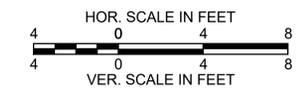
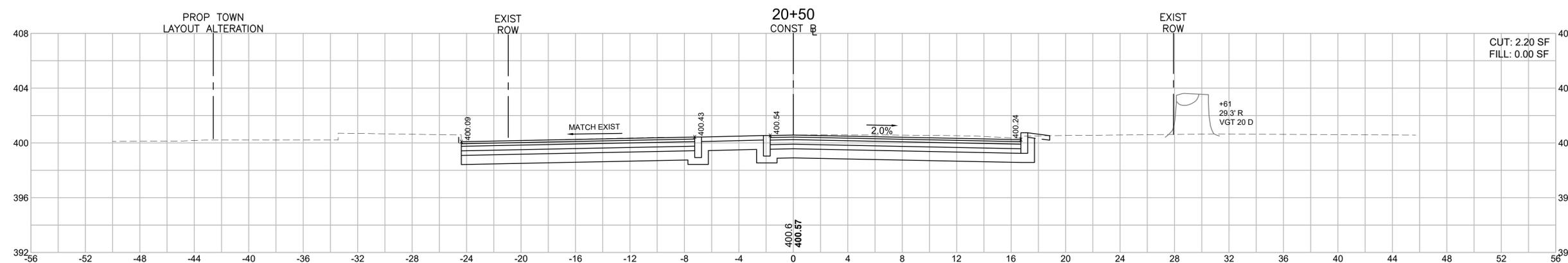
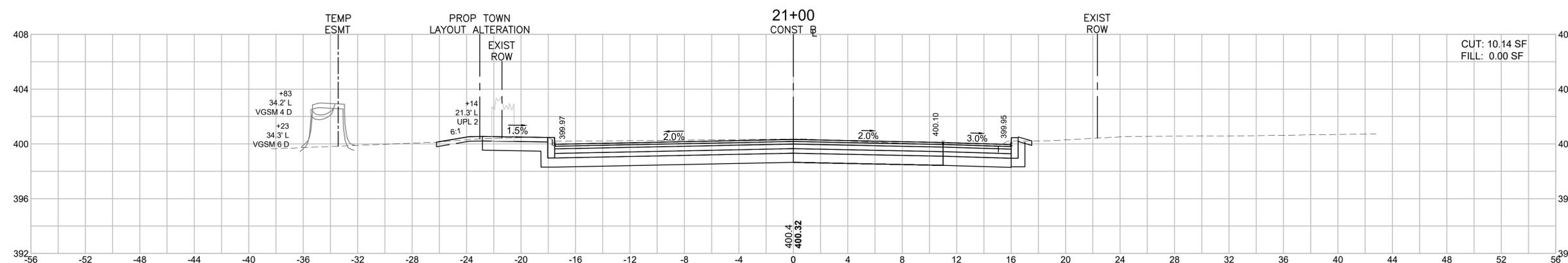
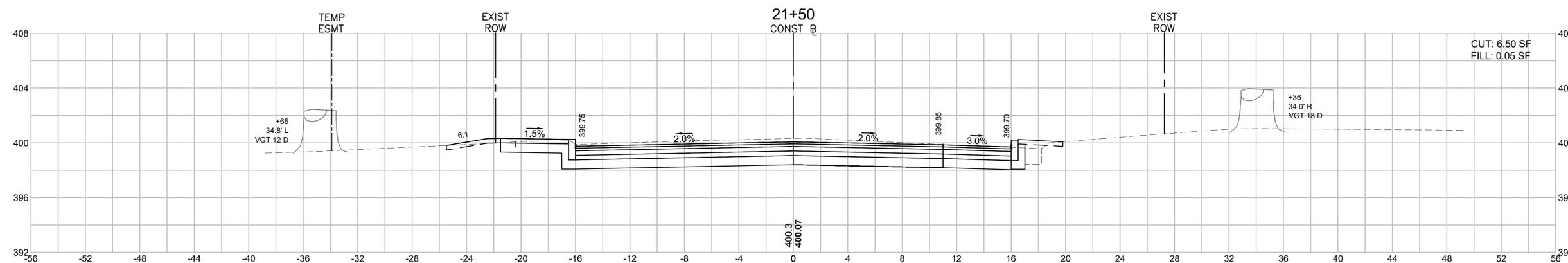


**WESTFORD
BOSTON ROAD**

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	80	132
PROJECT FILE NO.		609035	

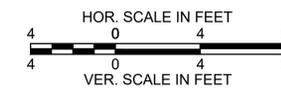
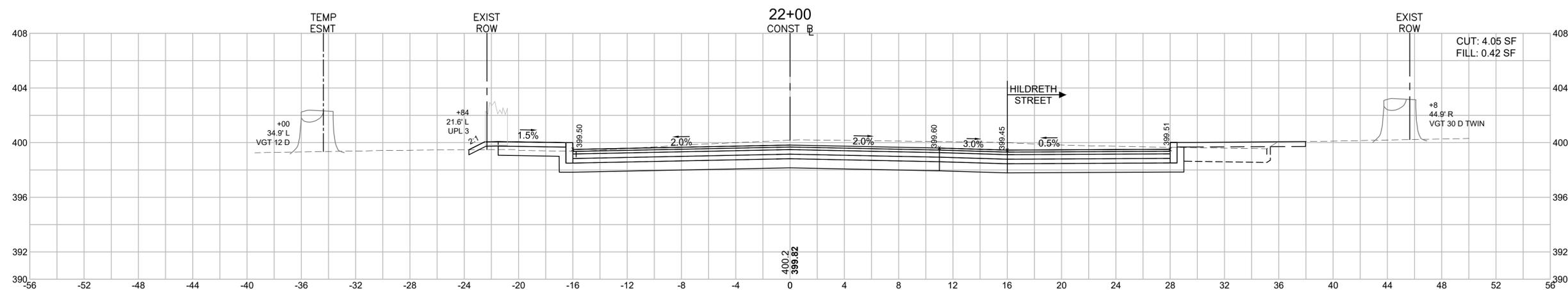
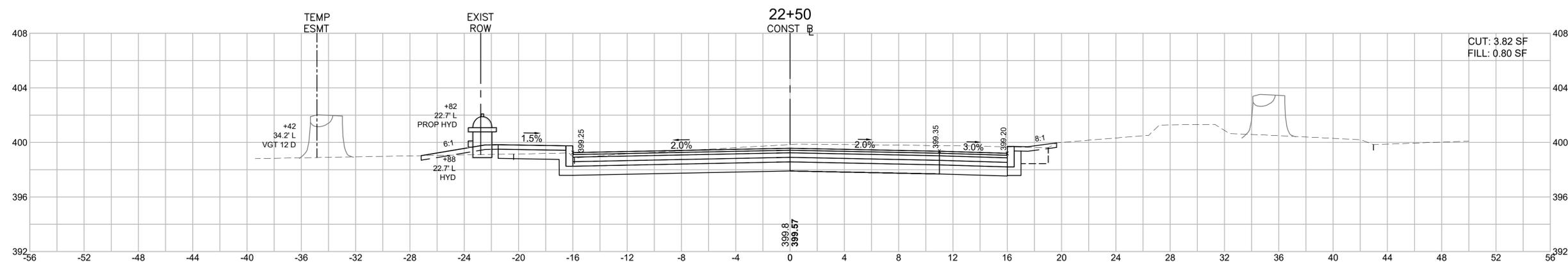
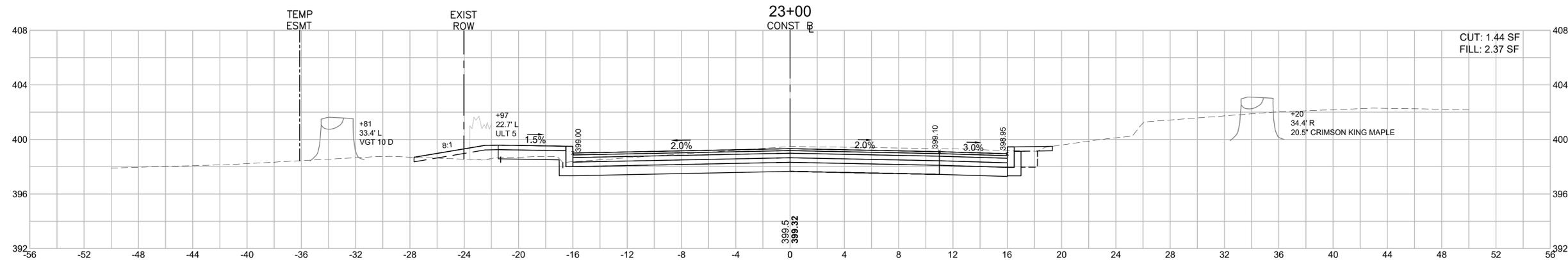
**CROSS SECTIONS - 1 OF 53
BOSTON ROAD**



**WESTFORD
BOSTON ROAD**

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	81	132
PROJECT FILE NO.		609035	

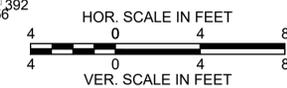
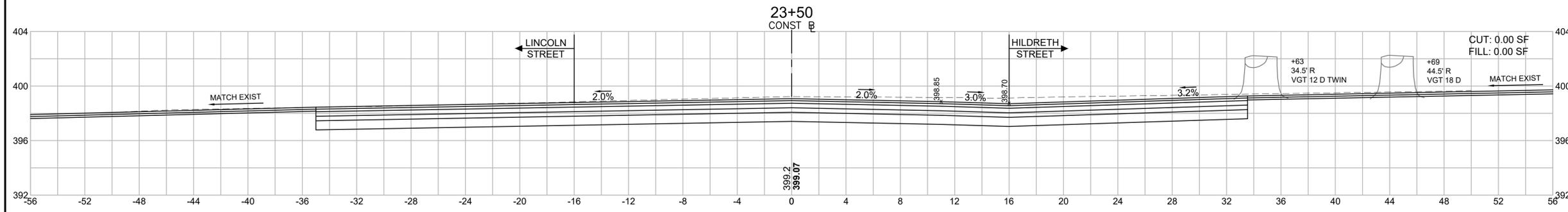
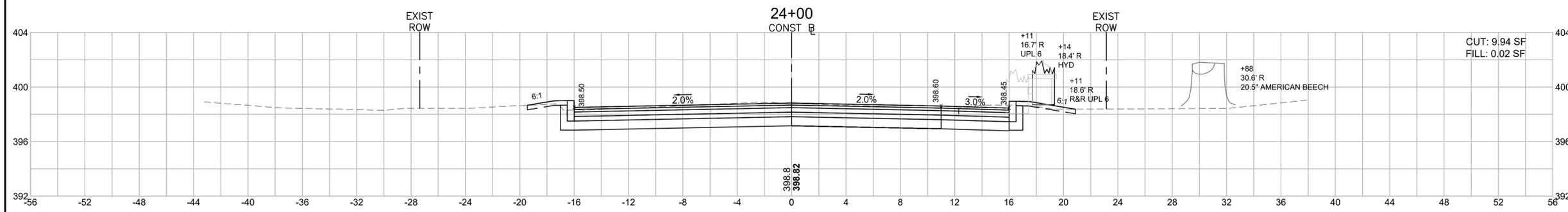
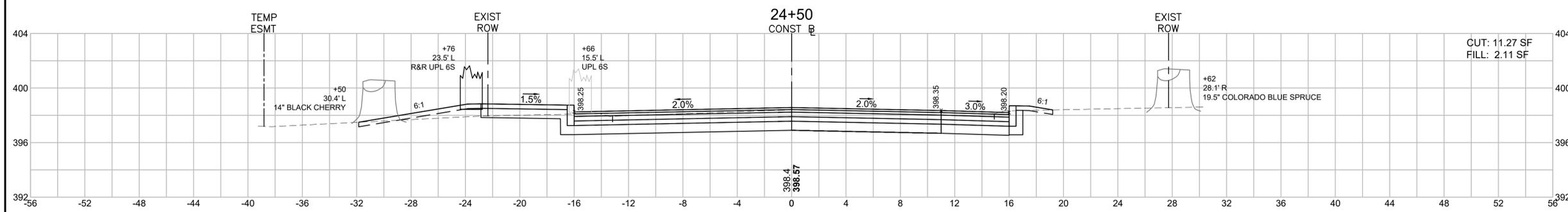
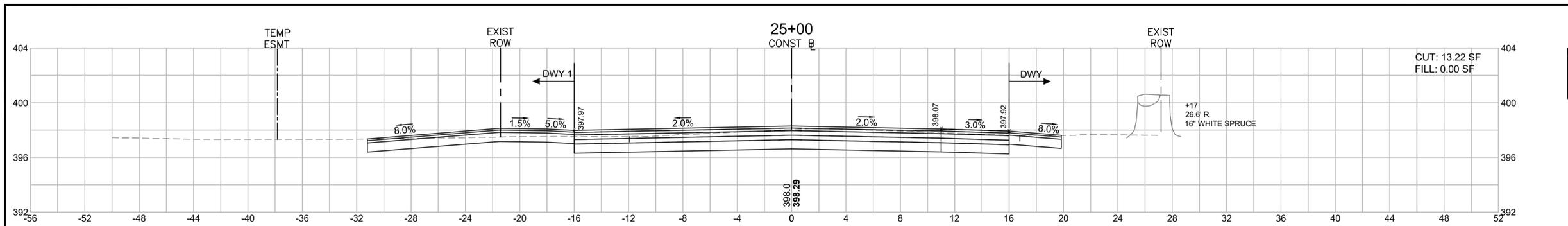
**CROSS SECTIONS - 2 OF 53
BOSTON ROAD**



**WESTFORD
BOSTON ROAD**

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	82	132
PROJECT FILE NO.		609035	

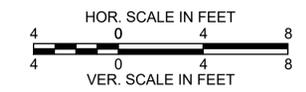
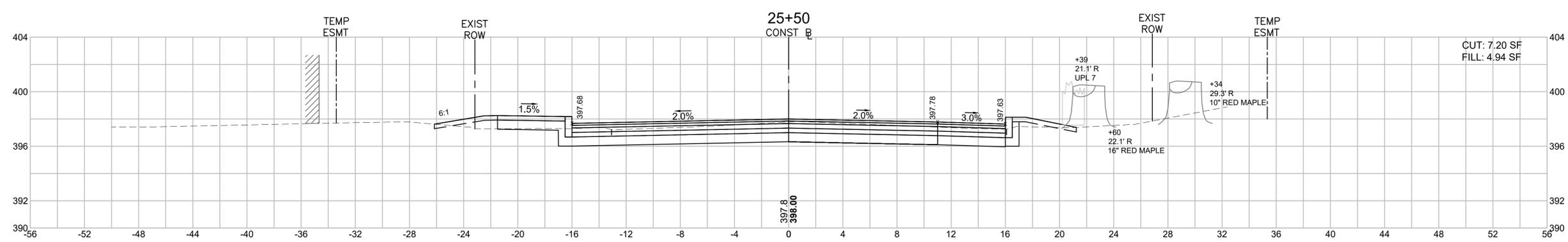
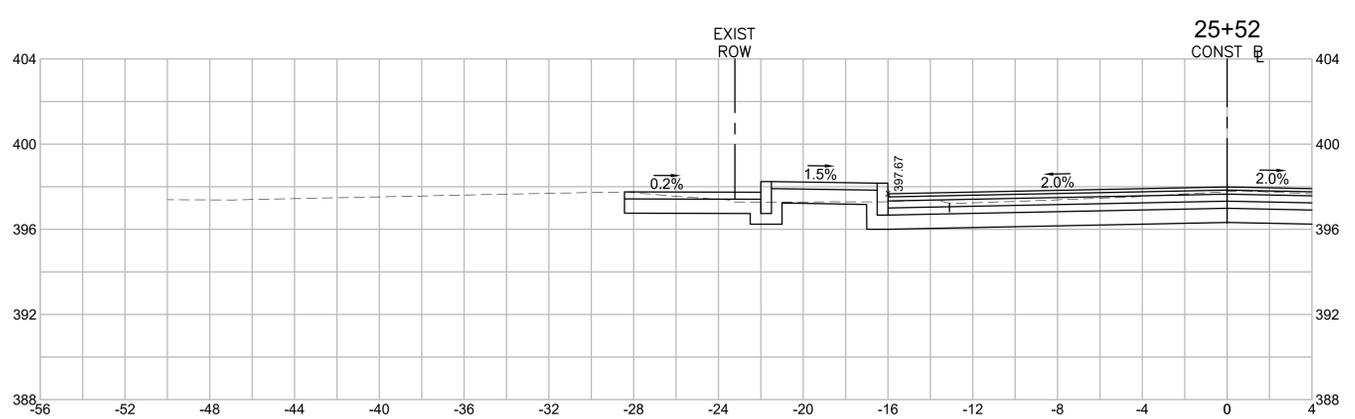
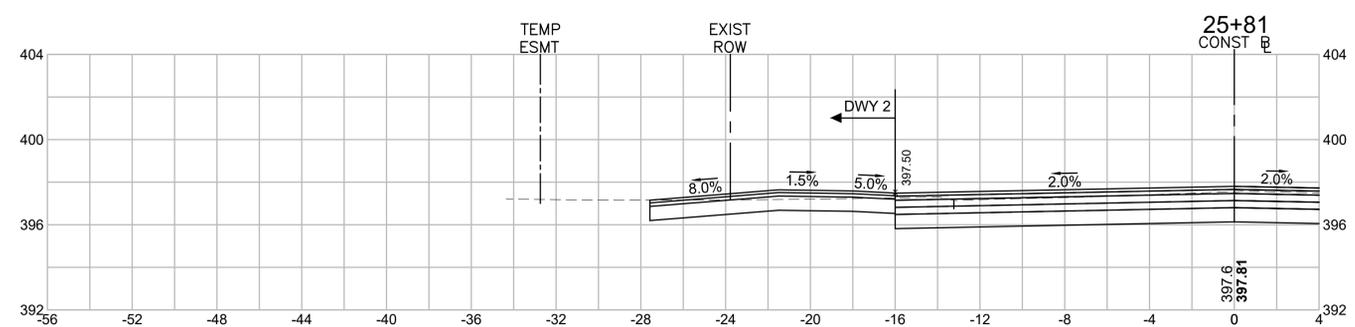
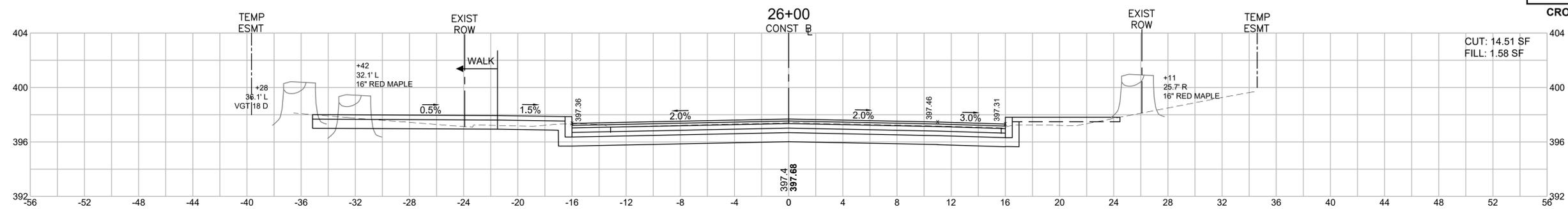
**CROSS SECTIONS - 3 OF 53
BOSTON ROAD**



**WESTFORD
BOSTON ROAD**

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	83	132
PROJECT FILE NO.		609035	

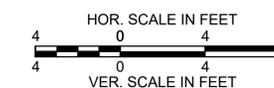
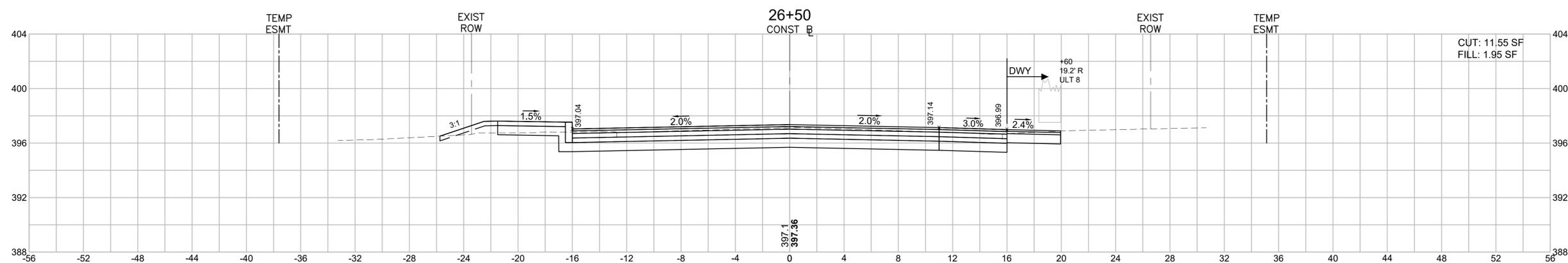
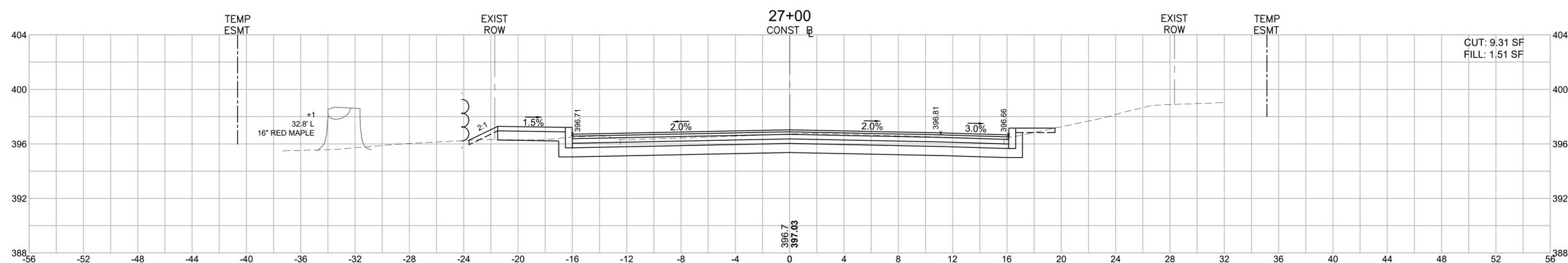
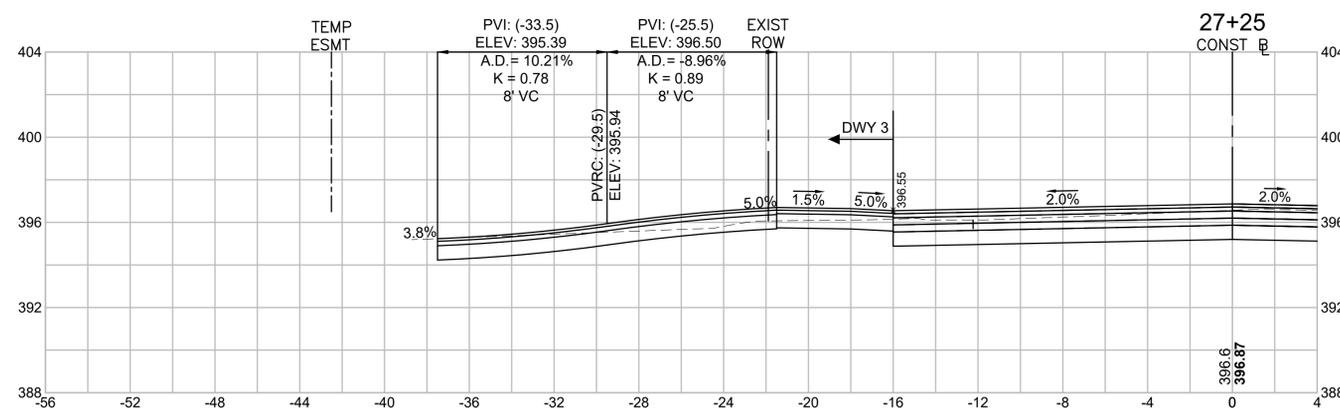
**CROSS SECTIONS - 4 OF 53
BOSTON ROAD**



**WESTFORD
BOSTON ROAD**

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	84	132
PROJECT FILE NO.		609035	

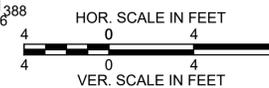
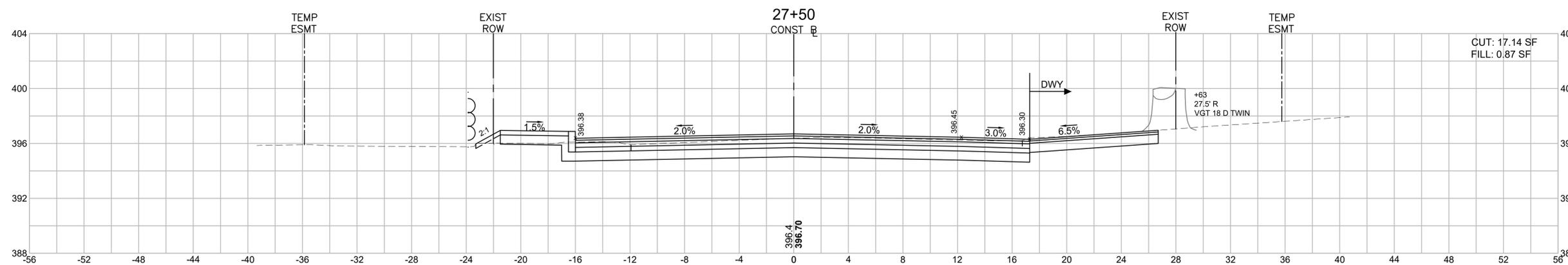
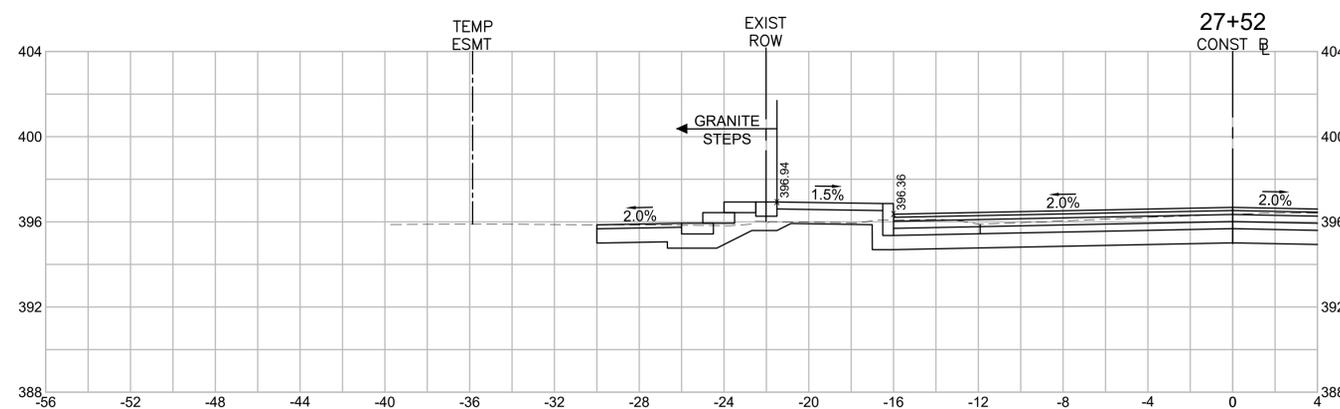
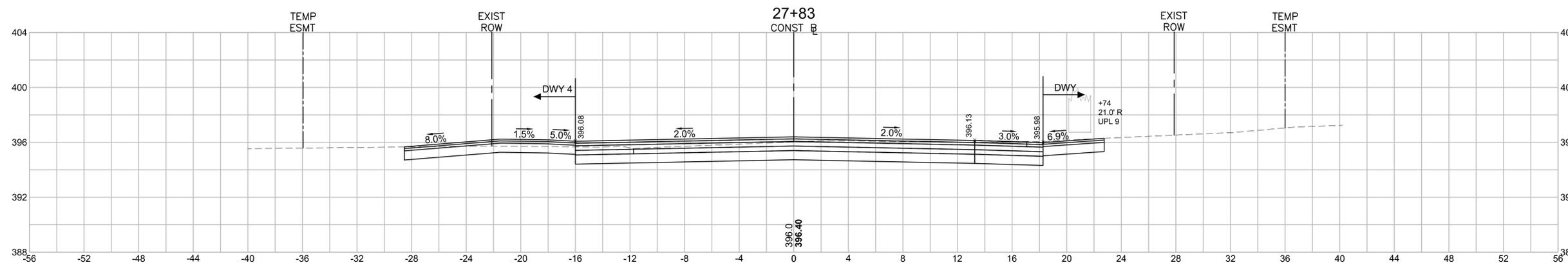
**CROSS SECTIONS - 5 OF 53
BOSTON ROAD**



**WESTFORD
BOSTON ROAD**

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	85	132

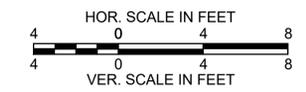
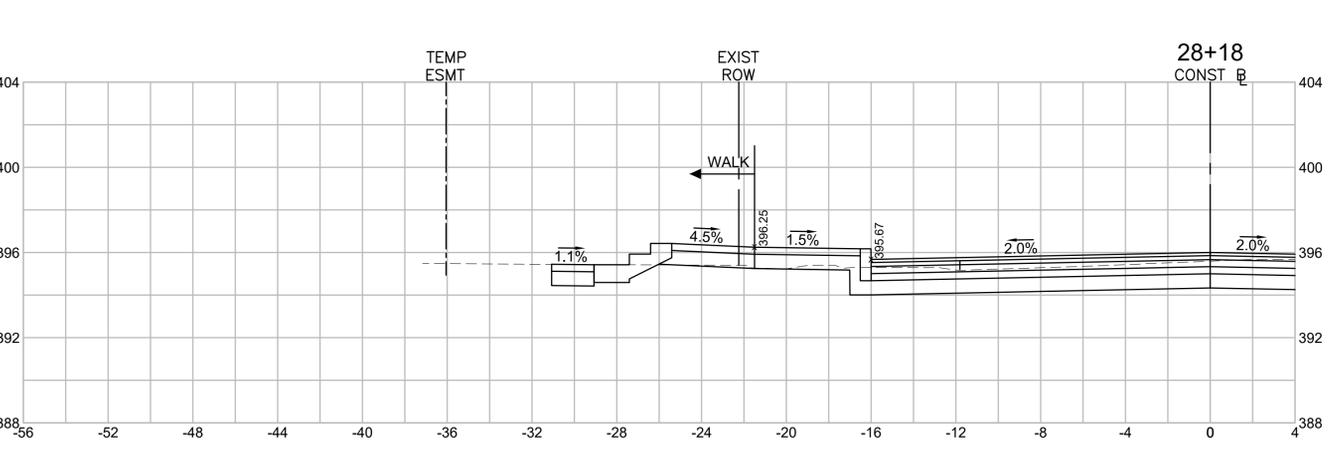
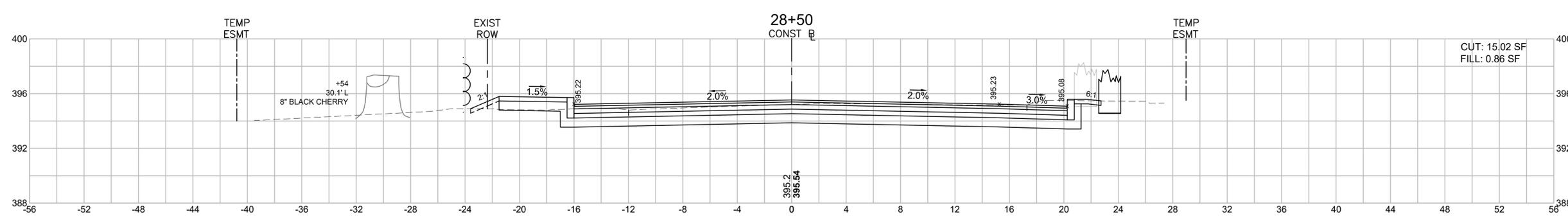
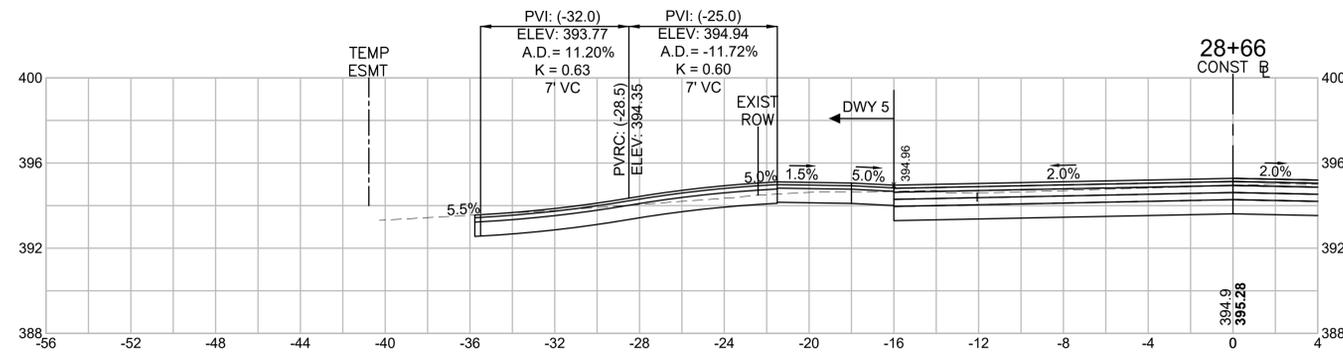
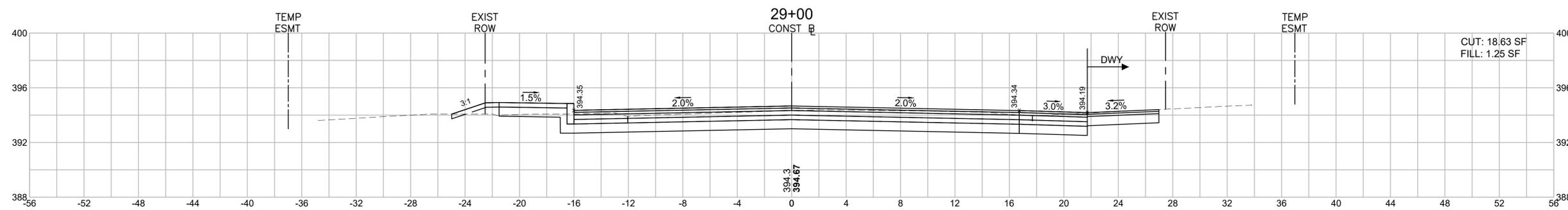
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**CROSS SECTIONS - 6 OF 53
BOSTON ROAD**



**WESTFORD
BOSTON ROAD**

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	86	132
PROJECT FILE NO.		609035	

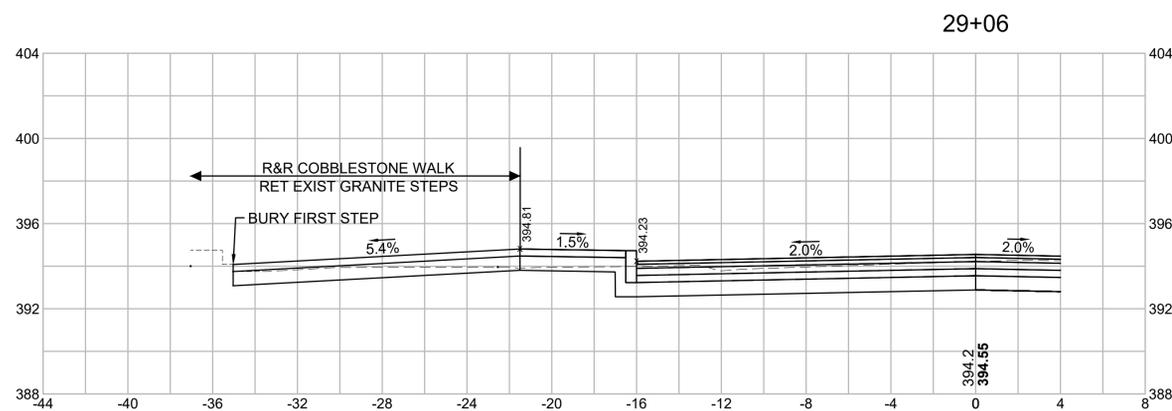
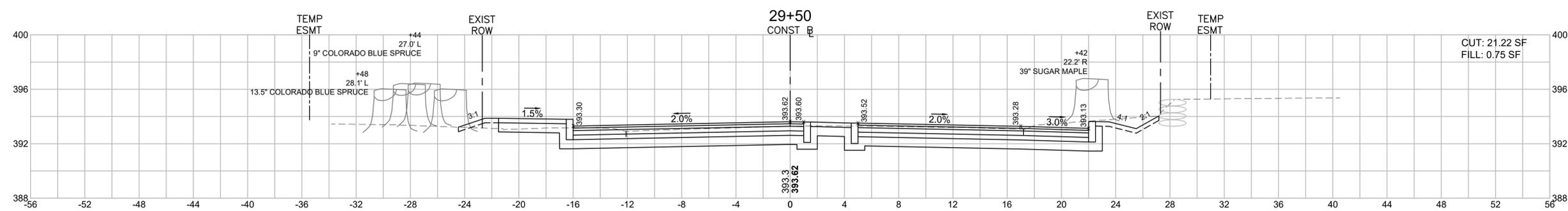
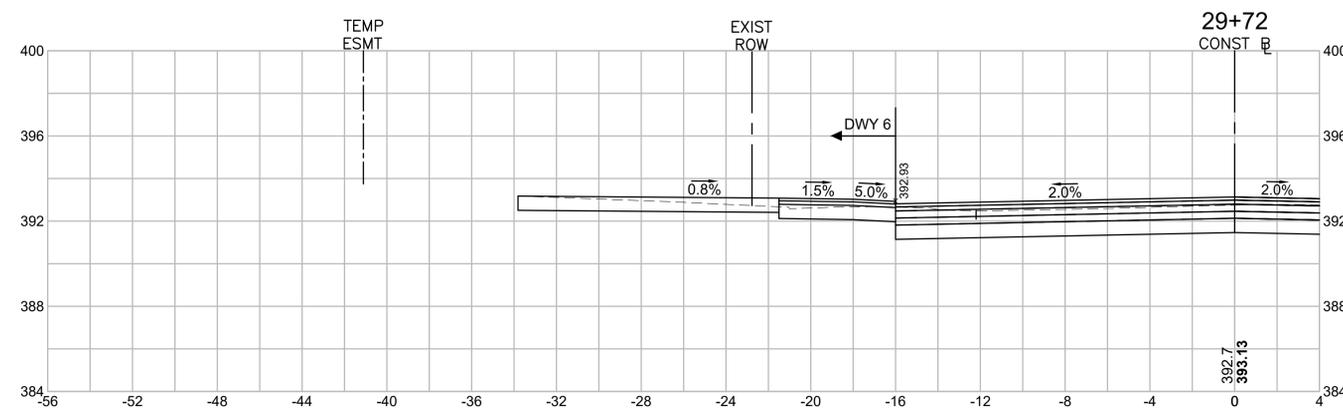
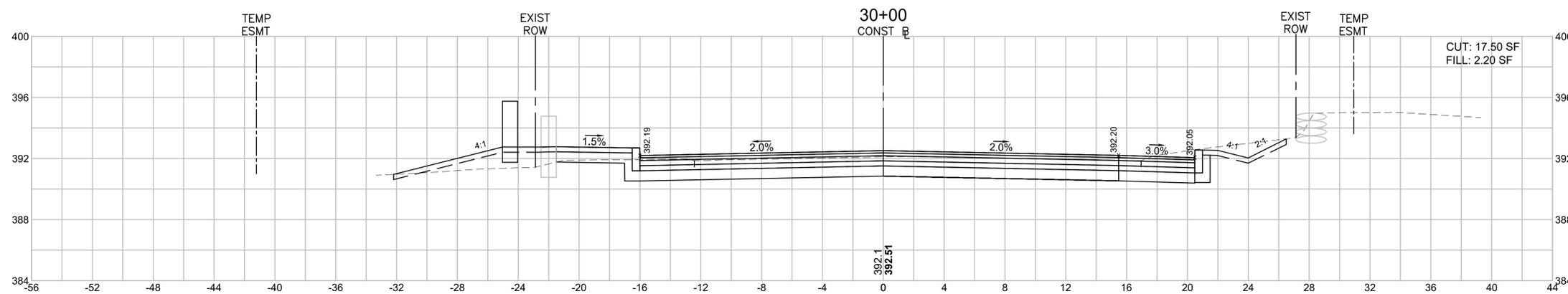
**CROSS SECTIONS - 7 OF 53
BOSTON ROAD**



WESTFORD
BOSTON ROAD

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	87	132
PROJECT FILE NO.		609035	

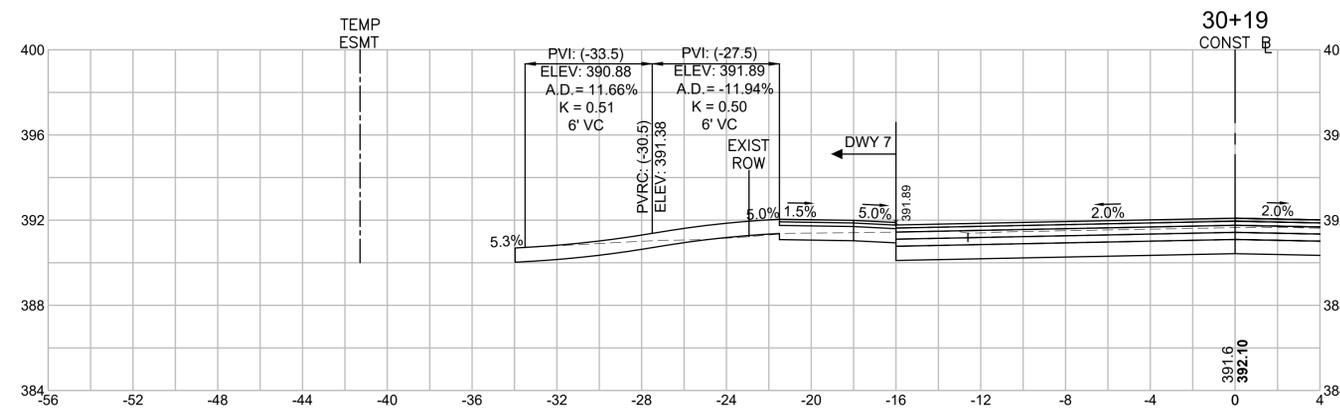
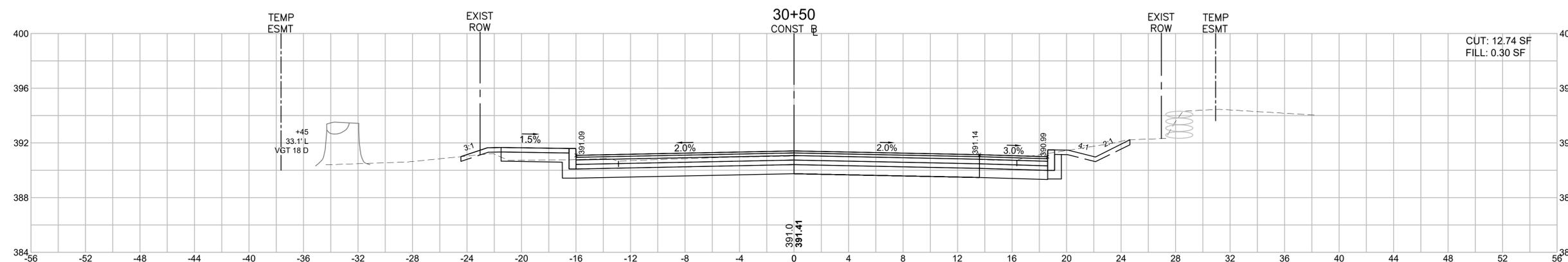
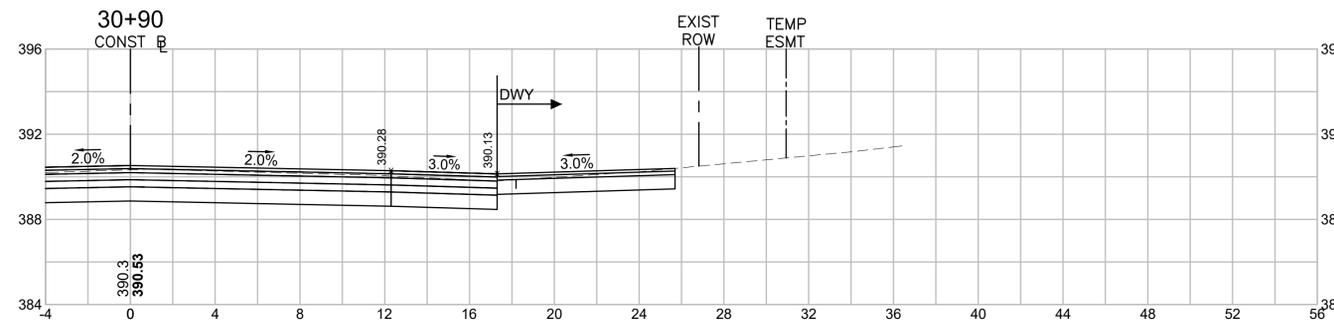
CROSS SECTIONS - 8 OF 53
BOSTON ROAD



**WESTFORD
BOSTON ROAD**

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	88	132
PROJECT FILE NO.		609035	

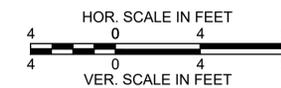
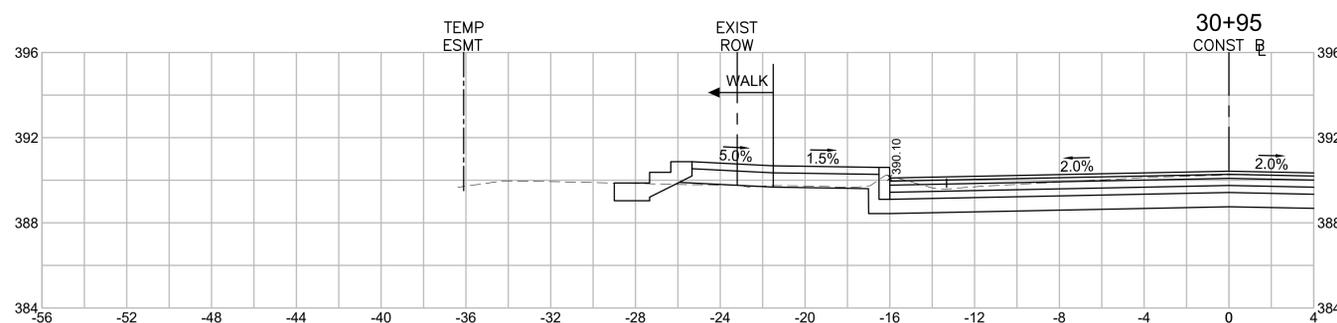
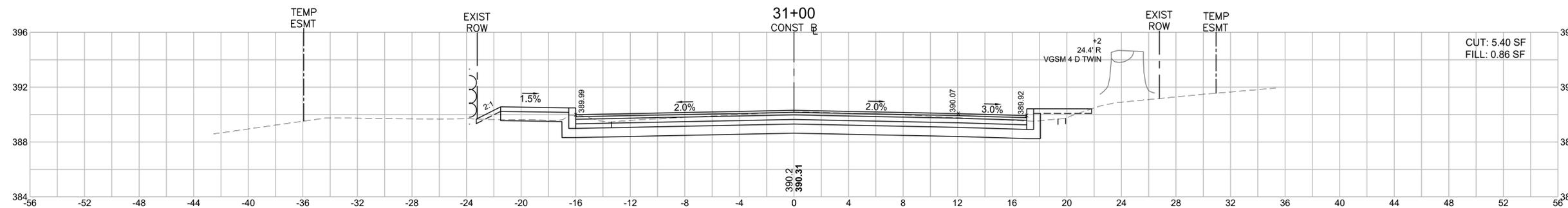
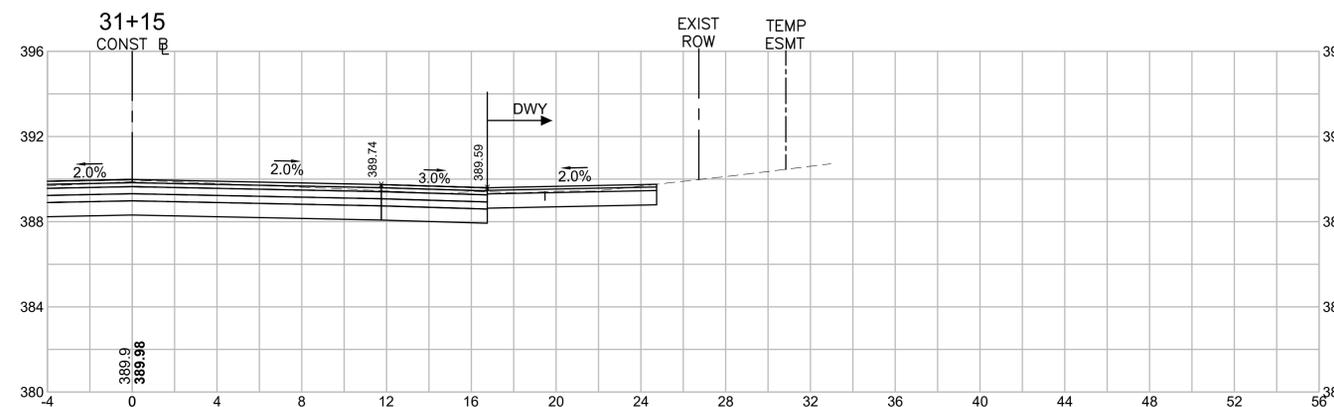
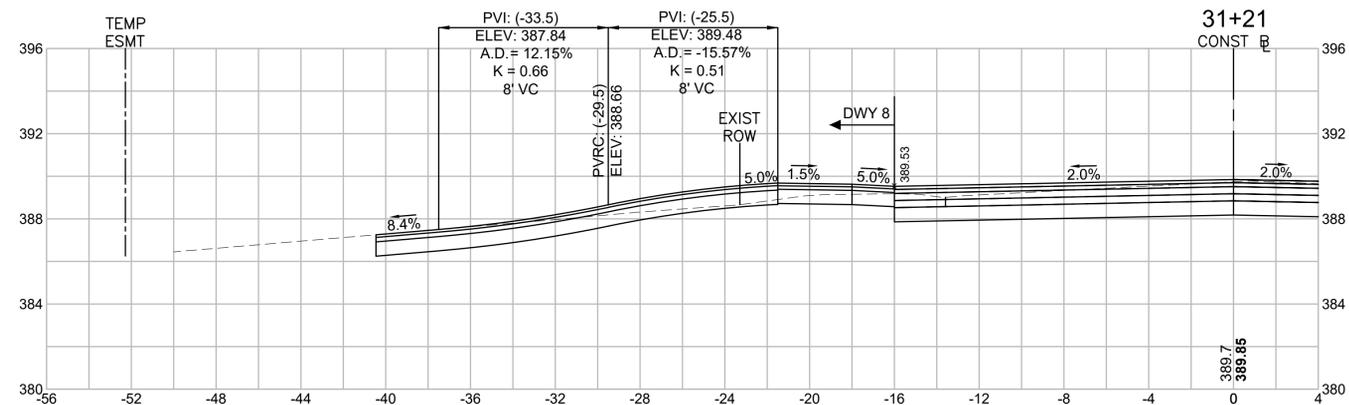
**CROSS SECTIONS - 9 OF 53
BOSTON ROAD**



**WESTFORD
BOSTON ROAD**

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	89	132
PROJECT FILE NO.		609035	

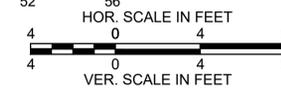
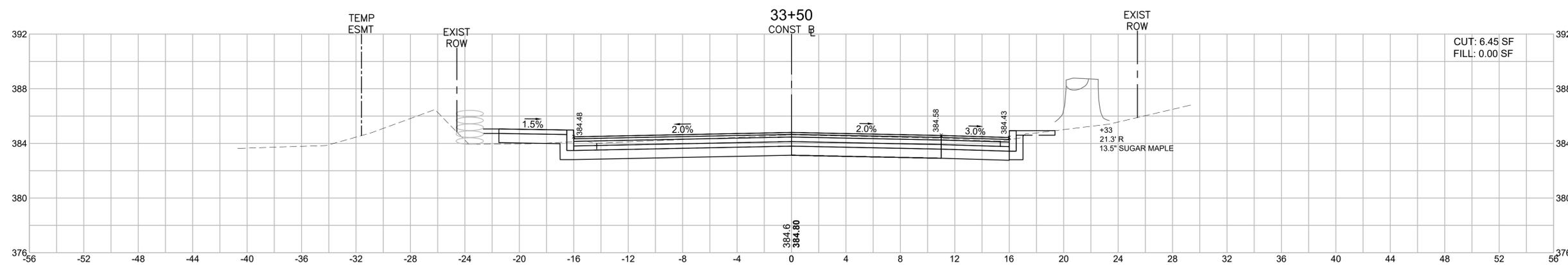
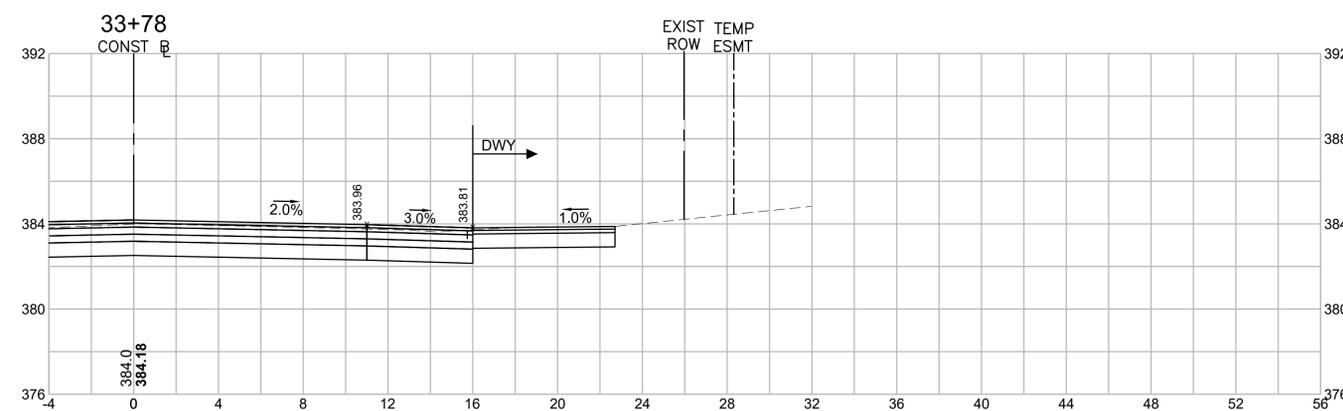
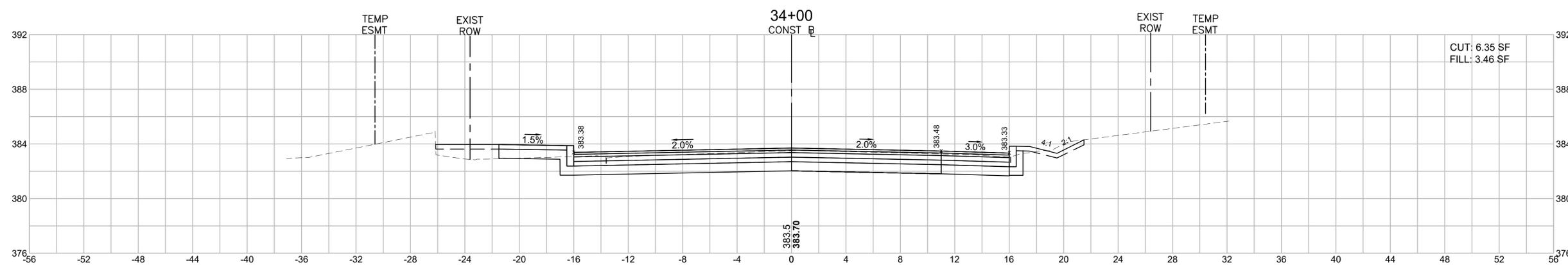
**CROSS SECTIONS - 10 OF 53
BOSTON ROAD**



**WESTFORD
BOSTON ROAD**

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	92	132
PROJECT FILE NO. 609035			

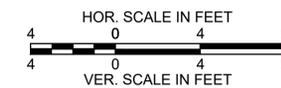
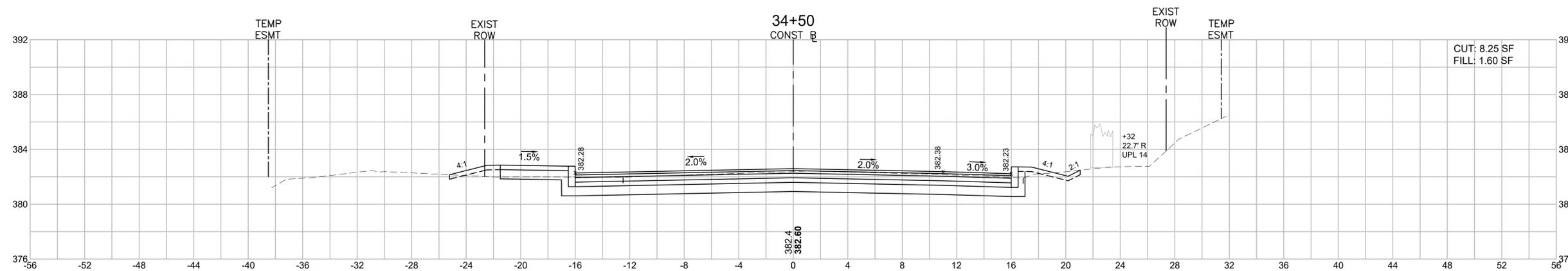
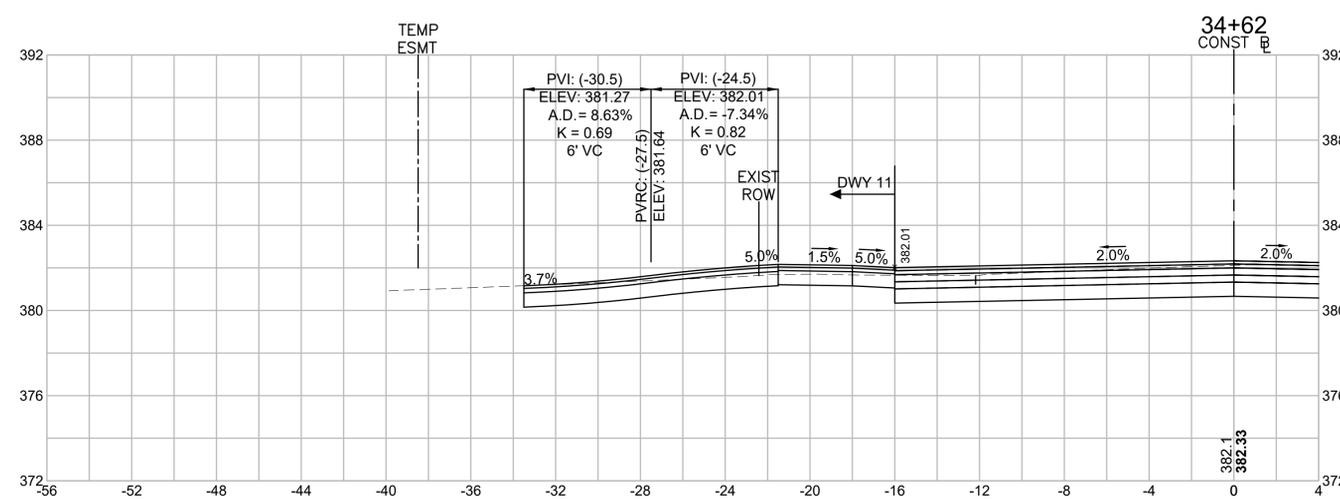
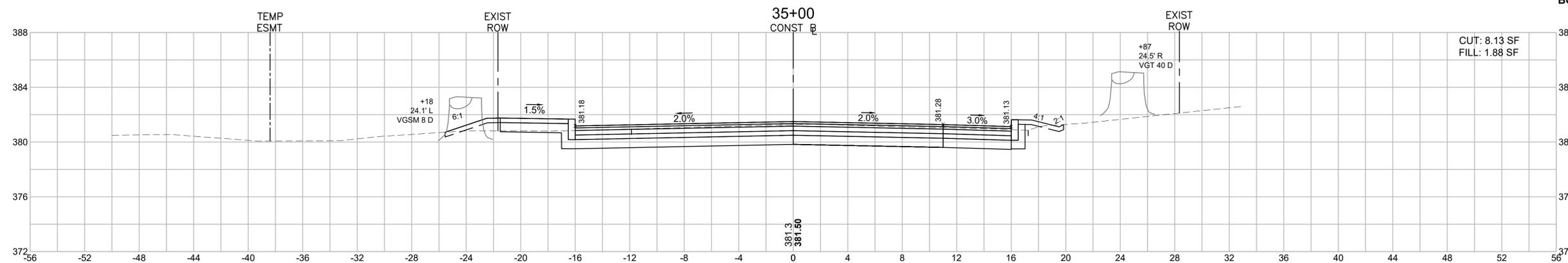
**CROSS SECTIONS - 13 OF 53
BOSTON ROAD**



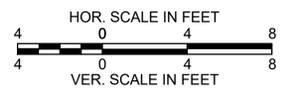
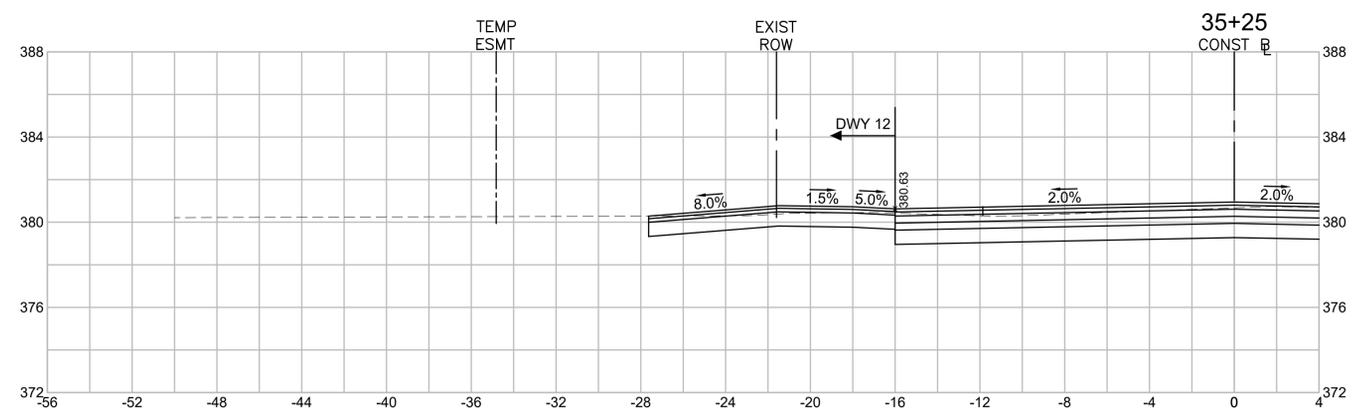
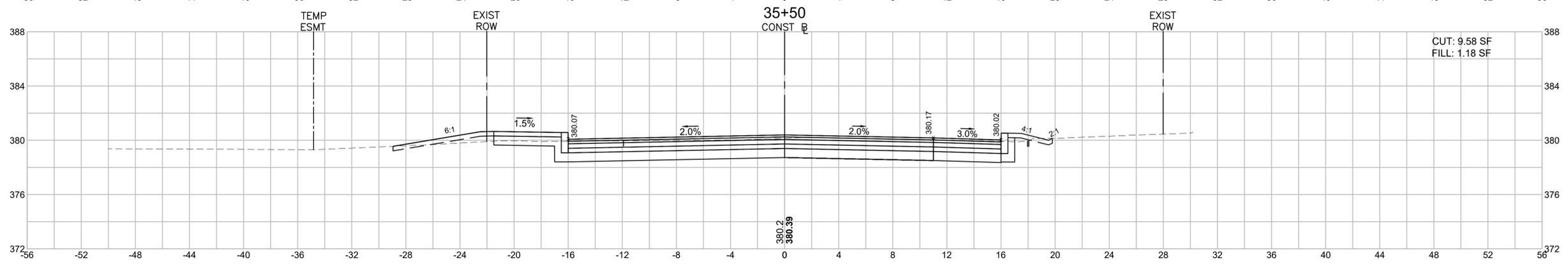
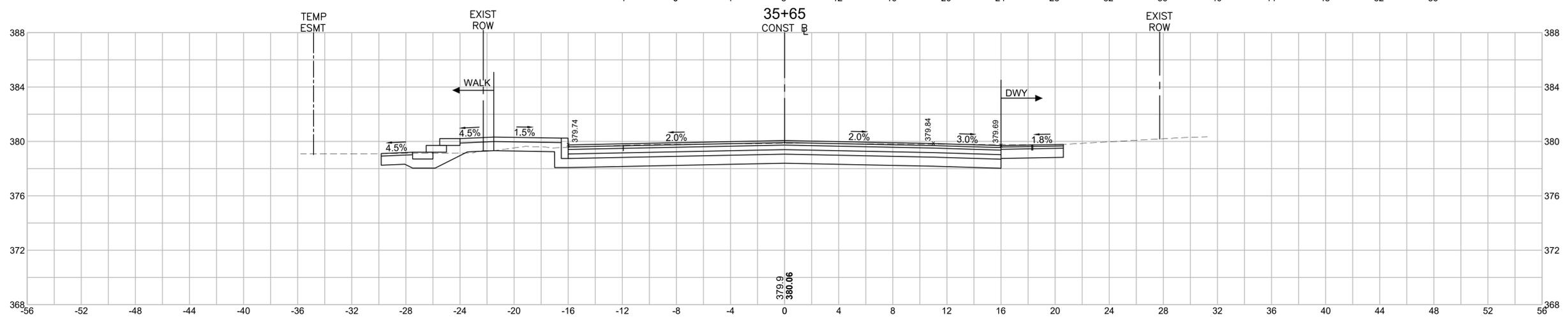
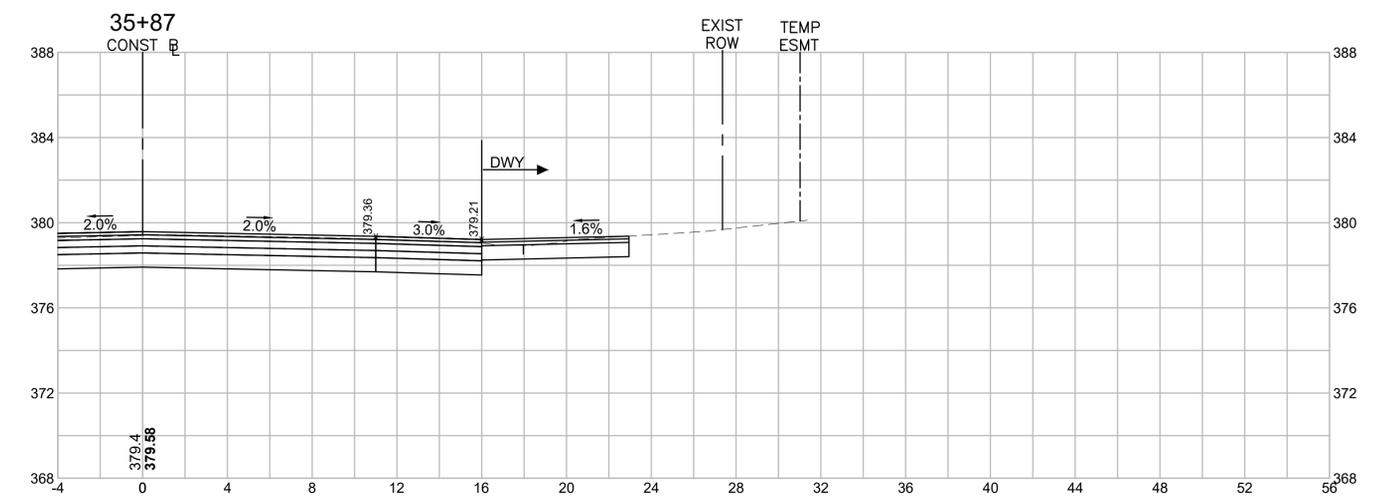
**WESTFORD
BOSTON ROAD**

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	93	132
PROJECT FILE NO.		609035	

**CROSS SECTIONS - 14 OF 53
BOSTON ROAD**



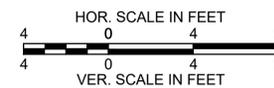
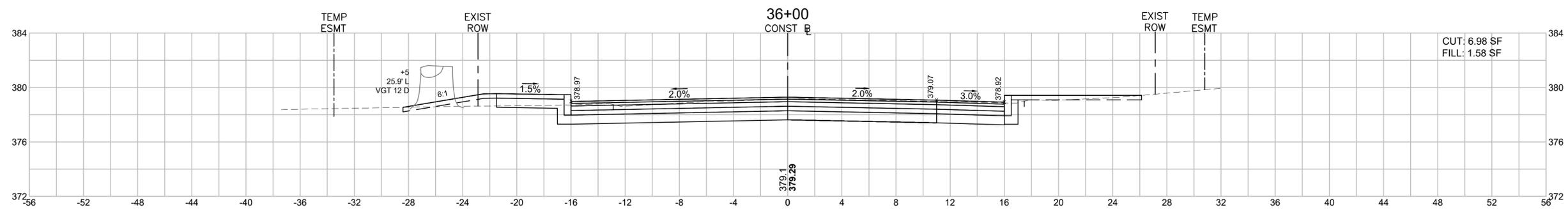
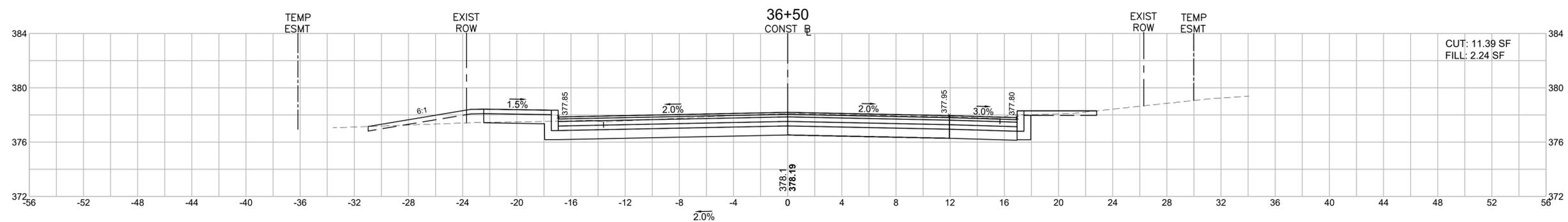
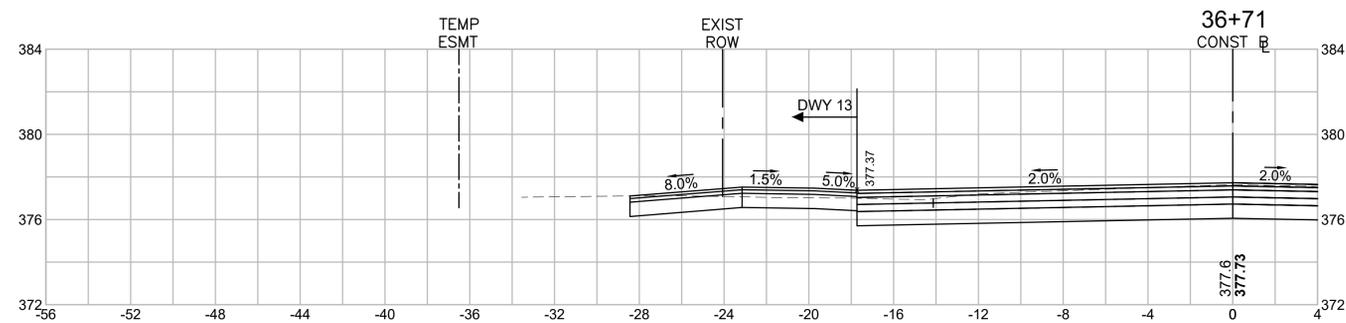
WESTFORD BOSTON ROAD			
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	94	132
PROJECT FILE NO.		609035	
CROSS SECTIONS - 15 OF 53 BOSTON ROAD			



**WESTFORD
BOSTON ROAD**

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	95	132
PROJECT FILE NO.		609035	

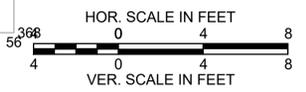
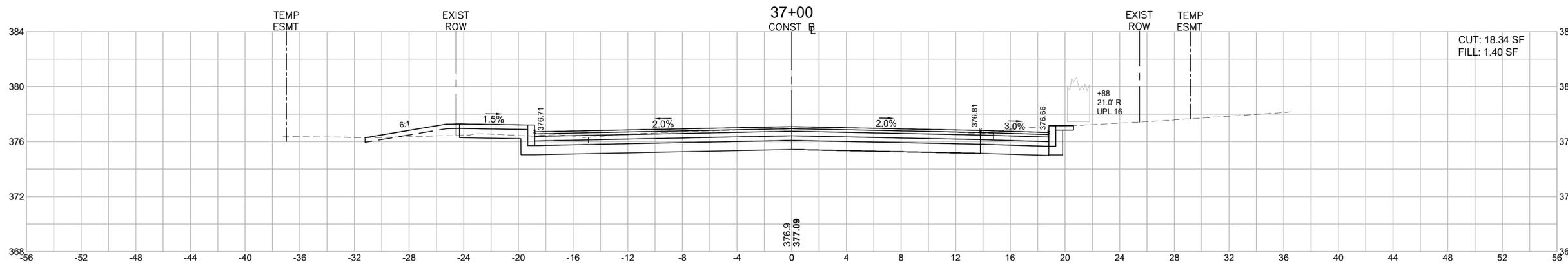
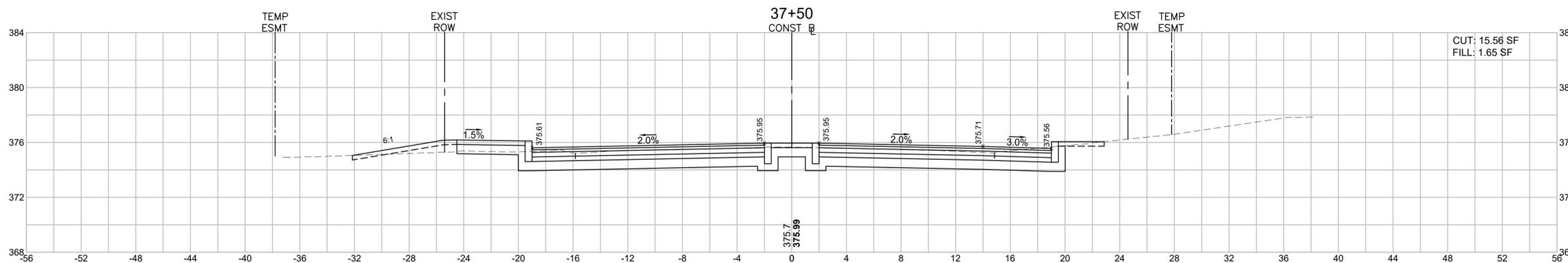
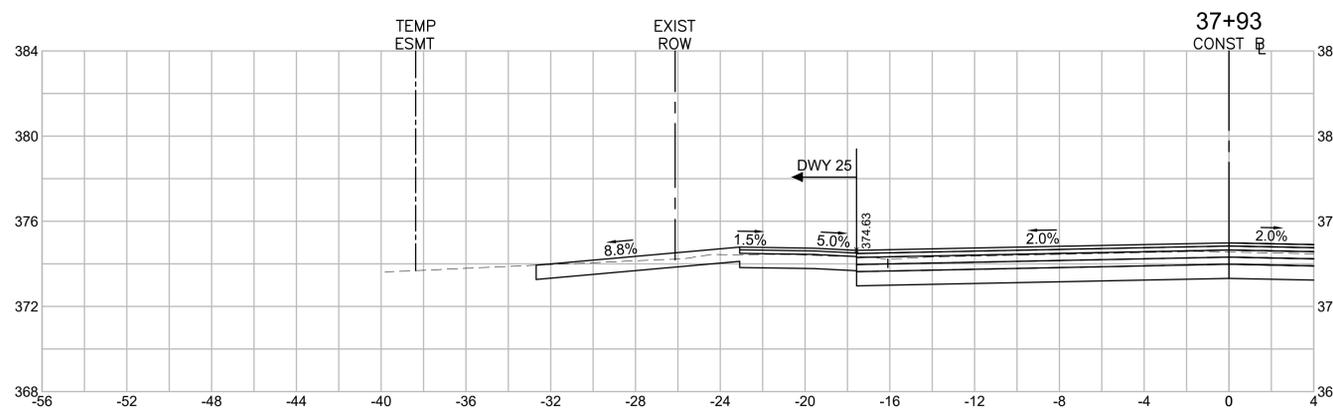
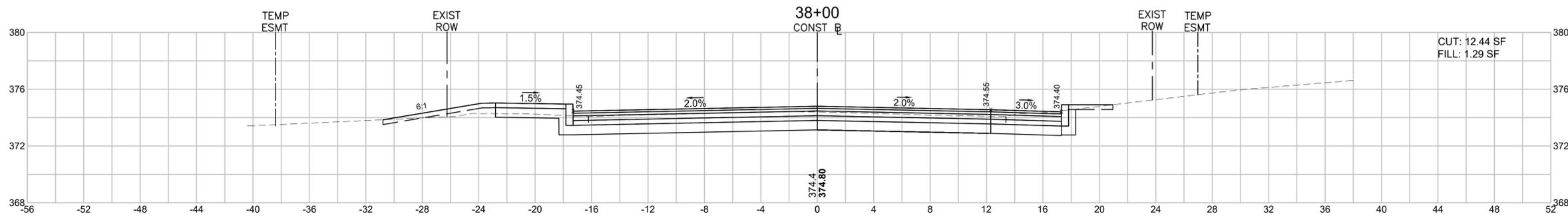
**CROSS SECTIONS - 16 OF 53
BOSTON ROAD**



**WESTFORD
BOSTON ROAD**

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	96	132
PROJECT FILE NO.		609035	

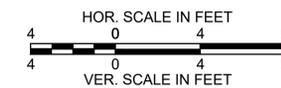
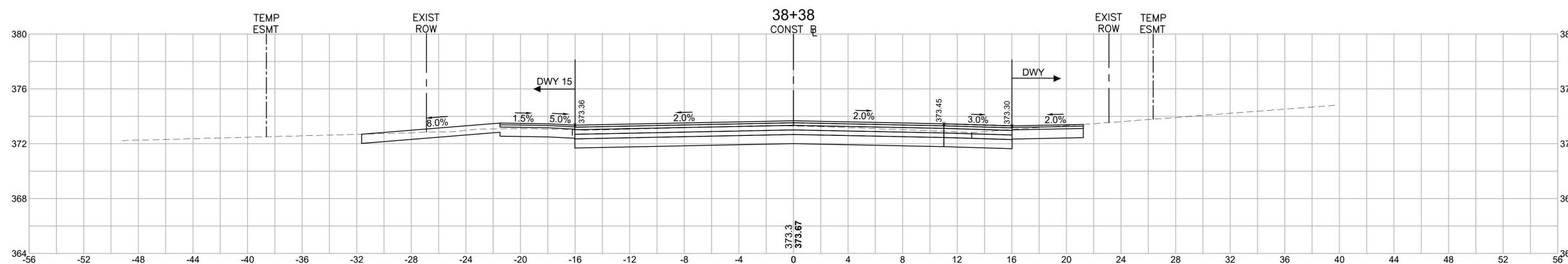
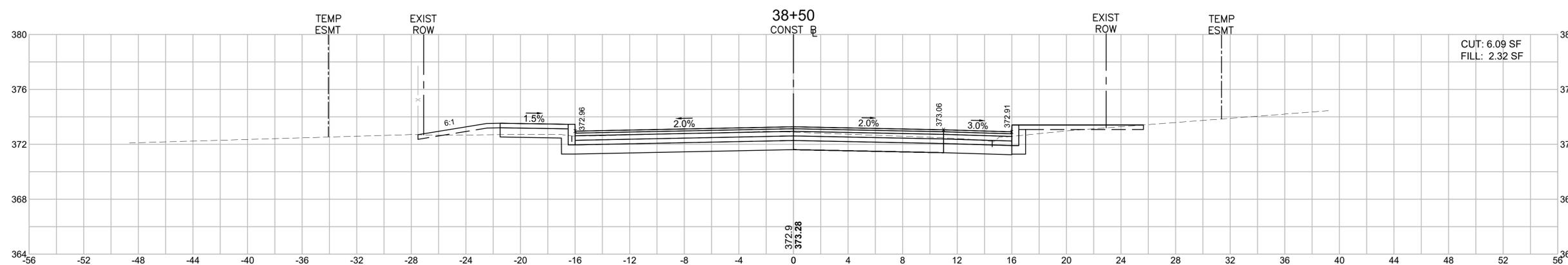
**CROSS SECTIONS - 17 OF 53
BOSTON ROAD**



WESTFORD
BOSTON ROAD

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	97	132
PROJECT FILE NO.		609035	

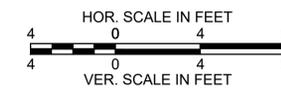
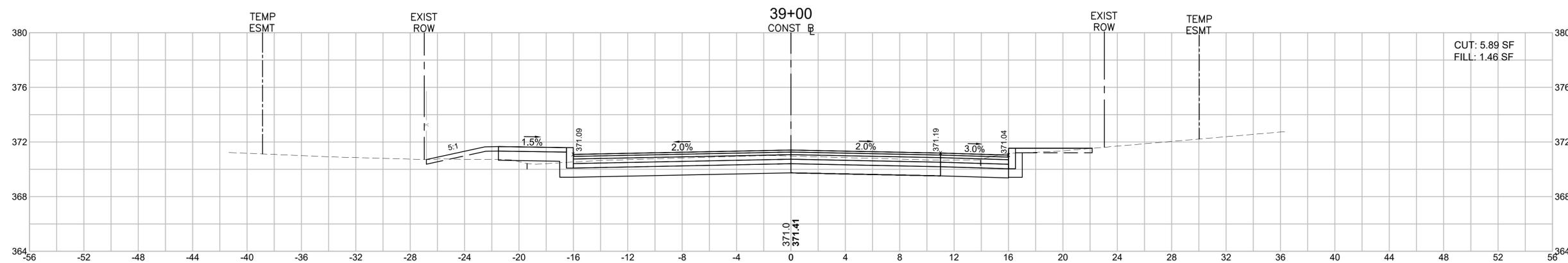
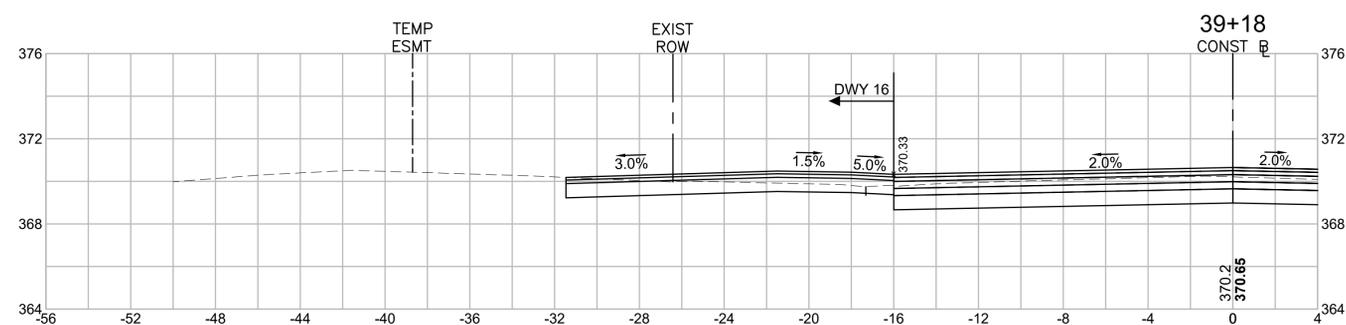
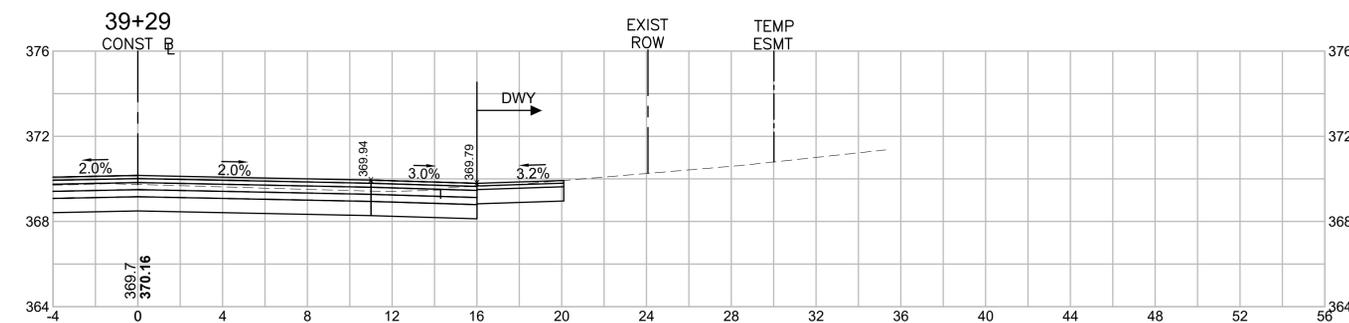
CROSS SECTIONS - 18 OF 53
BOSTON ROAD



**WESTFORD
BOSTON ROAD**

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	98	132
PROJECT FILE NO.		609035	

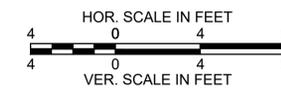
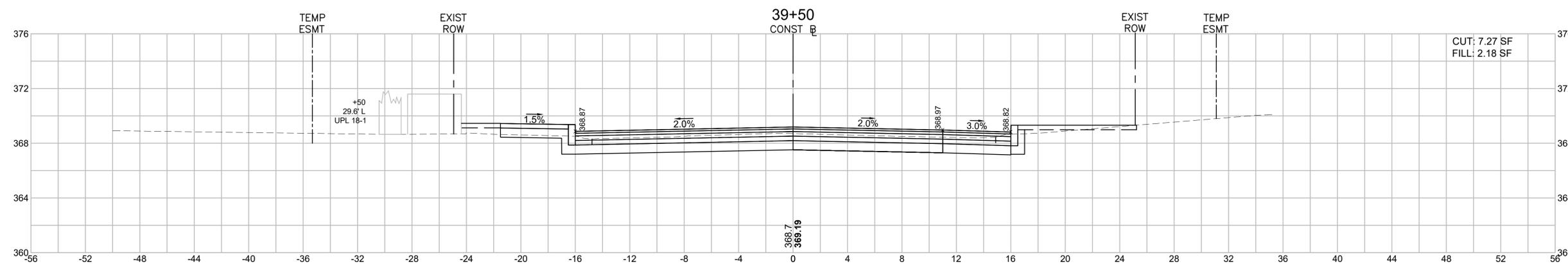
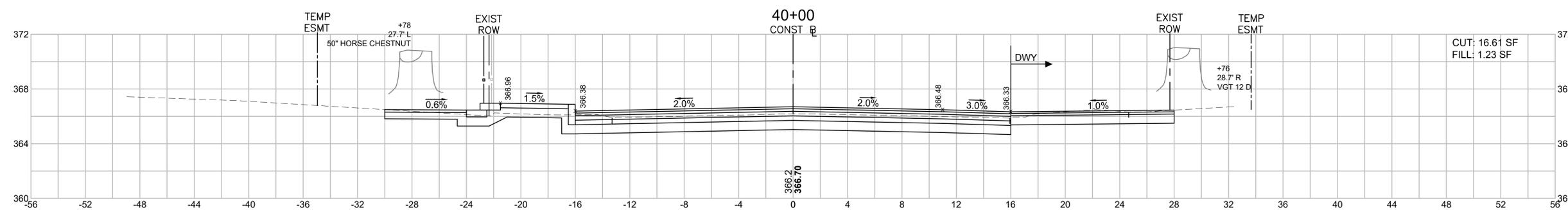
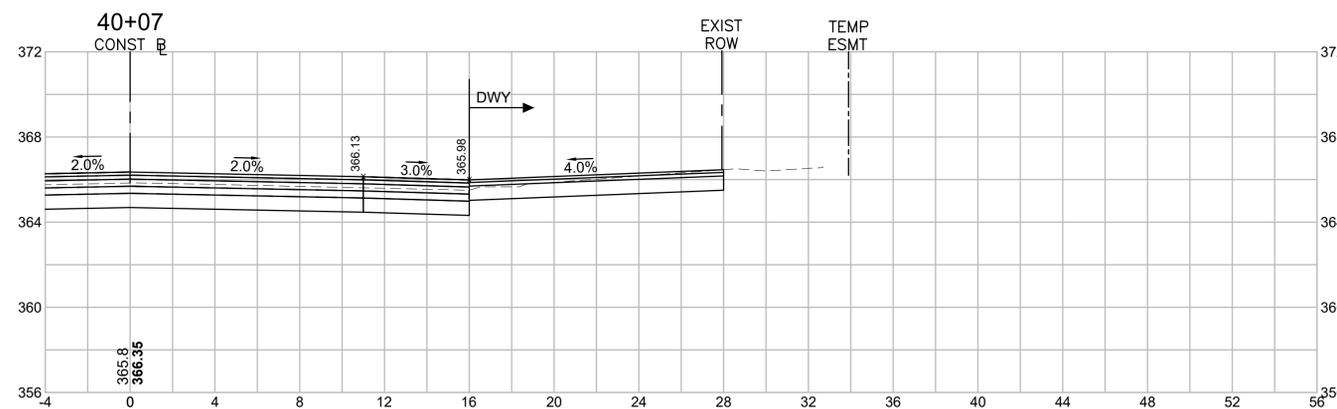
**CROSS SECTIONS - 19 OF 53
BOSTON ROAD**



**WESTFORD
BOSTON ROAD**

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	99	132
PROJECT FILE NO.		609035	

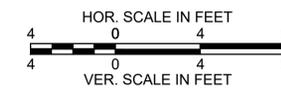
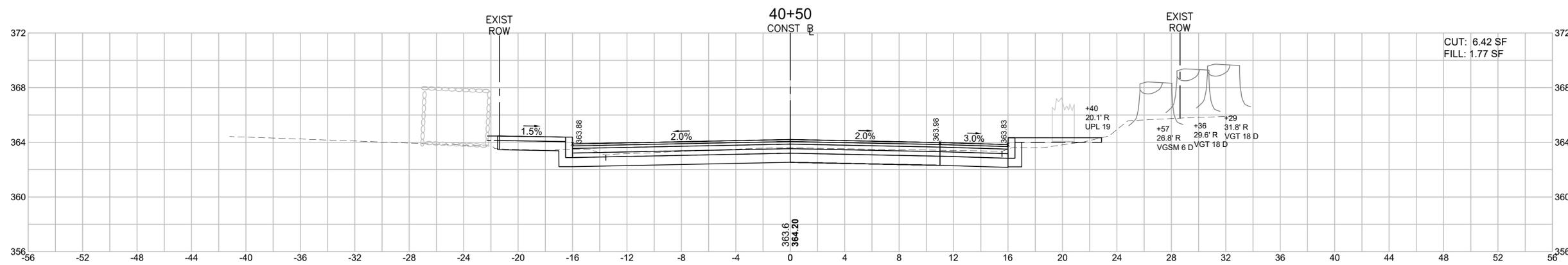
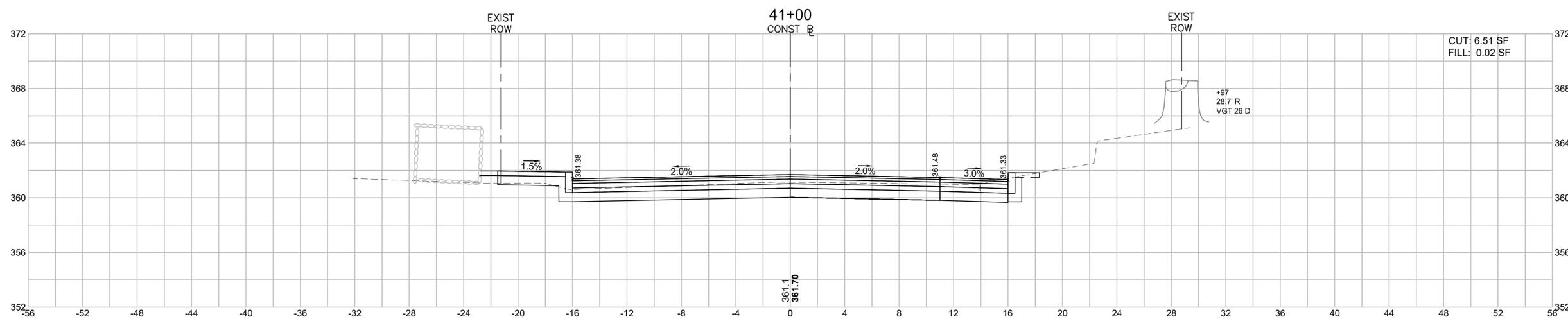
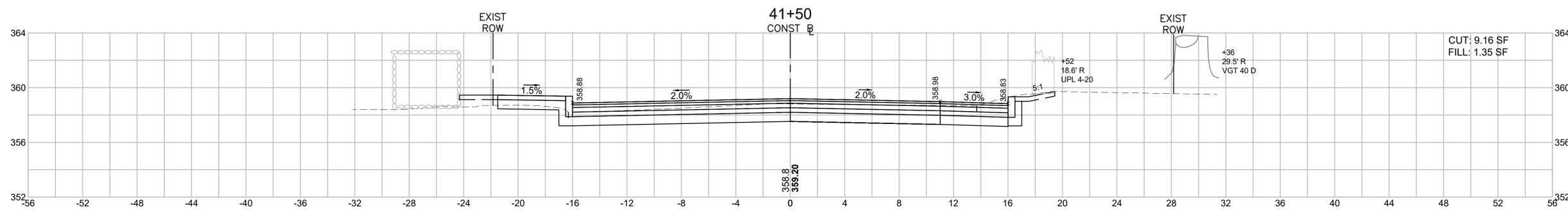
**CROSS SECTIONS - 20 OF 53
BOSTON ROAD**



**WESTFORD
BOSTON ROAD**

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	100	132
PROJECT FILE NO.		609035	

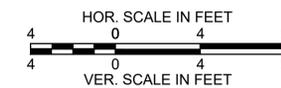
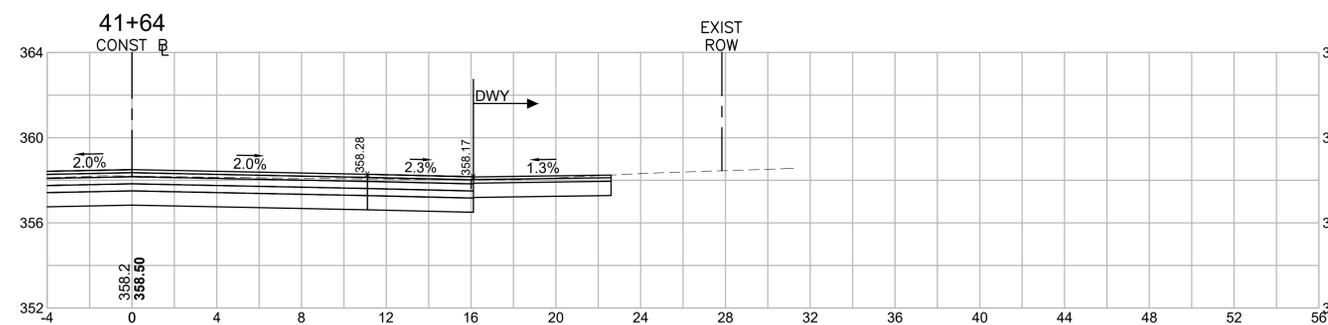
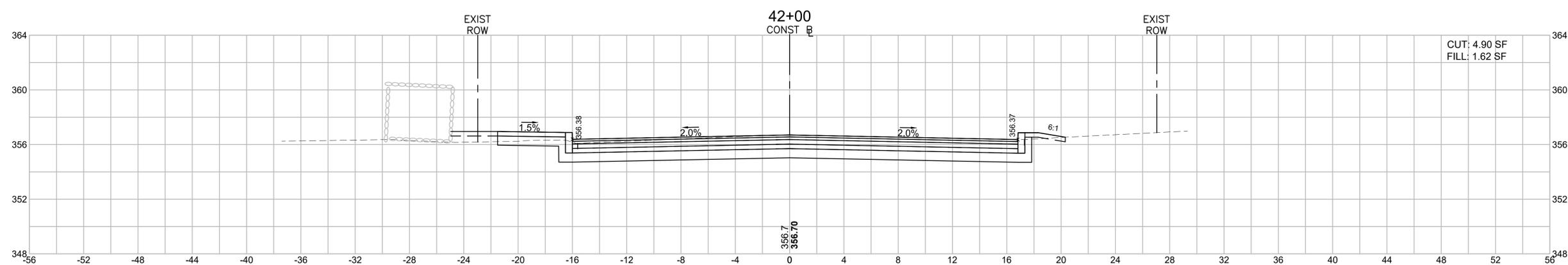
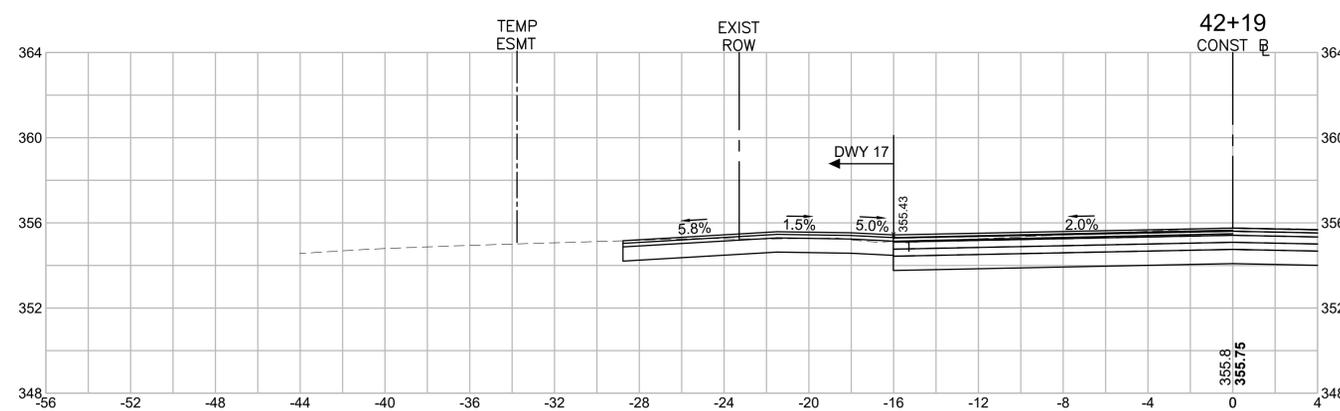
**CROSS SECTIONS - 21 OF 53
BOSTON ROAD**



**WESTFORD
BOSTON ROAD**

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	101	132
PROJECT FILE NO.		609035	

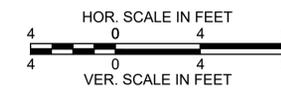
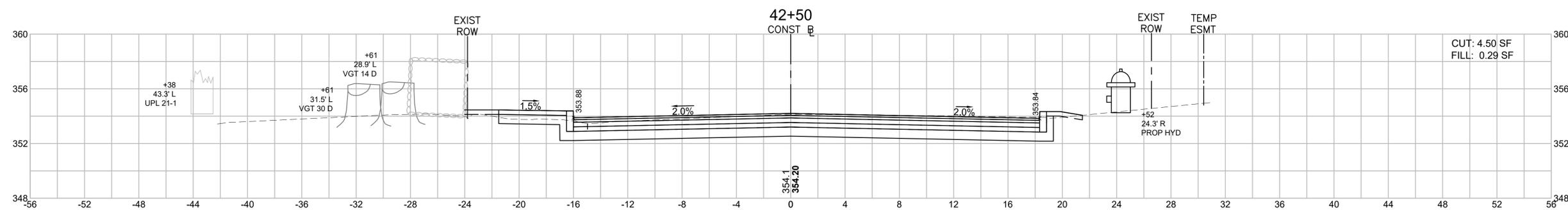
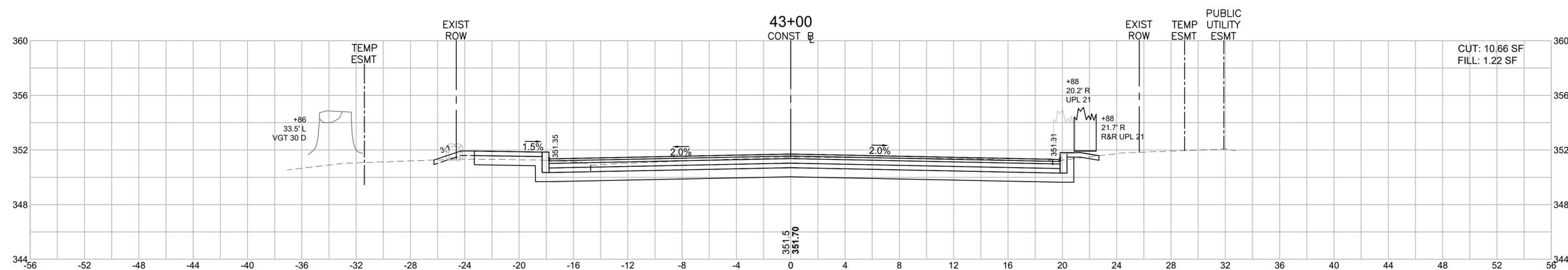
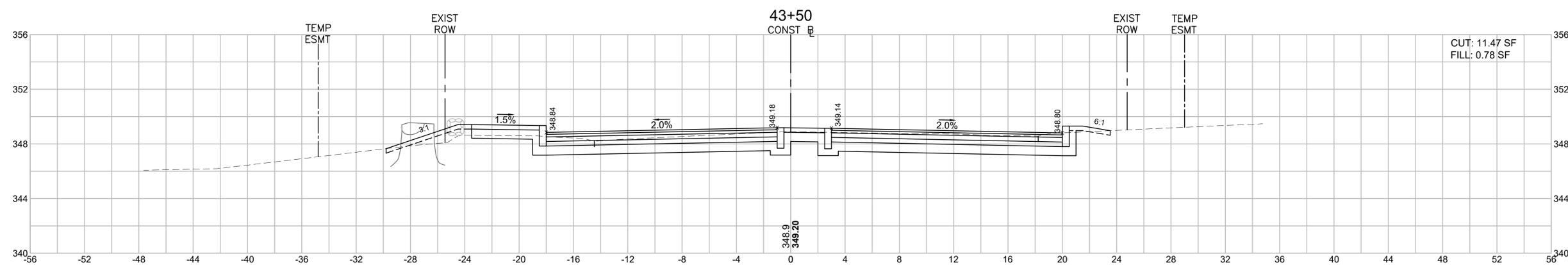
**CROSS SECTIONS - 22 OF 53
BOSTON ROAD**



**WESTFORD
BOSTON ROAD**

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	102	132
PROJECT FILE NO. 609035			

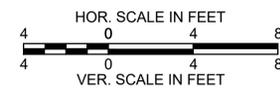
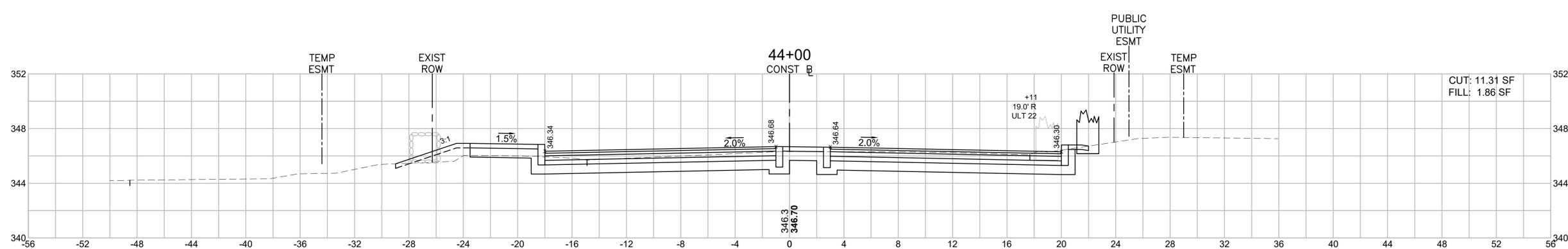
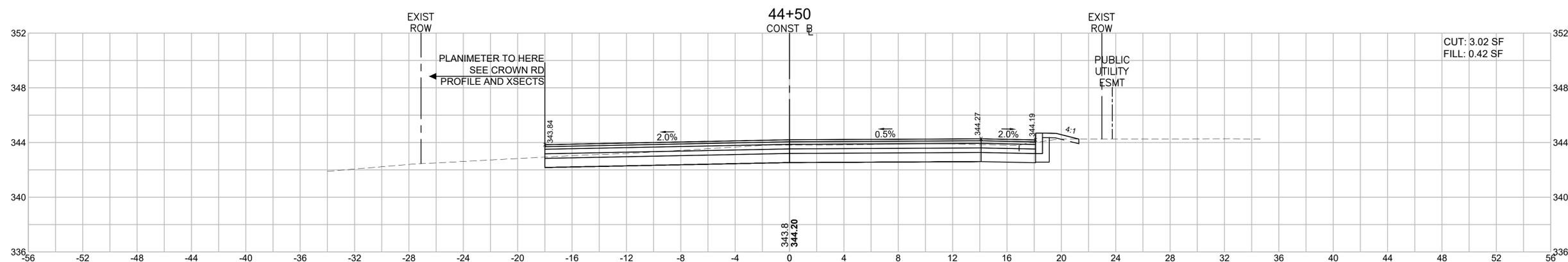
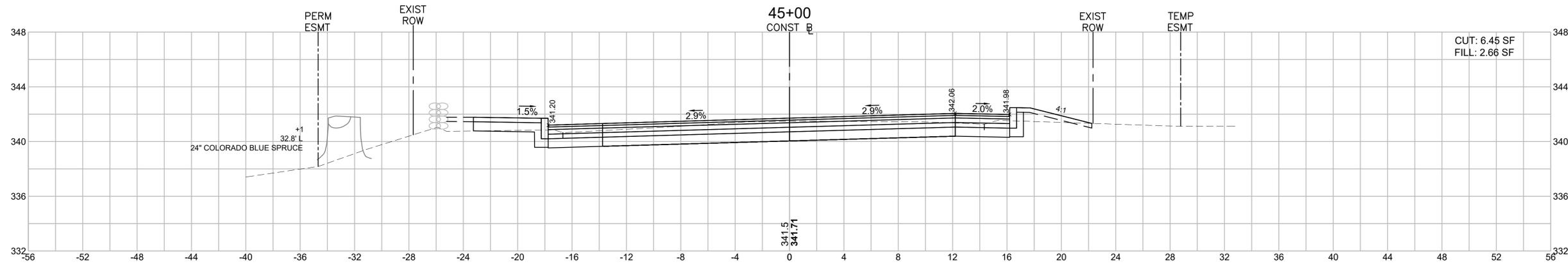
**CROSS SECTIONS - 23 OF 53
BOSTON ROAD**



**WESTFORD
BOSTON ROAD**

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	103	132
PROJECT FILE NO.		609035	

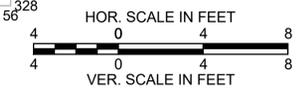
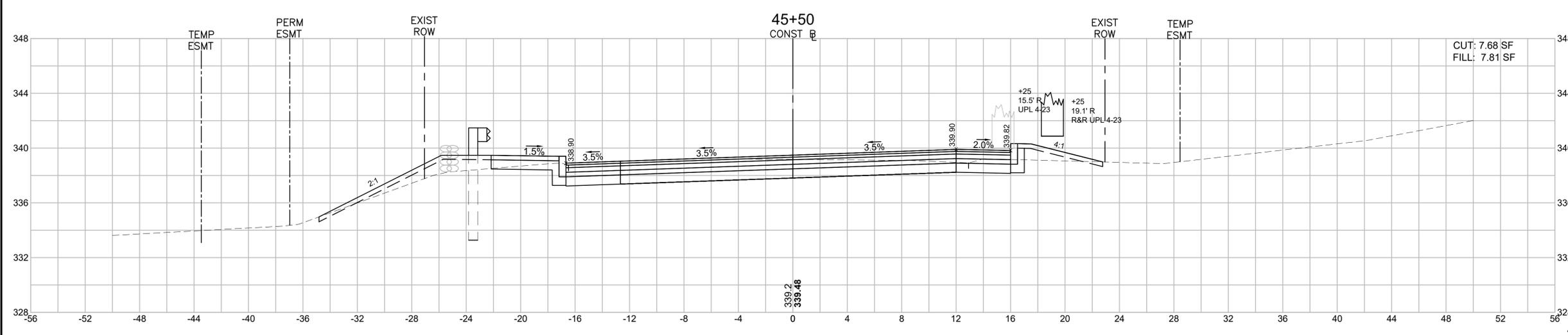
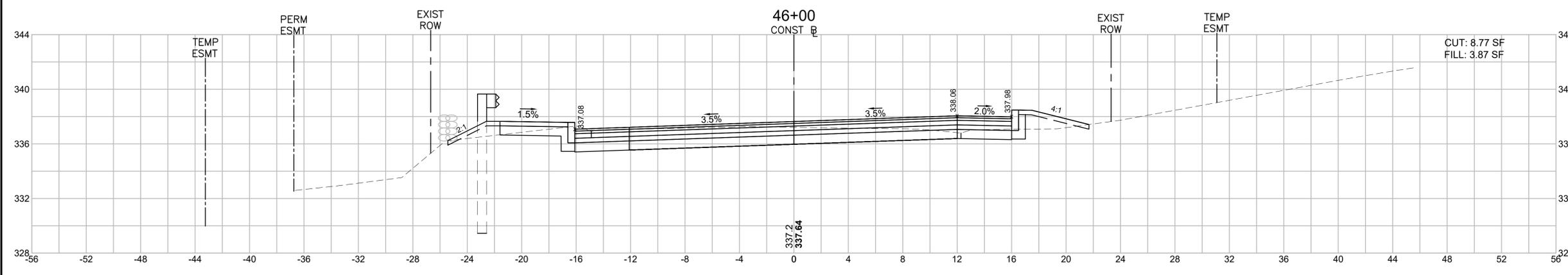
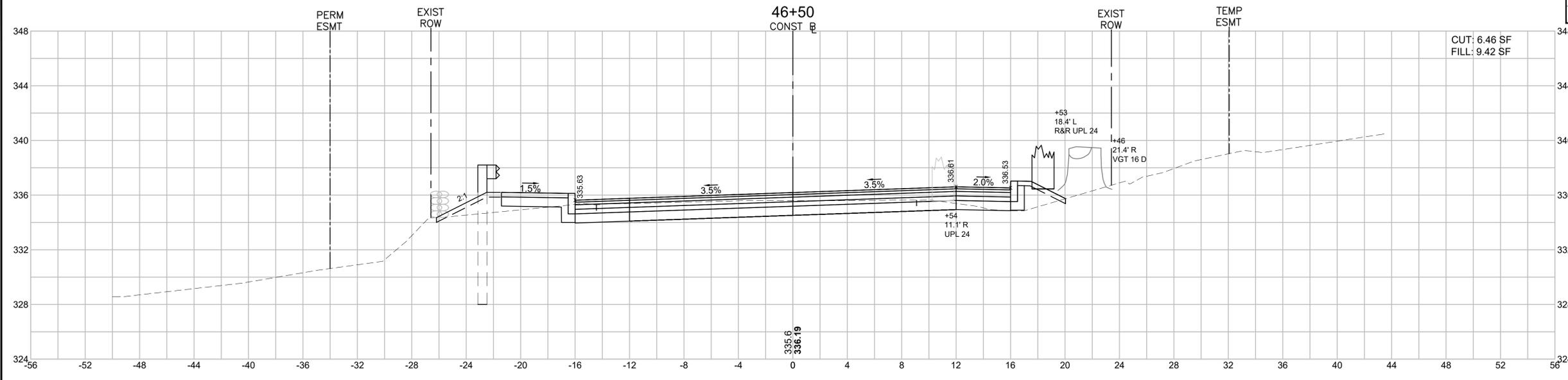
**CROSS SECTIONS - 24 OF 53
BOSTON ROAD**



**WESTFORD
BOSTON ROAD**

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	104	132
PROJECT FILE NO. 609035			

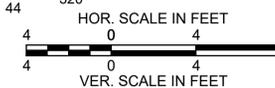
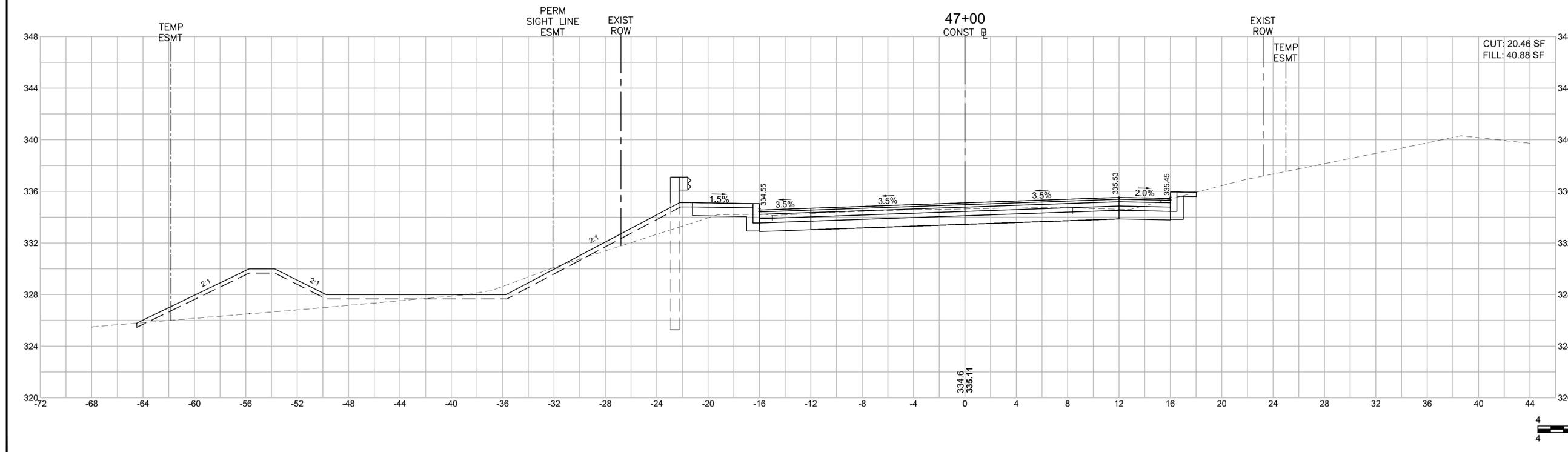
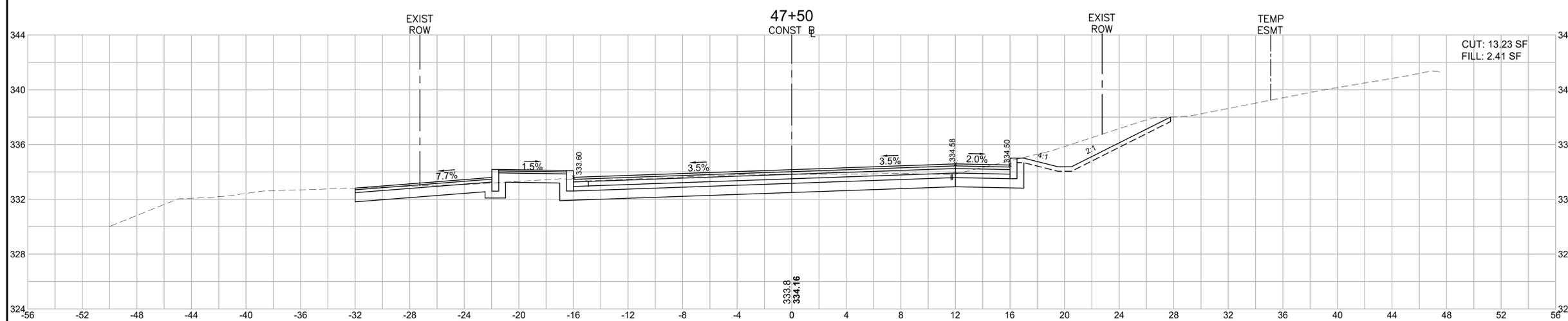
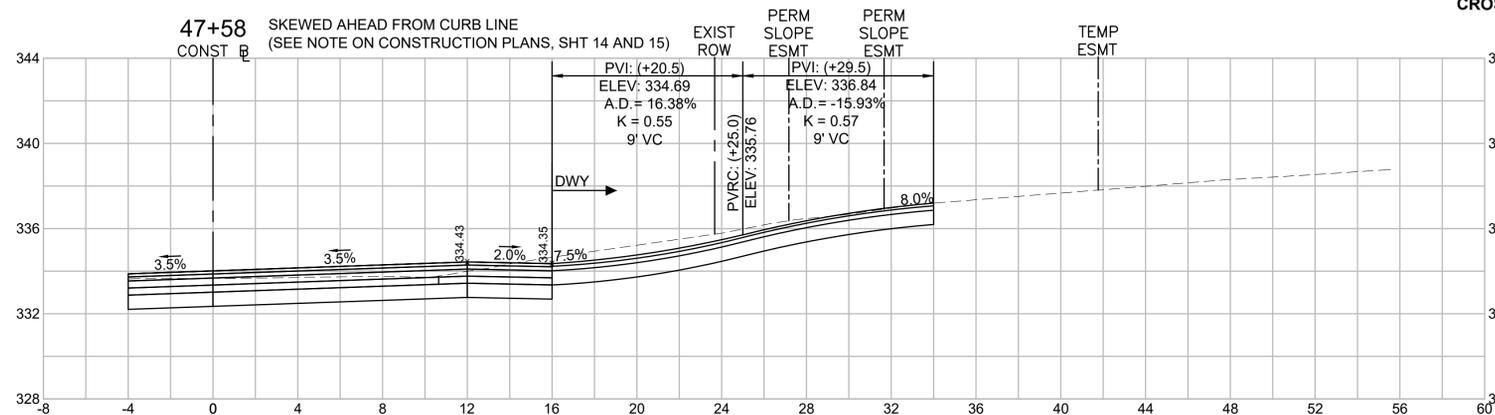
**CROSS SECTIONS - 25 OF 53
BOSTON ROAD**



**WESTFORD
BOSTON ROAD**

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	105	132
PROJECT FILE NO.		609035	

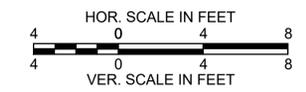
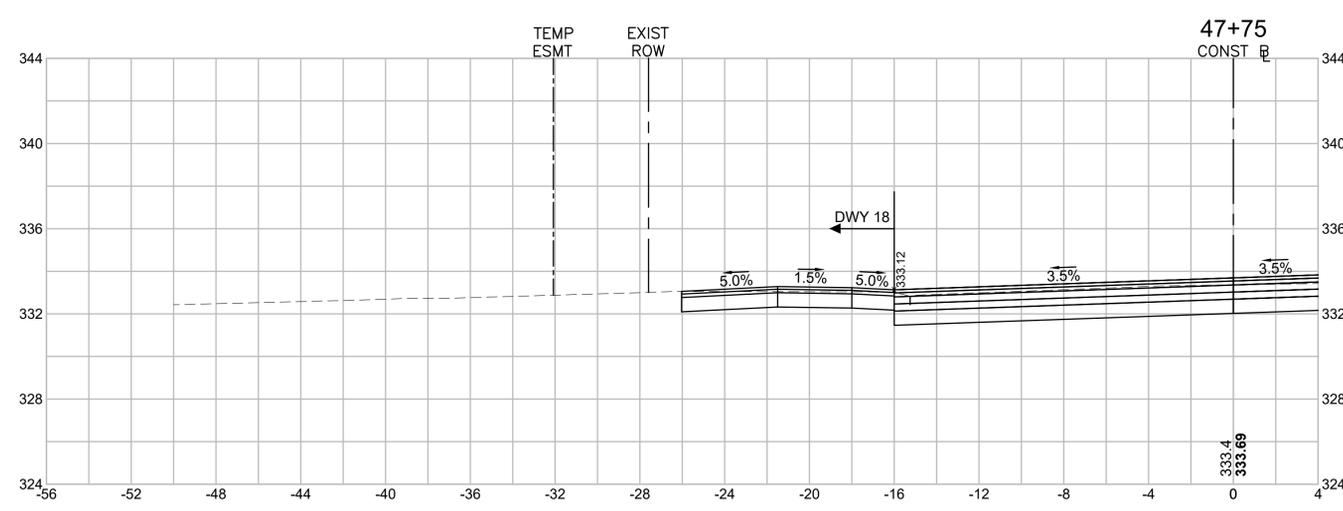
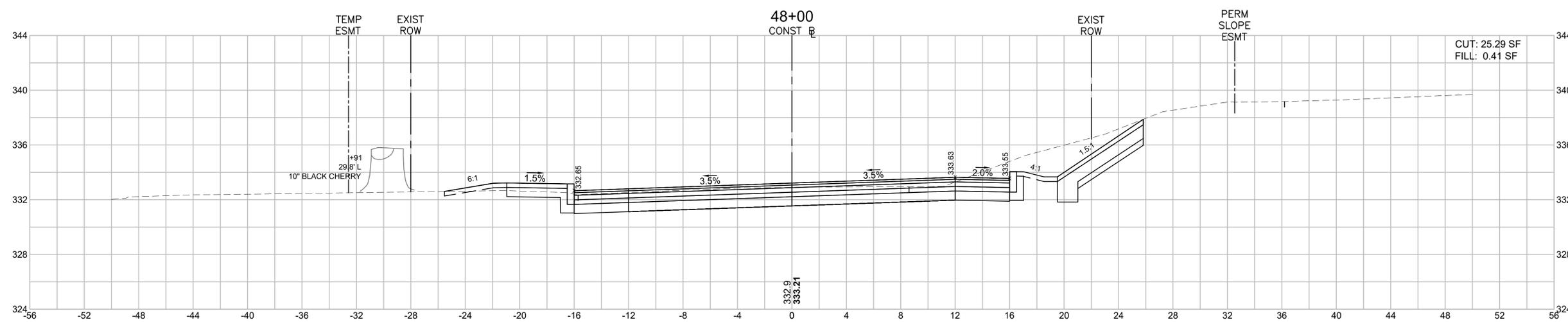
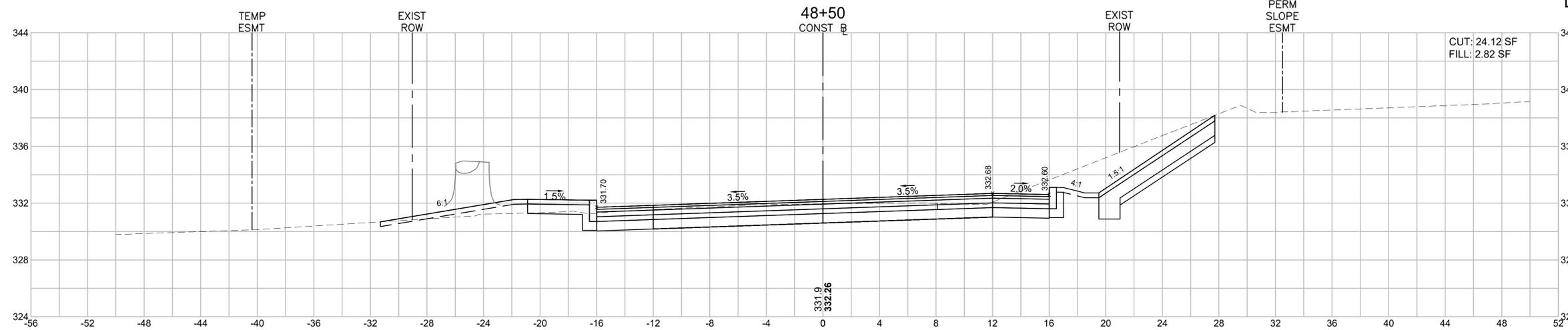
**CROSS SECTIONS - 26 OF 53
BOSTON ROAD**



**WESTFORD
BOSTON ROAD**

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	106	132
PROJECT FILE NO.		609035	

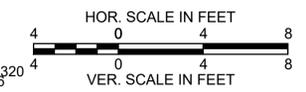
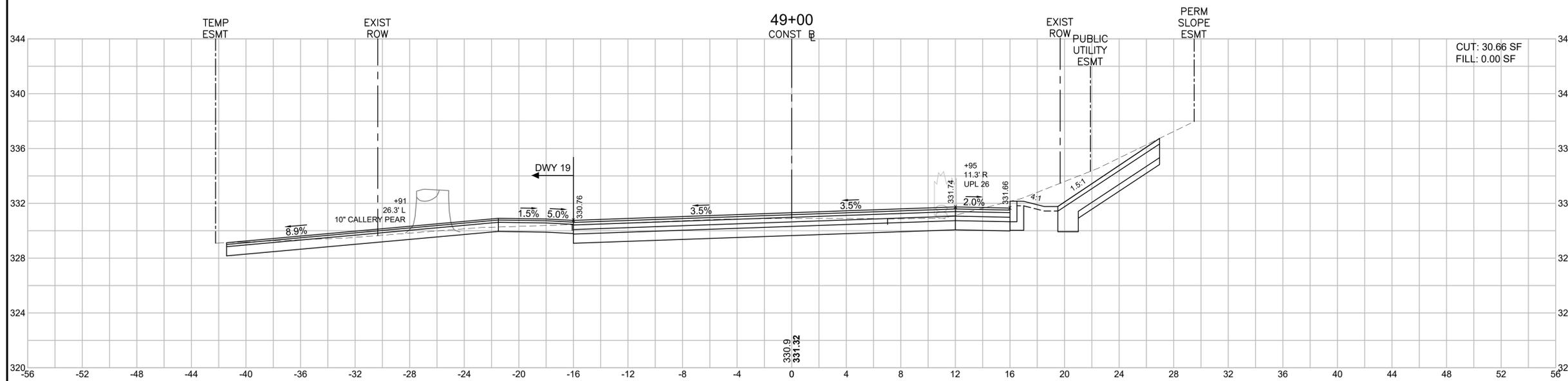
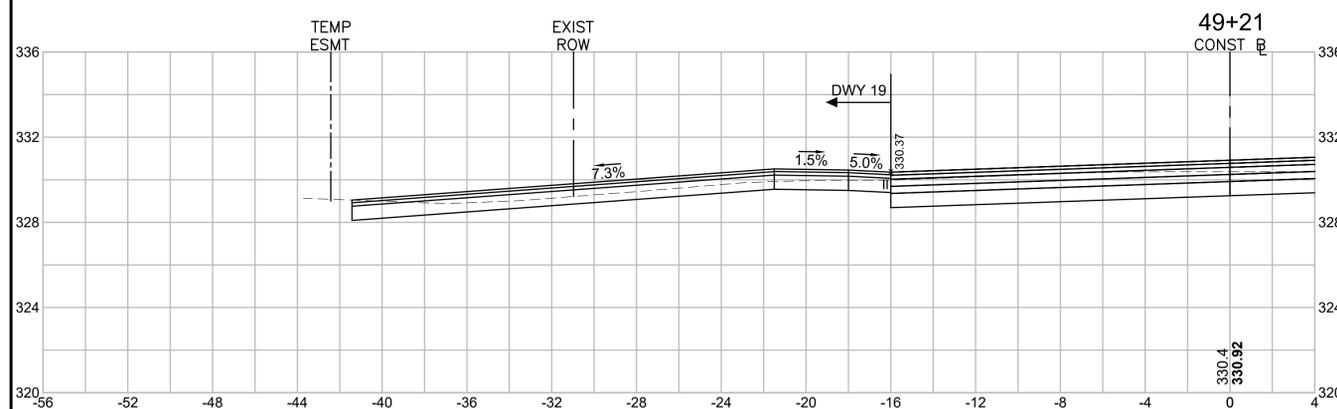
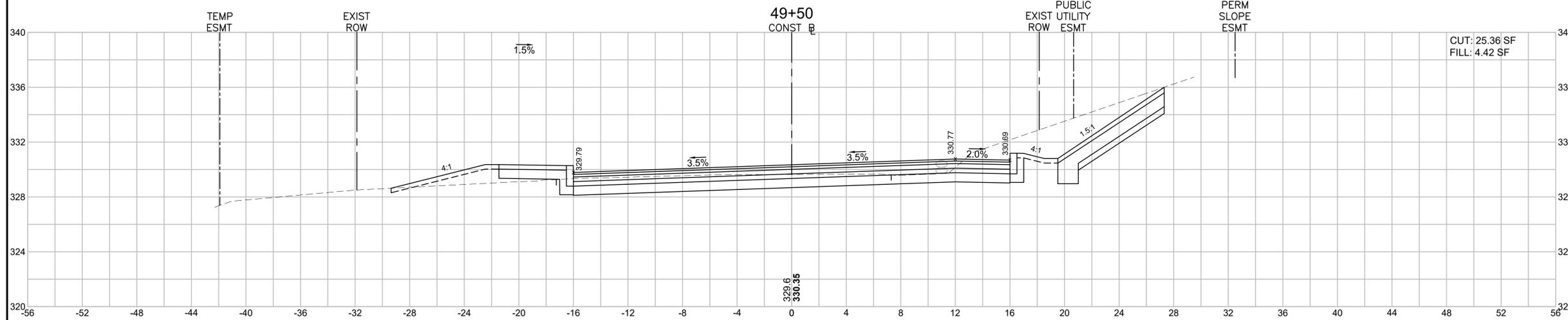
**CROSS SECTIONS - 27 OF 53
BOSTON ROAD**



**WESTFORD
BOSTON ROAD**

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	107	132
PROJECT FILE NO.		609035	

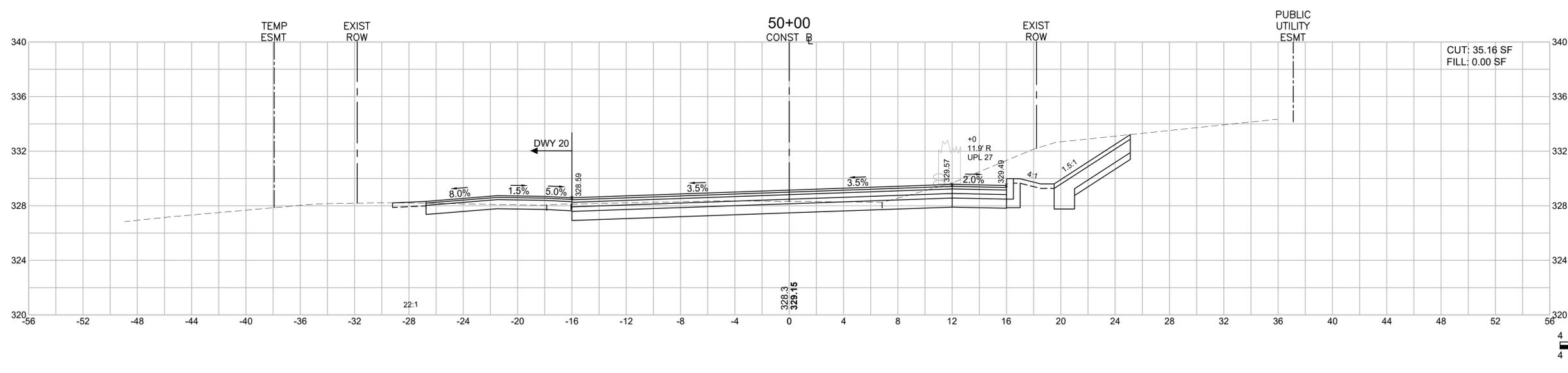
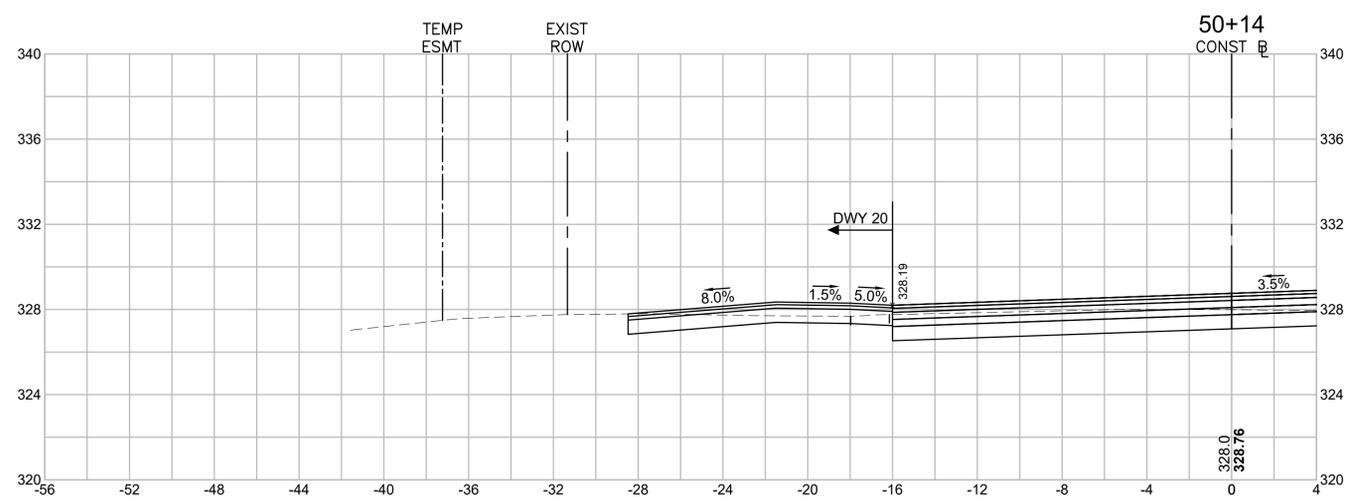
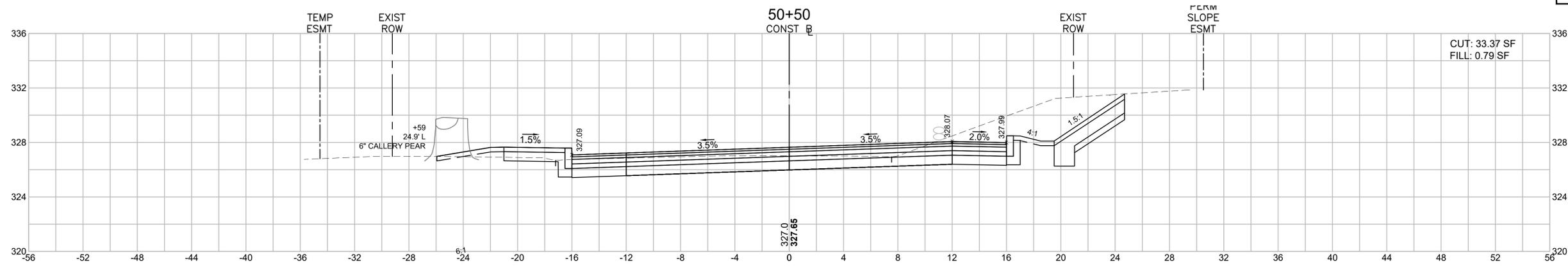
**CROSS SECTIONS - 28 OF 53
BOSTON ROAD**



**WESTFORD
BOSTON ROAD**

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	108	132
PROJECT FILE NO.		609035	

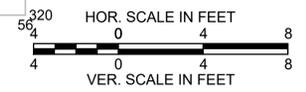
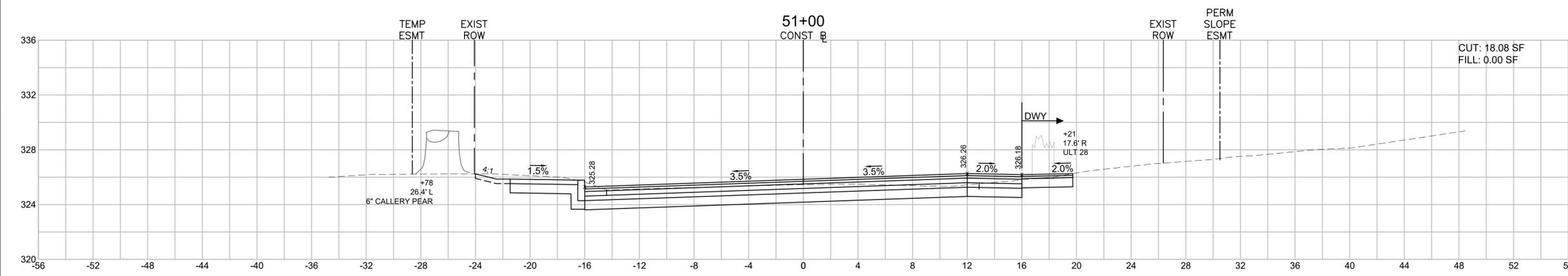
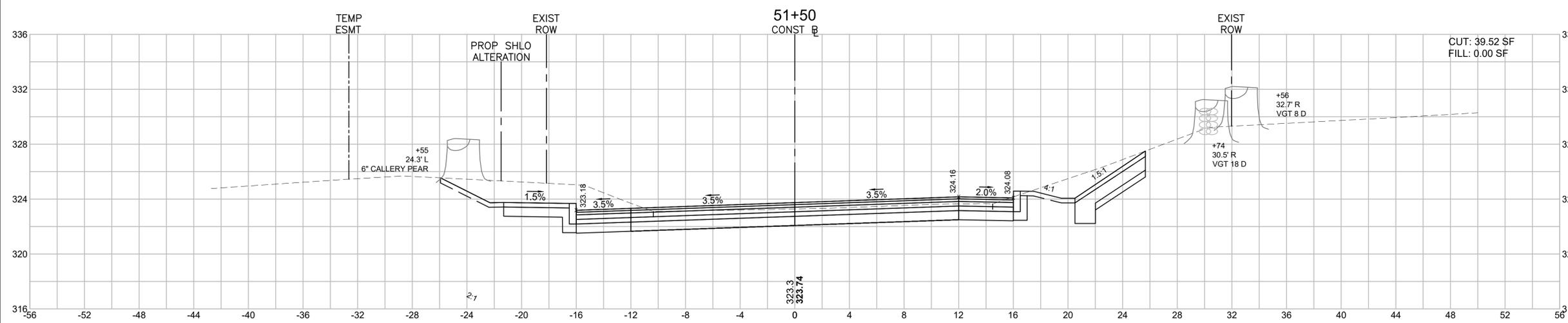
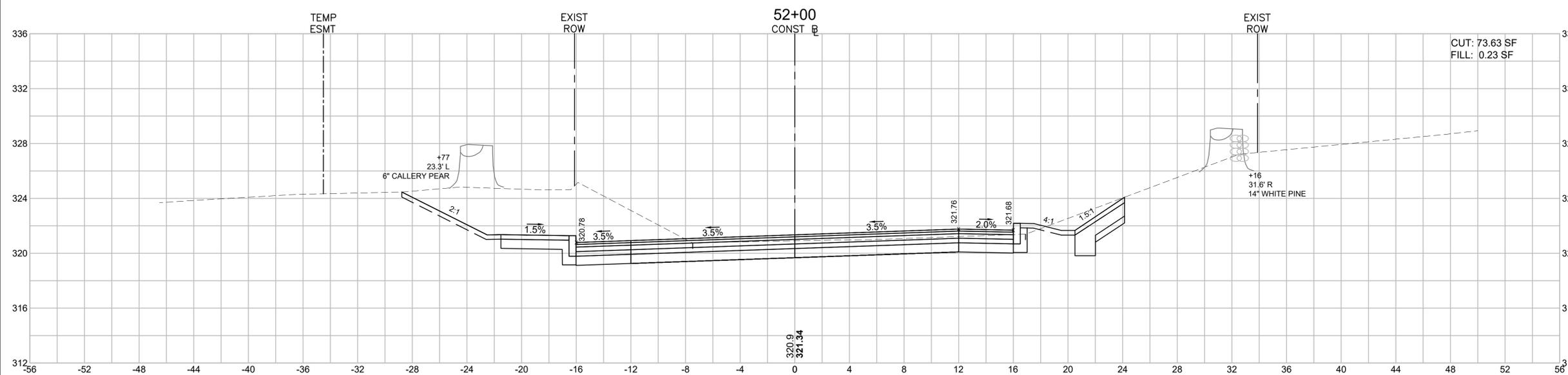
**CROSS SECTIONS - 29 OF 53
BOSTON ROAD**



**WESTFORD
BOSTON ROAD**

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	109	132
PROJECT FILE NO.		609035	

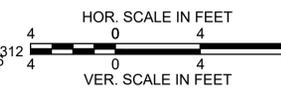
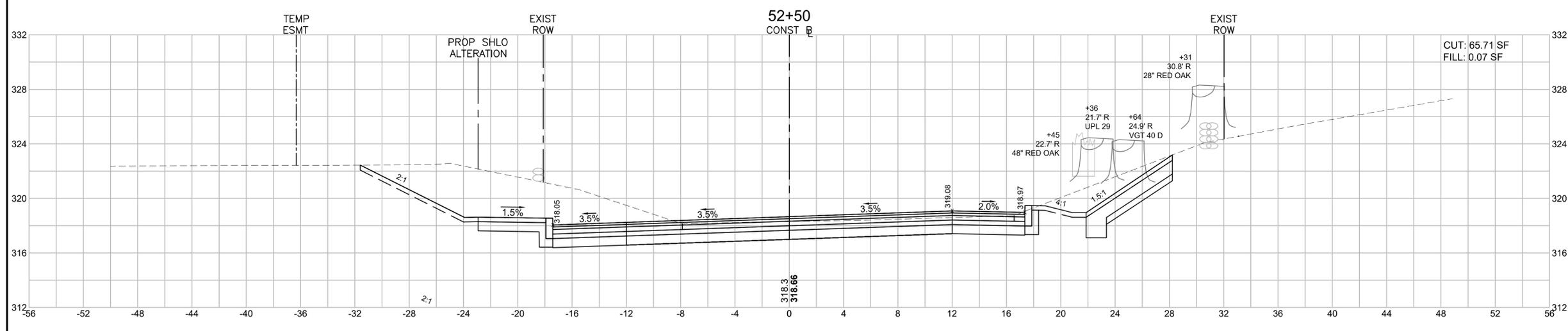
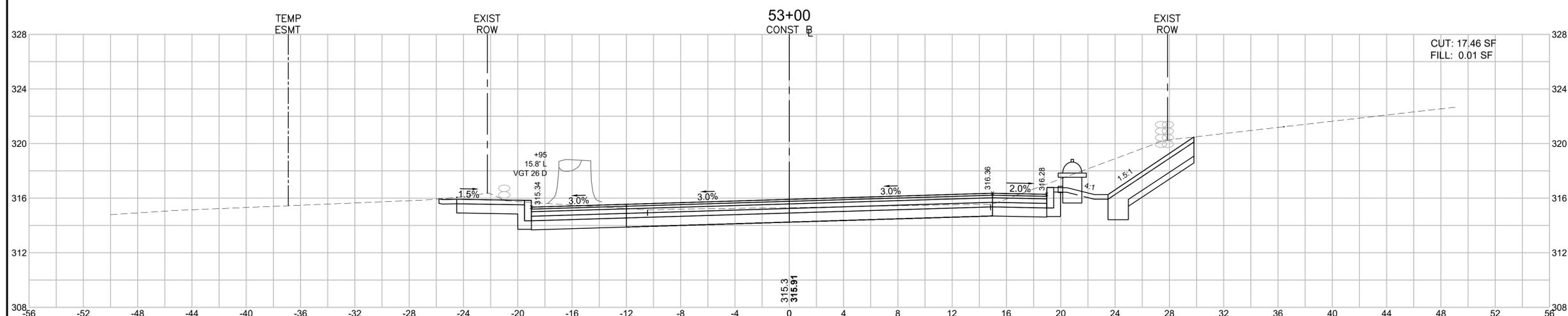
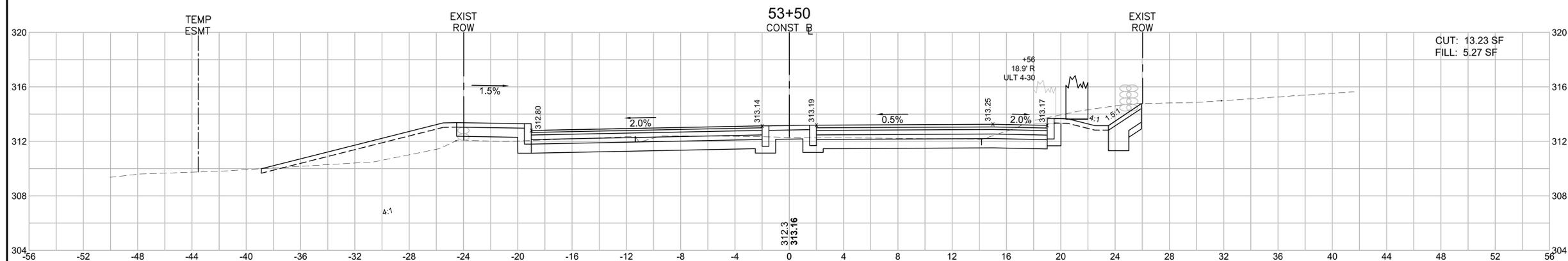
**CROSS SECTIONS - 30 OF 53
BOSTON ROAD**



**WESTFORD
BOSTON ROAD**

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	110	132
PROJECT FILE NO.		609035	

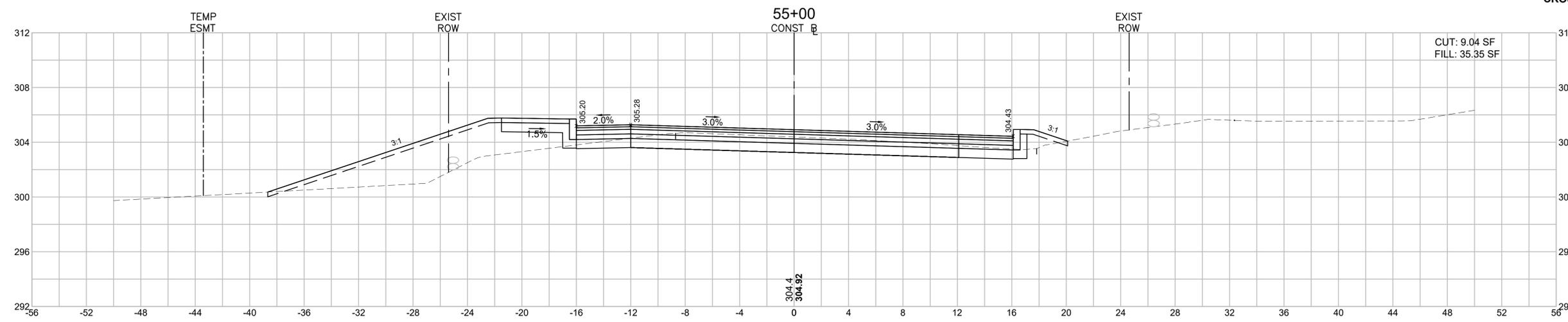
**CROSS SECTIONS - 31 OF 53
BOSTON ROAD**



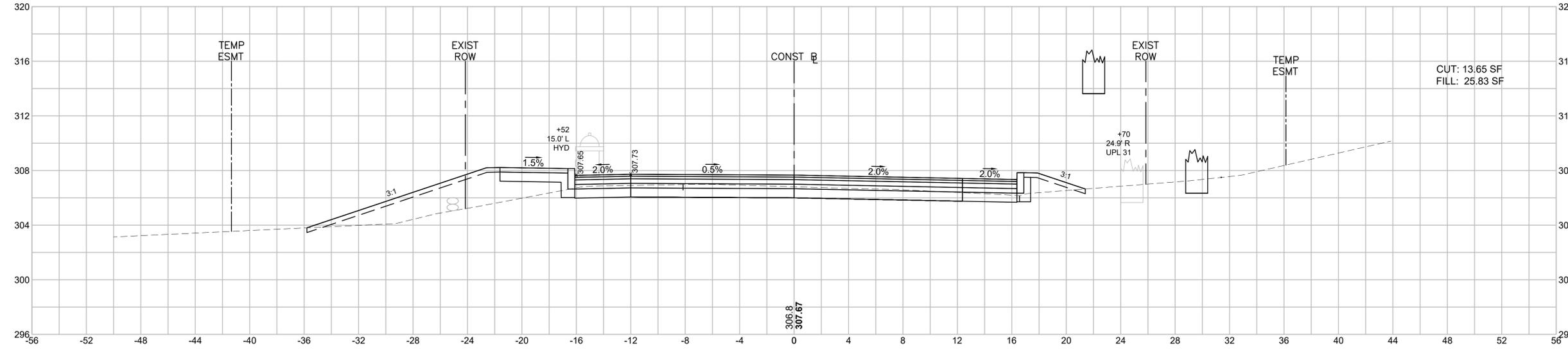
**WESTFORD
BOSTON ROAD**

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	111	132
PROJECT FILE NO. 609035			

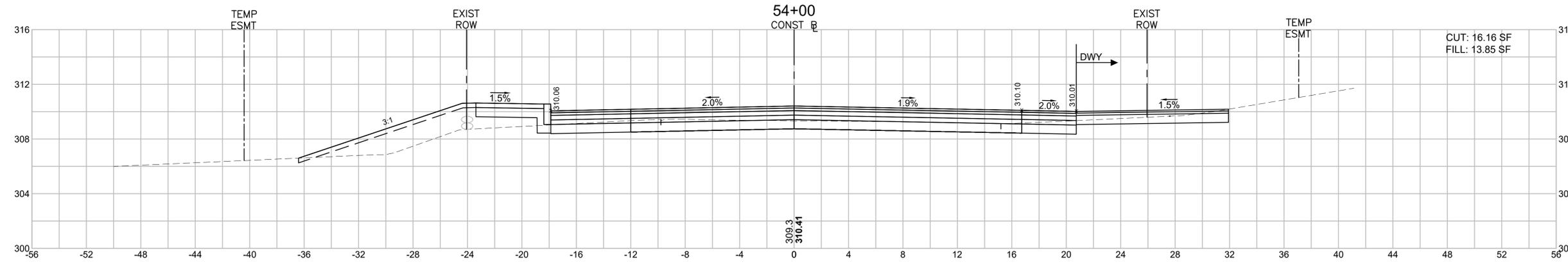
**CROSS SECTIONS - 32 OF 53
BOSTON ROAD**



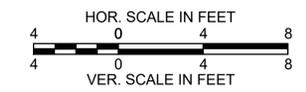
55+00
CONST. E



54+50
CONST. E



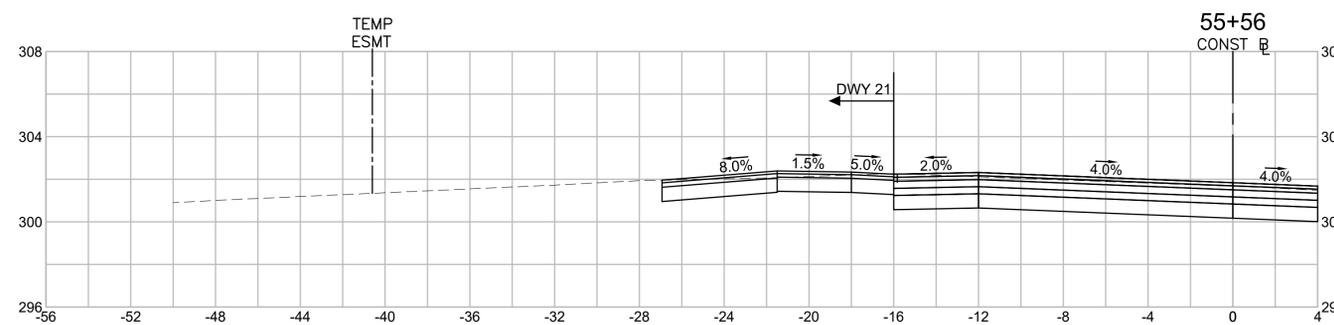
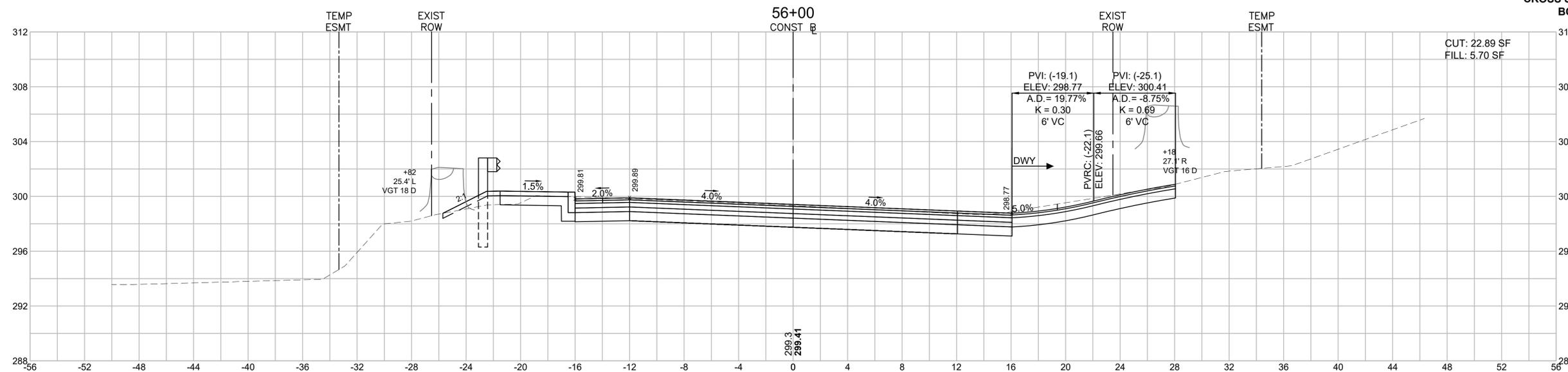
54+00
CONST. E



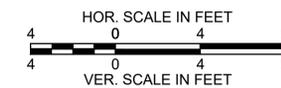
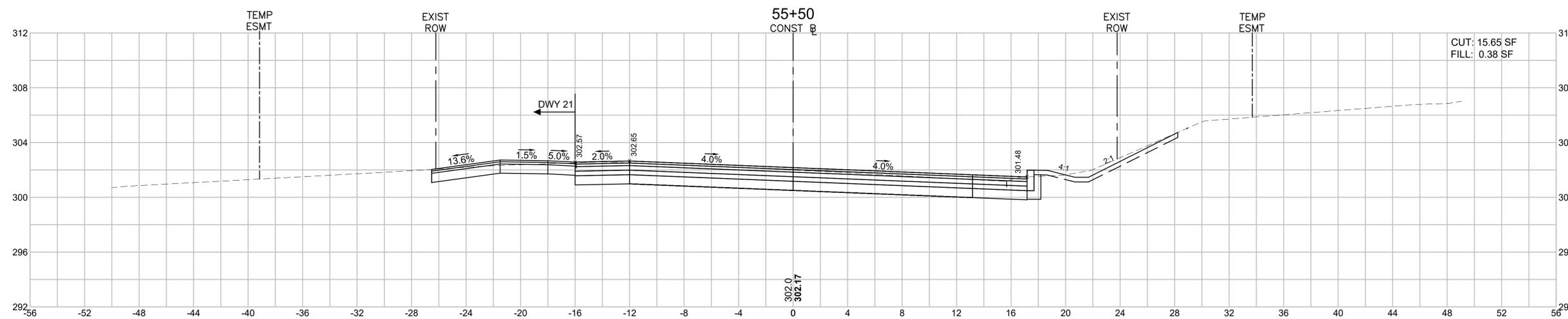
**WESTFORD
BOSTON ROAD**

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	112	132
PROJECT FILE NO.		609035	

**CROSS SECTIONS - 33 OF 53
BOSTON ROAD**



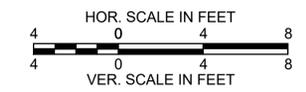
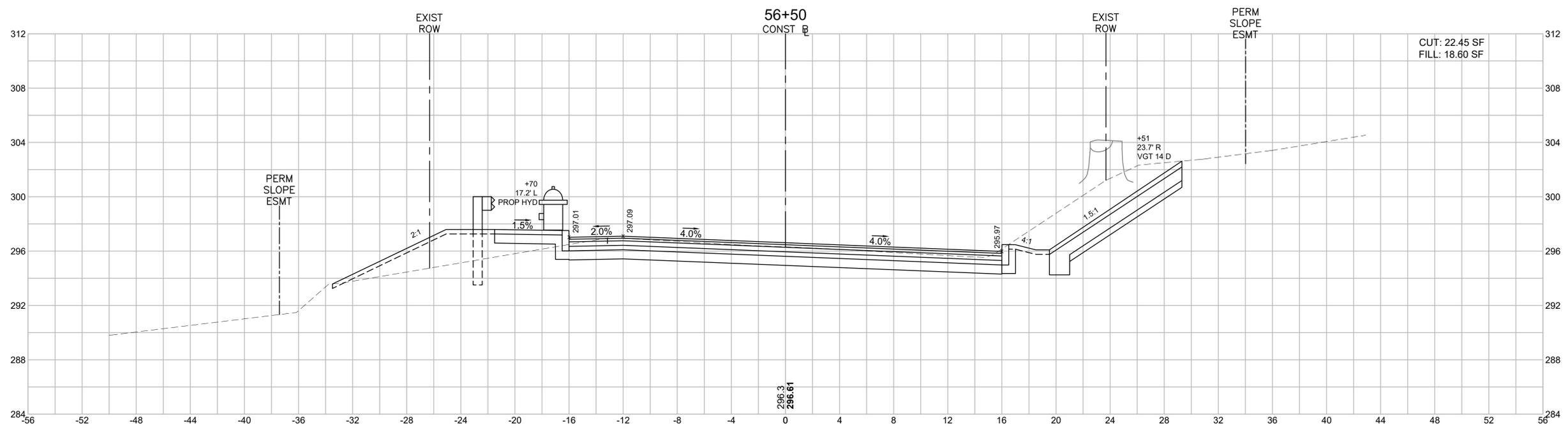
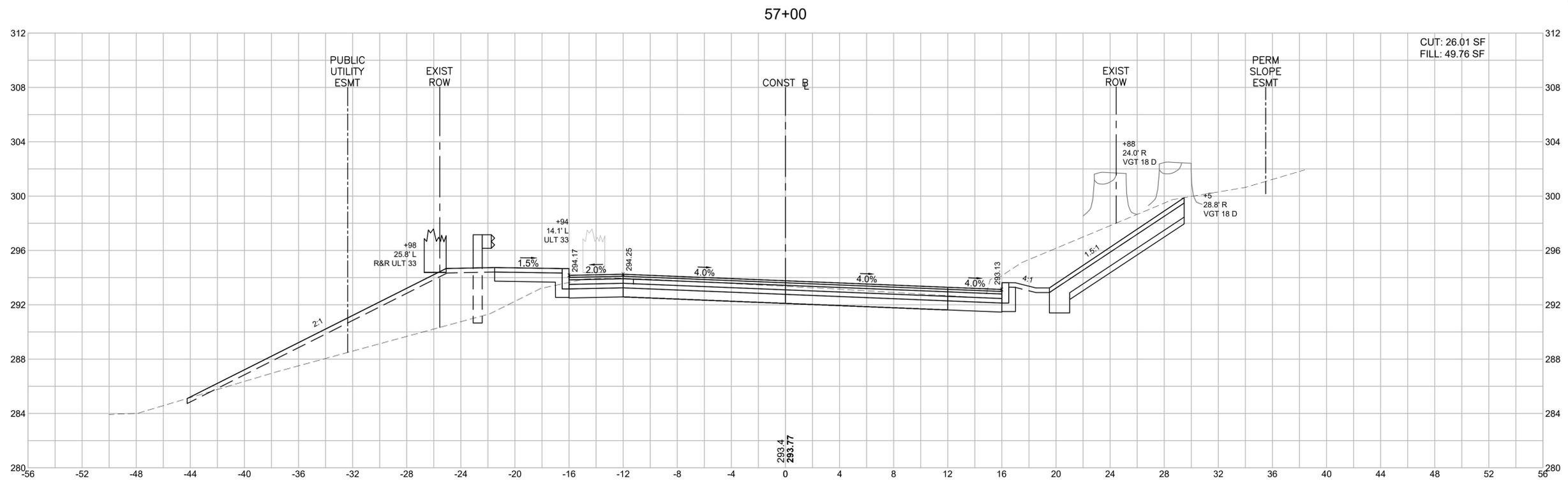
SKewed BEHIND FROM BACK OF PROPOSED SIDEWALK
(SEE NOTE ON CONSTRUCTION PLANS, SHT 16)



**WESTFORD
BOSTON ROAD**

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	113	132
PROJECT FILE NO.		609035	

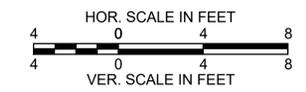
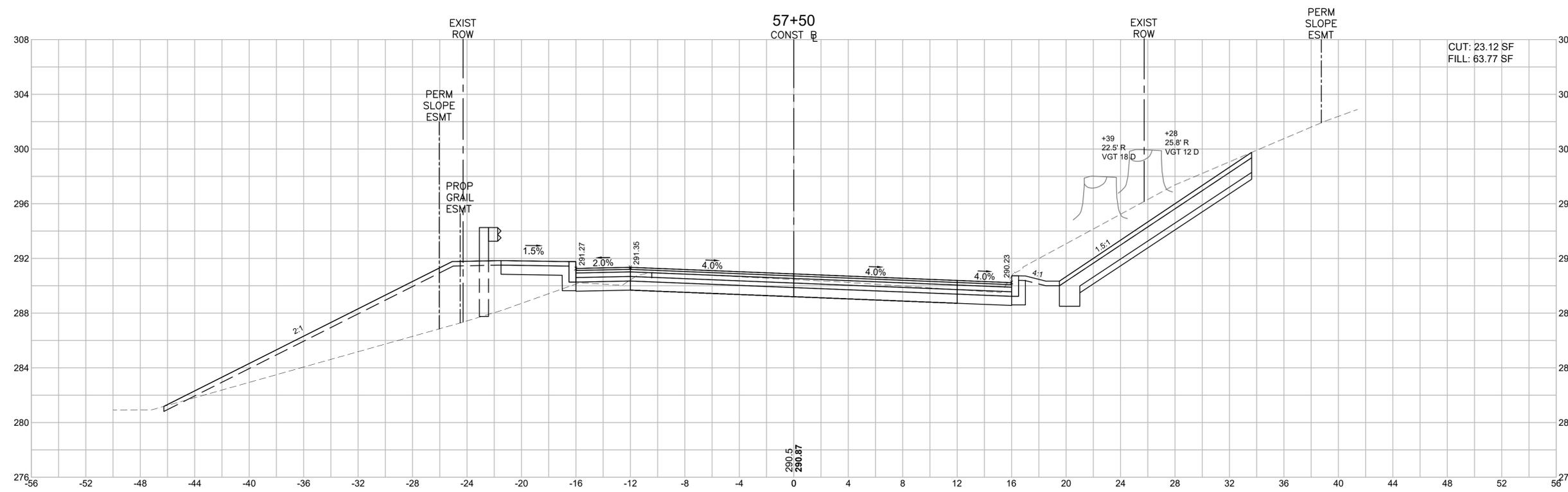
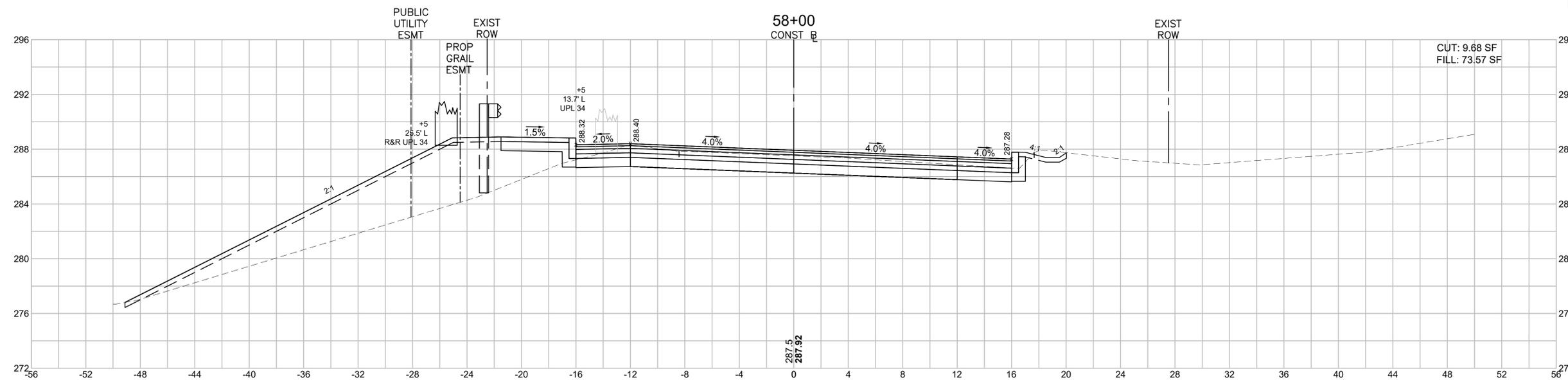
**CROSS SECTIONS - 34 OF 53
BOSTON ROAD**



**WESTFORD
BOSTON ROAD**

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	114	132
PROJECT FILE NO.		609035	

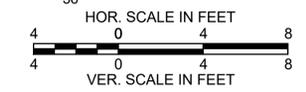
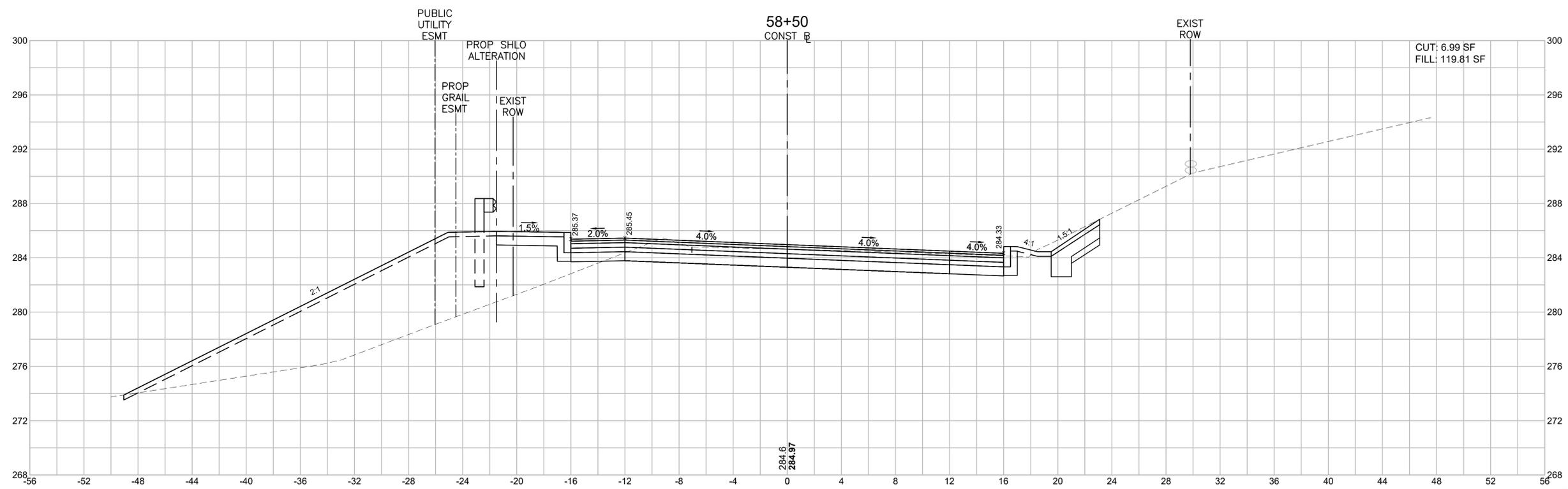
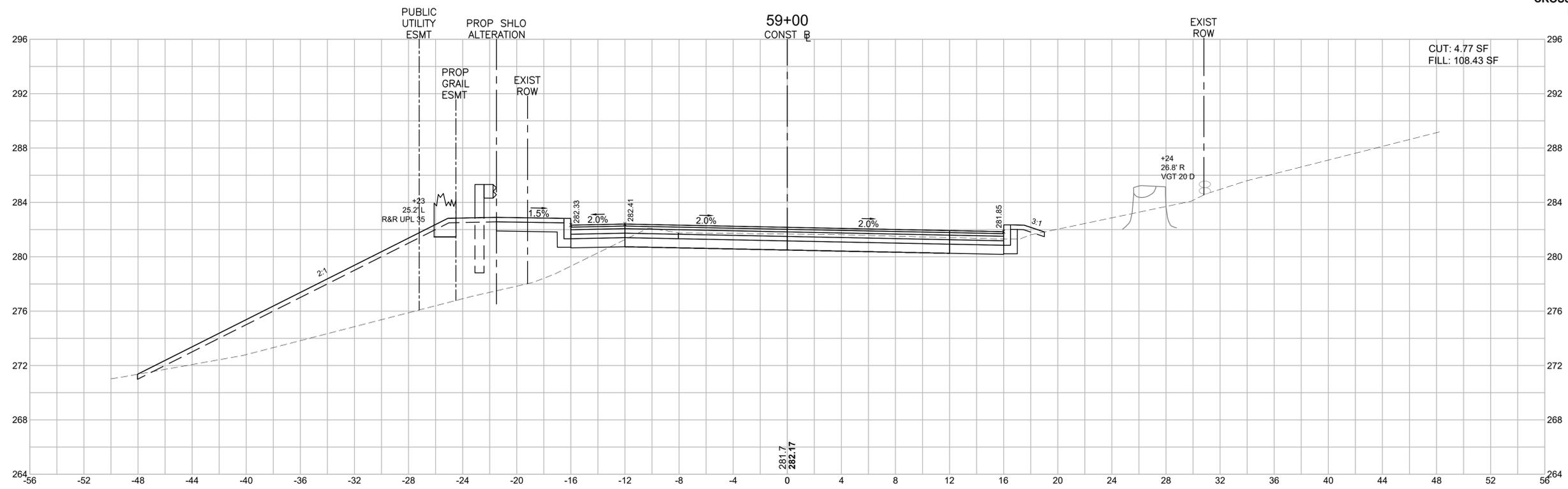
**CROSS SECTIONS - 35 OF 53
BOSTON ROAD**



**WESTFORD
BOSTON ROAD**

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	115	132
PROJECT FILE NO.		609035	

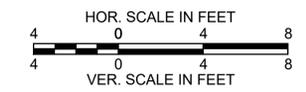
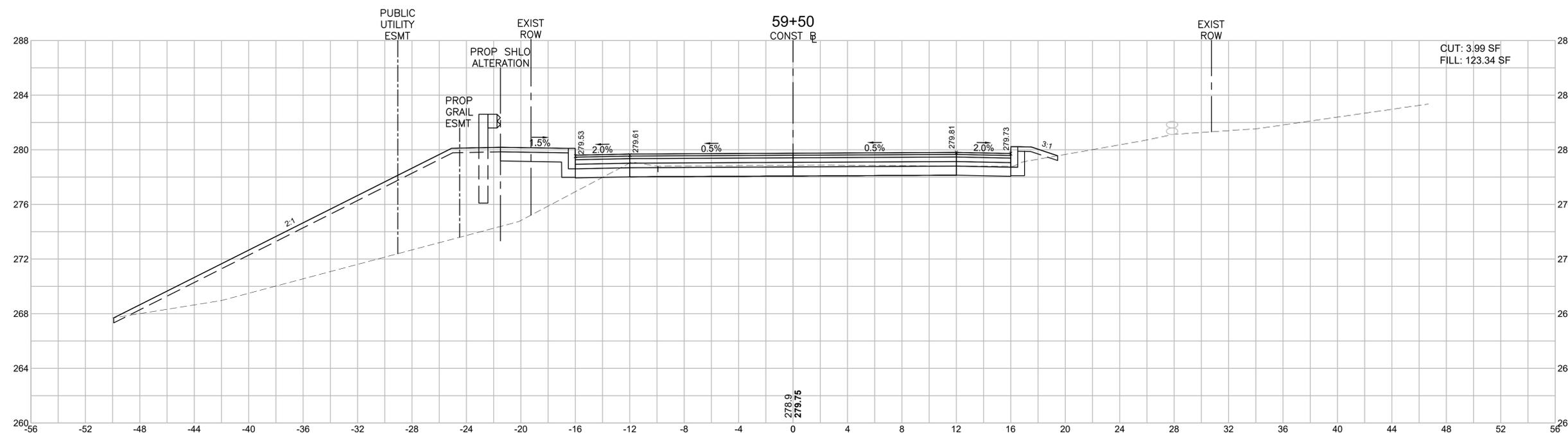
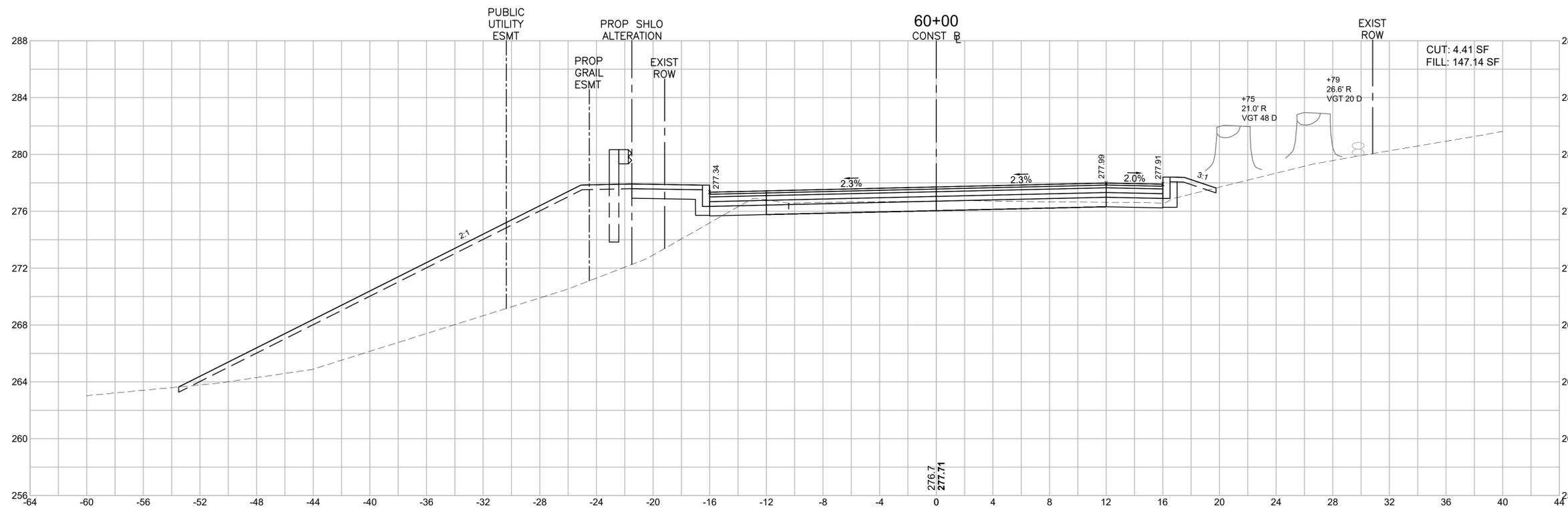
**CROSS SECTIONS - 36 OF 53
BOSTON ROAD**



**WESTFORD
BOSTON ROAD**

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	116	132
PROJECT FILE NO.		609035	

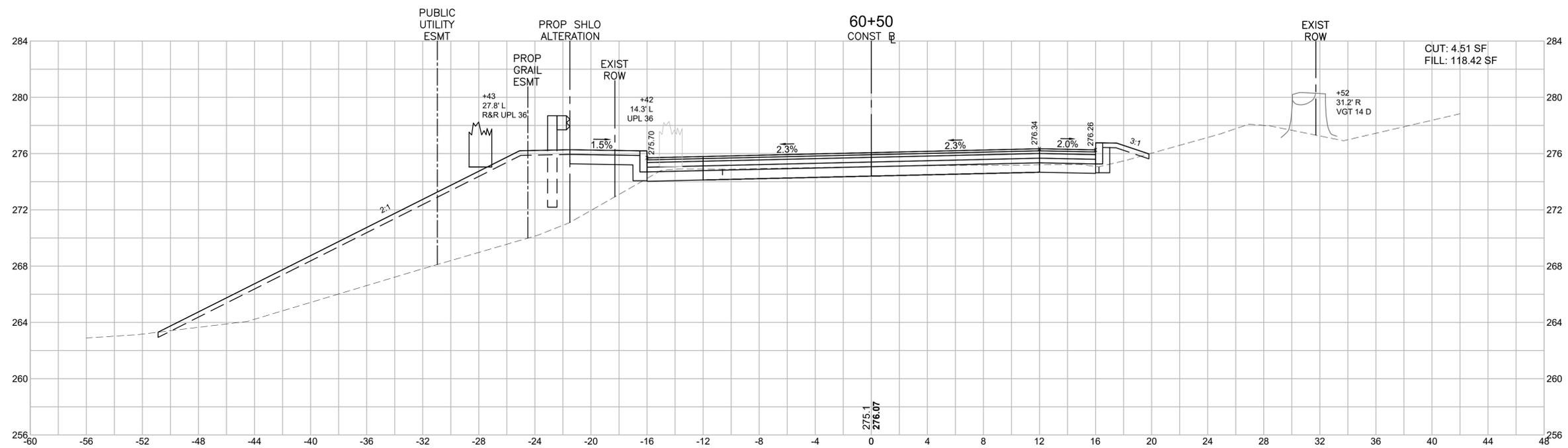
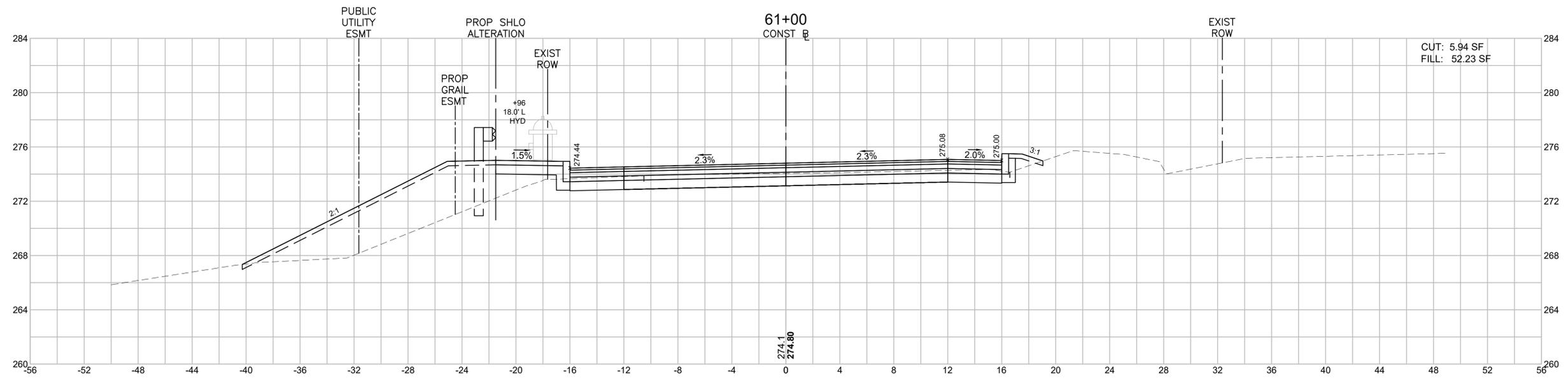
**CROSS SECTIONS - 37 OF 53
BOSTON ROAD**



**WESTFORD
BOSTON ROAD**

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	117	132
PROJECT FILE NO.		609035	

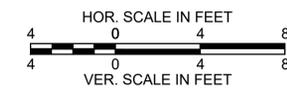
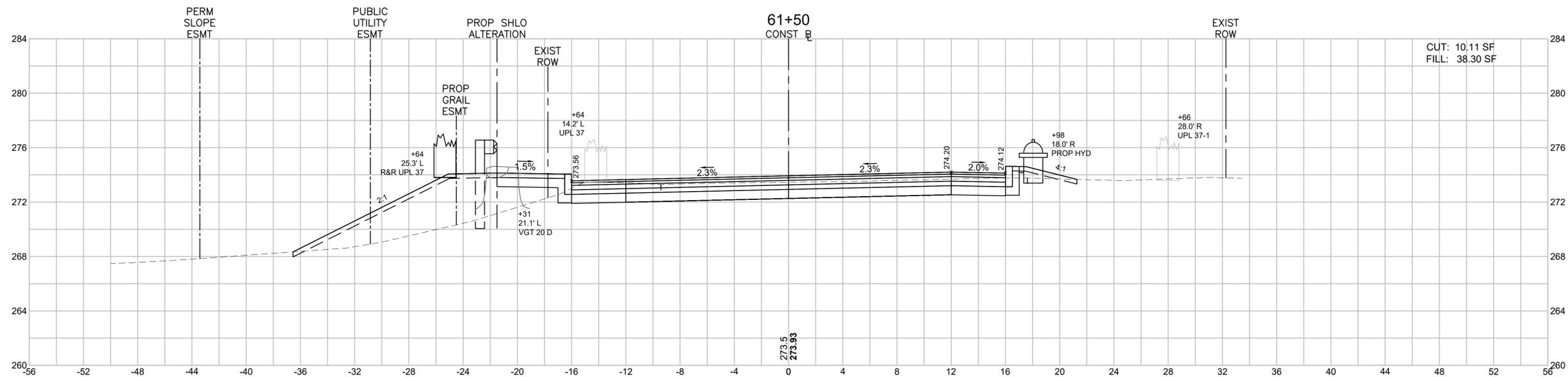
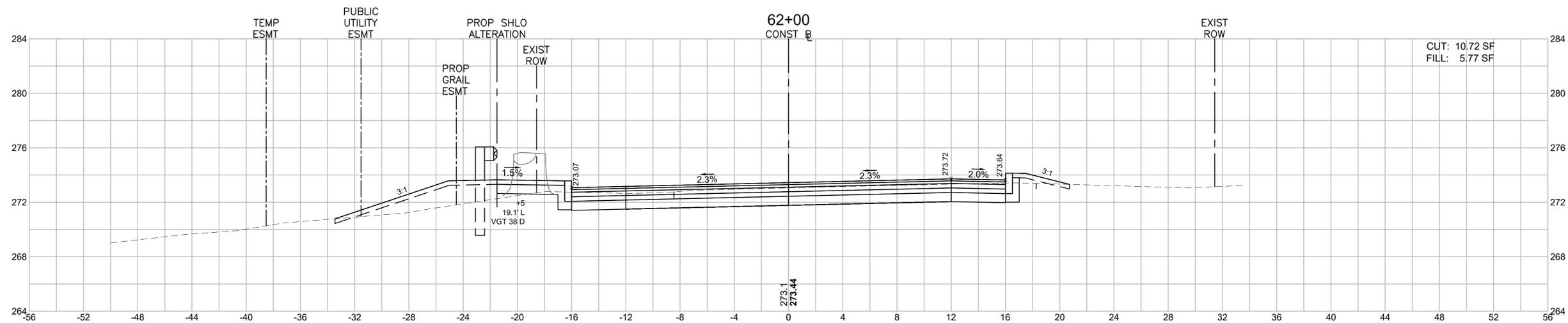
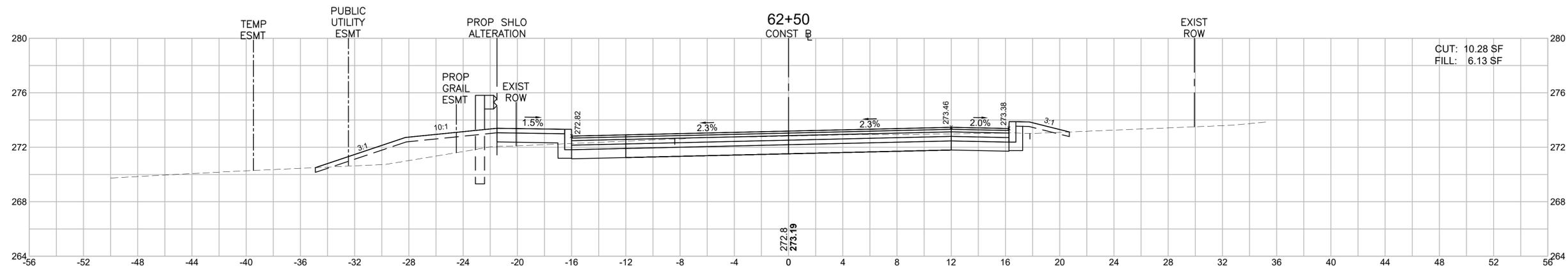
**CROSS SECTIONS - 38 OF 53
BOSTON ROAD**



**WESTFORD
BOSTON ROAD**

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	118	132
PROJECT FILE NO.		609035	

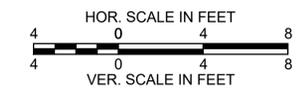
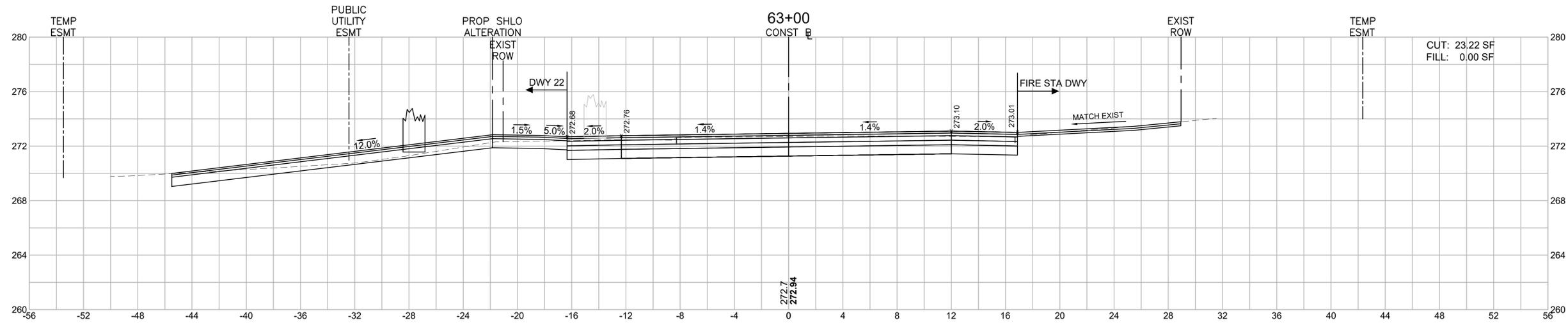
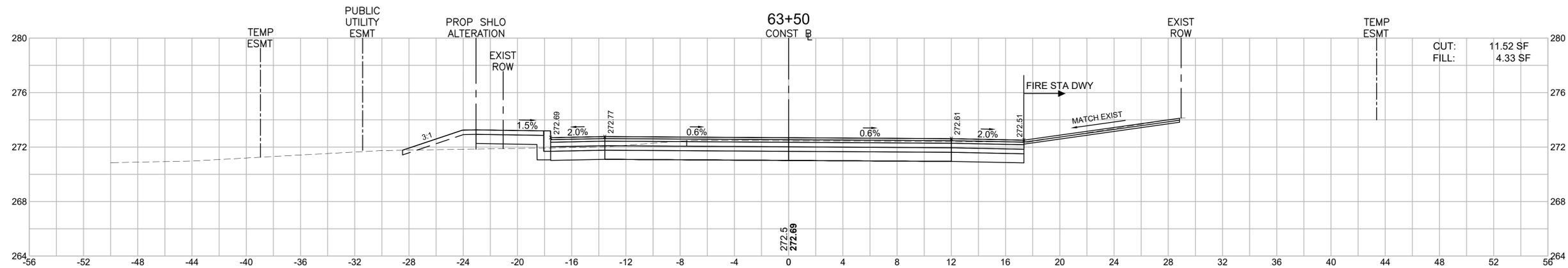
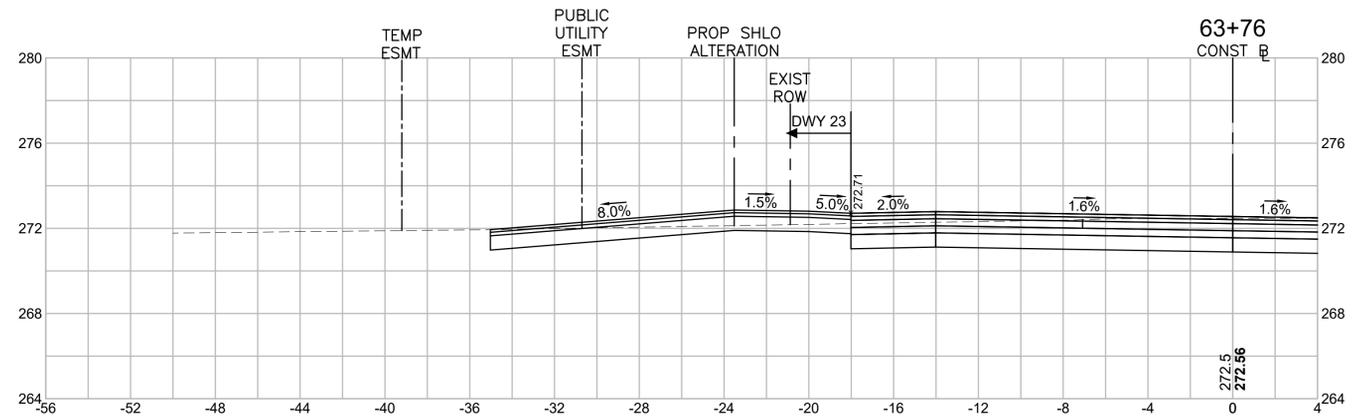
**CROSS SECTIONS - 39 OF 53
BOSTON ROAD**



**WESTFORD
BOSTON ROAD**

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	119	132
PROJECT FILE NO.		609035	

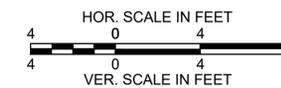
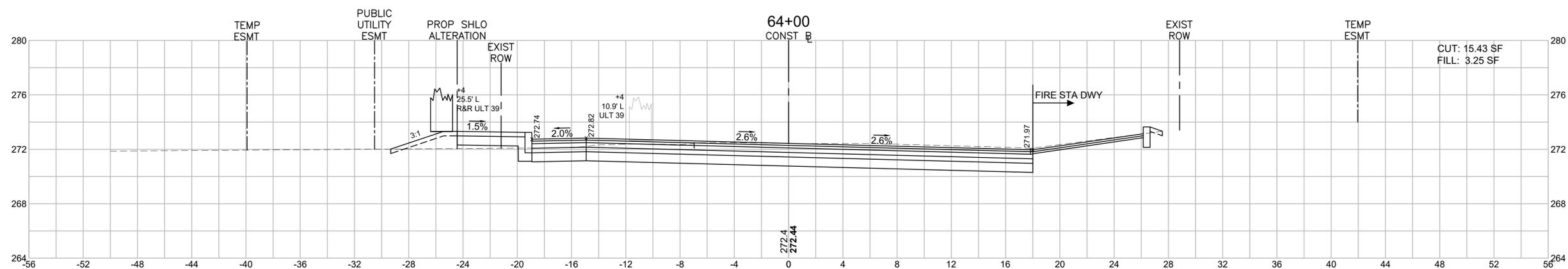
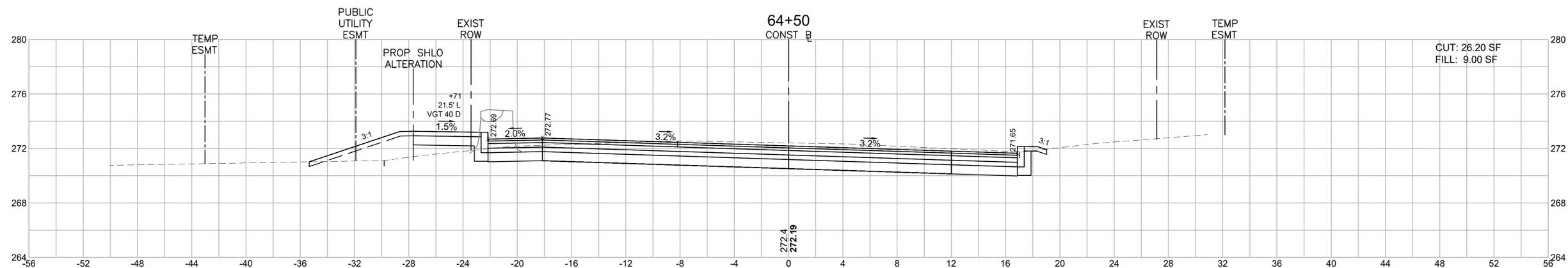
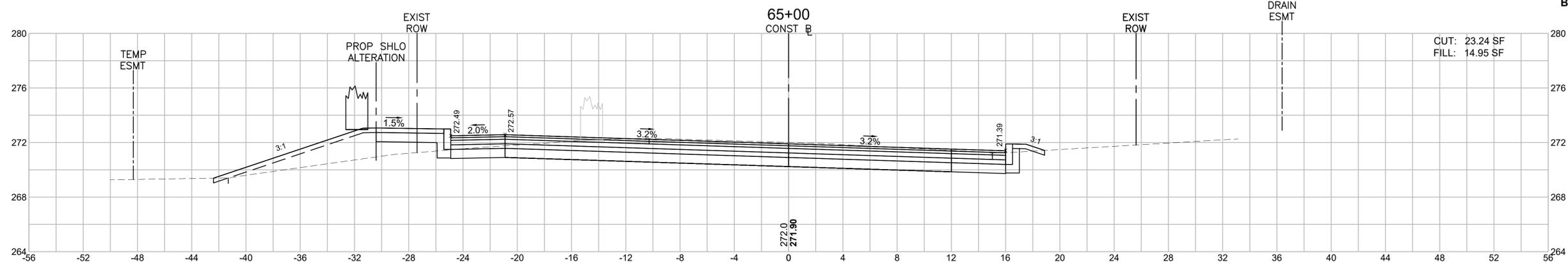
**CROSS SECTIONS - 40 OF 53
BOSTON ROAD**



**WESTFORD
BOSTON ROAD**

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	120	132
PROJECT FILE NO.		609035	

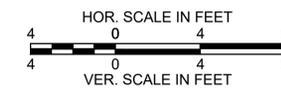
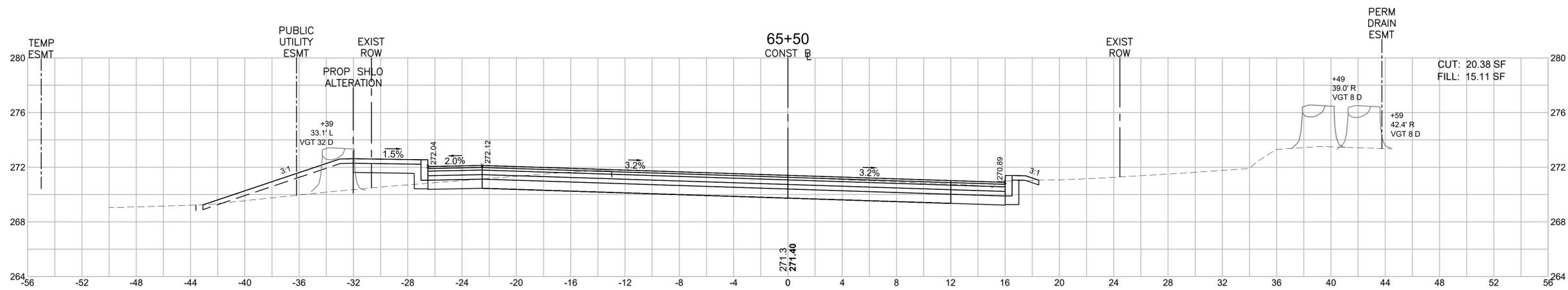
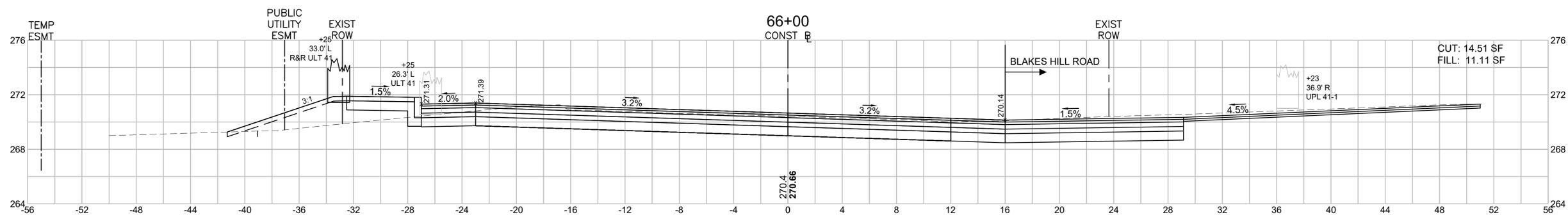
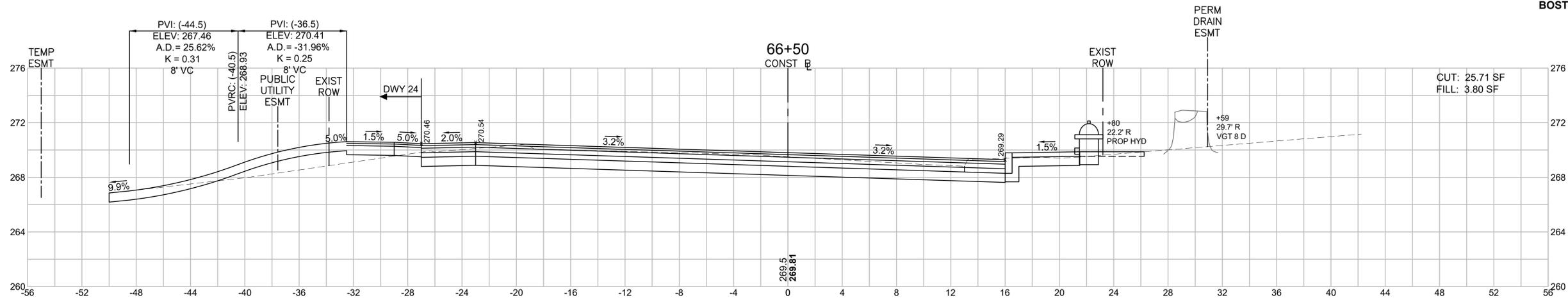
**CROSS SECTIONS - 41 OF 53
BOSTON ROAD**



**WESTFORD
BOSTON ROAD**

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	121	132
PROJECT FILE NO.		609035	

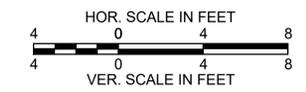
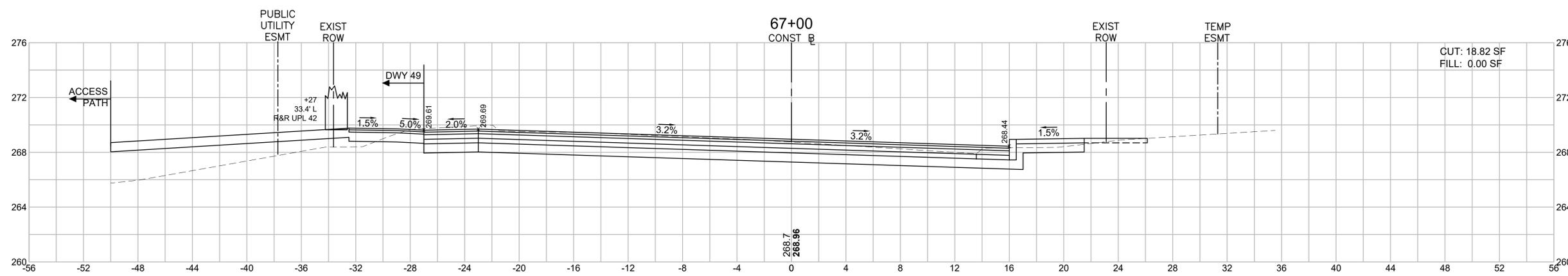
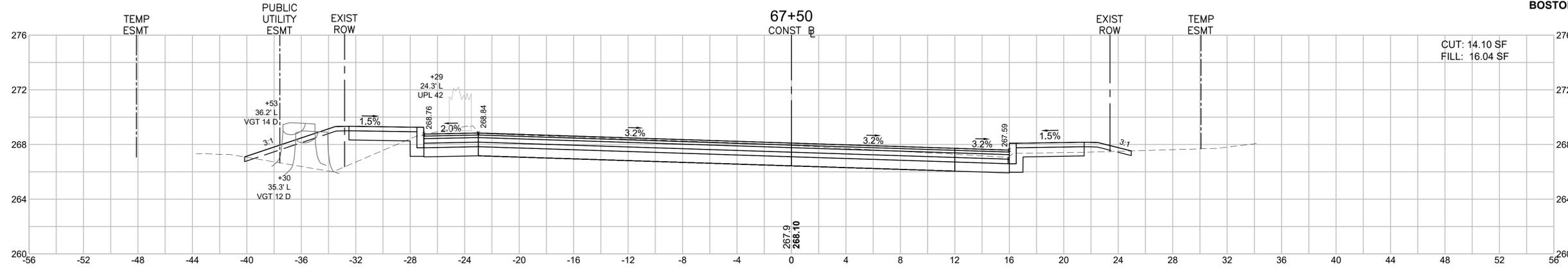
**CROSS SECTIONS - 42 OF 53
BOSTON ROAD**



**WESTFORD
BOSTON ROAD**

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	122	132
PROJECT FILE NO.		609035	

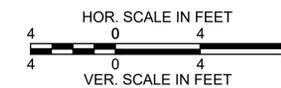
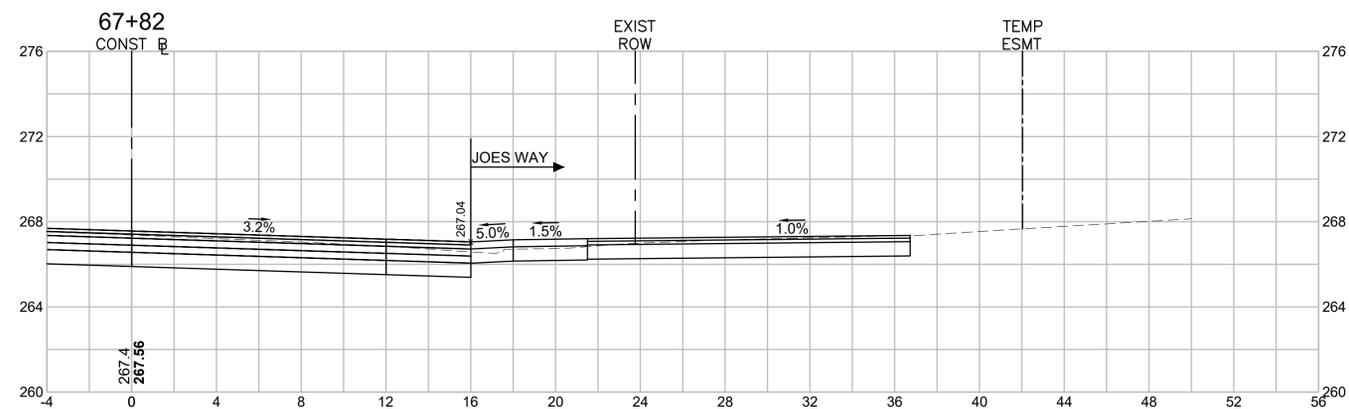
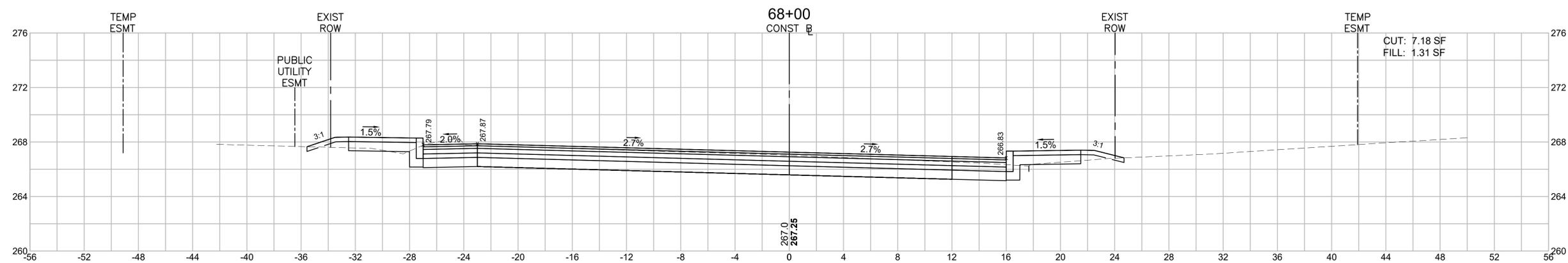
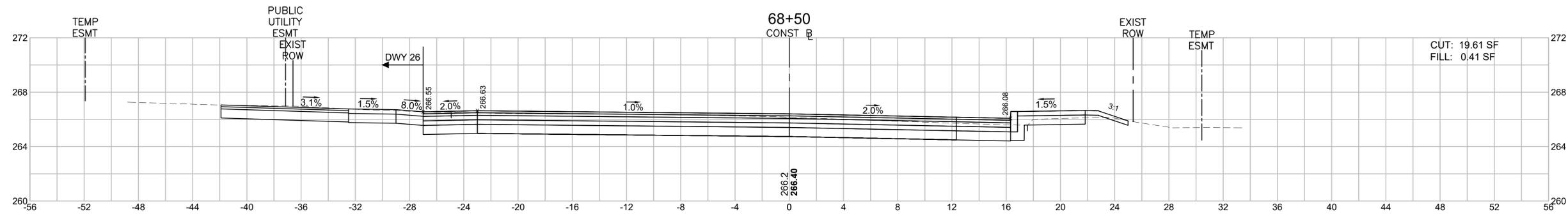
**CROSS SECTIONS - 43 OF 53
BOSTON ROAD**



**WESTFORD
BOSTON ROAD**

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	123	132
PROJECT FILE NO.		609035	

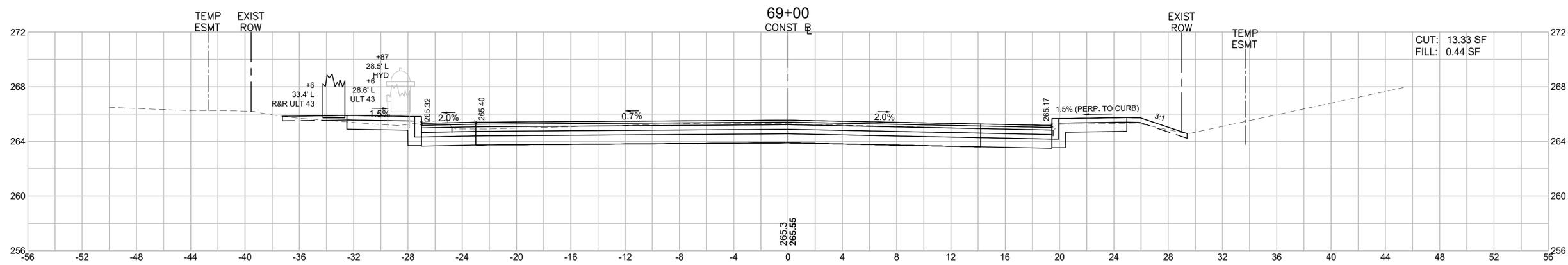
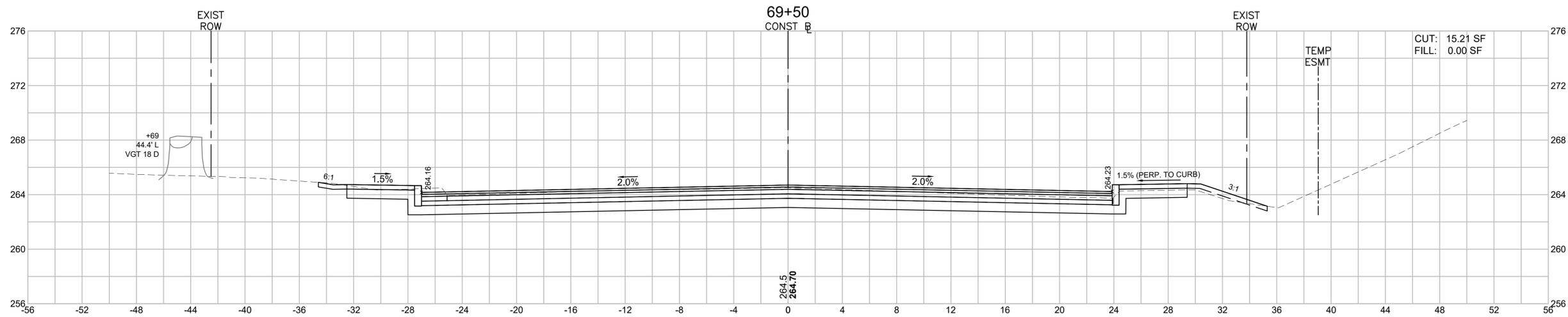
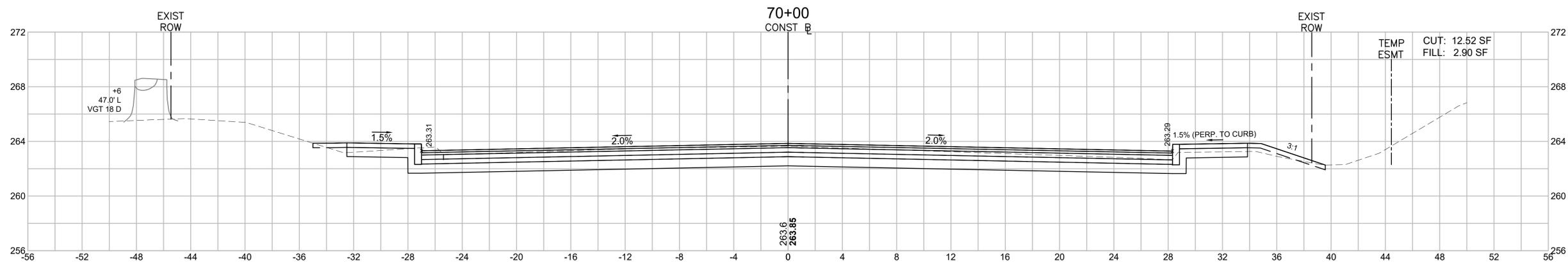
**CROSS SECTIONS - 44 OF 53
BOSTON ROAD**



**WESTFORD
BOSTON ROAD**

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	124	132
PROJECT FILE NO.		609035	

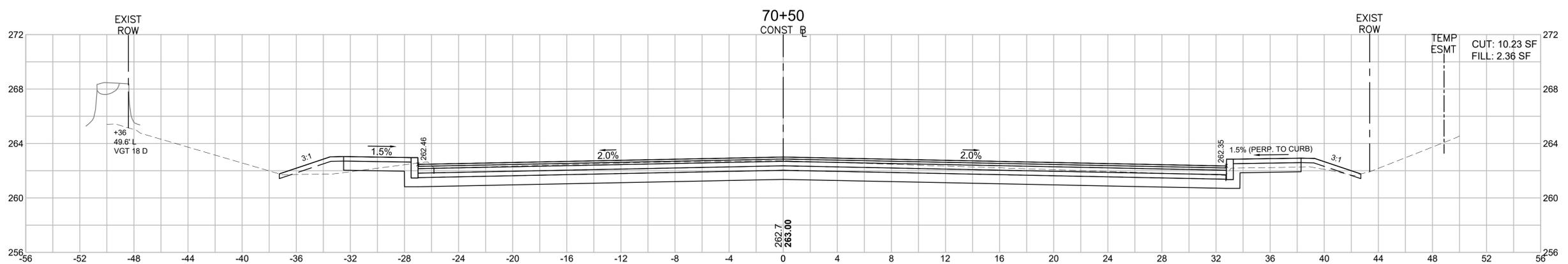
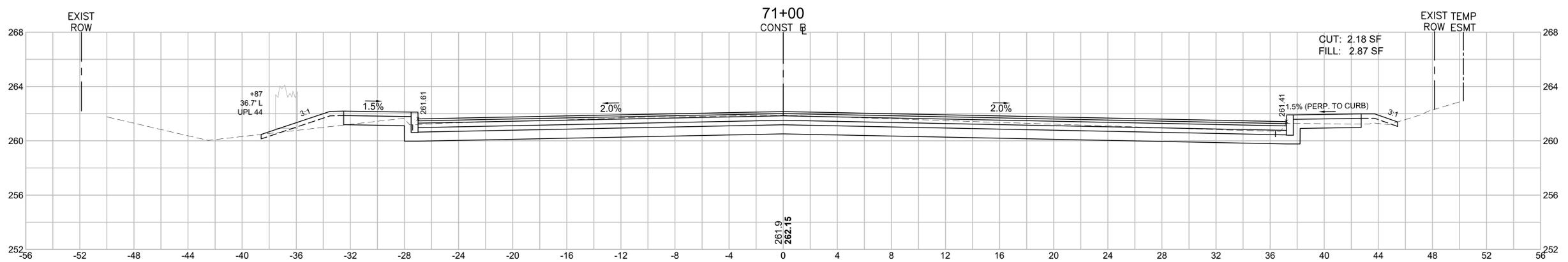
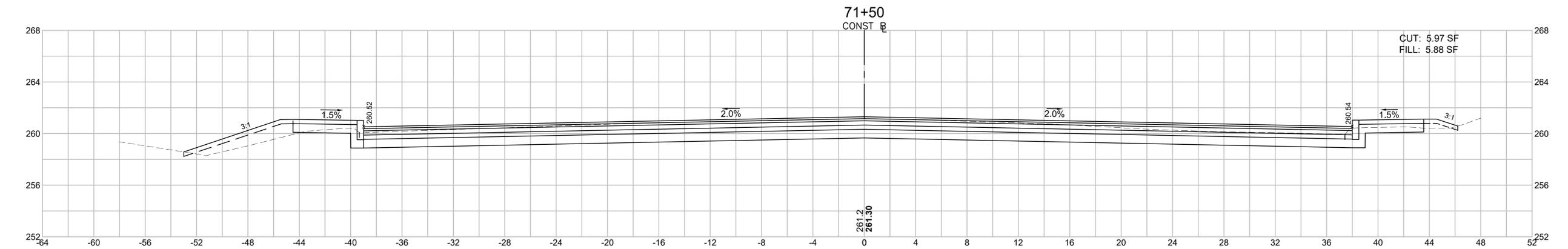
**CROSS SECTIONS - 45 OF 53
BOSTON ROAD**



**WESTFORD
BOSTON ROAD**

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	125	132
PROJECT FILE NO.		609035	

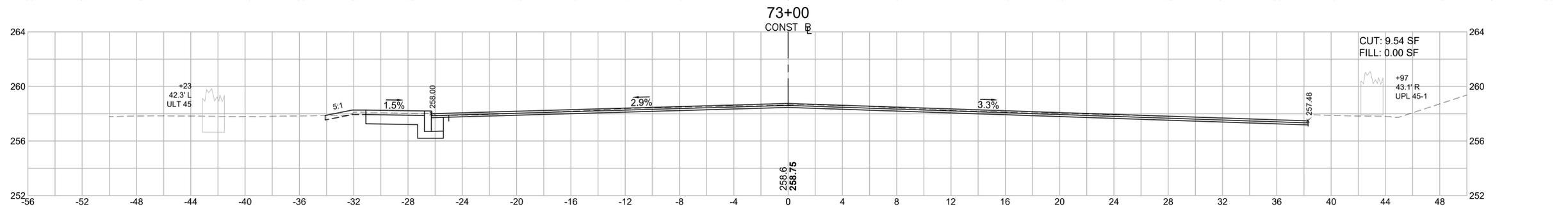
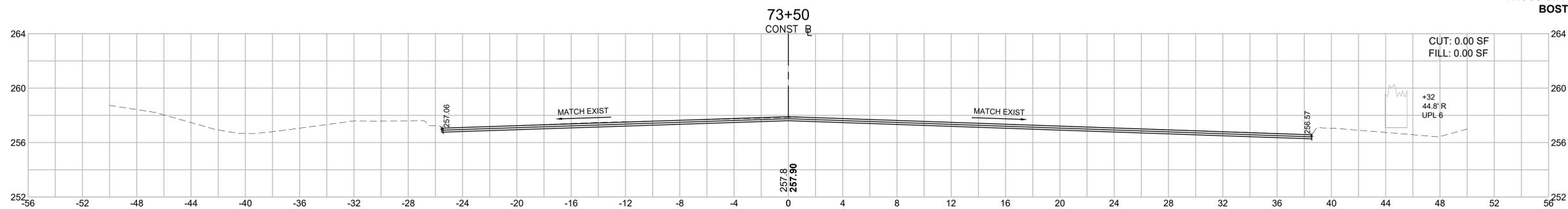
**CROSS SECTIONS - 46 OF 53
BOSTON ROAD**



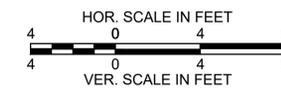
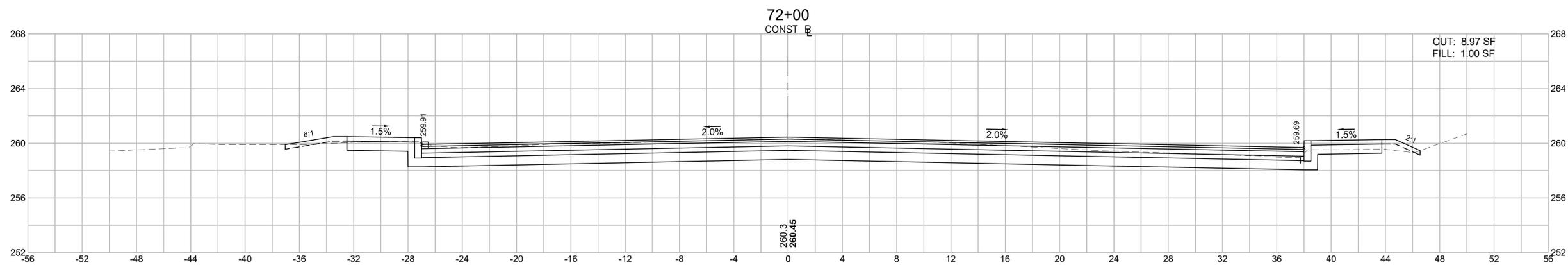
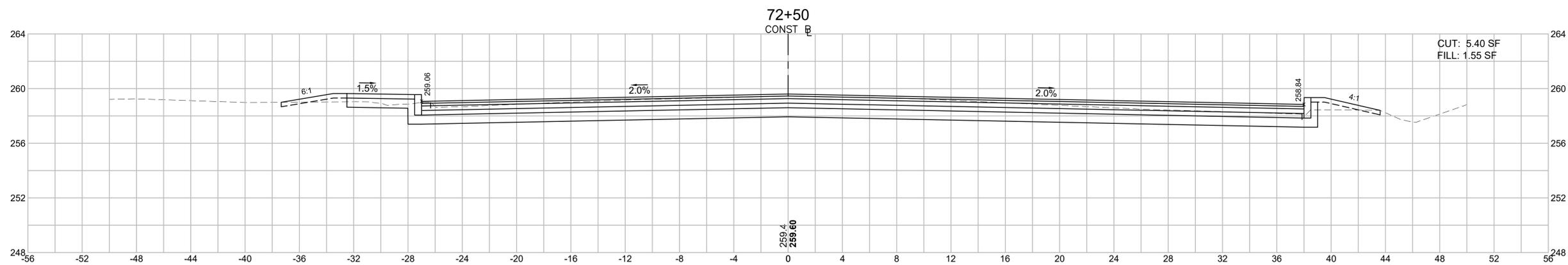
**WESTFORD
BOSTON ROAD**

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	126	132
PROJECT FILE NO.		609035	

**CROSS SECTIONS - 47 OF 53
BOSTON ROAD**



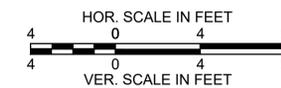
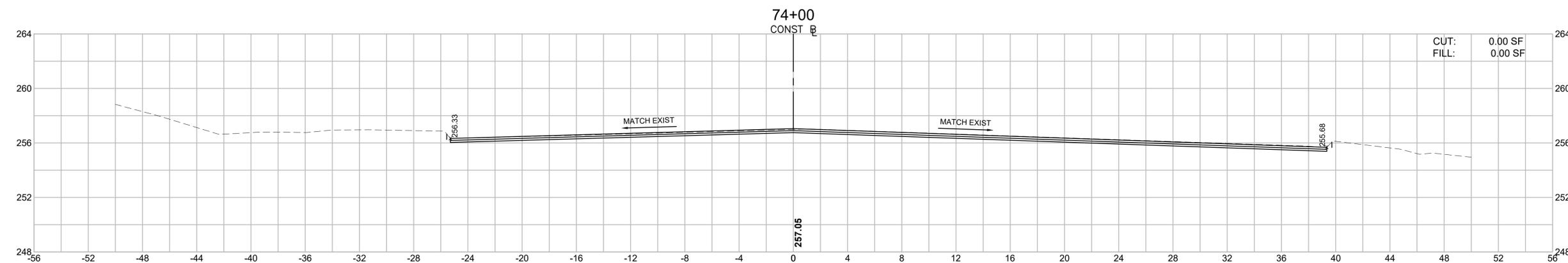
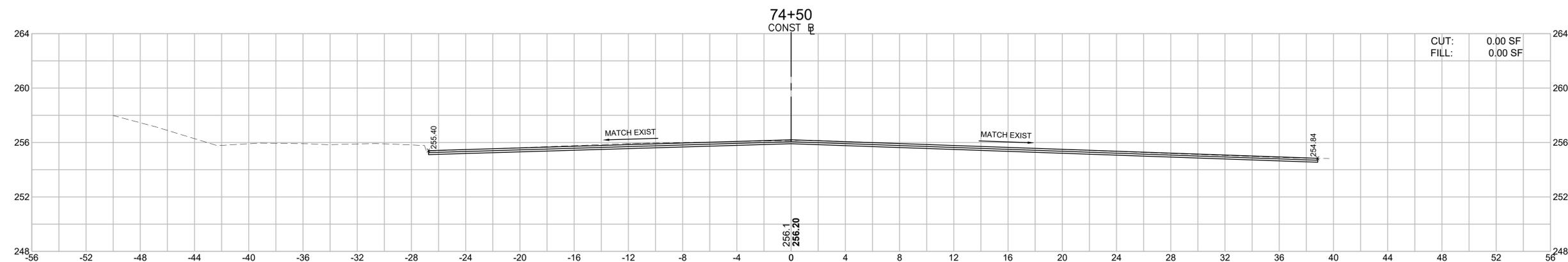
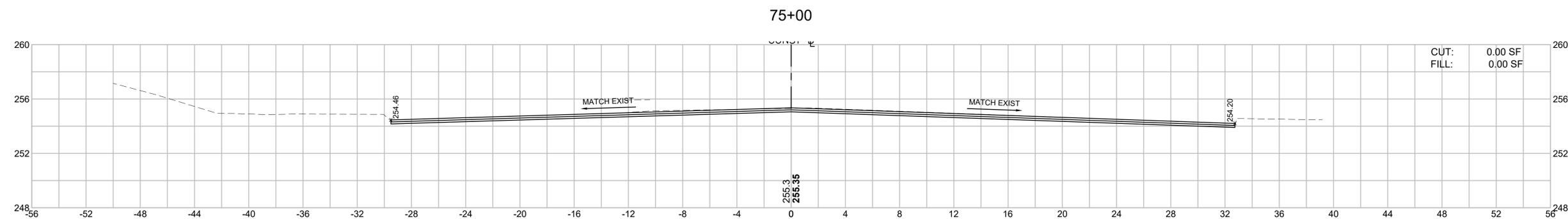
END FULL DEPTH RECLAMATION / BEGIN HMA MILL & OVERLAY



**WESTFORD
BOSTON ROAD**

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	127	132
PROJECT FILE NO.		609035	

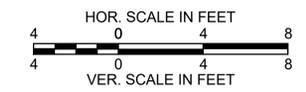
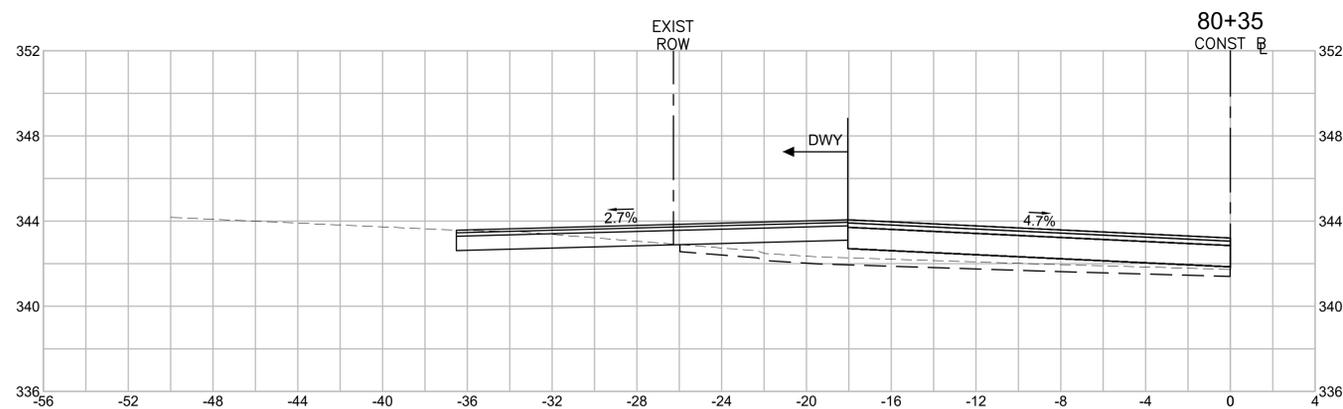
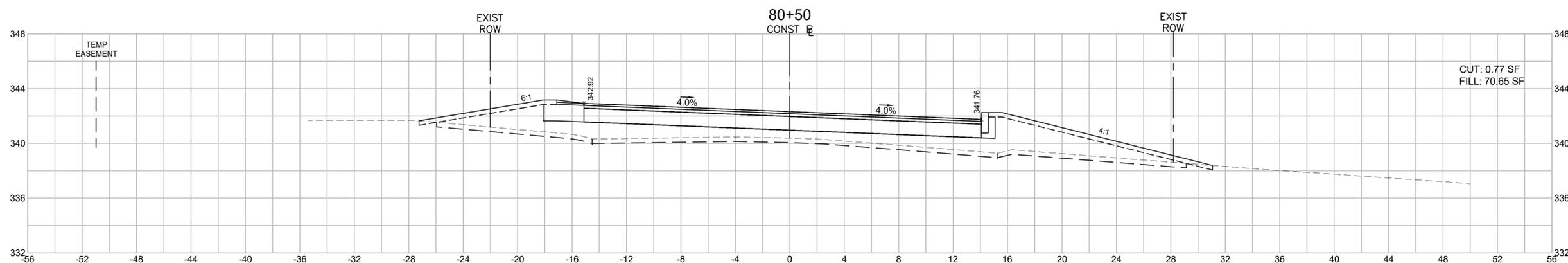
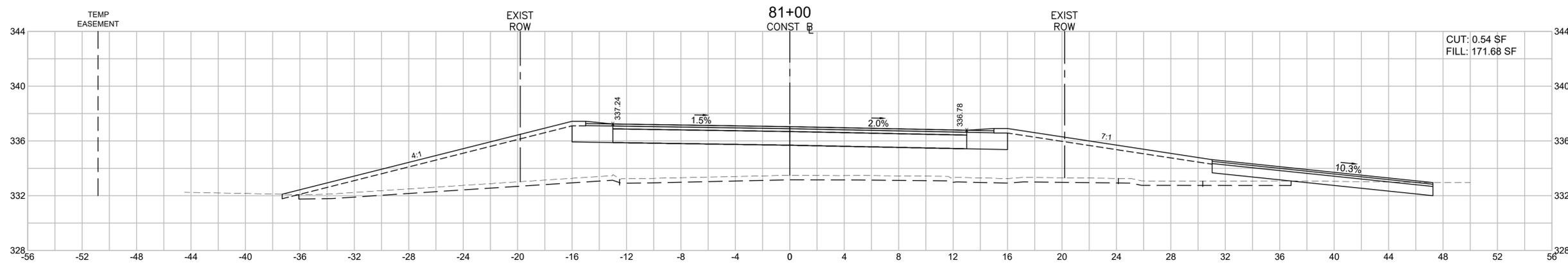
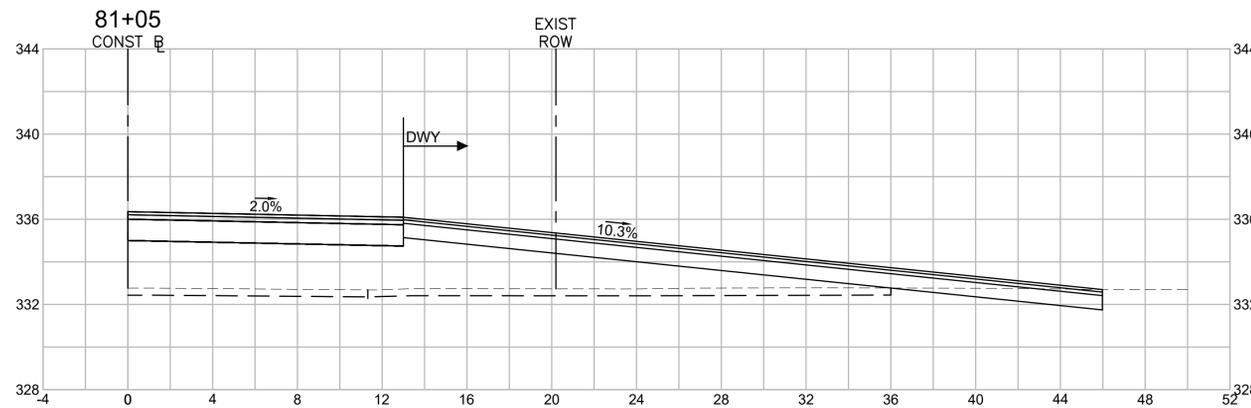
**CROSS SECTIONS - 48 OF 53
BOSTON ROAD**



**WESTFORD
BOSTON ROAD**

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	128	132
PROJECT FILE NO. 609035			

**CROSS SECTIONS - 49 OF 53
CROWN ROAD**

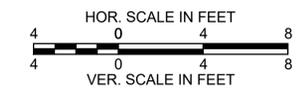
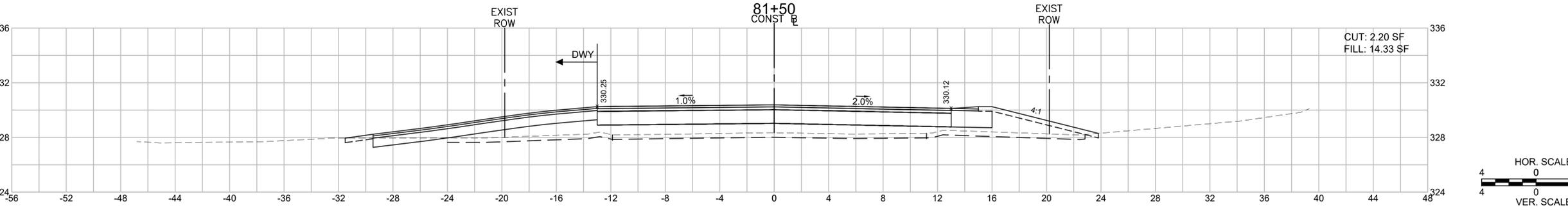
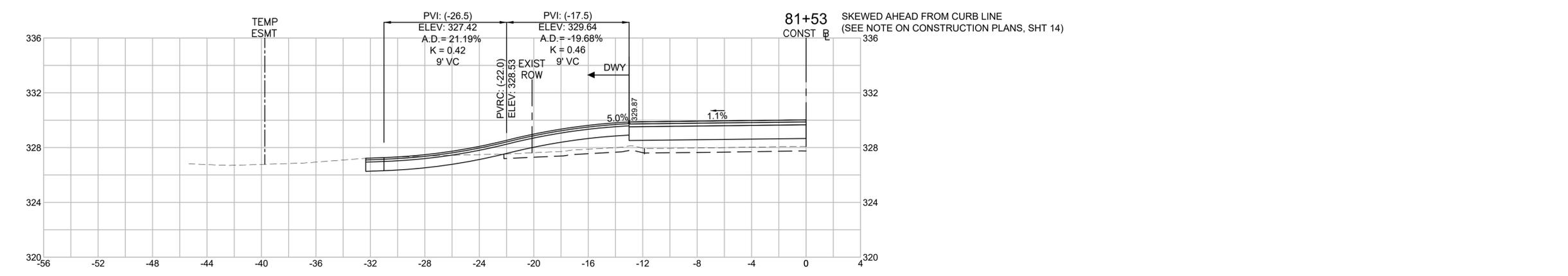
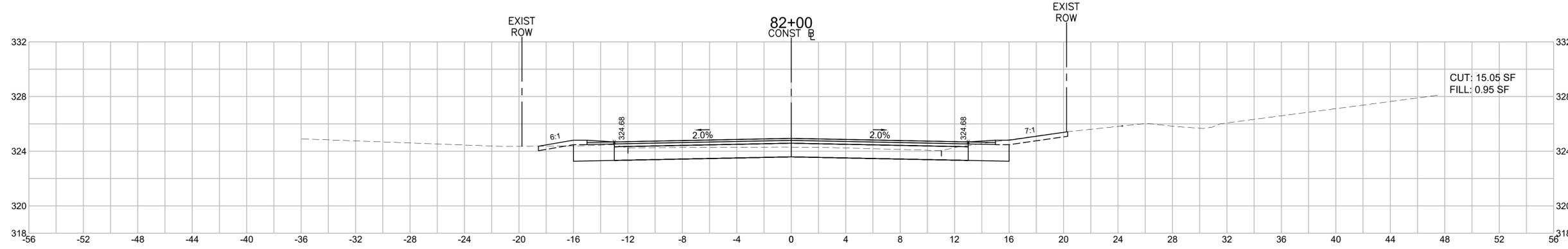
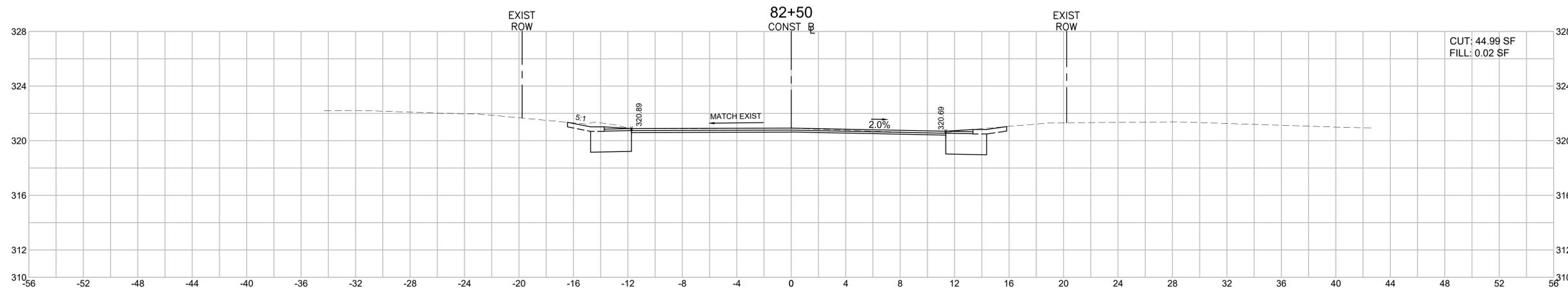


**WESTFORD
BOSTON ROAD**

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	129	132
PROJECT FILE NO.		609035	

**CROSS SECTIONS - 50 OF 53
CROWN ROAD**

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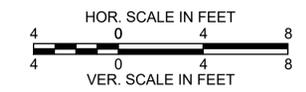
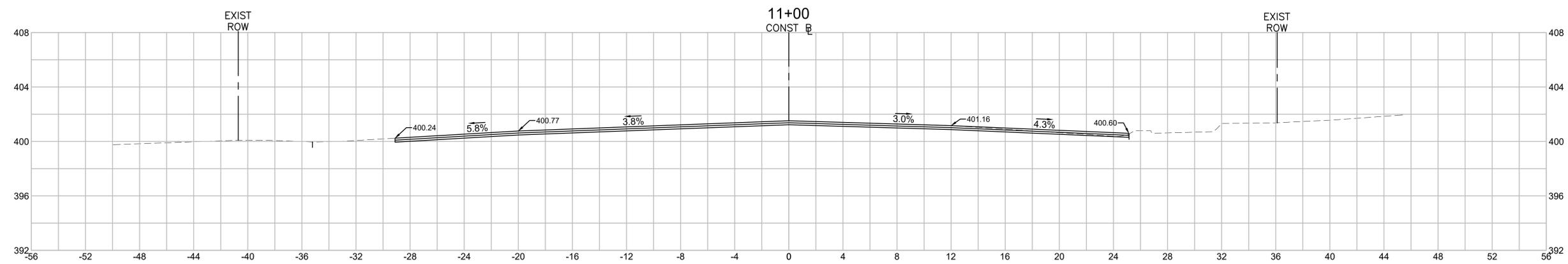
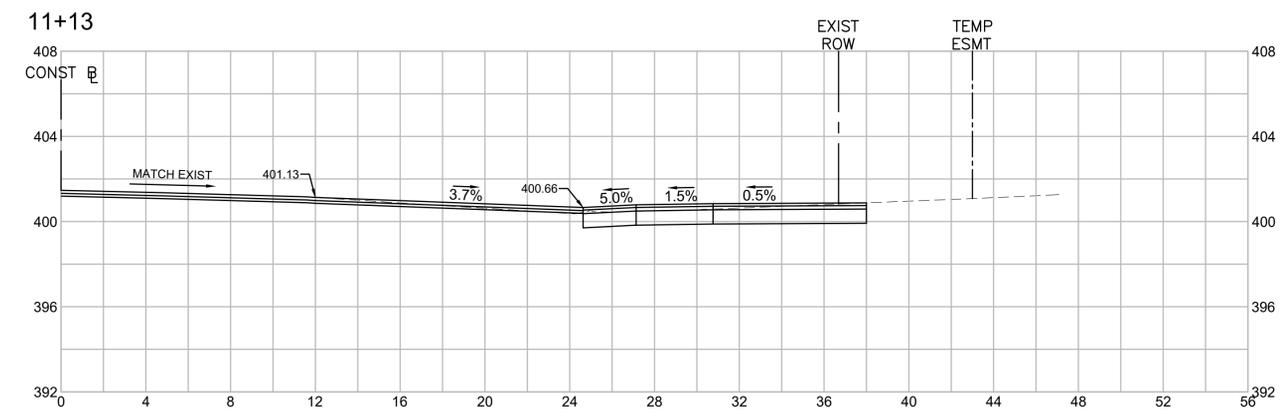
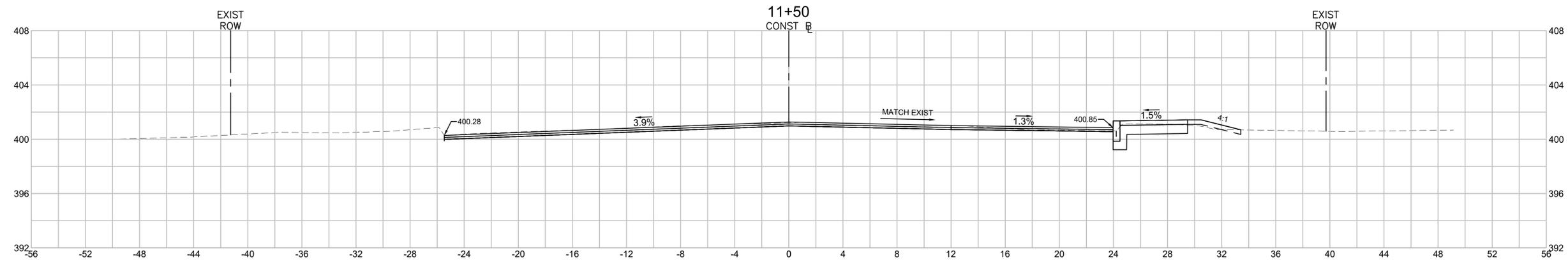


**WESTFORD
BOSTON ROAD**

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	130	132
PROJECT FILE NO.		609035	

**CROSS SECTIONS - 51 OF 53
MAIN STREET**

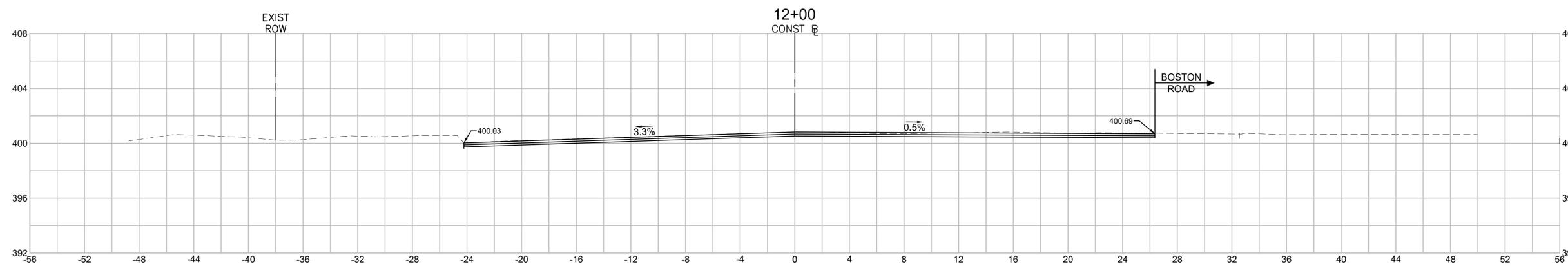
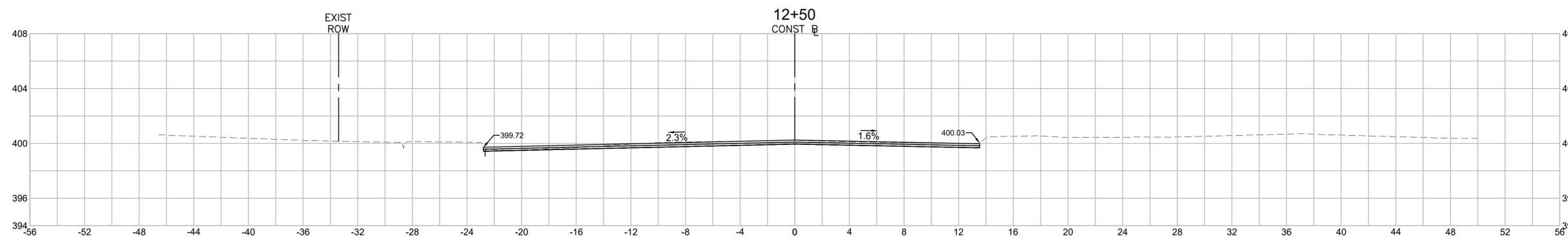
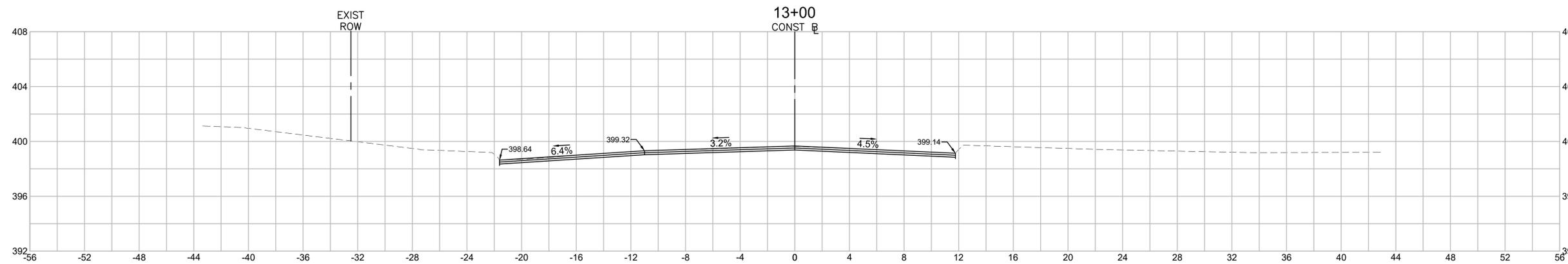
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**WESTFORD
BOSTON ROAD**

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	131	132
PROJECT FILE NO.		609035	

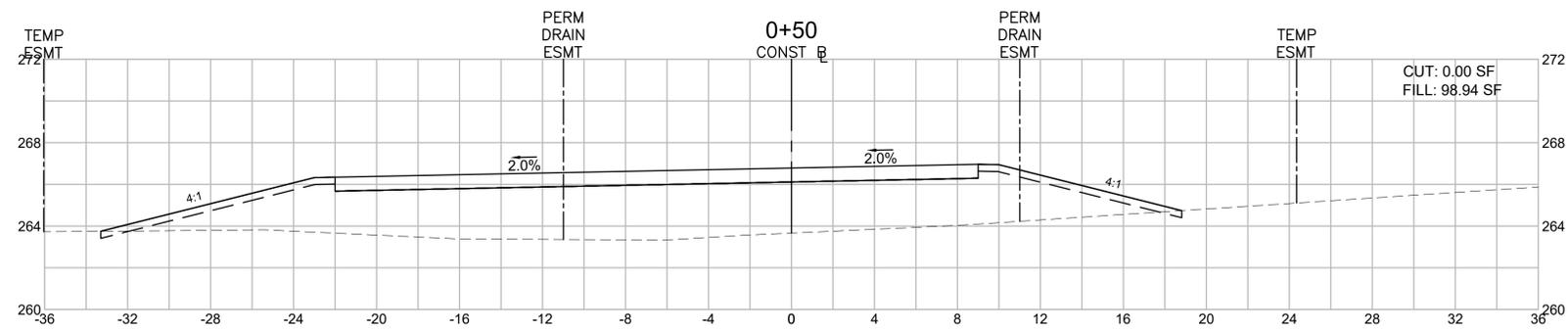
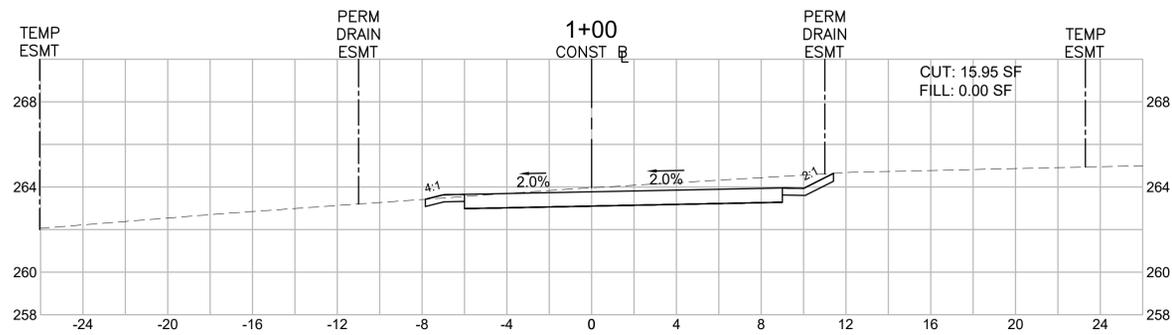
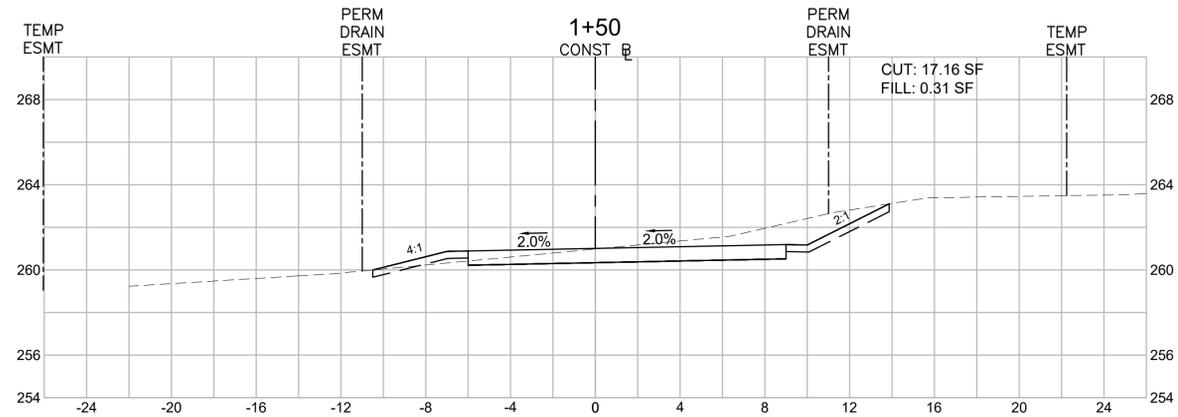
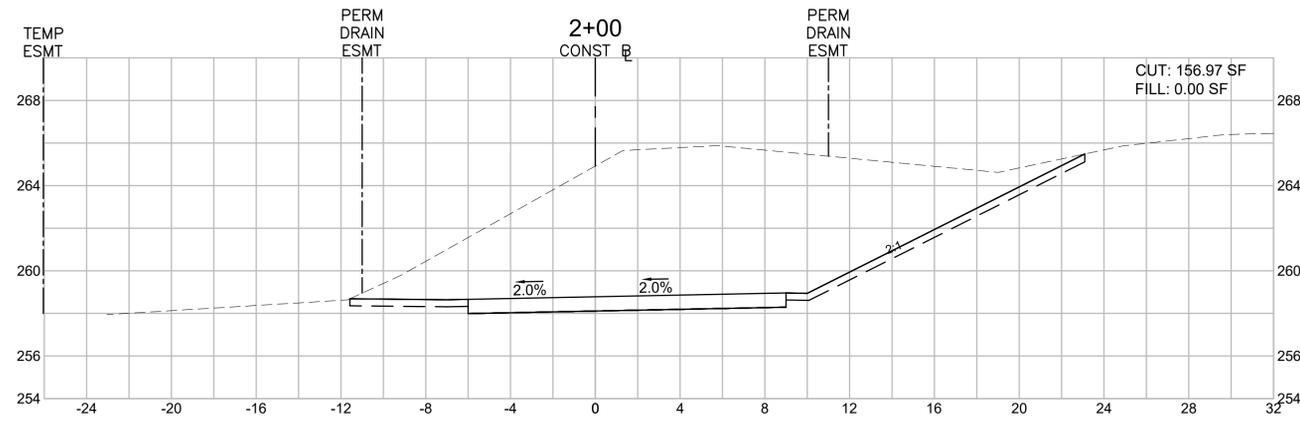
**CROSS SECTIONS -52 OF 53
MAIN STREET**

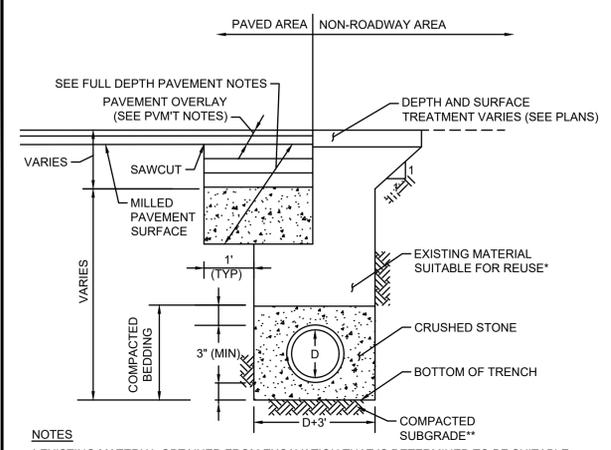


**WESTFORD
BOSTON ROAD**

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	132	132
PROJECT FILE NO.		609035	

**CROSS SECTIONS - 53 OF 53
ACCESS ROAD**



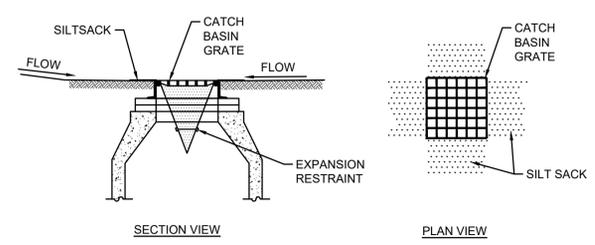


NOTES:

* EXISTING MATERIAL OBTAINED FROM EXCAVATION THAT IS DETERMINED TO BE SUITABLE AND APPROVED BY THE ENGINEER SHALL BE USED. BACKFILL SHALL BE PLACED IN LAYERS NO MORE THAN 8" IN DEPTH AND THOROUGHLY COMPACTED. BACKFILLING TO A POINT 2' OVER THE PIPE SHALL CONTAIN NO STONES LARGER THAN 3".

**SOFT OR UNSUITABLE MATERIAL EXISTING BELOW THE REQUIRED BEDDING GRADE SHALL BE REMOVED AS DIRECTED AND REPLACED WITH SAND, GRAVEL, CRUSHED STONE OR OTHER SUITABLE MATERIAL AND THOROUGHLY COMPACTED.

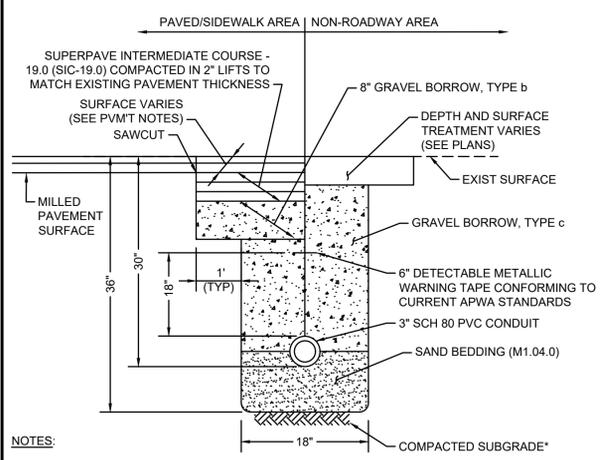
DRAINAGE TRENCH
N.T.S.



NOTES:

- INSTALL SILT SACK IN EXISTING CATCH BASINS BEFORE COMMENCING WORK, AND IN NEW CATCH BASINS IMMEDIATELY AFTER INSTALLATION OF STRUCTURE. MAINTAIN UNTIL BINDER COURSE PAVING IS COMPLETE OR A PERMANENT STAND OF GRASS HAS BEEN ESTABLISHED.
- GRATE TO BE PLACED OVER SILT SACK.
- SILT SACK SHALL BE INSPECTED PERIODICALLY AND AFTER ALL STORM EVENTS AND CLEANING OR REPLACEMENT SHALL BE PERFORMED PROMPTLY AS NEEDED.

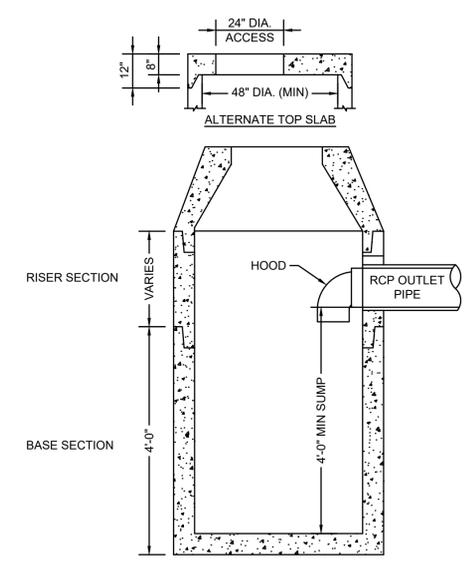
INLET PROTECTION SILT SACK IN CATCH BASIN
N.T.S.



NOTES:

* SOFT OR UNSUITABLE MATERIAL EXISTING BELOW THE REQUIRED BEDDING GRADE SHALL BE REMOVED AS DIRECTED AND REPLACED WITH SAND, GRAVEL, CRUSHED STONE OR OTHER SUITABLE MATERIAL AND THOROUGHLY COMPACTED.

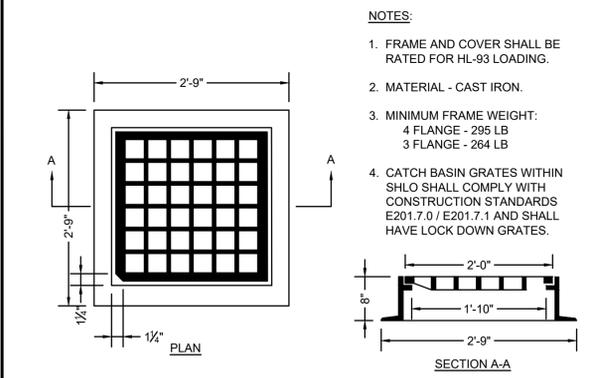
CONDUIT TRENCH
N.T.S.



NOTE:

ALL CATCH BASINS SHALL CONFORM TO MASSDOT CONSTRUCTION STANDARD E 201.4.0 EXCEPT FOR 4" SUMP DEPTH AND HOOD AS SHOWN

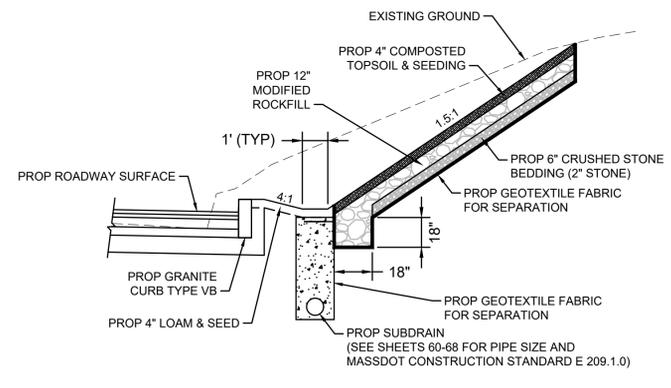
DEEP SUMP CATCH BASIN WITH HOOD
N.T.S.



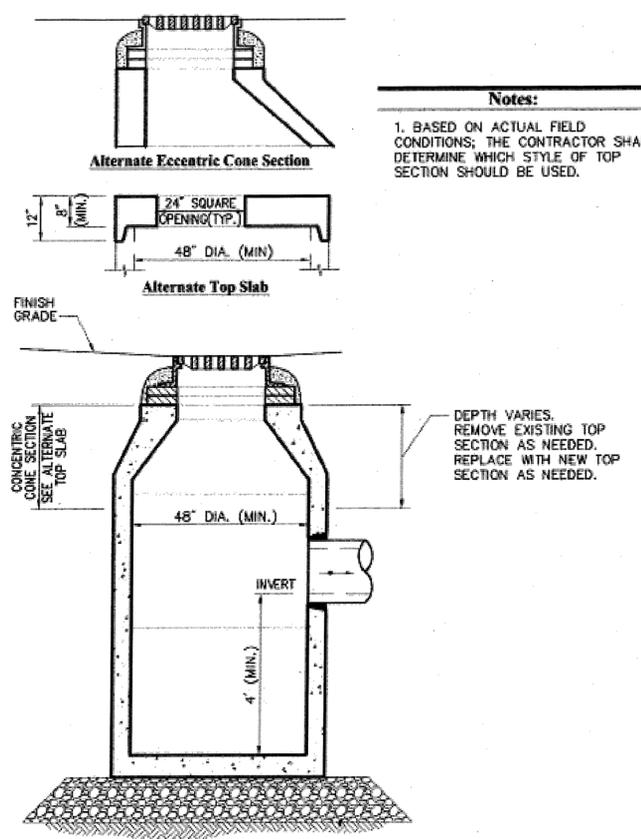
NOTES:

- FRAME AND COVER SHALL BE RATED FOR HL-93 LOADING.
- MATERIAL - CAST IRON.
- MINIMUM FRAME WEIGHT:
4 FLANGE - 295 LB
3 FLANGE - 284 LB
- CATCH BASIN GRATES WITH SHLO SHALL COMPLY WITH CONSTRUCTION STANDARDS E201.7.0 / E201.7.1 AND SHALL HAVE LOCK DOWN GRATES.

CATCH BASIN FRAME & GRATE (MUNICIPAL STANDARD)
N.T.S.



MODIFIED ROCKFILL SLOPE STABILIZATION
N.T.S.



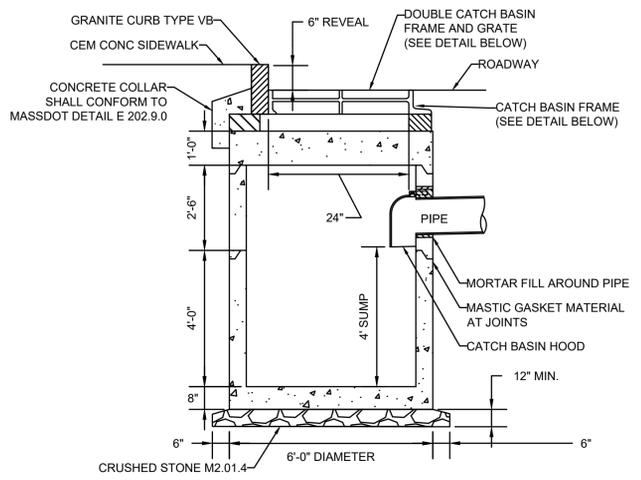
Notes:

- BASED ON ACTUAL FIELD CONDITIONS; THE CONTRACTOR SHALL DETERMINE WHICH STYLE OF TOP SECTION SHOULD BE USED.

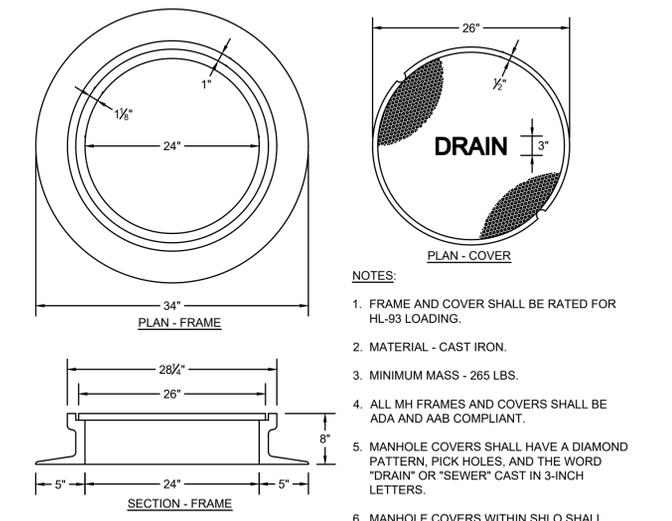
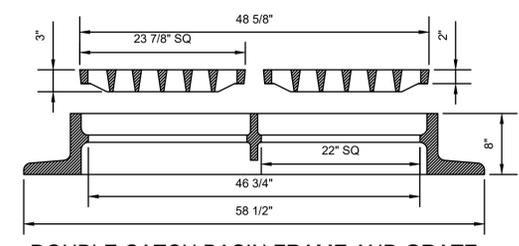
OFFSET CATCH BASIN
N.T.S.

NOTES:

- PAY LIMITS IN ROCK EXCAVATION SHALL BE 6" BEYOND THE OUTSIDE FACE AND BOTTOM OF PROPOSED STRUCTURE.
- INSTALL CB FRAME AND GRATE WITH 48" SIDE ALONG GRANITE CURB.



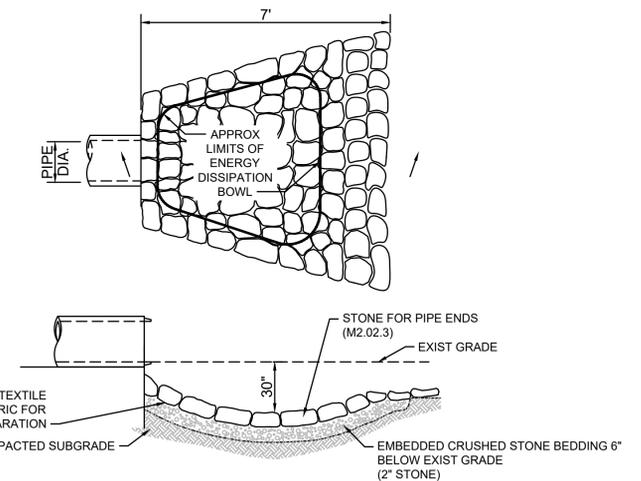
DOUBLE CATCH BASIN (ITEM 201.1)
N.T.S.



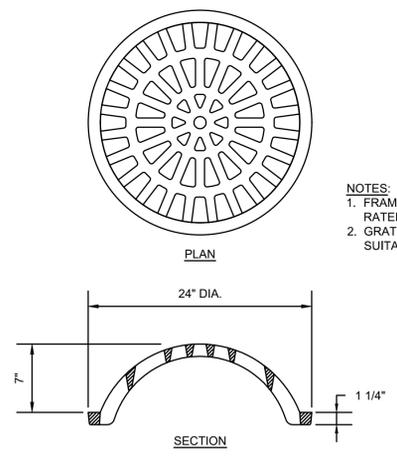
NOTES:

- FRAME AND COVER SHALL BE RATED FOR HL-93 LOADING.
- MATERIAL - CAST IRON.
- MINIMUM MASS - 265 LBS.
- ALL MH FRAMES AND COVERS SHALL BE ADA AND AAB COMPLIANT.
- MANHOLE COVERS SHALL HAVE A DIAMOND PATTERN, PICK HOLES, AND THE WORD "DRAIN" OR "SEWER" CAST IN 3-INCH LETTERS.
- MANHOLE COVERS WITHIN SHLO SHALL COMPLY WITH CONSTRUCTION STANDARD E202.6.0.

MANHOLE FRAME & COVER (MUNICIPAL STANDARD)
N.T.S.



STONE FOR PIPE ENDS
N.T.S.

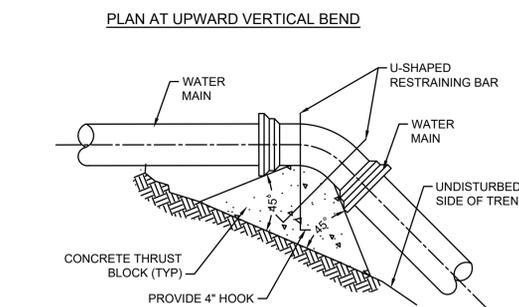
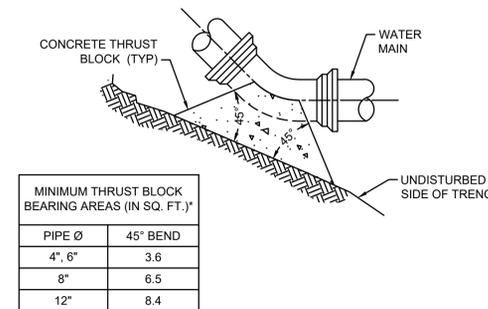
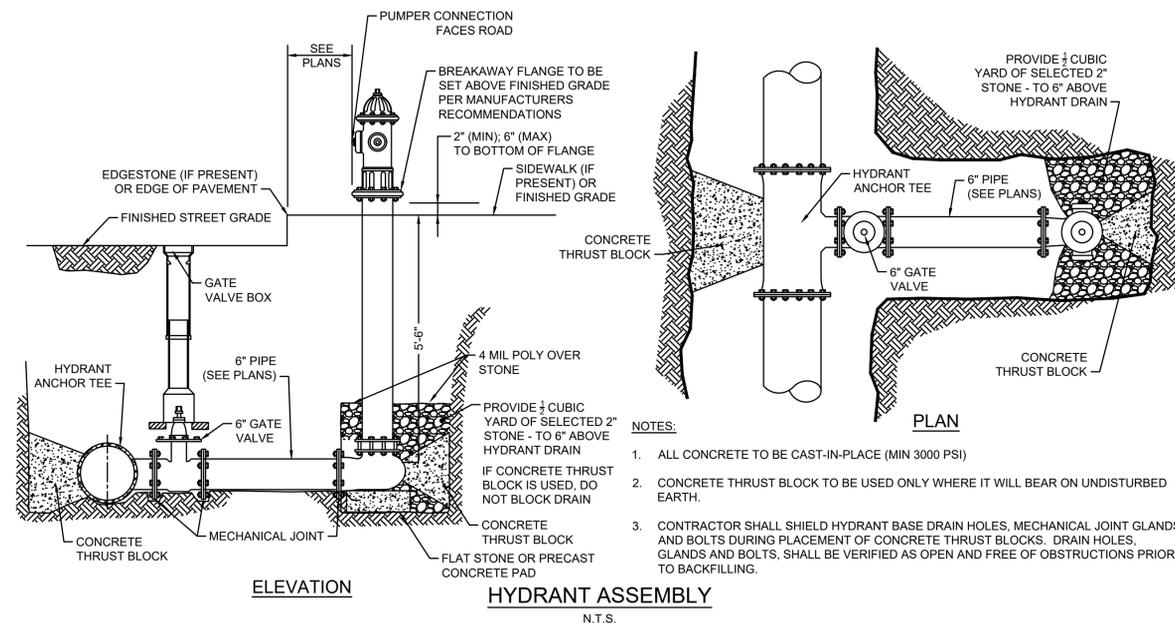


FRAME AND GRATE (BEEHIVE)
N.T.S.

NOTES:

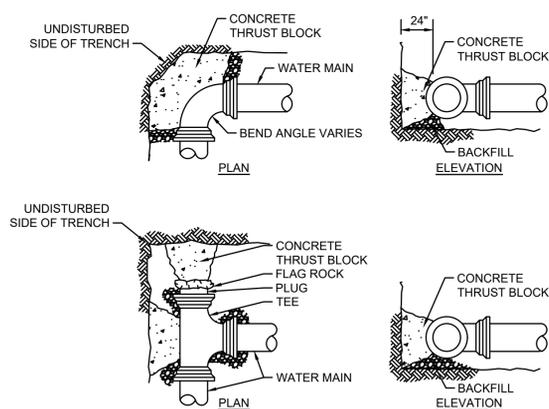
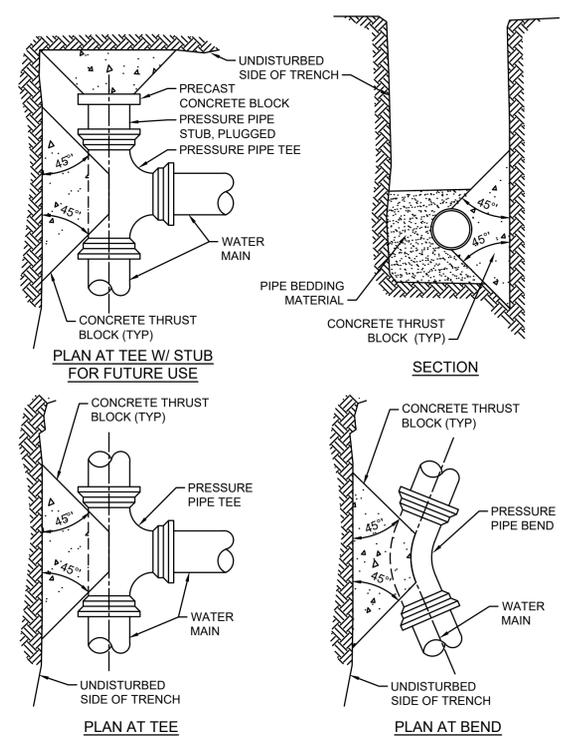
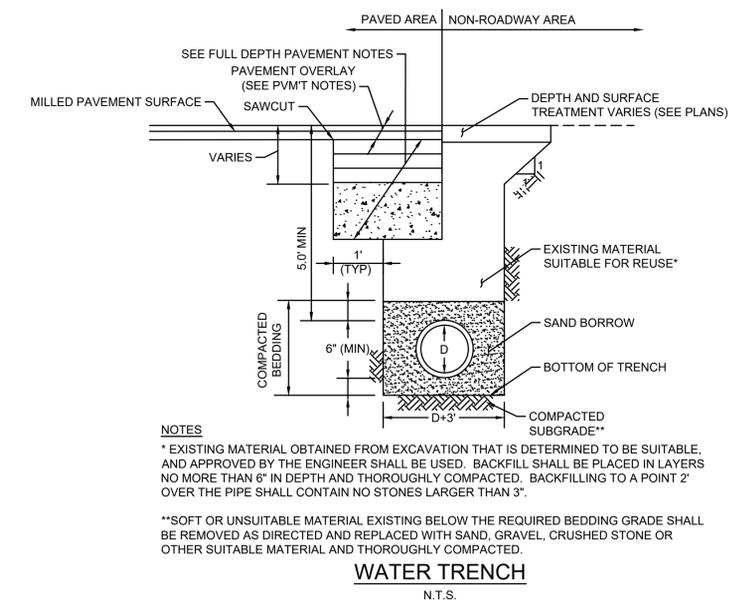
- FRAME AND GRATE SHALL BE RATED FOR HL-93 LOADING.
- GRATE SHALL BE INSTALLED IN SUITABLE MANHOLE FRAME.

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	72	132
PROJECT FILE NO.		609035	



- NOTES:**
- ALL WATER MAIN BENDS SHALL BE RESTRAINED W/ THRUST BLOCKS EXCEPT WHERE NOTED.
 - ALL THRUST BLOCKS & COLLARS SHALL BE INSTALLED SO THAT THEY BEAR AGAINST UNDISTURBED EARTH.
 - MINIMUM COMPRESSIVE STRENGTH OF THRUST BLOCK CONCRETE SHALL BE 3,000 P.S.I.
 - KEEP CONCRETE CLEAR OF MECHANICAL JOINTS.
 - MINIMUM BEARING AREAS ARE BASED ON 250 P.S.I. INTERNAL PIPE PRESSURE & 1.5 TON/S.F. ALLOWABLE SOIL BEARING CAPACITY.

THRUST BLOCK DETAILS - VERTICAL BENDS
N.T.S.



MINIMUM THRUST BLOCK BEARING AREAS (IN SQ. FT.)*				
PIPE Ø	90° BEND	45° BEND	22.5° BEND	TEES, PLUGS, CAPS & HYDRANTS
4", 6", 8"	6.0	2.9	2.3	4.5
10"	9.6	5.2	2.3	6.7
12"	13.3	6.7	3.7	9.6

* BASED ON 250 P.S.I. & 1.5 TON/S.F. ALLOWABLE SOIL BEARING CAPACITY

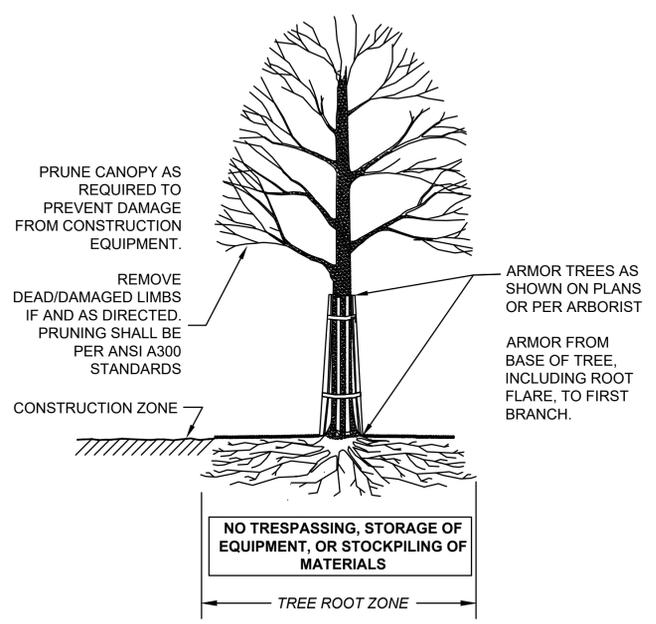
MINIMUM PIPE RESTRAINT LENGTH (IN FEET)*					
PIPE Ø	90° BEND	45° BEND	22.5° BEND	TEES	PLUG/CAP
8"	21.0	9.0	4.0	29.0	38.0
10"	26.0	11.0	5.0	38.0	46.0
12"	33.0	14.0	6.0	48.0	69.0

* BASED ON DUCTILE IRON PIPE WITH A 150 P.S.I. TEST PRESSURE WITH 5.0 FEET OF BURY IN UNIFIED SOIL CLASSIFICATION SM.

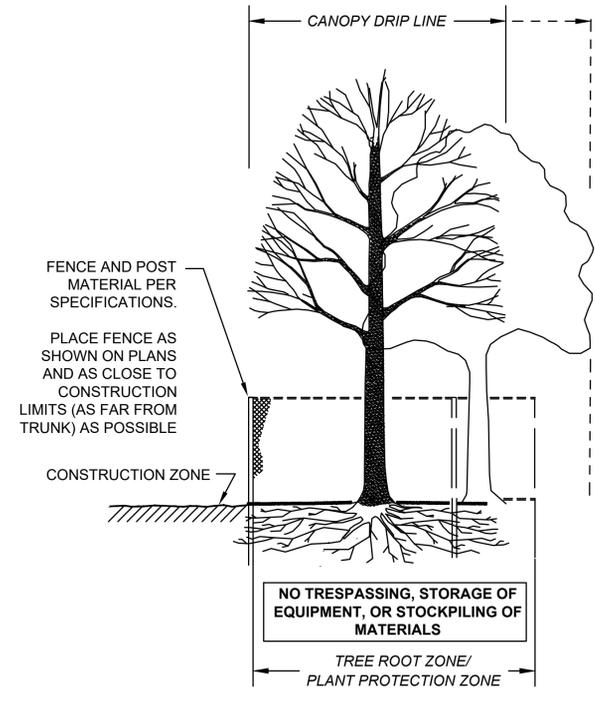
**NOTE: LONGER LENGTHS REQUIRED FOR PIPES WITH PLASTIC SLEEVES

- NOTES:**
- ALL WATER MAIN FITTINGS, BENDS, TEES, PLUGS ETC. SHALL BE RESTRAINED W/ THRUST BLOCKS EXCEPT WHERE NOTED.
 - ALL THRUST BLOCKS & COLLARS SHALL BE INSTALLED SO THAT THEY BEAR AGAINST UNDISTURBED EARTH.
 - MINIMUM COMPRESSIVE STRENGTH OF THRUST BLOCK CONCRETE SHALL BE 3,000 P.S.I.
 - KEEP CONCRETE CLEAR OF MECHANICAL JOINTS.
 - MINIMUM BEARING AREAS ARE BASED ON 250 P.S.I. INTERNAL PIPE PRESSURE & 1.5 TON/S.F. ALLOWABLE SOIL BEARING CAPACITY.
 - MINIMUM PIPE RESTRAINT LENGTH IS BASED ON DUCTILE IRON PIPE WITH A 150 P.S.I. INTERNAL PIPE PRESSURE WITH 5.0' OF BURY IN UNIFIED SOIL CLASSIFICATION SM.

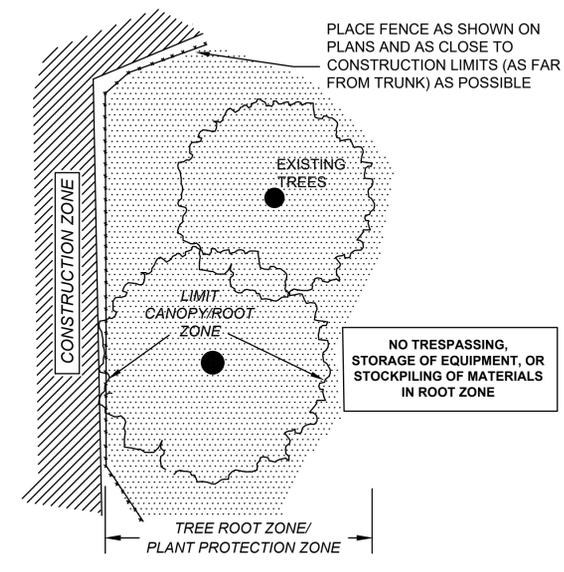
THRUST BLOCK - HORIZONTAL BENDS & PIPE RESTRAINT DETAILS
N.T.S.



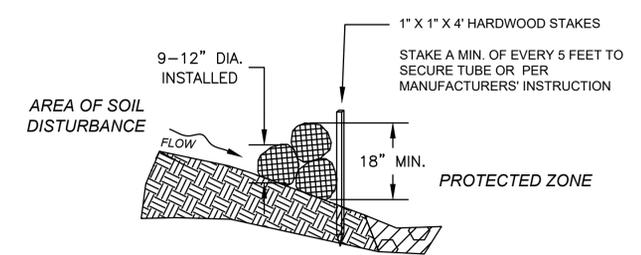
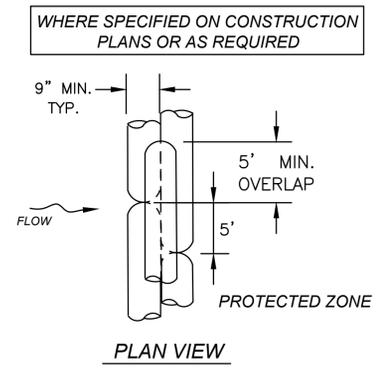
SECTION - TRUNK ARMORING & PRUNING
TREE PROTECTION - TRUNK
N.T.S.



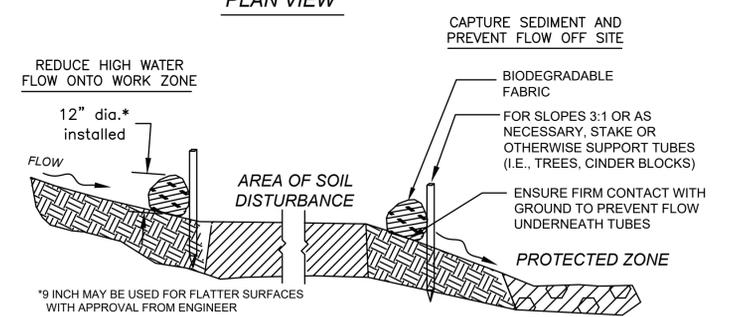
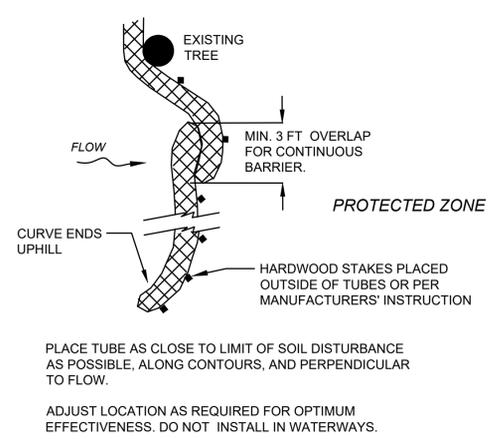
SECTION - FENCE PROTECTION OF ROOT ZONE
TREE PROTECTION - ROOT ZONE
N.T.S.



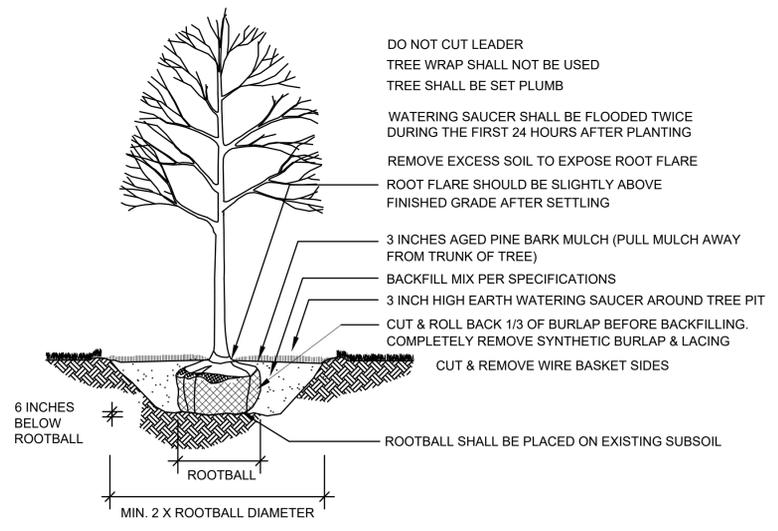
PLAN VIEW - FENCE PROTECTION OF ROOT ZONE
N.T.S.



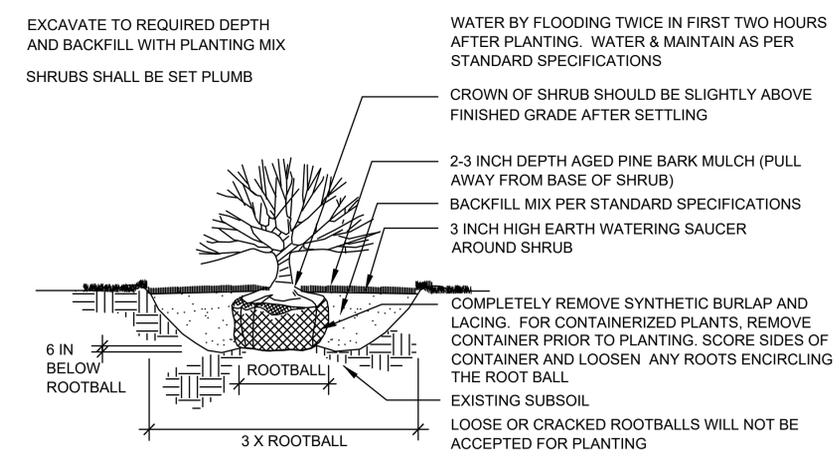
COMPOST FILTER TUBES STACKED
N.T.S.



SEDIMENT BARRIER - COMPOST FILTER TUBE
N.T.S.

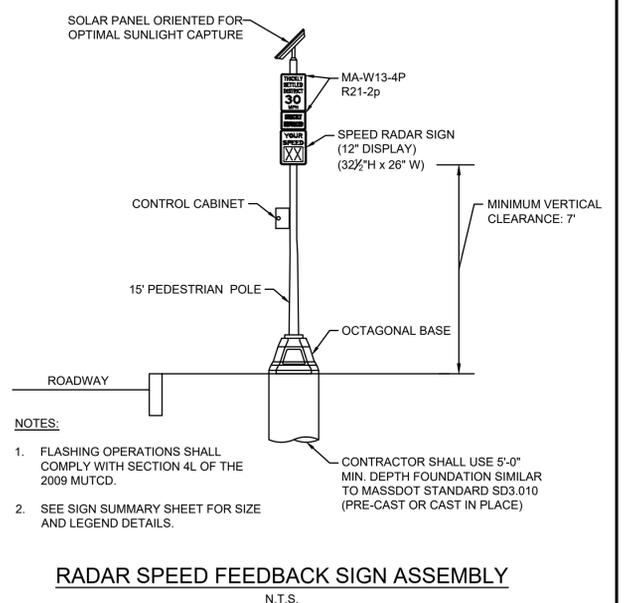
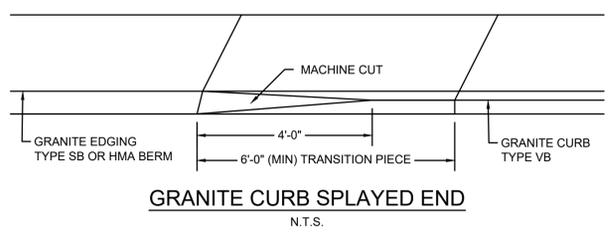
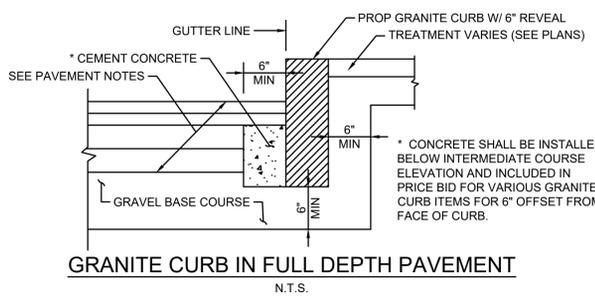
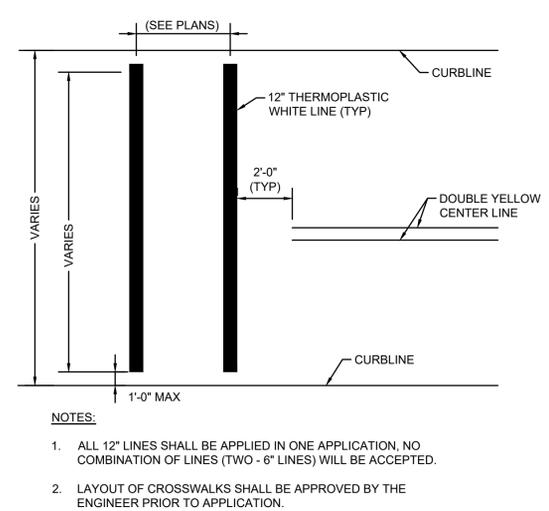
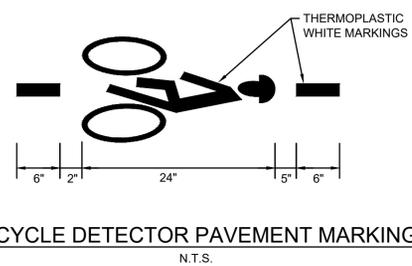
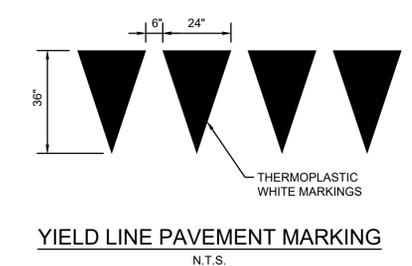
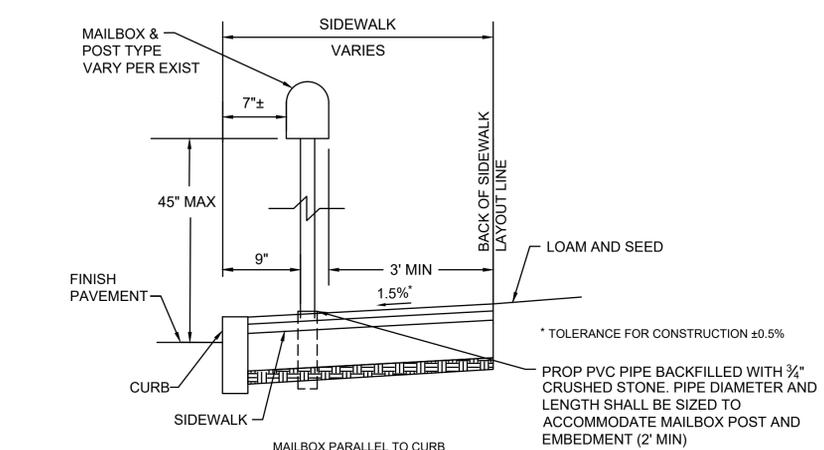
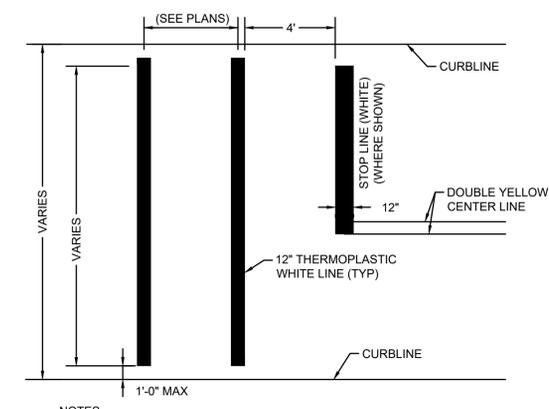
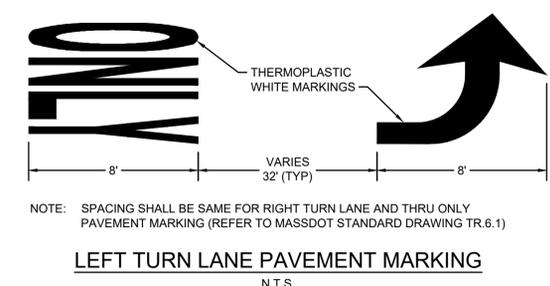
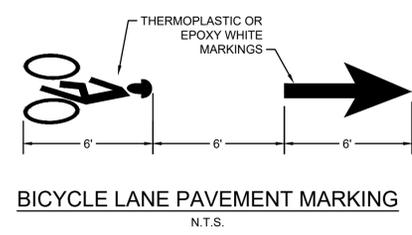
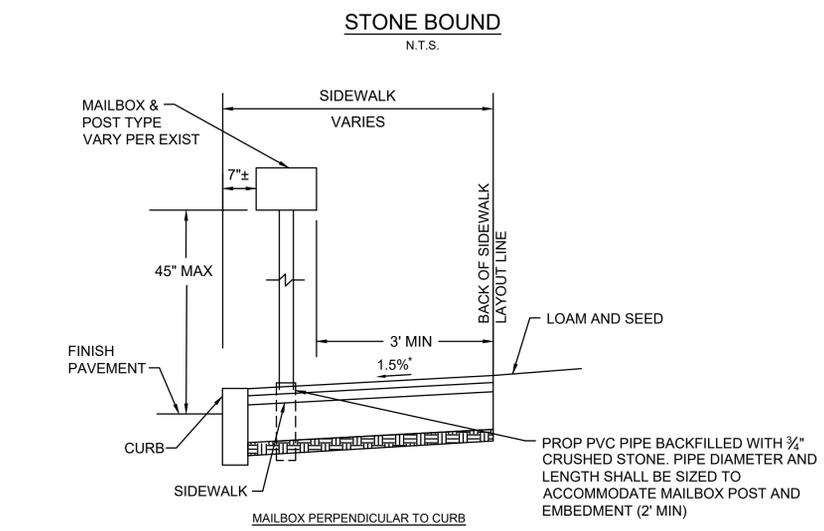
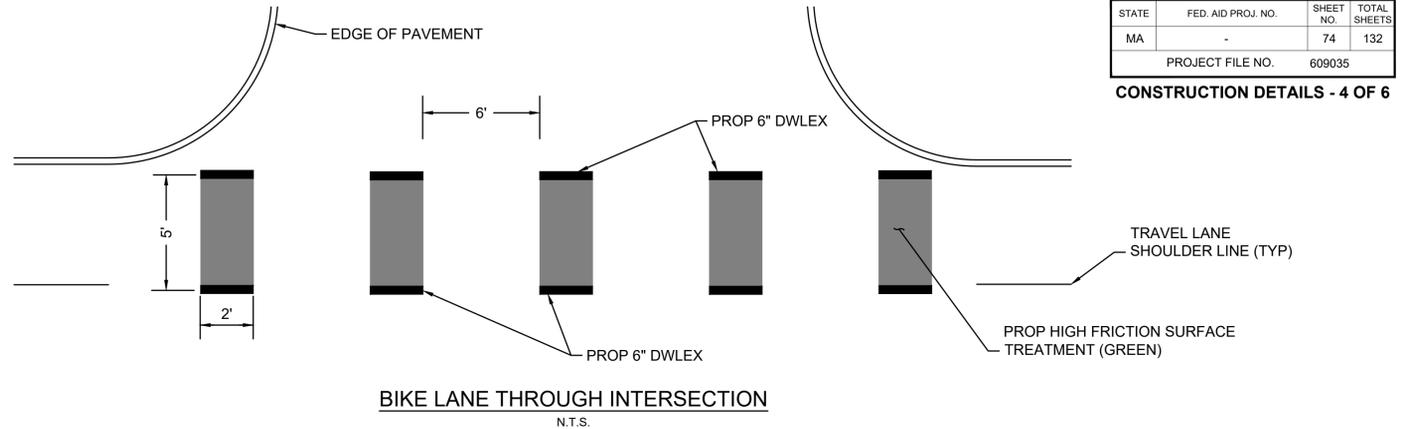
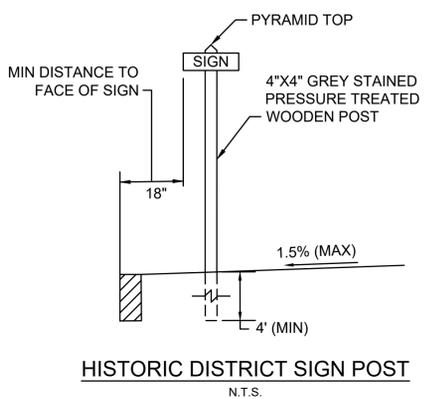
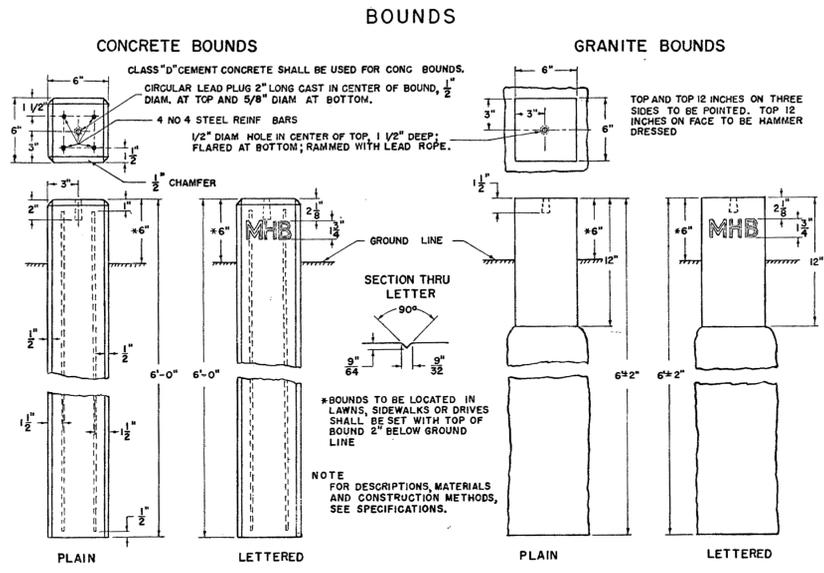


DECIDUOUS TREE PLANTING
N.T.S.

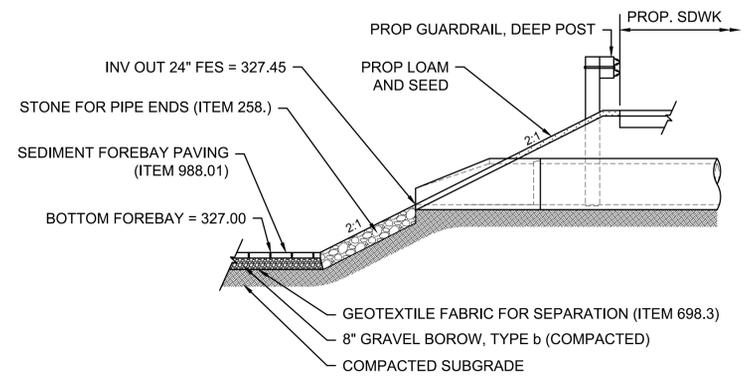
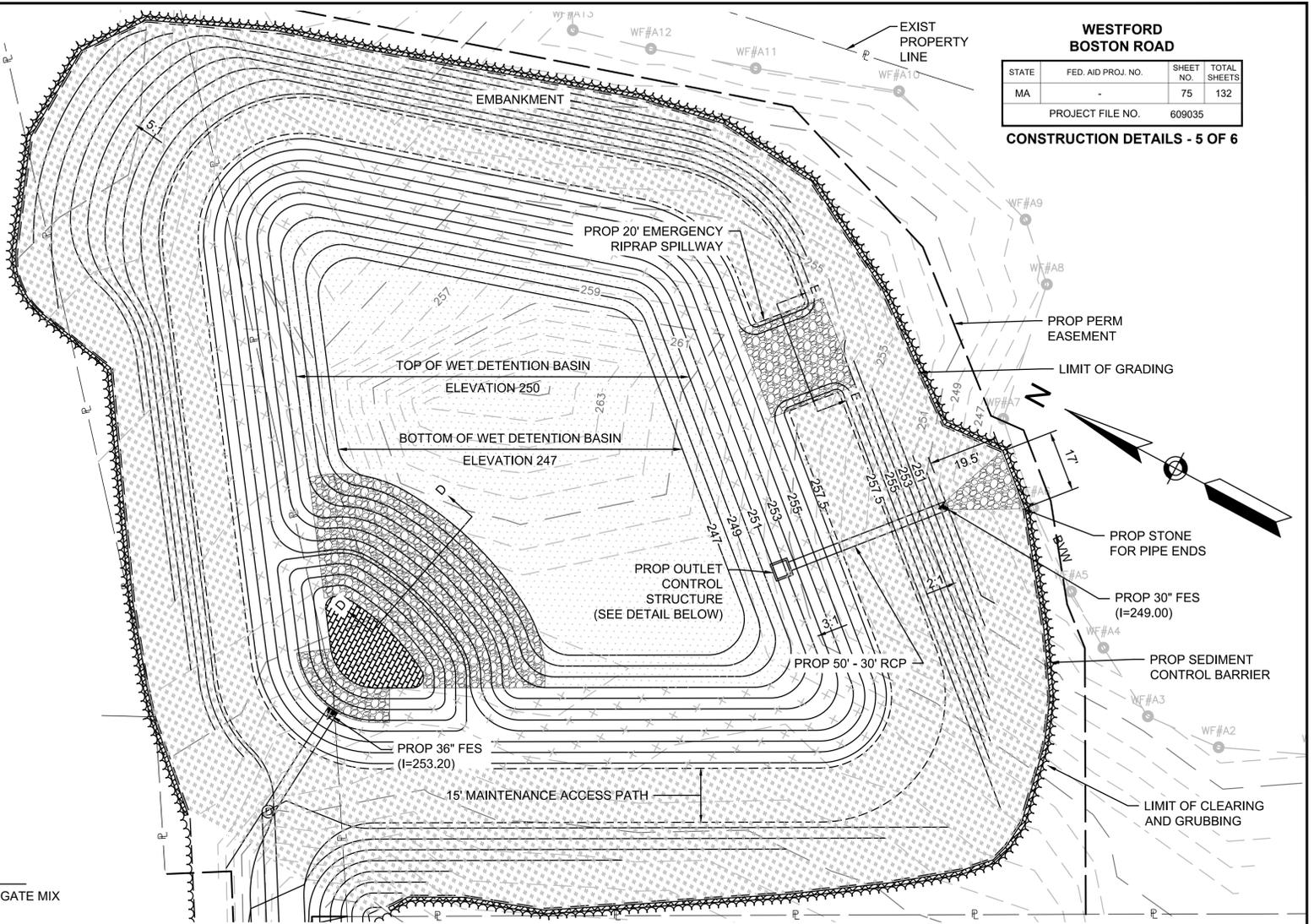
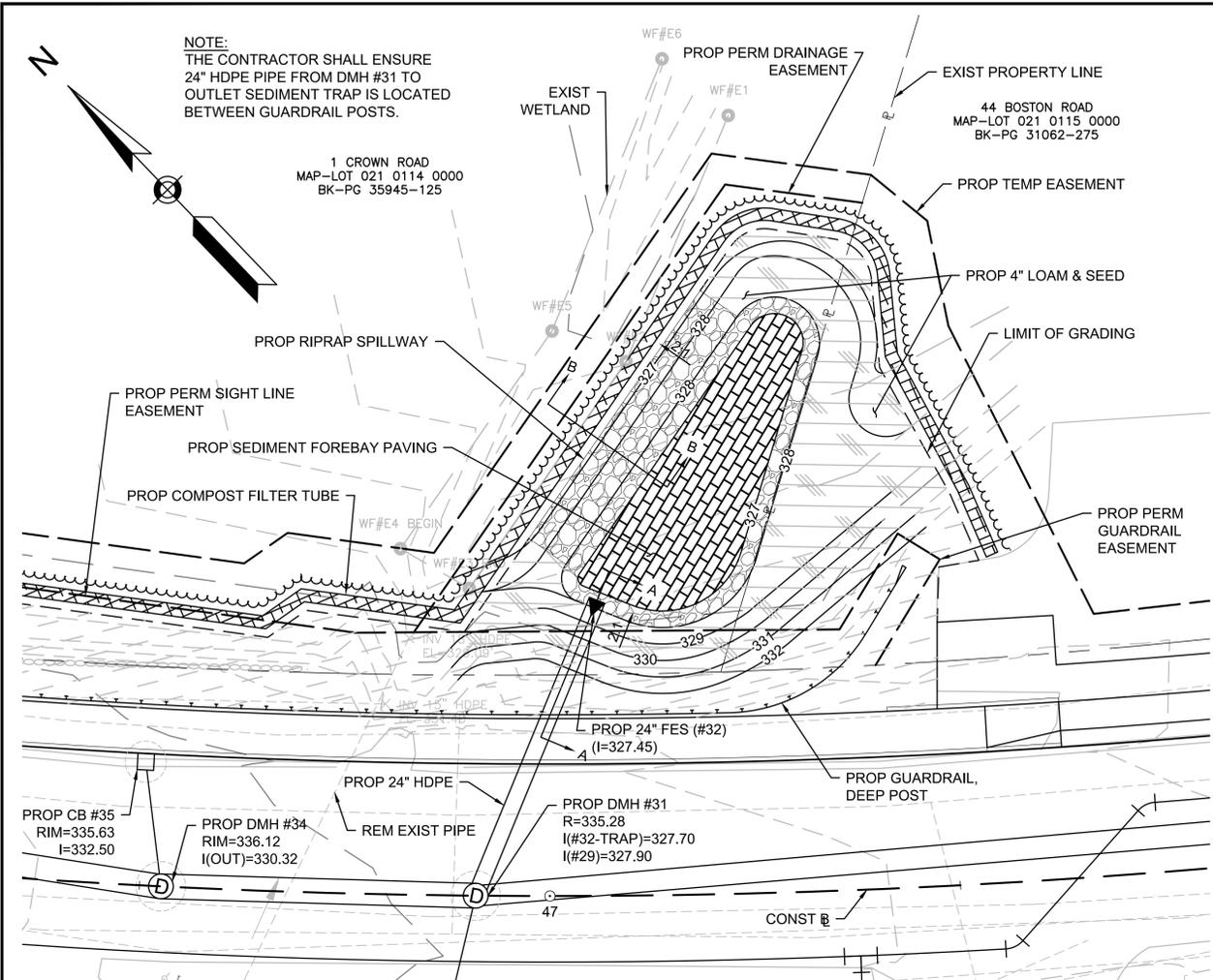


SHRUB PLANTING
N.T.S.

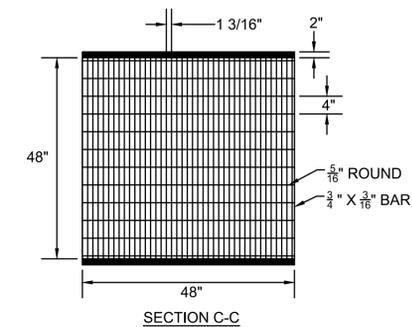
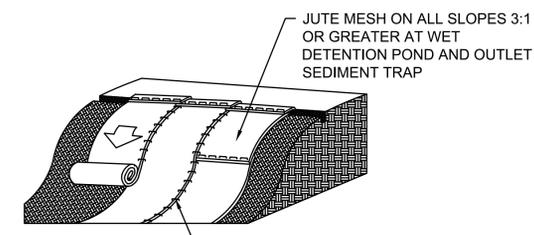
PLANT LIST					
QUAN	KEY	BOTANICAL NAME	COMMON NAME	SIZE	ITEM NO.
1	RM	Acer rubrum 'Red Sunset'	Red Sunset Red Maple	2"-2½" cal	776.557
1	YC	Prunus x yedoensis	Yoshino Flowering Cherry	1½"-2" cal	778.393
3	FC	Prunus serrulata 'Shirotae'	Mt. Fuji Flowering Cherry	1½"-2" cal	778.363
2	ER	Cercis canadensis	Eastern Redbud	7'-8" height	782.536
2	DW	Malus 'Donald Wyman'	Donald Wyman Crabapple	1½"-2" cal	778.423
1	AS	Amerlanchier x grandiflora	Autumn Brilliance Serviceberry	7'-8" height	783.044
1	LM	Crataegus viridis 'Winter King'	Winter King Hawthorne	1½"-2" cal	781.263
1	TT	Liriodendron tulipifera	Tulip Tree	2"-2½" cal	783.441
2	PC	Malus 'Prairiefire'	Prairiefire Crabapple	1½"-2" cal	778.436
1	WP	Pinus Strobus	Eastern White Pine	7'-8" height	773.438
SHRUBS					
3	RV	Rhododendron viscosim	Swamp Azalea	2'-3' height	788.265



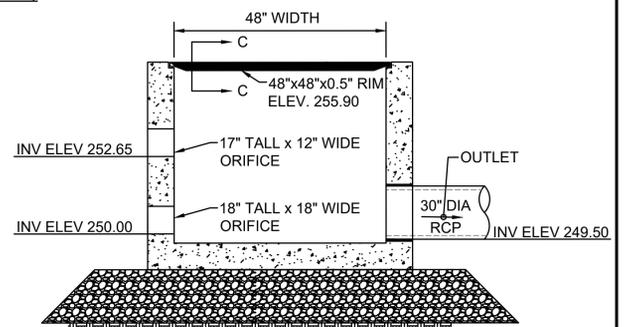
NOTE:
THE CONTRACTOR SHALL ENSURE
24" HDPE PIPE FROM DMH #31 TO
OUTLET SEDIMENT TRAP IS LOCATED
BETWEEN GUARDRAIL POSTS.



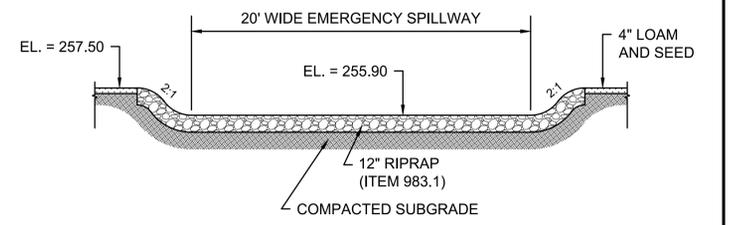
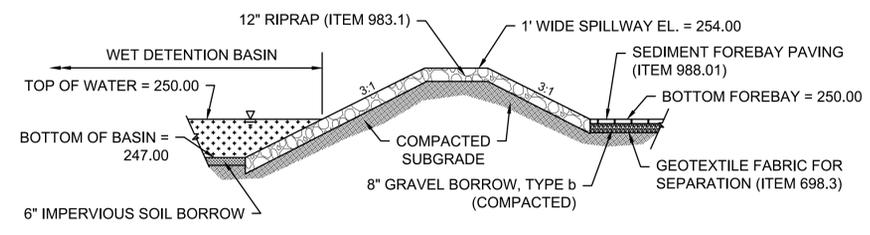
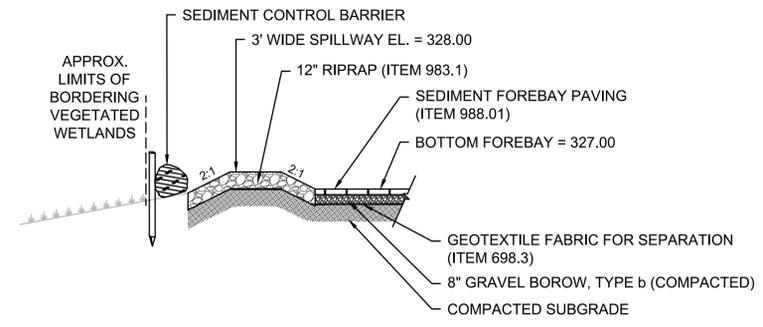
- SEEDING LEGEND**
- WETLAND SEED OBLIGATE MIX (ITEM 765.552)
 - WETLAND SEED RIPARIAN MIX (ITEM 765.533)
 - UPLAND SEED NATIVE SHORT GRASSLAND MIX (ITEM 765.415)
 - WETLAND SEED SEASONALLY FLOODED MIX (ITEM 765.554)
 - LAWN AREA SEED MIX (ITEM 765.) WITH LOAM FOR LAWNS



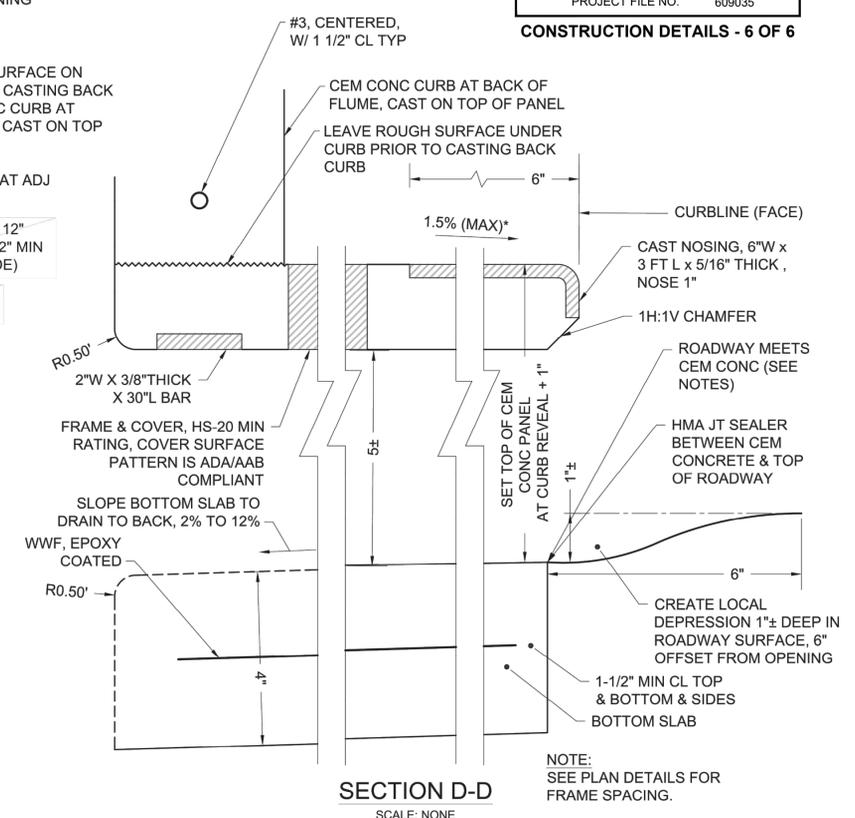
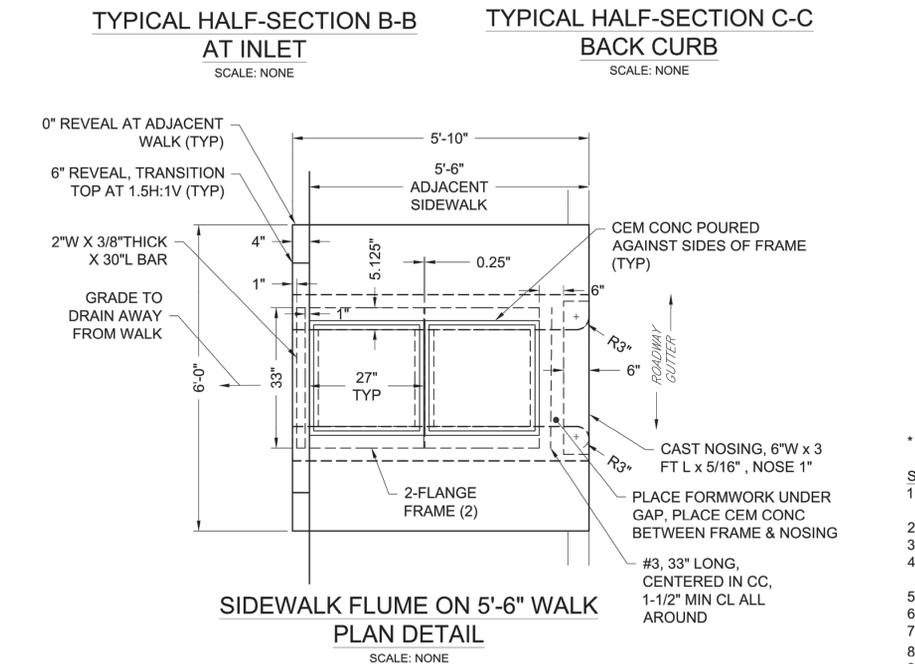
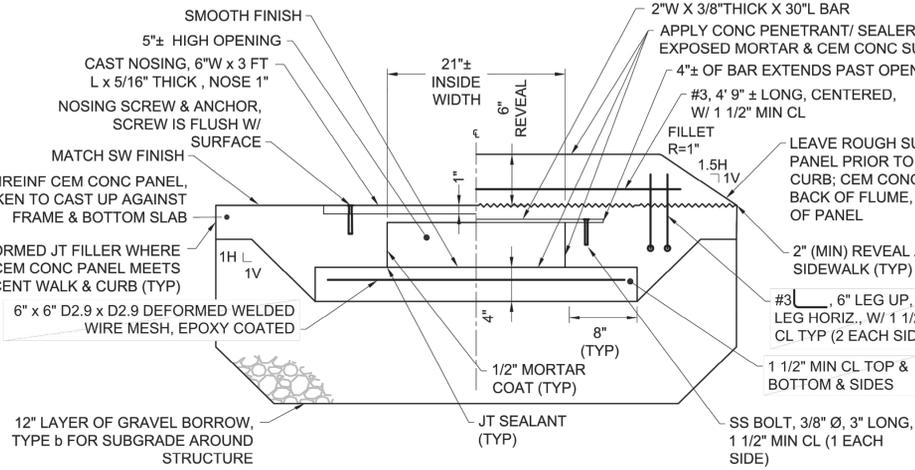
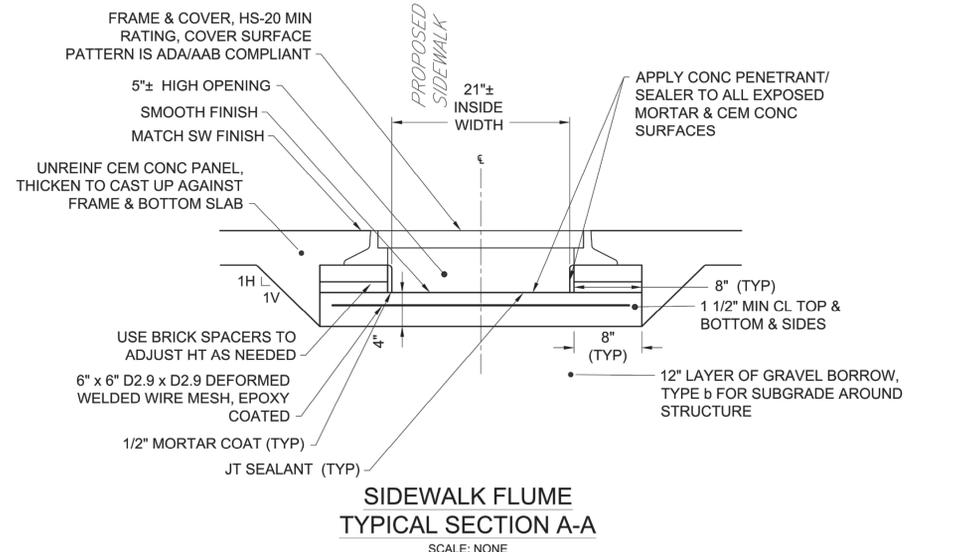
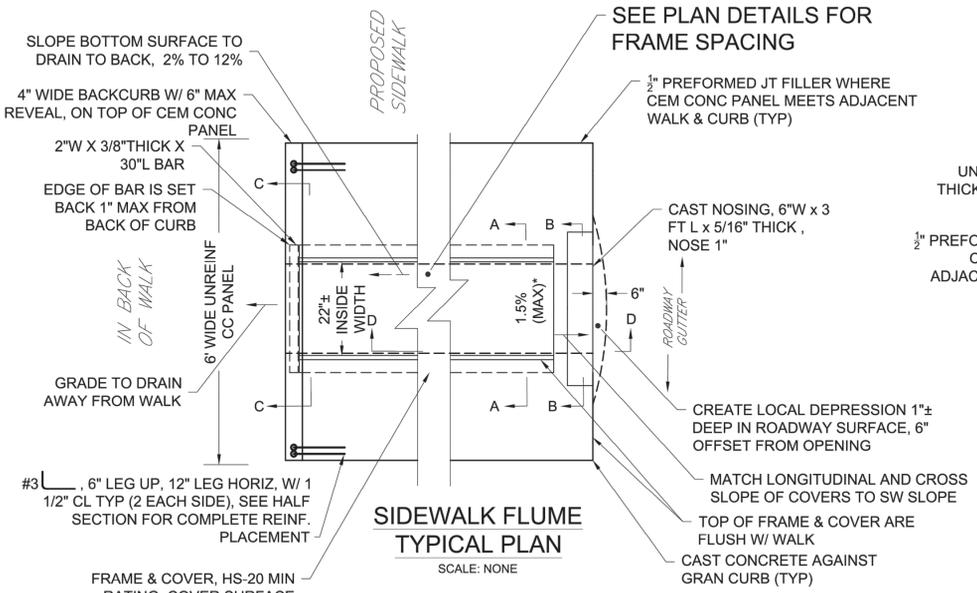
- SECTION C-C NOTES:**
- GRATE SHALL BE 48"x48" (INNER DIMENSIONS) WITH A 2" WIDE X 3/16" THICK (MIN) LIP ON TWO SIDES THAT ARE BOLTED TO THE PRECAST CONCRETE BOX STRUCTURE USING BOLTS THAT ARE 0.5" THICK X 2" LONG (MIN).
 - GRATE SHALL BE MADE OF ASTM-A36 MATERIAL WITH A GALVANIZED COATING.
 - GRATE SHALL HAVE A PEDESTRIAN LOAD RATING



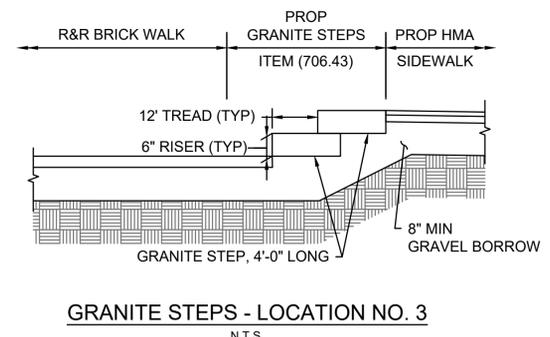
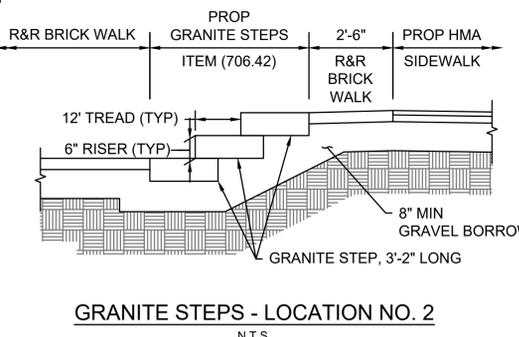
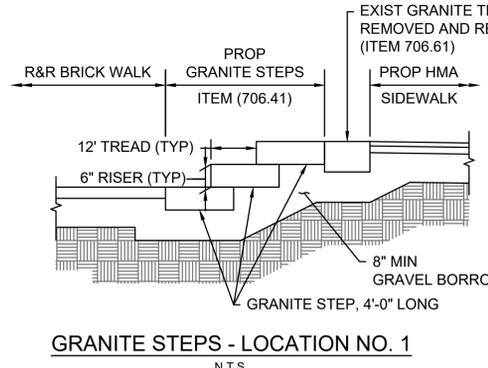
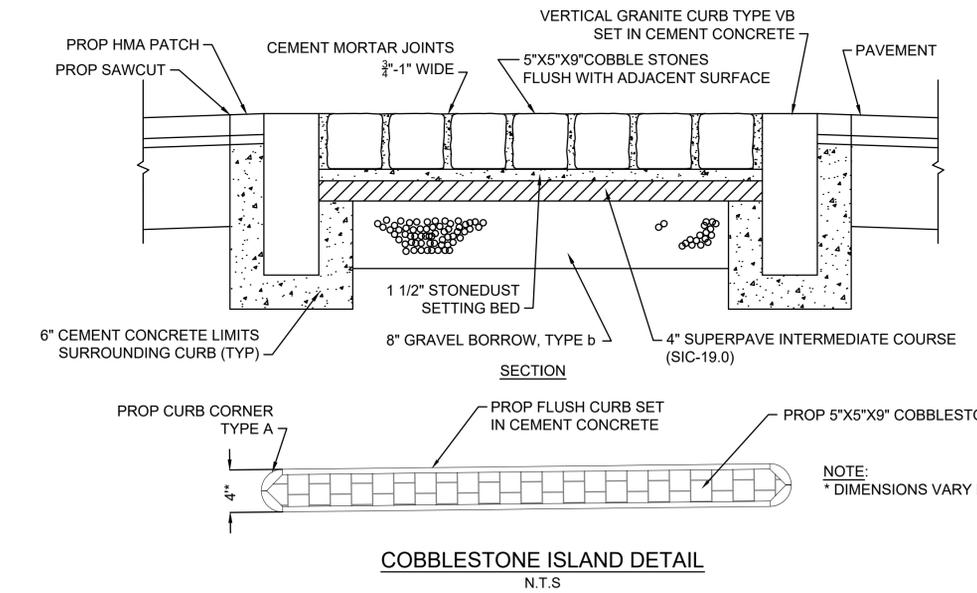
- GENERAL NOTES:**
- STRUCTURE SHALL BE 48"x48" (INNER DIMENSIONS) PRECAST CONCRETE BOX STRUCTURE
 - ALL SECTIONS SHALL BE DESIGNED FOR HS-20 LOADING.
 - PROVIDE "V" KNOCKOUTS FOR PIPES WITH 2" MAX CLEARANCE TO OUTSIDE OF PIPE. MORTAR ALL PIPE CONNECTIONS.
 - JOINT SEALANT BETWEEN PRECAST SECTIONS SHALL BE PREFORMED BUTYL RUBBER.



STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	76	132
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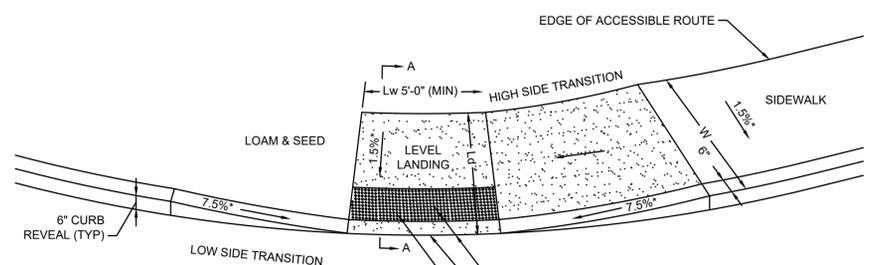


- * TOLERANCE FOR CONSTRUCTION OF ±0.5%
- SIDEWALK FLUME NOTES:**
- CONTRACTOR SHALL VERIFY ALL DIMENSIONS FOR THE CONSTRUCTABILITY OF THE SIDEWALK FLUME. ONLY AFTER VERIFICATION SHALL ANY REINFORCEMENT, STRUCTURAL STEEL, FRAMES, OR COVERS BE ORDERED.
 - MINIMUM SPACING BETWEEN FRAMES AND CAST NOSING IS 1/4 INCH.
 - CAST NOSING - INSTALL PER MANUFACTURER'S INSTRUCTIONS. SURFACE OF CAST NOSING SHALL BE NC SKID.
 - SUBMIT SHOP DRAWINGS FOR FRAME & COVERS FOR ENGINEER'S APPROVAL. MINIMUM LOAD RATING FOR FRAME & COVER IS HS-20. SHOW INSTALLATION OF FRAME & COVER ON CEMENT CONCRETE FLUME STRUCTURE.
 - IN WET AREAS, WRAP SUB-BASE IN GEOTEXTILE FABRIC FOR STABILIZATION AS DIRECTED BY ENGINEER.
 - ADJUST FORMWORK TO ADJUST HEIGHT OF INLET OPENING AND SIDEWALLS TO MEET CURB REVEAL.
 - ADJUST SLOPE OF BOTTOM SLAB FOR POSITIVE DRAINAGE.
 - USE 4000 PSI, 3/4 INCH, 610 LB CEMENT CONCRETE.
 - FOR BARS, ANGLES, AND RODS, USE Fy 36 ksi MINIMUM STRENGTH, GALVANIZED STEEL.
 - FOR DEFORMED WELDED WIRE FABRIC, USE Fy 60 ksi MINIMUM STRENGTH, EPOXY COATED.
 - APPLY PENETRANT/SEALER TO MORTAR & CEM CONC SURFACES INSIDE OF FLUME PRIOR TO INSTALLING COVERS.



STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	77	132
PROJECT FILE NO.		609035	

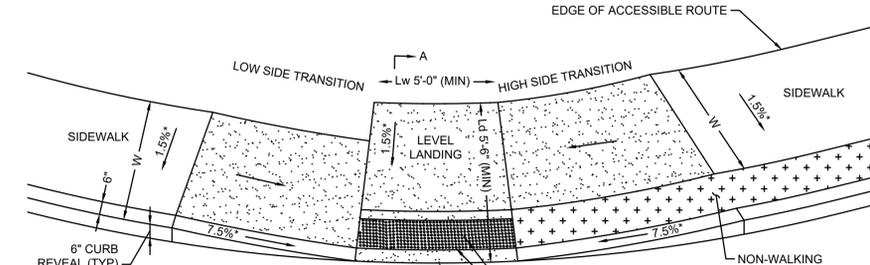
CURB RAMP & DRIVEWAY DETAILS - 1 OF 3



LEGEND:
W = SIDEWALK WIDTH
CC = CEMENT CONCRETE
* = TOLERANCE FOR CONSTRUCTION ±0.5%

NOTES:
1. USABLE SIDEWALK WIDTH PER AAB = W-6"
2. USABLE SIDEWALK WIDTH PER AAB IS NOT TO BE LESS THAN 4'-0"
3. ROADWAY GUTTER SLOPE MEASURED FROM LEFT TO RIGHT WHEN FACING RAMP OPENING
4. SEE E 107.6.5 FOR DETECTABLE WARNING PANEL DETAILS
5. SEE E 107.2.1 FOR ALL OTHER DETAILS

CURB RAMP TYPE A
N.T.S.



LEGEND:
W = SIDEWALK WIDTH
W1 = PERPENDICULAR RAMP LENGTH
CC = CEMENT CONCRETE
* = TOLERANCE FOR CONSTRUCTION ±0.5%

NOTES:
1. USABLE SIDEWALK WIDTH PER AAB = W - 6" (LEFT) OR W (RIGHT)
2. USABLE SIDEWALK WIDTH PER AAB IS NOT TO BE LESS THAN 4'-0"
3. ROADWAY GUTTER SLOPE MEASURED FROM LEFT TO RIGHT WHEN FACING RAMP OPENING
4. SEE E 107.6.5 FOR DETECTABLE WARNING PANEL DETAILS

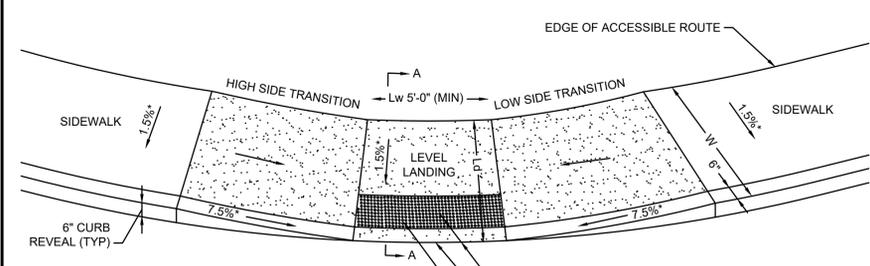
CURB RAMP TYPE B
N.T.S.

1. MAXIMUM ALLOWABLE SLOPE OF ACCESSIBLE ROUTE EXCLUDING CURB RAMPS SHALL BE DESIGNED TO 4.5% ±0.5% (7.5% ±0.5% FOR CURB RAMPS)
2. A MINIMUM OF 3'-0" CLEAR SHALL BE MAINTAINED AT ANY PERMANENT OBSTACLE IN ACCESSIBLE ROUTE (I.E., HYDRANTS, UTILITY POLES, TREE WELLS, SIGNS, ETC.).
3. CURB TREATMENT VARIES, SEE PLANS FOR CURB TYPE.
4. RAMP, CURB AND ADJACENT PAVEMENTS SHALL BE GRADED TO PREVENT PONDING.
5. WHERE ACCESSIBLE ROUTES ARE LESS THAN 5' IN WIDTH (EXCLUDING CURBING) A 5'x5' PASSING AREA SHALL BE PROVIDED AT INTERVALS NOT TO EXCEED 200 FT.
6. ELIMINATE CURBING AT RAMP WHERE IT ABUTS ROADWAY.
7. DETECTABLE WARNING PANELS ARE REQUIRED ON ALL OF THE PROPOSED CURB RAMPS AND ARE TO BE INSTALLED IN ACCORDANCE WITH CONSTRUCTION STANDARD E 107.6.5 (OCTOBER 2017). CONTRACTOR SHALL PROVIDE 6" BETWEEN DETECTABLE WARNING PANEL AND EDGE OF CONCRETE WHERE IT ABUTS LOAM & SEED.
8. CURB RAMP SLOPES AND CROSS SLOPES SHALL HAVE A CONSTRUCTION TOLERANCE OF ±0.5%.
9. DETECTABLE WARNING PANELS SHALL BE BRICK RED IN COLOR AS APPROVED BY THE ENGINEER.

CURB RAMP NOTES
N.T.S.

RAMP #	MASSDOT ID	BASELINE REFERENCE	STATION	OFFSET	LEVEL LANDING		ROADWAY GUTTER SLOPE	HIGH SIDE TRANSITION			LOW SIDE TRANSITION		
					WIDTH (Lw)	DEPTH (Ld)		TRANSITION LENGTH	CURB REVEAL	SIDEWALK WIDTH	TRANSITION LENGTH	CURB REVEAL	SIDEWALK WIDTH
△	-	BOSTON ROAD	20+25.2	19.3' RT	5'-0"	5'-6"	+0.8%	7'-8"	6"	5'-6"	6'-6"	6"	N/A
△	-	BOSTON ROAD	23+34.3	33.5' LT	5'-0"	5'-6"	-2.9%	11'-0"	6"	5'-6"	6'-6"	6"	N/A
△	-	BOSTON ROAD	71+81.1	56.5' LT	5'-0"	5'-6"	-2.6%	11'-0"	6"	5'-6"	6'-6"	6"	N/A

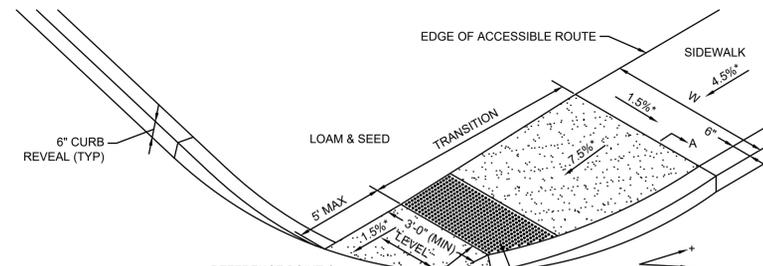
RAMP #	BASELINE REFERENCE	STATION	OFFSET	LEVEL LANDING		ROADWAY GUTTER SLOPE	HIGH SIDE TRANSITION			LOW SIDE TRANSITION		
				WIDTH (Lw)	DEPTH (Ld)		TRANSITION LENGTH	CURB REVEAL	SIDEWALK WIDTH	TRANSITION LENGTH	CURB REVEAL	SIDEWALK WIDTH
△	BOSTON ROAD	66+17.0	26.2' RT	5'-0"	8'-6"	+0.4%	7'-8"	6"	5'-0"	6'-6"	6"	5'-6"



LEGEND:
W = SIDEWALK WIDTH
CC = CEMENT CONCRETE
* = TOLERANCE FOR CONSTRUCTION ±0.5%

NOTES:
1. USABLE SIDEWALK WIDTH PER AAB = W-6"
2. USABLE SIDEWALK WIDTH PER AAB IS NOT TO BE LESS THAN 4'-0"
3. ROADWAY GUTTER SLOPE MEASURED FROM LEFT TO RIGHT WHEN FACING RAMP OPENING
4. SEE E 107.6.5 FOR DETECTABLE WARNING PANEL DETAILS
5. SEE E 107.2.1 FOR ALL OTHER DETAILS

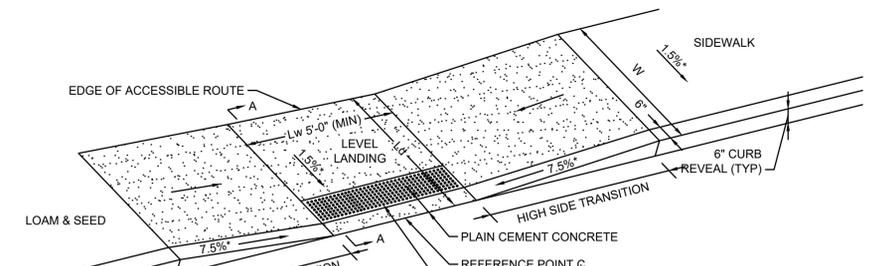
CURB RAMP TYPE C
N.T.S.



LEGEND:
W = SIDEWALK WIDTH
CC = CEMENT CONCRETE
* = TOLERANCE FOR CONSTRUCTION ±0.5%

NOTES:
1. USABLE SIDEWALK WIDTH PER AAB = W-6"
2. USABLE SIDEWALK WIDTH PER AAB IS NOT TO BE LESS THAN 4'-0"
3. ROADWAY GUTTER SLOPE MEASURED FROM LEFT TO RIGHT PARALLEL TO RAMP
4. SEE E 107.6.5 FOR DETECTABLE WARNING PANEL DETAILS
5. SEE E 107.6.0 FOR ALL OTHER DETAILS

CURB RAMP TYPE D
N.T.S.



LEGEND:
W = SIDEWALK WIDTH
CC = CEMENT CONCRETE
* = TOLERANCE FOR CONSTRUCTION ±0.5%

NOTES:
1. USABLE SIDEWALK WIDTH PER AAB = W-6"
2. USABLE SIDEWALK WIDTH PER AAB IS NOT TO BE LESS THAN 4'-0"
3. ROADWAY GUTTER SLOPE MEASURED FROM LEFT TO RIGHT WHEN FACING RAMP OPENING
4. SEE E 107.6.5 FOR DETECTABLE WARNING PANEL DETAILS
5. SEE E 107.2.1 FOR ALL OTHER DETAILS

CURB RAMP TYPE E
N.T.S.

RAMP #	BASELINE REFERENCE	STATION	OFFSET	LEVEL LANDING		ROADWAY GUTTER SLOPE	HIGH SIDE TRANSITION			LOW SIDE TRANSITION		
				WIDTH (Lw)	DEPTH (Ld)		TRANSITION LENGTH	CURB REVEAL	SIDEWALK WIDTH	TRANSITION LENGTH	CURB REVEAL	SIDEWALK WIDTH
△	BOSTON ROAD	65+71.0	26.3' RT	5'-0"	5'-6"	+1.0%	9'-0"	6"	5'-6"	7'-6"	6"	5'-6"

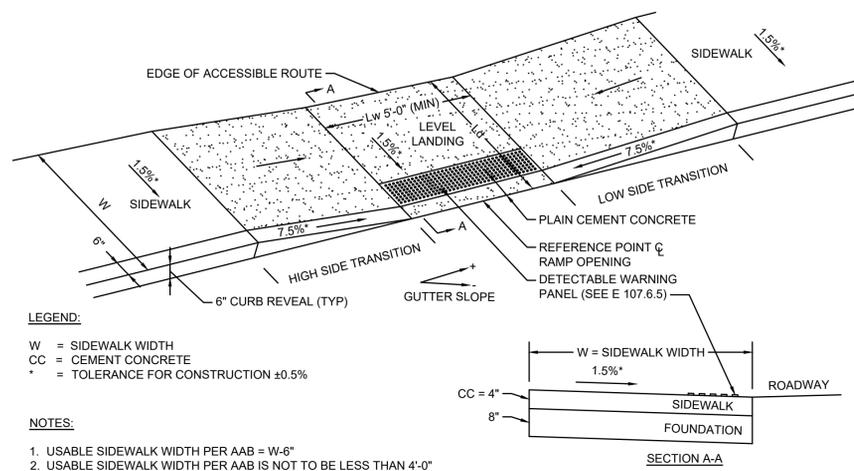
RAMP #	MASSDOT ID	BASELINE REFERENCE	STATION	OFFSET	ROADWAY GUTTER SLOPE	WIDTH OF RAMP OPENING (3' MIN.)	TRANSITION LENGTH		
							TRANSITION LENGTH	CURB REVEAL	SIDEWALK WIDTH
△	-	BOSTON ROAD	44+20.6	21.7' LT	5.0%	3'-0"	15'-0"	6"	5'-6"
△	-	BOSTON ROAD	44+84.6	21.4' LT	-5.0%	3'-0"	6'-6"	6"	5'-6"
△	PED-25101	BOSTON ROAD	72+66.6	31.1' LT	1.8%	3'-0"	9'-0"	6"	5'-6"
△	PED-12231	BOSTON ROAD	72+97.0	29.7' LT	-1.8%	3'-0"	6'-6"	6"	5'-6" (MIN)

RAMP #	MASSDOT ID	BASELINE REFERENCE	STATION	OFFSET	LEVEL LANDING		ROADWAY GUTTER SLOPE	HIGH SIDE TRANSITION			LOW SIDE TRANSITION		
					WIDTH (Lw)	DEPTH (Ld)		TRANSITION LENGTH	CURB REVEAL	SIDEWALK WIDTH	TRANSITION LENGTH	CURB REVEAL	SIDEWALK WIDTH
△	-	BOSTON ROAD	72+42.9	38.1' RT	5'-0"	5'-6"	+1.8%	9'-0"	6"	5'-6"	6'-6"	6"	5'-6"

WESTFORD
BOSTON ROAD

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	78	132
PROJECT FILE NO.		609035	

CURB RAMP & DRIVEWAY DETAILS - 2 OF 3



LEGEND:

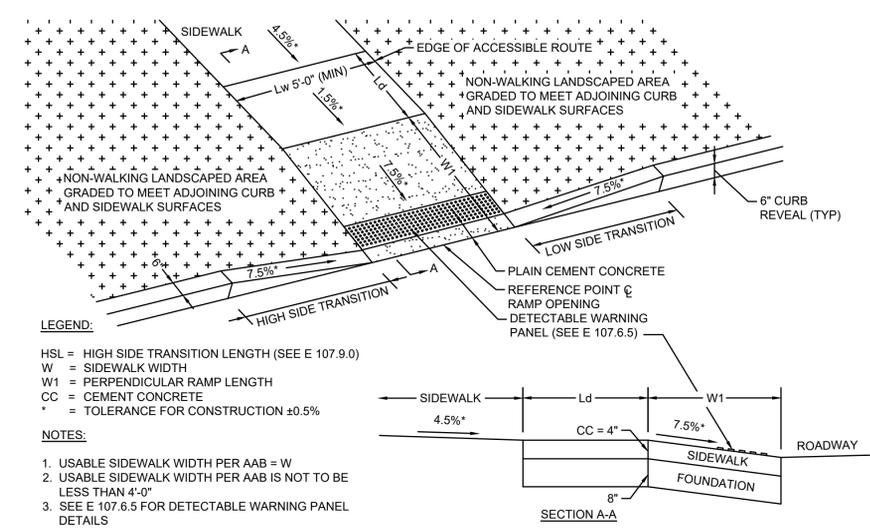
- W = SIDEWALK WIDTH
- CC = CEMENT CONCRETE
- * = TOLERANCE FOR CONSTRUCTION ±0.5%

NOTES:

1. USABLE SIDEWALK WIDTH PER AAB = W-6"
2. USABLE SIDEWALK WIDTH PER AAB IS NOT TO BE LESS THAN 4'-0"
3. ROADWAY GUTTER SLOPE MEASURED FROM LEFT TO RIGHT WHEN FACING RAMP OPENING
4. SEE E 107.6.5 FOR DETECTABLE WARNING PANEL DETAILS
5. SEE E 107.2.1 FOR ALL OTHER DETAILS

CURB RAMP TYPE F

N.T.S.



LEGEND:

- HSL = HIGH SIDE TRANSITION LENGTH (SEE E 107.9.0)
- W = SIDEWALK WIDTH
- W1 = PERPENDICULAR RAMP LENGTH
- CC = CEMENT CONCRETE
- * = TOLERANCE FOR CONSTRUCTION ±0.5%

NOTES:

1. USABLE SIDEWALK WIDTH PER AAB = W
2. USABLE SIDEWALK WIDTH PER AAB IS NOT TO BE LESS THAN 4'-0"
3. SEE E 107.6.5 FOR DETECTABLE WARNING PANEL DETAILS

CURB RAMP TYPE G

N.T.S.

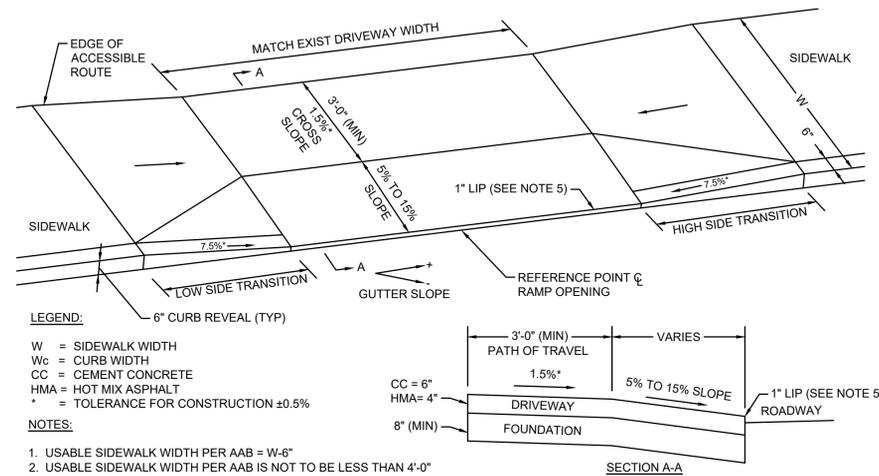
CURB RAMP DATA													
RAMP #	MASSDOT ID	BASELINE REFERENCE	STATION	OFFSET	LEVEL LANDING		ROADWAY GUTTER SLOPE	HIGH SIDE TRANSITION			LOW SIDE TRANSITION		
					WIDTH (Lw)	DEPTH (Ld)		TRANSITION LENGTH	CURB REVEAL	SIDEWALK WIDTH	TRANSITION LENGTH	CURB REVEAL	SIDEWALK WIDTH
9	-	BOSTON ROAD	72+42.8	27.0' LT	5'-0"	5'-6"	-1.8%	9'-0"	6"	5'-6"	6'-6"	6"	5'-6"

CURB RAMP DATA												
RAMP #	MASSDOT ID	BASELINE REFERENCE	STATION	OFFSET	LEVEL LANDING		PRIMARY RAMP (W1)	HIGH SIDE TRANSITION		LOW SIDE TRANSITION		SIDEWALK WIDTH (W)
					WIDTH (Lw)	DEPTH (Ld)		TRANSITION LENGTH	CURB REVEAL	TRANSITION LENGTH	CURB REVEAL	
8	-	BOSTON ROAD	71+93.2	38.2' LT	5'-0"	5'-0"	9'-3"	11'-0"	6"	6'-6"	6"	5'-6" (MIN)

WESTFORD
BOSTON ROAD

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	79	132
PROJECT FILE NO.		609035	

CURB RAMP & DRIVEWAY DETAILS - 3 OF 3



SIDEWALK THROUGH DRIVEWAY TYPE A
N.T.S.

DWY #	BASELINE REFERENCE	STATION	OFFSET	DRIVEWAY SURFACE	DWY WIDTH @ GUTTER	ROADWAY GUTTER SLOPE	WIDTH OF ACCESSIBLE ROUTE	HIGH SIDE TRANSITION			LOW SIDE TRANSITION		
								LENGTH	CURB REVEAL	SW WIDTH (W)	LENGTH	CURB REVEAL	SW WIDTH (W)
1	BOSTON ROAD	25+02.7	16.0' LT	HMA	44'-5"	-0.6%	3'-6"	7'-8"	6"	5'-6"	6'-6"	6"	5'-6"
2	BOSTON ROAD	25+81.4	16.0' LT	HMA	16'-0"	-0.7%	3'-6"	7'-8"	6"	5'-6"	6'-6"	6"	5'-6"
3	BOSTON ROAD	27+27.0	16.0' LT	HMA	16'-0"	-0.7%	3'-6"	7'-8"	6"	5'-6"	6'-6"	6"	5'-6"
4	BOSTON ROAD	27+83.6	16.0' LT	HMA	16'-0"	-0.9%	3'-6"	7'-8"	6"	5'-6"	6'-6"	6"	5'-6"
5	BOSTON ROAD	28+65.6	16.0' LT	HMA	16'-0"	-1.5%	3'-6"	9'-0"	6"	5'-6"	6'-6"	6"	5'-6"
6	BOSTON ROAD	29+73.3	16.0' LT	HMA	19'-0"	-2.2%	3'-6"	11'-0"	6"	5'-6"	6'-6"	6"	5'-6"
7	BOSTON ROAD	30+19.9	16.0' LT	HMA	16'-0"	-2.2%	3'-6"	11'-0"	6"	5'-6"	6'-6"	6"	5'-6"
8	BOSTON ROAD	31+20.6	16.0' LT	HMA	16'-0"	-2.2%	3'-6"	11'-0"	6"	5'-6"	6'-6"	6"	5'-6"
9	BOSTON ROAD	31+98.9	16.0' LT	HMA	18'-11"	-2.2%	3'-6"	11'-0"	6"	5'-6"	6'-6"	6"	5'-6"
10	BOSTON ROAD	33+07.7	16.0' LT	HMA	17'-4"	-2.2%	3'-6"	11'-0"	6"	5'-6"	6'-6"	6"	5'-6"
11	BOSTON ROAD	34+62.2	16.0' LT	HMA	16'-0"	-2.2%	3'-6"	11'-0"	6"	5'-6"	6'-6"	6"	5'-6"
12	BOSTON ROAD	35+22.9	16.0' LT	HMA	19'-6"	-2.2%	3'-6"	11'-0"	6"	5'-6"	6'-6"	6"	5'-6"
13	BOSTON ROAD	36+71.5	17.8' LT	HMA	17'-3"	-2.2%	3'-6"	11'-0"	6"	5'-6"	6'-6"	6"	5'-6"
14	BOSTON ROAD	37+93.1	18.3' LT	HMA	16'-0"	-2.5%	3'-6"	11'-0"	6"	5'-6"	6'-6"	6"	5'-6"
15	BOSTON ROAD	38+37.8	16.7' LT	HMA	16'-0"	-3.1%	3'-6"	14'-0"	6"	5'-6"	6'-6"	6"	5'-6"
16	BOSTON ROAD	39+18.3	16.0' LT	HMA	19'-9"	-4.0%	3'-6"	15'-0"	6"	5'-6"	6'-6"	6"	5'-6"
17	BOSTON ROAD	42+18.2	16.0' LT	HMA	29'-2"	-5.0%	3'-6"	15'-0"	6"	5'-6"	6'-6"	6"	5'-6"
18	BOSTON ROAD	47+74.8	16.1' LT	HMA	22'-6"	-1.9%	3'-6"	9'-0"	6"	5'-6"	6'-6"	6"	5'-6"
19	BOSTON ROAD	49+21.4	16.0' LT	HMA	44'-10"	-2.0%	3'-6"	11'-0"	6"	5'-6"	6'-6"	6"	5'-6"
20	BOSTON ROAD	50+12.8	16.0' LT	HMA	33'-9"	-2.7%	3'-6"	11'-0"	6"	5'-6"	6'-6"	6"	5'-6"
21	BOSTON ROAD	55+57.3	15.9' LT	HMA	18'-11"	-5.5%	3'-6"	15'-0"	6"	5'-6"	6'-6"	6"	5'-6"
22	BOSTON ROAD	63+01.8	16.4' LT	HMA	19'-2"	-0.5%	3'-6"	7'-8"	6"	5'-6"	6'-6"	6"	5'-6"
23	BOSTON ROAD	63+75.6	18.1' LT	HMA	45'-0"	-0.5%	3'-6"	7'-8"	6"	5'-6"	6'-6"	6"	5'-6"
24	BOSTON ROAD	66+58.2	27.0' LT	HMA	18'-11"	-1.8%	3'-6"	9'-0"	6"	5'-6"	6'-6"	6"	5'-6"
25	BOSTON ROAD	66+97.3	27.0' LT	HMA	18'-0"	-1.7%	3'-6"	9'-0"	6"	5'-6"	6'-6"	6"	5'-6"
26	BOSTON ROAD	67+82.7	16.0' RT	CC	30'-0"	+1.8%	3'-6"	9'-0"	6"	5'-6"	6'-6"	6"	5'-6"
27	BOSTON ROAD	68+45.8	27.0' LT	CC	29'-0"	-1.8%	3'-6"	9'-0"	6"	5'-6"	6'-6"	6"	5'-6"
28	MAIN STREET	11+14.8	24.3' RT	HMA/BRICK	13'-2"	-0.4%	3'-6"	6'-6"	6"	5'-6"	6'-6"	6"	6'-0"

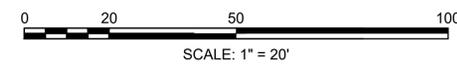
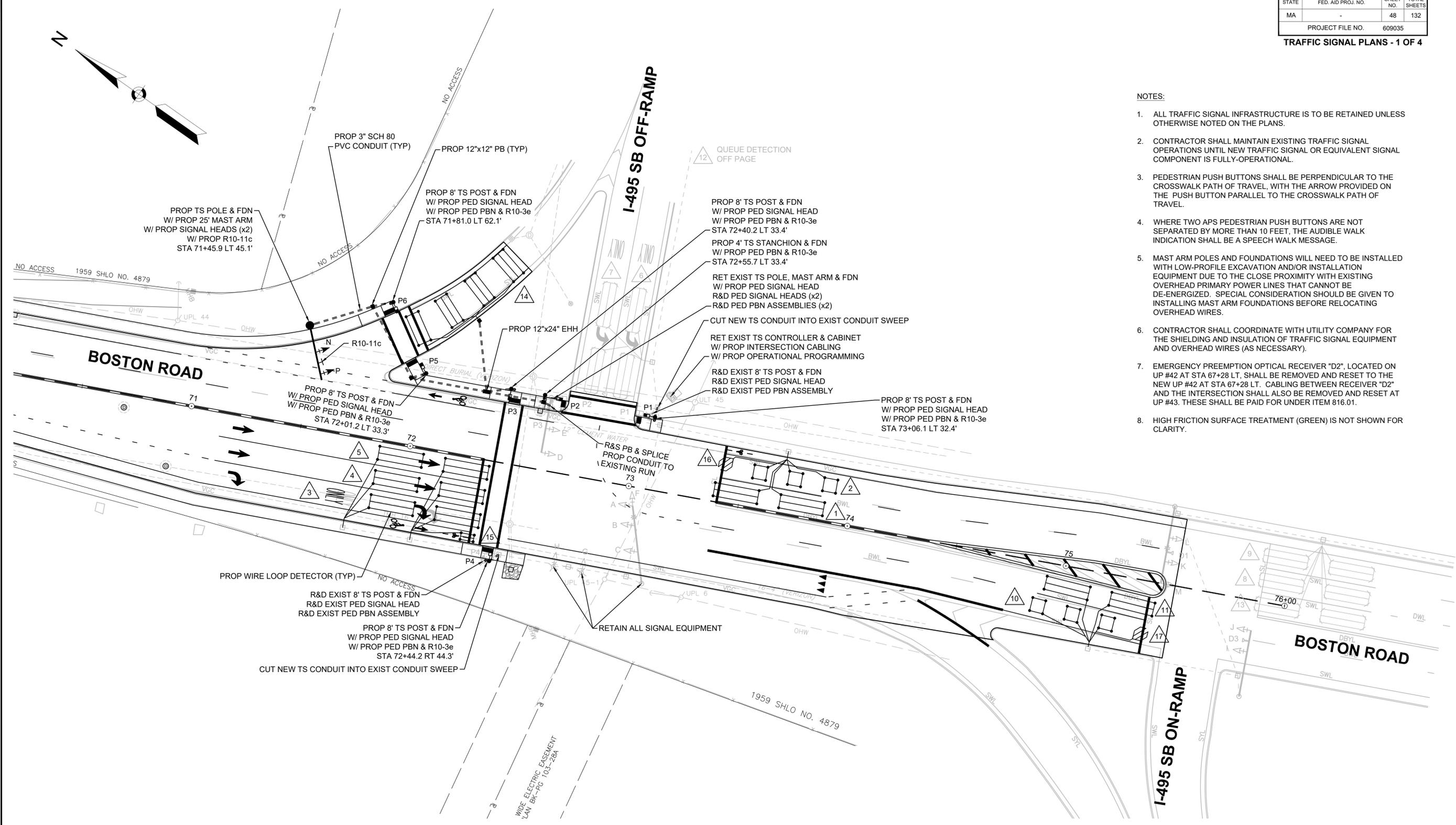
**WESTFORD
BOSTON ROAD**

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	48	132
PROJECT FILE NO.		609035	

TRAFFIC SIGNAL PLANS - 1 OF 4

NOTES:

- ALL TRAFFIC SIGNAL INFRASTRUCTURE IS TO BE RETAINED UNLESS OTHERWISE NOTED ON THE PLANS.
- CONTRACTOR SHALL MAINTAIN EXISTING TRAFFIC SIGNAL OPERATIONS UNTIL NEW TRAFFIC SIGNAL OR EQUIVALENT SIGNAL COMPONENT IS FULLY-OPERATIONAL.
- PEDESTRIAN PUSH BUTTONS SHALL BE PERPENDICULAR TO THE CROSSWALK PATH OF TRAVEL, WITH THE ARROW PROVIDED ON THE PUSH BUTTON PARALLEL TO THE CROSSWALK PATH OF TRAVEL.
- WHERE TWO APS PEDESTRIAN PUSH BUTTONS ARE NOT SEPARATED BY MORE THAN 10 FEET, THE AUDIBLE WALK INDICATION SHALL BE A SPEECH WALK MESSAGE.
- MAST ARM POLES AND FOUNDATIONS WILL NEED TO BE INSTALLED WITH LOW-PROFILE EXCAVATION AND/OR INSTALLATION EQUIPMENT DUE TO THE CLOSE PROXIMITY WITH EXISTING OVERHEAD PRIMARY POWER LINES THAT CANNOT BE DE-ENERGIZED. SPECIAL CONSIDERATION SHOULD BE GIVEN TO INSTALLING MAST ARM FOUNDATIONS BEFORE RELOCATING OVERHEAD WIRES.
- CONTRACTOR SHALL COORDINATE WITH UTILITY COMPANY FOR THE SHIELDING AND INSULATION OF TRAFFIC SIGNAL EQUIPMENT AND OVERHEAD WIRES (AS NECESSARY).
- EMERGENCY PREEMPTION OPTICAL RECEIVER "D2", LOCATED ON UP #42 AT STA 67+28 LT, SHALL BE REMOVED AND RESET TO THE NEW UP #42 AT STA 67+28 LT. CABLING BETWEEN RECEIVER "D2" AND THE INTERSECTION SHALL ALSO BE REMOVED AND RESET AT UP #43. THESE SHALL BE PAID FOR UNDER ITEM 816.01.
- HIGH FRICTION SURFACE TREATMENT (GREEN) IS NOT SHOWN FOR CLARITY.



STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	49	132
PROJECT FILE NO.		609035	

SEQUENCE AND TIMING CHART FOR FULLY-ACTUATED TRAFFIC SIGNAL CONTROL (COORDINATED)																										PREEMPT PHASING & PRIORITY										
BOSTON ROAD AT INTERSTATE 495 SB RAMPS (WESTFORD, MASSACHUSETTS)		Ø1		Ø2		Ø3		Ø4		Ø5		Ø6		Ø7		Ø8		PREEMPT NB - D1		PREEMPT SB - D2/D3		FLASHING OPERATION														
APPROACH	DIRECTION	HOUSING	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	30	31	32	33	34	35	36	
BOSTON ROAD	SB - T	A,B				R	R	R				R	R	R	R	Y	R	Y	R	R																
BOSTON ROAD	SB - R	C				-R	-R	-R				-R	-R	-R	-R	-FY	-Y	-R	-FY	-Y	-R	-R														
BOSTON ROAD	SB - T	I,J				R	R	R				G	G	Y	R	R	R	G	G	Y	R															
BOSTON ROAD	NB - L	M				←FY	←Y	←R				←R	←R	←R	←G	←Y	←R	←R	←R	←R	←R															
BOSTON ROAD	NB - T	D,E				Y	R					R	R	R	R	Y	R	R	R	R	R															
BOSTON ROAD	NB - T	K,L				G	Y	R				R	R	R	R	G	Y	R	R	R	R															
I-495 SB OFF-RAMP	WB - L	F,G,H				←R	←R	←R				←G	←Y	←R	←R	←R	←R	←R	←R	←R	←R															
I-495 SB OFF-RAMP	WB - R	N,P				-R	-R	-R				-G	-Y	-R	-R	-R	-R	-R	-R	-R	-R															
PEDESTRIAN	N-S	P1-P2				W/FDW	FDW	DW				DW	DW	DW	DW	DW	DW	DW	DW	DW	DW															
PEDESTRIAN	E-W	P3-P4				DW	DW	DW				W/FDW	DW	DW	DW	DW	DW	DW	DW	DW	DW															
PEDESTRIAN	N-S	P5-P6				W/FDW	FDW	DW				DW	DW	DW	DW	DW	DW	DW	DW	DW	DW															
MINIMUM INTERVAL						7						7				7																				
VEHICLE EXTENSION						3						2				2																				
MAXIMUM 1						31						26				10																				
MAXIMUM 2						31						30				30																				
YELLOW CLEARANCE						4.0						4.0	4.0			4.0																				
RED CLEARANCE							1.0							1.0																						
WALK						5.0						5.0																								
PEDESTRIAN CLEARANCE						5.0	4.0	1.0				15.0	4.0	4.0	1.0																					
RECALL						MIN						OFF							MIN																	
DETECTOR						NON-LOCK						NON-LOCK							NON-LOCK																	
COORDINATION DATA			COORDINATION PHASE TIMINGS																								EMERGENCY ONLY									
TIMING PLAN (D/S/O)	CYCLE	OFFSET	Ø1	Ø2	Ø3	Ø4	Ø5	Ø6	Ø7	Ø8																	Ø2	Ø6								
(1/1/1): M-F (0630-1000)	75	0		26		30	19	26																												
(2/1/1): M-F (1400-1900)	75	0		20		25	30	20																												
(3/1/1): S-S (0900-1500)	75	0		18		33	24	18																												

* SEE EMERGENCY VEHICLE PRE-EMPTION NOTES.

SEQUENCE & TIMING NOTES:

1. AUTOMATIC FLASHING OPERATION PER M.U.T.C.D. SECTION 4D.12.
2. PEDESTRIAN PHASE UPON PUSH BUTTON ACTIVATION ONLY.
3. FYA = FLASHING YELLOW ARROW
4. PERM = PERMITTED LEFT-TURN
5. MAXIMUM 1 = FREE OPERATION
6. MAXIMUM 2 = DURING COORDINATION
7. IF THE ASSIGNED RIGHT OF WAY FOR ANY TRAFFIC MOVEMENT IS TO REMAIN IN EFFECT DURING THE NEXT CALLED PHASE, THE SIGNAL INDICATIONS FOR THAT TRAFFIC MOVEMENT WILL NOT CHANGE DURING THE CLEARANCE INTERVAL.
8. THE RIGHT OF WAY MAY BE ASSIGNED TO ANY PHASE OR ANY COMBINATION OF NON-CONFLICTING PHASES.
9. IF CALLS EXIST ON ALL PHASES, THE ASSIGNMENT OF RIGHT OF WAY SHALL BE IN ACCORDANCE WITH THE PREFERENTIAL PHASE SEQUENCE.
10. IF THE ASSIGNED RIGHT-OF-WAY FOR ANY TRAFFIC MOVEMENT IS TO CHANGE DURING THE NEXT CALLED PHASE, THE SIGNAL INDICATION FOR THAT MOVEMENT WILL DISPLAY THE APPROPRIATE CLEARANCE INTERVALS.

COORDINATION NOTES:

1. OFFSET: BEGINNING OF Ø2&Ø6 YELLOW.
2. Ø2&Ø6 "CALL NOT ACTUATED" DURING COORDINATION.
3. SPLIT TIMES EQUAL GREEN PLUS CLEARANCES.
4. OFFSET REFERENCE LOCATION.
5. CONTRACTOR AND VENDOR SHALL ADJUST SIGNAL TIMINGS AND COORDINATION IN THE FIELD AS NECESSARY IN THE PRESENCE OF THE ENGINEER AND MASSDOT.

EMERGENCY VEHICLE PRE-EMPTION NOTES:

1. EMERGENCY VEHICLE PRE-EMPTION SIGNALS SHALL BE OPTICALLY TRANSMITTED BY OPTICAL EMITTERS MOUNTED IN EMERGENCY VEHICLES AND RECEIVED BY OPTICAL DETECTORS LOCATED AT EACH INTERSECTION.
2. EMERGENCY VEHICLE PRE-EMPTION SIGNALS SHALL BE SERVICED ON A FIRST DETECTED FIRST SERVED BASIS.
3. EMERGENCY PRE-EMPTION SHALL OVERRIDE COORDINATION.
4. IN RESPONSE TO A PRE-EMPTION SIGNAL RECEIVED AT AN INTERSECTION BY OPTICAL DETECTOR D1 (OR D2, D3) THE CONTROLLER SHALL HOLD OR ADVANCE TO AND HOLD IN EMERGENCY VEHICLE PRE-EMPTION PHASE ØA (OR ØB, ØC) GREEN FOR A MINIMUM OF TEN (10) SECONDS OR UNTIL PRE-EMPTION SIGNAL CEASES. THE CONTROLLER SHALL THEN TIME PRE-EMPTION PHASE CLEARANCE (AS NOTED IN CHART) AND SERVICE SUBSEQUENT EMERGENCY VEHICLE PRE-EMPTION PHASES AS NECESSARY.
5. NORMAL CLEARANCE SHALL BE PROVIDED ON PHASES THAT ARE TO BE TERMINATED BY PRE-EMPTION DEMAND.
6. CONFIRMATION STROBE (WHITE) SHALL BE ILLUMINATED WHENEVER ANY EMERGENCY VEHICLE PRE-EMPTION GREEN IS ON.

BOSTON ROAD AT INTERSTATE 495 SB RAMPS
LIST OF MAJOR ITEMS REQUIRED

ITEM #	QUANTITY	DESCRIPTION
	1	TS POLE W/ 25' MAST ARM, TYPE 2, W/ FOUNDATION
	5	8' TS POST, BASE W/ FOUNDATION
	1	4' TS STANCHION, BASE W/ FOUNDATION
	2	SIGNAL HEAD, 3-SECTION, 12" L.E.D. MODULES, REFLECTIVE BACKPLATES, VISORS
	1	12" YELLOW ARROW L.E.D. MODULE (REPLACING 12" GREEN BALL L.E.D. MODULE)
	6	PEDESTRIAN SIGNAL HEAD, 16" L.E.D. MODULE, COUNTDOWN INDICATOR & AUDIBLE WARNING DEVICES
	6	APS PEDESTRIAN PUSH BUTTON W/ R10-3e AND SIGN SADDLE
	4	WIRE LOOP DETECTORS (6'X14' QUADRUPOLE)
	6	WIRE LOOP DETECTORS (6'X20' QUADRUPOLE)
	2	WIRE LOOP DETECTORS - BICYCLE (3'X6' QUADRUPOLE-BL)
	4	TYPE C, 2-CHANNEL CARD RACK LOOP DETECTOR AMPLIFIER
	1	R&R EMERGENCY PREEMPTION OPTICAL RECEIVER (STA 67+28 LT)
	2	R&D 8' TS POST & DEMO FOUNDATION
	4	R&D PEDESTRIAN SIGNAL HEAD
	4	R&D PEDESTRIAN PUSH BUTTON ASSEMBLY
	1	CONTROLLER PROGRAMMING & FINE TUNING
	1	INTERSECTION CABLING FOR NEW SIGNAL HEADS / LOOPS / PRE-EMPTION
804.3	±205 FT	3" SCH. 80 PVC CONDUIT
811.22	1	12"X24" ELECTRIC HANDHOLE
811.31	4	12"X12" PULL BOX
811.351	1	PULL BOX REMOVED AND STACKED

PLUS NECESSARY CONDUIT, CABLE, LABOR, MISCELLANEOUS MATERIAL AND EQUIPMENT TO COMPLETE THE INSTALLATION AND PROVIDE AN OPERATING TRAFFIC CONTROL SIGNAL.

EXISTING SIGNAL HOUSINGS					PROPOSED SIGNAL HOUSINGS	
A,B,D,E	C	F,G,H	I,J,K,L	M	P1-P4	P1-P6
ALL 12" LENSES W/ 5" BACKPLATES, 3" RETRO-REFLECTIVE STRIP ("M" ONLY), & TUNNEL VISORS					REMOVE & DISCARD	ALL 12" LENSES W/ 5" BACKPLATES, 3" RR STRIP, & TUNNEL VISORS
					ALL 8" INDICATIONS	ALL 16" L.E.D. W/ COUNTDOWN INDICATION

LOOP DETECTOR DATA										
DETECTOR NO.	AMPLIFIER NO.	CHANNEL NO.	NO. SECTION/ SIZE	NO. OF TURNS	OPERATIONS	DELAY/ EXT.	PHASE CALLED	PHASE EXT.	LOOP CONNECTION	
1	1	1	2-6'X20' QUADRUPOLE	2-4-2	PRESENCE	0	Ø2	Ø2	SERIES	
2	1	2	3-6'X6' TYPE A	3	PRESENCE	0	Ø2	Ø2	SERIES	
3	5	1	2-6'X20' QUADRUPOLE	2-4-2	PRESENCE	0	Ø6	Ø6	SERIES	
4	5	2	2-6'X20' QUADRUPOLE	2-4-2	PRESENCE	0	Ø6	Ø6	SERIES	
5	6	1	2-6'X20' QUADRUPOLE	2-4-2	PRESENCE	0	Ø6	Ø6	SERIES	
6	3	1	2-6'X20' QUADRUPOLE	2-4-2	PRESENCE	0	Ø4	Ø4	SERIES	
7	3	2	2-6'X20' QUADRUPOLE	2-4-2	PRESENCE	0	Ø4	Ø4	SERIES	
8	2	2	2-6'X20' QUADRUPOLE	2-4-2	PRESENCE	0	Ø2	Ø2	SERIES	
9	2	1	2-6'X20' QUADRUPOLE	2-4-2	PRESENCE	0	Ø2	Ø2	SERIES	
10	4	1	3-6'X6' TYPE A	3	PRESENCE	0	Ø6	Ø6	SERIES	
11	4	2	2-6'X20' QUADRUPOLE	2-4-2	PRESENCE	0	Ø6	Ø6	SERIES	
12	6	2	2-6'X20' QUADRUPOLE	2-4-2	PRESENCE	0	Q1 - Ø4	Q1 - Ø4	SERIES	
13	7	1	2-6'X20' QUADRUPOLE	2-4-2	PRESENCE	0	Ø5	Ø5	SERIES	
14	7	2	4-6'X14' QUADRUPOLE	2-4-2	PRESENCE	0	Ø4	Ø4	SERIES	
15	8	1	3'X6' TYPE Q-BL	1-2-1	PRESENCE	0	Ø6	Ø6	SINGLE	
16	8	2	6'X6' TYPE D-1	3-3-3-3	PRESENCE	0	Ø2	Ø2	SINGLE	
17	9	1	6'X6' TYPE D-1	3-3-3-3	PRESENCE	0	Ø6	Ø6	SINGLE	

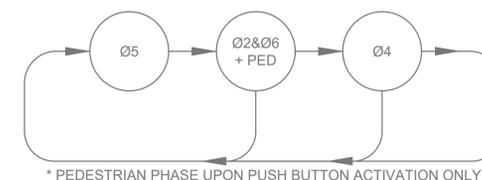
LOOP DETECTOR NOTES:

1. THE CONSTRUCTION SHALL CONFORM WITH MASSACHUSETTS DEPARTMENT OF TRANSPORTATION, HIGHWAY DIVISION SPECIFICATIONS UNLESS OTHERWISE NOTED.
2. DELAY AND EXTENSION TIMINGS SHALL BE PROGRAMMED IN THE CONTROLLER ONLY.
3. EACH LOOP GROUP SHALL BE SPLICED IN SINGLE PULL BOX AND WIRED TO SEPARATE CONTROLLER INPUT.
4. ALL BICYCLE LOOPS SHALL BE CONNECTED TO SEPARATE LOOP DETECTOR AMPLIFIERS CAPABLE OF HIGHER LEVELS OF SENSITIVITY.
5. UNLESS OTHERWISE NOTED, ALL LOOP DETECTORS SHALL BE PLACED IN THE CENTER OF THE LANE.

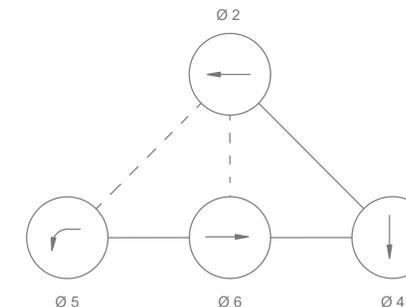
CONSTRUCTION NOTES:

1. PULL BOXES SHALL NOT BE LOCATED WITHIN CURB RAMPS.
2. THE CONSTRUCTION SHALL CONFORM WITH MASSACHUSETTS DEPARTMENT OF TRANSPORTATION, HIGHWAY DIVISION SPECIFICATIONS UNLESS OTHERWISE NOTED.
3. ALL MAST ARM FOUNDATIONS SHALL CONFORM WITH MASSACHUSETTS DEPARTMENT OF TRANSPORTATION, HIGHWAY DIVISION "OVERHEAD SIGNAL STRUCTURES & FOUNDATION STANDARDS", DATED DECEMBER 2015.
4. ALL SIGNAL HEADS AND SIGNS SHALL BE RIGIDLY MOUNTED.
5. CONTRACTOR SHALL FINE-TUNE THE TIMING AND COORDINATION PARAMETERS IN THE PRESENCE OF THE ENGINEER AND MASSDOT REPRESENTATIVES FOLLOWING INSTALLATION.

PREFERENTIAL PHASE SEQUENCE



NEMA DUAL RING PHASING



NEMA DUAL RING PHASING NOTES:

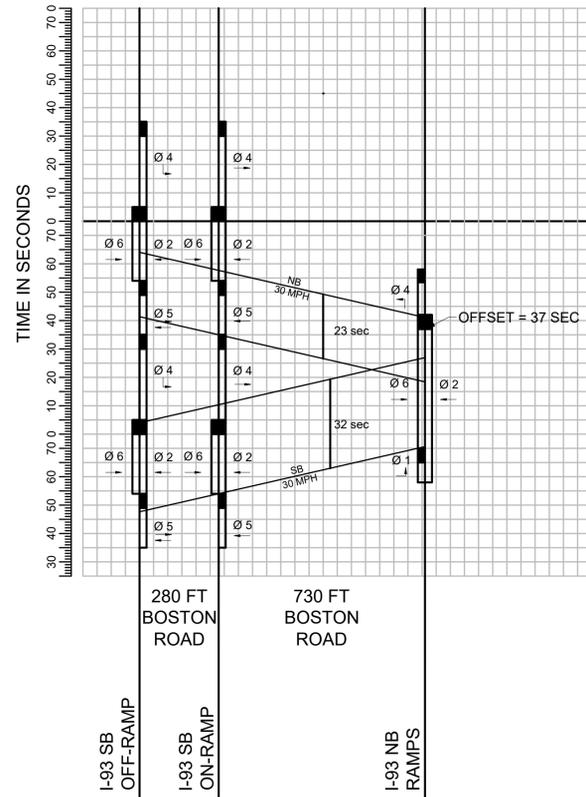
1. PHASES ASSOCIATED BY A SOLID LINE SHALL NOT OPERATE CONCURRENTLY.
2. PHASES ASSOCIATED BY A DASHED LINE MAY OPERATE CONCURRENTLY.
3. THROUGH MOVEMENTS MAY INCLUDE RIGHT TURNS.

**WESTFORD
BOSTON ROAD**

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	51	132
PROJECT FILE NO.		609035	

TRAFFIC SIGNAL PLANS - 4 OF 4

**PLAN 1/1/1
WEEKDAY MORNING PEAK HOURS
BOSTON ROAD
75 SECOND CYCLE**



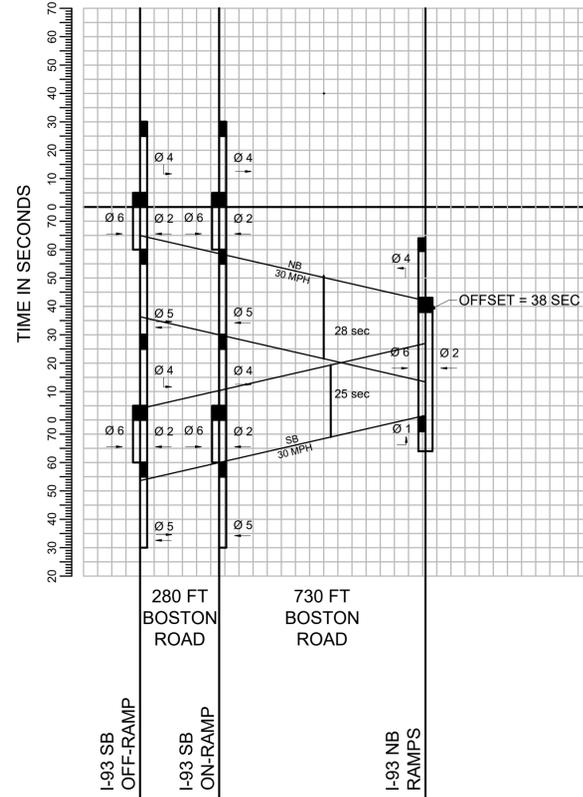
**BOSTON ROAD / I-495 SB RAMPS
COORDINATION DATA
(ALL ENTRIES IN SECONDS)**

	1/1/1	2/1/1	3/1/1
CYCLE LENGTH	75	75	75
OFFSET	0	0	0
SPLIT Ø2	26	20	18
SPLIT Ø4	30	25	33
SPLIT Ø5	19	30	24
SPLIT Ø6	26	20	18
COORDINATED PHASE	Ø2&Ø6	Ø2&Ø6	Ø2&Ø6

LEGEND:

- GREEN TIME
- CLEARANCE TIME (YELLOW + ALL RED)
- PHASE MOVEMENT
- INTERSECTION-INTERSECTION COORDINATION BAND

**PLAN 2/1/1
WEEKDAY EVENING PEAK HOURS
BOSTON ROAD
75 SECOND CYCLE**



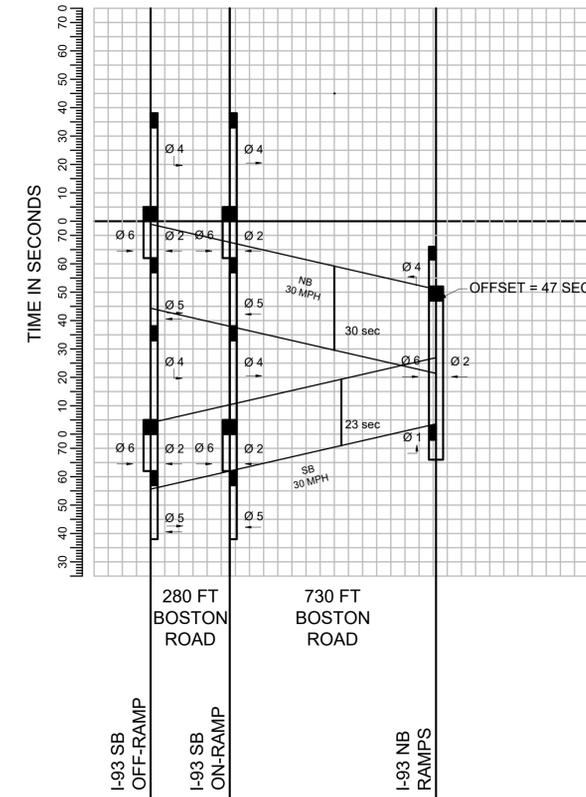
**BOSTON ROAD / I-495 NB RAMPS
COORDINATION DATA
(ALL ENTRIES IN SECONDS)**

	1/1/1	2/1/1	3/1/1
CYCLE LENGTH	75	75	75
OFFSET	37	38	47
SPLIT Ø1	12	12	12
SPLIT Ø2	47	42	49
SPLIT Ø4	16	21	16
SPLIT Ø6	59	54	61
COORDINATED PHASE	Ø2&Ø6	Ø2&Ø6	Ø2&Ø6

NOTES:

1. OFFSET: BEGINNING OF YELLOW FOR COORDINATED PHASE.
2. COORDINATED PHASE "CALL NOT ACTUATED" DURING COORDINATION.
3. SPLIT TIMES EQUAL GREEN PLUS CLEARANCES.
4. MASTER CONTROLLER LOCATED AT I-495 SB RAMPS.
5. CONTRACTOR AND VENDOR SHALL ADJUST SIGNAL TIMINGS AND COORDINATION IN THE FIELD AS NECESSARY ONLY AFTER MASSDOT APPROVAL.
6. CONTRACTOR IS RESPONSIBLE FOR IMPLEMENTING AND REFINING TIMINGS & COORDINATION PARAMETERS AT SIGNALIZED INTERSECTIONS AS PART OF THIS CONTRACT.

**PLAN 3/1/1
WEEKEND MIDDAY PEAK HOURS
BOSTON ROAD
75 SECOND CYCLE**



DAILY & WEEKLY COORDINATION PROGRAM

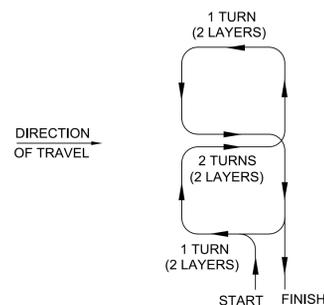
	MONDAY THRU FRIDAY	SATURDAY	SUNDAY
PLAN 1/1/1 60"/120" CYCLE	0630-1000	-	-
PLAN 2/1/1 70"/140" CYCLE	1400-1900	-	-
PLAN 3/1/1 60"/120" CYCLE	-	0900-1500	-
FREE OPERATION	0000-0630 1000-1400 1900-2400	0000-0900 1500-2400	0000-2400
FLASH OPERATION	NO PROGRAMMED FLASH MODE CONFLICT FLASH ONLY		



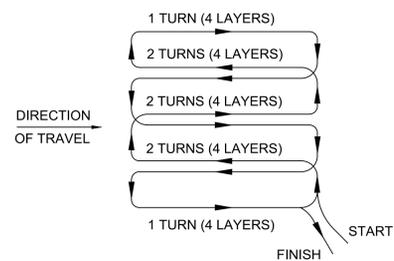
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	52	132
PROJECT FILE NO.		609035	

**TRAFFIC SIGNAL DETAILS
BICYCLE LOOP DETECTOR**

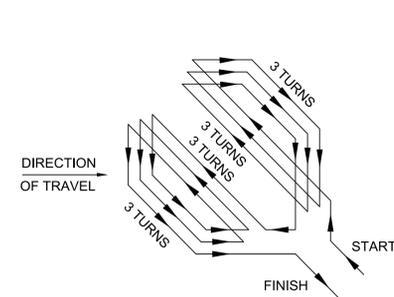
WINDING DETAILS



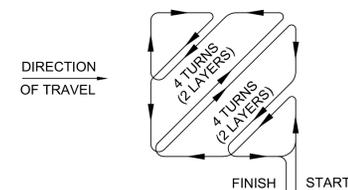
TYPE Q DETECTOR



TYPE D-Q DETECTOR

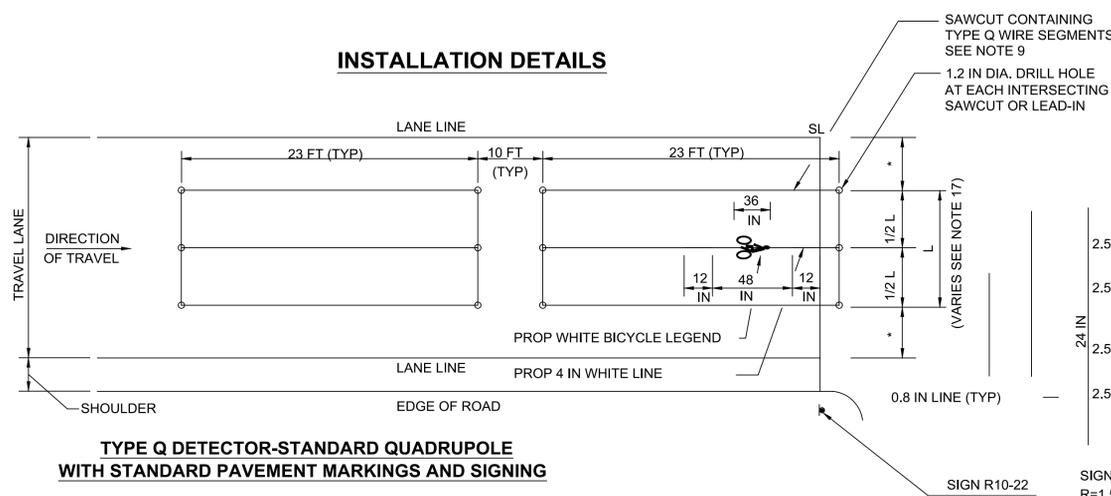


TYPE D-1 DETECTOR

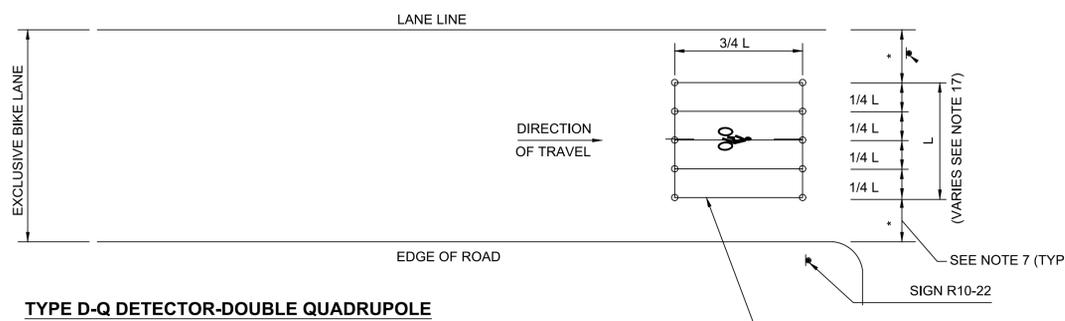


TYPE D-2 DETECTOR

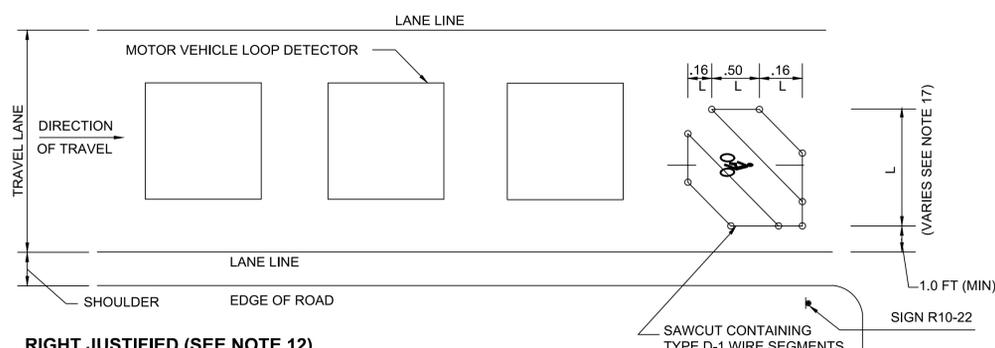
INSTALLATION DETAILS



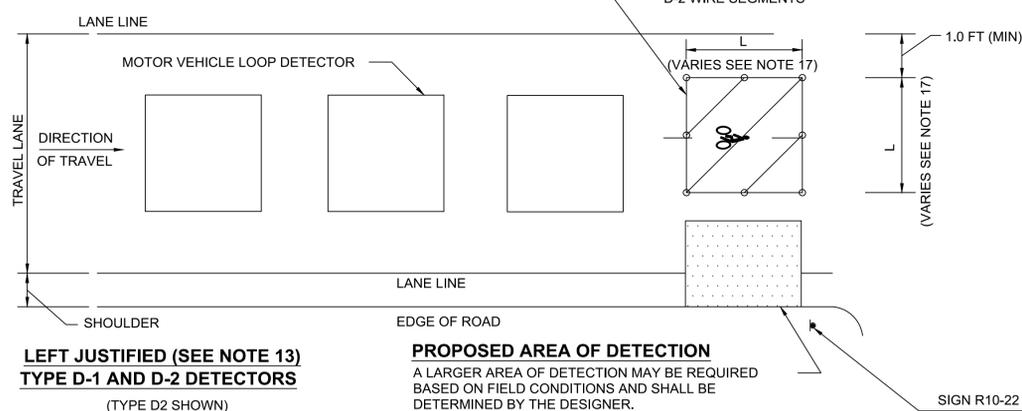
**TYPE Q DETECTOR-STANDARD QUADRUPOLE
WITH STANDARD PAVEMENT MARKINGS AND SIGNING**



TYPE D-Q DETECTOR-DOUBLE QUADRUPOLE



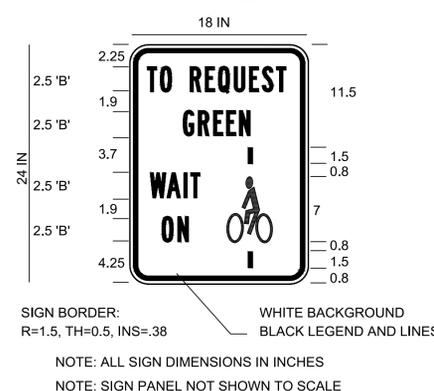
**RIGHT JUSTIFIED (SEE NOTE 12)
TYPE D-1 AND D-2 DETECTORS
(TYPE D1 SHOWN)**



**LEFT JUSTIFIED (SEE NOTE 13)
TYPE D-1 AND D-2 DETECTORS
(TYPE D2 SHOWN)**

PROPOSED AREA OF DETECTION
A LARGER AREA OF DETECTION MAY BE REQUIRED
BASED ON FIELD CONDITIONS AND SHALL BE
DETERMINED BY THE DESIGNER.

SIGN R10-22



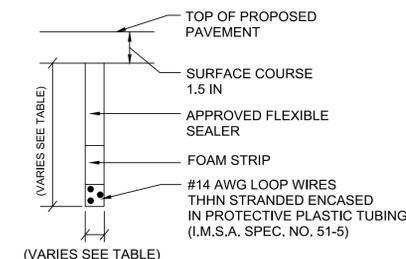
BICYCLE LOOP DETECTOR DETAILS

NOTES:

- REFER TO VEHICLE LOOP DETECTOR DETAIL SHEET FOR ADDITIONAL NOTES AND CONSTRUCTION DETAILS.
- ALL DETAILS ARE GRAPHICAL WITH NO SCALE.
- THE NUMBER, SIZE, LOCATION AND LENGTH OF DETECTION AREA VARIES AND SHALL BE DETERMINED BY THE DESIGNER REFER TO TRAFFIC SIGNAL PLAN.
- BICYCLE LOOPS SHALL BE CONNECTED TO SEPARATE LOOP DETECTOR AMPLIFIERS CAPABLE OF HIGHER LEVELS OF SENSITIVITY.
- BICYCLE LOOPS SHALL BE INSTALLED IN THE BASE COURSE OF EXISTING PAVEMENT. THE EXISTING PAVEMENT SHALL BE COLD PLANNED TO THE BASE COURSE AND SAWCUT FOR LOOP INSTALLATION.
- SIGNS AND PAVEMENT MARKINGS SHALL BE INSTALLED FOR ALL BICYCLE DETECTORS TO INFORM CYCLISTS OF THE DETECTION AREA.
- OFFSETS FROM LANE LINE EQUAL UNLESS OTHERWISE NOTED. SEE PLANS.
- TYPE Q DETECTORS SHALL BE WIRED IN A FIGURE EIGHT PATTERN WITH A DOUBLE LAYER DESIGN ("2-4-2") WITH 2 TURNS IN THE PERIMETER SLOTS AND 4 TURNS IN THE CENTER SLOT AS SHOWN IN THE WINDING DETAIL.
- BICYCLES WILL BE DETECTED WITHIN 4 IN. OF THE INTERIOR LONGITUDINAL LOOP WIRES FOR TYPE Q AND D-Q DETECTORS.
- PROVIDE 3 TURNS FOR TYPE D-1 DETECTORS.
- INSTALL 2 LAYERS OF WIRE WOUND IN THE SAME DIRECTION IN BOTH LAYERS FOR TYPE D-2 DETECTORS. THE RESULT IS 4 TURNS IN EACH DIAGONAL.
 - BICYCLE STOPPING ON THE RIGHT SIDE OF A THRU TRAVEL LANE.
 - BICYCLE STOPPING ON THE RIGHT SIDE OF AN EXCLUSIVE LEFT TURN LANE.
- LEFT JUSTIFIED LOOP DETECTORS SHALL BE CONSIDERED FOR THE FOLLOWING CONDITIONS:
 - BICYCLE STOPPING ON THE LEFT SIDE OF A SHARED LEFT/THRU LANE.
 - BICYCLE STOPPING JUST TO THE RIGHT OF THE CENTERLINE WHEN TURNING LEFT ON A TWO-LANE ROADWAY.
- RECTANGULAR LOOP DETECTORS SHALL BE CONSIDERED FOR BICYCLES STOPPING ON EITHER THE LEFT OR RIGHT SIDE OF A TWO-LANE ROADWAY. THE MINIMUM OFFSET FROM LANE LINE OR CURB LINE SHALL BE 1.0 FT.
- PAVEMENT CORES OR TEST PITS MAY BE REQUIRED TO DETERMINE THE DEPTH OF EXISTING PAVEMENT AND CONFIRM THAT THE DETECTION OPTION CHOSEN AND CORRESPONDING WINDING PATTERN CAN BE ACCOMMODATED.
- THESE DETAILS APPLY TO BICYCLE LOOPS INSTALLED IN ROADWAYS. PUSH BUTTON ACTUATION SHALL BE CONSIDERED FOR RECREATIONAL BIKE PATHS.
- THE MINIMUM DIMENSION FOR L SHALL BE 6 FT MIN. FOR DETECTORS TYPE D-Q, D-1 & D-2. FINAL DIMENSIONS SHALL BE DETERMINED BY THE DESIGN ENGINEER.

SECTION THRU LOOP DETECTOR

TURNS OF WIRE	SLOT SIZE	
	DEPTH (IN)	WIDTH (IN)
1	1.5	0.5
2	1.5	0.5
3	1.5	0.5
4	2.0	0.5
5	2.0	0.5
6	2.0	0.5
7	2.0	0.5
8	2.0	0.5



STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	53	132
PROJECT FILE NO.		609035	

TEMPORARY TRAFFIC CONTROL PLANS - 1 OF 7

TEMPORARY TRAFFIC CONTROL NOTES:

- ALL TEMPORARY TRAFFIC CONTROL WORK SHALL CONFORM TO THE LATEST EDITION OF THE "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES" (MUTCD) AND ALL REVISIONS, UNLESS SUPERCEDED BY THESE PLANS.
- ALL SIGN LEGENDS, BORDERS, AND MOUNTING SHALL BE IN ACCORDANCE WITH THE MUTCD.
- TEMPORARY CONSTRUCTION SIGNING AND ALL OTHER TRAFFIC CONTROL DEVICES SHALL BE IN PLACE PRIOR TO THE START OF ANY WORK.
- TEMPORARY CONSTRUCTION SIGNING, BARRICADES, AND ALL OTHER NECESSARY WORK ZONE TRAFFIC CONTROL DEVICES SHALL BE REMOVED FROM THE HIGHWAY OR COVERED WHEN THEY ARE NOT REQUIRED FOR CONTROL OF TRAFFIC.
- SIGNS AND SIGN SUPPORTS LOCATED ON OR NEAR THE TRAVELED WAY, CHANNELIZING DEVICES, BARRIERS, AND CRASH ATTENUATORS MUST PASS THE CRITERIA SET FORTH IN NCHRP REPORT 350, "RECOMMENDED PROCEDURES FOR THE SAFETY PERFORMANCE EVALUATION OF HIGHWAY FEATURES" AND/OR "MANUAL FOR ASSESSING SAFETY HARDWARE" (MASH).
- CONTRACTORS SHALL NOTIFY EACH ABUTTER AT LEAST 24 HOURS IN ADVANCE OF THE START OF ANY WORK THAT WILL REQUIRE THE TEMPORARY CLOSURE OF ACCESS, SUCH AS CONDUIT INSTALLATION, EXISTING PAVEMENT EXCAVATION, TEMPORARY DRIVEWAY PAVEMENT PLACEMENT, AND SIMILAR OPERATIONS.
- THE FIRST TEN PLASTIC DRUMS OF A TAPER SHALL BE MOUNTED WITH SEQUENTIAL FLASHING LIGHTS.
- THE ADVISORY SPEED LIMIT, IF REQUIRED, SHALL BE DETERMINED BY THE ENGINEER.
- DISTANCES ARE A GUIDE AND MAY BE ADJUSTED IN THE FIELD BY THE ENGINEER.
- MAXIMUM SPACING OF TRAFFIC DEVICES IN A TAPER (DRUMS OR CONES) IS EQUAL IN FEET TO THE SPEED LIMIT IN MPH.
- MINIMUM LANE WIDTH IS TO BE 11 FEET UNLESS OTHERWISE SHOWN. MINIMUM LANE WIDTH TO BE MEASURED FROM THE EDGE OF DRUMS OR MEDIAN BARRIER.
- ALL SIGNS SHALL BE MOUNTED ON THEIR OWN STANDARD SIGN SUPPORTS.
- CONTRACTOR SHALL MAINTAIN ACCESS FOR BICYCLES THROUGH THE CONSTRUCTION ZONE AT ALL TIMES. WHERE REDUCED LANE/SHOULDER WIDTHS ARE PROVIDED TO FACILITATE CONSTRUCTION, TEMPORARY W11-1/MA-W16-19P SIGNS SHALL BE INSTALLED, AS REQUIRED BY THE ENGINEER.

LEGEND:

- REFLECTORIZED PLASTIC DRUM OR 36" CONE
- WORK ZONE
- WORK VEHICLE
- TRUCK MOUNTED ATTENUATOR
- P/F POLICE/FLAGGER DETAIL
- DIRECTION OF TRAFFIC
- IMPACT ATTENUATOR
- TRAFFIC OR PEDESTRIAN SIGNAL
- TYPE III BARRICADE
- MEDIAN BARRIER
- SIGN
- CHANGEABLE MESSAGE SIGN
- MEDIAN BARRIER WITH WARNING LIGHTS
- ARROW BOARD

SUGGESTED WORK ZONE WARNING SIGN SPACING

ROAD TYPE	DISTANCE BETWEEN SIGNS **		
	A	B	C
LOCAL OR LOW VOLUME ROADWAYS*	350	350	350
MOST OTHER ROADWAYS*	500	500	500
FREEWAYS AND EXPRESSWAYS*	1,000	1,500	2,640

* ROAD TYPE TO BE DETERMINED BY MASSDOT OFFICE OF TRANSPORTATION PLANNING.

** DISTANCES ARE SHOWN IN FEET. THE COLUMN HEADINGS A, B, AND C ARE THE DIMENSIONS SHOWN IN THE DETAIL/TYPICAL SETUP FIGURES. THE A DIMENSION IS THE DISTANCE FROM THE TRANSITION OR POINT OF RESTRICTION TO THE FIRST SIGN. THE B DIMENSION IS THE DISTANCE BETWEEN THE FIRST AND SECOND SIGNS. THE C DIMENSION IS THE DISTANCE BETWEEN THE SECOND AND THIRD SIGNS. (THE "THIRD" SIGN IS THE FIRST ONE TYPICALLY ENCOUNTERED BY A DRIVER APPROACHING A TEMPORARY TRAFFIC CONTROL (TTC) ZONE.)

THE "THIRD" SIGN ABOVE IS TYPICALLY REFERRED TO AS AN "ADVANCE WARNING" SIGN ON THE TTC SETUPS. THESE ADVANCE WARNING SIGNS ARE LOCATED PRIOR TO THE PROJECT LIMITS ON ALL APPROACHES (i.e. THE W20-1 SERIES (ROAD WORK XX FT) SIGNS), AND USUALLY REMAIN FOR THE DURATION OF THE PROJECT. ADDITIONAL SIGNS (i.e. "RIGHT LANE CLOSED 1 MILE" AND "LEFT LANE CLOSED 1 MILE") HAVE BEEN SHOWN IN SOME FIGURES AS EXAMPLES OF REINFORCEMENT SIGN PLACEMENT BUT ARE USED IN RARE OCCASIONS.

THE FIRST AND SECOND WARNING SIGNS ABOVE ARE REFERRED TO AS THE OPERATIONAL (DAY-TO-DAY) WORK ZONE SIGNS AND MAY BE MOVED DEPENDING ON WHERE THE SPECIFIC ROADWAY WORK FOR THAT DAY IS LOCATED.

MA-R2-10a SIGNS SHALL BE PLACED BETWEEN THE SECOND AND THIRD SIGNS AS DESCRIBED ABOVE.

MA-R2-10a, MA-R2-10e, AND W20-1 SERIES SIGNS ARE TO BE INCLUDED ON ALL DETAILS/TYPICAL SETUPS.

TAPER LENGTH CRITERIA FOR TEMPORARY TRAFFIC CONTROL ZONES

TYPE OF TAPER	TAPER LENGTH (L)
MERGING TAPER	AT LEAST L
SHIFTING TAPER	AT LEAST 0.5L
SHOULDER TAPER	AT LEAST 0.33L
ONE-LANE, TWO-WAY TRAFFIC TAPER	50 FT MIN. 100 FT MAX.
DOWNSTREAM TAPER	50 FT MIN. 100 FT MAX. PER LANE

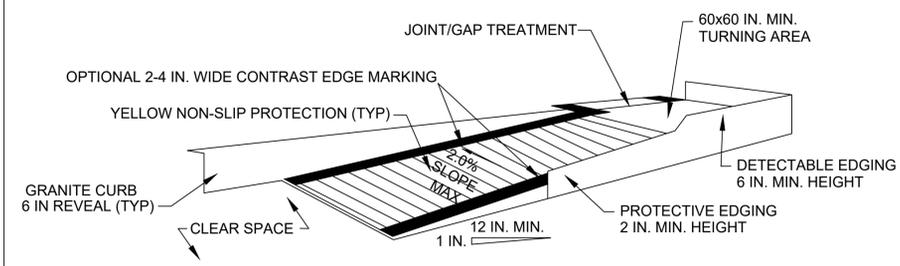
FORMULAS FOR DETERMINING TAPER LENGTHS

SPEED LIMIT (S)	TAPER LENGTH (L) FEET
40 MPH OR LESS	$L = \frac{WS^2}{60}$
45 MPH OR MORE	$L = WS$

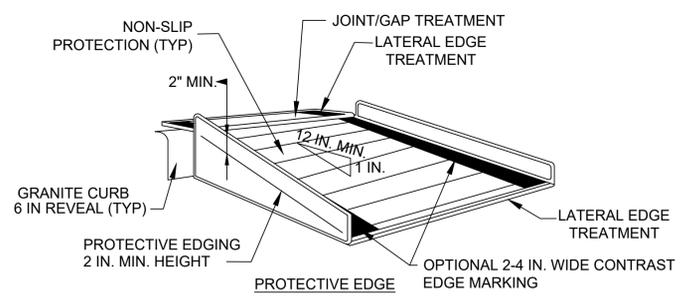
WHERE: L = TAPER LENGTH IN FEET
W = WIDTH OF OFFSET IN FEET
S = POSTED SPEED LIMIT, OR OFF-PEAK 85TH-PERCENTILE SPEED PRIOR TO WORK STARTING, OR THE ANTICIPATED OPERATING SPEED IN MPH

TYPICAL PEDESTRIAN DETAILS:

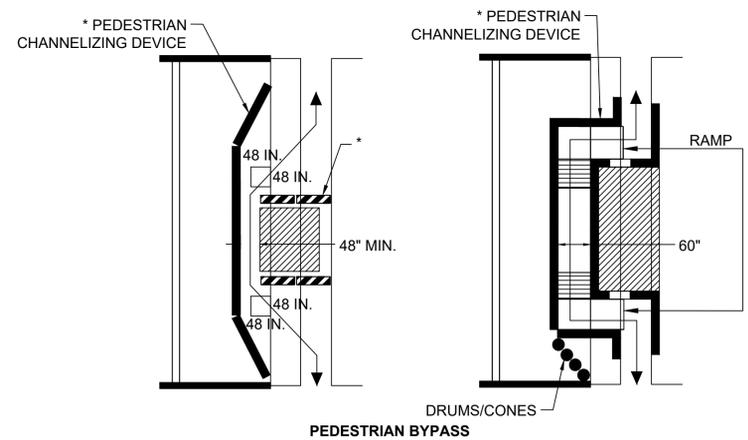
- NOTES:
- WHEN EXISTING PEDESTRIAN FACILITIES ARE DISRUPTED, CLOSED, OR RELOCATED IN A TTC ZONE, TEMPORARY FACILITIES SHALL BE PROVIDED AND THEY SHALL BE DETECTABLE AND INCLUDE ACCESSIBILITY FEATURES CONSISTENT WITH THE FEATURES PRESENT IN THE EXISTING PEDESTRIAN FACILITY.
 - A PEDESTRIAN CHANNELIZING DEVICE THAT IS DETECTABLE BY A PERSON WITH A VISUAL DISABILITY TRAVELING WITH THE AID OF A LONG CANE SHALL BE PLACED ACROSS THE FULL WIDTH OF THE CLOSED SIDEWALK.
 - WHEN USED, TEMPORARY RAMPS SHALL COMPLY WITH AMERICANS WITH DISABILITIES ACT.
 - THE ALTERNATE PATHWAY SHOULD HAVE A SMOOTH CONTINUOUS HARD SURFACE FOR THE ENTIRE LENGTH OF THE TEMPORARY PEDESTRIAN FACILITY.
 - THE PROTECTIVE REQUIREMENTS OF A TTC WORK ZONE MAY HAVE AN IMPACT IN DETERMINING THE NEED FOR TEMPORARY TRAFFIC BARRIERS AND THEIR USE IN PROVIDING PEDESTRIAN DELINEATION SHOULD BE BASED ON ENGINEERING JUDGEMENT.
 - AUDIBLE INFORMATION DEVICES SHOULD BE CONSIDERED WHERE MIDBLOCK CLOSINGS AND CHANGED CROSSWALK AREAS CAUSE INADEQUATE COMMUNICATION TO BE PROVIDED TO PEDESTRIANS WHO HAVE VISUAL DISABILITIES.
 - ADA COMPLIANT ACCESS SHALL BE MAINTAINED AT ALL TIMES INCLUDING PEDESTRIAN GUIDANCE SYSTEMS AT WORK ZONES. ANY PEDESTRIAN DETOURS OR BYPASSES SHALL INCLUDE AN ADA COMPLIANT ROUTE WITH PROPER BARRICADES, RAILING, RAMPS, AND SIGNAGE.



TEMPORARY CURB RAMP PARALLEL TO CURB

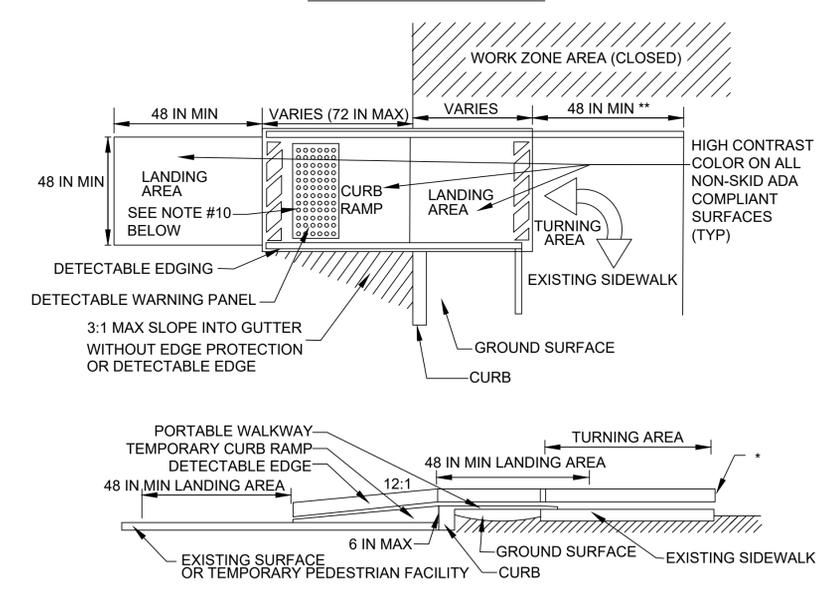


TEMPORARY CURB RAMP-PERPENDICULAR TO CURB



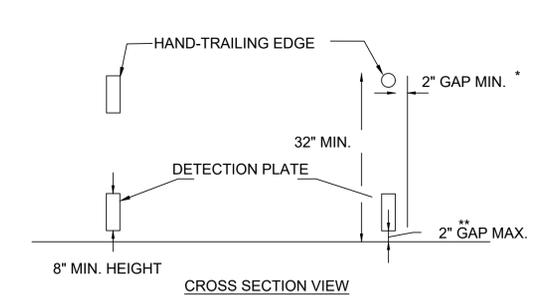
PEDESTRIAN BYPASS

TYPICAL PEDESTRIAN DEVICES:



- * -DETECTABLE EDGE REMOVED IF A CONTINUOUS SIDEWALK.
- ** -60 IN. IF AN OBSTRUCTION IS AT BACK OF SIDEWALK

TEMPORARY CURB RAMP-TYPE 2



CROSS SECTION VIEW

- NOTES:
- * THERE SHALL BE A 2 INCH GAP BETWEEN THE HAND-TRAILING EDGE AND ITS SUPPORT.
 - ** A MAXIMUM 2 INCH GAP BETWEEN THE BOTTOM OF THE BOTTOM RAIL AND THE SURFACE MAY BE USED TO PROVIDE DRAINAGE.

PEDESTRIAN CHANNELIZING DEVICE

TYPICAL PEDESTRIAN DEVICE NOTES:

- CURB RAMPS SHALL BE 60 IN. MINIMUM WIDTH WITH A FIRM, STABLE AND NON-SLIP SURFACE.
- PROTECTIVE EDGING WITH A 2 IN. MINIMUM HEIGHT SHALL BE INSTALLED WHEN THE CURB RAMP OR LANDING PLATFORM HAS A VERTICAL DROP OF 6 IN. OR GREATER OR HAS A SIDE APRON SLOPE STEEPER THAN 1:3 (33%). PROTECTIVE EDGING SHOULD BE CONSIDERED WHEN THE CURB RAMPS OR LANDING PLATFORMS HAVE A VERTICAL DROP OF 3 IN. OR MORE.
- DETECTABLE EDGING WITH 6 IN. MINIMUM HEIGHT AND CONTRASTING COLOR SHALL BE INSTALLED ON ALL CURB RAMP LANDINGS WHERE THE WALKWAY CHANGES DIRECTION (TURNS).
- CURB RAMPS AND LANDINGS SHOULD HAVE A 1:50 (2%) MAX CROSS-SLOPE.
- CLEAR SPACE OF 48x48 IN. MINIMUM SHALL BE PROVIDED ABOVE AND BELOW THE CURB RAMP.
- THE CURB RAMP WALKWAY EDGE SHALL BE MARKED WITH A CONTRASTING COLOR 2 TO 4 IN. WIDE MARKING. MARKING IS OPTIONAL WHERE COLOR CONTRASTING EDGING IS USED.
- WATER FLOW IN THE GUTTER SYSTEM SHALL HAVE MINIMAL RESTRICTION.
- LATERAL JOINTS OR GAPS BETWEEN SURFACES SHALL BE LESS THAN 0.5 IN. WIDTH.
- CHANGES BETWEEN SURFACE HEIGHTS SHOULD NOT EXCEED 0.5 IN. LATERAL EDGES SHOULD BE VERTICAL UP TO 0.25 IN. HIGH, AND BEVELED AT 1:2 BETWEEN 0.25 IN. AND 0.5 IN. HEIGHT.

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	54	132
PROJECT FILE NO. 609035			

