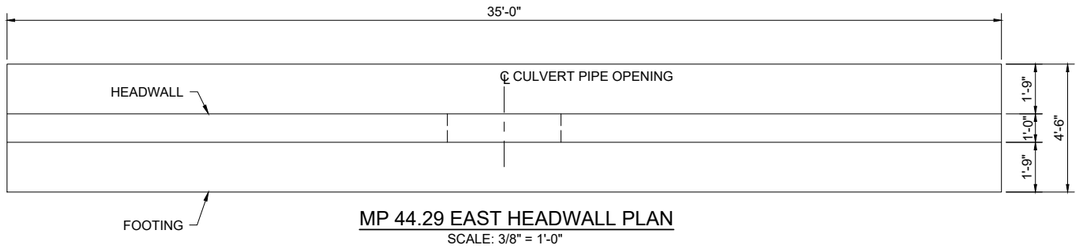
SECTION 1
SCALE: 1/2" = 1'-0"

NOTES:

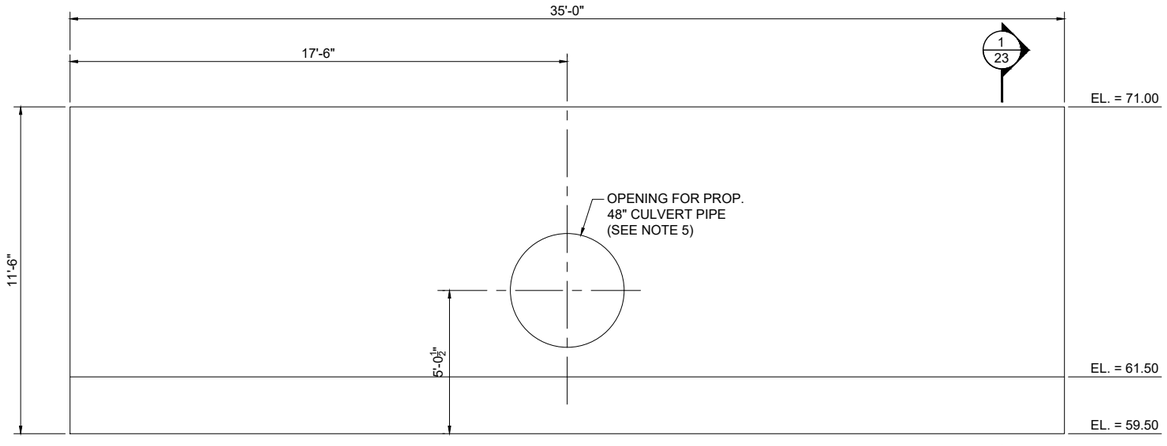
1. SEE SHEET 4 FOR GENERAL NOTES.
2. SEE SHEET 16 FOR THE CONSTRUCTION PLAN.
3. SEE SHEET 20 FOR THE PROPOSED LONGITUDINAL CROSS SECTION.
4. SEE SHEET 24 FOR HANDRAIL DETAILS AND NOTES.
5. HEADWALL OPENING SIZE PER THE PRECAST MANUFACTURER. 5000 PSI NON-SHRINK GROUT SHALL BE PLACED AROUND THE PIPE TO SEAL THE OPENING.
6. WEEP HOLES SHALL BE PER THE SPECIFICATIONS AND SLOPED TO DRAIN TO THE EXPOSED FACE. SUGGESTED WEEP HOLE SIZE SHOWN. WEEP HOLE SIZE AND SPACING TO BE DETERMINED BY THE PRECAST MANUFACTURER.
7. BITUMINOUS DAMP-PROOFING SHALL BE APPLIED TO THE BACK FACE OF THE HEADWALLS AND WINGWALLS.

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA		23	51
PROJECT FILE NO.	614096		

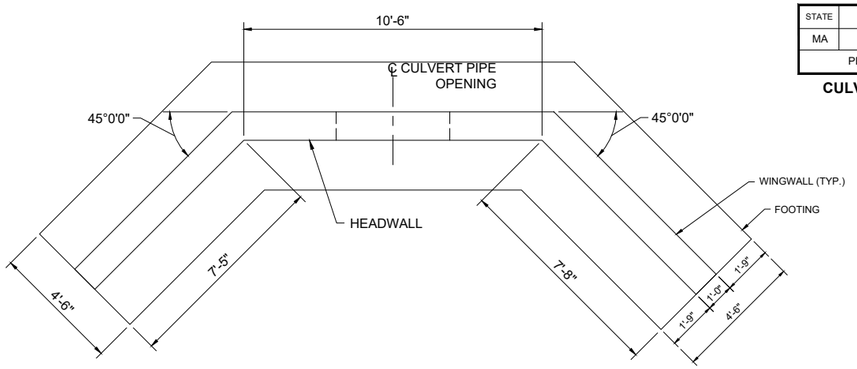
CULVERT DETAILS MP 44.29



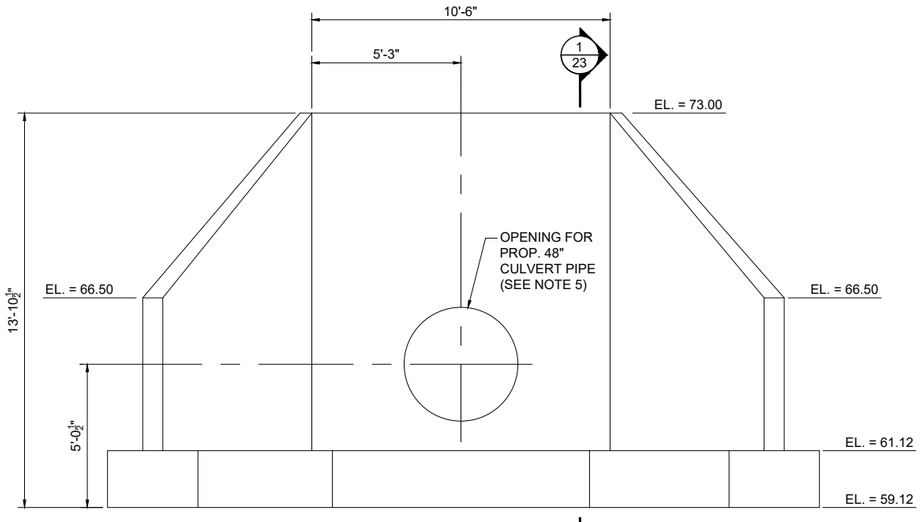
MP 44.29 EAST HEADWALL PLAN
SCALE: 3/8" = 1'-0"



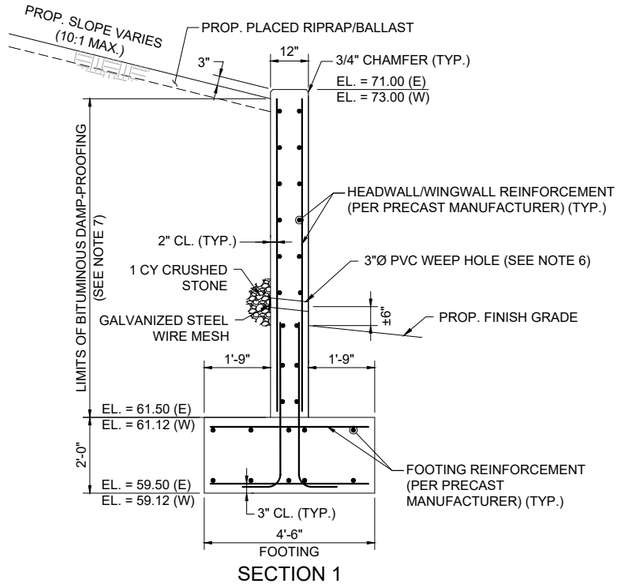
MP 44.29 EAST HEADWALL ELEVATION
SCALE: 3/8" = 1'-0"



MP 44.29 WEST HEADWALL AND WINGWALL PLAN
SCALE: 3/8" = 1'-0"



MP 44.29 WEST HEADWALL AND WINGWALL ELEVATION
SCALE: 3/8" = 1'-0"



SECTION 1
SCALE: 1/2" = 1'-0"

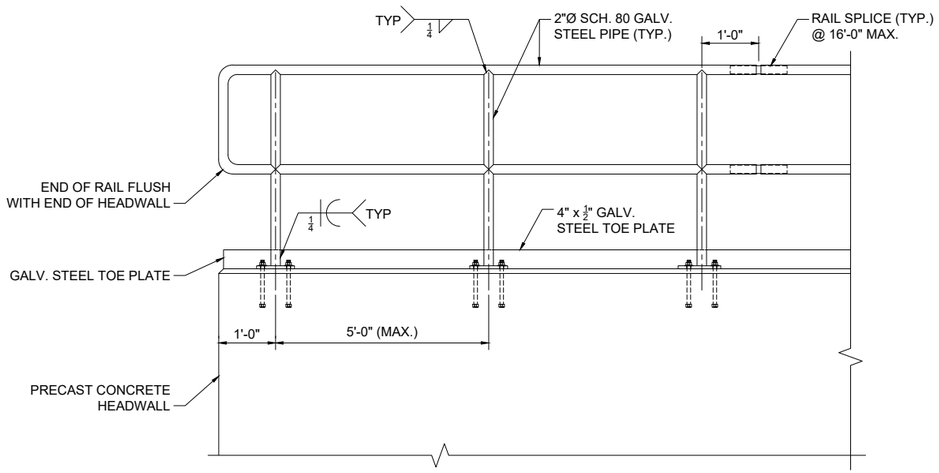
NOTES:

1. SEE SHEET 4 FOR GENERAL NOTES.
2. SEE SHEET 16 FOR THE CONSTRUCTION PLAN.
3. SEE SHEET 21 FOR THE PROPOSED LONGITUDINAL CROSS SECTION.
4. SEE SHEET 24 FOR HANDRAIL DETAILS AND NOTES.
5. HEADWALL OPENING SIZE PER THE PRECAST MANUFACTURER. 5000 PSI NON-SHRINK GROUT SHALL BE PLACED AROUND THE PIPE TO SEAL THE OPENING.
6. WEEP HOLES SHALL BE PER THE SPECIFICATIONS AND SLOPED TO DRAIN TO THE EXPOSED FACE. SUGGESTED WEEP HOLE SIZE SHOWN. WEEP HOLE SIZE AND SPACING TO BE DETERMINED BY THE PRECAST MANUFACTURER.
7. BITUMINOUS DAMP-PROOFING SHALL BE APPLIED TO THE BACK FACE OF THE HEADWALLS AND WINGWALLS.

MASSDOT CAPE MAIN
ROCHESTER & BARNSTABLE, MA
IMPROVEMENTS AT MP 44.27, 44.29, 68.00 & 71.66

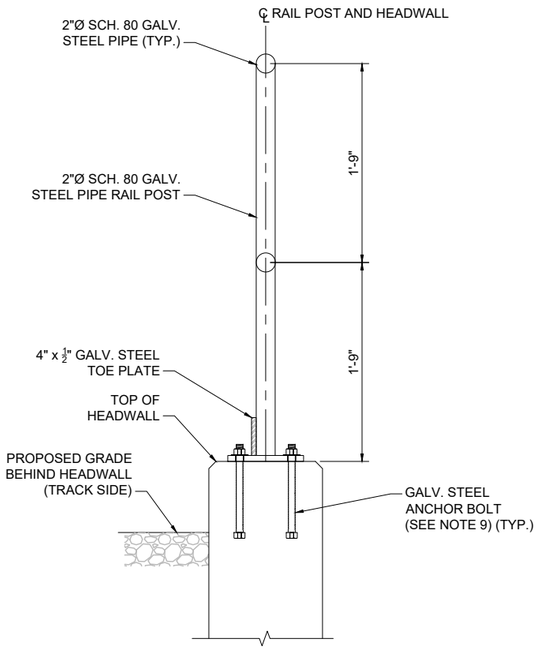
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA		24	51
PROJECT FILE NO.	614096		

HANDRAIL DETAILS



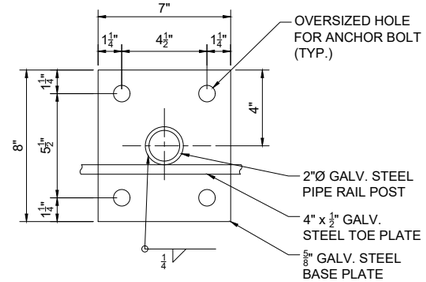
HANDRAIL DETAIL ELEVATION

SCALE: $\frac{3}{4}$" = 1'-0"



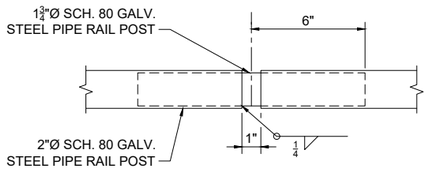
HANDRAIL DETAIL SECTION

SCALE: $1\frac{1}{2}$" = 1'-0"



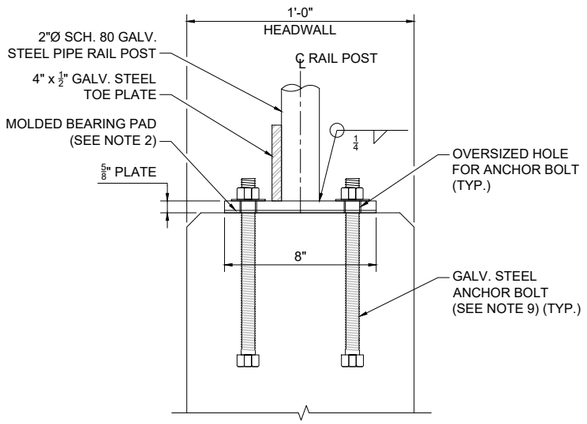
BASE PLATE DETAIL

SCALE: 3" = 1'-0"



RAIL SPLICE DETAIL

SCALE: 3" = 1'-0"



HEADWALL CONNECTION DETAIL

SCALE: 3" = 1'-0"

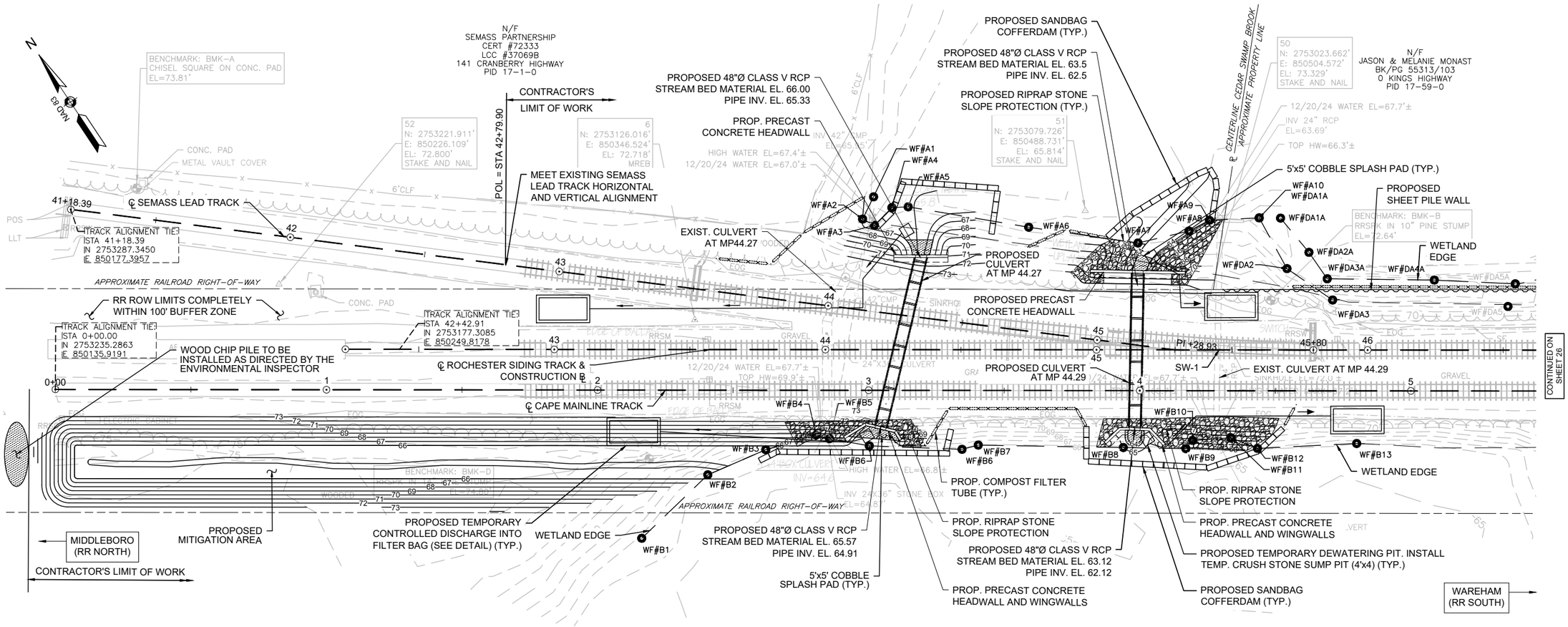
NOTES:

1. THE NUT SECURING THE POST BASE PLATE TO THE CONCRETE SHALL BE TIGHTENED TO A SNUG FIT, AND THEN GIVEN AN ADDITIONAL 1/8 TURN AFTER THE STEEL IS IN PLACE.
2. BOTTOM OF POST BASE PLATE TO BE SET ON AN 1/8" MOLDED FABRIC BEARING PAD (M9.16.2). THE THICKNESS OF THE PAD SHALL BE IGNORED BY THE DETAILER.
3. POSTS SHALL BE SET PLUMB. RAILS SHALL BE PARALLEL TO THE PROFILE GRADE LINE.
4. MAXIMUM POST SPACING = 5'-0"
5. HORIZONTAL RAILING COMPONENTS ARE TO HAVE FIXED CONNECTIONS AT ONE POST AND SLIDING CONNECTIONS AT THE OTHER. EACH POST IS TO HAVE ALL SLIDING CONNECTIONS ON ONE SIDE AND ALL FIXED CONNECTIONS ON THE OTHER.
6. THE CONTRACTOR MAY USE 90 DEGREE ELBOWS IN LIEU OF THE END CAP DETAILS AT THE END OF THE HANDRAIL SECTIONS.
7. RAIL BASE PLATES, AND OTHER PLATES SHALL CONFORM TO THE REQUIREMENTS OF AASHTO M 270 GRADE 50. CVN TESTS NOT REQUIRED. BASE PLATES TO BE GALVANIZED AND PAINTED BLACK.
8. PIPE RAILS AND POSTS SHALL CONFORM TO THE REQUIREMENTS OF ASTM A53 GRADE B AND SHALL BE GALVANIZED.
9. ANCHOR BOLTS, NUTS, AND WASHERS SHALL CONFORM TO ASTM F1554, AND SHALL BE GALVANIZED. ANCHOR BOLTS MAY BE CAST IN PLACE OR POST INSTALLED PER PRECAST CONCRETE MANUFACTURER PREFERENCE. THE CONTRACTOR SHALL COORDINATE ANCHOR BOLT FABRICATION AND INSTALLATION BETWEEN THE HANDRAIL FABRICATOR AND PRECAST CONCRETE MANUFACTURER AS REQUIRED. SEE CONSTRUCTION SPECIFICATIONS FOR REQUIREMENTS.
10. ALL WELDING PROCEDURE SHALL BE IN CONFORMANCE WITH AREMA/AWS, AND SHALL BE DONE BY E70XX ELECTRODES.

MASSDOT CAPE MAIN
ROCHESTER & BARNSTABLE, MA
IMPROVEMENTS AT MP 44.27, 44.29, 68.00 & 71.66

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA		25	51
PROJECT FILE NO.		614096	

CULVERTS AT MP 44.27 AND 44.29
EROSION CONTROL PLAN 1



NOTES:

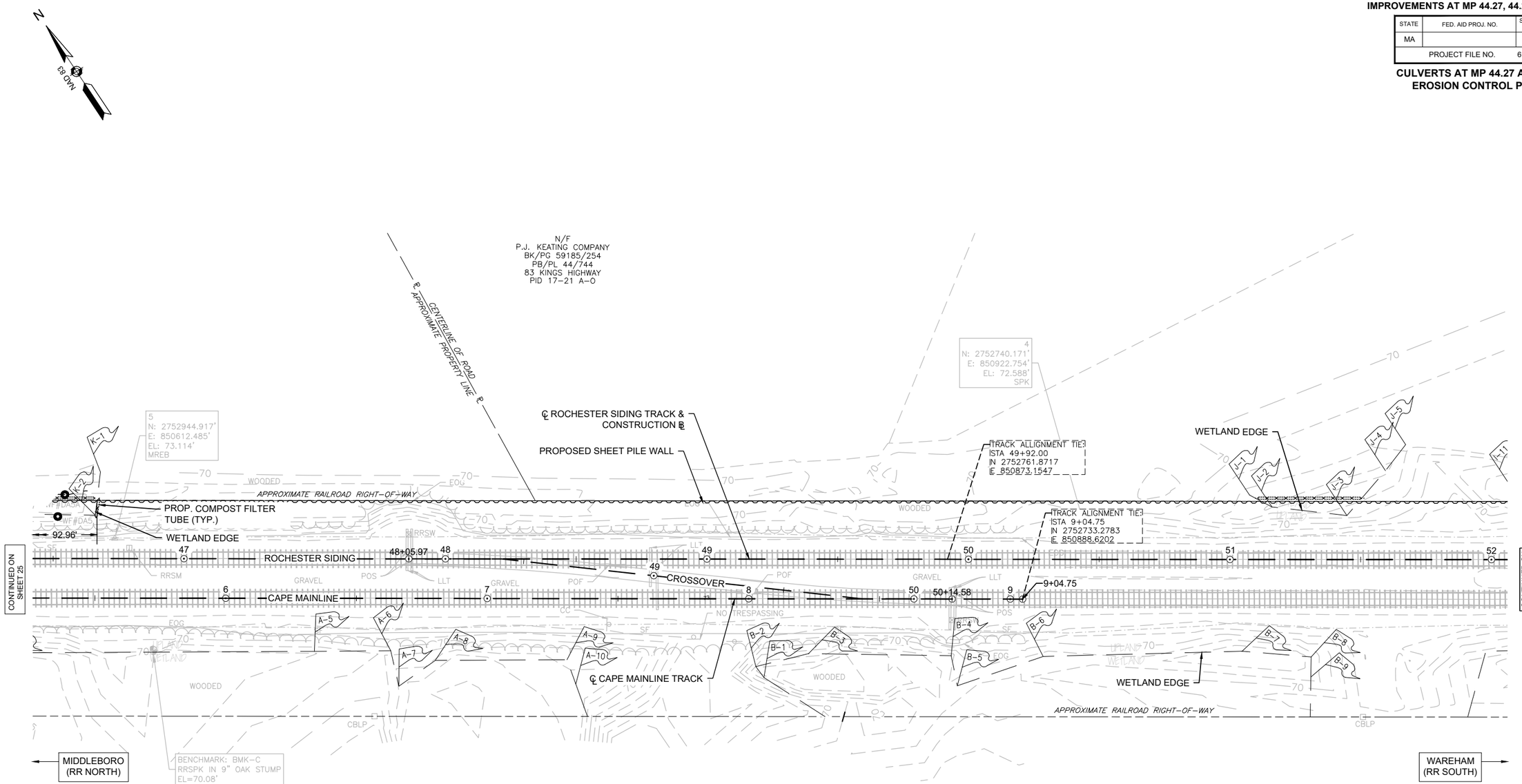
1. WETLAND DELINEATION SHOWN ON THIS SHEET WAS PERFORMED BY WSP IN NOVEMBER 2024 AND LOCATED VIA CONVENTIONAL FIELD SURVEY IN DECEMBER 2024.
2. SEE SHEET 33 FOR EROSION PROTECTION AND WETLAND MITIGATION DETAILS.
3. SEE SHEET 34 FOR EROSION CONTROL, WETLAND REPLICATION AND PLANTING NOTES.

0 20 40 80
HORIZONTAL SCALE IN FEET

MASSDOT CAPE MAIN
ROCHESTER & BARNSTABLE, MA
IMPROVEMENTS AT MP 44.27, 44.29, 68.00 & 71.66

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA		26	51
PROJECT FILE NO.	614096		

CULVERTS AT MP 44.27 AND 44.29
EROSION CONTROL PLAN 2



NOTES:

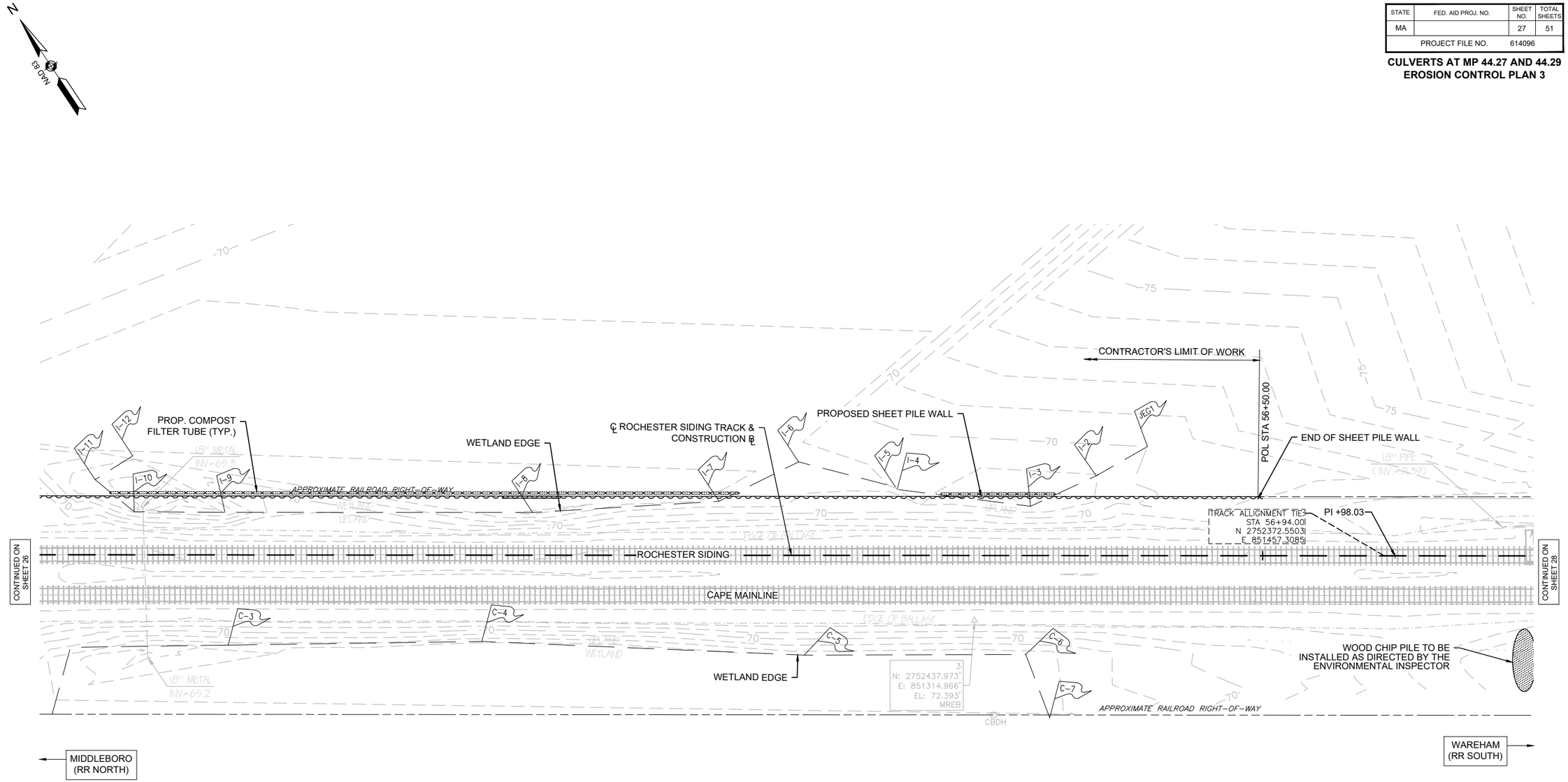
1. WETLAND DELINEATION SHOWN ON THIS SHEET WAS PERFORMED BY JACOBS IN APRIL 2019 AND PROVIDED BY MASSDOT/MBTA FOR USE ON THIS PROJECT. WETLAND DELINEATION VERIFICATION CONDUCTED BY WSP IN MARCH 2025.
2. SEE SHEET 33 FOR EROSION PROTECTION AND WETLAND MITIGATION DETAILS.
3. SEE SHEET 34 FOR EROSION CONTROL, WETLAND REPLICATION AND PLANTING NOTES.

0 20 40 80
HORIZONTAL SCALE IN FEET

MASSDOT CAPE MAIN
ROCHESTER & BARNSTABLE, MA
IMPROVEMENTS AT MP 44.27, 44.29, 68.00 & 71.66

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA		27	51
PROJECT FILE NO.	614096		

CULVERTS AT MP 44.27 AND 44.29
EROSION CONTROL PLAN 3



NOTES:

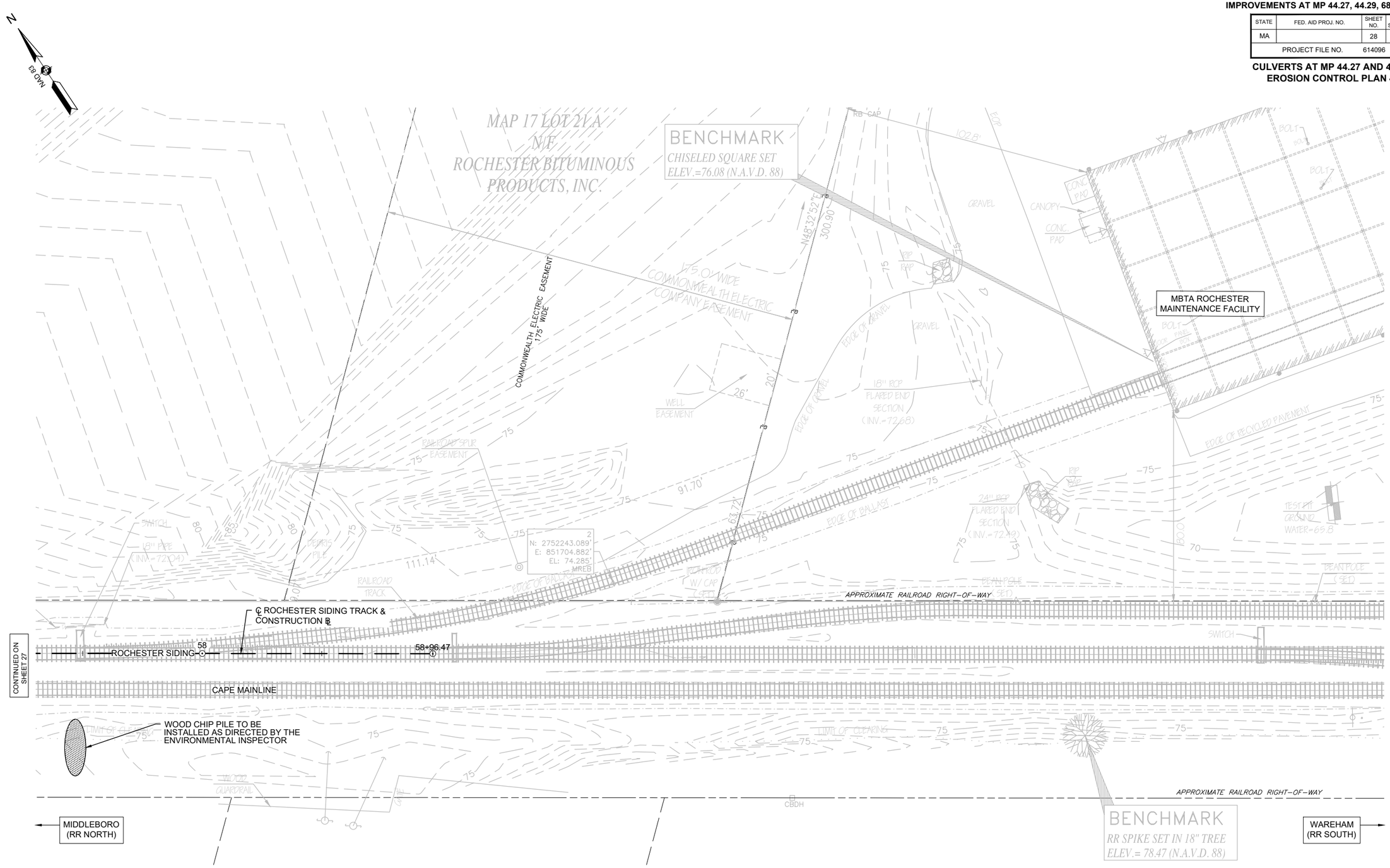
1. WETLAND DELINEATION SHOWN ON THIS SHEET WAS PERFORMED BY JACOBS IN APRIL 2019 AND PROVIDED BY MASSDOT/MBTA FOR USE ON THIS PROJECT. WETLAND DELINEATION VERIFICATION CONDUCTED BY WSP IN MARCH 2025.
2. SEE SHEET 33 FOR EROSION PROTECTION AND WETLAND MITIGATION DETAILS.
3. SEE SHEET 34 FOR EROSION CONTROL, WETLAND REPLICATION AND PLANTING NOTES.

0 20 40 80
HORIZONTAL SCALE IN FEET

MASSDOT CAPE MAIN
ROCHESTER & BARNSTABLE, MA
IMPROVEMENTS AT MP 44.27, 44.29, 68.00 & 71.66

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA		28	51
PROJECT FILE NO.	614096		

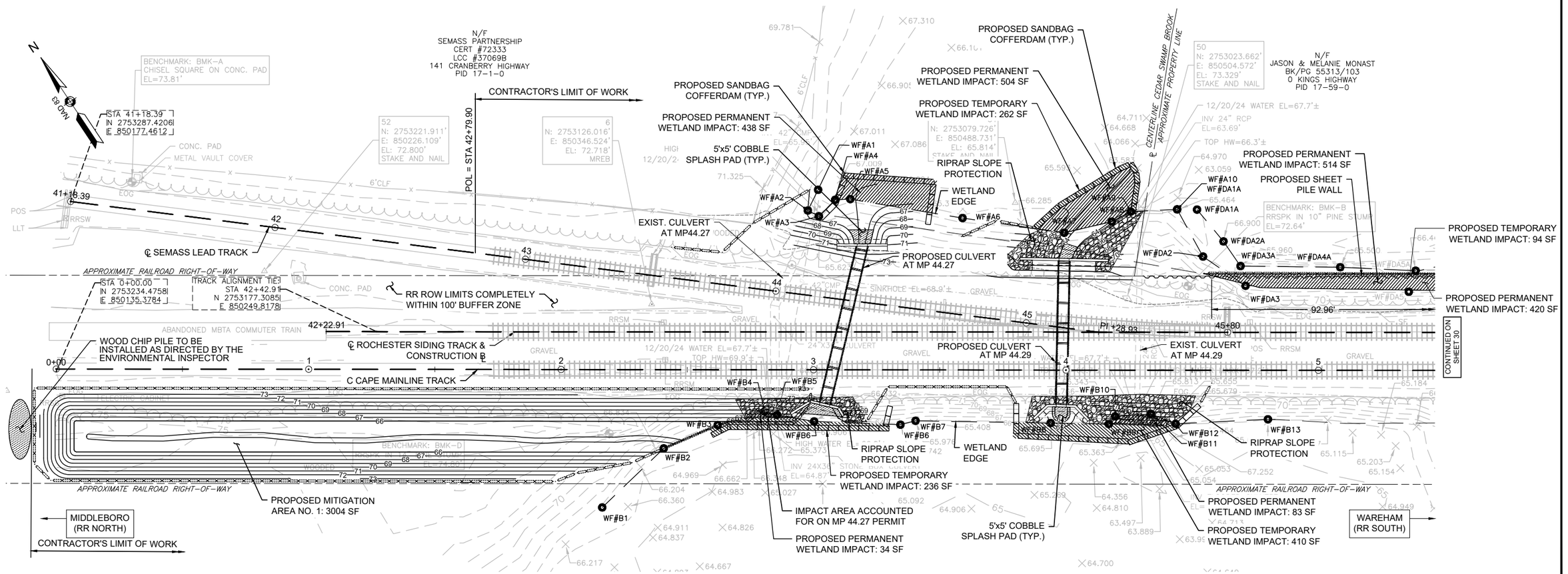
CULVERTS AT MP 44.27 AND 44.29
EROSION CONTROL PLAN 4



MASSDOT CAPE MAIN
ROCHESTER & BARNSTABLE, MA
IMPROVEMENTS AT MP 44.27, 44.29, 68.00 & 71.66

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA		29	51
PROJECT FILE NO.	614096		

CULVERTS AT MP 44.27 AND 44.29
WETLAND IMPACT PLAN 1



WETLAND MITIGATION AREA PLANTING SCHEDULE				
Common Name	**Scientific Name**	**Type**	**Spacing**	**Number**
Red Maple	*Acer rubrum*	Bag n Ball	10 ft	15
Silver Maple	*Acer saccharum*	Bag n Ball	10 ft	15
Pussy Willow	*Salix discolor*	Tube	10 ft	20
Sweet pepperbush	*Clethra alnifolia*	1-gallon	8 ft	15
Lowbush blueberry	*Vaccinium angustifolium*	1-gallon	8 ft	15
Highbush blueberry	*Vaccinium corymbosum*	1-gallon	8 ft	15
Steeplebush	*Spiraea tomentosa*	1-gallon	8 ft	20
Tussock sedge	*Carex stricta*	Plug	12 in	30
New England Wetmix		Seed rate: 2500 sf/lb		

LEGEND:
- TEMPORARY WETLAND IMPACTS
- PERMANENT WETLAND IMPACT

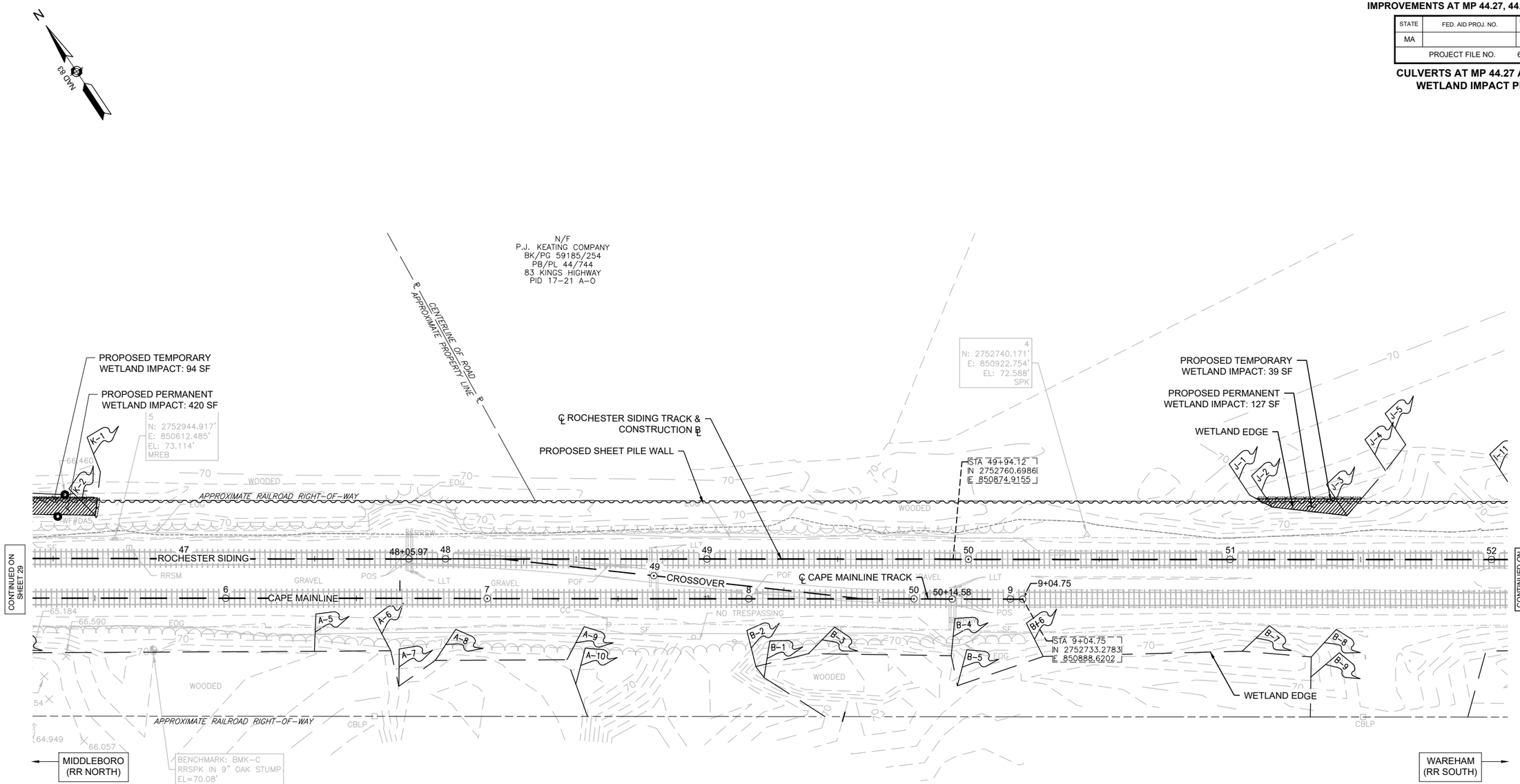
0 20 40 80
HORIZONTAL SCALE IN FEET

NOTES:
1. WETLAND DELINEATION SHOWN ON THIS SHEET WAS PERFORMED BY WSP IN NOVEMBER 2024 AND LOCATED VIA CONVENTIONAL FIELD SURVEY IN DECEMBER 2024.
2. SEE SHEET 33 FOR EROSION PROTECTION AND WETLAND MITIGATION DETAILS.
3. SEE SHEET 34 FOR EROSION CONTROL, WETLAND REPLICATION AND PLANTING NOTES.

MASSDOT CAPE MAIN
ROCHESTER & BARNSTABLE, MA
IMPROVEMENTS AT MP 44.27, 44.29, 68.00 & 71.66

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA		30	51
PROJECT FILE NO.	614096		

CULVERTS AT MP 44.27 AND 44.29
WETLAND IMPACT PLAN 2



LEGEND:

- TEMPORARY WETLAND IMPACTS
- PERMANENT WETLAND IMPACT

NOTES:

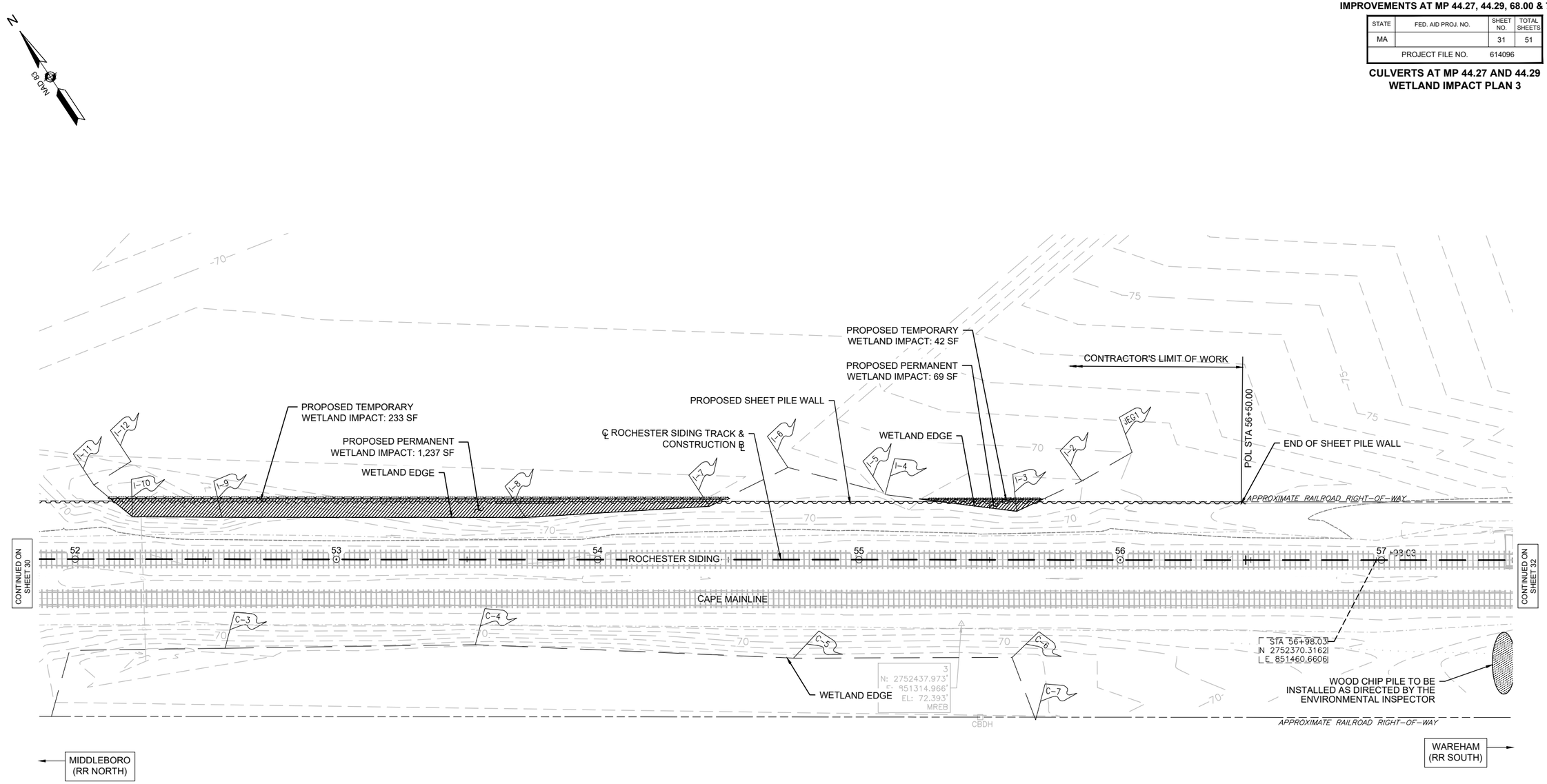
1. WETLAND DELINEATION SHOWN ON THIS SHEET WAS PERFORMED BY JACOBS IN APRIL 2019 AND PROVIDED BY MASSDOT/MBTA FOR USE ON THIS PROJECT. WETLAND DELINEATION VERIFICATION CONDUCTED BY WSP IN MARCH 2025.
2. SEE SHEET 33 FOR EROSION PROTECTION AND WETLAND MITIGATION DETAILS.
3. SEE SHEET 34 FOR EROSION CONTROL, WETLAND REPLICATION AND PLANTING NOTES.

0 20 40 80
HORIZONTAL SCALE IN FEET

MASSDOT CAPE MAIN
ROCHESTER & BARNSTABLE, MA
IMPROVEMENTS AT MP 44.27, 44.29, 68.00 & 71.66

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA		31	51
PROJECT FILE NO.	614096		

CULVERTS AT MP 44.27 AND 44.29
WETLAND IMPACT PLAN 3



LEGEND:

- TEMPORARY WETLAND IMPACTS
- PERMANENT WETLAND IMPACT

NOTES:

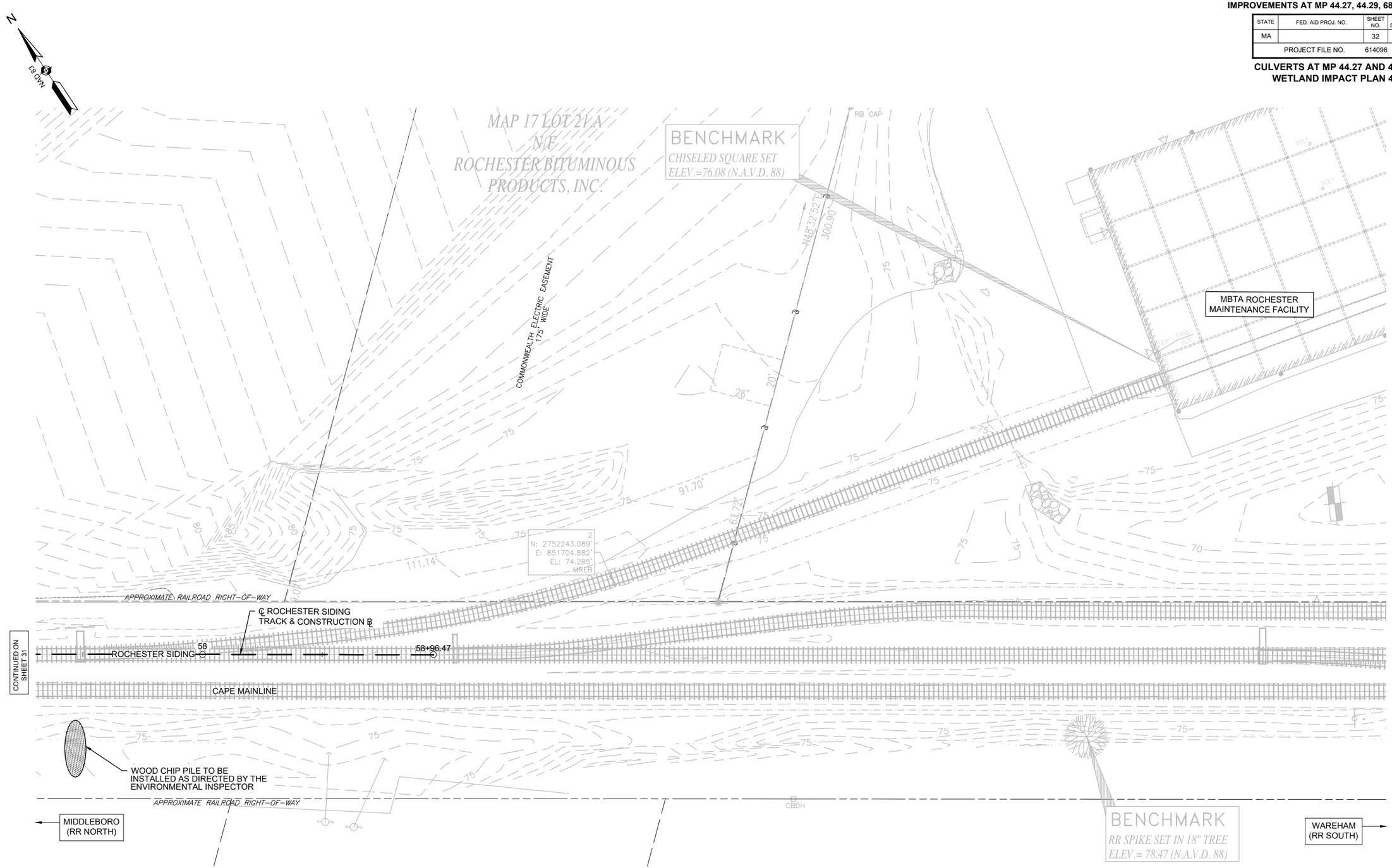
1. WETLAND DELINEATION SHOWN ON THIS SHEET WAS PERFORMED BY JACOBS IN APRIL 2019 AND PROVIDED BY MASSDOT/MBTA FOR USE ON THIS PROJECT. WETLAND DELINEATION VERIFICATION CONDUCTED BY WSP IN MARCH 2025.
2. SEE SHEET 33 FOR EROSION PROTECTION AND WETLAND MITIGATION DETAILS.
3. SEE SHEET 34 FOR EROSION CONTROL, WETLAND REPLICATION AND PLANTING NOTES.

0 20 40 80
HORIZONTAL SCALE IN FEET

MASSDOT CAPE MAIN
ROCHESTER & BARNSTABLE, MA
IMPROVEMENTS AT MP 44.27, 44.29, 68.00 & 71.66

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA		32	51
PROJECT FILE NO.	614096		

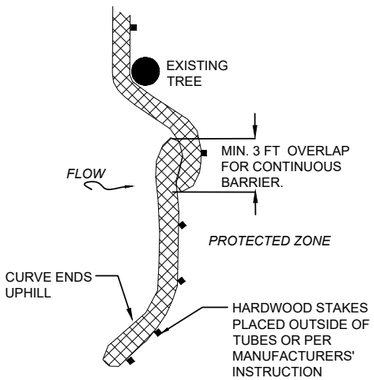
CULVERTS AT MP 44.27 AND 44.29
WETLAND IMPACT PLAN 4



STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA		33	51
PROJECT FILE NO.	614096		

EROSION PROTECTION AND WETLAND MITIGATION DETAILS

Plotted on 9-Jan-2026 2:10 PM



PLACE TUBE ALONG CONTOURS AND PERPENDICULAR TO FLOW.

PLACE AS CLOSE TO LIMIT OF SOIL DISTURBANCE AS POSSIBLE.

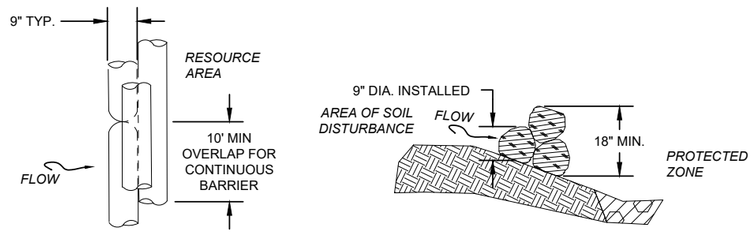
ADJUST LOCATION AS REQUIRED FOR OPTIMUM EFFECTIVENESS. DO NOT INSTALL IN WATERWAYS.

PLACE STAKES AS NEEDED TO SECURE TUBES IN PLACE.

PLAN VIEW

SEDIMENT BARRIER INSTALLATION

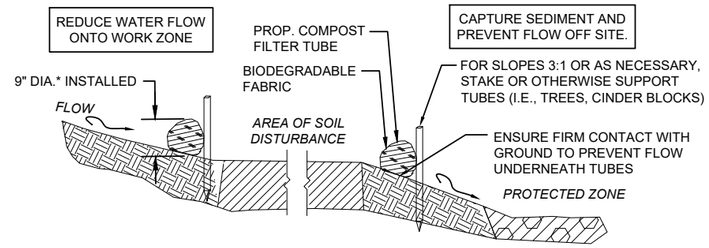
NOT TO SCALE



PLAN VIEW SECTION

SEDIMENTATION CONTROL BARRIER BERM (SLOPES 2:1 OR STEEPER)

NOT TO SCALE



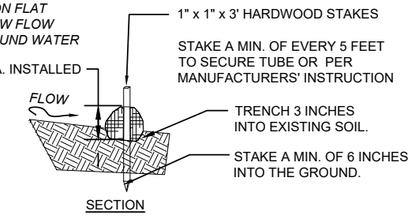
SECTION

SEDIMENT CONTROL BARRIER - COMPOST FILTER TUBE

NOT TO SCALE

9 INCH COMPOST FILTER TUBE

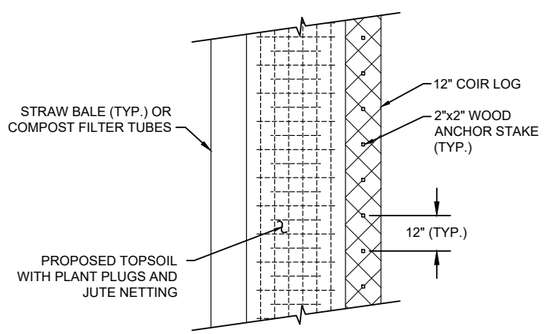
TO BE USED ONLY ON FLAT SURFACES WITH LOW FLOW TO DIVERT OR IMPOUND WATER FLOW



SECTION

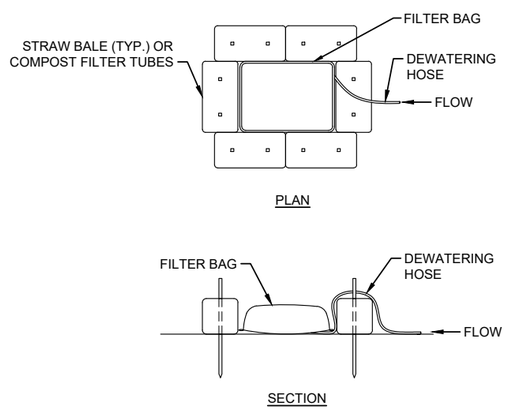
COMPOST FILTER TUBE

NOT TO SCALE



WETLAND MITIGATION DETAIL

NOT TO SCALE



DEWATERING CONTAINMENT AREA DETAIL

NOT TO SCALE

NOTES:

1. SEE SHEETS 3 AND 4 FOR GENERAL NOTES, SYMBOLS, AND ABBREVIATIONS.
2. SEE SHEETS 25 TO 32 FOR EROSION CONTROL PLANS AND WETLAND IMPACT PLANS.
3. SEE SHEET 34 FOR EROSION CONTROL, WETLAND REPLICATION AND PLANTING NOTES.
4. ALL EROSION AND SEDIMENT CONTROLS SHALL BE PLACED AND MAINTAINED IN ACCORDANCE WITH MASSDOT STANDARDS.
5. SEDIMENT BARRIERS SHALL BE PLACED AT LOCATIONS SHOWN ON EROSION CONTROL PLANS AND/OR AS DIRECTED BY THE ENGINEER.

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STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA		34	51
PROJECT FILE NO.	614096		

EROSION CONTROL, WETLAND REPLICATION AND PLANTING NOTES

WETLAND REPLICATION AREA NOTES:

1. WETLAND REPLICATION WORK SHALL BE PERFORMED VIA LOW-INTENSITY METHODS INCLUDING THE USE OF HAND TOOLS AND LIMITED PERSONNEL.
2. FINAL GRADES IN THE REPLICATION AREA SHALL CONFORM TO TARGET ELEVATIONS AS SHOWN ON THE PLANS AND AS APPROVED BY THE WETLAND SPECIALIST. THE FINISHED GRADE SHALL BE AT AN ELEVATION THAT WILL PROVIDE A HYDROLOGIC CONNECTION BETWEEN THE REPLACEMENT AREA AND ADJACENT RESOURCE AREAS. THE CONTRACTOR SHALL VERIFY THAT THIS ELEVATION IS NOT AT A LEVEL THAT COULD ALTER THE HYDROLOGY OF AN ADJACENT WETLAND. RESTORATION AREAS SHALL CONFORM TO EXISTING AND/OR ADJACENT GRADES.
3. THE REPLICATION AREA SHALL BE STAKED AND GRADES SET FOR APPROVAL BY THE WETLAND SPECIALIST PRIOR TO EXCAVATION. TO THE EXTENT POSSIBLE, LIMITS SHALL BE A MINIMUM OF 6 FEET FROM TRUNK OF TREES. ACTUAL LIMITS OF THE REPLICATION AREA MAY BE ADJUSTED IN THE FIELD TO PROTECT ROOT SYSTEMS OF EXISTING TREES. HOWEVER, THE TOTAL AREA OF THE REPLICATION AREA REQUIRED BY ALL PERMITS SHALL NOT BE REDUCED.
4. IT IS THE CONTRACTOR'S RESPONSIBILITY TO IDENTIFY EXISTING AREAS OF ESTABLISHED INVASIVE PLANTS AND NOTIFY THE ENGINEER AND WETLAND SCIENTIST OF THE CONDITION. SOIL CONTAINING INVASIVE PLANT MATERIAL SHALL BE EXCAVATED AND DISPOSED OF OFF-SITE AT AN APPROVED FACILITY.
5. ALL CUT TREES, STUMPS, BRUSH, WRACK OR VEGETATION NOT SPECIFIED TO REMAIN SHALL BE REMOVED FROM THE REPLICATION AREA UNLESS DIRECTED OTHERWISE BY THE ENGINEER. MATERIALS SHALL NOT TO BE STOCKPILED IN THE RESOURCE AREAS OR BUFFER ZONE WHILE AWAITING DISPOSAL.
6. SEQUENCE AND EXECUTION OF WORK SHALL ENSURE MINIMAL COMPACTION AND HEAVY EQUIPMENT MOVING OVER PLACED PLANTING SOIL. IF HEAVY EQUIPMENT IS REQUIRED TO TRAVEL OVER EXISTING WETLAND SOILS, WOOD MATS SHALL BE PLACED TO MINIMIZE IMPACTS. UPON ACCEPTANCE OF FINAL GRADES, NO HEAVY EQUIPMENT SHALL TRAVEL ACROSS PLACED SOIL. DO NOT WORK WITH WET OR MOIST SOILS. WORK THAT RESULTS IN COMPACTION OF SOILS SHALL RESULT IN REPLACEMENT OF WETLAND SOILS AT NO ADDITIONAL COST TO THE CONTRACT.

ENVIRONMENTAL NOTES:

1. VEGETATED WETLAND RESOURCE AREAS WITHIN THE PROJECT AREA WERE IDENTIFIED AND FIELD DELINEATED BY WSP IN DECEMBER 2024. THE DELINEATION WAS COMPLETED IN CONFORMANCE WITH THE STANDARDS AND METHODS OUTLINED IN THE U.S. ARMY CORPS OF ENGINEERS (USACE) 1987 WETLANDS DELINEATION MANUAL AND ASSOCIATED NORTHEAST AND NORTHCENTRAL REGIONAL SUPPLEMENT (USACE 2012).
2. ALL PLANS REFERENCE MASSACHUSETTS STATE PLANE, MAINLAND STANDARD COORDINATION SYSTEM.

EROSION CONTROL NOTES:

1. PRIOR TO PROJECT IMPLEMENTATION, THE CONTRACTOR SHALL SUBMIT FOR ACCEPTANCE A GENERAL WORK SCHEDULE, CONSTRUCTION SEQUENCE AND PLAN WHICH INDICATES PLANNING IMPLEMENTATION OF TEMPORARY AND PERMANENT EROSION CONTROL MEASURES. THIS PLAN SHALL INCLUDE PROPOSED METHODS OF SOILS MANAGEMENT AND DISPOSAL OF WASTE MATERIALS.
2. BEFORE CONSTRUCTION BEGINS, AN EROSION CONTROL BARRIER WILL BE ERECTED AROUND THE ENTIRE PROPOSED WETLAND REPLACEMENT SITE, EXCEPT THE UPGRADIENT EDGE TO ALLOW MACHINERY ACCESS TO THE SITE. THE EROSION CONTROL BARRIER PREVENTS EROSION OF DISTURBED SOILS AND SEDIMENTATION INTO THE ADJACENT EXISTING WETLAND AREAS.
3. EROSION CONTROLS SHALL BE FINALIZED BASED ON ACTUAL FIELD CONDITIONS.
4. NO SEDIMENT OR SILT SHALL BE DISCHARGED TO THE WETLAND AT ANY TIME.
5. NO DEWATERING IS PERMITTED UNLESS THE CONTRACTOR PREPARES A DEWATERING PLAN THAT INCLUDES PUMPING WATER TO AN UPLAND SITE WITH ADEQUATE SILTATION CONTROLS, AND THAT PLAN IS APPROVED BY THE DEP. CONTRACTOR SHALL BE RESPONSIBLE FOR ESTABLISHING AND MAINTAINING ALL TEMPORARY SEDIMENTATION AND EROSION CONTROLS.
6. FOR EROSION CONTROL INSTALLATION REQUIREMENTS, REFER TO EROSION PROTECTION PLAN. TEMPORARY TREATMENTS SHALL CONSIST OF COMPOST FILTER TUBE, SILT FENCE, FIBER MULCH OR PROTECTIVE COVER SUCH AS FABRIC MATS.
7. THE TOE OF ANY SLOPE IS TO REMAIN AT LEAST ONE FOOT INSIDE OF ALL EROSION CONTROLS. UNDER NO CIRCUMSTANCE SHALL THE CONTRACTOR COVER ANY PORTION OF THE EROSION CONTROLS WITH MATERIAL. ANY MATERIAL THAT IS PLACE ON ANY EROSION CONTROLS BY THE CONTRACTOR, OR ANY AGENT OF THE CONTRACTOR, SHALL BE IMMEDIATELY REMOVED BY THE CONTRACTOR, AND ANY NECESSARY REPAIRS TO THE EROSION CONTROLS ACCOMPLISHED, AT NO COST TO THE OWNER.
8. ADDITIONAL EROSION CONTROLS SHALL BE INSTALLED AS CONDITIONS WARRANT, OR AS DIRECTED BY THE ENGINEER.
9. DURING CONSTRUCTION, THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL EROSION CONTROL MAINTENANCE AND SHALL INSPECT AND/OR REPLACE ALL CONTROLS AS NEEDED. MAINTENANCE WILL BE CARRIED OUT IN ACCORDANCE WITH THE SPECIFICATIONS AND PERMIT CONDITIONS. THE CONTRACTOR IS RESPONSIBLE FOR CARRYING OUT NECESSARY MAINTENANCE DURING ALL PHASES OF PROJECT COMPLETION.
10. SEDIMENTATION CONTROL DEVICES SHALL BE INSPECTED CLOSELY AND MAINTAINED PROMPTLY AS DESCRIBED IN THE SPECIFICATIONS. THE CONTRACTOR SHALL INSPECT AND MAINTAIN EROSION CONTROL MEASURES ON A WEEKLY BASIS AND WITHIN 24 HOURS OF EACH STORM EVENT.
11. DISTURBED SLOPES ALONG THE EMBANKMENT WITHIN THE WORK ZONE SHALL BE STABILIZED WITH LOAM AND SEED.
12. UPON PROJECT COMPLETION, IMPACTED WETLANDS SHALL BE RESTORED TO EXISTING CONDITIONS. THE CONTRACTOR MUST REPAIR AND/OR RESEED ANY AREAS THAT DO NOT DEVELOP WITHIN ONE YEAR OF PLANTING.

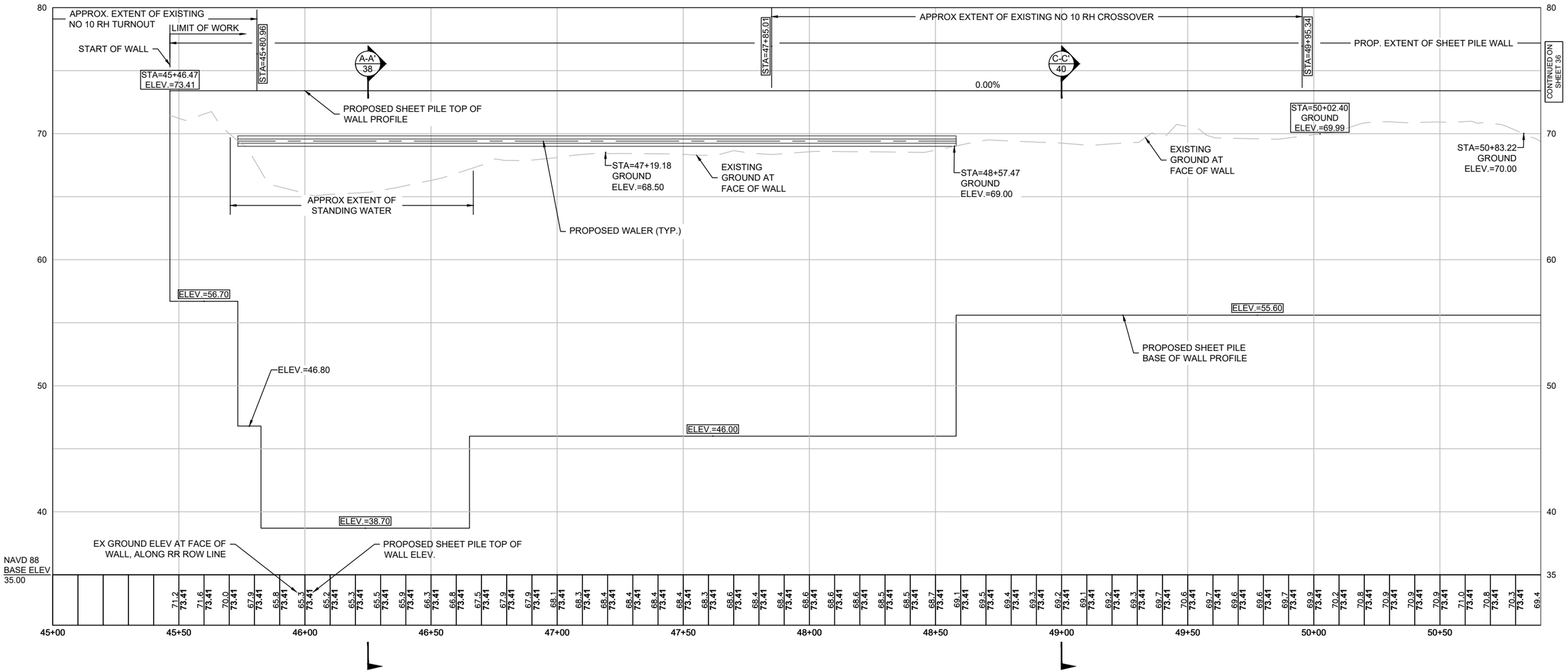
PLANTING AND SEEDING NOTES:

1. SEEDING WITHIN THE WETLAND REPLICATION AREA AND ADJACENT UPLANDS WILL CONFORM TO THE PLANS OR WILL BE COMPLETED IN ACCORDANCE WITH DIRECTIONS PROVIDED IN THE FIELD. ONLY PLANT MATERIALS NATIVE AND INDIGENOUS TO THE REGION WILL BE USED. USE OF CULTIVARS WILL BE PROHIBITED. SPECIES NOT SPECIFIED IN THE FINAL SEEDING PLAN WILL NOT BE USED WITHOUT WRITTEN APPROVAL FROM THE WETLAND SCIENTIST AND PERMITTING AGENCY.
2. MANUFACTURED HYDRIC SOIL SHALL BE PLACED WITHIN THE WETLAND REPLICATION AREA. WETLAND SOILS ARE CREATED FROM A MIXTURE OF ORGANIC AND MINERAL MATERIALS, WITH THE FINAL PRODUCT CONTAINING AT LEAST 12 PERCENT ORGANIC MATTER CONTENT BY WEIGHT. THE CONTRACTOR MUST PROVIDE ANALYSIS OF THE PREPARED TOPSOIL TO THE WETLAND SCIENTIST FOR APPROVAL PRIOR TO INSTALLATION. WHERE EMPIRICAL DATA ARE LACKING, COMPOST TO SOIL RATIO SHALL BE 1:1 BY VOLUME. SOIL MUST BE FREE OF SEEDS, ROOTS, STEMS OR OTHER VIABLE PARTS OF INVASIVE PLANT SPECIES. SOIL SHALL NOT CONTAIN KILN-DRIED WOOD OR CONSTRUCTION DEBRIS. SOIL SHALL BE FREE OF SOLID MATERIALS LARGER THAN 4-INCHES IN DIAMETER.
3. COMPOST SHALL BE COMPOST MEETING THE REQUIREMENTS FOR ORGANIC SOIL ADDITIVES, SECTION M 1.06.0 OF THE STANDARD SPECIFICATIONS AND THE FOLLOWING:
4. MOISTURE CONTENT SHALL BE 40-60 PERCENT AS MEASURED BY ASTM D2216 STANDARD TEST METHOD FOR LABORATORY DETERMINATION OF WATER CONTENT OF SOIL AND ROCK AND ASTM D2974 (CITED ABOVE).
5. NO SOIL FROM ANY AREA SUPPORTING INVASIVE SPECIES SHALL BE USED IN THE REPLICATION AREA.
6. CONTRACTOR SHALL SPREAD APPROXIMATELY SIX (6) INCHES OF MANUFACTURED WETLAND SOIL WITHIN THE REPLICATION AREA, RAKE IN SEED AND INSTALL ROLLED EROSION CONTROL PRODUCT TO SLOPES ACCORDING TO THE DETAIL. AN APPROVED, NATIVE CONSERVATION SEED MIX SHALL BE USED IN UPLANDS AND AN APPROVED, NATIVE WETLAND MIX SHALL BE USED IN WETLAND AREAS.
7. THE SUPERVISING WETLAND SCIENTIST WILL INSPECT PLANTING STOCK TO ENSURE THAT THE SPECIMENS ARE HEALTHY, FREE FROM PESTS AND ANY INVASIVE PLANT MATERIAL, AND SUITABLE FOR USE WITHIN THE WETLAND RESTORATION SITE. UNSUITABLE SPECIMENS WILL BE REJECTED AND REPLACED WITH SUITABLE SPECIMENS. THE SUPERVISING WETLAND SCIENTIST MUST APPROVE ANY PLANTING SUBSTITUTIONS. WOODY PLANT STOCK WILL BE EITHER BARE ROOT STOCK OR CONTAINER GROWN.
8. TRANSPLANTS AND PLANT MATERIAL COLLECTED FROM THE WILD IS PROHIBITED UNLESS APPROVED IN WRITING BY THE WETLAND SCIENTIST. ALL PLANT MATERIAL USED SHALL BE NURSERY-GROWN AND HEALTHY, SOUND AND FREE OF DISEASE, INSECT PESTS, EGGS OR LARVAE AND DISCOLORATIONS.
9. CONTAINER-GROWN STOCK SHALL NOT HAVE WILTING OR CURLING LEAVES OR WEEDS. CONTAINTER-GROWN STOCK SHALL HAVE BEEN GROWN IN A CONTAINER LONG ENOUGH FOR THE ROOT SYSTEM TO HAVE DEVELOPED SUFFICIENTLY TO HOLD ITS SOIL AFTER REMOVAL FROM THE CONTAINER. ROOTS SHALL VISIBLY EXTEND TO THE INSIDE FACE OF THE GROWING CONTAINER BUT SHALL NOT BE ROOT-BOUND OR GIRDLING.
10. ALL PLANTS SHALL BE DELIVERED TO THE SITE AS LIVE, ACTIVELY GROWING, OR JUST BREAKING DORMANCY, AND ARRIVE TO THE PROJECT SITE READY FOR PLANTING. THE WETLAND SCIENTIST MAY REJECT PLANTS DAMAGED IN HANDLING OR TRANSPORT. PLANT MATERIAL SHALL BE INSTALLED AS SOON AS POSSIBLE AFTER IT HAS BEEN DELIVERED TO THE SITE. ALL PLANT MATERIALS SHALL BE GUARANTEED FOR ONE YEAR FOLLOWING DATE OF FINAL ACCEPTANCE.
11. SOIL AND ROOTMASS SHALL BE WATERED AND MOIST ON DELIVERY TO THE JOB SITE. PLANTS WITH DRY SOIL AND ROOTS SHALL NOT BE ACCEPTABLE. ALL PLANT MATERIALS TEMPORARILY STORED AT THE SITE PRIOR TO PLANTING SHALL BE STORED OUT OF DIRECT EXPOSURE TO SUN AND WIND, SHALL BE MAINTAINED BY CAREFUL WATERING, AND SHALL BE PROTECTED FROM DAMAGE DUE TO CONSTRUCTION ACTIVITIES AND ADVERSE WEATHER.
12. TREE AND SHRUB PLANTING TO OCCUR BETWEEN MAY 1 AND JUNE 15 (SPRING SEASON) OR SEPTEMBER 1 AND NOVEMBER 15 (FALL SEASON).
13. UPON COMPLETION OF PLANTING, THE AREAS AROUND EACH TREE OR SHRUB PLANT WILL BE MULCHED WITH A 3-INCH-THICK LAYER OF LEAF LITTER OR OTHER NATURAL ORGANIC MATERIAL (NOT FRESH WOOD CHIPS). THE LEAF LITTER OR OTHER NATURAL ORGANIC MATERIAL SHALL BE SPREAD TO THE WIDEST EXTENT OF THE PLANT DRIP LINE.
14. CONTRACTOR SHALL SUPPLY A WETLAND SEED MIX INCLUDING A MAJORITY OF THE SPECIES LISTED IN THE WETLAND SEED MIX TABLE. 75% OF THE SEED MIX, BY WEIGHT, SHALL BE INDIGENOUS GRASSES AND SEDGES. SEEDS MUST BE FROM PLANTS GROWN WITHIN 200 MILES OF THE MITIGATION SITE.
15. CONTRACTOR SHALL PROVIDE A WRITTEN ANALYSIS OF THE SEED MIXTURE TO THE WETLAND SCIENTIST. NO SEEDING IS PERMITTED WITHOUT APPROVAL OF THE WETLAND SCIENTIST.
16. CONTRACTOR SHALL SUPPLY AN UPLAND SEED MIX INCLUDING A MAJORITY OF THE SPECIES LISTED IN THE UPLAND SEED MIX TABLE. 75% OF THE SEED MIX, BY WEIGHT, SHALL BE INDIGENOUS GRASSES AND, SEEDS MUST BE FROM PLANTS GROWN WITHIN 200 MILES OF THE MITIGATION SITE, CONTRACTOR SHALL PROVIDE A WRITTEN ANALYSIS OF THE SEED MIXTURE TO THE WETLAND SCIENTIST. NO SEEDING IS PERMITTED WITHOUT APPROVAL OF THE WETLAND SCIENTIST.
17. THE UPLAND SEED MIX SHALL BE APPLIED TO ALL DISTURBED SOILS WITHIN UPLANDS ADJACENT TO THE WETLAND MITIGATION AREA, 5, THE SEED MIXES SHALL BE APPLIED AT A RATE OF 1 LB PER 2,500 SQUARE FEET.
18. WATERING SHALL BE REQUIRED DURING THE GROWING SEASON (MAY 1 - NOV 1) WHEN NATURAL RAINFALL IS BELOW ONE INCH PER WEEK. WATER SHALL BE APPLIED IN SUFFICIENT QUANTITY TO THOROUGHLY SATURATE THE SOIL IN THE ROOT ZONE OF EACH PLANT. FOLLOWING THE FIRST MONTH OF PLANTING, WATERING WILL BE LIMITED TO PERIODS OF DECLARED DROUGHT. WATER SHALL BE PROVIDED BY THE CONTRACTOR AND NOT BE SOURCED FROM WATERWAYS ON SITE.
19. THE EROSION CONTROL BARRIERS WILL BE DISASSEMBLED AND PROPERLY DISPOSED OF BEFORE NOVEMBER 1 OF THE THIRD FULL GROWING SEASON AFTER PLANTING OF THE WETLAND REPLICATION AREA. SEDIMENT COLLECTED BY THE BARRIERS WILL BE REMOVED AND DISPOSED OF IN A MANNER THAT PREVENTS EROSION AND TRANSPORT TO A WETLAND OR WATERWAY. IF MINOR GRADING IS REQUIRED IN THE IMMEDIATE ZONE AROUND THE EROSION CONTROL BARRIER TO PROVIDE SURFACE HYDROLOGIC CONNECTION BETWEEN THE WETLAND ESTABLISHMENT SITE AND THE EXISTING WETLAND AREA, IT WILL BE DONE BY HAND AND STABILIZED BY MULCH.

MASSDOT CAPE MAIN
ROCHESTER & BARNSTABLE, MA
IMPROVEMENTS AT MP 44.27, 44.29, 68.00 & 71.66

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA		35	51
PROJECT FILE NO.	614096		

SHEET PILE WALL PROFILE SHEET 1



SHEET PILE WALL PROFILE

NOTES:

1. SEE SHEET 37 FOR NOTES.

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

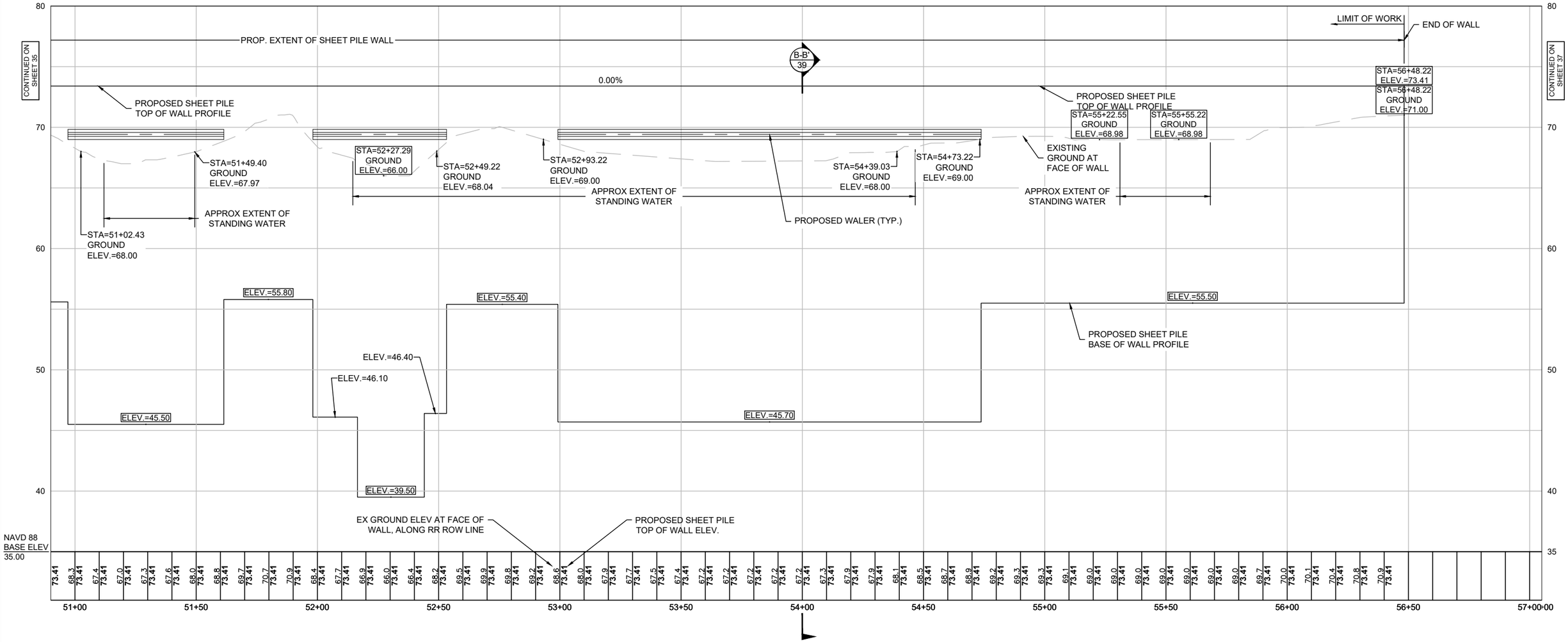
MASSDOT CAPE MAIN
ROCHESTER & BARNSTABLE, MA
IMPROVEMENTS AT MP 44.27, 44.29, 68.00 & 71.66

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA		36	51
PROJECT FILE NO.	614096		

SHEET PILE WALL PROFILE SHEET 2

CONTINUED ON SHEET 35

CONTINUED ON SHEET 37



SHEET PILE WALL PROFILE

NOTES:

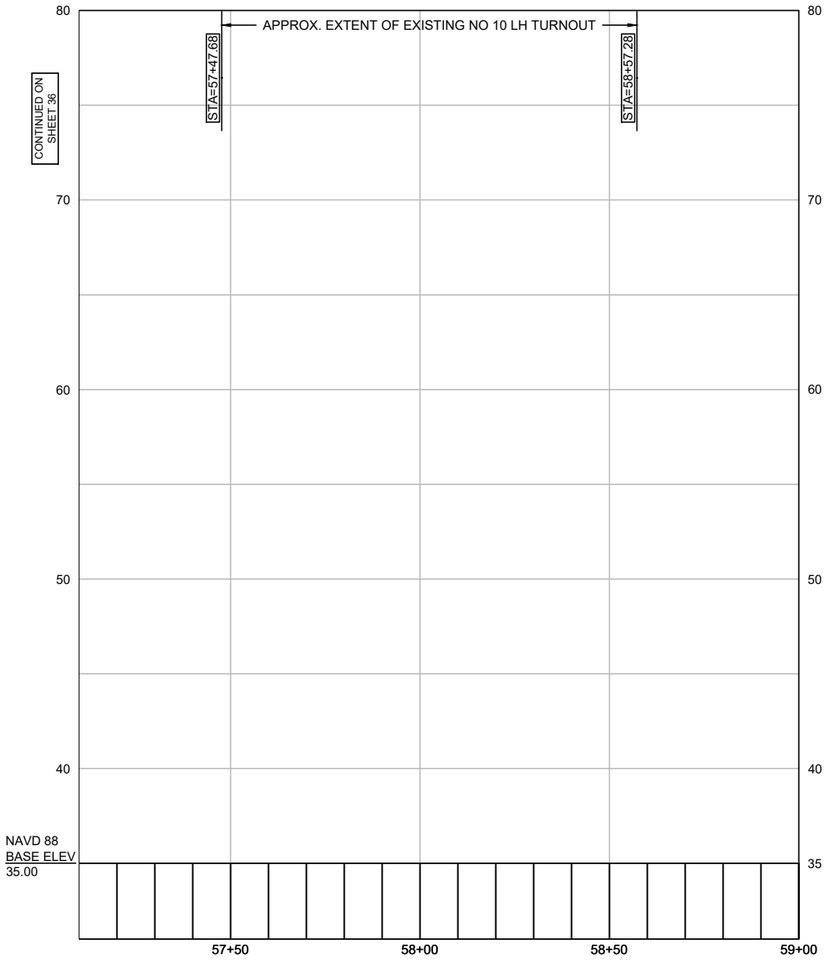
1. SEE SHEET 37 FOR NOTES.

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

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA		37	51
PROJECT FILE NO.	614096		

SHEET PILE WALL PROFILE SHEET 3

Plotted on 9-Jan-2026 2:27 PM



SHEET PILE WALL PROFILE

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

ANCHOR H-PILE SCHEDULE

H-Pile No.	Station	Offset from Back of Wall to Center of H-Pile (ft)	Top Elevation (ft)	Tip Elevation (ft)	H-Pile Section	H-Pile Length (ft)
P1	45+77.98	14.2	71.83	52.83	HP 12x84	19
P2	45+87.16	14.2	71.83	47.83	HP 12x84	24
P3	45+96.35	14.2	71.83	47.83	HP 12x84	24
P4	46+05.54	14.2	71.83	47.83	HP 12x84	24
P5	46+14.73	14.2	71.83	47.83	HP 12x84	24
P6	46+23.91	14.2	71.83	47.83	HP 12x84	24
P7	46+33.10	14.2	71.83	47.83	HP 12x84	24
P8	46+42.29	14.2	71.83	47.83	HP 12x84	24
P9	46+51.48	14.2	71.83	47.83	HP 12x84	24
P10	46+60.66	14.2	71.83	47.83	HP 12x84	24
P11	46+69.85	14.2	71.83	52.83	HP 12x84	19
P12	46+79.04	14.2	71.83	52.83	HP 12x84	19
P13	46+88.23	14.2	71.83	52.83	HP 12x84	19
P14	46+97.41	14.2	71.83	52.83	HP 12x84	19
P15	47+06.60	14.2	71.83	52.83	HP 12x84	19
P16	47+15.79	14.2	71.83	52.83	HP 12x84	19
P17	47+24.98	14.2	71.83	52.83	HP 12x84	19
P18	47+34.16	14.2	71.83	52.83	HP 12x84	19
P19	47+43.35	14.2	71.83	52.83	HP 12x84	19
P20	47+52.54	14.2	71.83	52.83	HP 12x84	19
P21	47+61.73	14.2	71.83	52.83	HP 12x84	19
P22	47+70.91	14.2	71.83	52.83	HP 12x84	19
P23	47+80.10	14.2	71.83	52.83	HP 12x84	19
P24	47+89.29	14.2	71.83	52.83	HP 12x84	19
P25	47+98.48	14.2	71.83	52.83	HP 12x84	19
P26	48+07.66	14.2	71.83	52.83	HP 12x84	19
P27	48+16.85	14.2	71.83	52.83	HP 12x84	19
P28	48+26.04	14.2	71.83	52.83	HP 12x84	19
P29	48+35.23	14.2	71.83	52.83	HP 12x84	19
P30	48+44.41	14.2	71.83	52.83	HP 12x84	19
P31	48+53.60	14.2	71.83	52.83	HP 12x84	19

ANCHOR H-PILE SCHEDULE

H-Pile No.	Station	Offset from Back of Wall to Center of H-Pile (ft)	Top Elevation (ft)	Tip Elevation (ft)	H-Pile Section	H-Pile Length (ft)
P32	51+01.66	14.2	71.83	52.83	HP 12x84	19
P33	51+10.85	14.2	71.83	52.83	HP 12x84	19
P34	51+20.04	14.2	71.83	52.83	HP 12x84	19
P35	51+29.23	14.2	71.83	52.83	HP 12x84	19
P36	51+38.41	14.2	71.83	52.83	HP 12x84	19
P37	51+47.60	14.2	71.83	52.83	HP 12x84	19
P38	51+56.79	14.2	71.83	52.83	HP 12x84	19
P39	52+02.73	14.2	71.83	52.83	HP 12x84	19
P40	52+11.91	14.2	71.83	52.83	HP 12x84	19
P41	52+21.10	14.2	71.83	47.83	HP 12x84	24
P42	52+30.29	14.2	71.83	47.83	HP 12x84	24
P43	52+39.48	14.2	71.83	47.83	HP 12x84	24
P44	52+48.66	14.2	71.83	52.83	HP 12x84	19
P45	53+03.79	14.2	71.83	52.83	HP 12x84	19
P46	53+12.98	14.2	71.83	52.83	HP 12x84	19
P47	53+22.16	14.2	71.83	52.83	HP 12x84	19
P48	53+31.35	14.2	71.83	52.83	HP 12x84	19
P49	53+40.54	14.2	71.83	52.83	HP 12x84	19
P50	53+49.73	14.2	71.83	52.83	HP 12x84	19
P51	53+58.91	14.2	71.83	52.83	HP 12x84	19
P52	53+68.10	14.2	71.83	52.83	HP 12x84	19
P53	53+77.29	14.2	71.83	52.83	HP 12x84	19
P54	53+86.48	14.2	71.83	52.83	HP 12x84	19
P55	53+95.66	14.2	71.83	52.83	HP 12x84	19
P56	54+04.85	14.2	71.83	52.83	HP 12x84	19
P57	54+14.04	14.2	71.83	52.83	HP 12x84	19
P58	54+23.23	14.2	71.83	52.83	HP 12x84	19
P59	54+32.41	14.2	71.83	52.83	HP 12x84	19
P60	54+41.60	14.2	71.83	52.83	HP 12x84	19
P61	54+50.79	14.2	71.83	52.83	HP 12x84	19

NOTES:

1. SEE SHEET 4 FOR GENERAL NOTES.
2. SEE SHEETS 16 TO 19 FOR THE CONSTRUCTION PLANS.
3. SEE SHEETS 38 TO 40 FOR THE RETAINING WALL SECTIONS.
4. SEE SHEET 41 FOR THE RETAINING WALL DETAILS.
5. SEE SHEET 42 FOR THE RETAINING WALL SUGGESTED CONSTRUCTION SEQUENCE.
6. ALL RETAINING WALL COMPONENTS MUST BE INSTALLED WITHIN THE RR ROW. NO COMPONENTS ARE PERMITTED TO EXTEND BEYOND THE RR ROW PROPERTY LINE.
7. SHEET PILES AND H-PILES SHALL BE INSTALLED TO THE REQUIRED TIP ELEVATIONS USING METHODS APPROVED BY THE ENGINEER.
8. SHEET PILES SHALL BE PAID FOR IN ACCORDANCE WITH SPECIAL PROVISION ITEM 996.01, RETAINING WALL STRUCTURE.
9. H-PILES SHALL BE PAID FOR IN ACCORDANCE WITH SPECIAL PROVISION ITEM 996.01, RETAINING WALL STRUCTURE.
10. PILE SPLICES ARE PROHIBITED.
11. H-PILES SHALL NOT BE OUT OF POSITION SPECIFIED BY MORE THAN 2 INCHES IN ANY DIRECTION.
12. SHEET PILES SHALL BE INSTALLED WITH FRONT PLANE LOCATED 1.5 INCHES INSIDE THE RAILROAD RIGHT-OF-WAY. SHEET SHALL NOT BE OUT OF POSITION SPECIFIED BY MORE THAN 0.5 INCHES IN DIRECTION PERPENDICULAR TO WALL ALIGNMENT. SHEET SHALL NOT BE OUT OF POSITION SPECIFIED BY MORE THAN 2 INCHES IN DIRECTION PARALLEL TO WALL ALIGNMENT.

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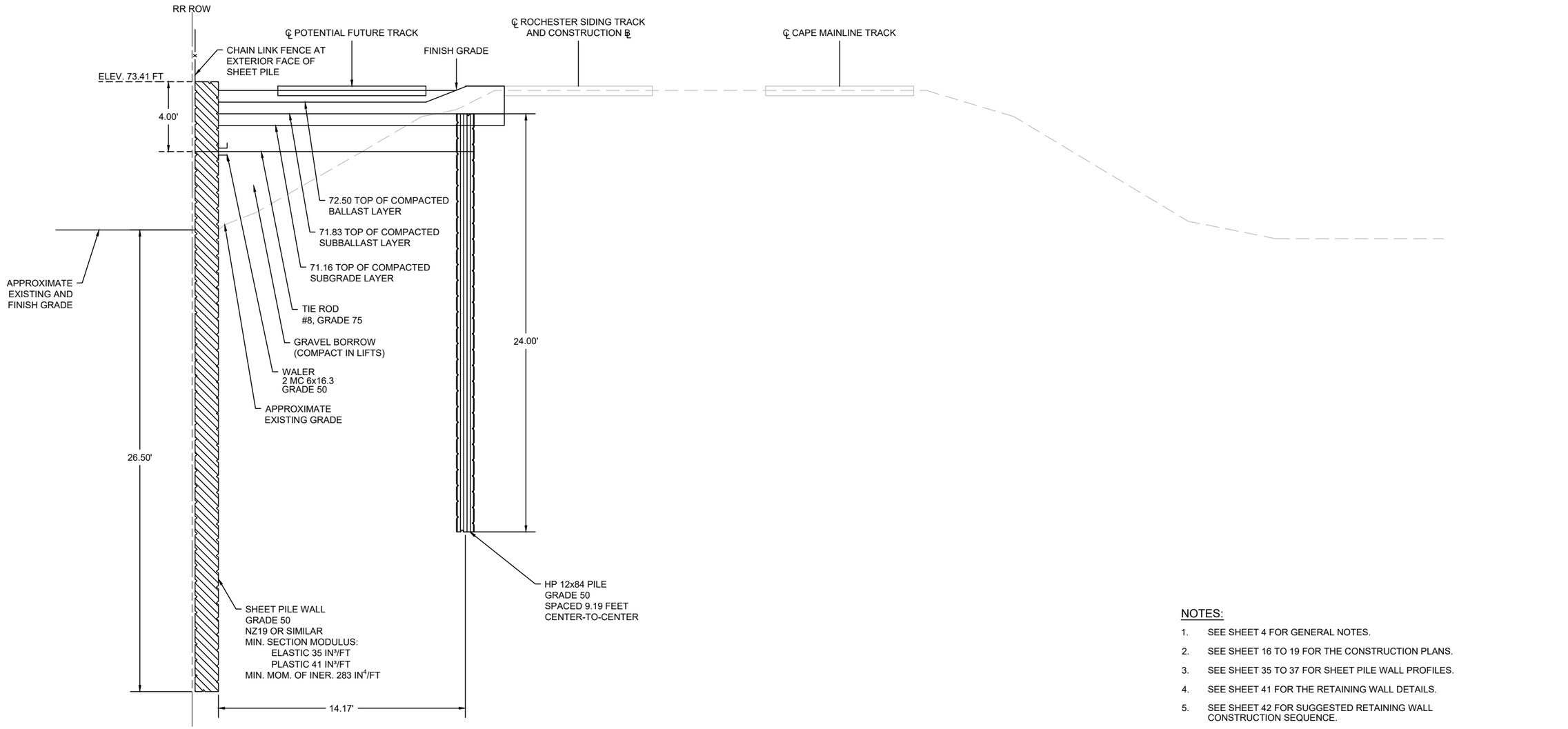
MASSDOT CAPE MAIN
ROCHESTER & BARNSTABLE, MA
IMPROVEMENTS AT MP 44.27, 44.29, 68.00 & 71.66

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA		38	51
PROJECT FILE NO.	614096		

TYPICAL RET WALL SECTION
DETAIL 1



SECTION A-A' - TYPICAL RETAINING WALL SECTION

NOT TO SCALE

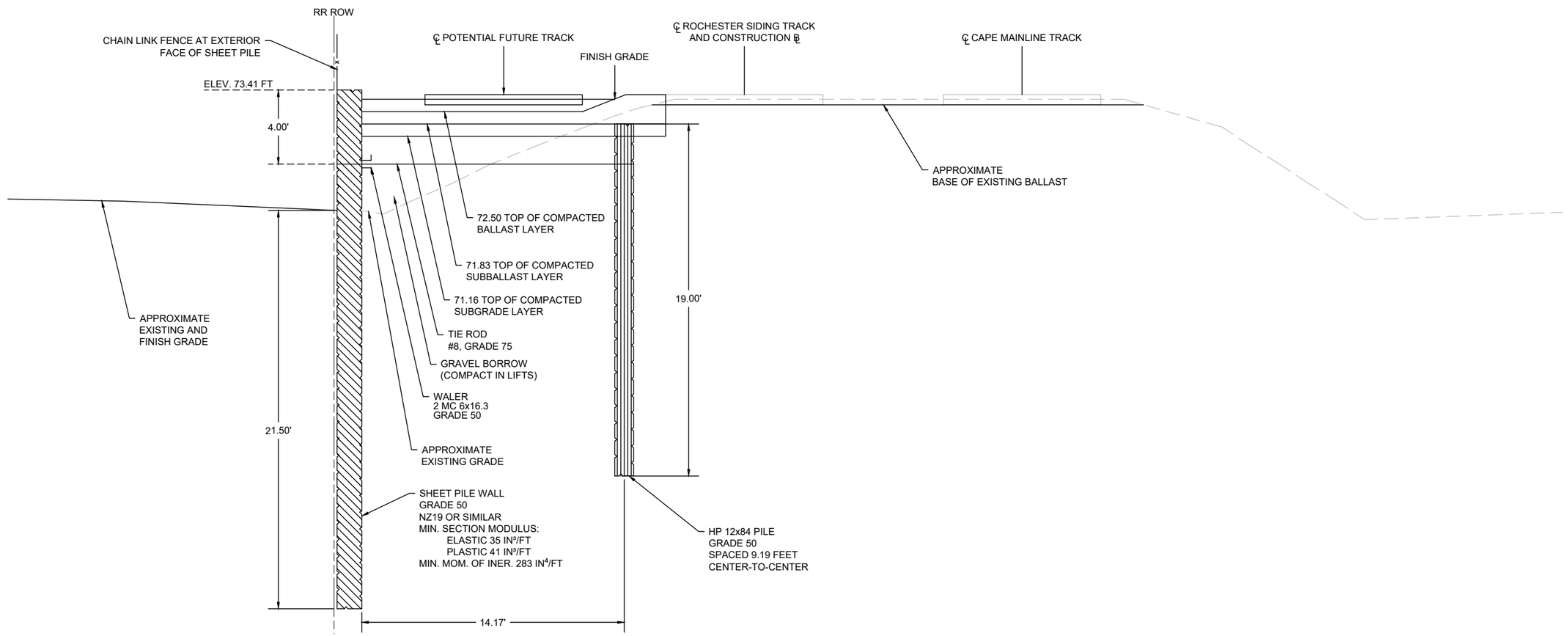
NOTES:

1. SEE SHEET 4 FOR GENERAL NOTES.
2. SEE SHEET 16 TO 19 FOR THE CONSTRUCTION PLANS.
3. SEE SHEET 35 TO 37 FOR SHEET PILE WALL PROFILES.
4. SEE SHEET 41 FOR THE RETAINING WALL DETAILS.
5. SEE SHEET 42 FOR SUGGESTED RETAINING WALL CONSTRUCTION SEQUENCE.
6. SHEET PILES AND ANCHOR H-PILES SHALL BE ASTM A572, GRADE 50.

MASSDOT CAPE MAIN
ROCHESTER & BARNSTABLE, MA
IMPROVEMENTS AT MP 44.27, 44.29, 68.00 & 71.66

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA		39	51
PROJECT FILE NO.	614096		

TYPICAL RET WALL SECTION
DETAIL 2



SECTION B-B' - TYPICAL RETAINING WALL SECTION

NOT TO SCALE

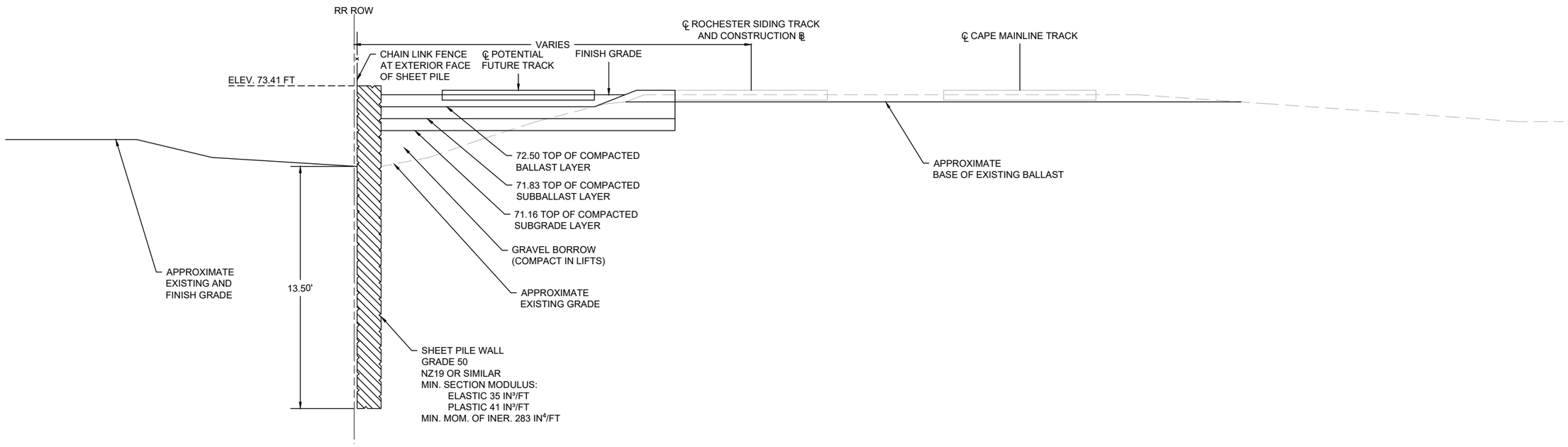
NOTES:

1. SEE SHEET 37 FOR NOTES.

MASSDOT CAPE MAIN
ROCHESTER & BARNSTABLE, MA
IMPROVEMENTS AT MP 44.27, 44.29, 68.00 & 71.66

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA		40	51
PROJECT FILE NO.	614096		

TYPICAL RET WALL SECTION
DETAIL 3

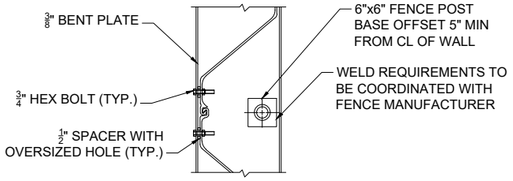


SECTION C-C' - TYPICAL RETAINING WALL SECTION

NOT TO SCALE

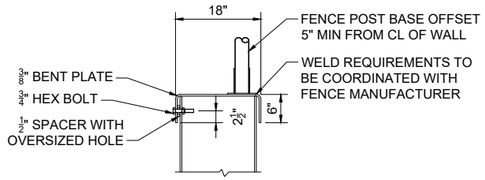
NOTES:

1. SEE SHEET 37 FOR NOTES.



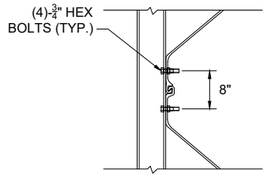
CAP AND FENCE POST CONNECTION PLAN

SCALE: ¾" = 1'-0"



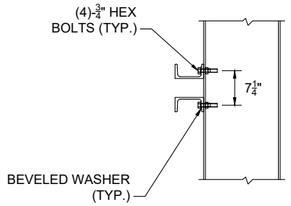
CAP AND FENCE POST CONNECTION SECTION

SCALE: ¾" = 1'-0"



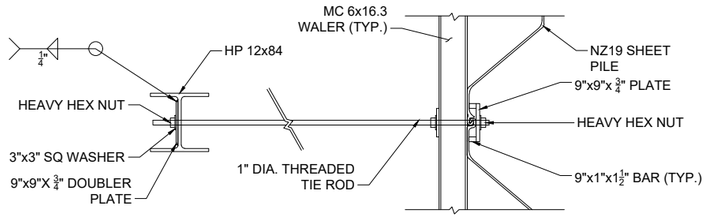
WALER TO SHEET PILE CONNECTION PLAN

SCALE: ¾" = 1'-0"



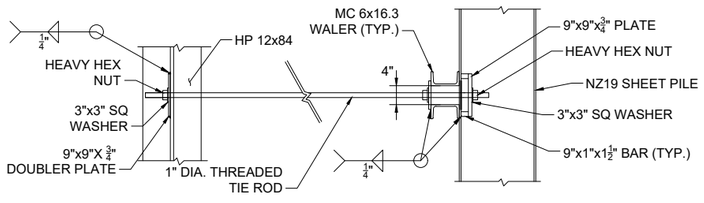
WALER TO SHEET PILE CONNECTION SECTION

SCALE: ¾" = 1'-0"



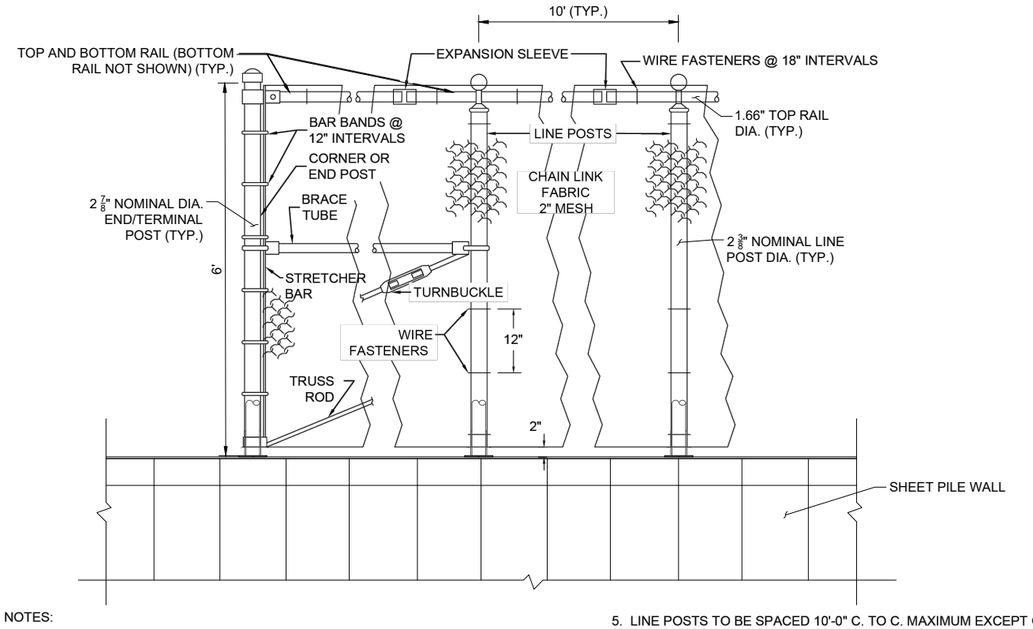
TIE ROD TO WALER CONNECTION PLAN

SCALE: ¾" = 1'-0"



TIE ROD TO WALER CONNECTION SECTION

SCALE: ¾" = 1'-0"



NOTES:

1. FABRIC FOR FENCES 4' OR LESS IN HEIGHT: TOP SELVAGE TO HAVE KNUCKLED FINISH. BOTTOM SELVAGE TO HAVE TWISTED AND BARBED FINISH UNLESS OTHERWISE NOTED.
2. FABRIC FOR FENCES 5' OR OVER IN HEIGHT: BOTH TOP AND BOTTOM SELVAGE TO HAVE TWISTED AND BARBED FINISH UNLESS OTHERWISE NOTED.
3. THE HEIGHT OF FENCE TO BE AS SPECIFIED.
4. GRADE OF FENCE TO BE PARALLEL WITH THE GRADE OF SIDEWALKS, CURBING, GROUND OR TOP OR WALL.
5. LINE POSTS TO BE SPACED 10'-0" C. TO C. MAXIMUM EXCEPT ON CURVES WHERE THEY SHALL BE SPACED AS FOLLOWS:
   - CURVES 200' TO 500' RADIUS — 8'-0" C. TO C. MAXIMUM
   - CURVES 100' TO 200' RADIUS — 6'-0" C. TO C. MAXIMUM
   - CURVES LESS THAN 100' RADIUS — 5'-0" C. TO C. MAXIMUM
6. FOR POST BASES AND CABLE ATTACHMENTS, SEE DRAWING E 650.0.1.
7. FOR DESCRIPTION, MATERIALS AND CONSTRUCTION METHODS, SEE STANDARD SPECIFICATIONS.

CHAIN LINK FENCE ELEVATION

SCALE: 1" = 1'-0"

MASSDOT CAPE MAIN
ROCHESTER & BARNSTABLE, MA
IMPROVEMENTS AT MP 44.27, 44.29, 68.00 & 71.66

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA		41	51
PROJECT FILE NO.	614096		

WALER AND FENCE CONNECTION DETAILS

NOTES:

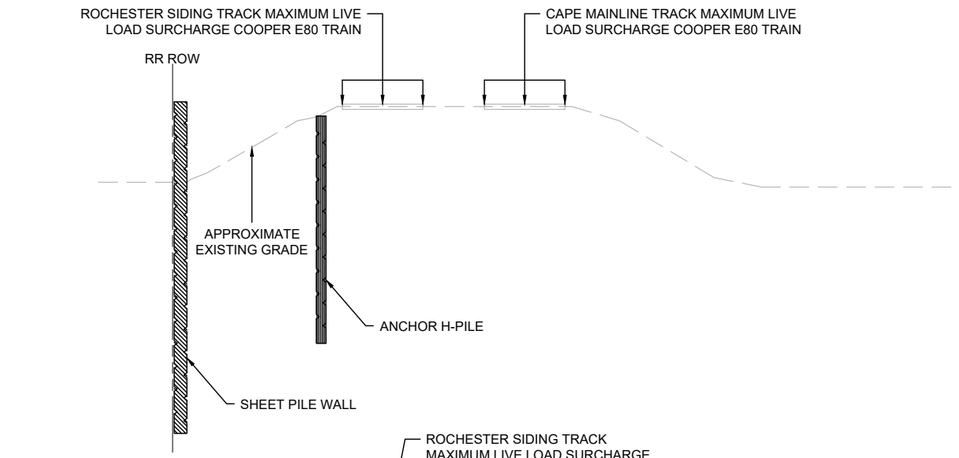
1. STEEL BOLTS SHALL BE ASTM F3125, TYPE 1.
2. WALER CHANNELS SHALL BE ASTM A992, GRADE 50.
3. PLATES SHALL BE ASTM A572, GRADE 50.
4. TIE RODS SHALL BE ASTM A615, GRADE 75.
5. WASHERS SHALL BE ASTM F436, TYPE 1.
6. WELDED SHOP AND FIELD CONNECTIONS SHALL BE MADE BY APPROVED CERTIFIED WELDERS USING MILLER METAL CONFORMING TO E70XX ELECTRODES FOR STRUCTURAL STEEL.
7. WALER CHANNEL SPLICES AND SPACER PLATES TO BE DESIGNED BY LICENSED PROFESSIONAL ENGINEER AND SUBMITTED FOR APPROVAL.
8. SEE MASSDOT CONSTRUCTION STANDARDS DRAWING 645.0.1 FOR ADDITIONAL CHAIN LINK FENCE DETAILS.
9. SEE THE SPECIFICATIONS ACCOMPANYING THESE PLANS FOR COATING REQUIREMENTS FOR THE STEEL ELEMENTS.

MASSDOT CAPE MAIN
ROCHESTER & BARNSTABLE, MA
IMPROVEMENTS AT MP 44.27, 44.29, 68.00 & 71.66

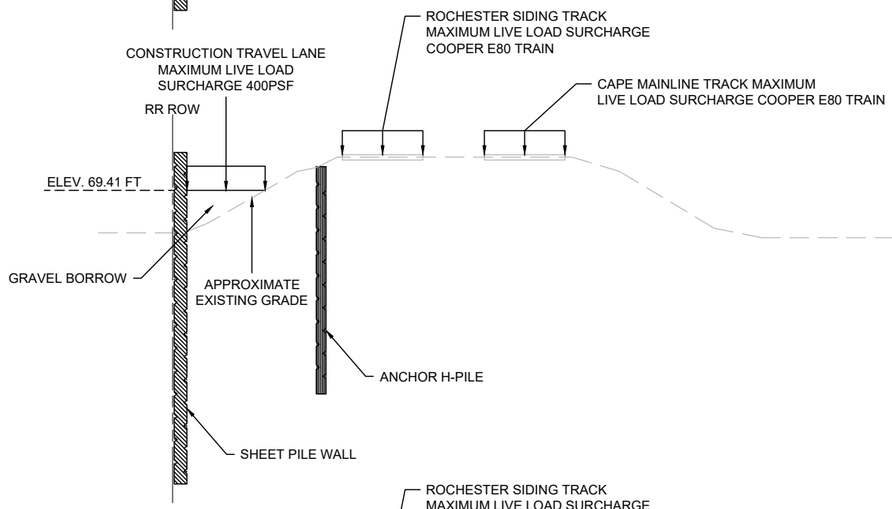
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA		42	51
PROJECT FILE NO.	614096		

SUGGESTED CONSTRUCTION SEQUENCE

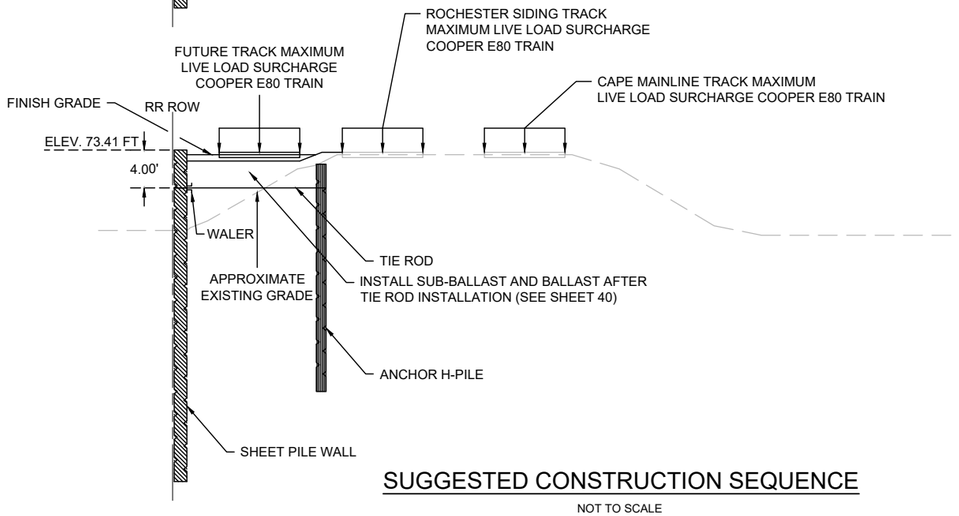
1) PILE INSTALLATION



2) MAXIMUM BACKFILL OF SHEET PILE WALL PRIOR TO INSTALLATION OF TIE RODS AND WALER



3) FINAL GRADE WITH TIE RODS AND WALER IN PLACE



SUGGESTED CONSTRUCTION SEQUENCE

NOT TO SCALE

MASSDOT CAPE MAIN
ROCHESTER & BARNSTABLE, MA
IMPROVEMENTS AT MP 44.27, 44.29, 68.00 & 71.66

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	43	51
PROJECT FILE NO.	614096		

LEGEND & ABBREVIATIONS FOR CATTLE PASSES AT MP 68.00 & 71.66

GENERAL SYMBOLS

EXISTING	PROPOSED	DESCRIPTION
JB		JERSEY BARRIER
CB		CATCH BASIN
		CATCH BASIN CURB INLET
FP		FLAG POLE
GP		GAS PUMP
MB		MAIL BOX
		POST SQUARE
		POST CIRCULAR
WELL		WELL
EHH	EHH	ELECTRIC HANDHOLE
		FENCE GATE POST
GG		GAS GATE
BHL #		BORING HOLE
MW #		MONITORING WELL
TP #		TEST PIT
		HYDRANT
		LIGHT POLE
CO.BD.		COUNTY BOUND
		GPS POINT
C		CABLE MANHOLE
D		DRAINAGE MANHOLE
E		ELECTRIC MANHOLE
G		GAS MANHOLE
M		MISC MANHOLE
S		SEWER MANHOLE
T		TELEPHONE MANHOLE
W		WATER MANHOLE
MHB		MASSACHUSETTS HIGHWAY BOUND
MON.		MONUMENT
SB		STONE BOUND
TB		TOWN OR CITY BOUND
		TRAVERSE OR TRIANGULATION STATION
TPL or GUY		TROLLEY POLE OR GUY POLE
HTP		TRANSMISSION POLE
UFB		UTILITY POLE W/ FIREBOX
UPDL		UTILITY POLE WITH DOUBLE LIGHT
ULT		UTILITY POLE W / 1 LIGHT
UPL		UTILITY POLE
		BUSH
SIZE & TYPE		TREE
		STUMP
		SWAMP / MARSH
WG		WATER GATE
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)
E E E		UNDERGROUND ELECTRICAL
C C C		UNDERGROUND COMMUNICATIONS
		BALANCED STONE WALL
		GUARD RAIL - STEEL POSTS
		GUARD RAIL - WOOD POSTS
		GUARD RAIL - DOUBLE FACE - STEEL POSTS
		GUARD RAIL - DOUBLE FACE - WOOD POSTS
x		CHAIN LINK OR METAL FENCE
		WOOD FENCE
		COMPOST FILTER TUBE
		EROSION CONTROLS (COIR LOGS)
		TREE LINE
		SAWCUT LINE
		BANK OF RIVER OR STREAM
		BORDER OF WETLAND
		100 FT WETLAND BUFFER
BLSF BLSF		BORDERING LAND SUBJECT TO FLOODING (BLSF) FEMA 100 YEAR FLOOD (TEXT UNDERLINE INDICATES SIDE OF LINE WHERE BLSF EXISTS)
		STATE HIGHWAY LAYOUT
		TOWN OR CITY LAYOUT
		COUNTY LAYOUT
		RAILROAD SIDELINE
		TOWN OR CITY BOUNDARY LINE
E		PROPERTY LINE OR APPROXIMATE PROPERTY LINE

ABBREVIATIONS

GENERAL

AADT	ANNUAL AVERAGE DAILY TRAFFIC
ABAN	ABANDON
ADJ	ADJUST
APPROX.	APPROXIMATE
A.C.	ASPHALT CONCRETE
ACCM PIPE	ASPHALT COATED CORRUGATED METAL PIPE
BIT.	BITUMINOUS
BD.	BOUND
BL	BASELINE
BLDG	BUILDING
BM	BENCHMARK
BO	BY OTHERS
BOS	BOTTOM OF SLOPE
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
DI	DROP INLET
DIA	DIAMETER
DIP	DUCTILE IRON PIPE
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
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

ABBREVIATIONS (cont.)

GENERAL

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
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
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
TAN	TANGENT
TEMP	TEMPORARY
TC	TOP OF CURB
TOS	TOP OF SLOPE
TYP	TYPICAL
UP	UTILITY POLE
VAR	VARIES
VERT	VERTICAL
VC	VERTICAL CURVE
WG	WATER GATE
WIP	WROUGHT IRON PIPE
WM	WATER METER/WATER MAIN
X-SECT	CROSS SECTION

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	44	51
PROJECT FILE NO.	614096		

GENERAL NOTES FOR CATTLE PASSES AT MP 68.00 & 71.66

GENERAL NOTES:

1. ALL WORK SHALL BE PERFORMED DURING SCHEDULED RAILROAD SHUTDOWN PERIODS NOT TO EXCEED 4 DAYS IN TOTAL UNLESS A LONGER SHUTDOWN IS AUTHORIZED BY MASSACHUSETTS COASTAL RAILROAD (MCRR). ALL WORK SHALL BE COORDINATED WITH MCRR AT LEAST 30 DAYS IN ADVANCE.

2. ALL CONSTRUCTION INDICATED ON THESE PLANS SHALL BE IN ACCORDANCE WITH:
   - THE SPECIFICATIONS ACCOMPANYING THESE PLANS
   - MASSDOT STANDARD SPECIFICATIONS FOR HIGHWAY AND BRIDGES, DATED 2025, AND SUPPLEMENTAL SPECIFICATIONS TO DATE.
   - AREMA MANUAL OF RAILWAY ENGINEERING, 2025 EDITION

3. THE CONTRACT PLANS REPRESENT THE FINAL COMPLETED STRUCTURE AND DO NOT INDICATE THE METHOD OF CONSTRUCTION. THE CONTRACTOR IS RESPONSIBLE FOR DESIGNING AND PROVIDING ALL SHORING, BRACING, AND ALL OTHER TEMPORARY SUPPORTS NECESSARY TO PERFORM THE WORK.

4. THE CONTRACTOR SHALL CONDUCT A PRECONSTRUCTION SURVEY AND VERIFY ALL EXISTING DIMENSIONS AND MATERIAL TYPES IN THE FIELD BEFORE COMMENCING WORK AND IMMEDIATELY NOTIFY THE ENGINEER OF ANY DISCREPANCIES. WHERE THE CLEAR INTENT OF THE PROPOSED WORK IS TO MATCH EXISTING CONDITIONS, THE FIELD DATA SHALL GOVERN.

5. TOPOGRAPHIC SURVEY PERFORMED BY WSP IN APRIL 2025.

6. VERTICAL ELEVATIONS REFER TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88), AND HORIZONTAL LOCATIONS REFER TO THE NORTH AMERICAN DATUM OF 1983 (NAD 83).

7. THE CONTRACTOR SHALL COORDINATE AND COMPLY WITH MASSDOT RAIL & TRANSIT DIVISION (MASSDOT) AND MCRR WORK REQUIREMENTS AND RESTRICTIONS. THE CONTRACTOR SHALL ALSO COORDINATE ALL CONSTRUCTION ACTIVITIES WITH THE APPROPRIATE LOCAL, STATE AND FEDERAL AGENCIES AND SHALL AVOID CONSTRUCTION RELATED IMPACTS TO THE ADJACENT AND ADJOINING AREAS.

8. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL LOCAL, STATE, AND FEDERAL PERMITS (INCLUDING INSPECTIONS AND SIGN-OFFS FROM APPLICABLE TOWN DEPARTMENTS) FOR THE CONSTRUCTION, UNLESS NOTED OTHERWISE.

9. THE LIMITS OF WORK ARE GENERALLY DEFINED BY THE RAILROAD RIGHT-OF-WAY AND THE LIMITS SHOWN ON THE PLANS. WHERE ENCROACHMENT ONTO ADJACENT PROPERTY NOT OWNED BY MASSDOT IS NECESSARY OR REQUIRED FOR EXECUTION OF THE WORK, THE CONTRACTOR SHALL SEEK THE APPROPRIATE APPROVALS FROM THE LAND OWNERS AND NOTIFY THE RAILROAD PRIOR TO COMMENCEMENT OF THE WORK.

10. ANY DAMAGE TO EXISTING FEATURES AT THE PROJECT SITE INTENDED TO REMAIN CAUSED BY THE CONTRACTOR SHALL BE REPAIRED BY THE CONTRACTOR AT NO ADDITIONAL COST TO MASSDOT OR MCRR.

11. ALL WORK PERFORMED, AND MATERIALS INSTALLED IN THE EXECUTION OF THE WORK SHALL BE UNDERTAKEN IN STRICT ADHERENCE TO ALL APPLICABLE CODES, STANDARDS, REGULATIONS, AND ORDINANCES OF GOVERNMENT AGENCIES HAVING JURISDICTION AT THE PROJECT SITE.

12. THE CONTRACTOR SHALL PROVIDE THE ENGINEER WITH REASONABLE ACCESS TO THE WORK SITE FOR IN-PROCESS AND FINAL INSPECTIONS.

13. CONTRACTOR SHALL COORDINATE AND NOTIFY MASSDOT, MCRR AND THE TOWN (IF REQUIRED) ON ALL UTILITY WORK WITHIN THE PROJECT LIMITS.

14. CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING THE WORK OF THIS CONTRACT WITH THE LOCAL UTILITY COMPANIES FOR RELOCATION OF THEIR FACILITIES AS REQUIRED FOR THE CONSTRUCTION AND/OR OTHER APPROPRIATE PARTIES PRIOR TO THE START OF EXCAVATION WORK.

GENERAL NOTES (CONTINUED):

15. IF THE CONTRACTOR IDENTIFIES SPECIAL CONDITIONS THAT WERE OTHERWISE NOT ANTICIPATED, AND REQUIRE AN ALTERNATIVE UTILITY LAYOUT OTHER THAN THAT AS SHOWN ON THE PLANS, SUCH ALTERNATIVES SHALL BE SUBMITTED FOR REVIEW AND APPROVAL BY MASSDOT/MCRR PRIOR TO INITIATING ANY WORK.

16. CONTRACTOR SHALL VERIFY LOCATION AND DEPTH OF ANY AND ALL EXISTING DRAINAGE AND UTILITY STRUCTURES.

17. ALL EXISTING RAIL, OTM, AND ALL SWITCH PARTS THAT ARE DEEMED SALVAGEABLE BY MCRR/MASSDOT WILL NEED TO BE DELIVERED TO A MCRR/MASSDOT STORAGE FACILITY WITHIN 75 MILES OF THE WORK AREA. ALL OTM AND SWITCH PARTS SHALL BE LABELED AND KEPT TOGETHER AND PALLETS FOR DELIVERY TO THE STORAGE FACILITY. ALL NON-SALVAGABLE STEEL TRACK MATERIALS (OTM) ITEMS SUCH AS TIE PLATES, RAIL ANCHORS, NUTS, WASHERS, ETC. AND TRACK SPIKES/SCREWS ARE TO BE COLLECTED BY THE CONTRACTOR AND PLACED IN A SCRAP CONTAINER ON SITE FOR PICK UP BY A SCRAP DEALER DESIGNATED BY MCRR. CONTRACTOR WILL BE RESPONSIBLE FOR THE COLLECTION AND DISPOSAL OF ALL SCRAP CROSSTIES AND SWITCH TIMBERS WITHIN THE LIMITS OF THE WORK.

18. THE CONTRACTOR WILL NOT BE ALLOWED TO WORK WITHIN THE "FOUL" AREA OF THE RAILROAD (15 FEET FROM CENTERLINE OF TRACK) WITHOUT FIRST OBTAINING ROADWAY WORKER PROTECTION (RWP) SAFETY TRAINING FROM MCRR, FOR ALL PERSONNEL WORKING WITHIN THE RAILROAD RIGHT-OF-WAY (ROW). THE CONTRACTOR SHALL COORDINATE APPROPRIATE PROTECTION FROM THE MCRR.

19. THE CONTRACTOR SHALL CONTACT MASSDOT, MCRR AND OTHER APPROPRIATE PARTIES (DIG SAFE, ETC.) PRIOR TO THE START OF EXCAVATION WORK.

20. ALL EXCAVATED MATERIAL SHALL BE HANDLED, TRANSPORTED AND GRADED TO THE SATISFACTION OF THE ENGINEER, WITHIN MASSDOT RAILROAD RIGHT-OF-WAY WITHIN 5 MILES OF THE WORK SITE AS DESIGNATED BY MCRR/MASSDOT.

21. THE CONTRACTOR SHALL TAKE ALL REASONABLE MEASURES TO MINIMIZE THE NOISE LEVELS ASSOCIATED WITH THE WORK AND WILL SCHEDULE WORK SO AS TO MINIMIZE THE EFFECTS OF THE NOISE ON THE LOCAL ABUTTERS.

22. THE CONTRACTOR SHALL SET BARRICADES, WARNING LIGHTS, AND OTHER PROTECTIVE DEVICES THAT ARE NECESSARY, IN THE JUDGMENT OF THE ENGINEER, FOR THE PROTECTION OF THE PUBLIC IN ACCORDANCE WITH M.U.T.C.D. LATEST EDITION.

23. THE CONTRACTOR WILL BE RESPONSIBLE FOR THE COLLECTION AND DISPOSAL OF ALL SCRAP CROSSTIES, TIMBERS, ASPHALT, CONCRETE, AND RUBBER MATERIAL WITHIN THE LIMITS OF THE WORK. ALL MATERIAL SHALL BE DISPOSED OF IN ACCORDANCE WITH STATE, LOCAL AND MASSDEP REQUIREMENTS.

24. THE CONTRACTOR SHALL BE RESPONSIBLE FOR LEASING OR OTHERWISE OBTAINING TEMPORARY RIGHTS TO LANDS NECESSARY FOR AREAS OF CONSTRUCTION STAGING AND/OR STORING CONSTRUCTION MATERIALS AND EQUIPMENT.

25. AT THE END OF EACH WORK DAY, THE CONTRACTOR WILL MAKE REASONABLE EFFORTS TO KEEP THE WORK SITE CLEAN AND FREE OF CONSTRUCTION DEBRIS, RUBBISH, SPOILS, TRASH, AND OTHER FOREIGN MATERIALS. ALL SUCH RUBBISH, DEBRIS AND LIKE MATERIALS SHALL BE DISPOSED OF IN ACCORDANCE WITH ALL ORDINANCES, RULES AND REGULATIONS OF THE JURISDICTIONAL AUTHORITY, INCLUDING ENVIRONMENTAL REGULATIONS.

26. THE CONTRACTOR SHALL SUPERVISE AND EXECUTE THE WORK USING THE HIGHEST QUALITY CONSTRUCTION SKILLS AND ATTENTION TO DETAIL. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR, AND HAVE CONTROL OVER, THE CONSTRUCTION MEANS, METHODS, TECHNOLOGIES, SEQUENCES, AND PROCEDURES, AS LONG AS APPROPRIATELY COORDINATED WITH THE RAILROAD.

27. ALL MATERIALS AND CONSTRUCTION SHALL CONFORM TO MASSDOT STANDARDS, MBTA COMMUTER RAIL STANDARDS AND AREMA SPECIFICATIONS FOR RAILROAD CONSTRUCTION, WHICHEVER IS MORE STRINGENT.

SUGGESTED CONSTRUCTION SEQUENCE:

1. PRIOR TO COMMENCING WORK, THE CONTRACTOR SHALL SUBMIT A DETAILED SEQUENCE OF CONSTRUCTION OPERATIONS FOR REVIEW AND APPROVAL BY THE ENGINEER, MCRR AND/OR MASSDOT.

2. INSTALL EROSION CONTROL MEASURES AS REQUIRED FOR CONSTRUCTION.

3. REMOVE EXISTING TRACKS (TIES AND RAILS) AND STORE SAFELY ON-SITE.

4. EXCAVATE TO THE EXISTING CATTLE PASS ROOF. EXCAVATED SOIL SHALL BE STOCKPILED FOR POTENTIAL REUSE. EXCAVATED EXISTING BALLAST AND SUBBALLAST SHALL BE STOCKPILED SEPARATELY.

5. REMOVE AND DISPOSE OF EXISTING RAIL TOP ROOF AND HEADWALLS. REMOVE UPPER COURSE OF STONE SIDEWALLS AS NECESSARY TO ACHIEVE AT LEAST 12" OF SPACE BELOW BOTTOM OF TIE.

6. PREPARE BED AND INSTALL PROPOSED PIPE LEVEL TO THE EXISTING CATTLE PASS FLOOR INVERT ELEVATION.

7. INSTALL (PLACE AND COMPACT IN LIFTS) PROCESSED GRAVEL AROUND THE PIPE. ONCE ABOVE PIPE INSTALL (PLACE AND COMPACT IN LIFTS) EXISTING STOCKPILED BACKFILL IN LIFTS TO 12" BELOW BOTTOM OF TIE.

8. ALL MATERIAL SHALL BE PLACED IN HORIZONTAL LAYERS NOT EXCEEDING EIGHT (8) INCHES (AFTER COMPACTION) AND SHALL BE COMPACTED AS SPECIFIED BEFORE THE NEXT LAYER IS PLACED.

9. INSTALL AND COMPACT EIGHT (8) INCHES OF BALLAST.

10. RE-INSTALL TRACK (TIES AND RAILS) AND INSTALL REMAINING BALLAST.

11. TAMP, LIFT AND SURFACE TO FINAL ELEVATION AND ALIGNMENT.

12. REMOVE EROSION CONTROL AND CLEAN WORK SITE.

TRACK NOTES:

1. PRIOR TO COMMENCING WORK, THE CONTRACTOR SHALL SUBMIT A PHASING PLAN FOR TRACK CONSTRUCTION FOR REVIEW AND APPROVAL BY THE ENGINEER, MCRR AND/OR MASSDOT.

2. MCRR FLAGGING SUPPORT SHALL BE ARRANGED BY THE CONTRACTOR, AND AT THE EXPENSE OF MASSDOT. THESE SERVICES WILL BE PROVIDED AS SPECIFIED HEREIN AND AS APPROVED BY THE MCRR AND MASSDOT TO ALLOW THE CONTRACTOR TO CARRY OUT THEIR WORK ACTIVITIES SAFELY AND WITHOUT ADVERSE IMPACTS TO RAILROAD OPERATIONS.

ENVIRONMENTAL NOTES:

1. IF ANY UNKNOWN HAZARDOUS MATERIALS ARE ENCOUNTERED IN THE SOILS DURING EXCAVATION OPERATIONS, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER AND SUSPEND EXCAVATION OPERATIONS UNTIL THE SITUATION CAN BE PROPERLY EVALUATED.

2. EXTREME CARE SHALL BE EXERCISED TO PREVENT ANY DEMOLITION AND CONSTRUCTION DEBRIS FROM FALLING INTO WETLAND RESOURCES. IF ANY MATERIAL/EQUIPMENT FALLS IN WETLAND RESOURCES, IT SHALL BE IMMEDIATELY REMOVED.

DESIGN DATA:

1. DESIGN SPECIFICATIONS: AREMA MANUAL OF RAILWAY ENGINEERING, 2025 EDITION.

2. DESIGN LIVE LOADS: AREMA COOPER E-80 LOCOMOTIVE WITH FULL IMPACT. STRESSES INDUCED BY TRANSPORTATION AND HANDLING.

MATERIALS:

1. PRECAST REINFORCED CONCRETE PIPE:
   - CLASS V
   - GASKET JOINTS

2. FOR ADDITIONAL MATERIAL REQUIREMENTS, SEE THE CONTRACT SPECIFICATIONS.

MASSDOT CAPE MAIN
ROCHESTER & BARNSTABLE, MA
IMPROVEMENTS AT MP 44.27, 44.29, 68.00 & 71.66

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	45	51
PROJECT FILE NO.	614096		

CATTLE PASS AT MP 68.00 EXISTING CONDITIONS PLAN

APPROXIMATE RAILROAD RIGHT-OF-WAY

WF#B-1

WF#B-2

WF#B-3

WF#B-4

WF#B-5

WF#B-6

NAD 83

WETLAND EDGE

EXIST. STONE WALL (TYP.)

INV 3.5' x 6.0' STONE CATTLE PASS EL=46.14'

TOP OF ROOF SUPPORT=49.3'±
BOTTOM OF ROOF SUPPORT=49.1'±

WOODED

STA 1785+50.00
N 2723527.2205
E 956911.9173

EXISTING CATTLE PASS AT MP 68.00 (SEE NOTE 1)

℄ CAPE MAINLINE TRACK & CONSTRUCTION ℄

STA=1785+88.90 ℄ OF TRACK AT ℄ OF CATTLE PASS

EXISTING MAINLINE TRACK 107NH JOINTED

TOP OF RAIL ELEV. 51.95'

INV 3.5' x 6.0' STONE CATTLE PASS EL=45.52'

TOP OF ROOF SUPPORT=49.4'±
BOTTOM OF ROOF SUPPORT=49.1'±

WETLAND EDGE

BOSTON (RR NORTH)

HYANNIS (RR SOUTH)

WF#A-1

WF#A-2

WF#A-3

WF#A-4

HOR. SCALE IN FEET
4 0 4 8

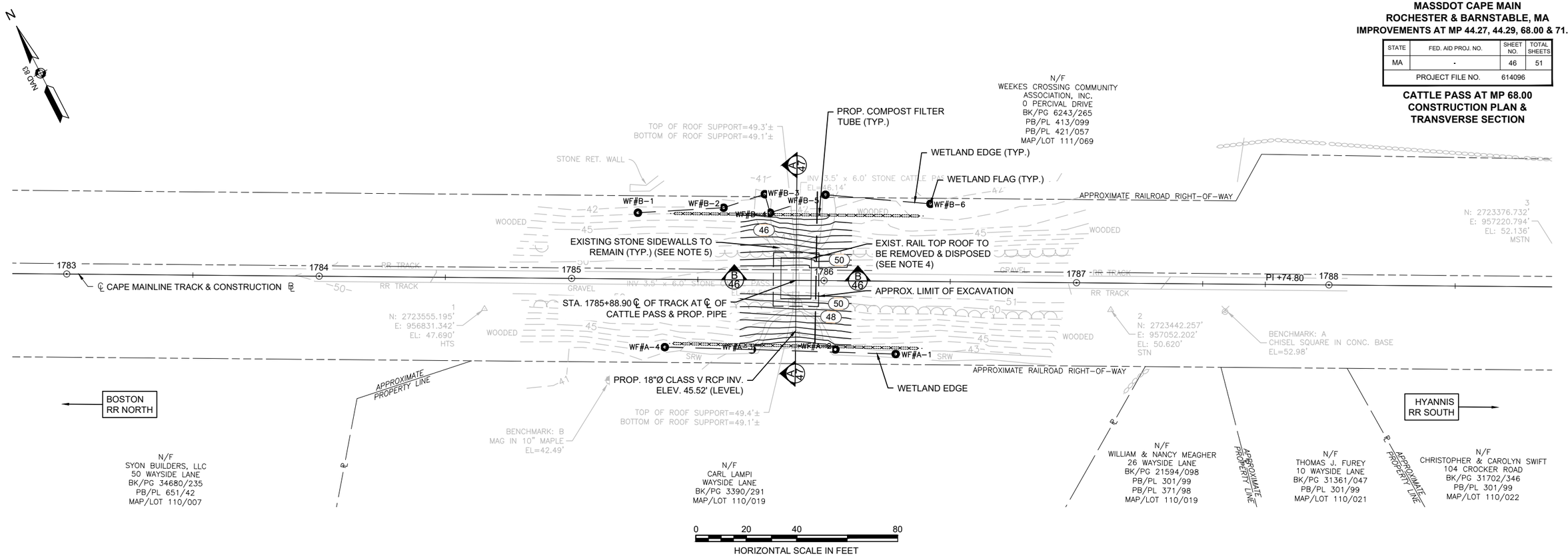
NOTES:

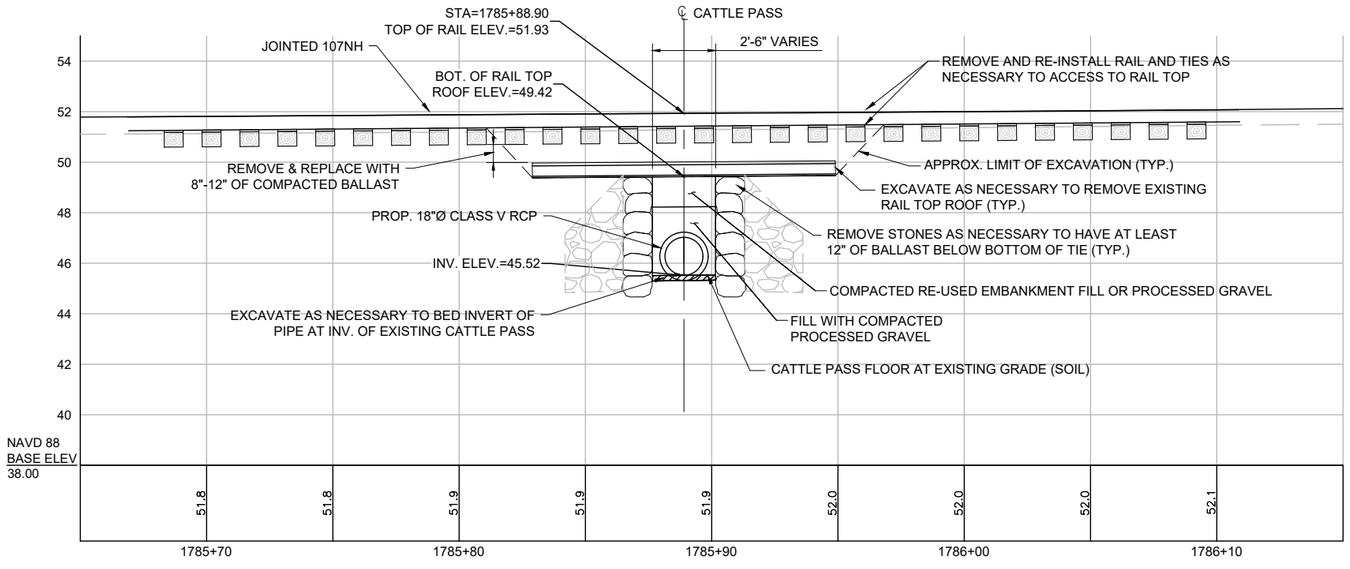
1. EXISTING CATTLE PASS CONSISTS OF A RAIL TOP ROOF (BUTTED RAIL SECTIONS WITH CONCRETE TOPPING SLAB) SUPPORTED BY STONE SIDEWALLS.
2. WETLAND DELINEATION SHOWN ON THIS SHEET WAS PERFORMED BY WSP IN FEBRUARY 2025 AND LOCATED VIA CONVENTIONAL FIELD SURVEY IN APRIL 2025.

MASSDOT CAPE MAIN
ROCHESTER & BARNSTABLE, MA
IMPROVEMENTS AT MP 44.27, 44.29, 68.00 & 71.66

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	46	51
PROJECT FILE NO.	614096		

CATTLE PASS AT MP 68.00 CONSTRUCTION PLAN & TRANSVERSE SECTION





PROPOSED CULVERT TRANSVERSE SECTION B-B

SCALE: 1" = 3'-0"

0 3 6 9 12

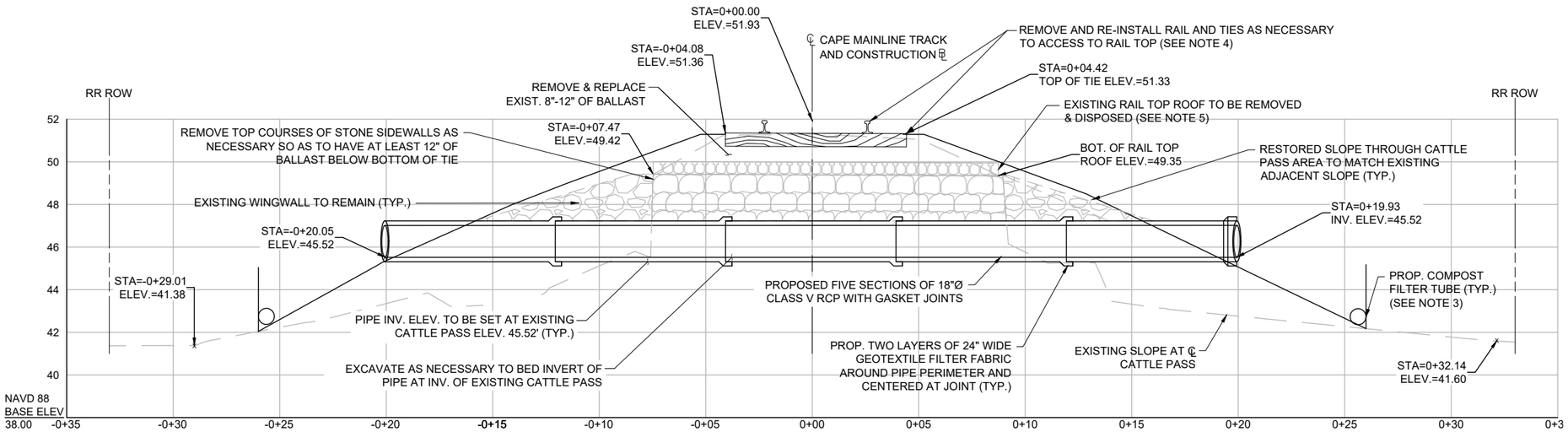
NOTES:

1. SEE SHEET 44 FOR GENERAL NOTES.
2. SEE SHEET 47 FOR THE PROPOSED LONGITUDINAL SECTION.
3. SEE SHEET 51 FOR THE EROSION CONTROL DETAILS AND NOTES.
4. EXISTING RAIL TOP ROOF (BUTTED RAIL SECTIONS WITH CONCRETE TOPPING SLAB) SHALL BE REMOVED. CONCRETE SHALL BE DISPOSED OF ACCORDING TO THE SPECIFICATIONS. RAILS TO BE SALVAGED.
5. CONTRACTOR SHALL TAKE CARE NOT TO DAMAGE THE EXISTING STONE SIDEWALLS INTENDED TO REMAIN. THE TOP COURSE OF SIDEWALLS MAY BE REMOVED TO FACILITATE RAIL TOP ROOF REMOVAL AND RCP INSTALLATION.

MASSDOT CAPE MAIN
ROCHESTER & BARNSTABLE, MA
IMPROVEMENTS AT MP 44.27, 44.29, 68.00 & 71.66

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	47	51
PROJECT FILE NO.	614096		

CATTLE PASS AT MP 68.00
LONGITUDINAL SECTION



PROPOSED CULVERT LONGITUDINAL SECTION A-A

SCALE: 1" = 3'-0"

0 3 6 9 12

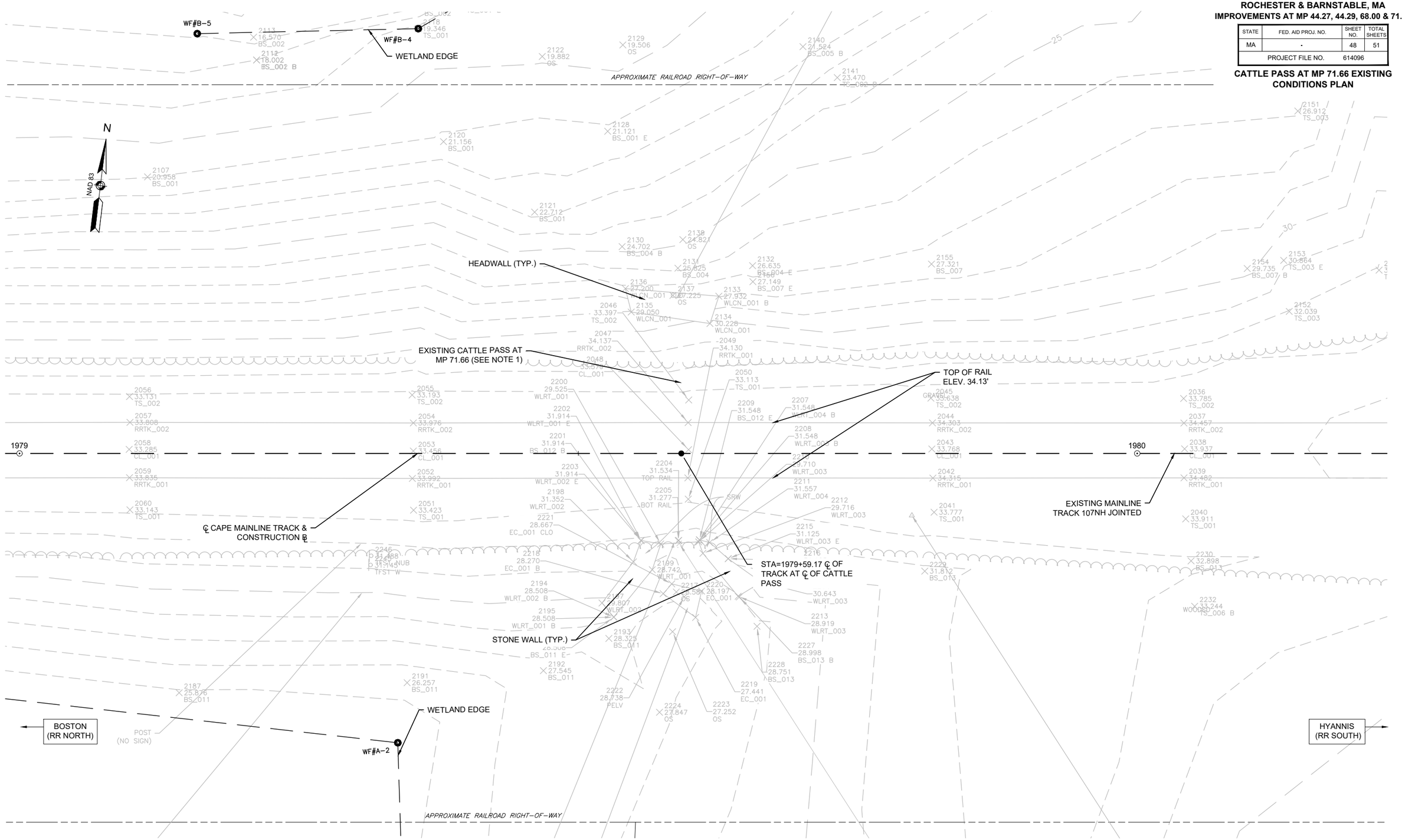
NOTES:

1. SEE SHEET 44 FOR GENERAL NOTES.
2. SEE SHEET 46 FOR THE CONSTRUCTION PLAN AND THE PROPOSED TRANSVERSE SECTION.
3. SEE SHEET 51 FOR THE EROSION CONTROL DETAILS AND NOTES.
4. EXISTING TRACK (RAILS AND TIES) TO BE REMOVED AND RE-INSTALLED AS NECESSARY FOR CATTLE PASS CONSTRUCTION.
5. EXISTING RAIL TOP ROOF (BUTTED RAIL SECTIONS WITH CONCRETE TOPPING SLAB) SHALL BE REMOVED. CONCRETE SHALL BE DISPOSED OF ACCORDING TO THE SPECIFICATIONS. RAILS TO BE SALVAGED.

MASSDOT CAPE MAIN
ROCHESTER & BARNSTABLE, MA
IMPROVEMENTS AT MP 44.27, 44.29, 68.00 & 71.66

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	48	51
PROJECT FILE NO.	614096		

CATTLE PASS AT MP 71.66 EXISTING CONDITIONS PLAN



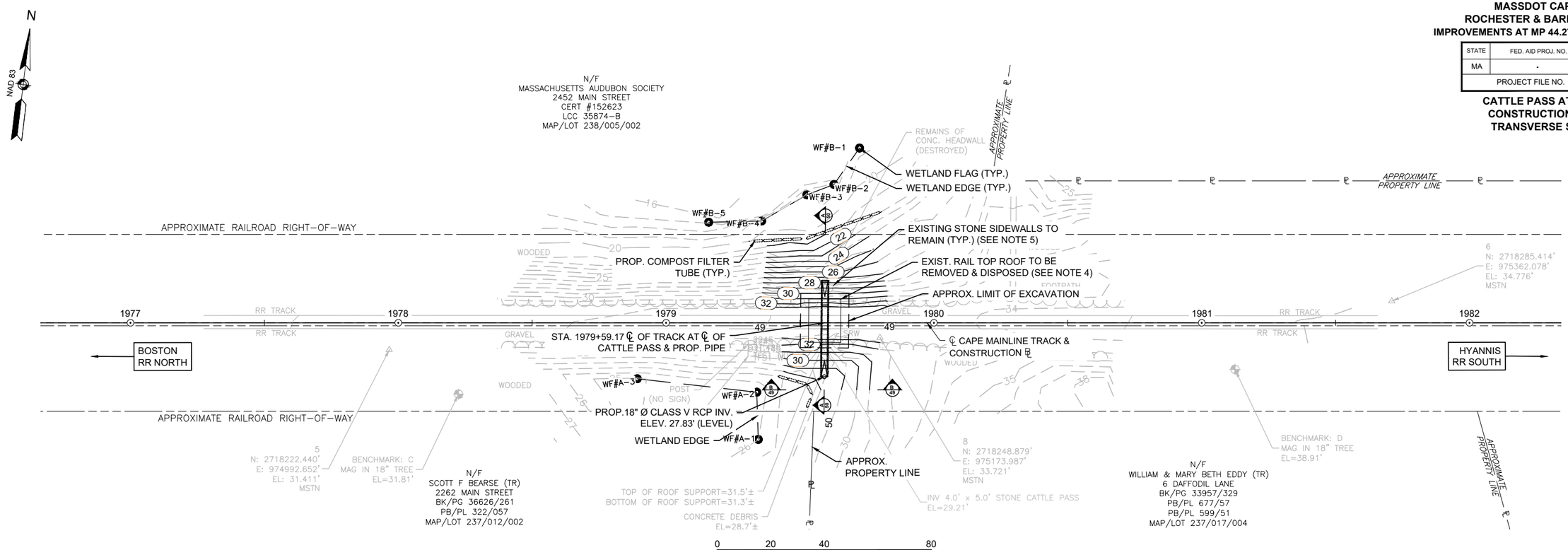
NOTES:

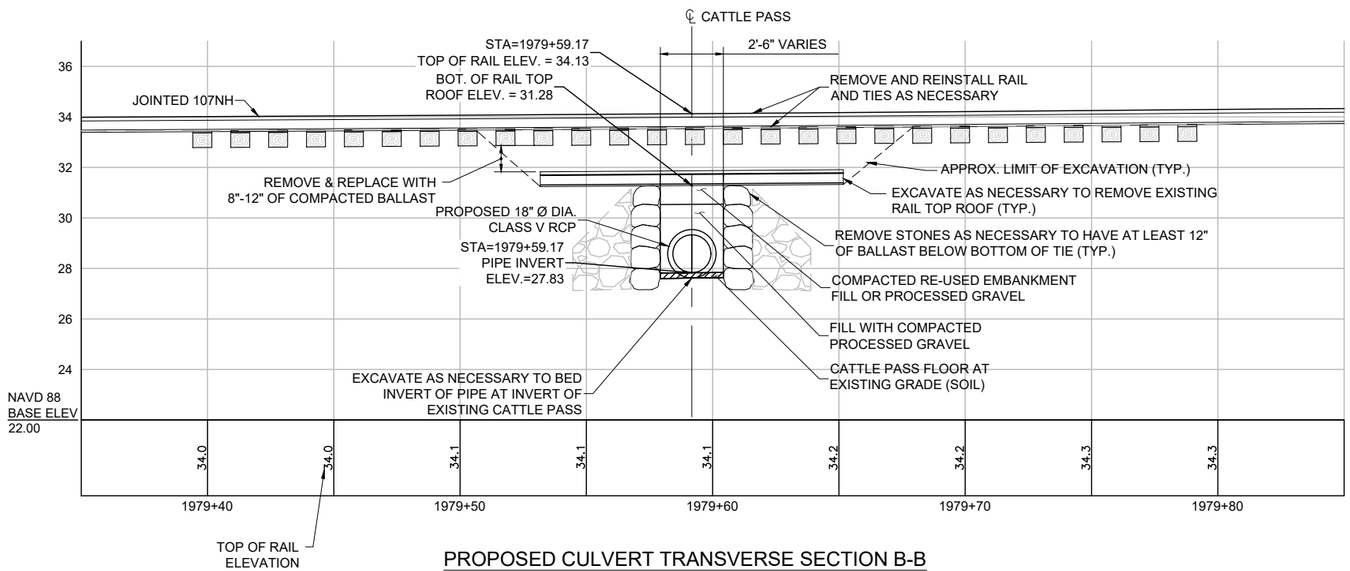
1. EXISTING CATTLE PASS CONSISTS OF A RAIL TOP ROOF (BUTTED RAIL SECTIONS WITH CONCRETE TOPPING SLAB) SUPPORTED BY STONE SIDEWALLS.
2. WETLAND DELINEATION SHOWN ON THIS SHEET WAS PERFORMED BY WSP IN FEBRUARY 2025 AND LOCATED VIA CONVENTIONAL FIELD SURVEY IN APRIL 2025.

MASSDOT CAPE MAIN
ROCHESTER & BARNSTABLE, MA
IMPROVEMENTS AT MP 44.27, 44.29, 68.00 & 71.66

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	49	51
PROJECT FILE NO.	614096		

CATTLE PASS AT MP 71.66 CONSTRUCTION PLAN & TRANSVERSE SECTION





PROPOSED CULVERT TRANSVERSE SECTION B-B

SCALE: 1" = 3'-0"

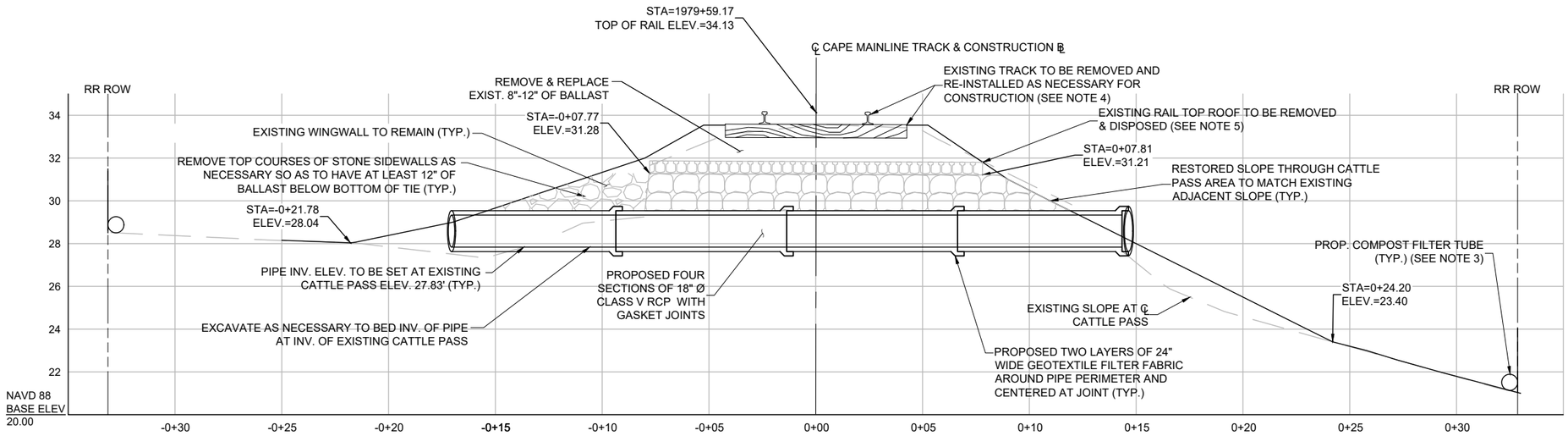
NOTES:

1. SEE SHEET 44 FOR GENERAL NOTES.
2. SEE SHEET 50 FOR THE PROPOSED LONGITUDINAL SECTION.
3. SEE SHEET 51 FOR THE EROSION CONTROL DETAILS AND NOTES.
4. EXISTING RAIL TOP ROOF (BUTTED RAIL SECTIONS WITH CONCRETE TOPPING SLAB) SHALL BE REMOVED. CONCRETE SHALL BE DISPOSED OF ACCORDING TO THE SPECIFICATIONS. RAILS TO BE SALVAGED.
5. CONTRACTOR SHALL TAKE CARE NOT TO DAMAGE THE EXISTING STONE SIDEWALLS INTENDED TO REMAIN. THE TOP COURSE OF SIDEWALLS MAY BE REMOVED TO FACILITATE RAIL TOP ROOF REMOVAL AND RCP INSTALLATION.

MASSDOT CAPE MAIN
ROCHESTER & BARNSTABLE, MA
IMPROVEMENTS AT MP 44.27, 44.29, 68.00 & 71.66

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	50	51
PROJECT FILE NO.	614096		

CATTLE PASS AT MP 71.66
LONGITUDINAL SECTION



PROPOSED CULVERT LONGITUDINAL SECTION A-A
SCALE: 1" = 3'-0"

0 3 6 9 12

NOTES:

1. SEE SHEET ## FOR GENERAL NOTES.
2. SEE SHEET 49 FOR THE CONSTRUCTION PLAN AND THE PROPOSED TRANSVERSE SECTION.
3. SEE SHEET 51 FOR THE EROSION CONTROL DETAILS AND NOTES.
4. EXISTING TRACK (RAILS AND TIES) TO BE REMOVED AND RE-INSTALLED AS NECESSARY FOR CATTLE PASS CONSTRUCTION.
5. EXISTING RAIL TOP ROOF (BUTTED RAIL SECTIONS WITH CONCRETE TOPPING SLAB) SHALL BE REMOVED. CONCRETE SHALL BE DISPOSED OF ACCORDING TO THE SPECIFICATIONS. RAILS TO BE SALVAGED.

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	51	51
PROJECT FILE NO.	614096		

EROSION CONTROL DETAILS AND NOTES

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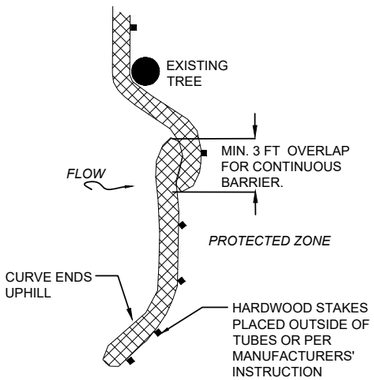


PLACE TUBE ALONG CONTOURS AND PERPENDICULAR TO FLOW.

PLACE AS CLOSE TO LIMIT OF SOIL DISTURBANCE AS POSSIBLE.

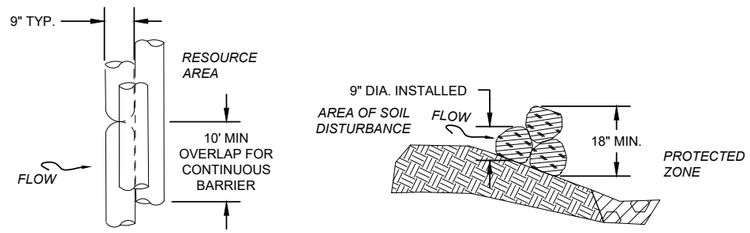
ADJUST LOCATION AS REQUIRED FOR OPTIMUM EFFECTIVENESS. DO NOT INSTALL IN WATERWAYS.

PLACE STAKES AS NEEDED TO SECURE TUBES IN PLACE.

PLAN VIEW

SEDIMENT BARRIER INSTALLATION

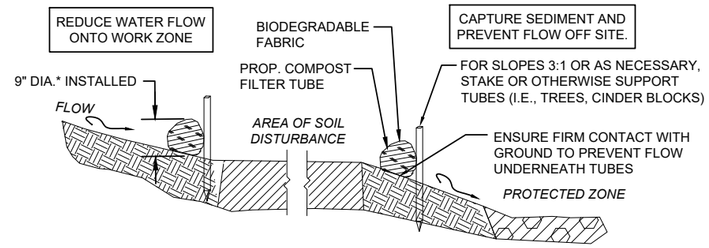
NOT TO SCALE



PLAN VIEW SECTION

SEDIMENTATION CONTROL BARRIER BERM (SLOPES 2:1 OR STEEPER)

NOT TO SCALE



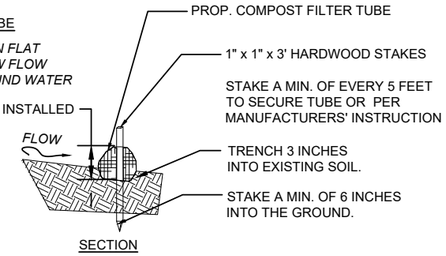
SECTION

SEDIMENT CONTROL BARRIER - COMPOST FILTER TUBE

NOT TO SCALE

COMPOST FILTER TUBE

TO BE USED ONLY ON FLAT SURFACES WITH LOW FLOW TO DIVERT OR IMPOUND WATER FLOW



SECTION

COMPOST FILTER TUBE - SEDIMENT BARRIER

NOT TO SCALE

EROSION CONTROL NOTES:

1. PRIOR TO PROJECT IMPLEMENTATION, THE CONTRACTOR SHALL SUBMIT FOR ACCEPTANCE A GENERAL WORK SCHEDULE, CONSTRUCTION SEQUENCE AND PLAN WHICH INDICATES PLANNING IMPLEMENTATION OF TEMPORARY AND PERMANENT EROSION CONTROL MEASURES. THIS PLAN SHALL INCLUDE PROPOSED METHODS OF SOILS MANAGEMENT AND DISPOSAL OF WASTE MATERIALS.
2. EROSION CONTROLS SHALL BE FINALIZED BASED ON ACTUAL FIELD CONDITIONS.
3. NO SEDIMENT OR SILT SHALL BE DISCHARGED TO THE WETLAND AT ANY TIME.
4. NO DEWATERING IS PERMITTED UNLESS THE CONTRACTOR PREPARES A DEWATERING PLAN THAT INCLUDES PUMPING WATER TO AN UPLAND SITE WITH ADEQUATE SILTATION CONTROLS, AND THAT PLAN IS APPROVED BY THE DEP. CONTRACTOR SHALL BE RESPONSIBLE FOR ESTABLISHING AND MAINTAINING ALL TEMPORARY SEDIMENTATION AND EROSION CONTROLS.
5. FOR EROSION CONTROL INSTALLATION REQUIREMENTS, REFER TO EROSION PROTECTION PLAN. TEMPORARY TREATMENTS SHALL CONSIST OF COMPOST FILTER TUBE, SILT FENCE, FIBER MULCH OR PROTECTIVE COVER SUCH AS FABRIC MATS.
7. THE TOE OF ANY SLOPE IS TO REMAIN AT LEAST ONE FOOT INSIDE OF ALL EROSION CONTROLS. UNDER NO CIRCUMSTANCE SHALL THE CONTRACTOR COVER ANY PORTION OF THE EROSION CONTROLS WITH MATERIAL. ANY MATERIAL THAT IS PLACE ON ANY EROSION CONTROLS BY THE CONTRACTOR, OR ANY AGENT OF THE CONTRACTOR, SHALL BE IMMEDIATELY REMOVED BY THE CONTRACTOR, AND ANY NECESSARY REPAIRS TO THE EROSION CONTROLS ACCOMPLISHED, AT NO COST TO THE OWNER.
8. ADDITIONAL EROSION CONTROLS SHALL BE INSTALLED AS CONDITIONS WARRANT, OR AS DIRECTED BY THE ENGINEER.
9. DURING CONSTRUCTION, THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL EROSION CONTROL MAINTENANCE AND SHALL INSPECT AND/OR REPLACE ALL CONTROLS AS NEEDED. MAINTENANCE WILL BE CARRIED OUT IN ACCORDANCE WITH THE SPECIFICATIONS AND PERMIT CONDITIONS. THE CONTRACTOR IS RESPONSIBLE FOR CARRYING OUT NECESSARY MAINTENANCE DURING ALL PHASES OF PROJECT COMPLETION.
10. SEDIMENTATION CONTROL DEVICES SHALL BE INSPECTED CLOSELY AND MAINTAINED PROMPTLY AS DESCRIBED IN THE SPECIFICATIONS. THE CONTRACTOR SHALL INSPECT AND MAINTAIN EROSION CONTROL MEASURES ON A WEEKLY BASIS AND WITHIN 24 HOURS OF EACH STORM EVENT.
11. DISTURBED SLOPES ALONG THE EMBANKMENT WITHIN THE WORK ZONE SHALL BE STABILIZED WITH LOAM AND SEED.

NOTES:

1. SEE SHEETS 43 AND # FOR GENERAL NOTES, SYMBOLS, AND ABBREVIATIONS.
2. ALL EROSION AND SEDIMENT CONTROLS SHALL BE PLACED AND MAINTAINED IN ACCORDANCE WITH MASSDOT STANDARDS.
3. SEDIMENT BARRIERS SHALL BE PLACED AT LOCATIONS SHOWN ON PLANS AND/OR AS DIRECTED BY THE ENGINEER.

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