

# TOWN OF TRUMBULL, CT BLACKHOUSE ROAD CULVERT REHABILITATION PROJECT

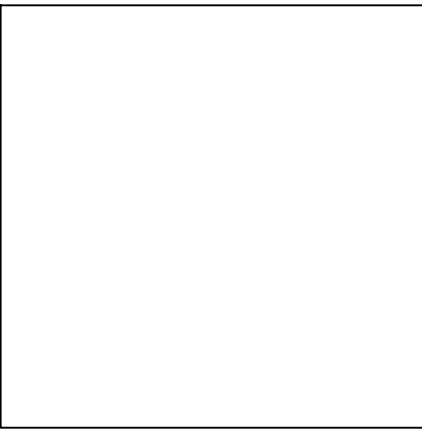
MAY 10, 2018

LIST OF DRAWINGS	
SHEET NO.	SHEET TITLE
	COVER
G-1	GENERAL NOTES, LEGEND, ABBREVIATIONS AND BORING LOGS
G-2	EXISTING CONDITIONS PLAN
S-1	SITE PLAN, SECTION AND WALL DETAILS
S-2	STRUCTURAL AND SITE NOTES AND DETAILS
HW-910_01	W-BEAM METAL BEAM RAIL HARDWARE
HW-910_02	METAL BEAM RAIL (TYPE R-3 350) GUIDERAIL
HW-910_07	R-B 350 BRIDGE ATTACHMENT VERTICAL SHAPE PARAPET
HW-911_01	R-B ANCHORAGE TYPE I AND II
HW-911_04	TYPICAL GRADING PLAN FOR W-BEAM GUIDERAIL TURN-DOWN ANCHOR



LOCATION MAP  
SCALE: 1"=1000'

PREPARED BY:  
**Tighe&Bond**  
[www.tighebond.com](http://www.tighebond.com)  
1000 Bridgeport Avenue  
Suite 320  
Shelton, CT 06484  
(203) 712-1100



DANA C. HUFF, P.E.



ALFRED J. MASCIA JR., P.E.

PREPARED FOR:  
TOWN OF TRUMBULL  
FIRST SELECTMAN: VICKI A. TESORO

DEPARTMENT OF PUBLIC WORKS  
DIRECTOR OF PUBLIC WORKS: JOHN MARSILIO  
TOWN ENGINEER: FRANK SMERIGLIO



GENERAL NOTES

- EXISTING CONDITIONS ARE NOT BASED ON FIELD SURVEY AND LOCATIONS OF SITE FEATURES ARE APPROXIMATE.
- LIGHT LINES AND TEXT INDICATE APPROXIMATE EXISTING CONDITIONS.
- BOLD LINES AND TEXT INDICATE PROPOSED WORK.
- LAND DISTURBANCE SHALL BE KEPT TO THE MINIMUM NECESSARY FOR CONSTRUCTION OPERATIONS.
- THE LOCATIONS OF UTILITIES ON THESE DRAWINGS ARE CONSIDERED APPROXIMATE AND THE SPECIFIC ALIGNMENT MAY VARY.
- THE OWNER AND ENGINEER ASSUME NO RESPONSIBILITY FOR THE LOCATION OF EXISTING UTILITIES. THE ENGINEER AND OWNER MAKE NO GUARANTEE AS TO THE UNDERGROUND CONDITIONS THAT MAY BE ENCOUNTERED.
- PER CONNECTICUT LAW, CONTRACTOR SHALL CALL 1-888-DIG-SAFE, (1-888-344-7233) AND THE TOWN OF TRUMBULL PRIOR TO ANY UNDERGROUND EXCAVATION ON SITE. THE DIG-SAFE SERVICE WILL FIELD LOCATE AND MARK UNDERGROUND UTILITIES IN THE FIELD. THE DIG-SAFE VERIFICATION NUMBER SHALL BE SUBMITTED TO THE TOWN OF TRUMBULL PRIOR TO ANY DEMOLITION AND REMOVAL OR CONSTRUCTION WORK.
- ALL EXISTING CONDITIONS SHALL BE FIELD VERIFIED BY THE CONTRACTOR PRIOR TO CONSTRUCTION. IF FIELD CONDITIONS ARE OBSERVED THAT VARY SIGNIFICANTLY FROM THOSE SHOWN ON THESE PLANS, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER IN WRITING FOR RESOLUTION OF THE CONFLICTING INFORMATION.
- ALL EXCAVATION SHALL COMPLY WITH OSHA'S LATEST STANDARDS. ALL REQUIREMENTS OF OSHA'S EXCAVATION STANDARDS SHALL BE PROVIDED BY THE CONTRACTOR INCLUDING, BUT NOT LIMITED TO, THE PROVISION FOR A COMPETENT PERSON ON SITE AND ANY REQUIRED DOCUMENTATION THAT MAY REQUIRE CERTIFICATION BY A PROFESSIONAL ENGINEER.
- IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO MAINTAIN ALL UTILITIES FUNCTIONING PROPERLY IN THE AREAS UNDER CONSTRUCTION PRIOR TO COMPLETION OF THE PROJECT. ALL PIPES AND STRUCTURES WITHIN THE LIMITS OF THIS CONTRACT SHALL BE LEFT IN A CLEAN AND OPERABLE CONDITION AT THE COMPLETION OF THE WORK. THE CONTRACTOR SHALL TAKE ALL NECESSARY PRECAUTIONS TO PREVENT SAND AND SILT FROM DISTURBED AREAS FROM ENTERING THE SYSTEM. CONTRACTOR IS RESPONSIBLE FOR DAMAGE SUSTAINED TO ANY EXISTING UTILITIES AND IT IS HIS RESPONSIBILITY TO MAKE REPAIRS TO THE REQUIREMENTS OF THE TOWN OR RESPECTIVE UTILITY COMPANY.
- COORDINATE RELOCATION OR SUPPORTING OF UTILITY POLES WITH THE RESPECTIVE UTILITIES.
- ANY AND ALL DEMOLISHED BUILDING MATERIALS, STRUCTURES, PIPES, PAVEMENT, CURBING, SURPLUS MATERIAL, AND SITE RUBBLE SHALL BE DISPOSED OF BY THE CONTRACTOR OFF-SITE AT HIS EXPENSE AND IN ACCORDANCE WITH ALL APPLICABLE STATE AND FEDERAL ENVIRONMENTAL REGULATIONS.
- ALL MATERIALS AND METHODS ARE TO COMPLY WITH TOWN OF TRUMBULL DPW STANDARDS, UNLESS OTHERWISE DIRECTED.
- ALL DISTURBED AREAS SHALL BE LOAMED & SEEDED UNLESS OTHERWISE SPECIFIED. OVER EXCAVATE LOAM AND SEED AREAS AS REQUIRED TO MEET GRADE.

SEDIMENTATION AND EROSION CONTROL PLAN NOTES

- ALL SEDIMENTATION AND EROSION CONTROL MEASURES SHALL BE IN ACCORDANCE WITH THE STANDARDS AND SPECIFICATIONS OF THE "2002 CONNECTICUT GUIDELINES FOR SOIL EROSION AND SEDIMENT CONTROL" DEEP BULLETIN NO 34, AND ALL AMENDMENTS AND ADDENDA THERETO AS PUBLISHED BY THE CONNECTICUT DEPARTMENT OF ENERGY AND ENVIRONMENTAL PROTECTION.
- LAND DISTURBANCE SHALL BE KEPT TO THE MINIMUM NECESSARY FOR CONSTRUCTION.
- ALL EROSION CONTROL MEASURES SHALL BE INSTALLED AS SHOWN ON THE PLANS AND ELSEWHERE AS ORDERED BY THE OWNER'S REPRESENTATIVE, OR THE TOWN OF TRUMBULL.
- ALL CATCH BASINS SHALL BE PROTECTED WITH SILT SACKS THROUGHOUT THE CONSTRUCTION PERIOD AND UNTIL ALL DISTURBED AREAS ARE THOROUGHLY STABILIZED.
- WHEREVER POSSIBLE, EROSION AND SEDIMENT CONTROL MEASURES SHALL BE INSTALLED PRIOR TO CONSTRUCTION.
- ADDITIONAL CONTROL MEASURES SHALL BE INSTALLED DURING CONSTRUCTION PERIOD AS ORDERED BY THE OWNER'S REPRESENTATIVE, OR THE TOWN OF TRUMBULL.
- ALL SEDIMENTATION AND EROSION CONTROL MEASURES SHALL BE MAINTAINED IN EFFECTIVE CONDITION THROUGHOUT THE CONSTRUCTION PERIOD.
- SEDIMENT REMOVED SHALL BE DISPOSED OF LEGALLY OFFSITE.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR CONSTRUCTION AND MAINTENANCE OF ALL EROSION CONTROL MEASURES THROUGHOUT THE CONSTRUCTION PERIOD.
- THE CONTRACTOR SHALL MAINTAIN A SUPPLY OF SILT FENCE/HAYBALES AND ANTI-TRACKING CRUSHED STONE ON-SITE FOR EMERGENCY REPAIRS.
- THE CONTRACTOR SHALL UTILIZE APPROVED METHODS/MATERIALS FOR PREVENTING THE BLOWING AND MOVEMENT OF DUST FROM EXPOSED SOIL SURFACES ONTO ADJACENT PROPERTIES AND SITE AREAS.
- ALL DRAINAGE STRUCTURES SHALL BE INSPECTED WEEKLY BY THE CONTRACTOR AND CLEANED TO PREVENT THE BUILD-UP OF SILT.
- THE CONTRACTOR SHALL CAREFULLY COORDINATE THE PLACEMENT OF EROSION CONTROL MEASURES WITH THE PHASING OF CONSTRUCTION.
- KEEP ALL PAVED SURFACES CLEAN. SWEEP BEFORE FORECASTED STORMS OR WEEKLY AS NECESSARY. SWEEP IMPACTED PUBLIC ROADS OF ALL DIRT AND DEBRIS AT THE END OF EACH WORK DAY.
- TREAT ALL UNPAVED SURFACES WITH 4" MINIMUM OF TOPSOIL AND SEEDING PRIOR TO FINAL STABILIZATION.
- ALL TRUCKS ENTERING OR LEAVING THE SITE WITH MATERIALS MUST BE COVERED.
- ALL SEDIMENTATION AND EROSION CONTROLS SHALL BE CHECKED WEEKLY AND AFTER EACH RAINFALL EVENT. NECESSARY REPAIRS SHALL BE MADE WITHOUT DELAY.
- PRIOR TO ANY FORECASTED RAINFALL, EROSION AND SEDIMENT CONTROLS SHALL BE INSPECTED AND REPAIRED AS NECESSARY.
- AFTER ALL DISTURBED AREAS HAVE BEEN STABILIZED, EROSION CONTROLS MAY BE REMOVED ONCE AUTHORIZATION TO DO SO HAS BEEN SECURED FROM THE TOWN OF TRUMBULL. DISTURBED AREAS SHALL BE SEEDED AND MULCHED.
- CONTRACTOR IS TO COMPLY WITH THE REQUIREMENTS OF THE SOIL EROSION AND SEDIMENTATION CONTROL PLAN.

LEGEND:

- UTILITY POLE
- CATCH BASIN
- TREELINE
- FENCE LINE
- ROADWAY GUARDRAIL
- TOP MOUNTED STEEL GUARDRAIL
- UNDERGROUND NATURAL GAS LINE
- UNDERGROUND STORM DRAIN
- OVERHEAD ELECTRICAL LINE
- EDGE OF PAVEMENT
- NEW LIMITS OF CLEARING AND GRUBBING
- APPROXIMATE LIMITS OF WORK
- PAVED ROADWAY
- PROPOSED CAST-IN-PLACE CONCRETE WALL

ABBREVIATIONS:

APPROX	APPROXIMATE
BIT.	BITUMINOUS
BLDG	BUILDING
CC	CONCRETE CURB
CJ	CONSTRUCTION JOINT
CLF	CHAIN LINK FENCE
CONC	CONCRETE
CONST	CONSTRUCTION
CW	CONCRETE WALL
CY	CUBIC YARD
DP	DEPTH
EJ	EXPANSION JOINT
ELEV	ELEVATION
EOP	EDGE OF PAVEMENT
GC	GRANITE CURB
H	HEIGHT
H.P.	HIGH POINT
INV	INVERT
KIP	1000 POUNDS-FORCE
MAX	MAXIMUM
MFR	MANUFACTURER
MH	MANHOLE
MIN	MINIMUM
N/F	NOW OR FORMERLY
NTS	NOT TO SCALE
R&D	REMOVE AND DISPOSE OF
RWL	RETAINING WALL
S	SLOPE
SF	SQUARE FEET
TBM	TEMPORARY BENCHMARK
T/WALL	TOP OF WALL
TYP	TYPICAL
W	WIDTH



Drilling Co.: General Borings				Casing		Sampler		Groundwater Readings							
Foreman:		John Wyatt		Type		Split Spoon		Date		Time		Casing		Sta. Time	
T&B Rep.:		Chris Dubuque		I.D./O.D.		1-3/8"/2"									
Date Start:		12/14/15		End:		12/14/15		140#							
Location		See Exploration Location Plan		Hammer Wt.		30"									
GS. Elev.				Datum:											
				Other											



Drilling Co.: General Borings					Casing		Sampler		Groundwater Readings											
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T&B Rep.: Chris Dubuque					I.D./O.D.		1-3/8"/2"													
Date Start: 12/14/15					End: 12/14/15		140#													
Location: See Exploration Location Plan					Hammer Wt.		30"													
GS. Elev.					Datum:															
Sample No.					Sample Depth (ft.)		Blows Per 6"		Sample Description					General Stratigraphy		Notes		Well Construction		
Depth (ft.)		Casing Blows Per Ft.		Rec. (in)																
5				S-1/12"		0-2'		2/5		Dark Brown medium dense Sand and Silt										
						15/50-2"														
				S-2/6"		2'-4'		5/11		Dark Brown medium dense Sand and Silt, some gravel										
						22/16														
				S-3/8"		5'-7"		3/10		Redish Brown Dense Sand and Silt, some gravel										
						22/27														
10				S-4/14"		7'-9"		24/50-2"		Course Sand, some silt, some rock fragments										
										Drill bit was grinding rock for 15 minutes from 9' to 10'.										
				S-5/1"		10'-12'		100-1"		Small piece of rock recovered.										
15																				
20																				
25																				
30																				
Notes: Rock encountered at 9' deep. No water encountered					Proportions Used					Density/Consistency										
					TRACE (TR.) 0 - <10% LITTLE (LI.) 10 - <20% SOME (SO.) 20 - <35% AND 35 - <50%					VERY LOOSE 0-4 LOOSE 4-10 MEDIUM DENSE 10-30 DENSE 30-50 VERY DENSE >50					VERY SOFT <2 SOFT 2-4 MEDIUM 4-8 STIFF 8-15 VERY STIFF 15-30 HARD >30					

Blackhouse Road Culvert Rehabilitation

Town of Trumbull, CT

VERIFY SCALE  
BAR IS 1 INCH ON ORIGINAL DRAWING  
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

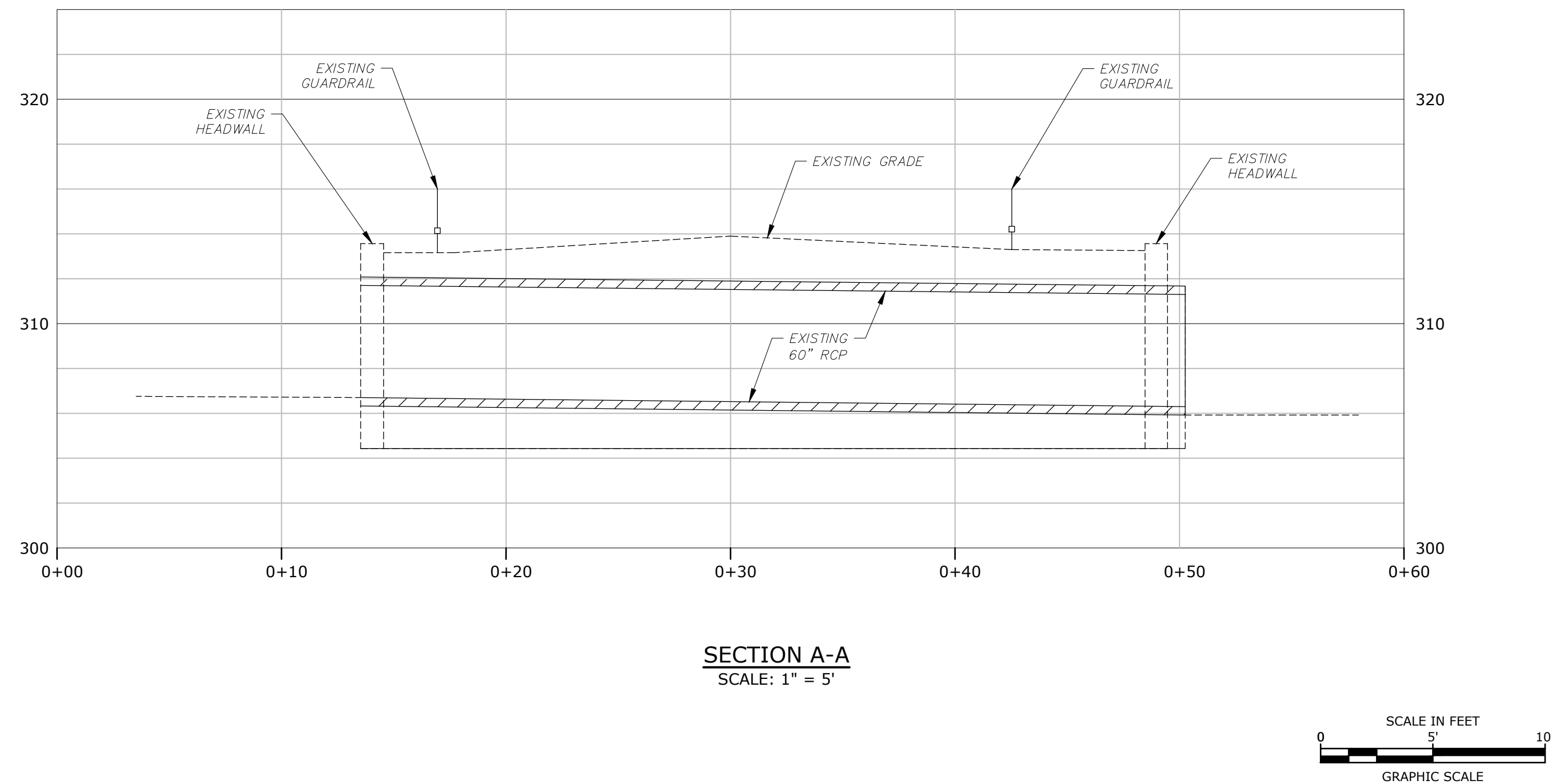
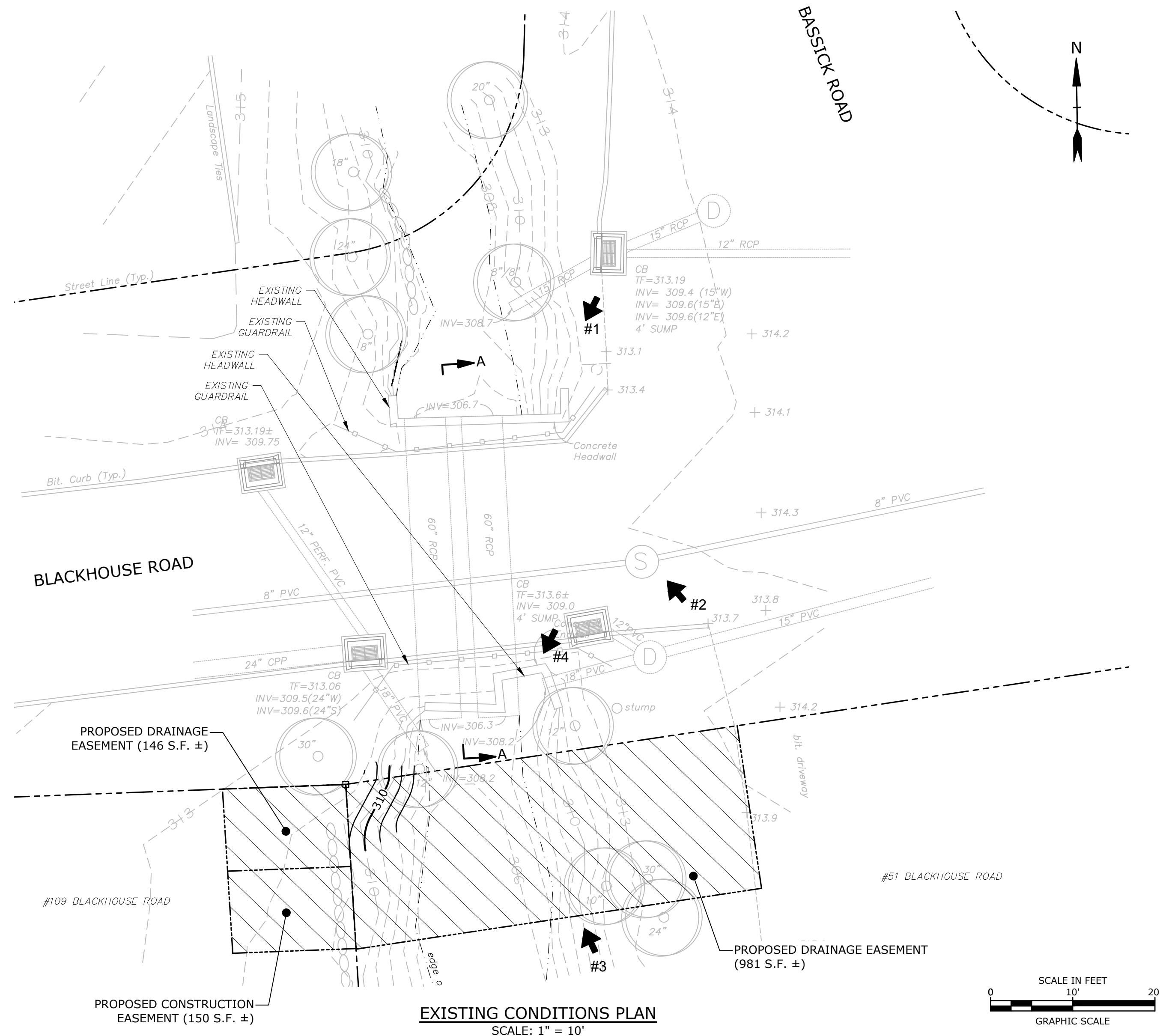
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PROJECT NO: T-0196-72		
DATE: 05/10/2019		
FILE: GN-T0196-72-01.dwg		
DRAWN BY: ADM		
CHECKED: AJM		
APPROVED: DH		

GENERAL NOTES, ABBREVIATIONS, LEGEND AND BORING LOGS

SCALE: 1" = 10'



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 Tighe & Bond J:\T0196\22 Blackhouse Rd Drawings - Figures\AutoCAD\Culvert\Sheets\EX-T0196-72-01.dwg



LEGEND:  
 PHOTOGRAPH

## Blackhouse Road Culvert Rehabilitation

Town of Trumbull, CT

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FILE:	EX-T0196-72-01.dwg	
DRAWN BY:	ADM	
CHECKED:	AJM	
APPROVED:	DH	

EXISTING CONDITIONS PLAN

SCALE: AS NOTED



Blackhouse  
Road Culvert  
Rehabilitation

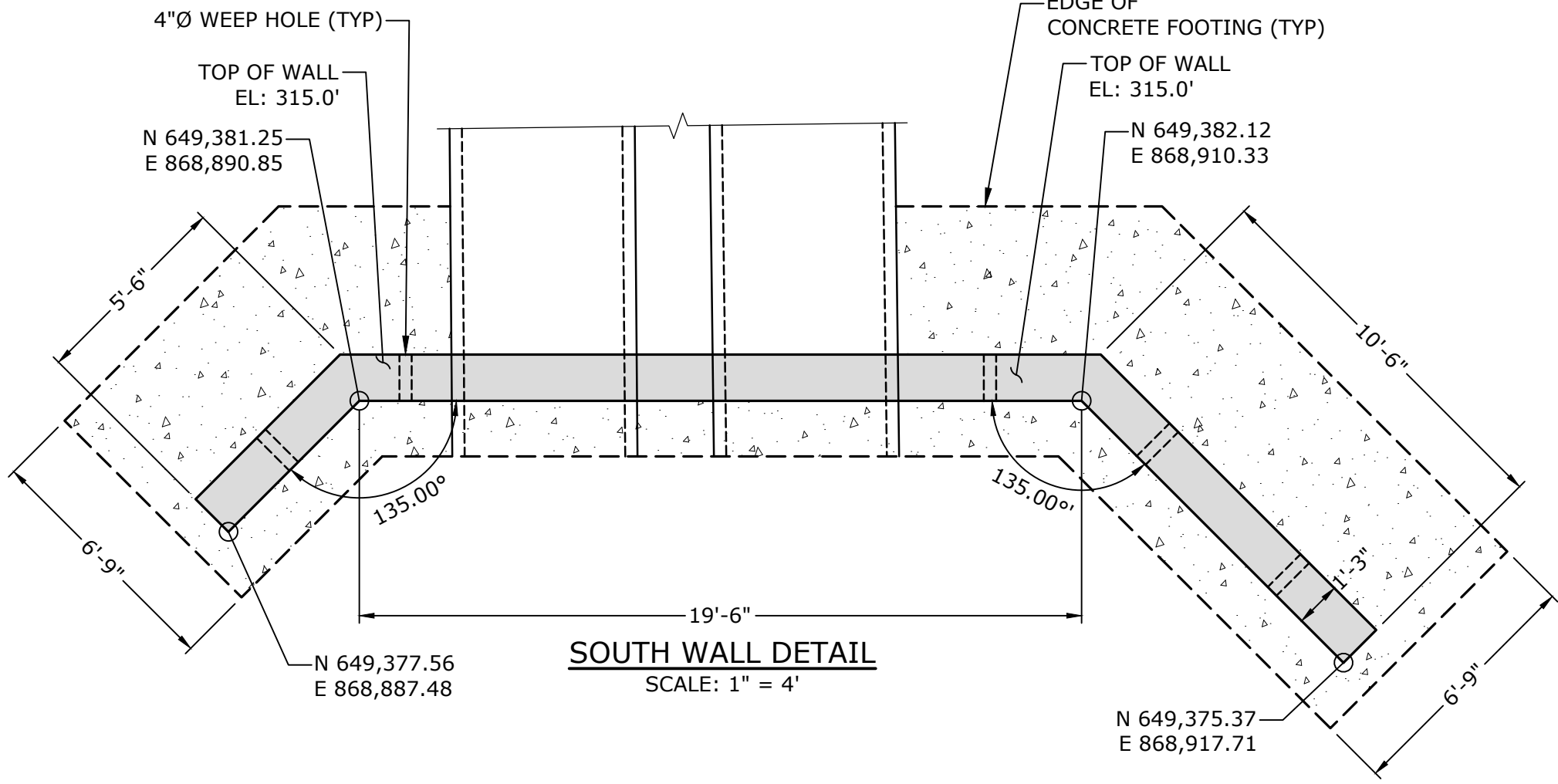
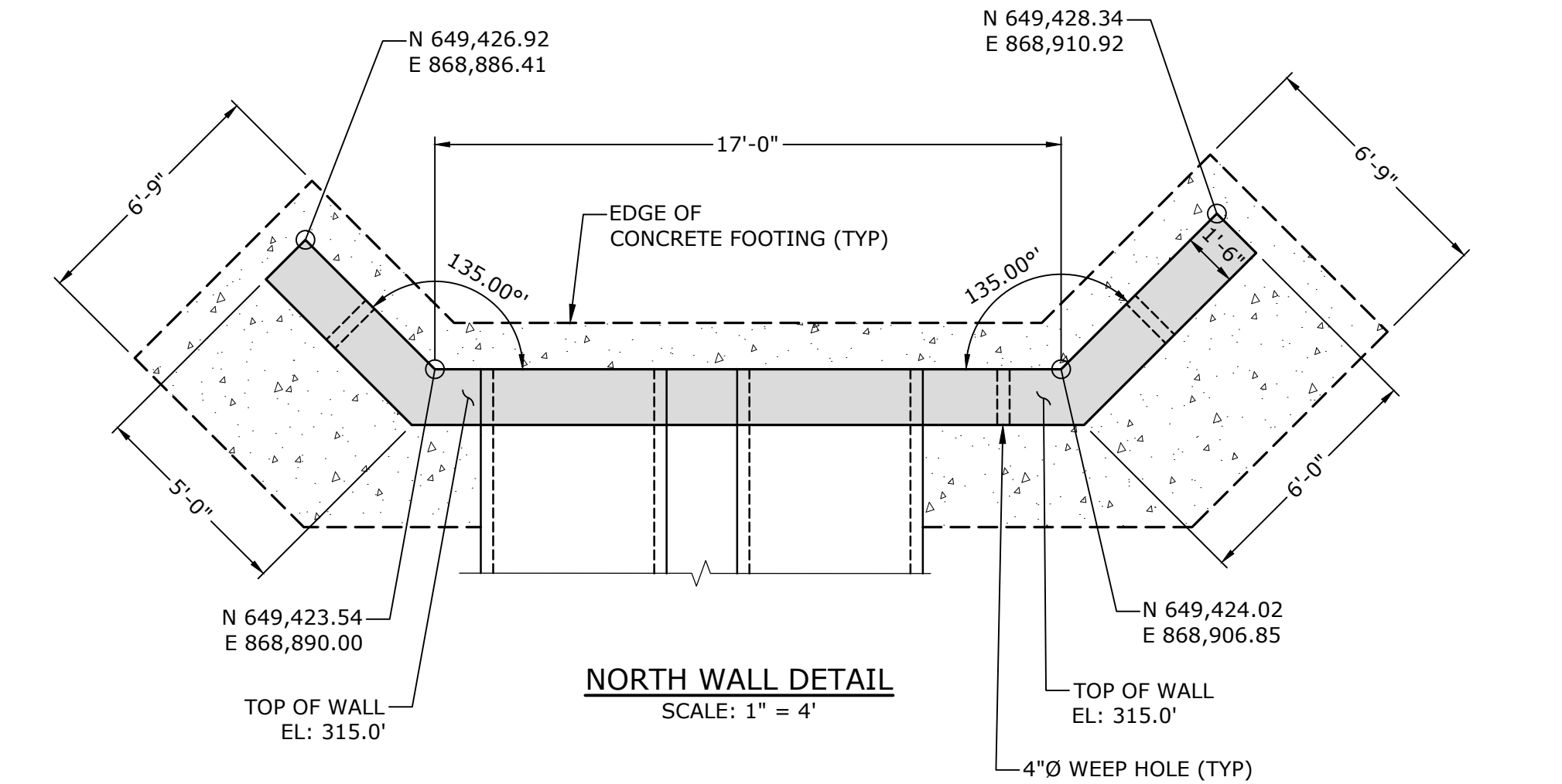
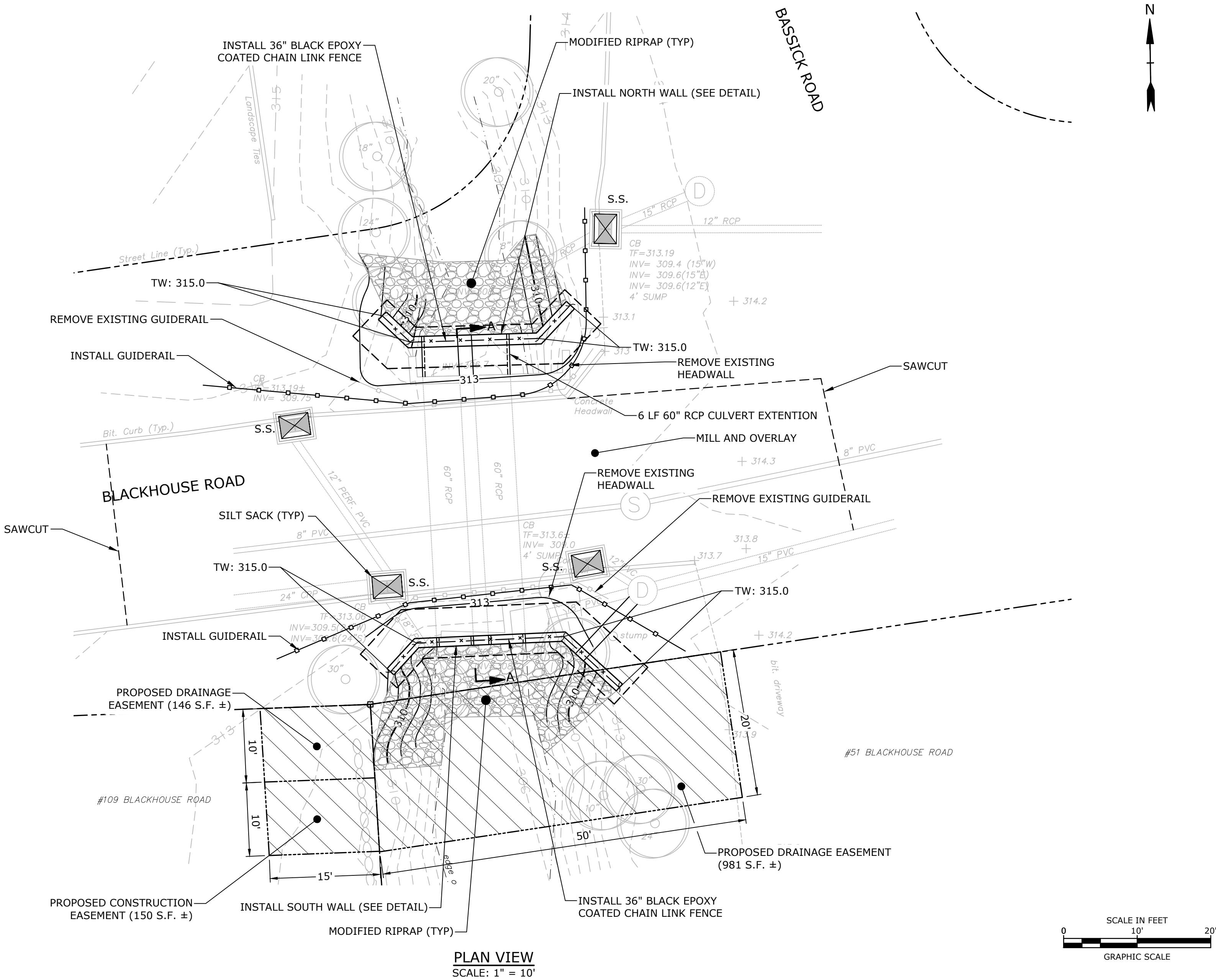
Town of  
Trumbull, CT

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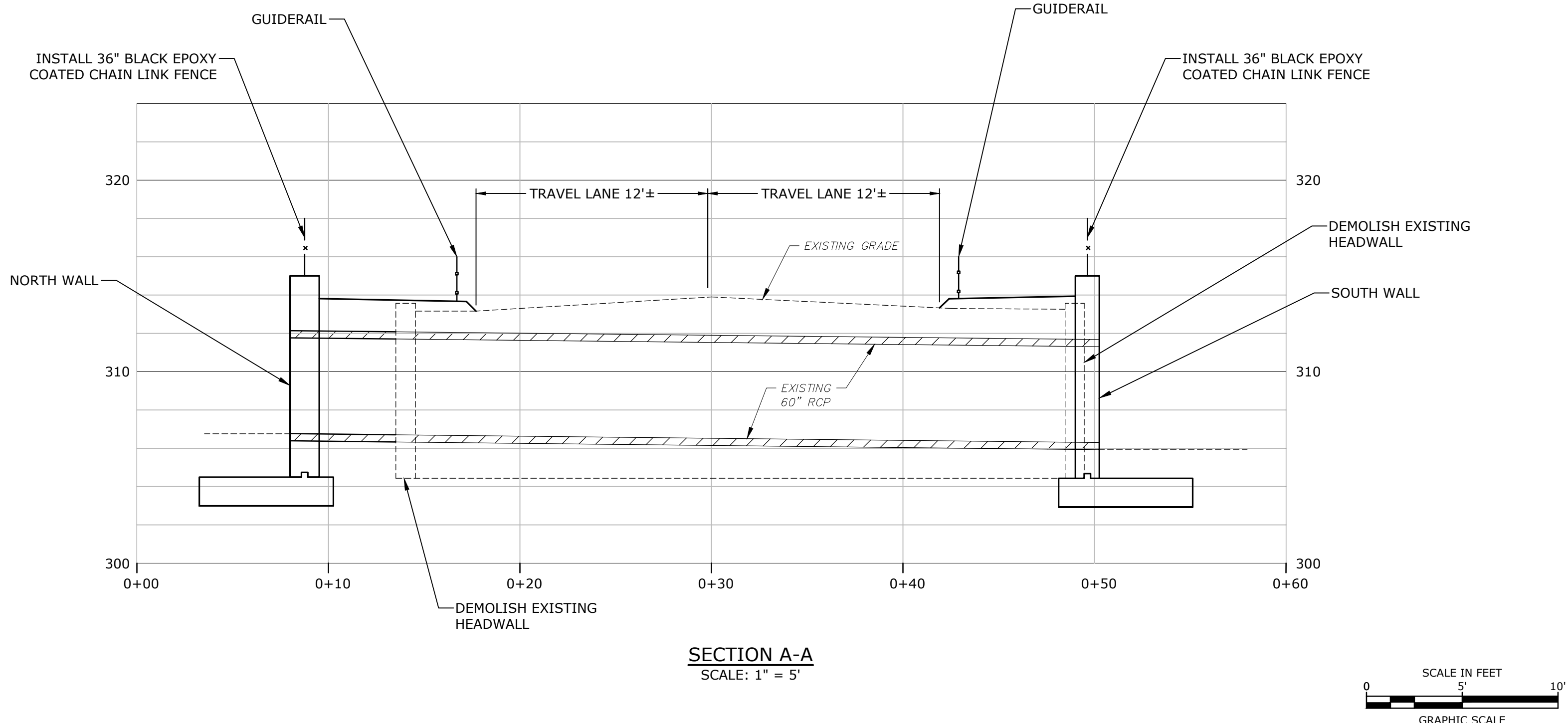
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DATE:	05/10/2019	
FILE:	DR-T0196-72-01.dwg	
DRAWN BY:	ADM	
CHECKED:	AJM	
APPROVED:	DH	

SITE PLAN, SECTION  
AND WALL DETAILS

SCALE: AS NOTED



NOTE:  
TOWN OF TRUMBULL ENGINEERING DEPARTMENT WILL PROVIDE THE CONTRACTOR  
WITH CONTROL POINTS AND BENCHMARK TO LAYOUT PROPOSED CONSTRUCTION.





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GENERAL

- G1

STRUCTURAL WORK SHALL CONFORM TO CONNECTICUT DEPARTMENT OF TRANSPORTATION LRFD BRIDGE MANUAL, LATEST EDITION, INCLUDING MOST RECENT ADDENDA, AND CONTRACT DOCUMENTS. IN CASE OF CONFLICT, MOST STRINGENT REQUIREMENT SHALL GOVERN.
- G2

CONTRACTOR SHALL VERIFY AND COORDINATE DIMENSIONS RELATED TO THIS PROJECT.
- G3

PREFORMED BITUMINOUS JOINT FILLER SHALL BE NON-EXTRUDING AND RESILIENT BITUMINOUS TYPE PREFORMED EXPANSION JOINT FILLER. IT SHALL MEET THE REQUIREMENTS OF CTDOT FORM 817.
- G4

PREFORMED EXPANSION JOINT FILLER SHALL CONFORM TO CT DOT FORM 817.

REINFORCEMENT

- R1

DETAILING, FABRICATION, AND ERECTION OF REINFORCEMENT, UNLESS OTHERWISE NOTED, SHALL CONFORM TO ACI "BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE (ACI 318)" AND ACI "MANUAL OF STANDARD PRACTICE FOR DETAILING REINFORCED CONCRETE STRUCTURES (ACI 315)", LATEST EDITION.
- R2

STEEL REINFORCEMENT UNLESS OTHERWISE SHOWN SHALL CONFORM TO ASTM A615 GRADE 60 MINIMUM (YIELD STRENGTH - 60,000 PSI).
- R3

EPOXY COATED BAR REINFORCEMENT SHALL CONFORM TO THE REQUIREMENTS OF ASTM A615 GRADE 60 AND BE COATED TO THE REQUIREMENTS OF ASTM D3963.
- R4

PROVIDE AND SCHEDULE ON SHOP DRAWINGS, ALL NECESSARY ACCESSORIES TO HOLD REINFORCEMENT SECURELY IN POSITION: MINIMUM REQUIREMENTS SHALL BE: HIGH CHAIRS, 4'-0" ON CENTER, #5 SUPPORT BAR FOR HIGH CHAIRS, SLAB BOLSTERS, 3'-6" ON CENTER, ALL WIRE CHAIRS AND BOLSTERS TO BE PLASTIC TIPPED.
- R5

WHERE CONTINUOUS BARS ARE CALLED FOR THEY SHALL BE RUN CONTINUOUSLY AROUND CORNERS AND LAPPED AT NECESSARY SPLICES OR HOOKED AT DISCONTINUOUS ENDS.
- R6

WHERE REINFORCEMENT IS CALLED FOR IN SECTION, REINFORCEMENT IS CONSIDERED TYPICAL WHEREVER THE SECTION APPLIES.
- R7

REINFORCEMENT SHALL BE CONTINUOUS THROUGH ALL CONSTRUCTION JOINTS UNLESS OTHERWISE INDICATED ON THE DRAWINGS.
- R8

WELDED WIRE FABRIC SHALL LAP 12" OR TWO SPACES, WHICHEVER IS LARGER, AND SHALL BE WIRED TOGETHER.
- R9

REINFORCEMENT COUPLER SPLICES SHALL BE MECHANICAL DEVICES CAPABLE OF TRANSMITTING THE ULTIMATE TENSILE AND COMPRESSIVE STRENGTH OF THE BAR.  
  
INSTALLATION OF REINFORCEMENT SHALL BE COMPLETED AT LEAST 24 HOURS PRIOR TO SCHEDULED CONCRETE PLACEMENT. NOTIFY ENGINEER OF COMPLETION AT LEAST 24 HOURS PRIOR TO SCHEDULED COMPLETION OF PLACEMENT OR REINFORCEMENT.
- R11

REINFORCEMENT SHALL BE SET BEFORE PLACING CONCRETE. SETTING ANY REINFORCEMENT INTO WET CONCRETE IS PROHIBITED.

CONCRETE

- C1

CONCRETE WORK SHALL CONFORM TO THE LATEST EDITIONS OF THE CONNECTICUT DEPARTMENT OF TRANSPORTATION BRIDGE DESIGN MANUAL AND STANDARD SPECIFICATIONS
- C2

CONCRETE SHALL BE CONTROLLED CONCRETE, PROPORTIONED, MIXED AND PLACED UNDER THE SUPERVISION OF AN APPROVED CONCRETE TESTING AGENCY OR THE ENGINEER.
- C3

CAST-IN-PLACE FOOTINGS AND STEMS SHALL BE CT DOT STANDARD "CLASS A" CONCRETE. TOP SLAB SHALL BE CT DOT STANDARD "CLASS F" CONCRETE.
- C4

THE USE OF CONSTRUCTION JOINTS WHERE SHOWN ON THE DRAWINGS IS MANDATORY. OMISSIONS, ADDITIONS OR CHANGES SHALL NOT BE MADE EXCEPT WITH THE SUBMISSION OF A WRITTEN REQUEST TOGETHER WITH DRAWINGS OF THE PROPOSED JOINT LOCATIONS FOR APPROVAL OF THE STRUCTURAL ENGINEER.
- C5

WHERE CONSTRUCTION JOINTS ARE NOT SHOWN, DRAWINGS SHOWING LOCATION OF CONSTRUCTION JOINTS AND CONCRETE PLACING SEQUENCE SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL PRIOR TO PREPARATION OF THE REINFORCEMENT SHOP DRAWINGS.
- C6

CONCRETE SLABS SHALL BE CAST SO THAT THE SLAB THICKNESS IS AT NO POINT LESS THAN THAT INDICATED ON THE DRAWINGS.
- C7

CONCRETE SHALL BE PLACED WITHOUT HORIZONTAL CONSTRUCTION JOINTS EXCEPT WHERE SHOWN OR NOTED.
- C8

EXPOSED EDGES OF CONCRETE ELEMENTS SHALL HAVE CHAMFERED CORNERS.

FOUNDATIONS

- F1

NO CONCRETE SHALL BE PLACED IN WATER OR ON FROZEN GROUND.
- F2

BOTTOM OF FOUNDATION ELEVATIONS GIVEN ON DRAWINGS ARE TO BE CONSIDERED MINIMUM DEPTHS. CONTRACTOR SHALL HAVE FURTHER EXCAVATION AS REQUIRED TO REACH GOOD BEARING.
- F3

ALL EXCAVATIONS FOR FOOTINGS SHALL BE FINISHED BY HAND FOR THE LAST 6".
- F4

ALL FINISHED EXCAVATIONS SHALL BE INSPECTED BY THE ENGINEER BEFORE ANY CONCRETE IS PLACED.
- F5

ALL BACKFILL SHALL BE COMPACTED IN MAXIMUM 12" LIFTS. SEE SPECIFICATIONS.
- F6

BACKFILL WITH CT DOT SPECIFIED PERVIOUS STRUCTURE BACKFILL.
- F7

GROUP 2 NON-WOVEN GEOTEXTILE SHALL BE AMOCO 4506, CARTHAGE MILLS FX-60HS, MIRAFI 160N, OR APPROVED EQUAL.
- F8

EXCAVATED SOIL SUBGRADES SHOULD BE PROOF COMPACTED WITH EITHER 10 PASSES OF A 10-TON VIBRATORY DRUM ROLLER FOR OPEN EXCAVATIONS OR 6 PASSES OF A LARGE, REVERSIBLE, WALK BEHIND VIBRATORY COMPACTOR CAPABLE OF EXERTING A MINIMUM FORCE OF 2,000 LBS IN TRENCH OR FIT EXCAVATIONS.
- F9

OVER-EXCAVATE ANY SOFT OR WEAK SPOTS AND REPLACE WITH COMPACTED GRANULAR FILL OR COMPACTED CRUSHED STONE WRAPPED IN A NON-WOVEN GEOTEXTILE.

BAR SIZE DESIGNATION		DEVELOPMENT LENGTH (INCHES)	SPLICE LENGTH (INCHES)	
ENGLISH	METRIC	Ld	CLASS B	CLASS B TOP BARS
#3	#10	15	19	25
#4	#13	19	25	33
#5	#16	24	31	40
#6	#19	29	37	48
#7	#22	42	54	70
#8	#25	48	62	81
#9	#29	54	70	91
#10	#32	61	79	103

REBAR SPLICE LENGTH SCHEDULE

- NOTES:
1.

IF CLEAR SPACING BETWEEN THE REBARS IS LESS THAN THREE BAR DIAMETERS, OR IF COVER IS LESS THAN TWO BAR DIAMETERS, INCREASE THE SPLICE LENGTH BY AN ADDITIONAL 50%.
2.

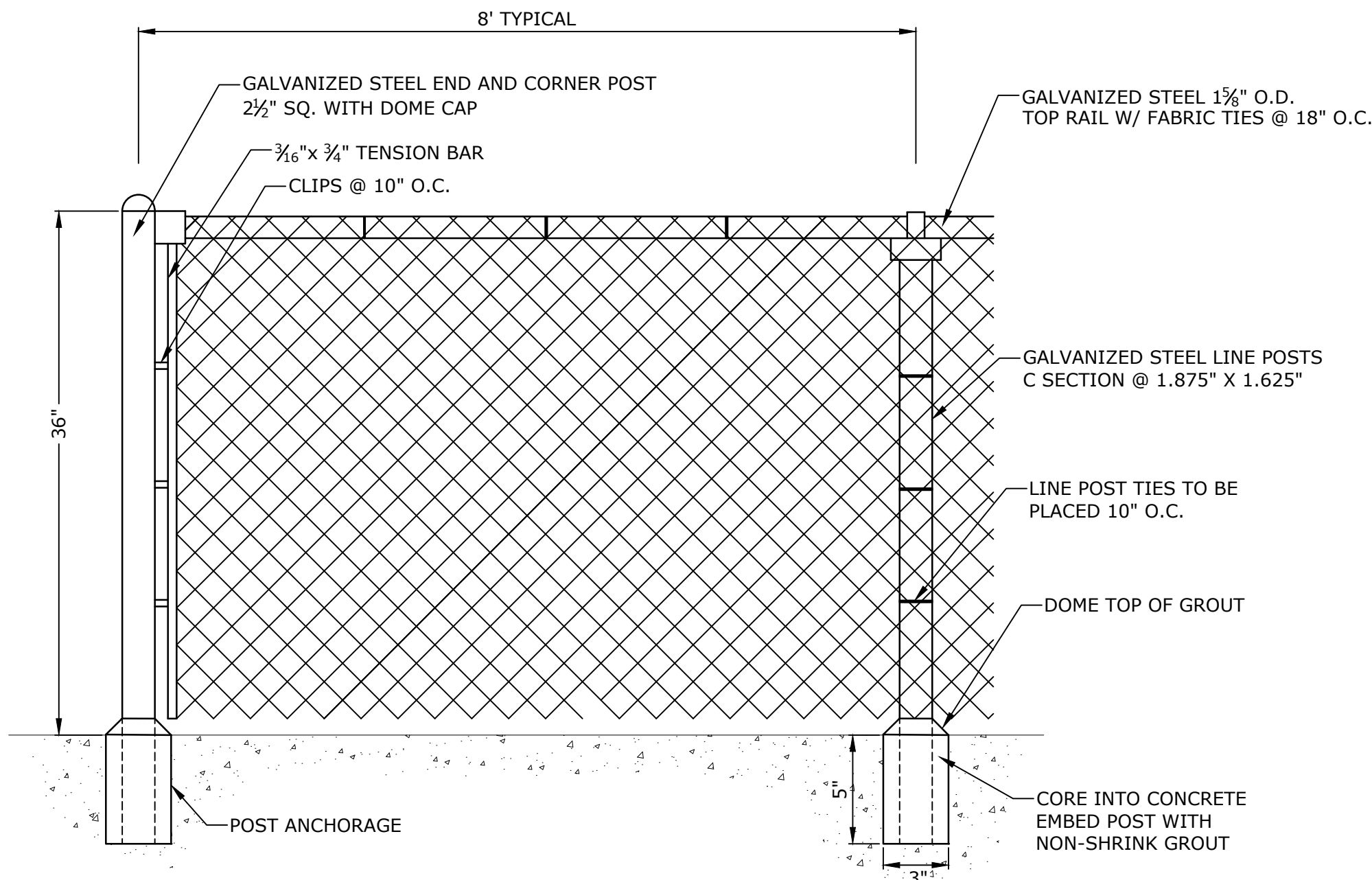
IF EPOXY COATED REBAR IS USED, INCREASE THE SPLICE LENGTH BY AN ADDITIONAL 50%.
3.

IF LIGHTWEIGHT CONCRETE IS USED, INCREASE THE SPLICE LENGTH BY AN ADDITIONAL 30%.
4.

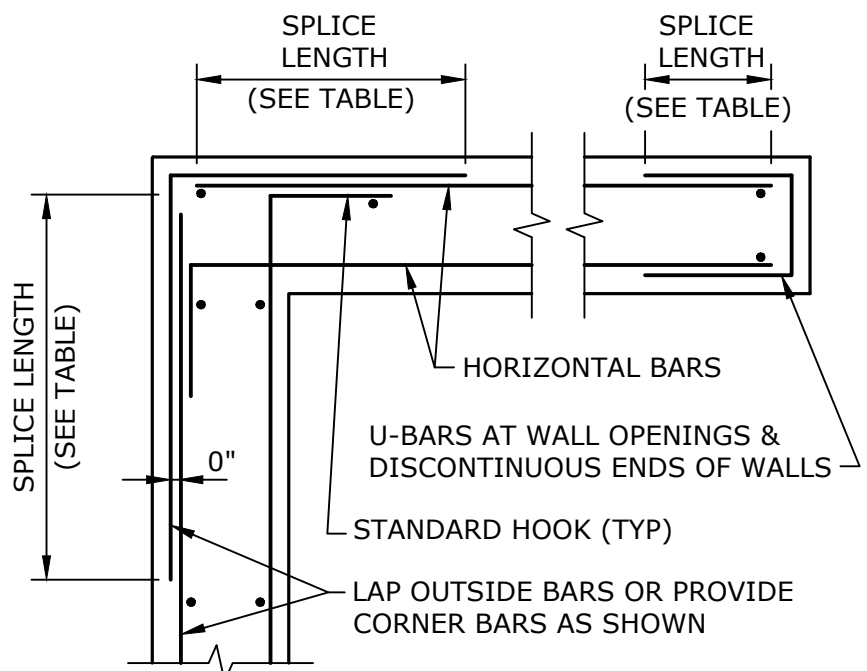
THE MINIMUM REBAR SPLICE LENGTH SCHEDULE IS BASED ON F'c= 4,000 PSI AND Fy= 60,000 PSI. ADJUST FOR OTHER STRENGTHS USING ACI-318.
5.

FOR HORIZONTAL REINFORCEMENT SO PLACED THAT MORE THAN 12 INCHES OF FRESH CONCRETE IS CAST IN THE MEMBER BELOW, INCREASE THE DEVELOPMENT LENGTH BY AN ADDITIONAL 30%.
6.

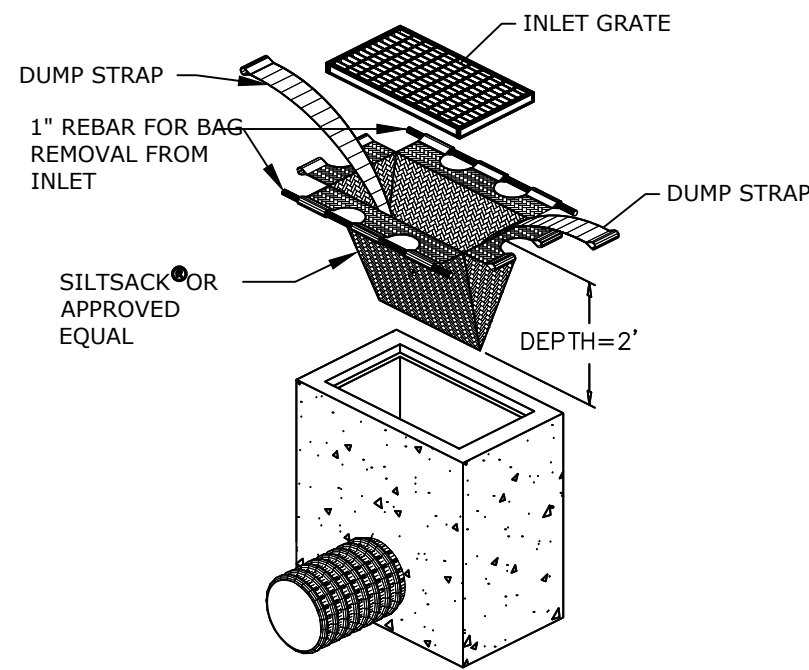
WHEN BARS OF DIFFERENT SIZE ARE LAP SPICED, THE SPLICE LENGTH SHALL BE THE LARGER OF EITHER THE DEVELOPMENT LENGTH OF THE LARGER BAR OR THE SPLICE LENGTH OF THE SMALLER BAR.



36" BLACK EPOXY COATED CHAIN LINK FENCE  
 RETAINING WALL MOUNTED  
 NO SCALE



PLAN OF HORIZONTAL REINFORCING  
 AT CORNERS OF CONCRETE WALLS  
 NO SCALE



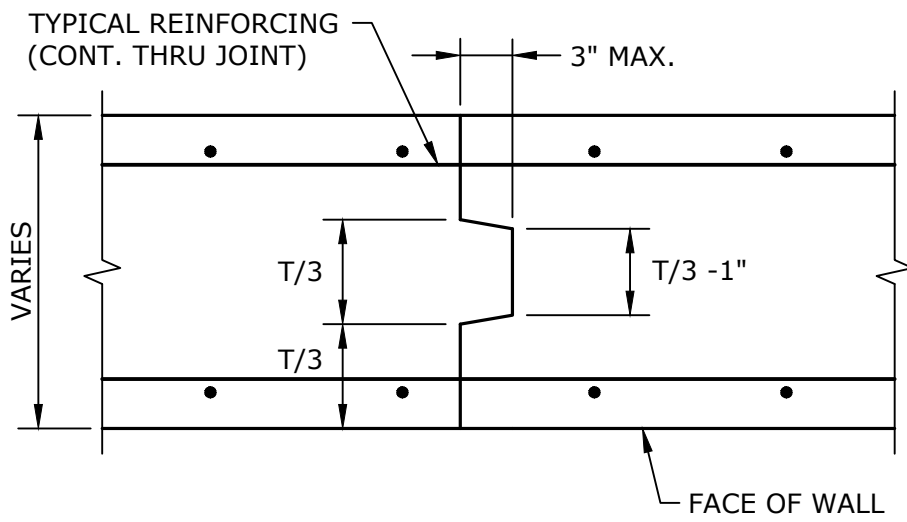
- NOTES:
1.

SILTSACKS MANUFACTURED BY ATLANTIC CONSTRUCTION FABRICS, INC.; 1801-A WILLIS ROAD; RICHMOND, VA 23237.
2.

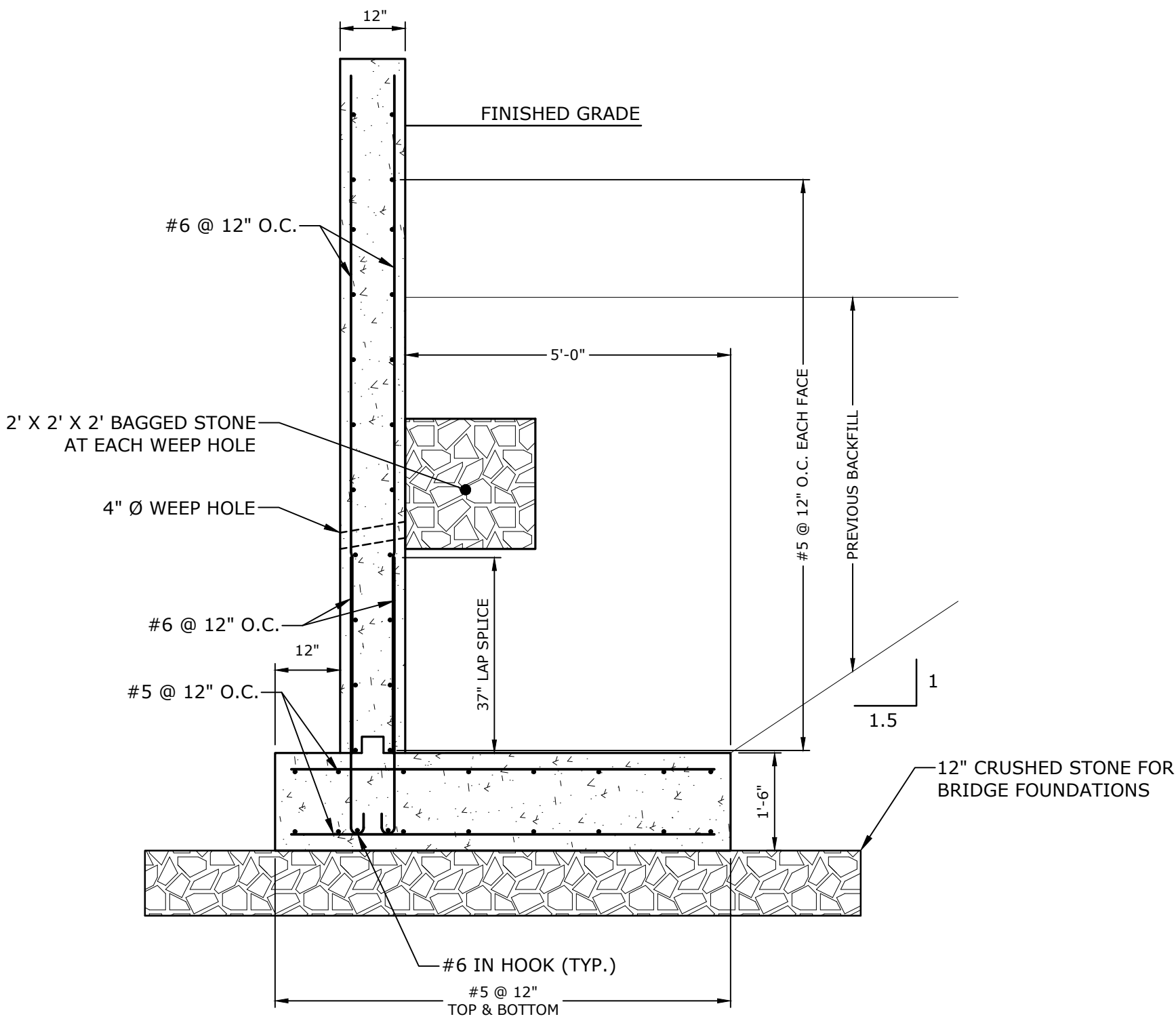
SILTSACKS FOR TRENCH GRATE WILL MATCH OPENING LENGTH AS REQUIRED.
3.

SILTSACKS SHALL BE CLEANED OUT AND MAINTAINED IN GOOD WORKING ORDER PER MFR RECOMMENDATIONS.

SILTSACK®  
 NO SCALE



CONSTRUCTION JOINT  
 NO SCALE



TYPICAL WING WALL SECTION  
 SCALE: 1" = 2'

Blackhouse  
 Road Culvert  
 Rehabilitation

Town of  
 Trumbull, CT

VERIFY SCALE  
 BAR IS 1 INCH ON  
 ORIGINAL DRAWING  
 0 1 INCH  
 IF NOT ONE INCH ON  
 THIS SHEET, ADJUST  
 SCALES ACCORDINGLY

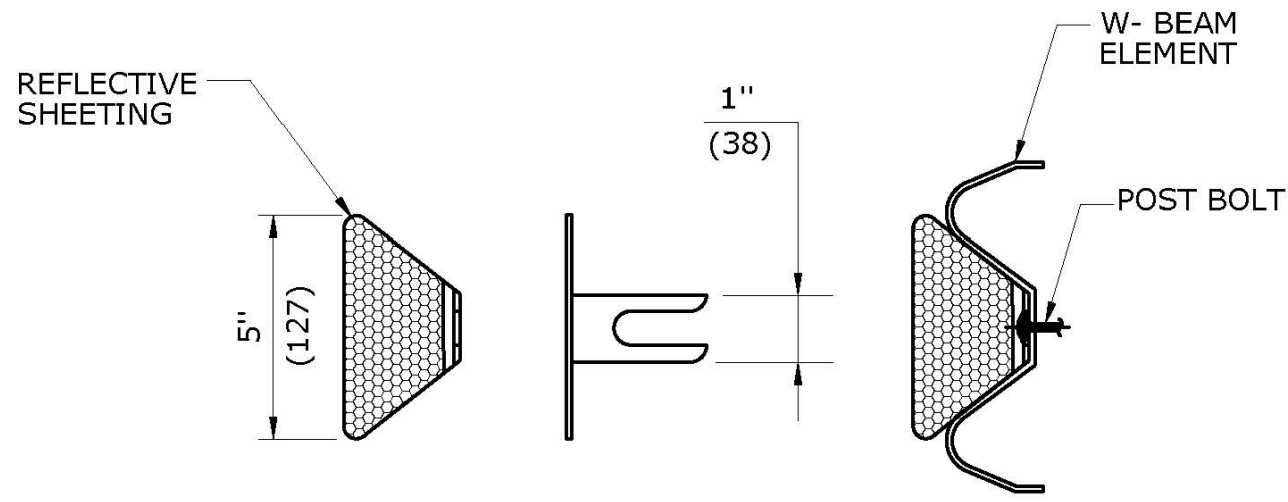
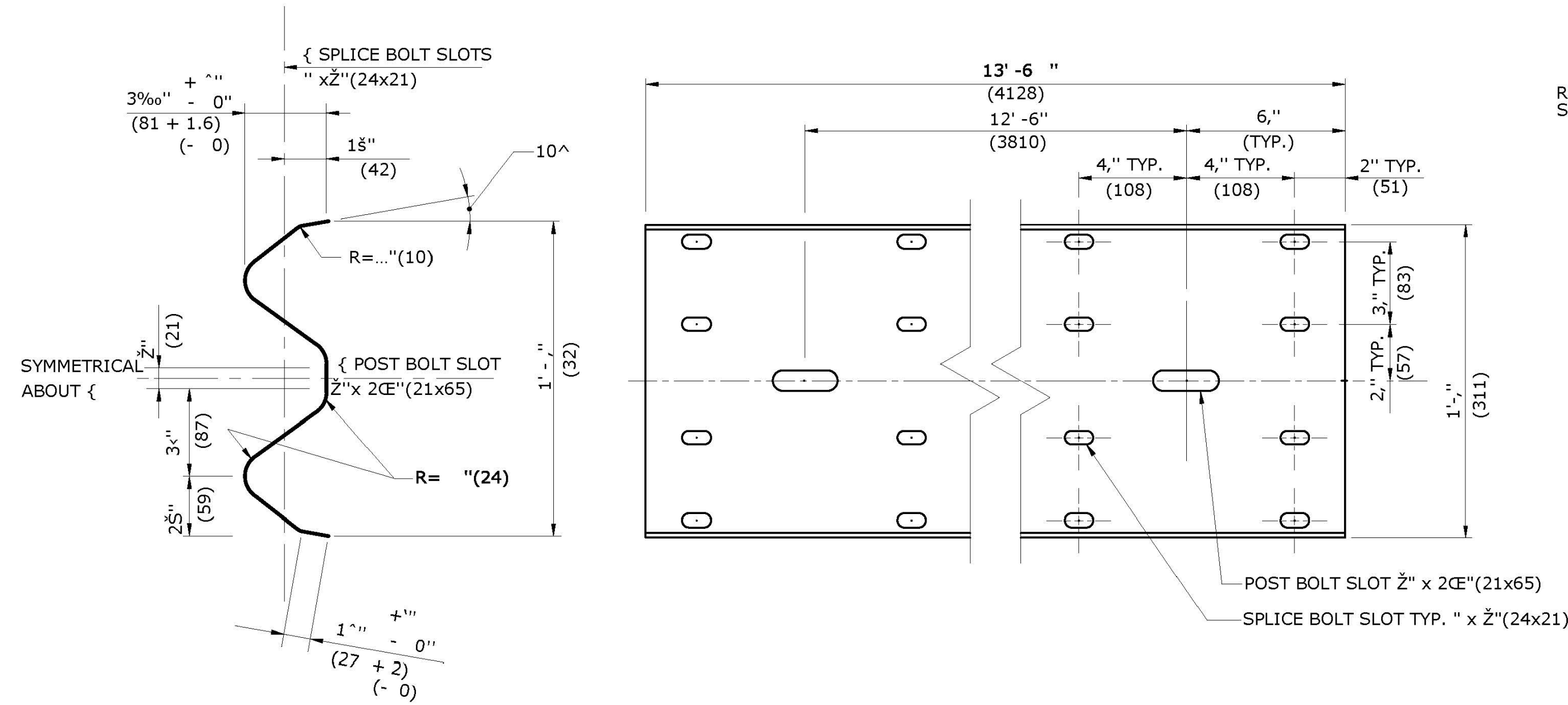
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DATE:	05/10/2019	
FILE:	DS-T0196-72-01.dwg	
DRAWN BY:	RAS	
CHECKED:	AJM	
APPROVED:	DH	

STRUCTURAL AND SITE  
 NOTES AND DETAILS

SCALE: AS NOTED



Last Saved: 5/10/2018 9:25pm By: WKeeler  
 Tighe & Bond 3:117019672 Blackhouse RdDrawings\_FiguresAutoCAD/CulvertSheets/05-10196-72-01.dwg



GENERAL NOTES:

- NEW R-B 350 GUIDERAIL INCLUDING SYSTEMS, ANCHORS AND TRANSITIONS INSTALLED ON EXPRESSWAYS AND RAMPS SHALL USE CLASS B TYPE II (10 GAUGE) W-BEAM RAIL ELEMENTS.
- W6x9 (W150x14) POSTS MAY BE USED IN PLACE OF W6 x 8.5(W150x13) POSTS.
- W8x13 (W200x19) POSTS, 7'-6\"(2286) LONG, ARE USED WITH TRANSITIONS TO VERTICAL OR SAFETY SHAPE PARAPETS (POSTS 1 AND 2) AND SYSTEM 6.
- W6x8.5 (W150x13) POSTS, 6'-0\"(1829) LONG, ARE USED WITH TRANSITIONS TO VERTICAL OR SAFETY SHAPE PARAPETS (POSTS 3 THROUGH 6), MD-B 350, SYSTEM 5 & 5A, AND STANDARD R-B 350 GUIDERAIL.

DELINEATOR NOTES:

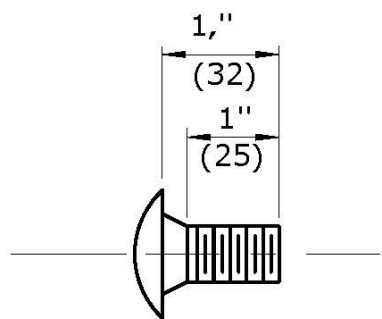
- DELINEATORS SHALL BE FORMED OF .080 POLY-CARBONATE OR .080 SHEET ALUMINUM IN ACCORDANCE WITH M.18.13.
- REFLECTIVE SHEETING SHALL CONFORM TO M.18.09.2.
- DELINEATORS SHALL BE INSTALLED ON THE POST CLOSEST TO THE DESIGNATED SPACING.
- REFLECTIVE SHEETING SHALL BE WHITE EXCEPT ON THE LEFT SIDE OF DIVIDED STREETS, HIGHWAYS, RAMPS, AND ONE WAY ROADS IN THE DIRECTION OF TRAVEL WHERE IT SHALL BE YELLOW.
- INSTALL DELINEATORS ON RAIL THAT IS PARALLEL TO AND NOT GREATER THAN 6\"(1829) FROM THE EDGE OF THE ROADWAY. A MINIMUM OF THREE DELINEATORS MUST BE INSTALLED ON ANY RUN OF RAIL.

DELINEATOR SPACING:  
 RADIUS ≥ 300'(91440) - SPACE EVERY 50'(15.24m)  
 RADIUS < 300'(91440) - SPACE EVERY 25'(7.62m)

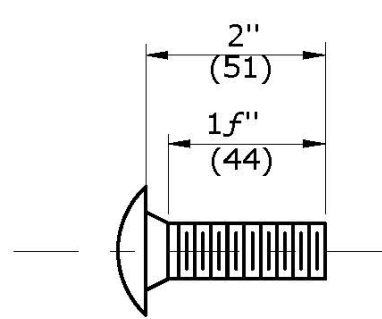
SELECTION THRU RAIL ELEMENT  
END VIEW

TYPICAL W-BEAM RAIL ELEMENT  
CLASS A, TYPE II

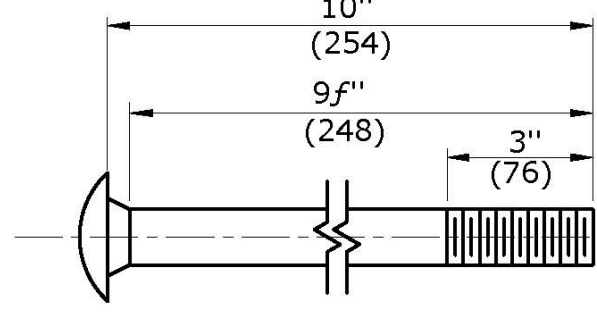
NOTE: ALL DIMENSIONS SUBJECT TO  
MANUFACTURING TOLERANCES



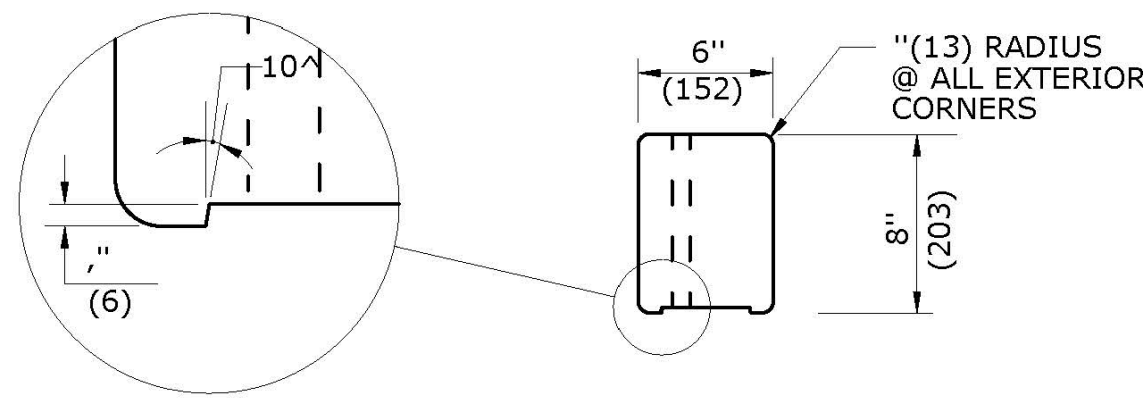
W-BEAM SPLICE  
BOLT DETAIL



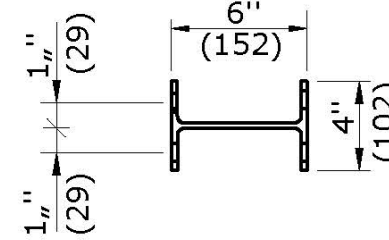
POST BOLT DETAIL  
FOR R-B 350  
SYSTEM 6 RUBRAIL



POST BOLT DETAIL FOR R-B 350  
AND MD-B 350 GUIDERAIL  
(UNTHREADED PORTION NOT TO EXCEED 6f\"(171))

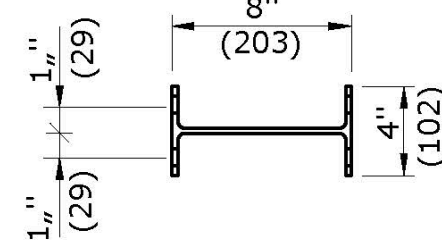


PLAN



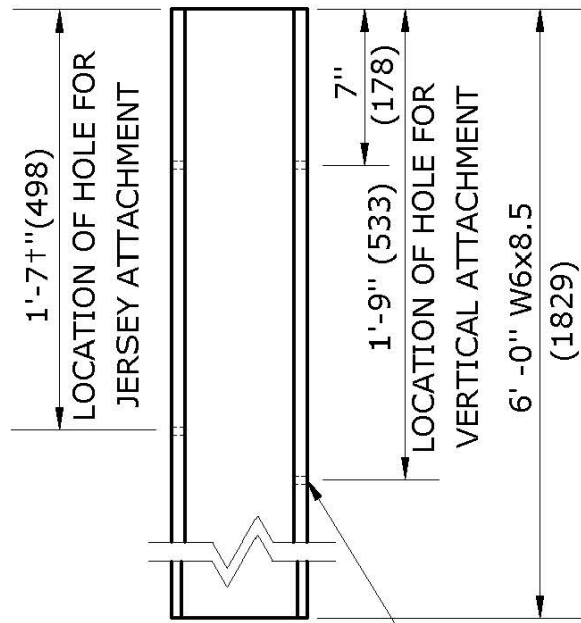
W6x8.5 POST  
(W150x13)

6'-0\"(1829) LONG



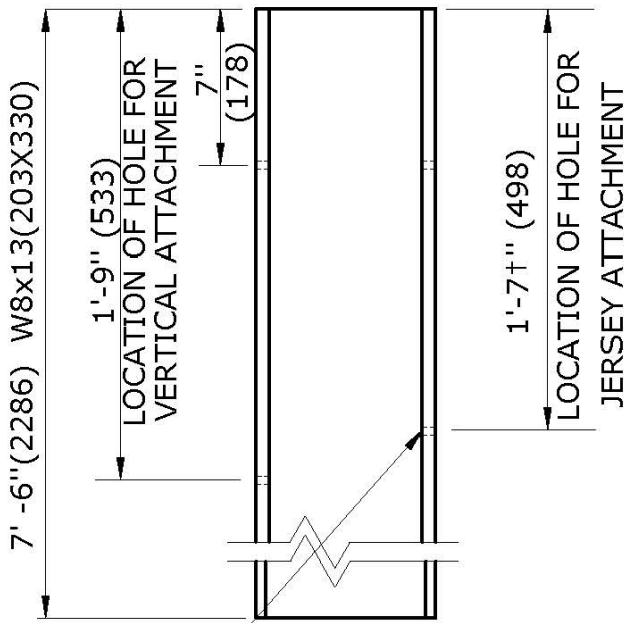
W8x13 POST  
(W200x19)

7'-6\"(2286) LONG



W6x8.5 POST  
(W150x13)

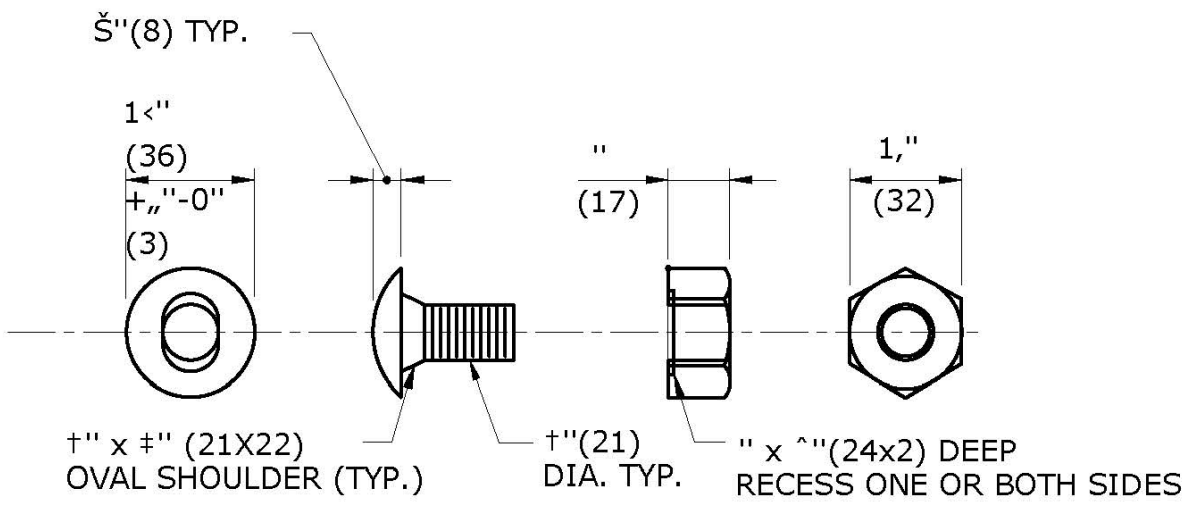
6'-0\"(1829) LONG



W8x13 POST  
(W200x19)

7'-6\"(2286) LONG

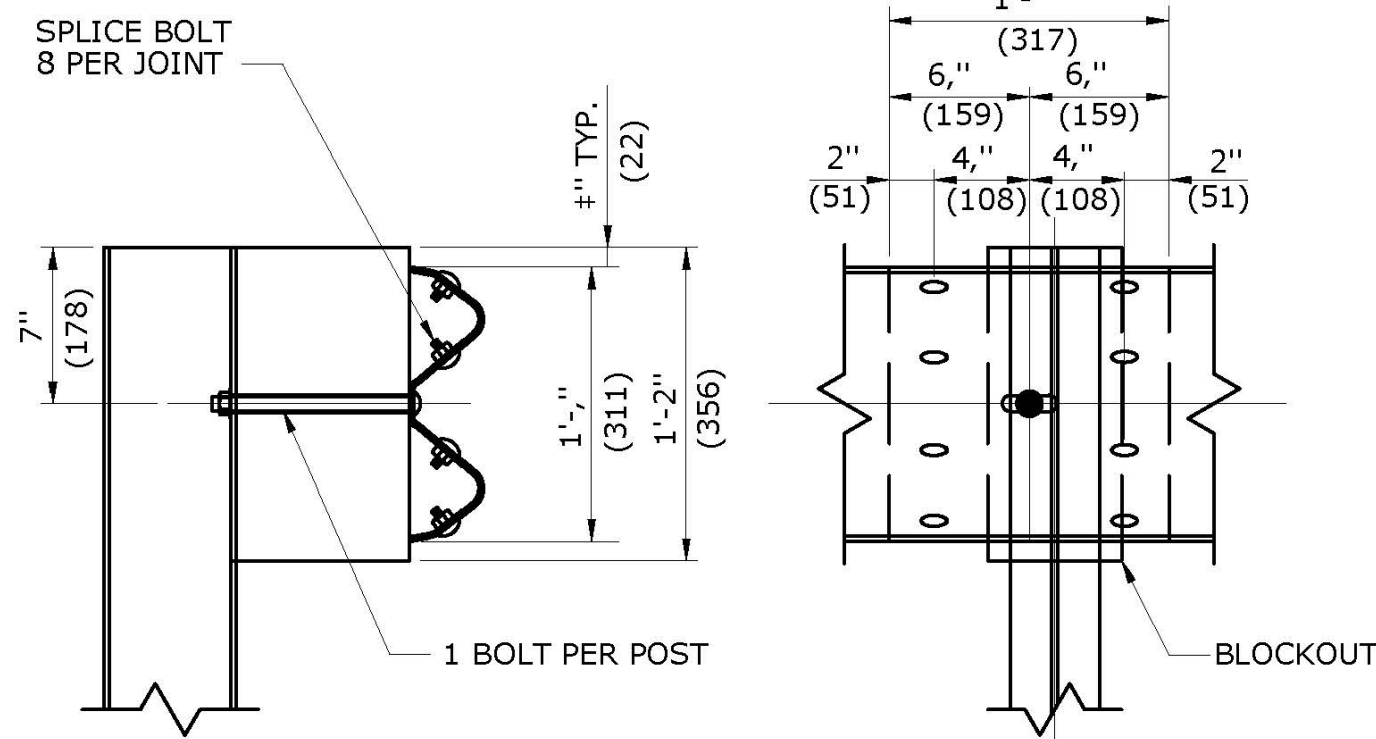
BOLT HOLE LAYOUT FOR W8x13(W200x19)  
AND W6x8.5 (W150x13)UNIFORM POST  
(REFER TO GENERAL NOTES)



NOTE: AFTER GALVANIZING, THE NUT SHALL BE FREE RUNNING ON THE BOLT. DIAMETER SHOWN IS TYPICAL FOR ALL GUIDERAIL BOLTS. SEE DETAILS ABOVE FOR SPECIFIC LENGTHS.

BUTTONHEAD BOLT

HEX NUT

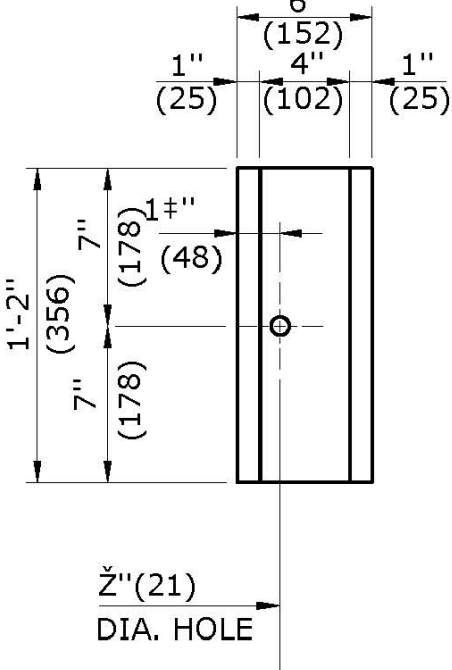


SECTION

ELEVATION

LAP DETAIL

NOTE:  
LAP RAIL SECTION IN DIRECTION OF TRAFFIC



R-B 350 PLASTIC  
BLOCKOUT DETAIL

ALL METRIC DIMENSIONS ARE IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

REV.	DATE	REVISION DESCRIPTION
1	6/11	REMOVE WEATHERING STEEL NOTES

NOT TO SCALE  
 STATE OF CONNECTICUT  
 DEPARTMENT OF TRANSPORTATION  
 Filename: \$FILE\$\$ Model: \$MODELNAME\$

SUBMITTED BY:	NAME/DATE/TIME:
APPROVED BY:	NAME/DATE/TIME:

CTDOT STANDARD SHEET
OFFICE OF ENGINEERING

STANDARD SHEET TITLE:	W-BEAM METAL BEAM RAIL HARDWARE
-----------------------	------------------------------------

STANDARD SHEET NO.:	HW-910_01
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Blackhouse  
 Road Culvert  
 Rehabilitation

Town of  
 Trumbull, CT

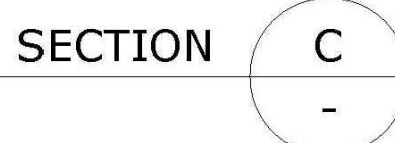
MARK	DATE	DESCRIPTION
PROJECT NO:	T-0196-72	
DATE:	05/10/2019	
FILE:	DS-T0196-72-01.dwg	
DRAWN BY:	JCB	
CHECKED:	AJM	
APPROVED:	DH	

CTDOT DETAILS - 1

SCALE: AS NOTED

HW-910\_01



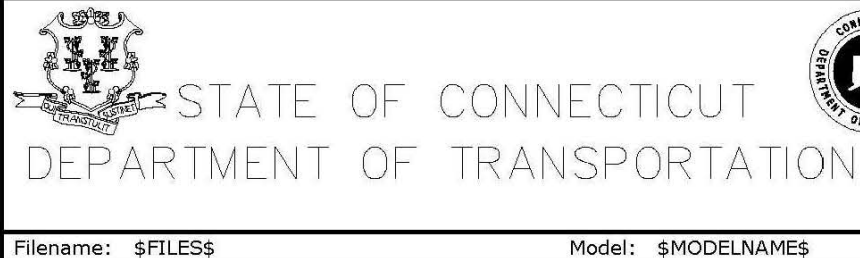


1	6/11	REVISED NOTE 9 FOR USE OF PROCESSED AGGREGATE AND REMOVED NOTE 6 FOR WEATHERING STEEL
	--	--
	--	--
	--	--
	--	--
	--	--
REV.	DATE	REVISION DESCRIPTION

THE INFORMATION, INCLUDING ESTIMATED QUANTITIES OF WORK, SHOWN ON THESE SHEETS IS BASED ON LIMITED INVESTIGATIONS BY THE STATE AND IS IN NO WAY WARRANTED TO INDICATE THE CONDITIONS OF ACTUAL QUANTITIES OF WORK WHICH WILL BE REQUIRED.

Plotted Date: \$DATE\$

NOT TO SCALE



SUBMITTED BY:	NAME/DATE/TIME:
APPROVED BY:	NAME/DATE/TIME:

CTDOT  
STANDARD SHEET


OFFICE OF ENGINEERING

METAL BEAM RAIL  
(TYPE R-B 350) GUIDERAIL

HW-910 0

**VERIFY SCALE**

BAR IS 1 INCH ON  
ORIGINAL DRAWING

0  1 INCH

IF NOT ONE INCH ON  
THIS SHEET, ADJUST  
SCALES ACCORDINGLY

MARK	DATE	DESCRIPTION
PROJECT NO:		T-0196-72
DATE:		05/10/2019
FILE: DS-T0196-72-01.dwg		
DRAWN BY:		JCB
CHECKED:		AJM
APPROVED:		DH

CTDOT DETAILS - 2

SCALE: AS NOTED

HW-910 02



Blackhouse  
Road Culvert  
Rehabilitation

Town of  
Trumbull, CT

VERIFY SCALE  
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ORIGINAL DRAWING  
IF NOT ONE INCH ON  
THIS SHEET, ADJUST  
SCALES ACCORDINGLY

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PROJECT NO:	T-0196-72	
DATE:	05/10/2019	
FILE:	DS-T0196-72-01.dwg	
DRAWN BY:	JCB	
CHECKED:	AM	
APPROVED:	DH	

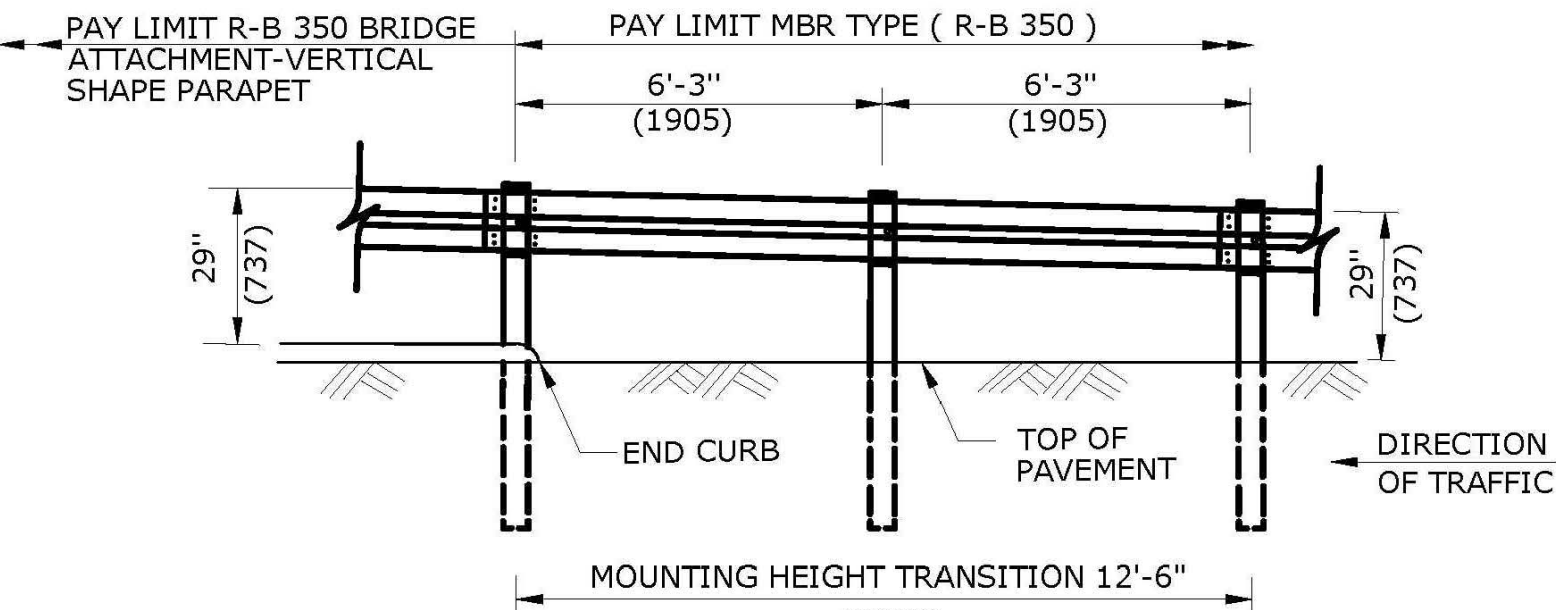
CTDOT DETAILS - 3

SCALE: AS NOTED

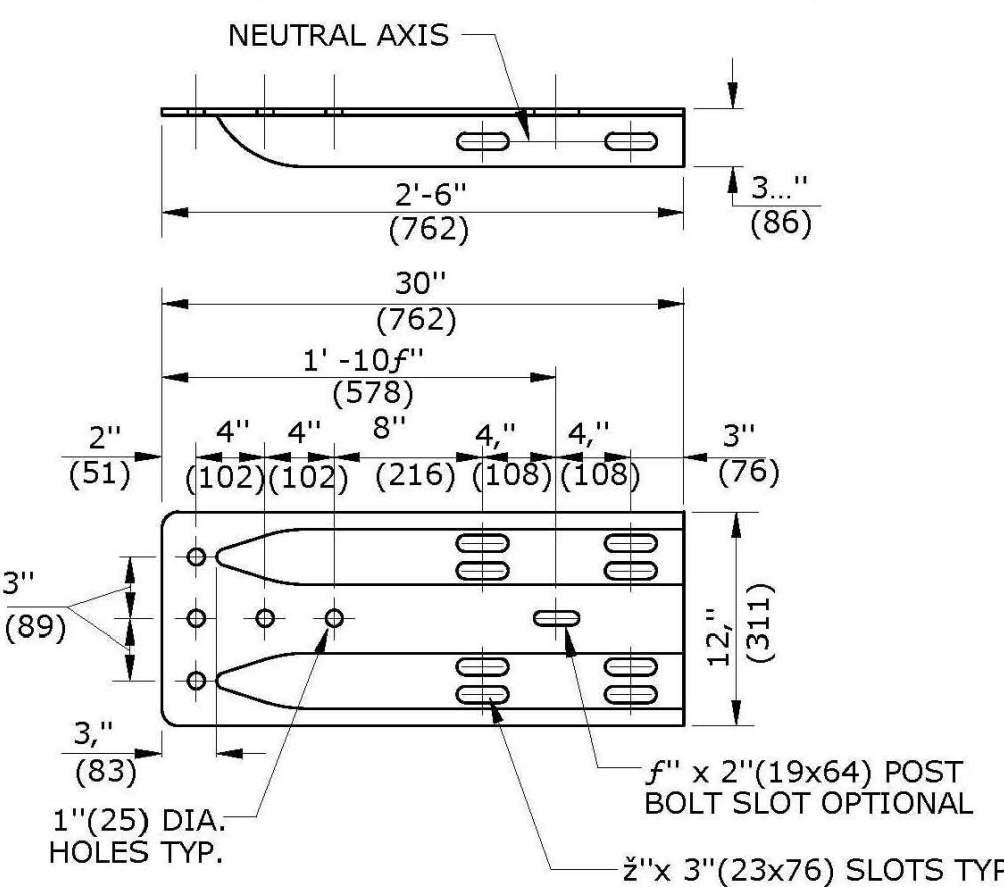
HW-910\_07

GENERAL NOTES:

- THIS R-B 350 GUIDERAIL TRANSITION IS APPROPRIATE FOR CONNECTION AT THE FOLLOWING LOCATIONS:
  - WHEN ANY SAFETY SHAPE (F-SHAPED OR JERSEY SHAPE) PARAPET HAS AN ELECTRICAL JUNCTION BOX WITHIN 8' (2438) OF THE END OF THE PARAPET, THE END OF THE PARAPET SHALL BE MODIFIED OR TRANSFORMED TO A VERTICAL SHAPE PRIOR TO GUIDERAIL ATTACHMENT.
  - VERTICAL WALL OR ABUTMENT FACE.
  - VERTICAL CONCRETE PARAPET WITH SIDEWALK.
  - VERTICAL FACE FOR LEADING AND TRAILING ENDS ON DUAL DIRECTION ROADWAYS.
- POSTS 1 AND 2 ARE W8 x 13(W200x19), 7'-6" (2286) LONG. ALL OTHER POSTS IN TRANSITION ARE W6 x 8.5(W150x14), 6' (1829) LONG.
- POSTS 1 THROUGH 5 REQUIRE AN ADDITIONAL HOLE TO ATTACH LOWER BLOCKOUTS AND/OR LOWER RUBRAIL.
- RUBRAIL BLOCKOUTS FOR POSTS 1 THROUGH 4 ARE ATTACHED TO POST AND RAIL WITH A 1" (16) BUTTONHEAD BOLTS (SEE CHART FOR BOLT LENGTH). RUBRAIL ONLY IS ATTACHED TO POST 5 WITH A 1" x 1" (16 x 32) BUTTONHEAD BOLT.
- THE RUBRAIL MAY BE SHOP BENT IN THE LAST 3' (914) TO FACILITATE INSTALLATION. DO NOT ATTACH RUBRAIL TO BACK OF POST 6.
- USE CLASS B (10 GAUGE) TYPE II W-BEAM RAIL ELEMENTS FOR INSTALLATIONS ON EXPRESSWAYS AND RAMP.
- FOR THIS APPLICATION WHEN CURBING IS USED, R-B 350 RAIL HEIGHT MUST BE MEASURED FROM THE TOP OF CURBING TO THE TOP OF RAIL. SEE DETAIL D FOR HEIGHT TRANSITION.
- FOR NEW CONSTRUCTION WHERE CURBING IS NEEDED, USE EITHER 4" (102) BITUMINOUS CONCRETE PARK CURBING OR PRECAST CONCRETE TRANSITION CURBING SET WITH A 4" (102) REVEAL. THE PREFERRED CURBING FOR HIGH SPEED ROADWAYS (>45 MPH (72kph)) IS 4" (102). HOWEVER, ON LOW SPEED ROADWAYS (<45 MPH (72kph)) A 6" (152) CURBING MAY BE USED. ADJUST RAIL HEIGHT AS REQUIRED.
- ANCHORAGE:
  - AT EXISTING PARAPETS EACH W-BEAM TERMINAL CONNECTOR SHALL BE ANCHORED USING FOUR 3/4" x 12" (22 x 305) CHEMICALLY ANCHORED BOLTS WITH WASHERS OR AS DETAILED ON STRUCTURE SHEETS. MAXIMUM BOLT PROJECTION BEYOND THE NUT SHALL BE 1" (13). THE 12" (305) MINIMUM LENGTH OF CHEMICALLY ANCHORED BOLTS SHALL INCLUDE A MINIMUM EMBEDMENT DEPTH OF 10" (254) INTO SUITABLY REINFORCED CONCRETE OR AS RECOMMENDED BY THE MANUFACTURER OF BONDING MATERIAL.
  - FOR NEW PARAPETS OR BARRIERS, THE W-BEAM TERMINAL CONNECTORS SHALL BE ANCHORED AS DETAILED ON THE STRUCTURE SHEETS.
- ADDITIONAL BLOCKOUTS WITH POSTS 1 THROUGH 6 SHOULD BE AVOIDED.
- FOR SINGLE DIRECTION ROADWAY:
  - INSTALL W-BEAM TERMINAL CONNECTOR BETWEEN NESTED GUIDERAIL ELEMENTS. FOR DUAL DIRECTION ROADWAY FOR APPROACHING TRAFFIC.
  - INSTALL W-BEAM TERMINAL CONNECTOR BETWEEN NESTED GUIDERAIL ELEMENTS. FOR TRAILING END.
- INSTALL W-BEAM TERMINAL CONNECTOR OUTSIDE OF THE NESTED GUIDERAIL ELEMENTS.
- MINIMUM RAIL HEIGHT FOR NEW CONSTRUCTION SHALL BE 29" (737) + 1" (25).



DETAIL D  
HEIGHT TRANSITION



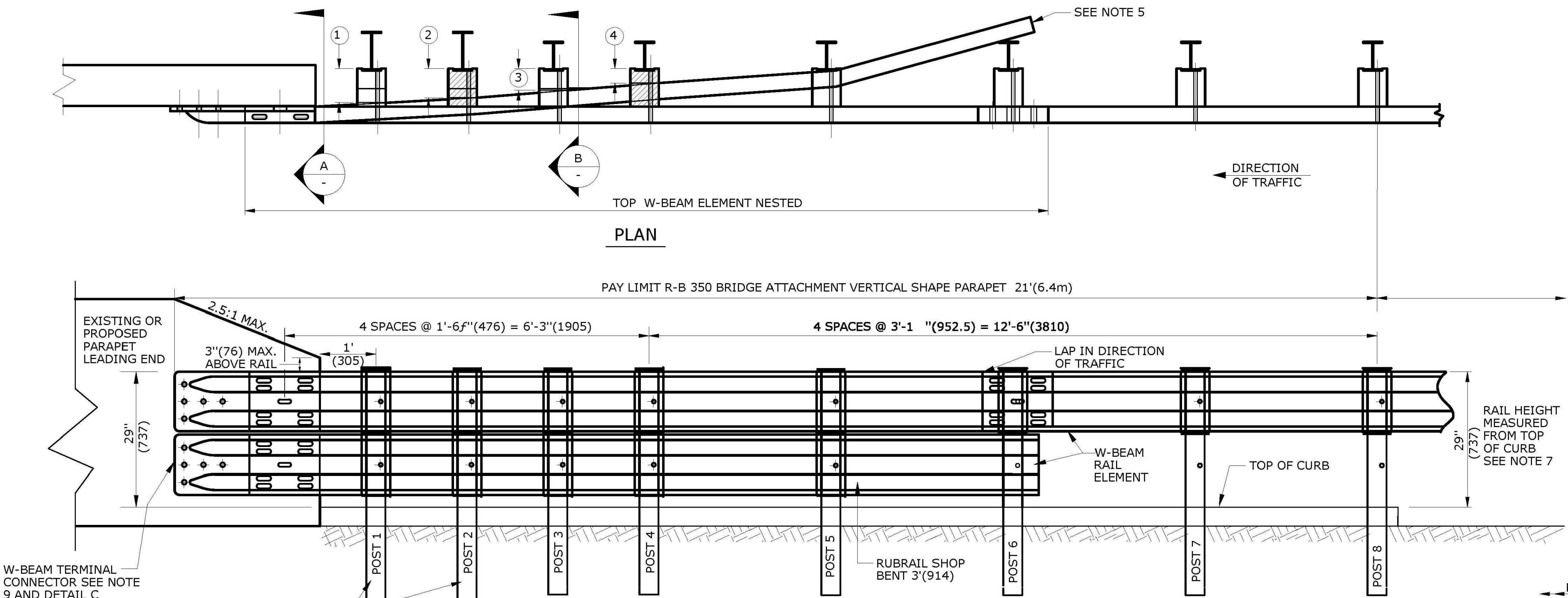
DETAIL C  
W-BEAM TERMINAL CONNECTOR  
CLASS B TYPE II

SEE NOTE 11

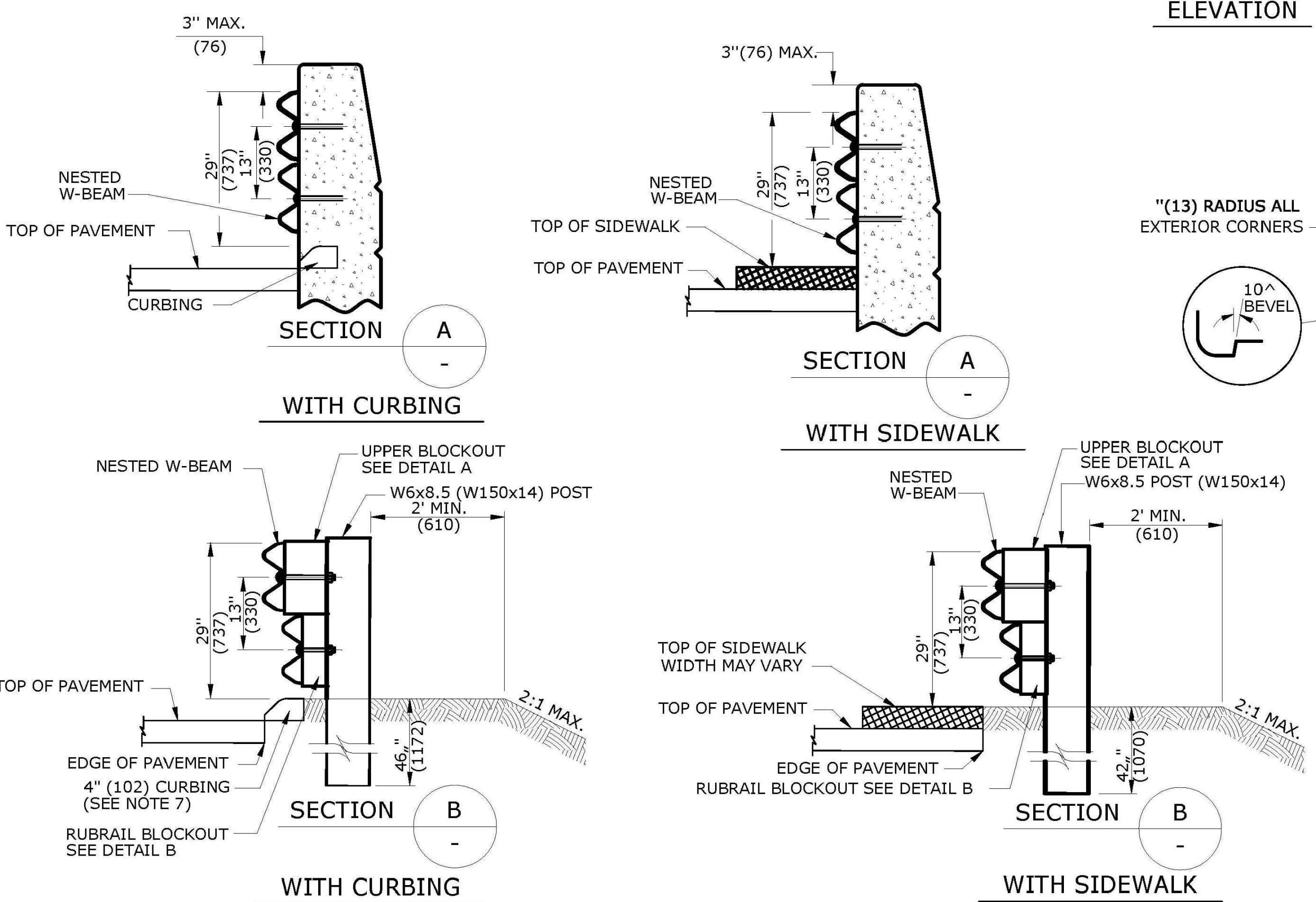
ALL METRIC DIMENSIONS ARE IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

R-B 350 BRIDGE ATTACHMENT  
VERTICAL SHAPE PARAPET

HW-910\_07



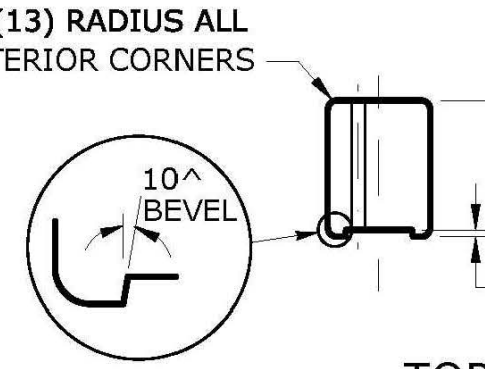
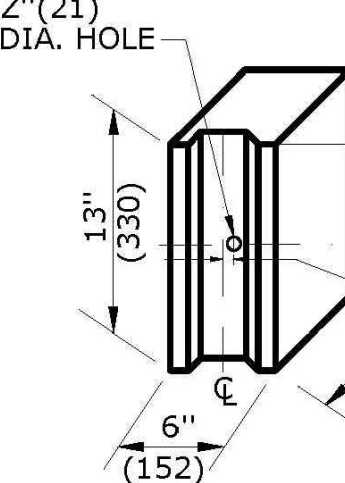
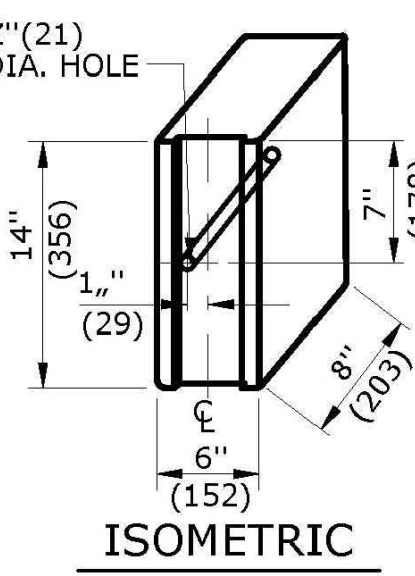
ELEVATION



RUBRAIL BLOCKOUTS 13"(330)HIGH x 6"(152)WIDE		
POST	THICKNESS	BOLT LENGTH
①	7"(178)	9"(229)
②	6"(152)	8"(203)
③	4"(114)	6"(152)
④	3"(76)	5"(127)

FRONT  
DETAIL A  
UPPER BLOCKOUT

DETAIL B  
RUBRAIL BLOCKOUT



REV.	DATE	REVISION DESCRIPTION	Plotted Date: \$DATE\$	NOT TO SCALE	STATE OF CONNECTICUT DEPARTMENT OF TRANSPORTATION	FILENAME: \$FILE\$ MODEL: \$MODELNAME\$	SUBMITTED BY: NAME/DATE/TIME:	APPROVED BY: NAME/DATE/TIME:	CTDOT STANDARD SHEET OFFICE OF ENGINEERING	STANDARD SHEET TITLE:	STANDARD SHEET NO.:
1	6/11	REVISED NOTE 9 FOR USE OF CHEMICAL ANCHORS								R-B 350 BRIDGE ATTACHMENT VERTICAL SHAPE PARAPET	HW-910_07



Blackhouse  
Road Culvert  
Rehabilitation

Town of  
Trumbull, CT

VERIFY SCALE  
BAR IS 1 INCH ON  
ORIGINAL DRAWING  
IF NOT ONE INCH ON  
THIS SHEET, ADJUST  
SCALES ACCORDINGLY

MARK	DATE	DESCRIPTION
PROJECT NO:	T-0196-72	
DATE:	05/10/2019	
FILE:	DS-T0196-72-01.dwg	
DRAWN BY:	JCB	
CHECKED:	AJM	
APPROVED:	DH	

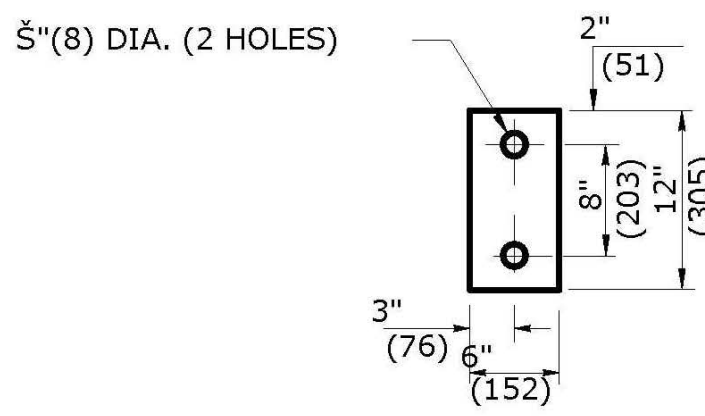
CTDOT DETAILS - 4

SCALE: AS NOTED

HW-911\_01

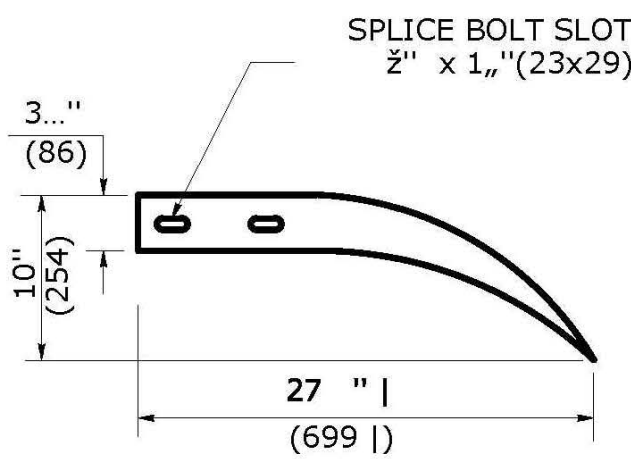
GENERAL NOTES:

- R-B END ANCHORAGE TYPE I INSTALLED ON FREEWAYS AND RAMPs SHALL USE CLASS B (10 GAUGE) TERMINAL AND W-BEAM RAIL ELEMENTS. ALL OTHER R-B END ANCHORAGE TYPE I SHALL USE CLASS A (12 GAUGE) TERMINAL AND W-BEAM RAIL ELEMENTS.
  - R-B END ANCHORAGE TYPE II SHALL USE CLASS A (12 GAUGE) TERMINAL AND W-BEAM RAIL ELEMENTS.
  - OTHER RADII WHICH CAN BE DEMONSTRATED TO PROVIDE THE INSTALLATIONS SHOWN FOR END ANCHORAGE TYPE II MAY BE APPROVED.
  - J-HOOK BOLTS MAY BE SUBSTITUTED FOR BOTTOM PLATE ANCHORAGE IN CONCRETE END ANCHORS USING THE SAME SIZE, STRENGTH, AND LENGTH AS NOTED ON THE PLANS.
  - MINIMUM RAIL HEIGHT FOR NEW CONSTRUCTION SHALL BE 29" (737) + 1' (25).
  - R-B TYPE I END ANCHOR: INSTALL LEADING END USING DESIGN CLEAR ZONE DISTANCE MEASURED FROM TRAVEL WAY LINE TO END POST AS SHOWN ON PLANS, THEN PLACE CONCRETE ANCHOR 4'-6" (1372) FROM THE LINE OF GUIDERAIL EXTENSION. INSTALL TRAILING END ON DUAL DIRECTION ROADWAYS IN THE SAME MANNER EXCEPT MEASURE CLEAR ZONE FROM THE DOUBLE YELLOW LINE. INSTALL TRAILING END ON SINGLE DIRECTION ROADWAYS MEASURED FROM THE GUIDERAIL LINE EXTENDED AND OFFSET 4'-6" (1372).
- R-B TYPE II END ANCHOR: INSTALL ONLY ON ROADWAYS WITH DESIGN SPEEDS < 45mph (72kph). FOR DUAL DIRECTION ROADWAYS INSTALL IN THE SAME MANNER AS TYPE I END ANCHOR FOR BOTH LEADING AND TRAILING END USING DESIGN CLEAR ZONE DISTANCE EXCEPT PLACE CONCRETE ANCHOR 2'-4" (711) MEASURED FROM THE LINE OF GUIDERAIL EXTENDED INSTALL TRAILING END ON SINGLE DIRECTION ROADWAYS MEASURED FROM THE GUIDERAIL LINE EXTENDED AND OFFSET 2'-4" (711).
- SEE HW-911\_04 FOR TYPICAL END ANCHOR GRADING PLAN.

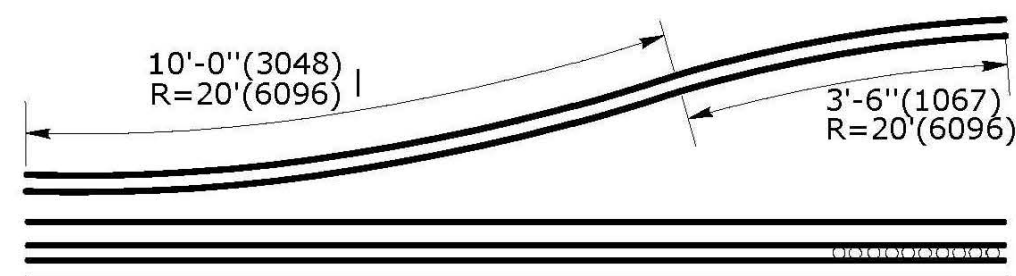
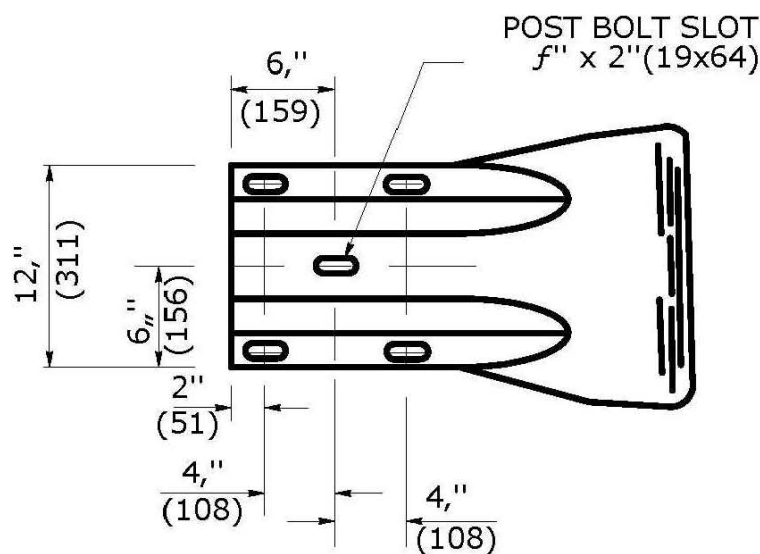


DETAIL A  
TYPE 2 OBJECT MARKER  
SIGN # 51-5030

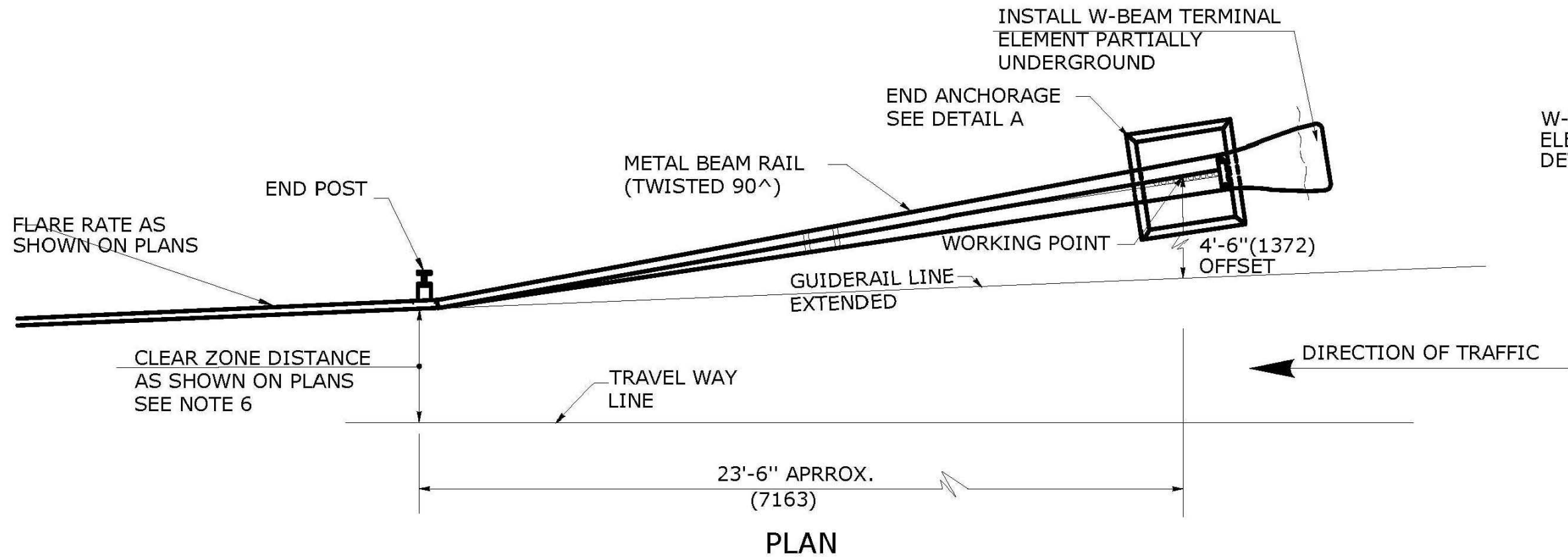
OBJECT MARKER FACE SHALL BE YELLOW TYPE III RETROREFLECTORIZED. THE BOTTOM OF TYPE 2 OBJECT MARKER SHALL BE 4'(1219) ABOVE GROUND LEVEL MOUNTED ON METAL DELINEATOR POST. IT SHALL BE USED TO IDENTIFY CULVERT ENDS AND TYPE II END ANCHORS, OR AS DIRECTED BY THE ENGINEER.



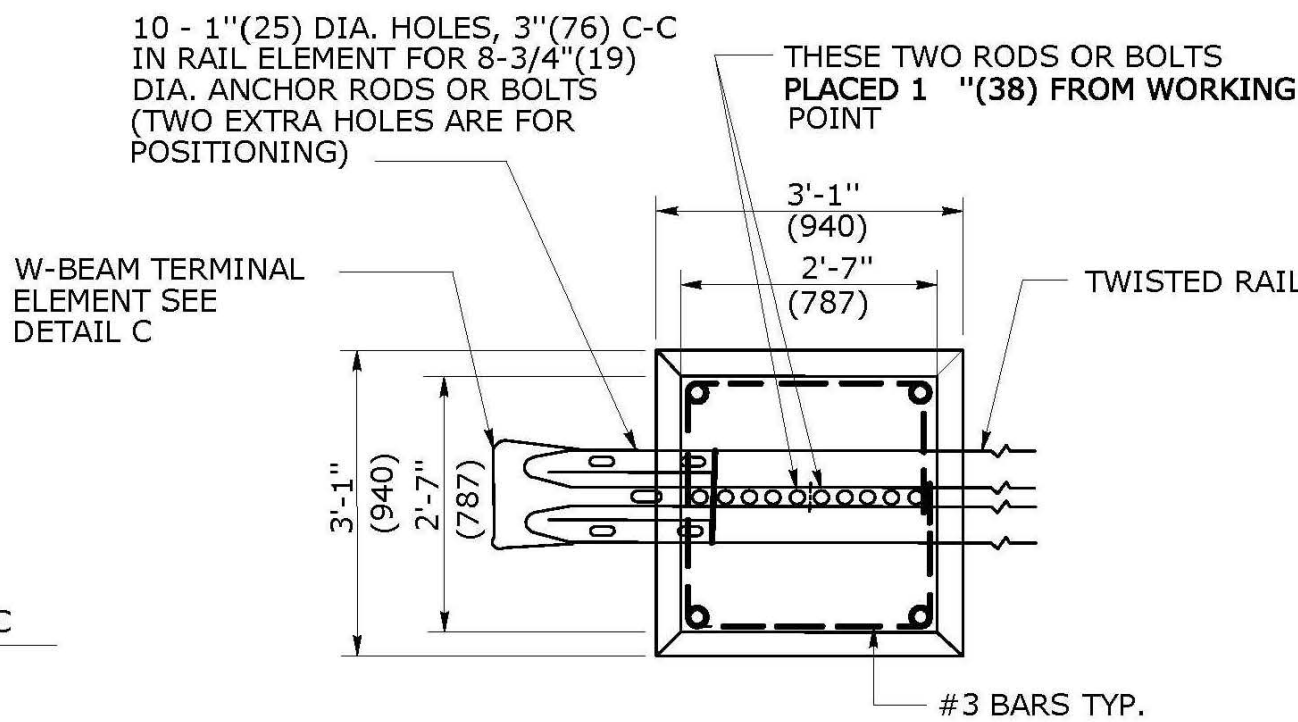
DETAIL C  
W-BEAM TERMINAL ELEMENT



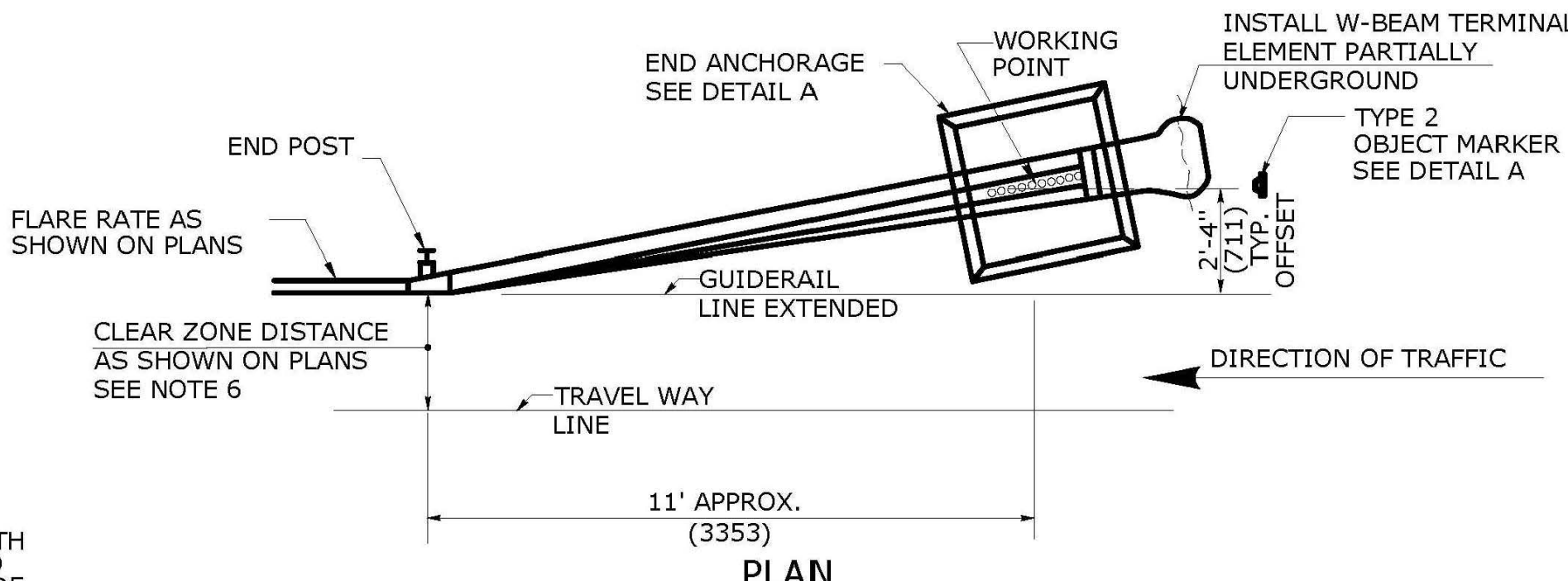
DETAIL D  
SHOP CURVED RAIL  
SEE NOTE 3



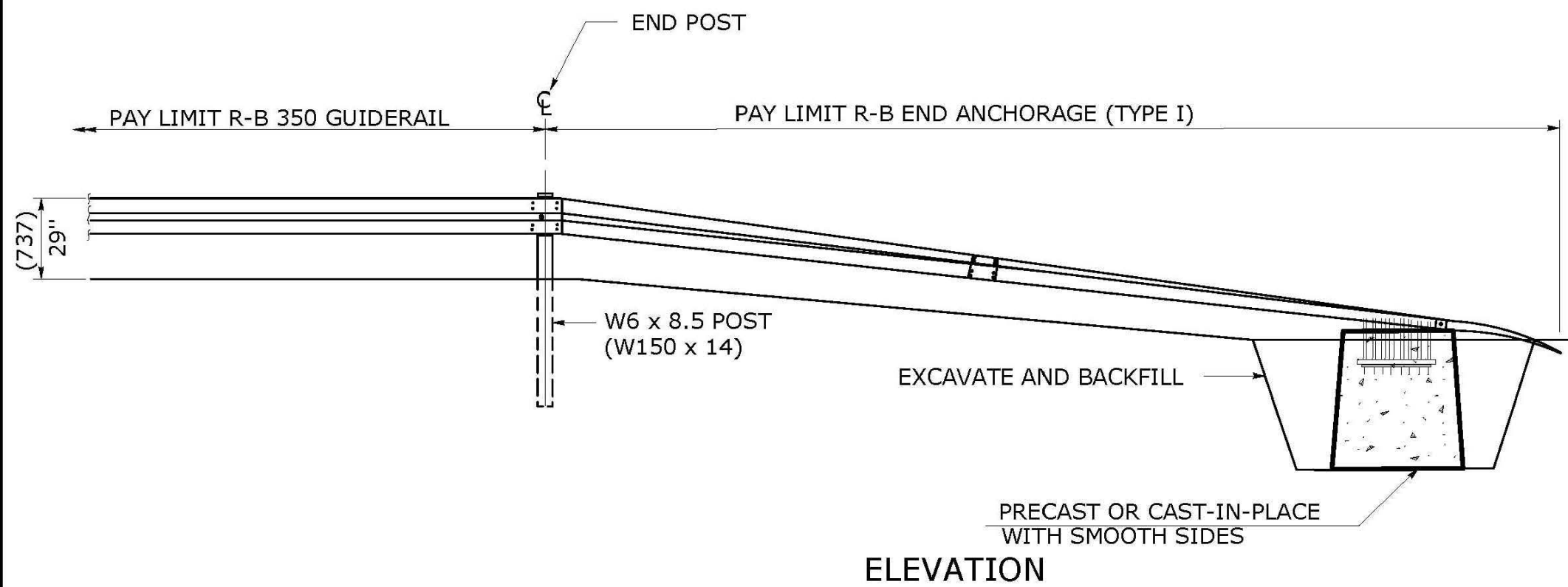
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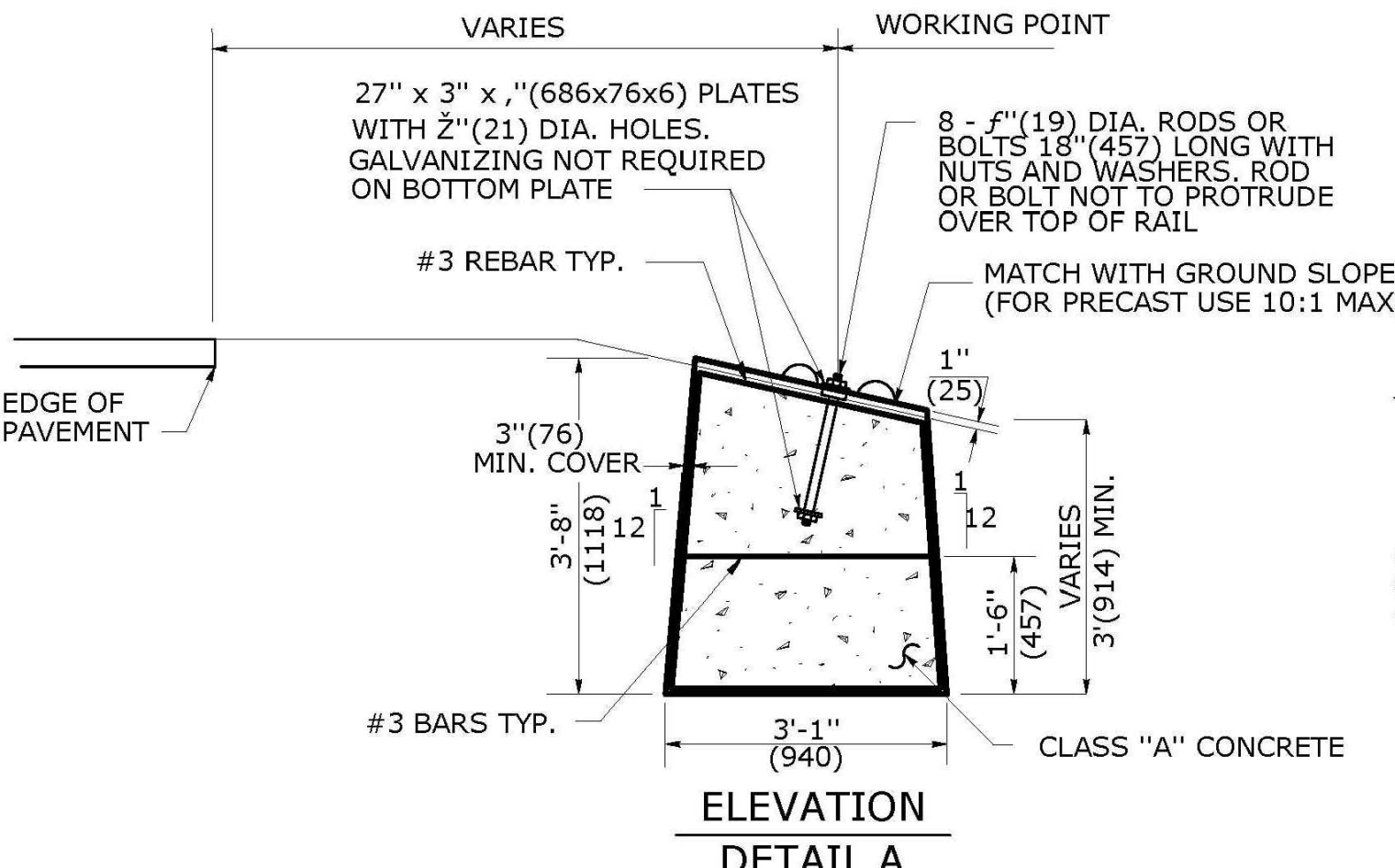
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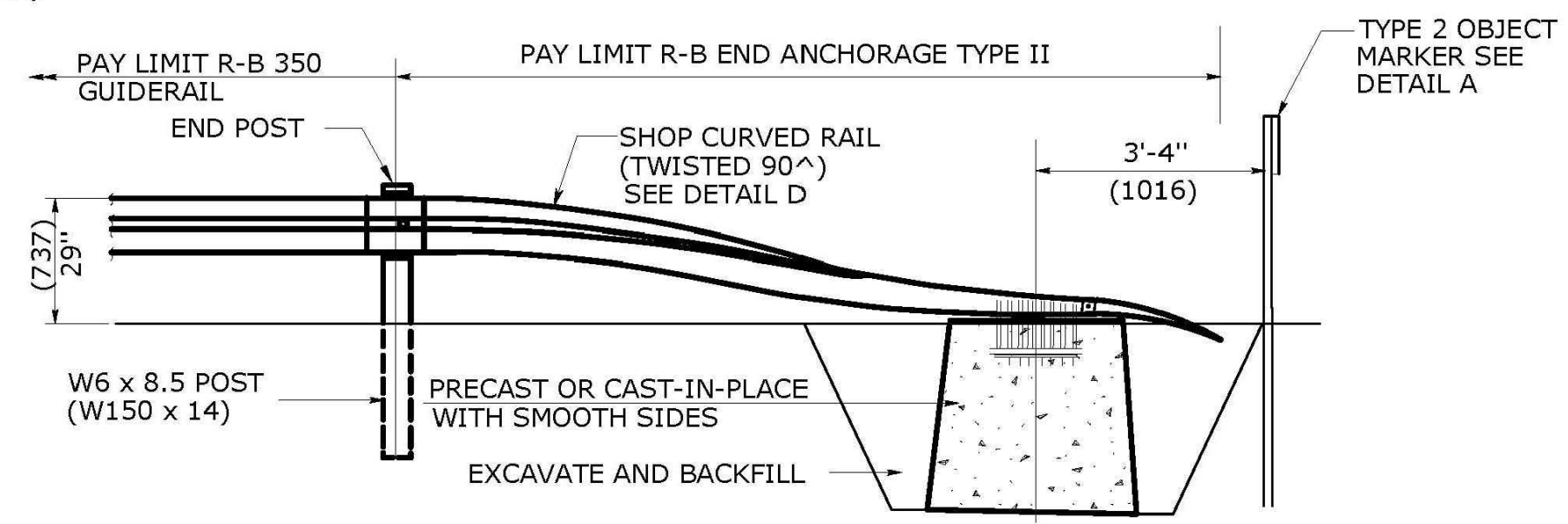
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ELEVATION



ELEVATION



ELEVATION

R-B END ANCHORAGE TYPE I  
(ROADSIDE APPLICATION)

ROADSIDE CONCRETE  
END ANCHOR  
SEE NOTE 4

R-B END ANCHORAGE TYPE II  
SEE NOTE 2

ALL METRIC DIMENSIONS ARE IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

REV.	DATE	REVISION DESCRIPTION	Plotted Date: \$DATE\$	NOT TO SCALE	STATE OF CONNECTICUT DEPARTMENT OF TRANSPORTATION	CTDOT STANDARD SHEET OFFICE OF ENGINEERING	R-B END ANCHORAGE TYPE I AND II	HW-911_01
1	6/11	REVISED TYPE I AND II ANCHOR FOR CLEAR ZONE PLACEMENT						
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Blackhouse  
 Road Culvert  
 Rehabilitation

Town of  
 Trumbull, CT

VERIFY SCALE  
 BAR IS 1 INCH ON  
 ORIGINAL DRAWING  
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 IF NOT ONE INCH ON  
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DRAWN BY:		JCB
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APPROVED:		DH

CTDOT DETAILS - 5

SCALE: AS NOTED

HW-911\_04