

# STATE OF VERMONT AGENCY OF TRANSPORTATION



## PROPOSED IMPROVEMENT BRIDGE PROJECT

TOWN OF WARREN  
COUNTY OF WASHINGTON

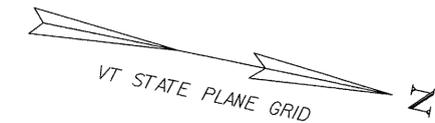
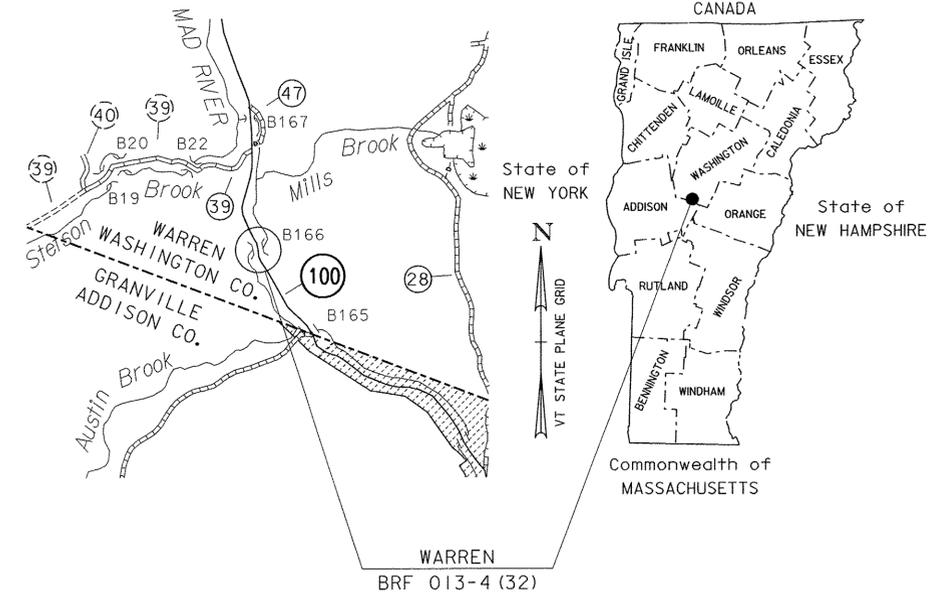
VT ROUTE 100 (MINOR ARTERIAL)

BRIDGE NO : 166

BEGINNING AT A POINT APPROXIMATELY 8.3 MILES SOUTH OF JUNCTION OF VT ROUTE 100 WITH VT ROUTE 17 AND EXTENDING NORTHERLY 250 FEET ALONG VT ROUTE 100

WORK TO BE PERFORMED UNDER THIS PROJECT INCLUDES REPLACEMENT OF THE EXISTING BRIDGE WITH A NEW BRIDGE ON THE EXISTING ALIGNMENT WITH NECESSARY ROADWAY AND CHANNEL WORK.

LENGTH OF STRUCTURE: 103.80 FEET  
LENGTH OF ROADWAY: 146.20 FEET  
LENGTH OF PROJECT: 250.00 FEET



QUALITY ASSURANCE PROGRAM: LEVEL 2

### CONVENTIONAL SYMBOLS

COUNTY LINE	
TOWN LINE	
LIMITS OF ACCESS	
POINT OF ACCESS	
FENCE LINE	
STONE WALL	
TRAVELED WAY	
GUARD RAIL	
RAILROAD	
SURVEY LINE	
CULVERT	
POWER POLE	
TELEPHONE POLE	
TREES	
CONTROL OF ACCESS	
PROPERTY LINE	
R.O.W. TAKING LINE	
SLOPE RIGHTS	
TOP OF CUT	
TOE OF SLOPE	

SURVEYED BY : VTRANS  
SURVEYED DATE : 2/14/2002

DATUM  
VERTICAL NAVD88  
HORIZONTAL NAD83 (96)

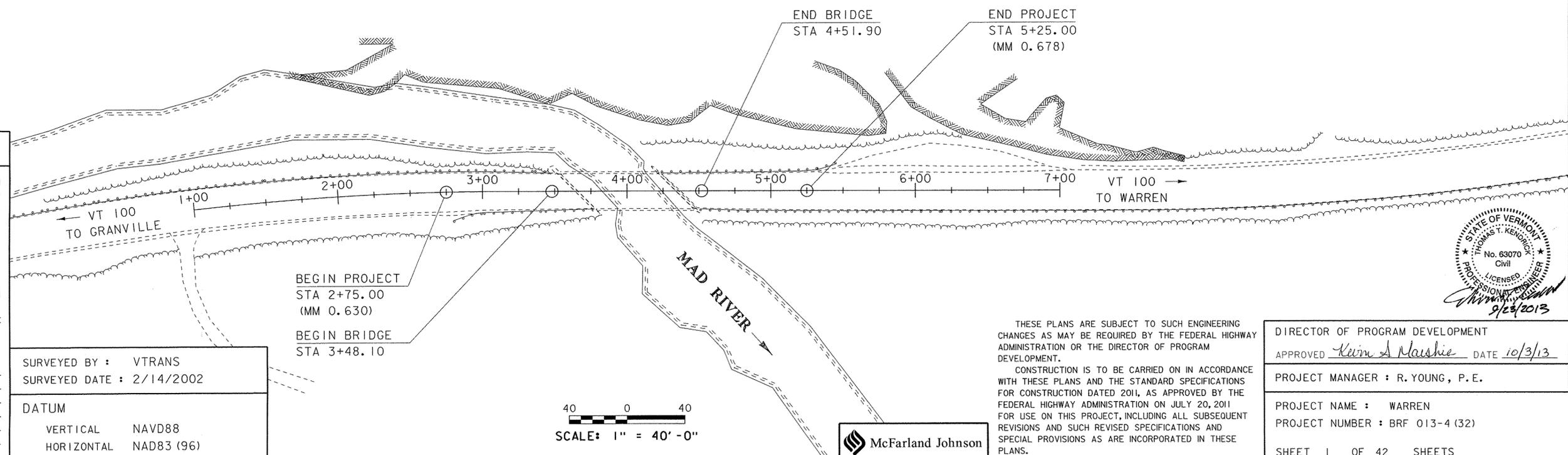
40 0 40  
SCALE: 1" = 40' - 0"

McFarland Johnson

THESE PLANS ARE SUBJECT TO SUCH ENGINEERING CHANGES AS MAY BE REQUIRED BY THE FEDERAL HIGHWAY ADMINISTRATION OR THE DIRECTOR OF PROGRAM DEVELOPMENT.

CONSTRUCTION IS TO BE CARRIED ON IN ACCORDANCE WITH THESE PLANS AND THE STANDARD SPECIFICATIONS FOR CONSTRUCTION DATED 2011, AS APPROVED BY THE FEDERAL HIGHWAY ADMINISTRATION ON JULY 20, 2011 FOR USE ON THIS PROJECT, INCLUDING ALL SUBSEQUENT REVISIONS AND SUCH REVISED SPECIFICATIONS AND SPECIAL PROVISIONS AS ARE INCORPORATED IN THESE PLANS.

DIRECTOR OF PROGRAM DEVELOPMENT  
APPROVED *Kevin A. Marshie* DATE 10/3/13  
PROJECT MANAGER : R. YOUNG, P. E.  
PROJECT NAME : WARREN  
PROJECT NUMBER : BRF 013-4 (32)  
SHEET 1 OF 42 SHEETS



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#### STANDARDS LIST

T-1	TRAFFIC CONTROL GENERAL NOTES	08-06-2012
T-30	CONSTRUCTION SIGN DETAILS	08-06-2012
T-35	CONSTRUCTION ZONE LONGITUDINAL DROP-OFFS	08-06-2012
T-36	CONSTRUCTION ZONE LOGITUDINAL DROP-OFFS FOR PAVING	08-06-2012
E-120	STANDARD SIGN PLACEMENT - EXPRESSWAY & FREEWAY	08-08-1995
E-121	STANDARD SIGN PLACEMENT - CONVENTIONAL ROAD	08-08-1995
E-127	ROUTE MARKINGS AT RURAL INTERSECTIONS	08-08-1995
E-134	BRIDGE NUMBER PLAQUE	08-08-1995
E-136B	STATE ROUTE MARKER SIGN DETAILS	08-08-1995
T-45	SQUARE TUBE SIGN POST AND ANCHOR	01-02-2013
E-193	PAVEMENT MARKING DETAILS	08-18-1995
G-1	STEEL BEAM GUARDRAIL DETAILS (POST, DELINEATOR, TYPICALS)	01-03-2000
G-1B	BOX BEAM GUARD RAIL	06-01-1994
S-364A	BRIDGE RAILING, GALVANIZED 3 RAIL BOX BEAM	04-23-2012
S-364B	GUARDRAIL APPROACH SECTION, GALVANIZED 3 RAIL BOX BEAM	04-23-2012
S-364C	GUARDRAIL APPROACH SECTION, GALVANIZED 3 RAIL BOX BEAM	04-23-2012
S-364D	GUARDRAIL APPROACH SECTION, GALVANIZED 3 RAIL BOX BEAM	04-23-2012

#### STRUCTURES DETAILS SHEETS

SD-501.00	CONCRETE DETAILS AND NOTES	05-07-2010
SD-502.00	CONCRETE DETAILS AND NOTES	10-10-2012
SD-516.10	BRIDGE JOINT ASPHALTIC PLUG	05-07-2010
SD-601.00	STRUCTURAL STEEL DETAILS AND NOTES	06-04-2010
SD-602.00	STRUCTURAL STEEL PLATE GIRDER DETAILS AND NOTES	05-02-2011

### FINAL HYDRAULIC REPORT

#### HYDROLOGIC DATA

Date: FEBRUARY 2013

DRAINAGE AREA : 10.15 SQ MI  
 CHARACTER OF TERRAIN : FORESTED, MOUNTAINOUS  
 STREAM CHARACTERISTICS : MEANDERING, PARALLEL TO VT 100  
 NATURE OF STREAMBED : GRAVEL, COBBLES

#### PEAK FLOW DATA

Q 2.33 =	400 CFS	Q 50 =	1500
Q 10 =	900	Q 100 =	1800
Q 25 =	1200	Q 500 =	2520

DATE OF FLOOD OF RECORD: UNKNOWN  
 ESTIMATED DISCHARGE: UNKNOWN  
 WATER SURFACE ELEV.: UNKNOWN  
 NATURAL STREAM VELOCITY: @ Q50 = 9.8 FPS  
 ICE CONDITIONS: MODERATE  
 DEBRIS: MODERATE  
 DOES THE STREAM REACH MAXIMUM HIGHWATER ELEV. RAPIDLY? NO  
 IS ORDINARY RISE RAPID? NO  
 IS STAGE AFFECTED BY UPSTREAM OR DOWNSTREAM CONDITIONS? NO  
 IF YES, DESCRIBE:

WATERSHED STORAGE: >1% HEADWATERS:  
 UNIFORM: X  
 IMMEDIATELY ABOVE SITE:

#### EXISTING STRUCTURE INFORMATION

STRUCTURE TYPE: SINGLE SPAN ROLLED BEAM  
 YEAR BUILT: 1939  
 CLEAR SPAN(NORMAL TO STREAM): 48 FT  
 VERTICAL CLEARANCE ABOVE STREAMBED: 10.8 FT  
 WATERWAY OF FULL OPENING: 360 SQ FT  
 DISPOSITION OF STRUCTURE: PARTIAL REMOVAL  
 TYPE OF MATERIAL UNDER SUBSTRUCTURE: UNKNOWN

#### WATER SURFACE ELEVATIONS AT:

Q2.33 =	1132.3 FT	VELOCITY =	6.3 FPS
Q10 =	1134.1	"	7.9
Q25 =	1134.9	"	8.7
Q50 =	1136.5	"	9.7
Q100 =	1137.1	"	10.6

#### LONG TERM STREAMBED CHANGES:

IS THE ROADWAY OVERTOPPED BELOW Q100: NO  
 FREQUENCY: N/A  
 RELIEF ELEVATION: 1142.8 FT  
 DISCHARGE OVER ROAD @Q100: 0

#### UPSTREAM STRUCTURE

TOWN: WARREN DISTANCE: 4,000 FT  
 HIGHWAY #: VT 100 STRUCTURE #: BR 165  
 CLEAR SPAN: 32 FT CLEAR HEIGHT: 6 FT  
 YEAR BUILT: 2012 FULL WATERWAY: 180 SQ FT  
 STRUCTURE TYPE: PRECAST CONCRETE RIGID FRAME

#### DOWNSTREAM STRUCTURE

TOWN: WARREN DISTANCE: 4,500 FT  
 HIGHWAY #: VT 100 STRUCTURE #: BR 167  
 CLEAR SPAN: 80 FT CLEAR HEIGHT: 12 FT  
 YEAR BUILT: 1957 FULL WATERWAY:  
 STRUCTURE TYPE: SINGLE SPAN ROLLED BEAM

#### LRFR LOAD RATING FACTORS

LOADING LEVELS	TRUCK						
	H-20	HL-93	3S2	6 AXLE	3A STR	4A STR	5A SEMI
TONNAGE	20	36	36	66	30	34.5	38
INVENTORY	3.56	1.88					
POSTING							
OPERATING	4.61	2.44	3.27	2.08	3.14	2.83	2.89
COMMENTS:	SERVICEABILITY (DEFLECTION) GOVERNS DESIGN						

AS BUILT "REBAR" DETAIL		
LEVEL I	LEVEL II	LEVEL III
TYPE:	TYPE:	TYPE:
GRADE:	GRADE:	GRADE:

#### TRAFFIC DATA

YEAR	ADT	DHV	% D	% T	ADTT	20 year ESAL for flexible pavement from 2014 to 2034 : 378000
2014	1100	140	55	5.6	65	40 year ESAL for flexible pavement from 2014 to 2054 : 873000
2034	1200	160	55	8.7	110	Design Speed : 50 mph

#### PILE DRIVING AND TESTING REQUIREMENTS

- NOMINAL PILE DRIVING CAPACITY (SEE GENERAL NOTES)  $F_{nd}$
- PILE TEST RESISTANCE FACTOR (SEE GENERAL NOTES)  $\phi$
- MAXIMUM PILE TIP ELEVATION **SEE BELOW**
- PILES MUST BE DRIVEN A MINIMUM OF 19 FEET BELOW BOTTOM OF ABUTMENT REGARDLESS IF REQUIRED DRIVING RESISTANCE HAS BEEN MET.

#### PROPOSED STRUCTURE

STRUCTURE TYPE: PRECAST CONCRETE/STEEL COMPOSITE SUPERSTRUCTURE

CLEAR SPAN(NORMAL TO STREAM): 82 FT  
 VERTICAL CLEARANCE ABOVE STREAMBED: 10 FT  
 WATERWAY OF FULL OPENING: 420 SQ FT

#### WATER SURFACE ELEVATIONS AT:

Q2.33 =	1132.3 FT	VELOCITY=	6.3 FPS
Q10 =	1134.0	"	7.9
Q25 =	1134.9	"	8.7
Q50 =	1136.4	"	9.7
Q100 =	1137.0	"	10.6

IS THE ROADWAY OVERTOPPED BELOW Q100: NO  
 FREQUENCY: N/A  
 RELIEF ELEVATION: 1142.8 FT  
 DISCHARGE OVER ROAD @Q100: 0

AVERAGE LOW ELEVATION OF SUPERSTRUCTURE: 1138.0 FT  
 VERTICAL CLEARANCE: @ Q50 = 1.6 FT

SCOUR: 1.5' @ Q100

REQUIRED CHANNEL PROTECTION: STONE FILL, TYPE IV

#### PERMIT INFORMATION

AVERAGE DAILY FLOW: 21 CFS DEPTH OR ELEVATION:  
 ORDINARY LOW WATER: 10 DEPTH = 0.5 FT  
 ORDINARY HIGH WATER: 172 DEPTH = 2 FT

#### TEMPORARY BRIDGE REQUIREMENTS

STRUCTURE TYPE: N/A  
 CLEAR SPAN (NORMAL TO STREAM):  
 VERTICAL CLEARANCE ABOVE STREAMBED:  
 WATERWAY AREA OF FULL OPENING:

#### ADDITIONAL INFORMATION

OHW AND OLW ARE AVERAGE DEPTHS MEASURED UPSTREAM AND DOWNSTREAM OF THE BRIDGE.

#### TRAFFIC MAINTENANCE NOTES

- MAINTAIN TRAFFIC ON AN OFF SITE DETOUR.
- TRAFFIC SIGNALS ARE NOT NECESSARY.
- SIDEWALKS ARE NOT NECESSARY

#### DESIGN VALUES

1. DESIGN LIVE LOAD	HL-93
2. FUTURE PAVEMENT	$d_p$ : 3.0 INCH
3. DESIGN SPAN	$L$ : 101.50 FT
4. MIN. MID-SPAN POS. CAMBER @ RELEASE (PRESTRESSED UNITS)	$\Delta$ : ---
5. PRESTRESSING STRAND	$f_y$ : ---
6. PRESTRESSED CONCRETE STRENGTH	$f'_c$ : ---
7. PRESTRESSED CONCRETE RELEASE STRENGTH	$f'_{cr}$ : ---
8. SPECIAL PROVISION (HIGH PERFORMANCE CONCRETE, RAPID SET)	$f'_c$ : 7.0 KSI
9. CONCRETE, HIGH PERFORMANCE CLASS A	$f'_c$ : 4.0 KSI
10. CONCRETE, HIGH PERFORMANCE CLASS B	$f'_c$ : ---
11. CONCRETE, CLASS C	$f'_c$ : ---
12. REINFORCING STEEL	$f_y$ : 60 KSI
13. STRUCTURAL STEEL AASHTO M270 (WEATHERING)	$f_y$ : 50 KSI
14. SOIL UNIT WEIGHT	$\gamma$ : 0.140 KCF
15. NOMINAL BEARING RESISTANCE OF SOIL	$q_n$ : ---
16. SOIL BEARING RESISTANCE FACTOR (REFER TO AASHTO LRFD)	$\phi$ : ---
17. NOMINAL BEARING RESISTANCE OF ROCK	$q_n$ : ---
18. ROCK BEARING RESISTANCE FACTOR (REFER TO AASHTO LRFD)	$\phi$ : ---
19. NOMINAL AXIAL PILE RESISTANCE (SEE PROJECT NOTES)	$q_p$ : ---
20. PILE YIELD STRENGTH ASTM A572	$f_y$ : 50 KSI
21. PILE SIZE	HP 12X74
22. EST. PILE LENGTH	$L_p$ : ---
ABUTMENT NO. 1 = 19 FT ABUTMENT NO. 2 = 19 FT	
23. PILE RESISTANCE FACTOR	$\phi$ : 0.45
24. LATERAL PILE DEFLECTION	$\Delta$ : 0.50 INCH
25. BASIC WIND SPEED	$V_{3s}$ : 100 MPH
26. MINIMUM GROUND SNOW LOAD	$p_g$ : ---
27. SEISMIC DATA	PGA: --- $S_s$ : --- $S_1$ : ---

PROJECT NAME: WARREN  
 PROJECT NUMBER: BRF 013-4(32)  
 FILE NAME: z10b424fm.dgn PLOT DATE: 10/11/2013  
 PROJECT LEADER: R.YOUNG DRAWN BY: P.DUSTIN  
 DESIGNED BY: VTRANS/D.KULL CHECKED BY: T.KENDRICK  
**PRELIMINARY INFORMATION SHEET** SHEET 2 OF 42



# QUANTITY SHEET 1

SUMMARY OF ESTIMATED QUANTITIES										TOTALS		DESCRIPTIONS				DETAILED SUMMARY OF QUANTITIES			
						ROADWAY	TRAINING	EROSION CONTROL	FULL C.E. ITEMS	BRIDGE	GRAND TOTAL	FINAL	UNIT	ITEMS	ITEM NUMBER	ROUND	QUANTITIES	UNIT	ITEMS
						1					1		LS	CLEARING AND GRUBBING, INCLUDING INDIVIDUAL TREES AND STUMPS	201.10				
						500					500		CY	COMMON EXCAVATION	203.15				
										1000	1000		CY	UNCLASSIFIED CHANNEL EXCAVATION	203.27		500	CY	FILL AVAILABLE COMMON EXCAVATION
										525	525		CY	STRUCTURE EXCAVATION	204.25		500	CY	TOTAL AVAILABLE FILL
										300	300		CY	GRANULAR BACKFILL FOR STRUCTURES	204.30				
						335					335		SY	COLD PLANING, BITUMINOUS PAVEMENT	210.10		45	CY	FILL REQUIRED PLANIMETERED FILL
						400					400		CY	SUBBASE OF DENSE GRADED CRUSHED STONE	301.35		45	CY	TOTAL FILL REQUIRED
						25					25		CY	AGGREGATE SHOULDERS, IN PLACE	402.10		455	CY	TOTAL WASTE
						3					3		CWT	EMULSIFIED ASPHALT	404.65				
						1					1		LU	PRICE ADJUSTMENT, ASPHALT CEMENT (N.A.B.I)	406.50				
										1	1		LS	FURNISHING EQUIPMENT FOR DRIVING PILING	504.10				
										252	252		LF	STEEL PILING, HP 12 X 74	505.16				
										4060	4060		LB	REINFORCING STEEL, LEVEL II	507.12				
										10	10		GAL	WATER REPELLENT, SILANE	514.10				
										60	60		LF	BRIDGE EXPANSION JOINT, ASPHALTIC PLUG	516.10				
										345	345		SY	MEMBRANE WATERPROOFING, SPRAY APPLIED	520.10				
										210	210		LF	BRIDGE RAILING, GALVANIZED 3 RAIL BOX BEAM	525.335				
										1	1		EACH	REMOVAL OF STRUCTURE (2100 SF - EST.)	529.15				
										1	1		LS	PRECAST CONCRETE STRUCTURE (ABUTMENT NO. 1)	540.10				
										1	1		LS	PRECAST CONCRETE STRUCTURE (ABUTMENT NO. 2)	540.10				
										1	1		LS	PRECAST CONCRETE STRUCTURE (APPROACH SLAB NO. 1)	540.10				
										1	1		LS	PRECAST CONCRETE STRUCTURE (APPROACH SLAB NO. 2)	540.10				
						180					180		CY	STONE FILL, TYPE III	613.12				
										700	700		CY	STONE FILL, TYPE IV	613.13				
						370					370		LF	BOX BEAM GUARDRAIL	621.30				
						4					4		EACH	GUARDRAIL APPROACH SECTION, GALVANIZED 3 RAIL BOX BEAM	621.725				
						505					505		LF	REMOVAL AND DISPOSAL OF GUARDRAIL	621.80				
						60					60		LF	TEMPORARY TRAFFIC BARRIER	621.90				
						120					120		HR	FLAGGERS	630.15				
									1		1		LS	FIELD OFFICE, ENGINEERS	631.10				
									1		1		LS	TESTING EQUIPMENT, CONCRETE	631.16				
									1		1		LS	TESTING EQUIPMENT, BITUMINOUS	631.17				
									3000		3000		DL	FIELD OFFICE TELEPHONE (N.A.B.I)	631.26				
						1					1		LS	MOBILIZATION/DEMOBILIZATION	635.11				
						1					1		LS	TRAFFIC CONTROL	641.10				
						4					4		EACH	PORTABLE CHANGEABLE MESSAGE SIGN	641.15				
						700					700		LF	4 INCH WHITE LINE	646.20				
						700					700		LF	4 INCH YELLOW LINE	646.21				
										710	710		SY	GEOTEXTILE UNDER STONE FILL	649.31				
								225			225		SY	GEOTEXTILE FOR SILT FENCE	649.51				

PROJECT NAME: WARREN  
PROJECT NUMBER: BR 013-4(32)

FILE NAME: z10b424frm.dgn  
PROJECT LEADER: R. YOUNG  
DESIGNED BY: D. KULL  
QUANTITY SHEET (1 OF 3)

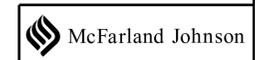
PLOT DATE: 03-OCT-2013  
DRAWN BY: P. DUSTIN  
CHECKED BY: T. KENDRICK  
SHEET 4 OF 42



# QUANTITY SHEET 2

SUMMARY OF ESTIMATED QUANTITIES										TOTALS		DESCRIPTIONS				DETAILED SUMMARY OF QUANTITIES			
						ROADWAY	TRAINING	EROSION CONTROL	FULL C.E. ITEMS	BRIDGE	GRAND TOTAL	FINAL	UNIT	ITEMS	ITEM NUMBER	ROUND	QUANTITIES	UNIT	ITEMS
								125			125		SY	GEOTEXTILE FOR FILTER CURTAIN	649.61				
								3			3		LB	SEED	651.15				
								20			20		LB	FERTILIZER	651.18				
								0.25			0.25		TON	AGRICULTURAL LIMESTONE	651.20				
								0.25			0.25		TON	HAY MULCH	651.25				
								20			20		CY	TOPSOIL	651.35				
										520	520		SY	GRUBBING MATERIAL	651.40				
								1			1		LS	EPSC PLAN	652.10				
								60			60		HR	MONITORING EPSC PLAN	652.20				
								1			1		LU	MAINTENANCE OF EPSC PLAN (N.A.B.I.)	652.30				
								190			190		SY	PERMANENT EROSION MATTING	653.21				
								5			5		CY	TEMPORARY STONE CHECK DAM, TYPE I	653.25				
								30			30		CY	VEHICLE TRACKING PAD	653.35				
								525			525		LF	PROJECT DEMARCATION FENCE	653.55				
						1					1		SF	TRAFFIC SIGNS, TYPE A	675.20				
						16					16		LF	SQUARE TUBE SIGN POST AND ANCHOR	675.341				
						4					4		EACH	REMOVING SIGNS	675.50				
										70	70		CY	SPECIAL PROVISION (HIGH PERFORMANCE CONCRETE, RAPID SET)(FPQ)	900.608				
						141					141		LF	SPECIAL PROVISION (GUARDRAIL TRANSITION, STEEL BEAM TO BOX BEAM)	900.640				
										360	360		LF	SPECIAL PROVISION (PRE-EXCAVATION OF INTEGRAL ABUTMENT PILES)	900.640				
						1					1		LS	SPECIAL PROVISION (CPM SCHEDULE)	900.645				
						1					1		LU	SPECIAL PROVISION (INCENTIVE/DISINCENTIVE) (N.A.B.I.)	900.650				
						1					1		LU	SPECIAL PROVISION (MAT DENSITY PAY ADJUSTMENT, SMALL QUANTITY) (N.A.B.I.)	900.650				
						1					1		LU	SPECIAL PROVISION (MIXTURE PAY ADJUSTMENT) (N.A.B.I.)	900.650				
										376	376		SY	SPECIAL PROVISION (PREFABRICATED BRIDGE UNIT SUPERSTRUCTURE)	900.675				
						255					255		TON	SPECIAL PROVISION (BITUMINOUS CONCRETE PAVEMENT, SMALL QUANTITY)	900.680				

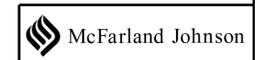
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 FILE NAME: z10b424frm.dgn  
 PROJECT LEADER: R. YOUNG  
 DESIGNED BY: D. KULL  
 QUANTITY SHEET (2 OF 3)  
 PLOT DATE: 14-OCT-2013  
 DRAWN BY: P. DUSTIN  
 CHECKED BY: T. KENDRICK  
 SHEET 5 OF 42

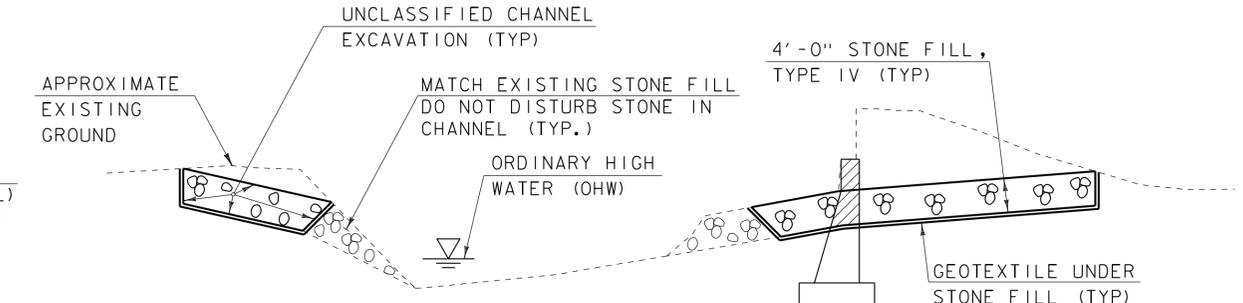
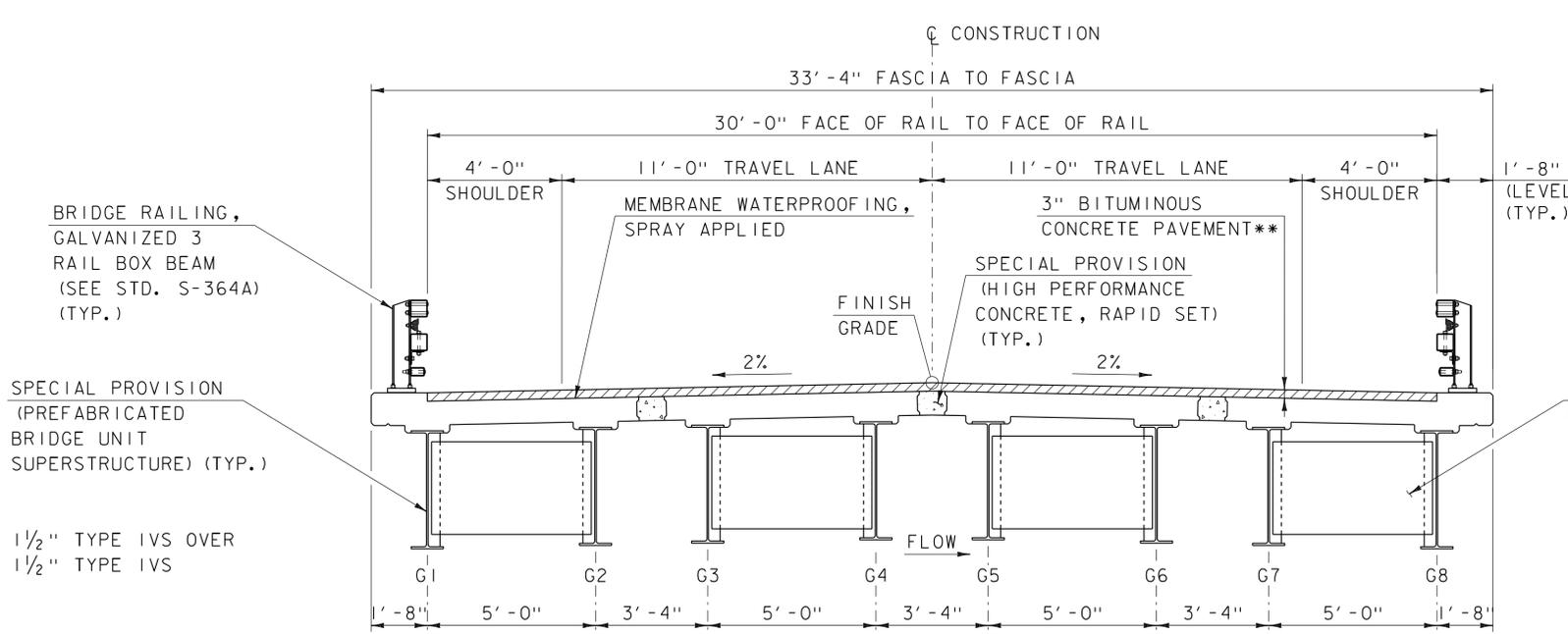
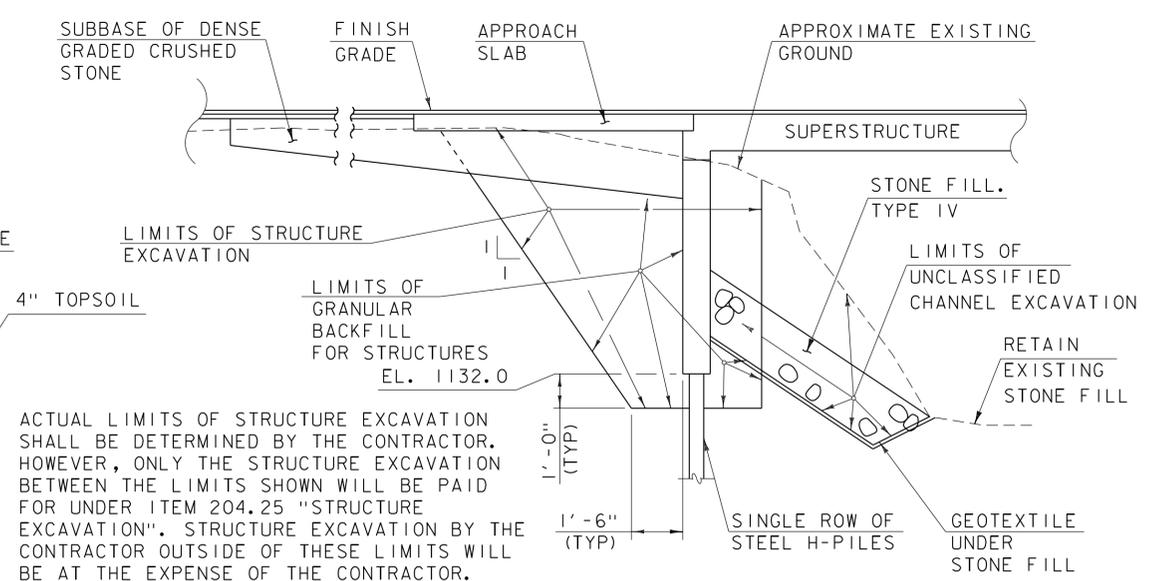
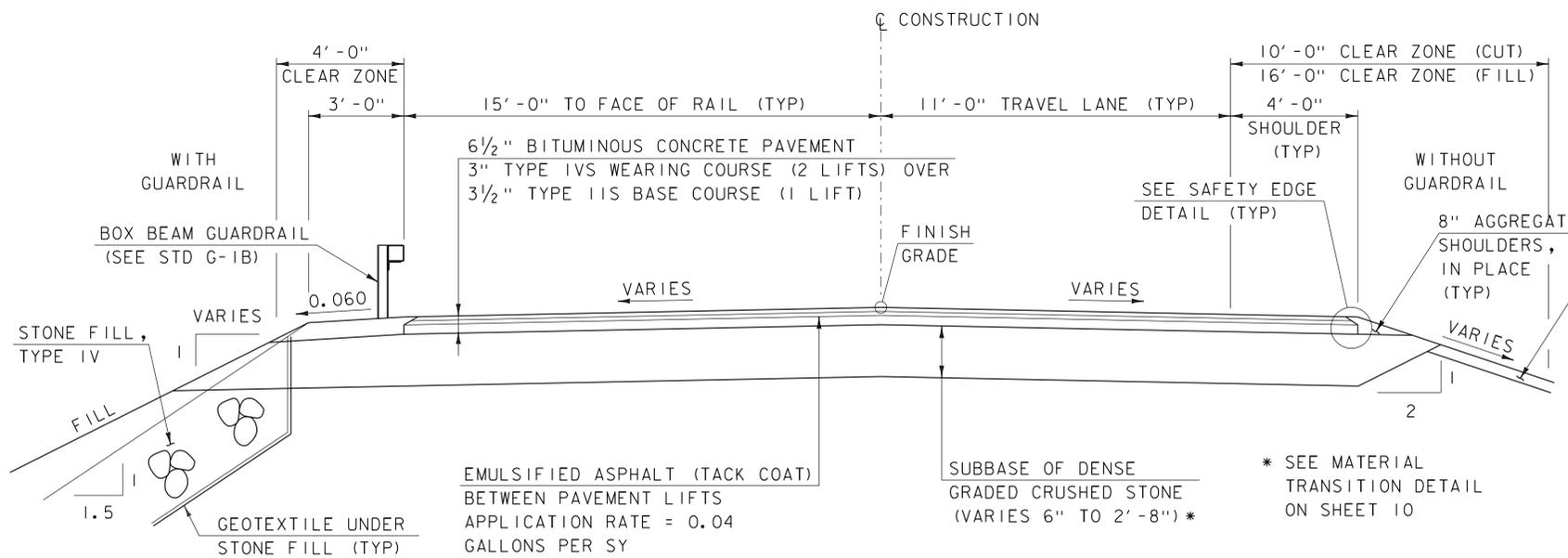


# BRIDGE QUANTITY SHEET 1

SUMMARY OF BRIDGE QUANTITIES										TOTALS		DESCRIPTIONS				DETAILED SUMMARY OF QUANTITIES			
							APPROACH SLABS	ABUTMENT NO. 1	ABUTMENT NO. 2	SUPERSTRUCTURE	BRIDGE TOTAL		UNIT	ITEMS	ITEM NUMBER		QUANTITIES	UNIT	ITEMS
								475	525		1000		CY	UNCLASSIFIED CHANNEL EXCAVATION	203.27				
								250	275		525		CY	STRUCTURE EXCAVATION	204.25				
								150	150		300		CY	GRANULAR BACKFILL FOR STRUCTURES	204.30				
								0.5	0.5		1		LS	FURNISHING EQUIPMENT FOR DRIVING PILING	504.10				
								126	126		252		LF	STEEL PILING, HP 12 X 74	505.16				
								2030	2030		4060		LB	REINFORCING STEEL, LEVEL II	507.12				
								2.5	2.5	5	10		GAL	WATER REPELLENT, SILANE	514.10				
							60				60		LF	BRIDGE EXPANSION JOINT, ASPHALTIC PLUG	516.10				
										345	345		SY	MEMBRANE WATERPROOFING, SPRAY APPLIED	520.10				
										210	210		LF	BRIDGE RAILING, GALVANIZED 3 RAIL BOX BEAM	525.335				
										1	1		EACH	REMOVAL OF STRUCTURE (2100 SF - EST.)	529.15				
								1			1		LS	PRECAST CONCRETE STRUCTURE (ABUTMENT NO. 1)	540.10				
									1		1		LS	PRECAST CONCRETE STRUCTURE (ABUTMENT NO. 2)	540.10				
							1				1		LS	PRECAST CONCRETE STRUCTURE (APPROACH SLAB NO. 1)	540.10				
							1				1		LS	PRECAST CONCRETE STRUCTURE (APPROACH SLAB NO. 2)	540.10				
								385	315		700		CY	STONE FILL, TYPE IV	613.13				
								330	380		710		SY	GEOTEXTILE UNDER STONE FILL	649.31				
								230	290		520		SY	GRUBBING MATERIAL	651.40				
								32	32	6	70		CY	SPECIAL PROVISION (HIGH PERFORMANCE CONCRETE, RAPID SET)(FPQ)	900.608				
								180	180		360		LF	SPECIAL PROVISION (PRE-EXCAVATION OF INTEGRAL ABUTMENT PILES)	900.640				
										376	376		SY	SPECIAL PROVISION (PREFABRICATED BRIDGE UNIT SUPERSTRUCTURE)	900.675				

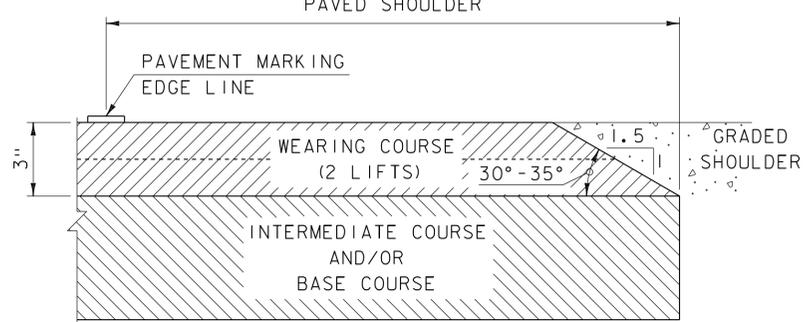
PROJECT NAME: WARREN  
 PROJECT NUMBER: BRF 013-4(32)  
 FILE NAME: z10b424frm.dgn  
 PROJECT LEADER: R. YOUNG  
 DESIGNED BY: D. KULL  
 QUANTITY SHEET (3 OF 3)  
 PLOT DATE: 03-OCT-2013  
 DRAWN BY: P. DUSTIN  
 CHECKED BY: T. KENDRICK  
 SHEET 6 OF 42



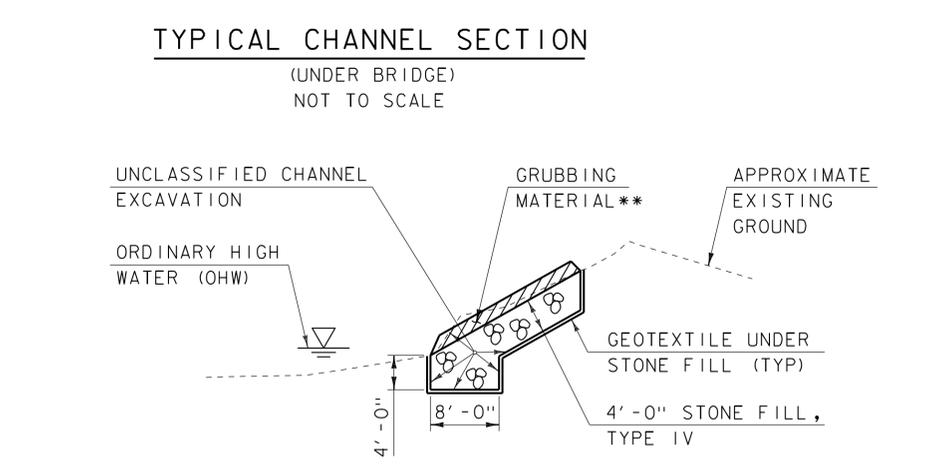


**MATERIAL TOLERANCES**  
(IF USED ON PROJECT)

SURFACE	TOTAL DEPTH
- PAVEMENT (TOTAL THICKNESS)	+/- 1/4"
- AGGREGATE SURFACE COURSE	+/- 1/2"
SUBBASE	+/- 1"
SAND BORROW	+/- 1"



- NOTES:
- LEVELING COURSE MAY INCLUDE THE "SAFETY EDGE" AT THE CONTRACTOR'S CHOICE.
  - THE EDGE OF PAVEMENT SHALL BE FORMED IN SUCH A WAY THAT THE BITUMINOUS CONCRETE PAVEMENT IS EXTRUDED OR COMPRESSED TO FORM THE 30 TO 35 DEGREE ANGLE. DEVICES THAT SIMPLY STRIKE-OFF THE MIX WITHOUT PROVIDING ANY COMPACTIVE EFFORT WILL NOT BE ALLOWED.



\*\* GRUBBING MATERIAL SHALL NOT BE PLACED ON THE STONE FILL IN THE AREA UNDER THE BRIDGE. WHENEVER CHANNEL SLOPE INTERSECTS ROADWAY SUBBASE, GRUBBING MATERIAL SHALL BEGIN AT THE BOTTOM OF SUBBASE.

GPS CONTROL POINTS

HVCTRL #1

TWIN RIVER AZ

N = 576661.660  
E = 1546135.820  
ELEV. = 1089.47

GENERAL LOCATION, WARREN, VERMONT. TO REACH FROM THE INTERSECTION OF VERMONT ROUTES 100 AND 17 IN WAITSFIELD GO SOUTH ALONG ROUTE 100 FOR 7.35 MI (11.83 KM) TO THE MARK ON THE LEFT. THE MARK IS SET FLUSH WITH THE GROUND SURFACE IN THE TOP OF A 30 CM DIAMETER CONCRETE MONUMENT SET 1.3 M (4.3 FT) DEEP. IT IS 4.7 M (15.4 FT) EAST OF AND ABOUT 0.5 M (1.6 FT) HIGHER THAN THE EAST EDGE OF PAVEMENT OF ROUTE 100, 7.2 M (23.6 FT) WEST THE CENTERLINE OF A GRAVEL ROAD, 9.2 M (30.2 FT) NORTH OF POLE NO. 119, AND 5.2 M (17.1 FT) NORTH OF A 15 CM WHITE BIRCH AND A FIBERGLASS WITNESS POST.

HVCTRL #2

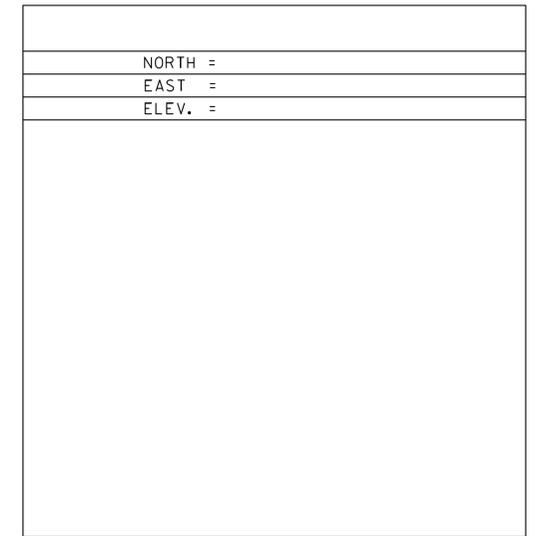
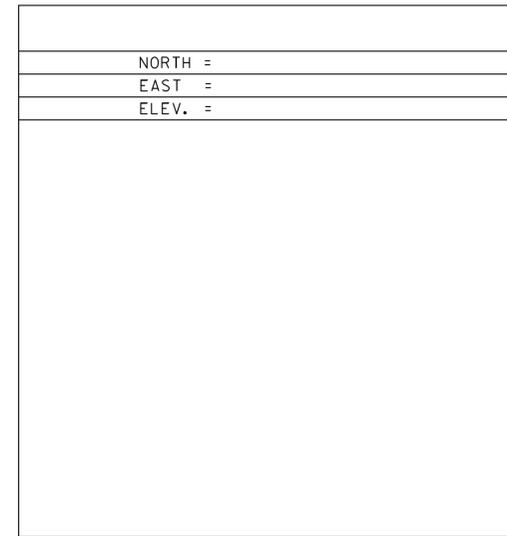
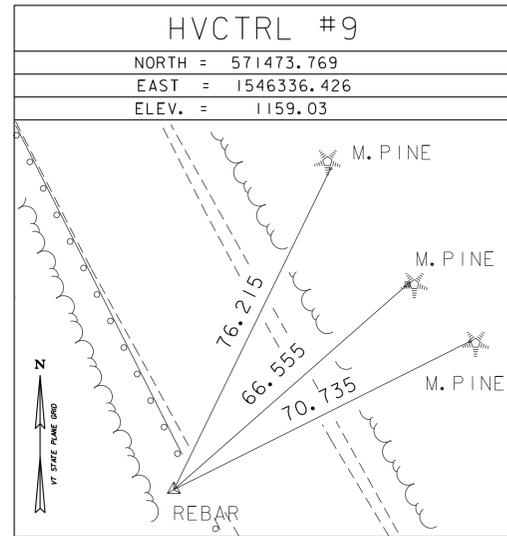
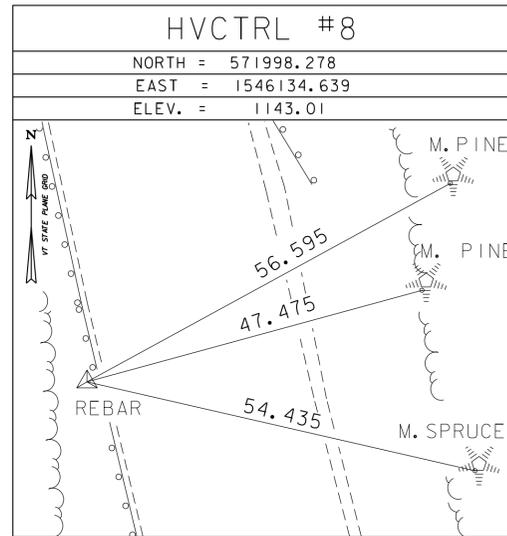
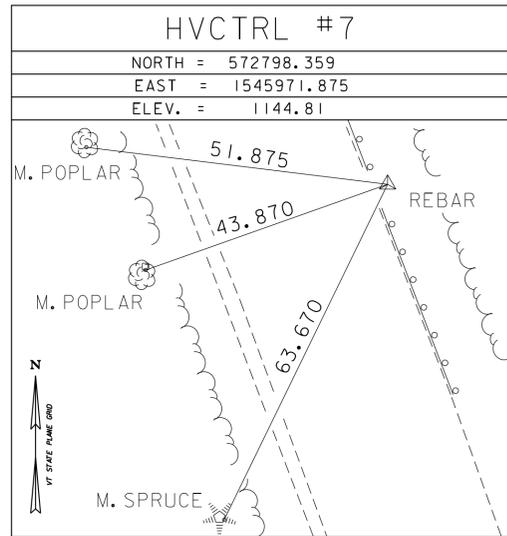
TWIN RIVER

N = 575426.060  
E = 1546006.840  
ELEV. = 1084.41

GENERAL LOCATION, WARREN, VERMONT. TO REACH FROM THE INTERSECTION OF VERMONT ROUTES 100 AND 17 IN WAITSFIELD GO SOUTH ALONG ROUTE 100 FOR 7.6 MI (12.2 KM) TO THE MARK ON THE RIGHT. THE MARK IS SET FLUSH WITH THE GROUND SURFACE IN THE TOP OF A 30 CM DIAMETER CONCRETE MONUMENT SET 1.4 M (4.6 FT) DEEP. IT IS 3.1 M (10.2 FT) WEST OF AND ABOUT 0.5 M (1.6 FT) LOWER THAN THE WEST EDGE OF PAVEMENT OF ROUTE 100, 17.0 M (55.8 FT) OF POLE NO. 123, 13.7 M (44.9 FT) WEST OF MILE MARKER 1000/1217/0131, 29.0 M (95.1 FT) NORTH OF THE CENTERLINE OF A PAVED DRIVE AND 3.1 M (10.2 FT) EAST OF A FIBERGLASS WITNESS POST.

\* DESCRIPTION PROVIDED BY VERMONT AGENCY OF TRANSPORTATION GEODETIC SURVEY UNIT

TRAVERSE TIES



\* MAIN TRAVERSE COMPLETED: FEB. 14, 2002 BY R. GILMAN, P. WINTERS, & D. BREER

ALIGNMENT COORD

ALIGNMENT COORDINATES

VT ROUTE 100			
	STATION	NORTHING	EASTING
PC	1+00.00	571847.9800	1546194.0104
PT	3+06.43	572047.1222	1546140.0849
POE	7+00.00	572432.3768	1546059.6208
CHANNEL			
POB	50+00.00	572055.0399	1546066.1947
POE	52+50.00	572264.2242	1546203.0958

CURVE (1)  
DELTA = 6°42'32.57" RT.  
D = 3°15'00"  
R = 1762.95'  
T = 103.33'  
L = 206.43'  
E = 3.03'

DATUM

VERTICAL	NAVD 88
HORIZONTAL	NAD 83 (96)
ADJUSTMENT	Compass

PROJECT NAME: WARREN  
PROJECT NUMBER: BRF 013-4(32)

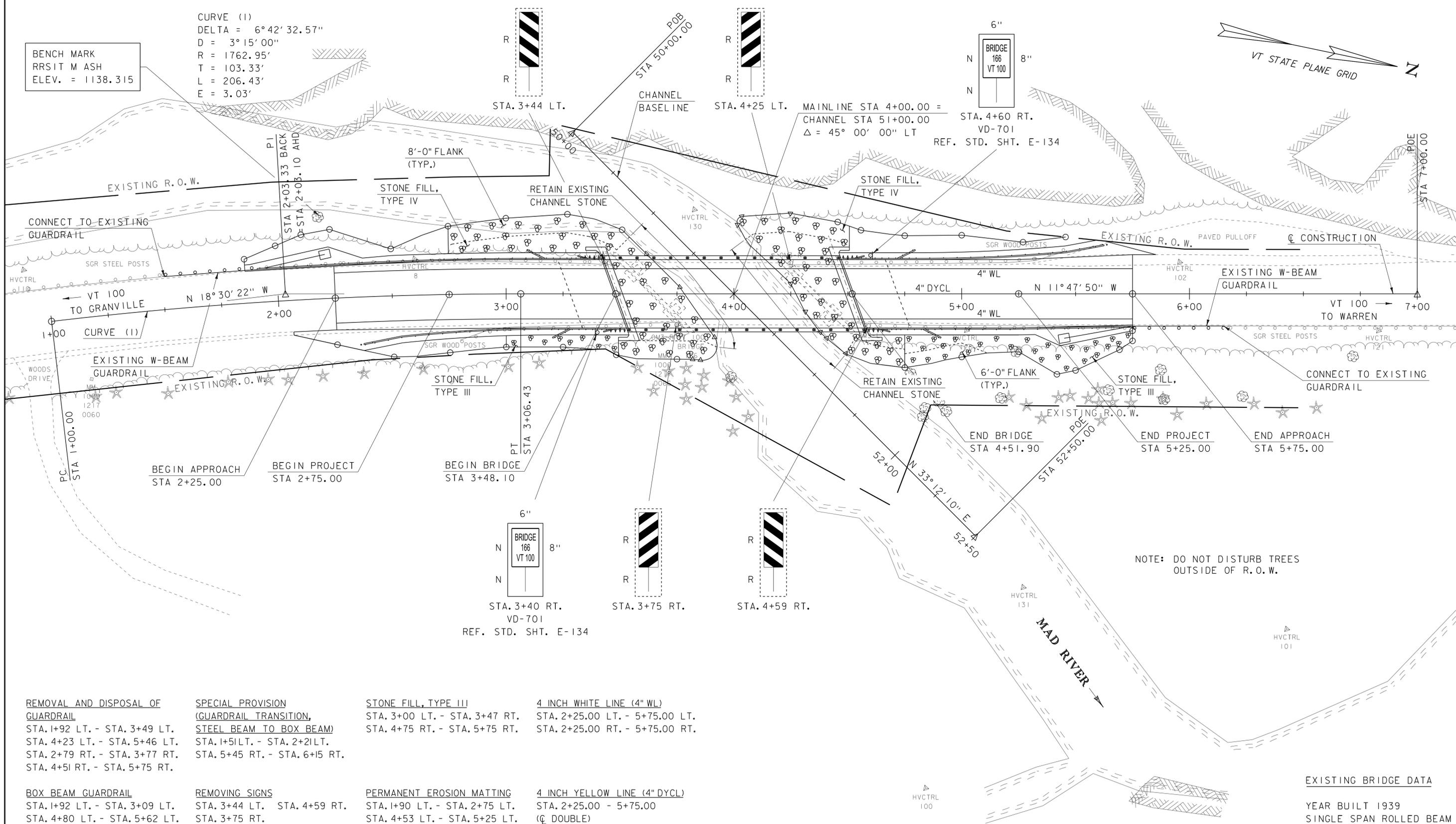
FILE NAME: z10b424+1e.dgn  
PROJECT LEADER: R. YOUNG  
DESIGNED BY: VTRANS  
TIE SHEET

PLOT DATE: 03-OCT-2013  
DRAWN BY: R. BULLOCK  
CHECKED BY: T. KENDRICK  
SHEET 8 OF 42



BENCH MARK  
RRSIT M ASH  
ELEV. = 1138.315

CURVE (1)  
DELTA = 6°42'32.57"  
D = 3°15'00"  
R = 1762.95'  
T = 103.33'  
L = 206.43'  
E = 3.03'



**REMOVAL AND DISPOSAL OF GUARDRAIL**  
STA. 1+92 LT. - STA. 3+49 LT.  
STA. 4+23 LT. - STA. 5+46 LT.  
STA. 2+79 RT. - STA. 3+77 RT.  
STA. 4+51 RT. - STA. 5+75 RT.

**BOX BEAM GUARDRAIL**  
STA. 1+92 LT. - STA. 3+09 LT.  
STA. 4+80 LT. - STA. 5+62 LT.  
STA. 2+37 RT. - STA. 3+20 RT.  
STA. 4+91 RT. - STA. 5+75 RT.

**GUARDRAIL APPROACH SECTION, GALVANIZED 3 RAIL BOX BEAM**  
STA. 3+09 LT. - STA. 3+41 LT.  
STA. 4+48 LT. - STA. 4+80 LT.  
STA. 3+20 RT. - STA. 3+52 RT.  
STA. 4+59 RT. - STA. 4+91 RT.

**SPECIAL PROVISION (GUARDRAIL TRANSITION, STEEL BEAM TO BOX BEAM)**  
STA. 1+51 LT. - STA. 2+21 LT.  
STA. 5+45 RT. - STA. 6+15 RT.

**REMOVING SIGNS**  
STA. 3+44 LT. STA. 4+59 RT.  
STA. 3+75 RT.  
STA. 3+76 RT.  
STA. 4+25 LT.

**STONE FILL, TYPE IV**  
STA. 2+75 - STA. 3+78 LT.  
STA. 3+47 - STA. 3+91 RT.  
STA. 4+01 - STA. 4+50 LT.  
STA. 4+27 - STA. 4+75 RT.

**STONE FILL, TYPE III**  
STA. 3+00 LT. - STA. 3+47 RT.  
STA. 4+75 RT. - STA. 5+75 RT.

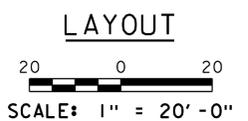
**PERMANENT EROSION MATTING**  
STA. 1+90 LT. - STA. 2+75 LT.  
STA. 4+53 LT. - STA. 5+25 LT.  
STA. 2+37 RT. - STA. 3+00 RT.

**GRUBBING MATERIAL (OVER STONE FILL)**  
STA. 2+75 LT. - STA. 3+62 LT.  
STA. 4+01 LT. - STA. 4+50 LT.  
STA. 3+00 RT. - STA. 3+91 RT.  
STA. 4+80 RT. - STA. 5+75 RT.

**4 INCH WHITE LINE (4" WL)**  
STA. 2+25.00 LT. - 5+75.00 LT.  
STA. 2+25.00 RT. - 5+75.00 RT.

**4 INCH YELLOW LINE (4" DYCL) (DOUBLE)**  
STA. 2+25.00 - 5+75.00

**NOTE:**  
GRUBBING MATERIAL SHALL NOT BE PLACED ON STONE FILL BENEATH BRIDGE.

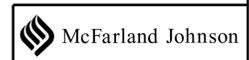


**LEGEND**

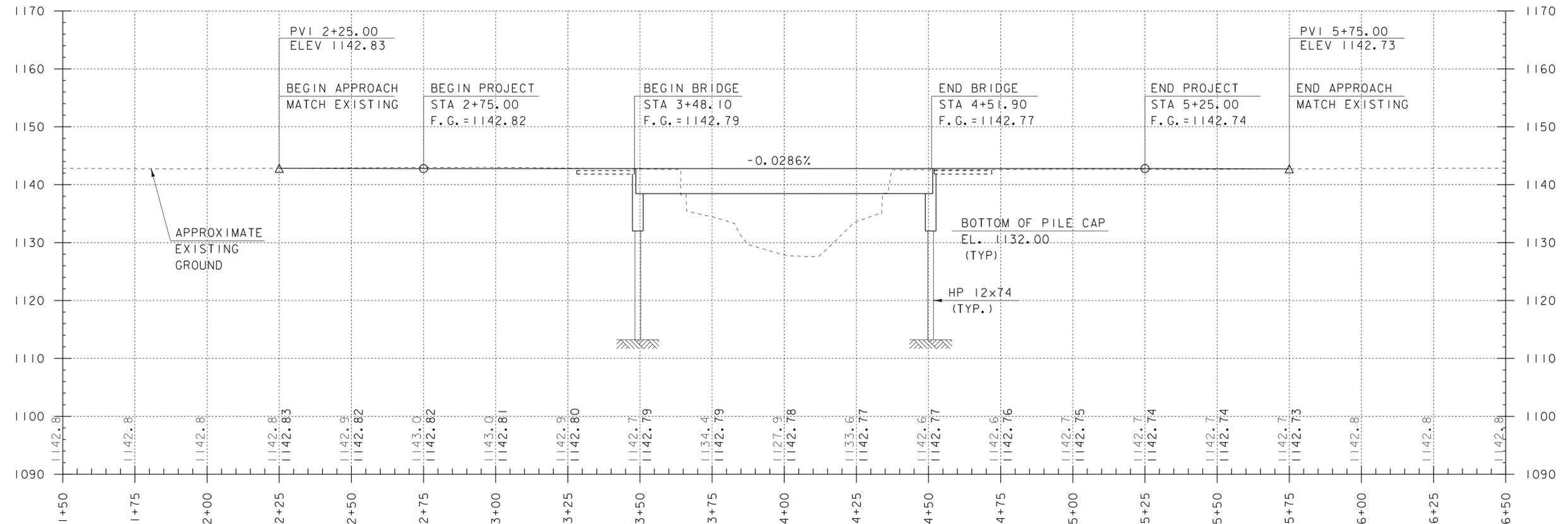
- R [Symbol] REMOVE EXISTING SIGN AND POST (SALVAGE TO THE STATE)
- N [Symbol] NEW SIGN AND POST

NOTE: DO NOT DISTURB TREES OUTSIDE OF R.O.W.

**EXISTING BRIDGE DATA**  
YEAR BUILT 1939  
SINGLE SPAN ROLLED BEAM  
OVERALL LENGTH = 74 FT  
CLEAR SPAN = 71 FT  
DECK WIDTH = 27 FT

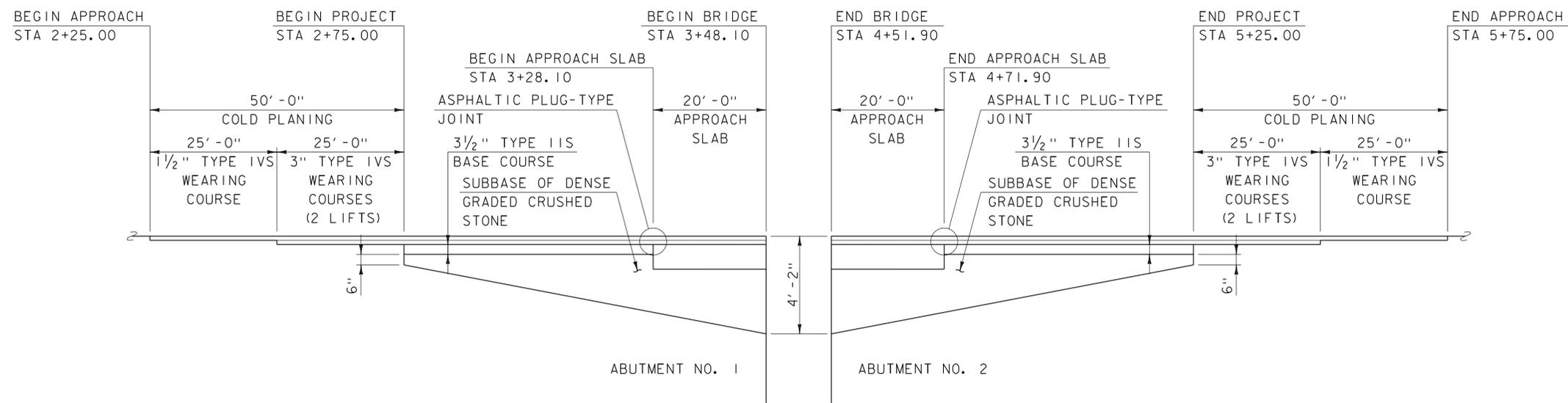


PROJECT NAME: WARREN	PLOT DATE: 03-OCT-2013
PROJECT NUMBER: BRF 013-4(32)	DRAWN BY: P. DUSTIN
FILE NAME: z10b424bdr_nul.dgn	CHECKED BY: T. KENDRICK
PROJECT LEADER: R. YOUNG	SHEET 9 OF 42
DESIGNED BY: D. KULL	
LAYOUT SHEET	



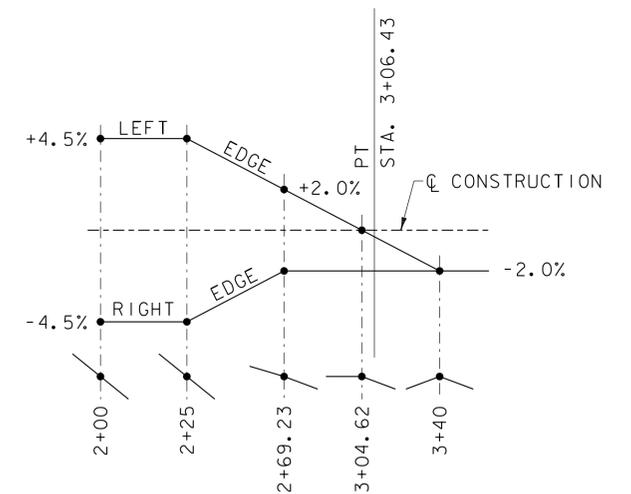
**VT 100 PROFILE**

HORIZONTAL SCALE: 1" = 20' - 0"  
 VERTICAL SCALE: 1" = 10' - 0"



**MATERIAL TRANSITION DETAIL**

NOT TO SCALE



**PROPOSED BANKING DIAGRAM**

NOT TO SCALE

**NOTES**

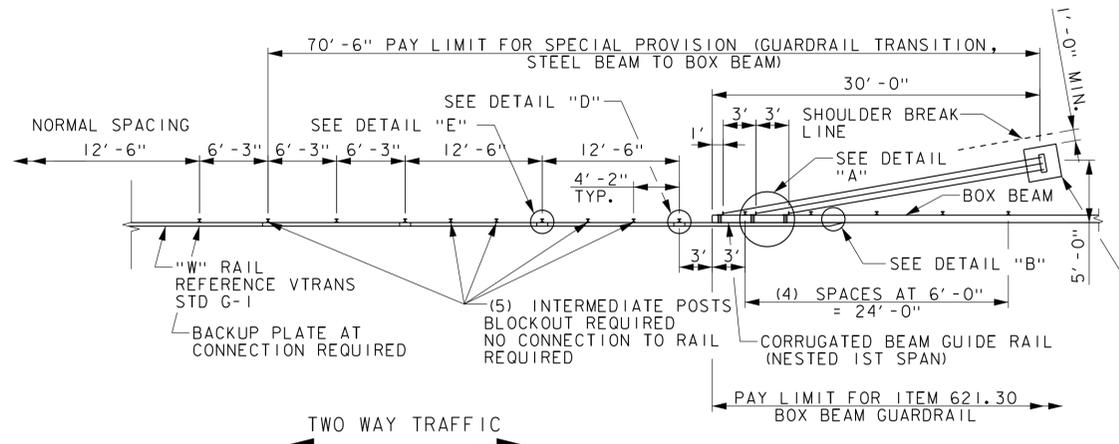
1. ELEVATIONS SHOWN TO THE NEAREST TENTH ARE EXISTING GROUND ALONG PROPOSED CENTERLINE.
2. ELEVATIONS SHOWN TO THE NEAREST HUNDREDTH ARE FINISH GRADES ALONG PROPOSED CENTERLINE.

PROJECT NAME: WARREN  
 PROJECT NUMBER: BR 013-4(32)

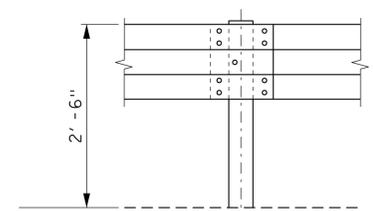
FILE NAME: z10b424pro.dgn  
 PROJECT LEADER: R. YOUNG  
 DESIGNED BY: VTRANS/D. KULL  
 PROFILE SHEET

PLOT DATE: 03-OCT-2013  
 DRAWN BY: P. DUSTIN  
 CHECKED BY: T. KENDRICK  
 SHEET 10 OF 42

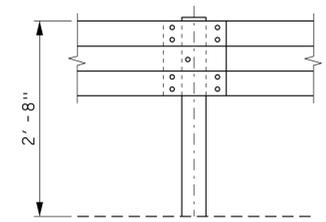




PLAN



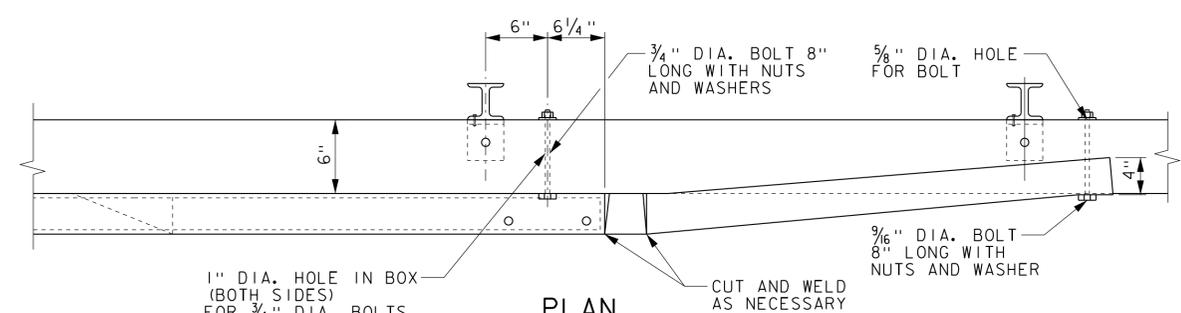
DETAIL "D"



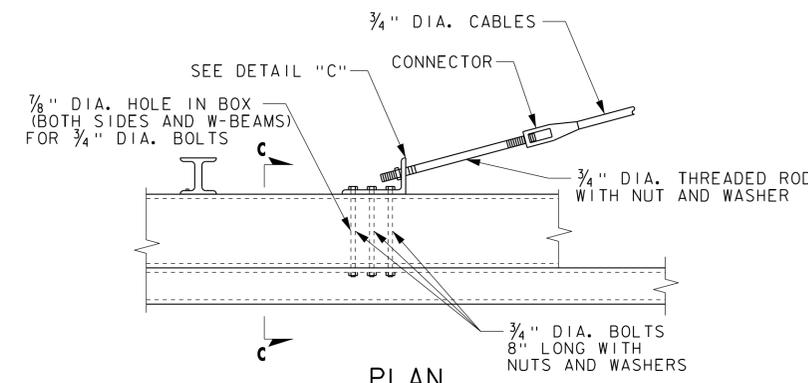
DETAIL "E"

(FULL HEIGHT POST)  
NOT TO SCALE

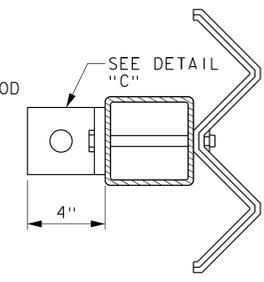
TYPICAL ANCHOR FOR STEEL BOX BEAM TRANSITION. SEE DETAILS IN "GUARDRAIL TRANSITION DETAILS (2 OF 2)". SPRING COMPENSATORS ARE NOT REQUIRED AT THIS LOCATION.



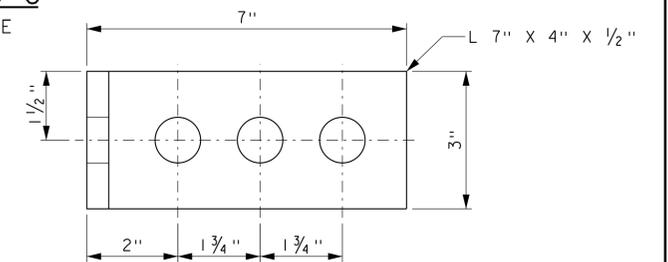
PLAN  
DETAIL "B"  
NOT TO SCALE



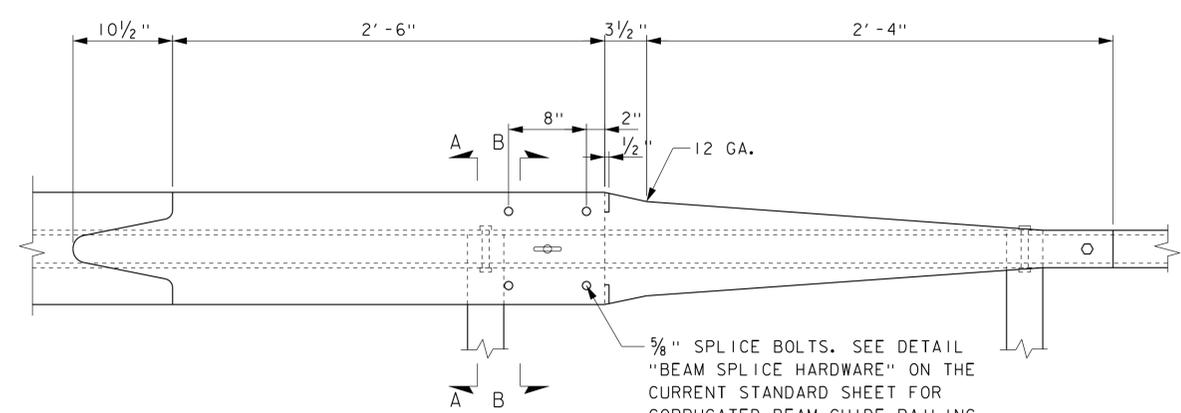
PLAN  
DETAIL "A"  
NOT TO SCALE



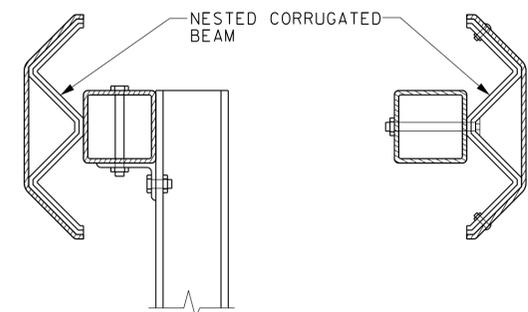
SECTION C-C  
NOT TO SCALE



DETAIL "C"  
NOT TO SCALE



ELEVATION  
DETAIL "B"  
NOT TO SCALE



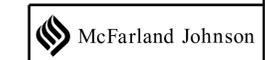
SECTION A-A  
NOT TO SCALE

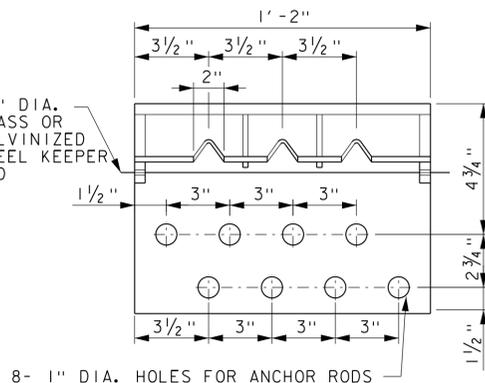
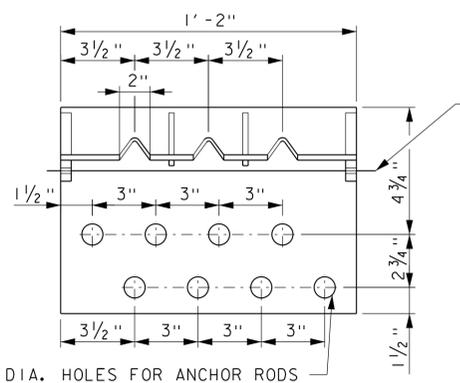
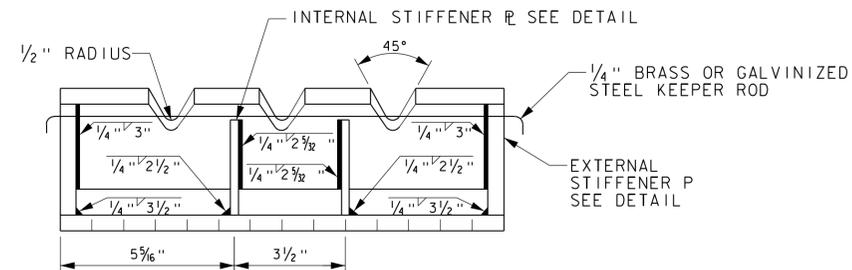
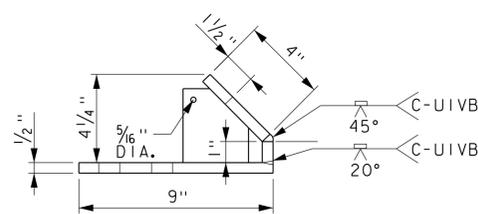
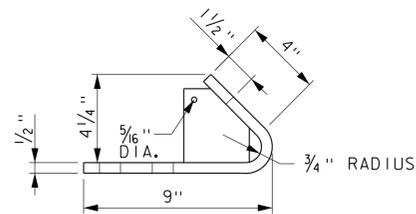
SECTION B-B  
NOT TO SCALE

PROJECT NAME: WARREN  
PROJECT NUMBER: BR 013-4(32)

FILE NAME: z10b424grdt1s.dgn  
PROJECT LEADER: R. YOUNG  
DESIGNED BY: D. KULL  
GUARDRAIL TRANSITION DETAILS (1 OF 2)

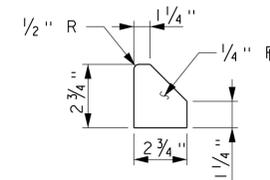
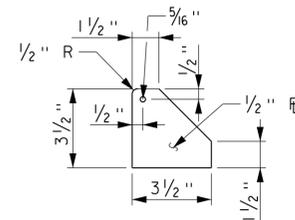
PLOT DATE: 03-OCT-2013  
DRAWN BY: P. DUSTIN  
CHECKED BY: T. KENDRICK  
SHEET 11 OF 42





**ANCHOR ANGLE DETAILS**

NOT TO SCALE



**BENT PLATE ANCHOR ANGLE DETAILS**

NOT TO SCALE

**WELDED PLATE ANCHOR ANGLE DETAILS**

NOT TO SCALE

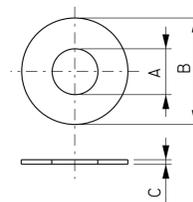
**EXTERNAL STIFFENER ANCHOR ANGLE DETAILS**

NOT TO SCALE

**INTERNAL STIFFENER ANCHOR ANGLE DETAILS**

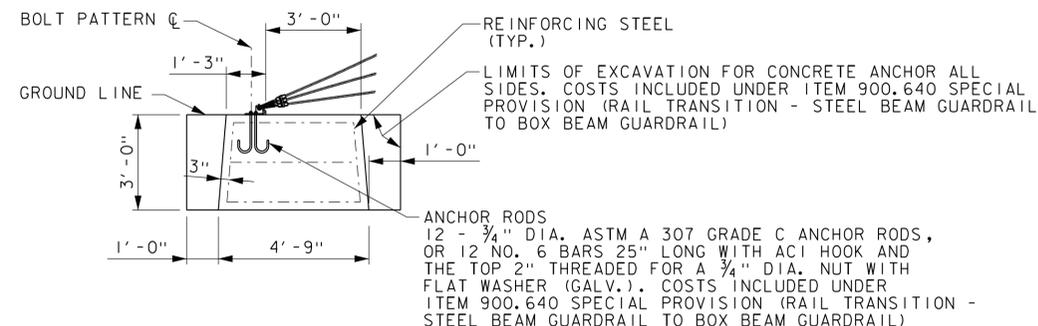
NOT TO SCALE

WASHER	WASHER SERIES	INSIDE DIAMETER "A"			OUTSIDE DIAMETER "B"			THICKNESS "C"		
		BASIC	TOLERANCE PLUS	TOLERANCE MINUS	BASIC	TOLERANCE PLUS	TOLERANCE MINUS	BASIC	MAX.	MIN.
3/4"	REGULAR	0.812	0.030	0.007	1.469	0.030	0.007	0.134	0.160	0.108
	WIDE	0.812	0.030	0.007	2.000	0.030	0.007	0.165	0.192	0.136
1/2"	NARROW	0.531	0.015	0.005	1.062	0.030	0.007	0.095	0.121	0.074



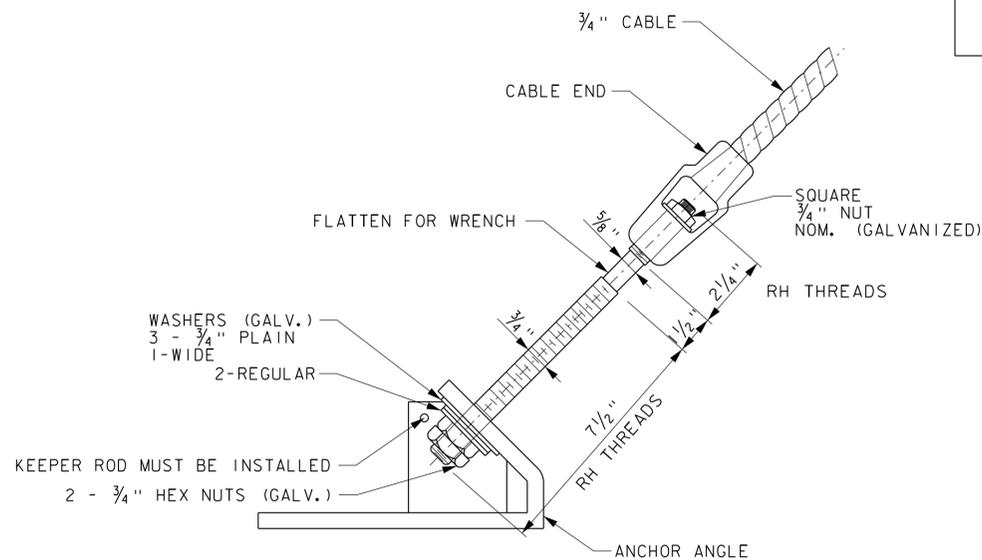
**WASHER TABLE AND WASHER DETAIL**

NOT TO SCALE



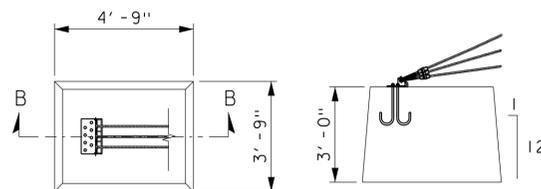
**ANCHOR UNIT DETAIL**

NOT TO SCALE



**CABLE END ASSEMBLY TO ANCHOR ANGLE DETAILS**

NOT TO SCALE

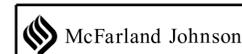


**PLAN**

**SECTION B-B**

**CONCRETE ANCHOR**

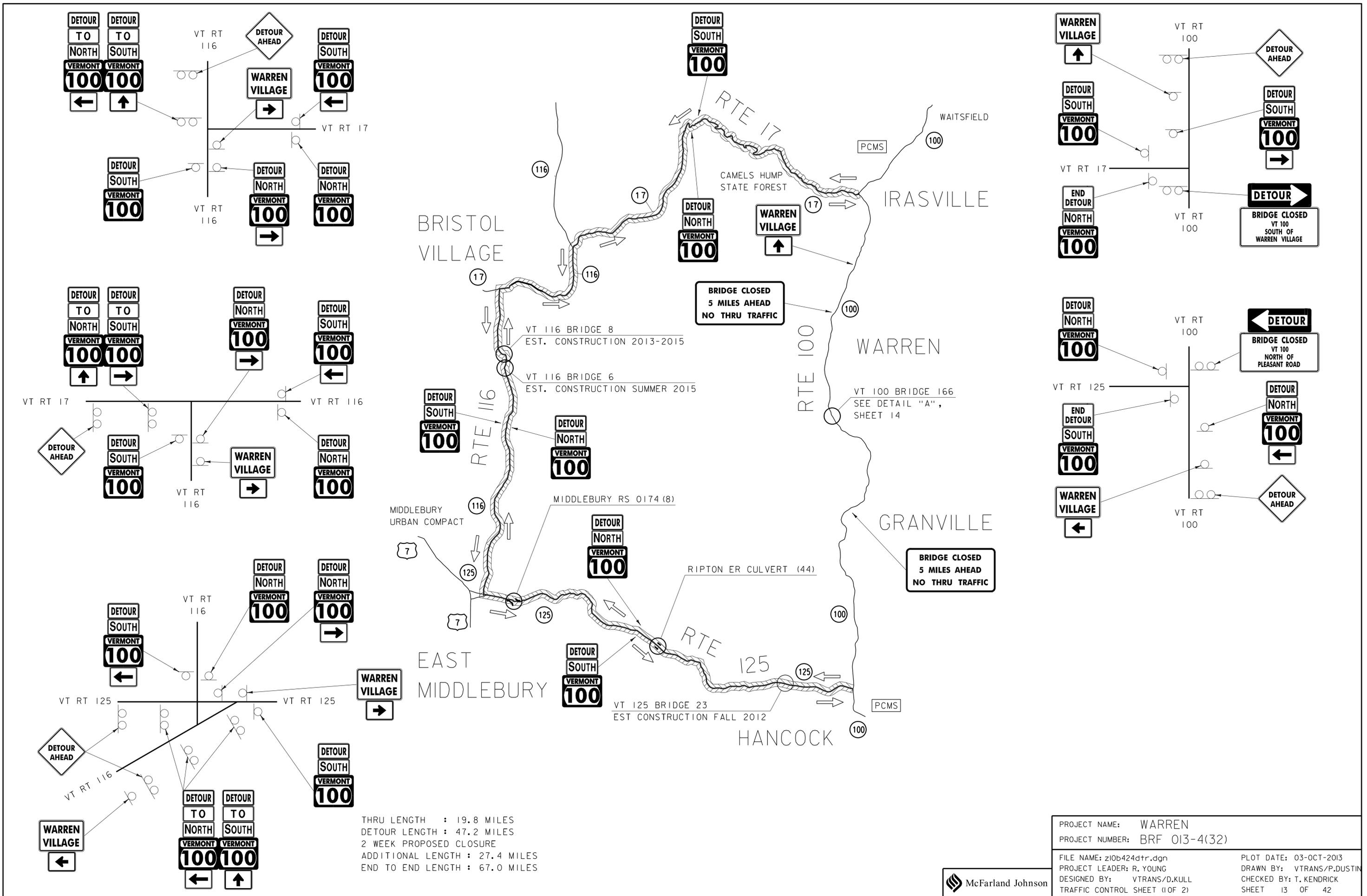
NOT TO SCALE



PROJECT NAME: WARREN  
PROJECT NUMBER: BR 013-4(32)

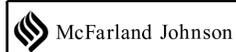
FILE NAME: z10b424grdt1s.dgn  
PROJECT LEADER: R. YOUNG  
DESIGNED BY: D. KULL  
GUARDRAIL TRANSITION DETAILS (2 OF 2)

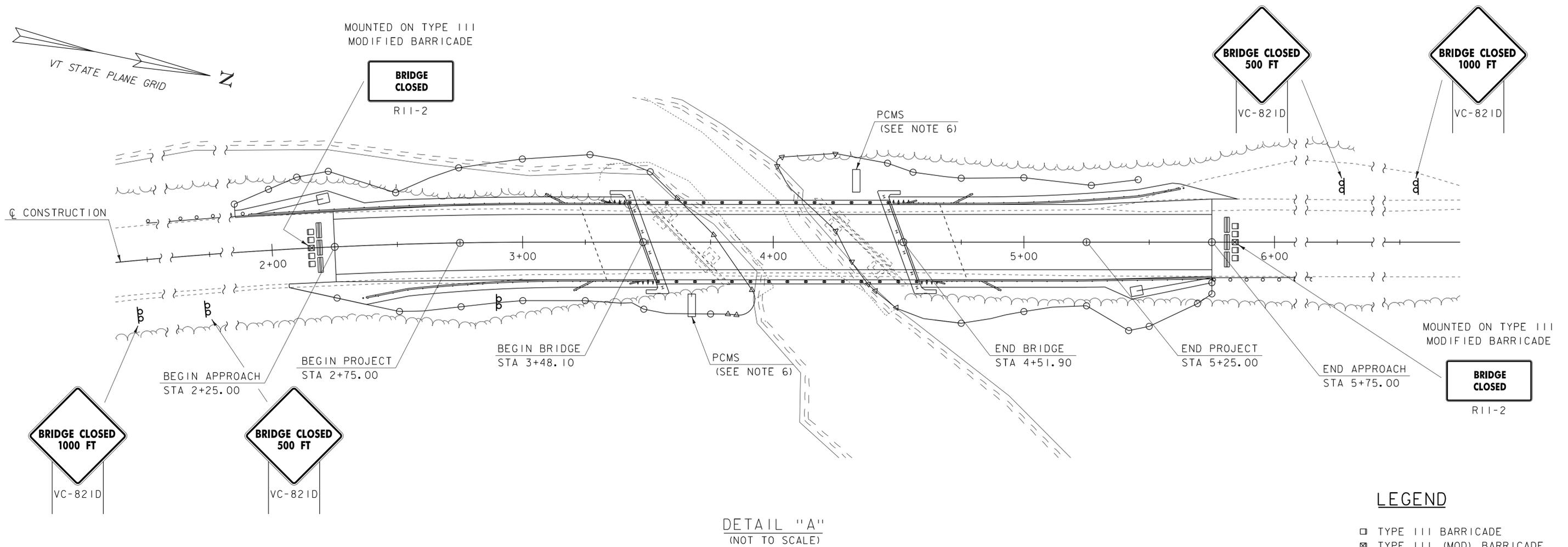
PLOT DATE: 03-OCT-2013  
DRAWN BY: P. DUSTIN  
CHECKED BY: T. KENDRICK  
SHEET 12 OF 42



THRU LENGTH : 19.8 MILES  
 DETOUR LENGTH : 47.2 MILES  
 2 WEEK PROPOSED CLOSURE  
 ADDITIONAL LENGTH : 27.4 MILES  
 END TO END LENGTH : 67.0 MILES

PROJECT NAME: WARREN	
PROJECT NUMBER: BRF 013-4(32)	
FILE NAME: z10b424dtr.dgn	PLOT DATE: 03-OCT-2013
PROJECT LEADER: R. YOUNG	DRAWN BY: VTRANS/P.DUSTIN
DESIGNED BY: VTRANS/D.KULL	CHECKED BY: T. KENDRICK
TRAFFIC CONTROL SHEET (1 OF 2)	SHEET 13 OF 42

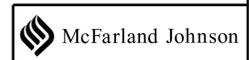




**TRAFFIC CONTROL NOTES**

1. THE OFFICIAL STATE DETOUR IS SHOWN FOR THE ROAD CLOSURE PORTION OF THIS PROJECT ON SHEET 13.
2. NO LOCAL DETOUR ROUTE WILL BE SIGNED OR OFFICIALLY RECOGNIZED FOR THIS PROJECT.
3. TRACTOR TRAILER TRUCKS SHOULD SEEK ALTERNATE ROUTES.
4. A PUBLIC OUTREACH COORDINATOR (NOT IN CONTRACT) SHALL BE USED FOR PUBLICIZING AND COORDINATING DETOUR INFORMATION, INCLUDING (BUT NOT LIMITED TO) TRAFFIC DELAYS FOR THE PUBLIC. THE CONTRACTOR IS TO COORDINATE WITH THE PUBLIC OUTREACH COORDINATOR AS NEEDED.
5. THE CONTRACTOR SHALL BE RESPONSIBLE FOR DESIGNING, ERECTING AND MAINTAINING (AS WELL AS REMOVING AND RESETTING) ALL DETOUR AND ON-PROJECT TEMPORARY TRAFFIC CONTROL ZONE DEVICES, INCLUDING (BUT NOT LIMITED TO) CONSTRUCTION SIGNS, BARRICADES, TEMPORARY TRAFFIC BARRIERS, PORTABLE CHANGEABLE MESSAGE SIGNS (PCMS) AND OTHER REQUIRED DEVICES (AS ORDERED BY THE ENGINEER) USED TO REGULATE, WARN AND GUIDE TRAFFIC DURING CONSTRUCTION. TRAFFIC CONTROL DEVICES SHALL MEET THE REQUIREMENTS OF LATEST EDITION OF THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD) AND PERTINENT E-SERIES AND T-SERIES STANDARDS. WHERE CONFLICTS EXIST, THE MUTCD SHALL GOVERN. EXACT LOCATIONS OF DEVICES SHALL BE COORDINATED WITH THE ENGINEER. ADDITIONAL PROJECT CONSTRUCTION SIGNS SHALL BE INSTALLED AS REQUIRED BY THE ENGINEER. THE COST OF ALL DETOUR AND ON-PROJECT TEMPORARY TRAFFIC CONTROL ZONE DEVICES (WITH THE EXCEPTION OF TEMPORARY TRAFFIC BARRIERS AND PCMS) SHALL BE PAID FOR UNDER ITEM 641.10, TRAFFIC CONTROL.
6. PORTABLE CHANGEABLE MESSAGE SIGNS "PCMS" SHALL BE PLACED AT THE APPROXIMATE LOCATIONS SHOWN ON THE PLANS OR WHERE DESIGNATED BY THE ENGINEER. TWO SIGNS SHALL BE PLACED AT THE BRIDGE 14 DAYS PRIOR TO THE START OF CONSTRUCTION TO WARN OF THE IMPENDING DETOURS. SIGN MESSAGE SHALL BE DETERMINED BY THE PUBLIC OUTREACH COORDINATOR AND THE ENGINEER. PAYMENT FOR THESE SIGNS SHALL BE INCLUDED IN ITEM 641.15 "PORTABLE CHANGEABLE MESSAGE SIGN".
7. TRAFFIC WILL BE ALLOWED TO BE REDUCED TO ONE LANE FOR A MAXIMUM OF TWO WEEKS PRIOR TO THE BRIDGE CLOSURE PERIOD FOR PRE-EXCAVATION OF THE PILES. THE CONTRACTOR IS REQUIRED TO INFORM THE PUBLIC OUTREACH COORDINATOR PRIOR TO REDUCING TRAFFIC TO ONE LANE. ALL SIGNS, SIGNALS, BARRIERS, ETC. REQUIRED TO MAINTAIN ONE LANE OF TRAFFIC IS TO BE INCLUDED UNDER ITEM 641.10, TRAFFIC CONTROL.
8. THE STATE ROUTE MARKERS USED FOR THE DETOUR AS SHOWN ON THE PLANS SHALL FOLLOW STANDARDS T-127 AND T-136B. THESE SIGNS SHALL BE REMOVED AT THE END OF THE ROAD CLOSURE. THESE SIGNS AND THEIR REMOVAL SHALL BE PAID FOR UNDER ITEM 641.10 "TRAFFIC CONTROL".
9. ALL TRAFFIC CONTROL DEVICES SHALL BE KEPT IN THEIR PROPER POSITION AT ALL TIMES AND SHALL BE REPAIRED, REPLACED OR CLEANED AS NECESSARY TO PRESERVE THEIR APPEARANCE AND CONTINUITY.
10. ALL SIGNS SHALL BE PLACED WITHIN EXISTING OR TOWN RIGHTS-OF-WAY.
11. ACCESS TO ALL EXISTING DRIVES AND SIDE ROADS SHALL BE MAINTAINED AT ALL TIMES DURING ALL PHASES OF CONSTRUCTION.
12. INSTALLATION OF DETOUR AND ON-SITE SIGNS SHALL NOT BLOCK ANY EXISTING TRAFFIC CONTROL SIGN ASSEMBLIES AND SHALL MODIFY OR BE PLACED ADJACENT TO EXISTING ROUTE MARKER SIGN ASSEMBLIES WHEN POSSIBLE. THE CONTRACTOR SHALL MAINTAIN AT LEAST 200 FEET BETWEEN SIGN ASSEMBLIES WHENEVER POSSIBLE.
13. EXISTING SIGNS THAT ARE IN CONFLICT WITH THE TRAFFIC FLOW OF THE DETOUR SHALL BE REMOVED OR COVERED BY THE CONTRACTOR. ALL SIGNS REMOVED OR COVERED SHALL BE REPLACED OR UNCOVERED WHEN THE TRAFFIC CONTROL PLAN IS DISASSEMBLED. PAYMENT FOR THIS WORK WILL BE INCIDENTAL TO ITEM 641.10 "TRAFFIC CONTROL".
14. NO CONSTRUCTION SIGNS SHALL BE INSTALLED AS TO INTERFERE WITH STOPPING SIGHT DISTANCE AND CORNER SIGHT DISTANCE FROM DRIVES AND TOWN HIGHWAYS.
15. CONTACT DIG-SAFE AT 1-888-344-7233 PRIOR TO BREAKING GROUND TO INSTALL ANY SIGN POSTS.

PROJECT NAME: WARREN	
PROJECT NUMBER: BRP 013-4(32)	
FILE NAME: z10b424dtr.dgn	PLOT DATE: 14-OCT-2013
PROJECT LEADER: R. YOUNG	DRAWN BY: VTRANS/P.DUSTIN
DESIGNED BY: VTRANS/D.KULL	CHECKED BY: T. KENDRICK
TRAFFIC CONTROL SHEET (2 OF 2)	SHEET 14 OF 42



**SOIL CLASSIFICATION**

AASHTO

A1	Gravel and Sand
A3	Fine Sand
A2	Silty or Clayey Gravel and Sand
A4	Silty Soil - Low Compressibility
A5	Silty Soil - Highly Compressible
A6	Clayey Soil - Low Compressibility
A7	Clayey Soil - Highly Compressible

**ROCK QUALITY DESIGNATION**

R.Q.D. (%)	ROCK DESCRIPTION
<25	Very Poor
25 to 50	Poor
51 to 75	Fair
76 to 90	Good
>90	Excellent

**SHEAR STRENGTH**

UNDRAINED SHEAR STRENGTH IN P.S.F.	CONSISTENCY
<250	Very Soft
250-500	Soft
500-1000	Med. Stiff
1000-2000	Stiff
2000-4000	Very Stiff
>4000	Hard

**CORRELATION GUIDE OF "N" TO DENSITY/CONSISTENCY**

DENSITY (GRANULAR SOILS)		CONSISTENCY (COHESIVE SOILS)	
N	DESCRIPTIVE TERM	N	DESCRIPTIVE TERM
<5	Very Loose	<2	Very Soft
5-10	Loose	2-4	Soft
11-24	Med. Dense	5-8	Med. Stiff
25-50	Dense	9-15	Stiff
>50	Very Dense	16-30	Very Stiff
		31-60	Hard
		>60	Very Hard

**COMMONLY USED SYMBOLS**

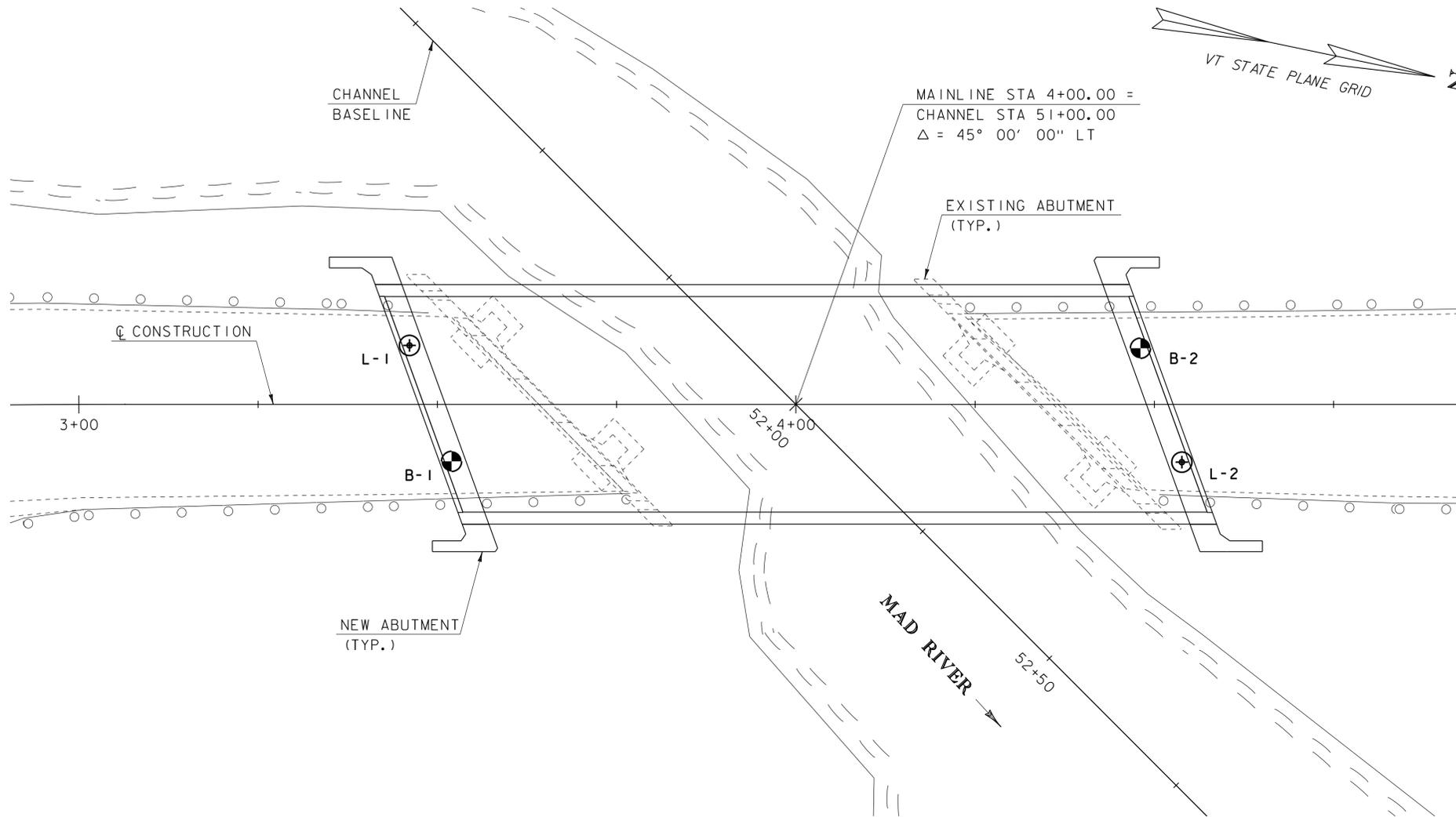
- ▼ Water Elevation
- ⊕ Standard Penetration Boring
- ⊕ Auger Boring
- ⊕ Rod Sounding
- ⊕ Sample
- N Standard Penetration Test
  - Blow Count Per Foot For:
  - 2" O.D. Sampler
  - 1 3/8" I.D. Sampler
  - Hammer Weight Of 140 Lbs.
  - Hammer Fall Of 30"
- VS Field Vane Shear Test
- US Undisturbed Soil Sample
- B Blast
- DC Diamond Core
- MD Mud Drill
- WA Wash Ahead
- HSA Hollow Stem Auger
- AX Core Size 1 1/8"
- BX Core Size 1 5/8"
- NX Core Size 2 1/8"
- M Double Tube Core Barrel Used
- LL Liquid Limit
- PL Plastic Limit
- PI Plasticity Index
- NP Non Plastic
- w Moisture Content (Dry Wgt. Basis)
- D Dry
- M Moist
- MTW Moist To Wet
- W Wet
- Sat Saturated
- Bo Boulder
- Gr Gravel
- Sa Sand
- SI Silt
- Cl Clay
- HP Hardpan
- Le Ledge
- NLTD No Ledge To Depth
- CNPF Can Not Penetrate Further
- TLOB Top of Ledge Or Boulder
- NR No Recovery
- Rec. Recovery
- %Rec. Percent Recovery
- RQD Rock Quality Designation
- CBR California Bearing Ratio
- < Less Than
- > Greater Than
- R Refusal (N > 100)
- VTSPG NAD83 - See Note 7

**COLOR**

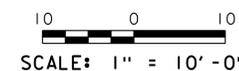
blk	Black	pnk	Pink
bl	Blue	pu	Purple
brn	Brown	rd	Red
dk	Dark	tn	Tan
gry	Gray	wh	White
gn	Green	yel	Yellow
lt	Light	mltc	Multicolored
or	Orange		

**DEFINITIONS (AASHTO)**

- BEDROCK (LEDGE) - Rock in its native location of indefinite thickness.
- BOULDER - A rock fragment with an average dimension > 12 inches.
- COBBLE - Rock fragments with an average dimension between 3 and 12 inches.
- GRAVEL - Rounded particles of rock < 3" and > 0.0787" (#10 sieve).
- SAND - Particles of rock < 0.0787" (#10 sieve) and > 0.0029" (#200 sieve).
- SILT - Soil < 0.0029" (#200 sieve), non or slightly plastic and exhibits no strength when air-dried.
- CLAY - Fine grained soil, exhibits plasticity when moist and considerable strength when air-dried.
- VARVED - Alternate layers of silt and clay.
- HARDPAN - Extremely dense soil, cemented layer, not softened when wet.
- MUCK - Soft organic soil (containing > 10% organic material).
- MOISTURE CONTENT - Weight of water divided by dry weight of soil.
- FLOWING SAND - Granular soil so saturated (loose) that it flows into drill casing during extraction of wash rod.
- STRIKE - Angle from magnetic north to line of intersection of bed with a horizontal plane.
- DIP - Inclination of bed with a horizontal plane.



**BORING LAYOUT**



**BORING CHART**

HOLE NO.	SURV. STATION	OFFSET	GROUND ELEV.	DEPTH TLOB (FT.)	NORTHING	EASTING
B-1	3+52	7.93 RT.	1142.5	40.0	572093.33	1546138.54
B-2	4+48	7.82 LT.	1142.3	39.2	572184.16	1546103.48
L-1	3+46	8.20 LT.	1142.5	20.0	572084.29	1546123.94
L-2	4+54	8.05 RT.	1142.3	29.5	572193.05	1546117.83

**LEGEND**

- ⊕ B-1 BORING
- ⊕ L-1 LEDGE PROBE

**GENERAL NOTES**

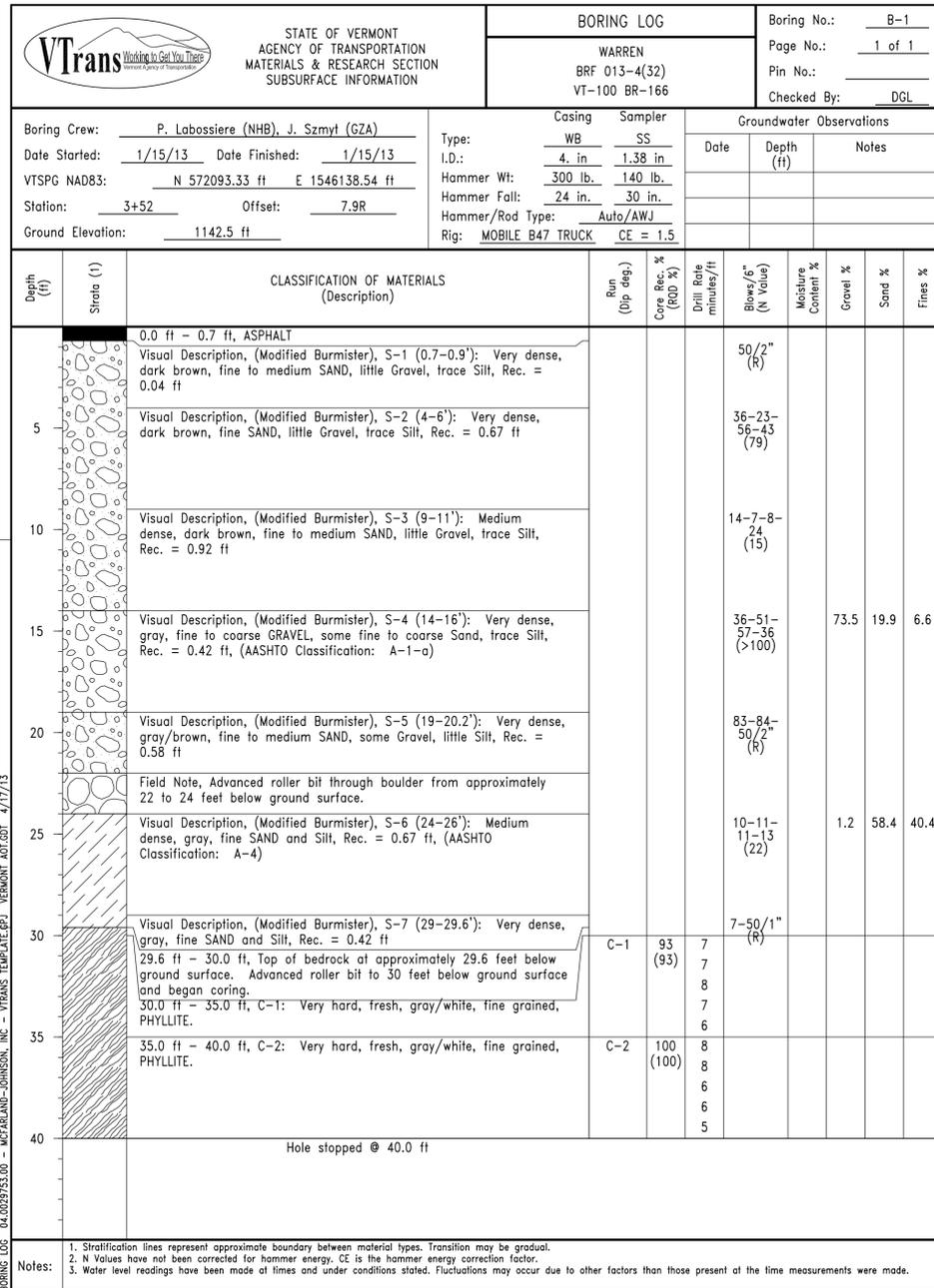
- The subsurface explorations shown herein were made between January 13, 2013 and January 17, 2013 by GZA Geoenvironmental.
- Soil and rock classifications, properties and descriptions are based on engineering interpretation from available subsurface information by the Agency and may not necessarily reflect actual variations in subsurface conditions that may be encountered between individual boring or sample locations.
- Observed water levels and/or conditions indicated are as recorded at the time of exploration and may vary according to the prevailing rainfall, methods of exploration and other factors.
- Engineering judgment was exercised in preparing the subsurface information presented herein. Analysis and interpretation of subsurface data was performed and interpreted for Agency design and estimating purposes. Presentation of the information in the Contract is intended to provide the Contractor access to the same data available to the Agency. The subsurface information is presented in good faith and is not intended as a substitute for personal investigation, independent interpretation, independent analysis or judgment by the Contractor.
- Pictorial structure details shown on the boring plan layout or soils profile are for illustrative purposes only and may not accurately portray final contract details.
- Terminology used on boring logs to describe the hardness, degree of weathering, and spacing of fractures, joints and other discontinuities in the bedrock is defined in the AASHTO Manual on Subsurface Investigations, 1988.
- Northing and Easting coordinates are shown in Vermont State Plane Grid North American Datum 1983 in meters and survey feet.



PROJECT NAME: WARREN  
PROJECT NUMBER: BRF 013-4(32)

FILE NAME: z10b424bor.dgn  
PROJECT LEADER: R. YOUNG  
DESIGNED BY: D. KULL  
BORING INFORMATION SHEET

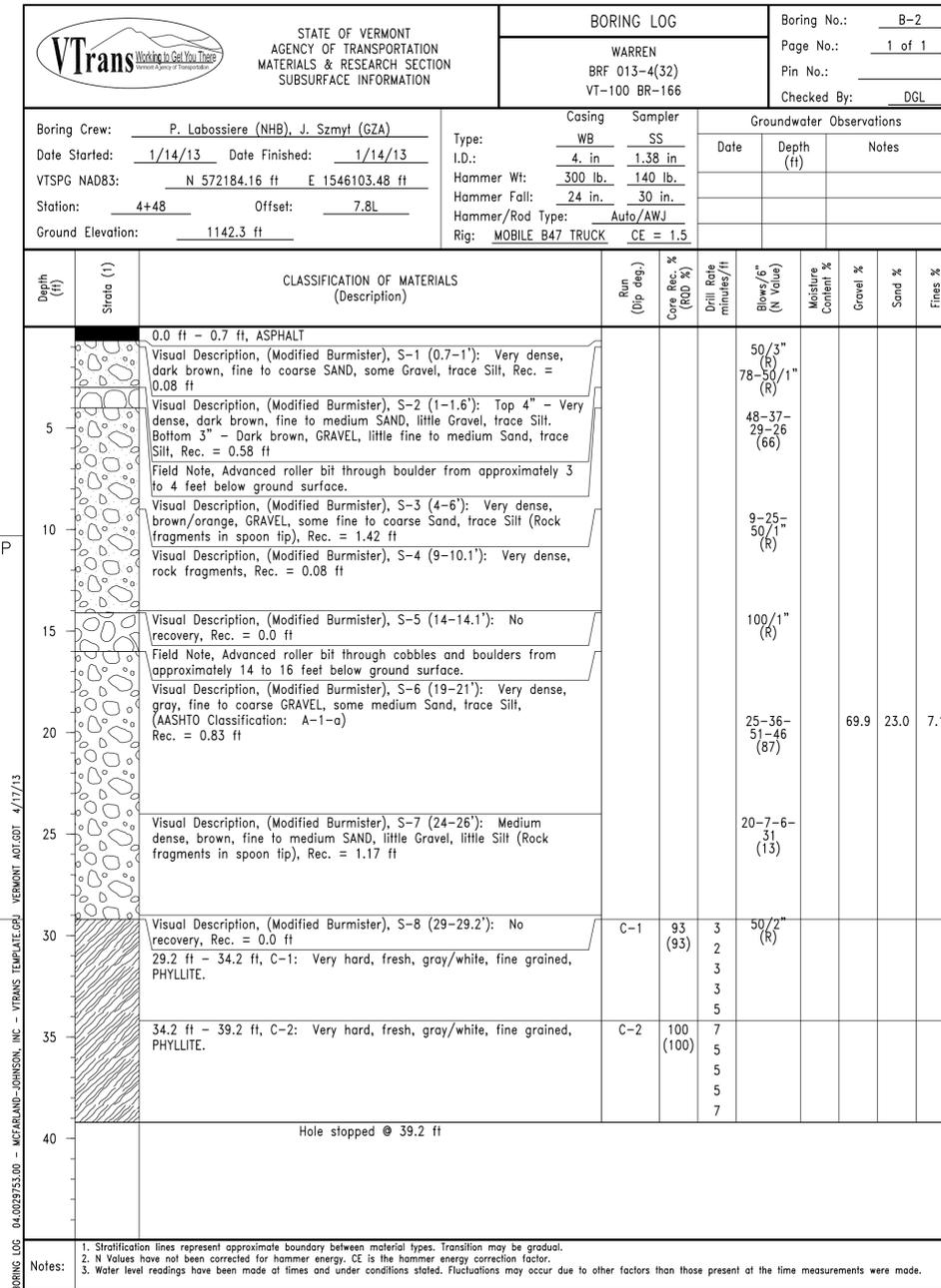
PLOT DATE: 03-OCT-2013  
DRAWN BY: P. DUSTIN  
CHECKED BY: T. KENDRICK  
SHEET 15 OF 42



ABUT. NO. 1  
 BOTTOM PILE CAP  
 EL. 1132.00

ESTIMATED PILE  
 TIP EL. 1112.9

BORING LOG 04.0029753.00 - MCFARLAND-JOHNSON, INC. - VTRANS TEMPLATE.GPJ VERMONT AOT.GDT 4/17/13



ABUT. NO. 2  
 BOTTOM PILE CAP  
 EL. 1132.00

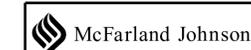
ESTIMATED PILE  
 TIP EL. 1113.1

BORING LOG 04.0029753.00 - MCFARLAND-JOHNSON, INC. - VTRANS TEMPLATE.GPJ VERMONT AOT.GDT 4/17/13

PROJECT NAME: WARREN  
 PROJECT NUMBER: BRF 013-4(32)

FILE NAME: z10b424bor\_log.dgn  
 PROJECT LEADER: R. Young  
 DESIGNED BY: D. Kull  
 BORING LOG SHEET (1 OF 2)

PLOT DATE: 03-OCT-2013  
 DRAWN BY: P. Dustin  
 CHECKED BY: T. Kendrick  
 SHEET 16 OF 42



VT Trans		STATE OF VERMONT AGENCY OF TRANSPORTATION MATERIALS & RESEARCH SECTION SUBSURFACE INFORMATION		BORING LOG		Boring No.: L-1		
		WARREN BRF 013-4(32) VT-100 BR-166				Page No.: 1 of 1		
						Pin No.:		
						Checked By: DGL		
Boring Crew: P. Labossiere (NHB), J. Szmyt (GZA)		Casing Type: WB		Sampler		Groundwater Observations		
Date Started: 1/16/13 Date Finished: 1/17/13		I.D.: 4 in		Date		Depth (ft)		
VTSPG NAD83: N 572084.29 ft E 1546123.94 ft		Hammer Wt: 300 lb. N.A.		Notes				
Station: 3+46 Offset: 8.2L		Hammer Fall: 24 in. N.A.						
Ground Elevation: 1142.5 ft		Hammer/Rod Type: AWJ						
		Rig: MOBILE B47 TRUCK CE =						
Depth (ft)	Strata (1)	CLASSIFICATION OF MATERIALS (Description)		Blows/ft (N Value)	Moisture Content %	Gravel %	Sand %	Fines %
0.0		0.0 ft - 0.7 ft, ASPHALT						
0.7		0.7 ft - 1.0 ft, SAND						
1.0		1.0 ft - 3.0 ft, COBBLES AND BOULDERS						
3.0		3.0 ft - 10.0 ft, SAND AND GRAVEL						
10.0		10.0 ft - 20.0 ft, COBBLES AND BOULDERS						
20.0		Hole stopped @ 20.0 ft						
Remarks: 1. Boring advanced without sampling. Stratum descriptions based on observations of drilling action and wash water. 2. Roller bit refusal at 20 feet below ground surface.								
Notes: 1. Stratification lines represent approximate boundary between material types. Transition may be gradual. 2. N Values have not been corrected for hammer energy. CE is the hammer energy correction factor. 3. Water level readings have been made at times and under conditions stated. Fluctuations may occur due to other factors than those present at the time measurements were made.								

ABUT. NO. 1  
BOTTOM PILE CAP  
EL. 1132.00

BORING LOG 04.0029753.00 - MCFARLAND-JOHNSON, INC. - VTTRANS TEMPLATE.GPJ VERMONT AOT.GDT 4/17/13

VT Trans		STATE OF VERMONT AGENCY OF TRANSPORTATION MATERIALS & RESEARCH SECTION SUBSURFACE INFORMATION		BORING LOG		Boring No.: L-2		
		WARREN BRF 013-4(32) VT-100 BR-166				Page No.: 1 of 1		
						Pin No.:		
						Checked By: DGL		
Boring Crew: P. Labossiere (NHB), J. Szmyt (GZA)		Casing Type: WB		Sampler		Groundwater Observations		
Date Started: 1/15/13 Date Finished: 1/16/13		I.D.: 4 in		Date		Depth (ft)		
VTSPG NAD83: N 572193.05 ft E 1546117.83 ft		Hammer Wt: 300 lb. N.A.		Notes				
Station: 4+54 Offset: 8.1R		Hammer Fall: 24 in. N.A.						
Ground Elevation: 1142.3 ft		Hammer/Rod Type: AWJ						
		Rig: MOBILE B47 TRUCK CE =						
Depth (ft)	Strata (1)	CLASSIFICATION OF MATERIALS (Description)		Blows/ft (N Value)	Moisture Content %	Gravel %	Sand %	Fines %
0.0		0.0 ft - 0.7 ft, ASPHALT						
0.7		0.7 ft - 1.0 ft, SAND						
1.0		1.0 ft - 2.0 ft, COBBLES AND BOULDERS						
2.0		2.0 ft - 15.0 ft, SAND AND GRAVEL						
15.0		15.0 ft - 24.0 ft, COBBLES AND BOULDERS						
24.0		24.0 ft - 29.0 ft, SAND AND GRAVEL						
29.0		29.0 ft - 29.5 ft, PROBABLE BEDROCK						
29.5		Hole stopped @ 29.5 ft						
Remarks: 1. Boring advanced without sampling. Stratum descriptions based on observations of drilling action and wash water. 2. Advanced roller bit into probable bedrock from 29.0 to 29.5 feet below ground surface.								
Notes: 1. Stratification lines represent approximate boundary between material types. Transition may be gradual. 2. N Values have not been corrected for hammer energy. CE is the hammer energy correction factor. 3. Water level readings have been made at times and under conditions stated. Fluctuations may occur due to other factors than those present at the time measurements were made.								

ABUT. NO. 2  
BOTTOM PILE CAP  
EL. 1132.00

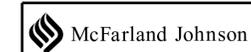
ESTIMATED PILE  
TIP EL. 1113.3

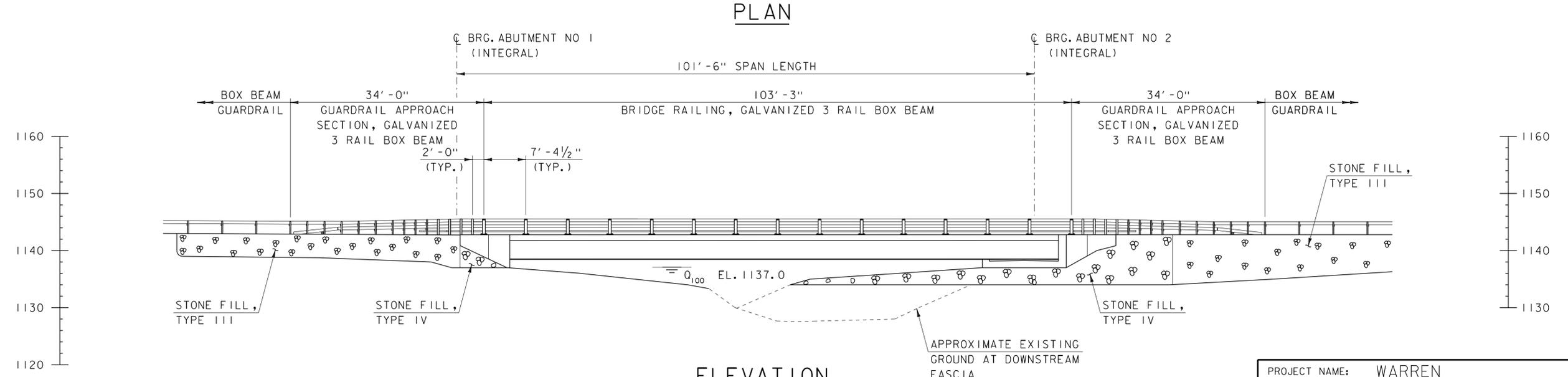
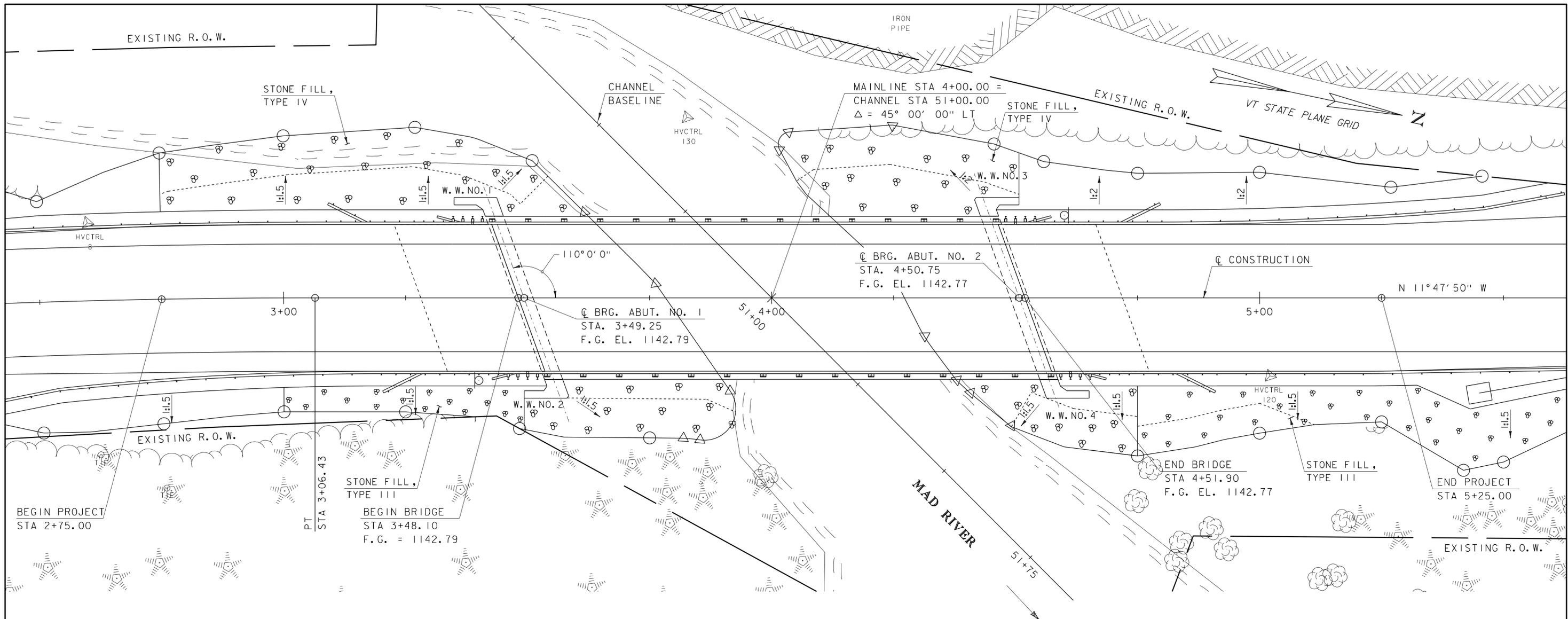
BORING LOG 04.0029753.00 - MCFARLAND-JOHNSON, INC. - VTTRANS TEMPLATE.GPJ VERMONT AOT.GDT 4/17/13

PROJECT NAME: WARREN  
PROJECT NUMBER: BRF 013-4(32)

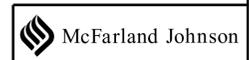
FILE NAME: z10b424bor\_log.dgn  
PROJECT LEADER: R. Young  
DESIGNED BY: D. Kull  
BORING LOG SHEET (2 OF 2)

PLOT DATE: 03-OCT-2013  
DRAWN BY: P. Dustin  
CHECKED BY: T. Kendrick  
SHEET 17 OF 42

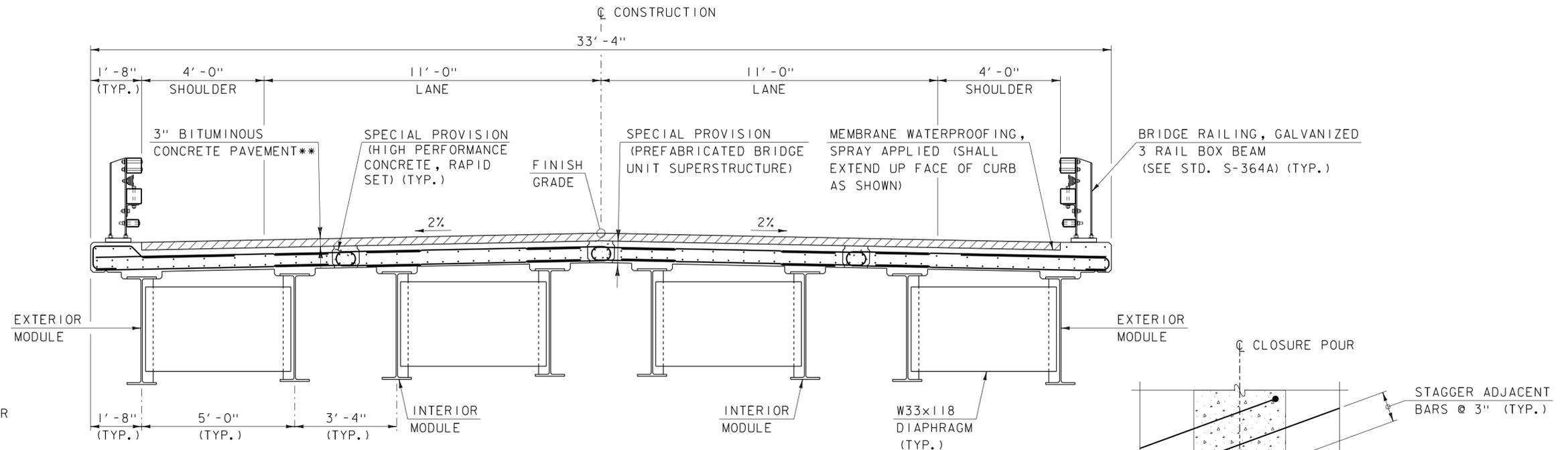




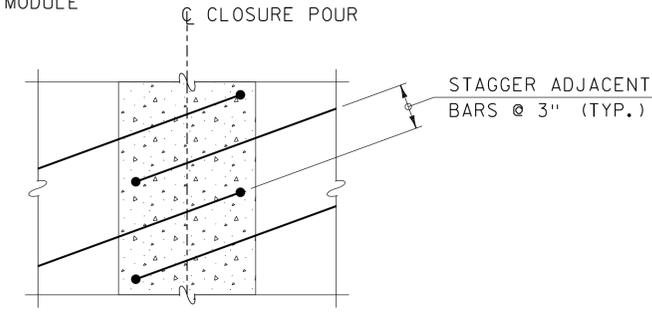
SCALE: 1" = 10'-0"



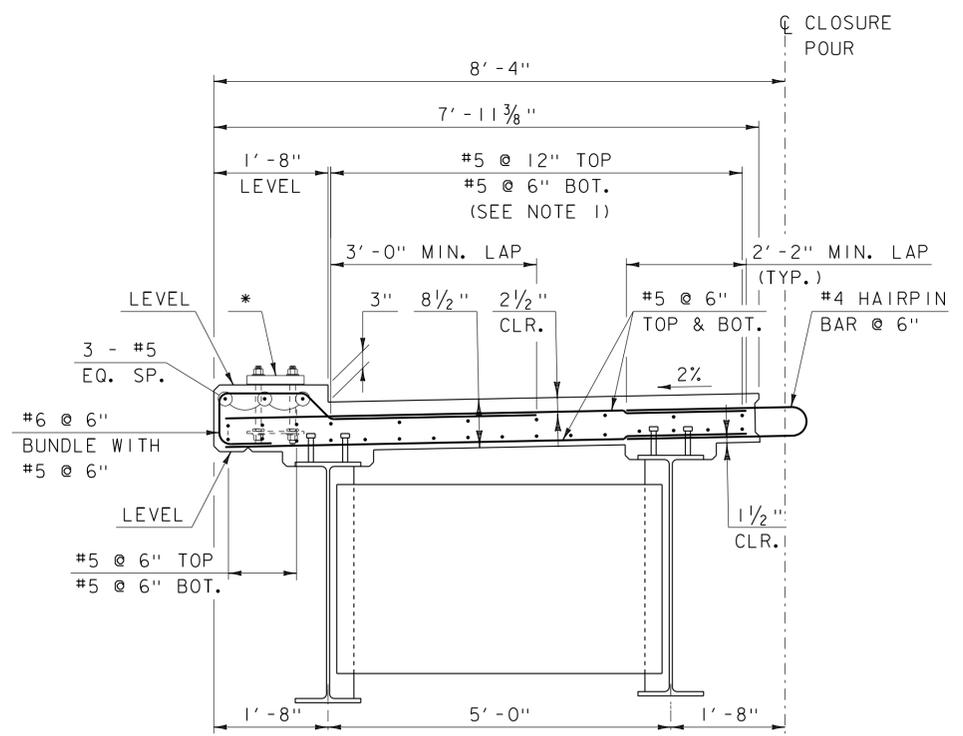
PROJECT NAME: WARREN	PROJECT NUMBER: BRF 013-4(32)
FILE NAME: z10b424pe.dgn	PROJECT LEADER: R. YOUNG
DESIGNED BY: D. KULL	CHECKED BY: T. KENDRICK
PLAN AND ELEVATION	SHEET 18 OF 42



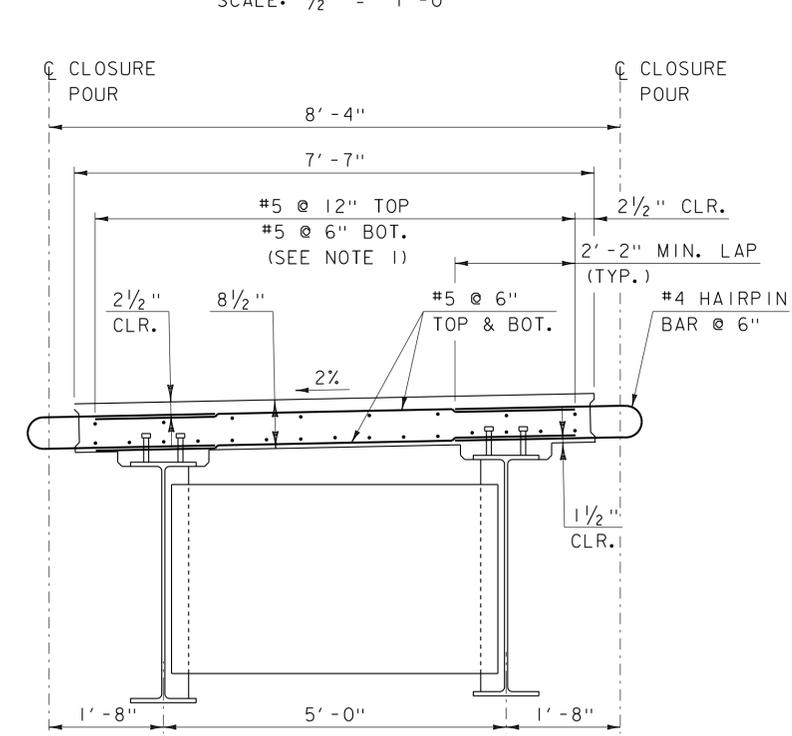
**DECK TYPICAL SECTION**  
SCALE: 1/2" = 1'-0"



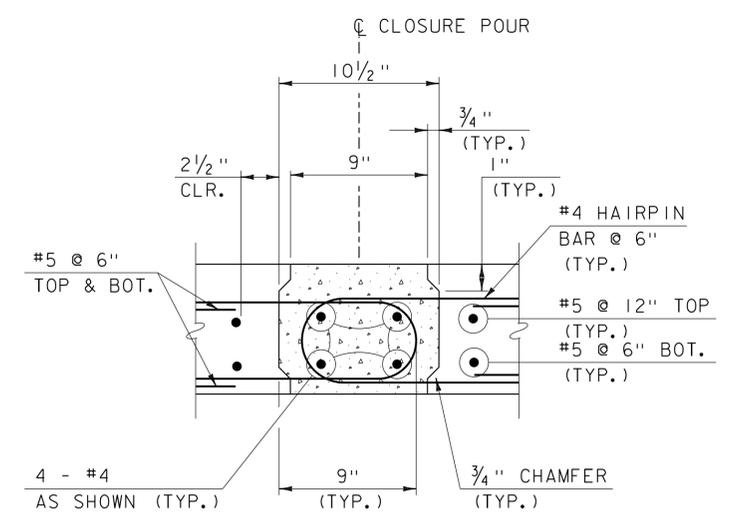
**CONNECTION DETAIL PLAN**  
SCALE: 2" = 1'-0"



**EXTERIOR MODULE DETAIL**  
SCALE: 3/4" = 1'-0"



**INTERIOR MODULE DETAIL**  
SCALE: 3/4" = 1'-0"



**CONNECTION DETAIL SECTION**  
SCALE: 2" = 1'-0"

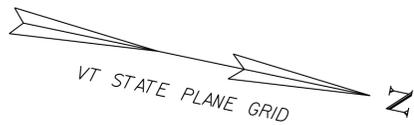
**NOTES**

1. MINIMUM LONGITUDINAL LAP SPLICE IS 1'-9"
2. TRANSVERSE REINFORCING ORIENTED WITH  $\zeta$  BEARING. STAGGER BARS BETWEEN ADJACENT PBU'S.

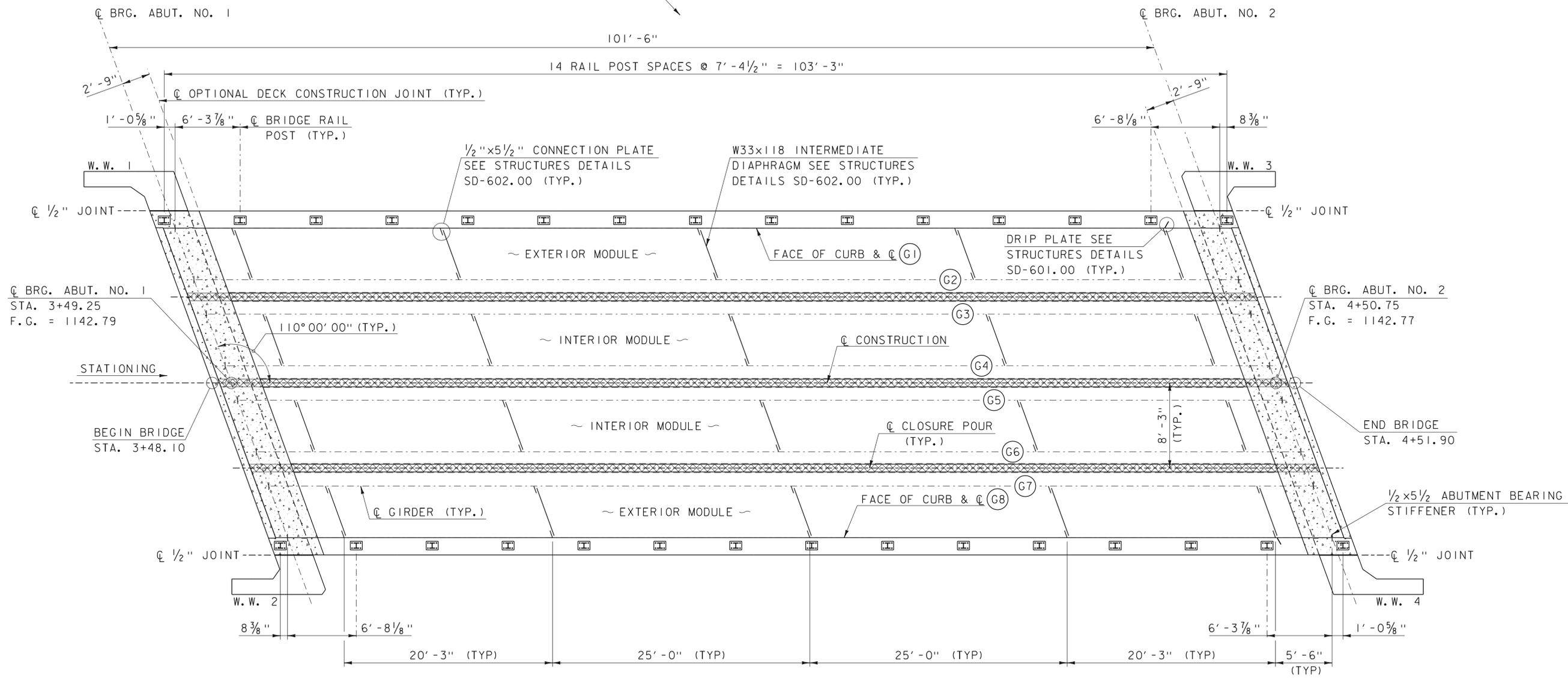
**NOTE:**

- NF = NEAR FACE
- FF = FAR FACE
- EF = EACH FACE
- ▲ = CUT TO FIT IN FIELD
- 3" CLEAR, UNLESS OTHERWISE SPECIFIED ON THE PLANS.

\* BRIDGE RAIL ANCHORAGE SHOWN. ADJUST DECK REINFORCEMENT AS NECESSARY TO AVOID CONFLICT.



MAD RIVER



**DECK AND FRAMING PLAN**

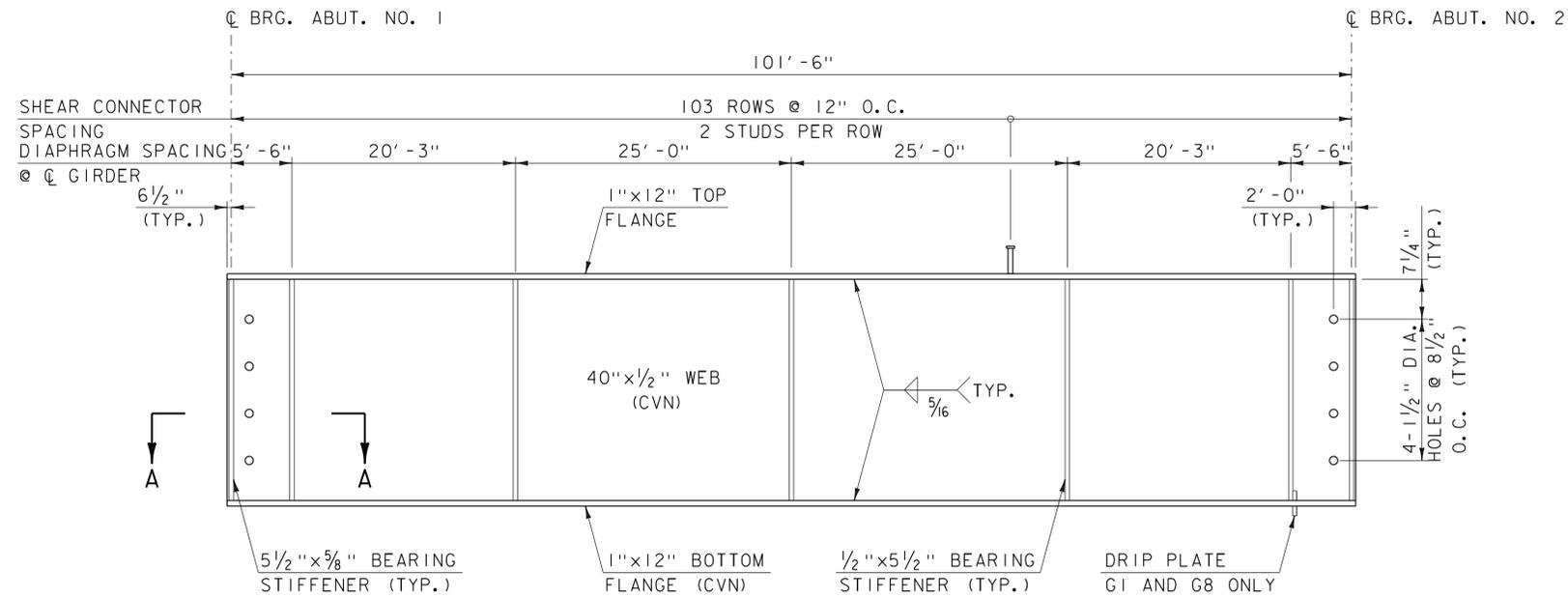
SCALE: 3/16" = 1'-0"

**LEGEND**

-  SPECIAL PROVISION  
(HIGH PERFORMANCE CONCRETE,  
RAPID SET) (FPQ)
-  OPTIONAL CLOSURE POUR  
SPECIAL PROVISION  
(HIGH PERFORMANCE CONCRETE,  
RAPID SET) (FPQ)



PROJECT NAME: WARREN	PLOT DATE: 03-OCT-2013
PROJECT NUMBER: BRF 013-4(32)	DRAWN BY: P. DUSTIN
FILE NAME: z10b424framing.dgn	CHECKED BY: T. KENDRICK
PROJECT LEADER: R. YOUNG	SHEET 20 OF 42
DESIGNED BY: D. KULL	
DECK AND FRAMING PLAN	

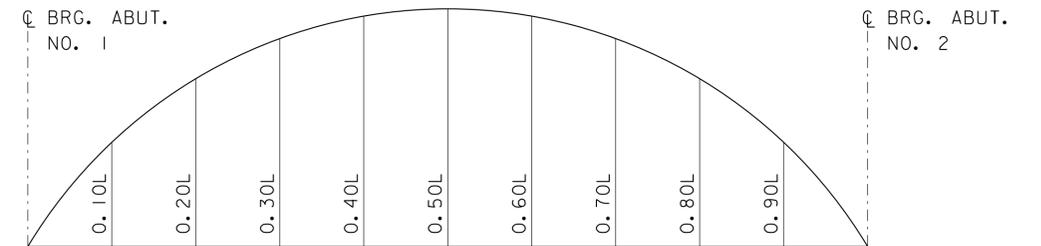


CVN = CHARPY V-NOTCH TEST IN ACCORDANCE WITH SUBSECTION 714.01.

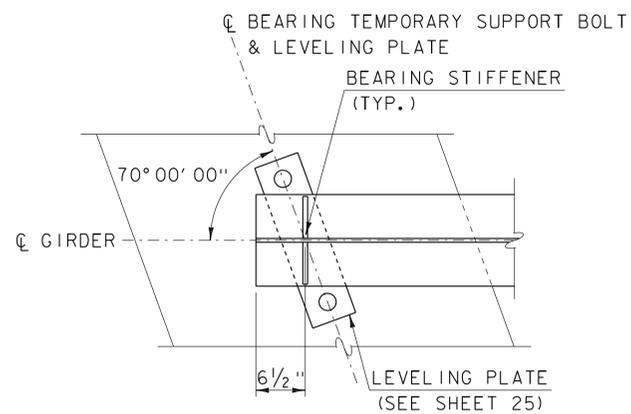
**GIRDER ELEVATION**  
NOT TO SCALE

CAMBER TABLE - GIRDERS 1 & 8 (INCHES)											
POINT ON GIRDER	CL BRG. ABUT. 1	0.10 L	0.20 L	0.30 L	0.40 L	0.50 L	0.60 L	0.70 L	0.80 L	0.90 L	CL BRG. ABUT. 2
STEEL DL	0.00	0.31	0.59	0.81	0.95	1.00	0.95	0.81	0.59	0.31	0.00
CONCRETE SLAB	0.00	1.02	1.94	2.65	3.10	3.26	3.10	2.65	1.94	1.02	0.00
SUPERIMPOSED DL	0.00	0.20	0.37	0.51	0.59	0.62	0.59	0.51	0.37	0.20	0.00
TOTAL DEFLECTION	0.00	1.53	2.90	3.97	4.65	4.88	4.65	3.97	2.90	1.53	0.00
RESIDUAL CAMBER	0.00	0.25	0.50	0.75	1.00	1.25	1.00	0.75	0.50	0.25	0.00
TOTAL CAMBER	0.00	1.78	3.40	4.72	5.65	6.13	5.65	4.72	3.40	1.78	0.00

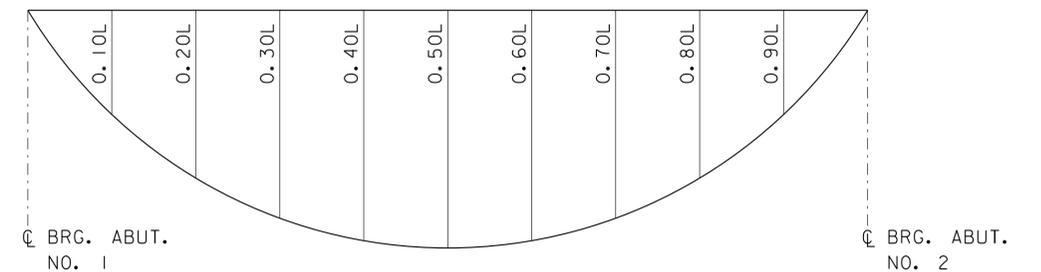
CAMBER TABLE - GIRDERS 2 - 7 (INCHES)											
POINT ON GIRDER	CL BRG. ABUT. 1	0.10 L	0.20 L	0.30 L	0.40 L	0.50 L	0.60 L	0.70 L	0.80 L	0.90 L	CL BRG. ABUT. 2
STEEL DL	0.00	0.31	0.59	0.81	0.95	1.00	0.95	0.81	0.59	0.31	0.00
CONCRETE SLAB	0.00	0.98	1.86	2.55	2.99	3.13	2.99	2.55	1.86	0.98	0.00
SUPERIMPOSED DL	0.00	0.20	0.37	0.51	0.59	0.62	0.59	0.51	0.37	0.20	0.00
TOTAL DEFLECTION	0.00	1.49	2.82	3.87	4.53	4.76	4.53	3.87	2.82	1.49	0.00
RESIDUAL CAMBER	0.00	0.25	0.50	0.75	1.00	1.25	1.00	0.75	0.50	0.25	0.00
TOTAL CAMBER	0.00	1.74	3.32	4.62	5.53	6.01	5.53	4.62	3.32	1.74	0.00



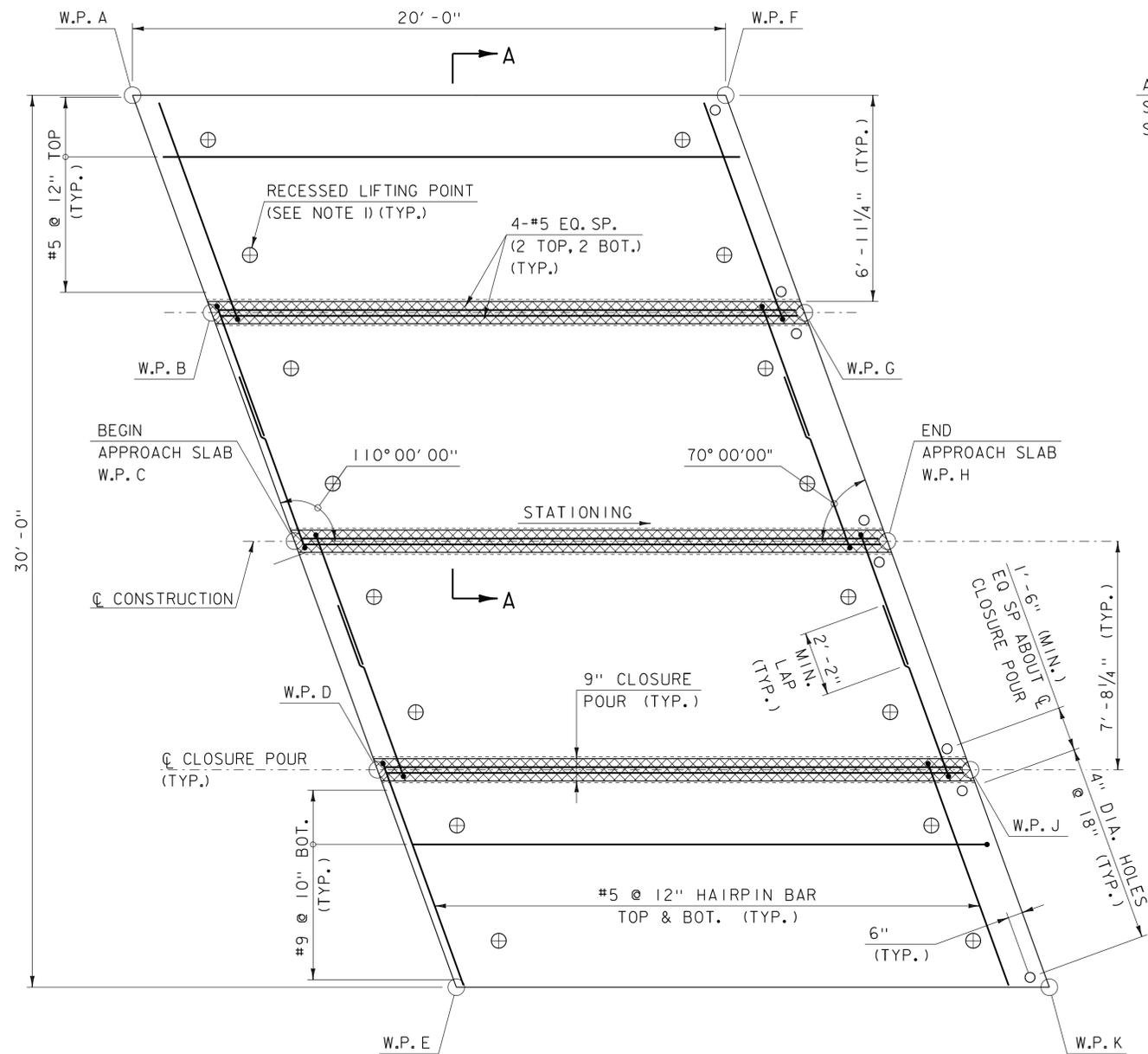
**CAMBER DIAGRAM**  
SEE CAMBER TABLES



**TYPICAL GIRDER END SECTION**  
SCALE: 1" = 1'-0"



**DEAD LOAD DEFLECTION DIAGRAM**  
SEE CAMBER TABLES

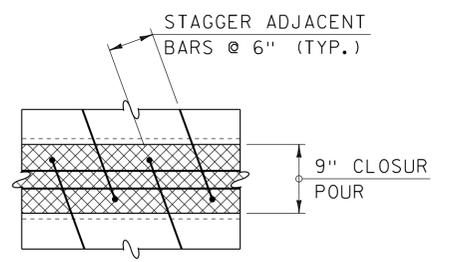
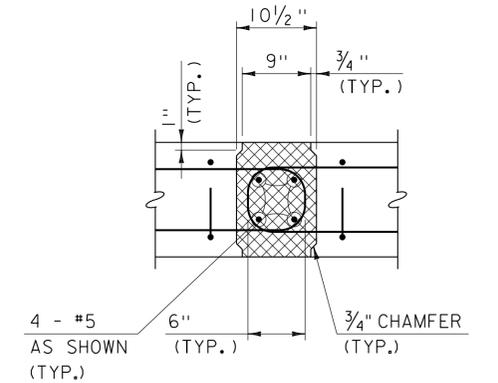
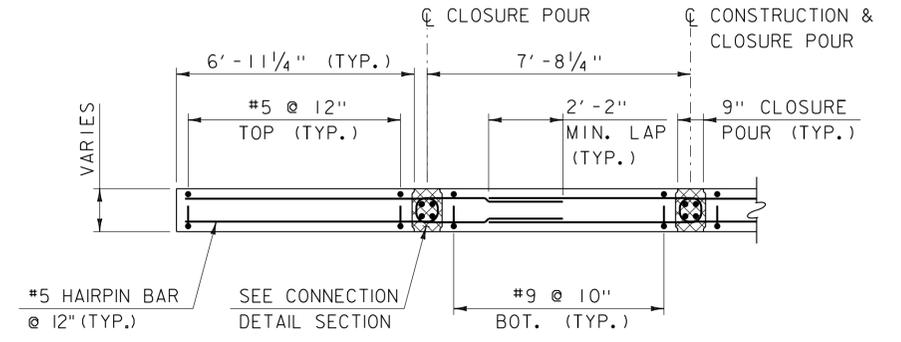
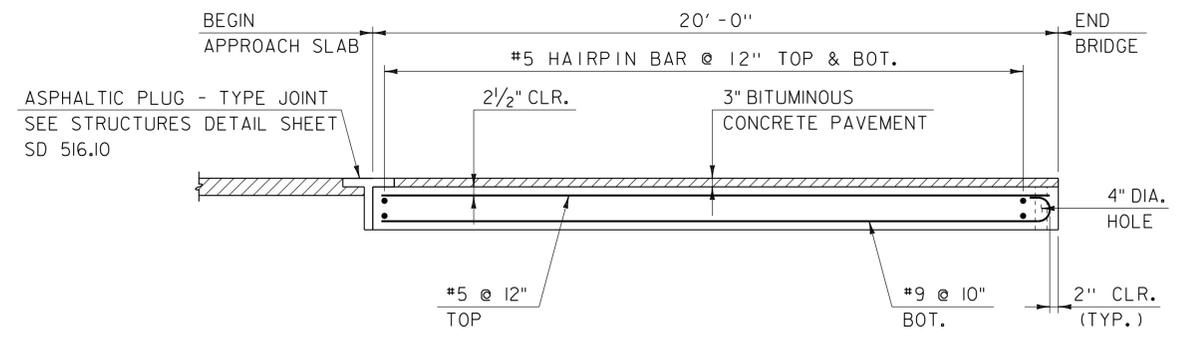


**LEGEND**

SPECIAL PROVISION  
 (HIGH PERFORMANCE CONCRETE,  
 RAPID SET) (FPQ)

APPROACH SLAB ELEVATIONS								
W.P.	APPROACH SLAB NO. 1				APPROACH SLAB NO. 2			
	STATION	OFFSET	ELEVATION	THICKNESS	STATION	OFFSET	ELEVATION	THICKNESS
A	3+22.64	15.00' LT.	1142.40	1'-4 3/4"	4+46.47	15.00' LT.	1142.22	1'-3"
B	3+25.30	7.69' LT.	1142.46	1'-3 3/4"	4+49.10	7.69' LT.	1142.36	1'-3"
C	3+28.10	CL	1142.55	1'-3"	4+51.90	CL	1142.52	1'-3"
D	3+30.90	7.69' RT.	1142.40	1'-3"	4+54.70	7.69' RT.	1142.36	1'-3"
E	3+33.56	15.00' RT.	1142.25	1'-3"	4+57.36	15.00' RT.	1142.21	1'-3"
F	3+42.64	15.00' LT.	1142.25	1'-3"	4+66.44	15.00' LT.	1142.21	1'-3"
G	3+45.30	7.69' LT.	1142.39	1'-3"	4+69.10	7.69' LT.	1142.36	1'-3"
H	3+48.10	CL	1142.54	1'-3"	4+71.90	CL	1142.51	1'-3"
J	3+50.90	7.69' RT.	1142.39	1'-3"	4+74.70	7.69' RT.	1142.35	1'-3"
K	3+53.56	15.00' RT.	1142.24	1'-3"	4+77.36	15.00' RT.	1142.21	1'-3"

ALL ELEVATIONS ARE AT TOP OF SLAB

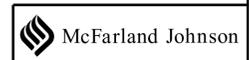


**NOTES**

- LIFTING POINTS ARE SHOWN FOR ILLUSTRATIVE PURPOSES ONLY. ACTUAL LIFTING LOCATIONS SHALL BE DETERMINED BY THE FABRICATOR AND INDICATED ON THE FABRICATION DRAWINGS WITH CALCULATIONS.
- THE TOP SURFACE OF THE PRECAST APPROACH SLAB PANELS SHALL HAVE A BROOM FINISH PARALLEL TO THE CENTERLINE OF CONSTRUCTION.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR ESTABLISHING UNIFORM CONTACT BETWEEN THE APPROACH SLAB AND THE SUBBASE MATERIAL TO THE SATISFACTION OF THE ENGINEER. THE FABRICATION DRAWINGS SHALL INDICATE THE MEANS AND METHODS NECESSARY TO INSTALL THE APPROACH SLABS TO THE ELEVATIONS SPECIFIED.

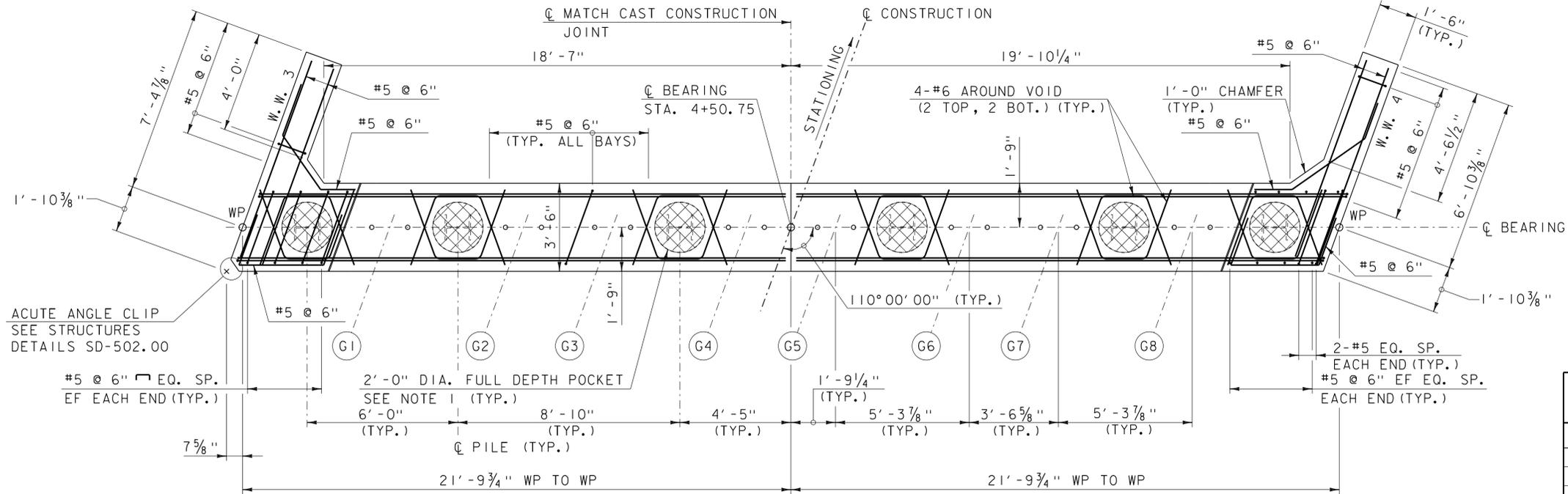
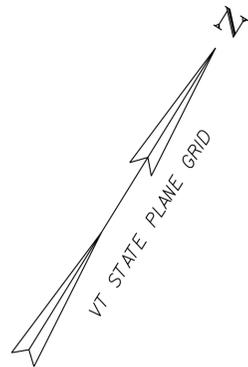
**NOTE:**

NF = NEAR FACE  
 FF = FAR FACE  
 EF = EACH FACE  
 ▲ = CUT TO FIT IN FIELD  
 3" CLEAR, UNLESS OTHERWISE SPECIFIED ON THE PLANS.  
 2'-2" BAR LAP UNLESS OTHERWISE SPECIFIED ON THE PLANS.



PROJECT NAME: WARREN	PLOT DATE: 03-OCT-2013
PROJECT NUMBER: BRP 013-4(32)	DRAWN BY: P. DUSTIN
FILE NAME: z10b424subapp.dgn	DESIGNED BY: D. KULL
APPROACH SLAB DETAILS	CHECKED BY: T. KENDRICK
	SHEET 22 OF 42





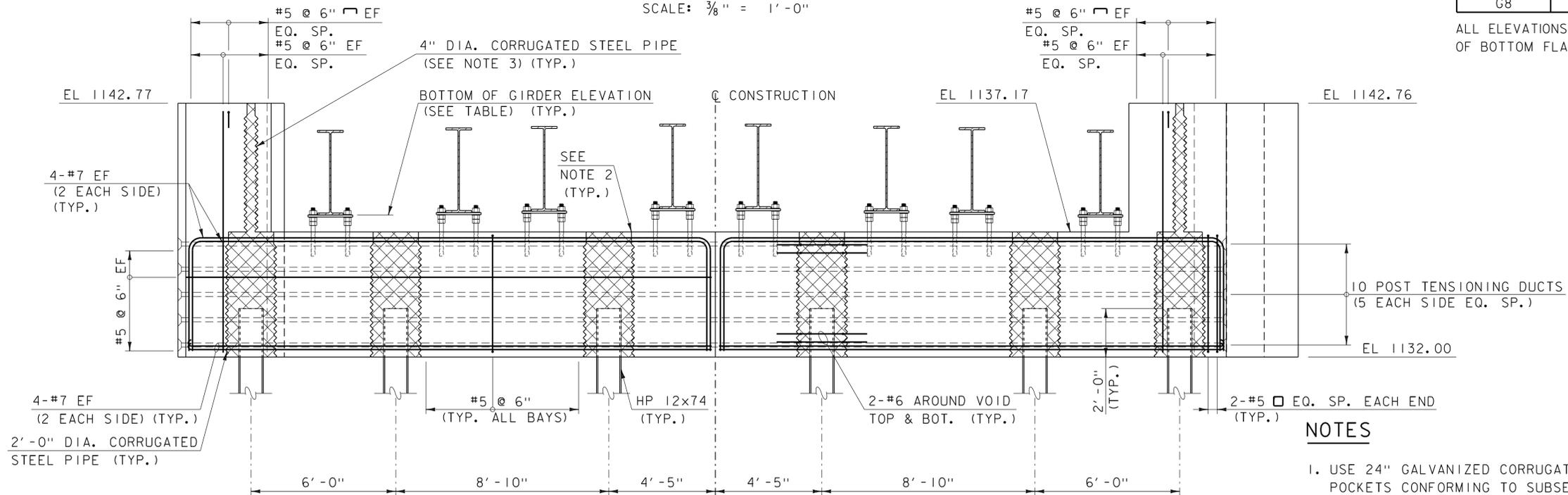
NOTE: ABUTMENT PLAN BELOW BRIDGE SEAT SHOWN.  
FOR PLAN VIEW ABOVE BRIDGE SHEET, SEE  
SHEET 28.

**PRECAST ABUTMENT NO. 2 PLAN**

(ABUTMENT PLAN BELOW BRIDGE SEAT SHOWN)  
SCALE: 3/8" = 1'-0"

GIRDER ELEVATION TABLE	
GIRDER	ELEVATION
G1	1137.85
G2	1137.95
G3	1138.01
G4	1138.11
G5	1138.11
G6	1138.00
G7	1137.94
G8	1137.84

ALL ELEVATIONS ARE AT BOTTOM OF BOTTOM FLANGE



NOTE: WINGWALL REINFORCEMENT NOT SHOWN FOR CLARITY.  
FOR WINGWALL REINFORCEMENT, SEE SHEET 26.

**PRECAST ABUTMENT NO. 2 ELEVATION**

SCALE: 3/8" = 1'-0"

**NOTES**

- USE 24" GALVANIZED CORRUGATED STEEL PIPE FOR PILE POCKETS CONFORMING TO SUBSECTION 711.01.
- FORM TOP 6" WITH REMOVABLE FORM TO ELIMINATE EXPOSED CORRUGATED STEEL ON THE TOP OF THE ABUTMENT.
- 4" GALVANIZED CORRUGATED STEEL PIPE TO CONFORM TO SUBSECTION 711.01.

**NOTE:**

- NF = NEAR FACE
- FF = FAR FACE
- EF = EACH FACE
- ▲ = CUT TO FIT IN FIELD
- 3" CLEAR, UNLESS OTHERWISE SPECIFIED ON THE PLANS.
- 2'-2" BAR LAP UNLESS OTHERWISE SPECIFIED ON THE PLANS.

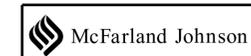
**LEGEND**

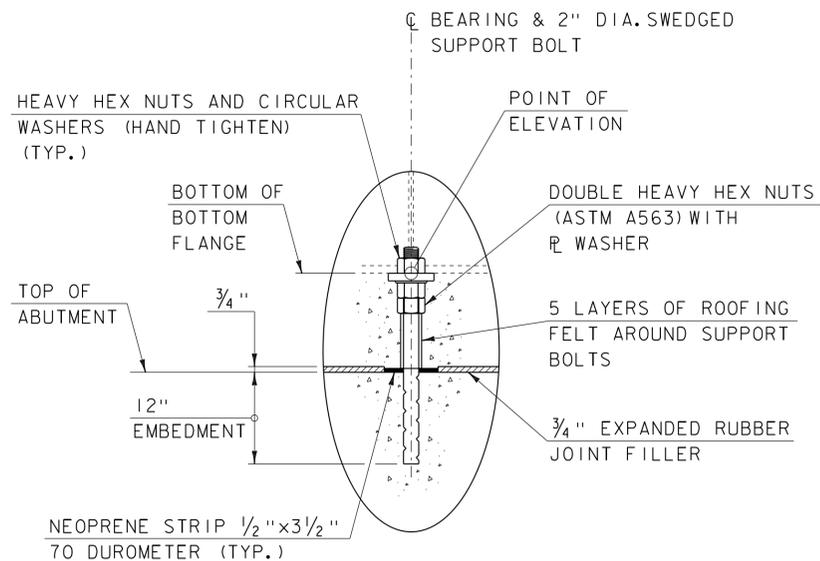
- SPECIAL PROVISION (HIGH PERFORMANCE CONCRETE, RAPID SET) (FPQ)

PROJECT NAME: WARREN  
PROJECT NUMBER: BRP 013-4(32)

FILE NAME: z10b424abutdtls.dgn  
PROJECT LEADER: R. YOUNG  
DESIGNED BY: D. KULL  
ABUTMENT NO. 2 PRECAST DETAILS

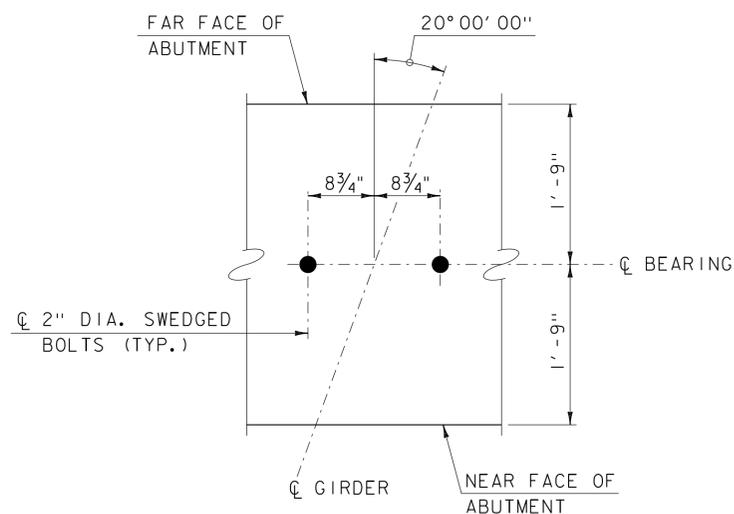
PLOT DATE: 03-OCT-2013  
DRAWN BY: S. MERKWAN  
CHECKED BY: T. KENDRICK  
SHEET 24 OF 42





**SUPPORT BOLT DETAIL**

SCALE: 1" = 1'-0"

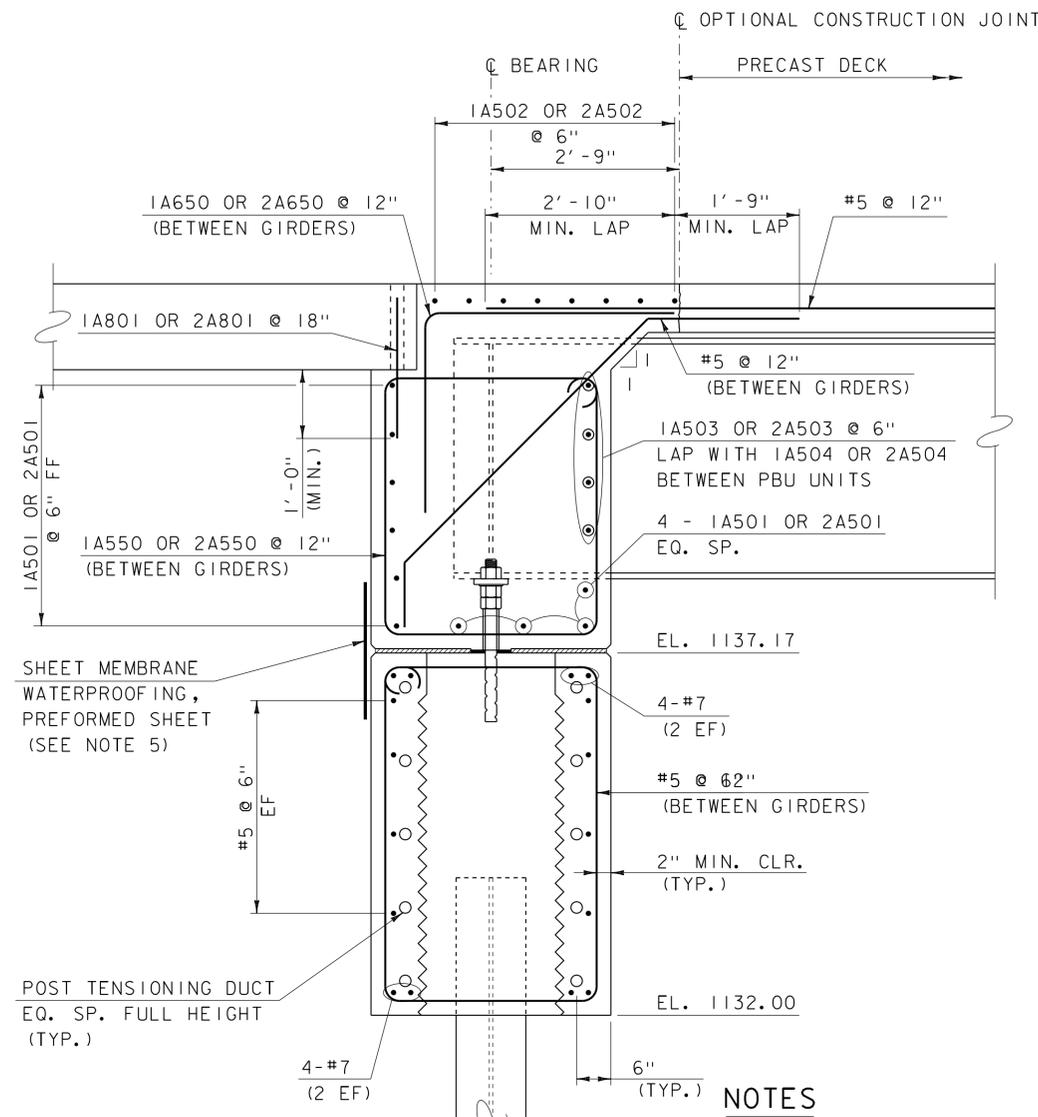


**SUPPORT BOLT LAYOUT**

SCALE: 1" = 1'-0"

**NOTE:**

- NF = NEAR FACE
- FF = FAR FACE
- EF = EACH FACE
- ▲ = CUT TO FIT IN FIELD
- 3" CLEAR, UNLESS OTHERWISE SPECIFIED ON THE PLANS.
- 2'-2" BAR LAP UNLESS OTHERWISE SPECIFIED ON THE PLANS.

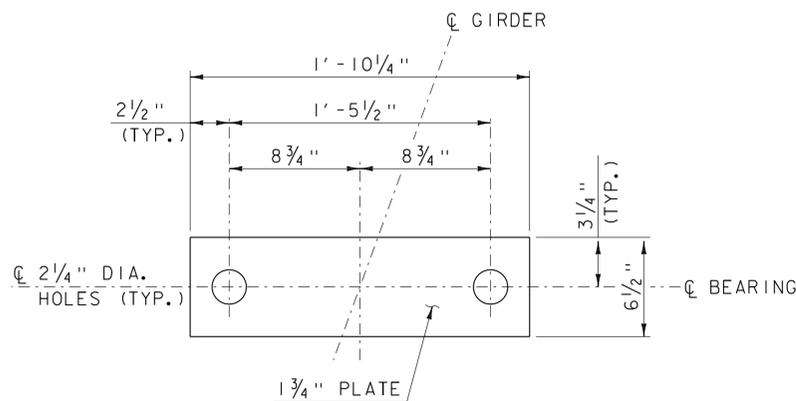


**ABUTMENT SECTION**

SCALE: 3/4" = 1'-0"

**NOTES**

1. PAYMENT FOR TEMPORARY SUPPORT ASSEMBLIES SHALL BE INCIDENTAL TO RESPECTIVE 540.10 ITEMS.
2. THE TOP SURFACE OF THE LEVELING PLATE SHALL BE GREASED PRIOR TO SETTING PBU'S. EXCESS GREASE SHALL BE WIPED CLEAN AFTER PBU'S HAVE BEEN SET.
3. LEVELING PLATES SHALL BE LEVEL PRIOR TO SETTING PBU'S. ELEVATIONS SHALL BE ADJUSTED TO WITHIN 0.10 FT OF REQUIRED ELEVATIONS.
4. LEVELING PLATE STEEL SHALL BE GRADE 50 AND CONFORM TO SUBSECTION 714.03. ANCHOR RODS SHALL MEET THE REQUIREMENTS OF SUBSECTION 714.08 AND SHALL BE GRADE 55.
5. PREFORMED SHEET INCIDENTAL TO ITEMS 540.10 PRECAST CONCRETE STRUCTURE (ABUTMENT NO. 1) OR PRECAST CONCRETE STRUCTURE (ABUTMENT NO. 2) AND SHALL MEET THE REQUIREMENTS OF SUBSECTION 707.07.



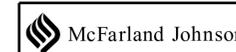
**LEVELING PLATE**

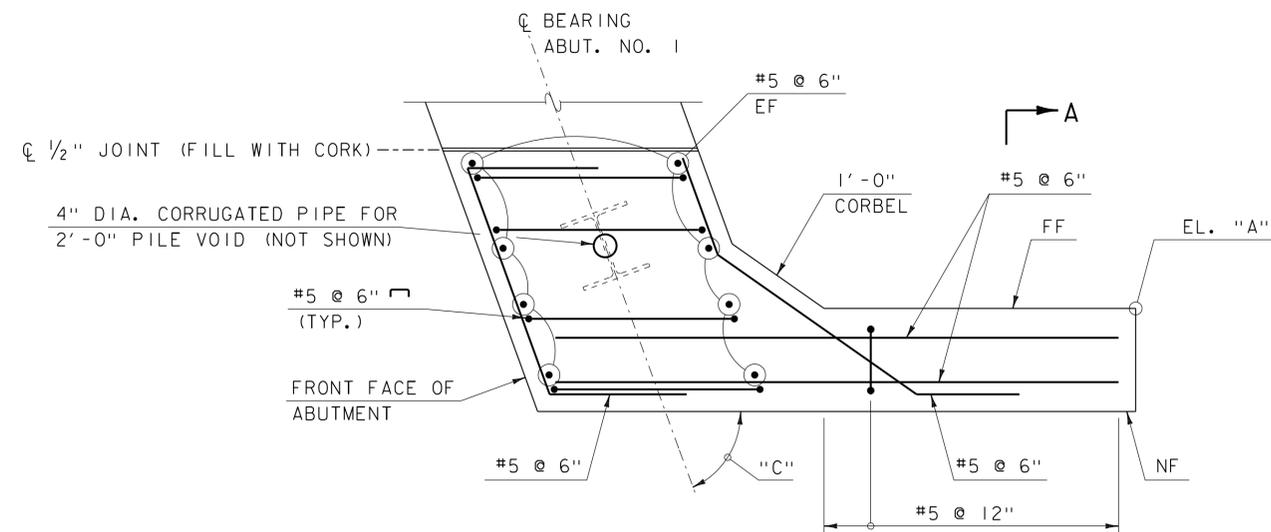
SCALE: 2" = 1'-0"

PROJECT NAME: WARREN  
PROJECT NUMBER: BRP 013-4(32)

FILE NAME: z10B424abutdt1s.dgn  
PROJECT LEADER: R, YOUNG  
DESIGNED BY: D, KULL  
ABUTMENT DETAILS

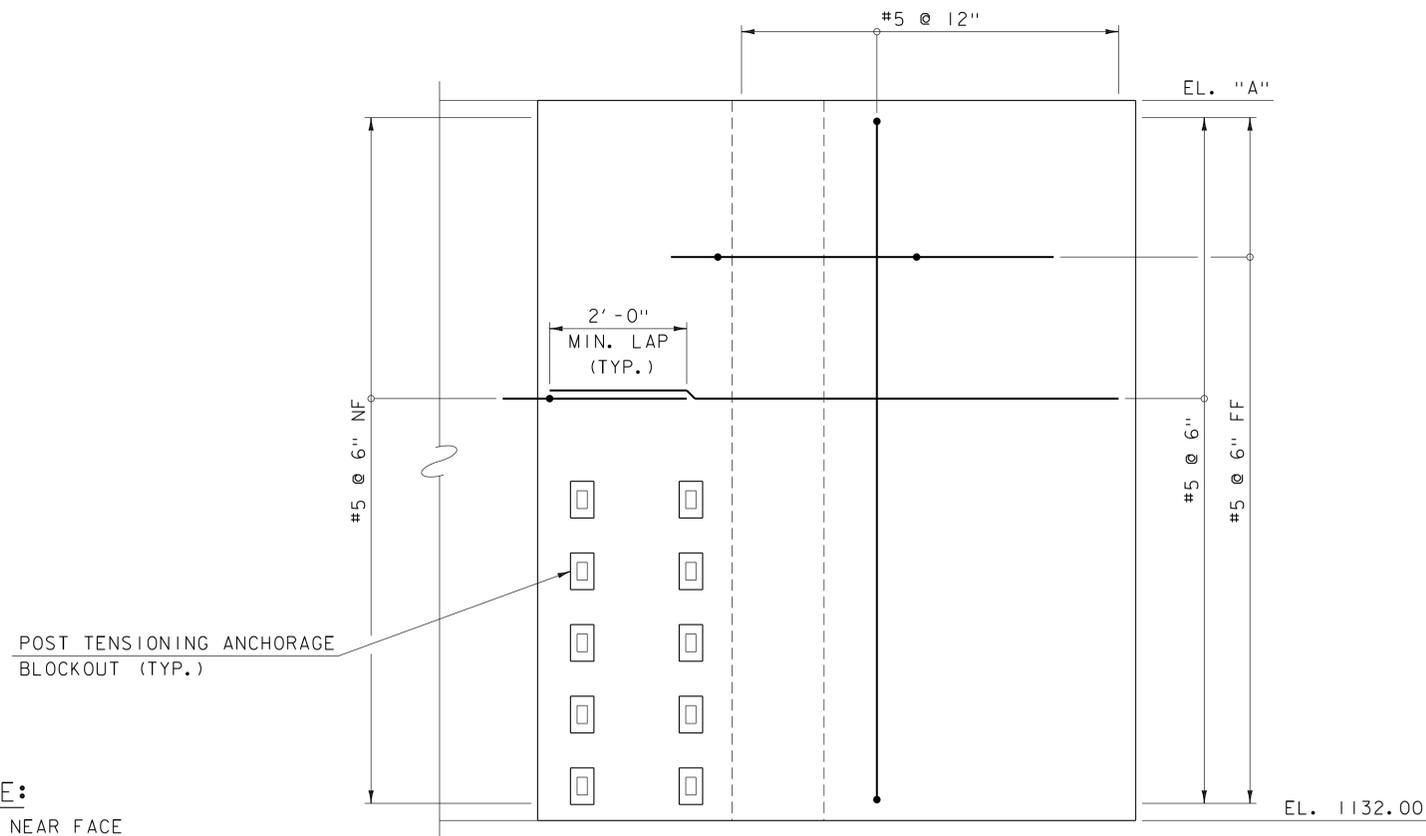
PLOT DATE: 04-OCT-2013  
DRAWN BY: P, DUSTIN  
CHECKED BY: T, KENDRICK  
SHEET 25 OF 42



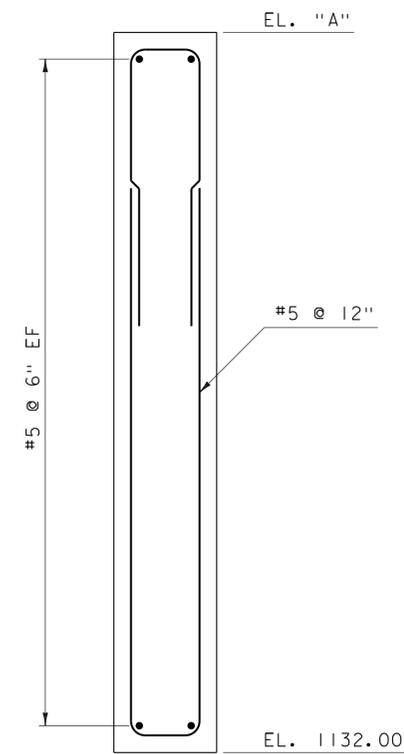


**WINGWALL PLAN**  
(W. W. 1 SHOWN)  
SCALE: 3/4" = 1'-0"

WINGWALL TABLE				
	W.W. 1	W.W. 2	W.W. 3	W.W. 4
EL. "A"	1142.42	1142.42	1142.42	1142.42
ANGLE "C"	70° 00' 00"	110° 00' 00"	110° 00' 00"	70° 00' 00"



**WINGWALL ELEVATION**  
(W. W. 1 SHOWN)  
SCALE: 3/4" = 1'-0"

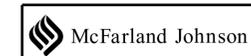


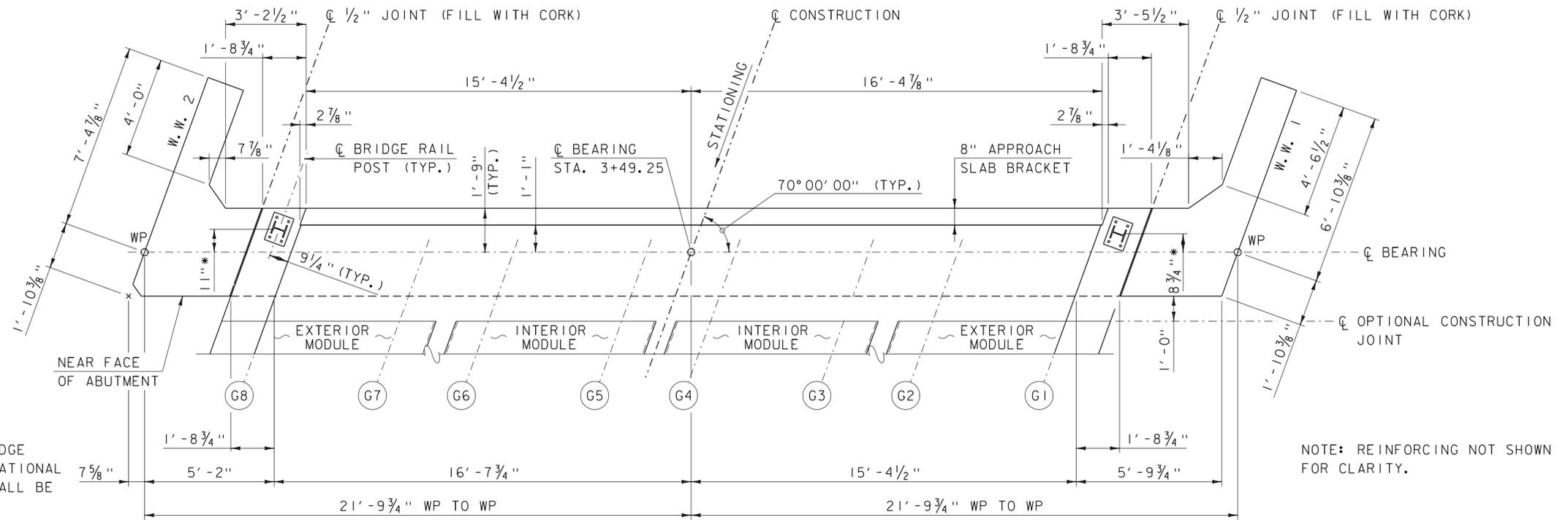
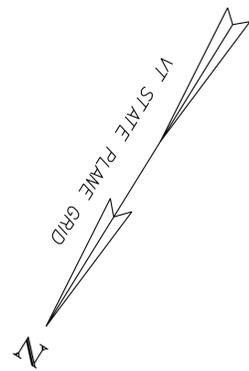
**SECTION A-A**  
(W. W. 1 SHOWN - CORNER BARS NOT SHOWN)  
SCALE: 3/4" = 1'-0"

**NOTE:**  
NF = NEAR FACE  
FF = FAR FACE  
EF = EACH FACE  
▲ = CUT TO FIT IN FIELD  
3" CLEAR, UNLESS OTHERWISE SPECIFIED ON THE PLANS.  
2'-2" BAR LAP UNLESS OTHERWISE SPECIFIED ON THE PLANS.

**NOTE**  
1. SEE SHEETS 23 AND 24 FOR REINFORCING DETAILS NOT SHOWN.

PROJECT NAME: WARREN	FILE NAME: z10b424wingd1ts.dgn	PLOT DATE: 03-OCT-2013
PROJECT NUMBER: BRF 013-4(32)	PROJECT LEADER: R. YOUNG	DRAWN BY: P. DUSTIN
	DESIGNED BY: D. KULL	CHECKED BY: T. KENDRICK
	WINGWALL DETAILS	SHEET 26 OF 42



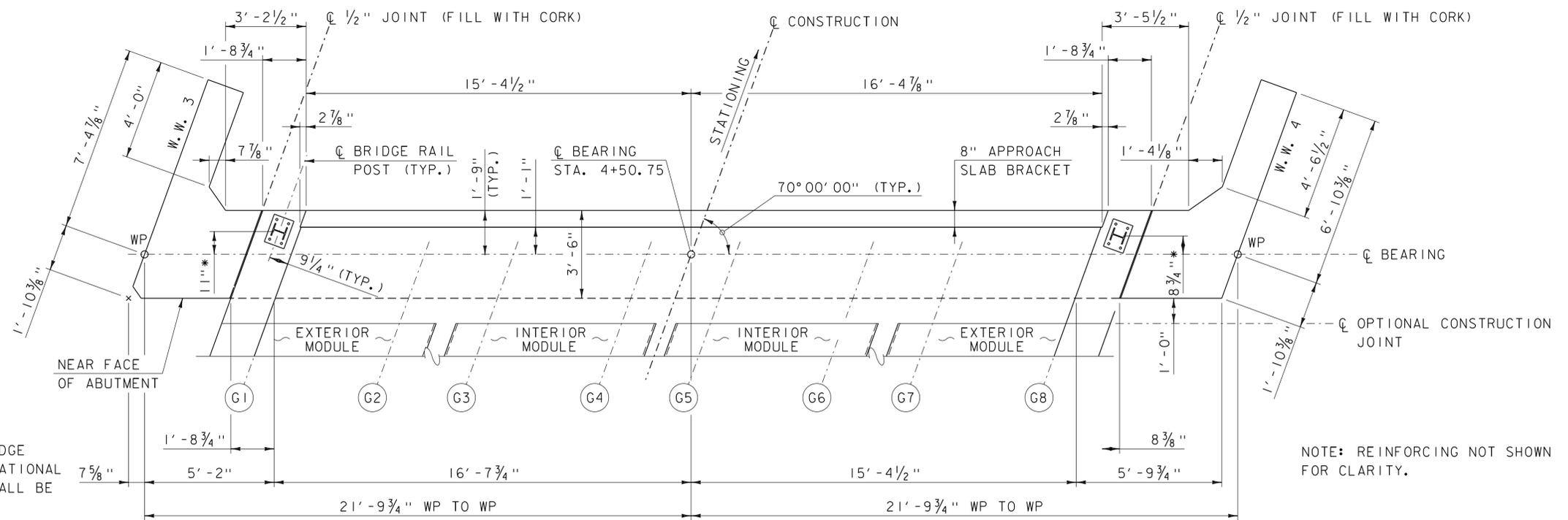
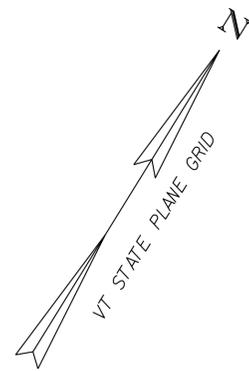


\* RAIL POST DIMENSIONED TO  $\text{C}$  OF BRIDGE POST HAS BEEN PROVIDED FOR INFORMATIONAL PURPOSES ONLY. ACTUAL LOCATION SHALL BE DETERMINED BY THE FABRICATOR.

NOTE: REINFORCING NOT SHOWN FOR CLARITY.

**ABUTMENT NO. 1 CLOSURE POUR PLAN**

SCALE:  $\frac{3}{8}'' = 1'-0''$



\* RAIL POST DIMENSIONED TO  $\text{C}$  OF BRIDGE POST HAS BEEN PROVIDED FOR INFORMATIONAL PURPOSES ONLY. ACTUAL LOCATION SHALL BE DETERMINED BY THE FABRICATOR.

NOTE: REINFORCING NOT SHOWN FOR CLARITY.

**ABUTMENT NO. 2 CLOSURE POUR PLAN**

SCALE:  $\frac{3}{8}'' = 1'-0''$

PROJECT NAME: WARREN  
PROJECT NUMBER: BRP 013-4(32)

FILE NAME: z10b424abutd1s.dgn  
PROJECT LEADER: R. YOUNG  
DESIGNED BY: D. KULL  
ABUTMENT CLOSURE POUR DETAILS

PLOT DATE: 03-OCT-2013  
DRAWN BY: S. MERKWAN  
CHECKED BY: T. KENDRICK  
SHEET 27 OF 42

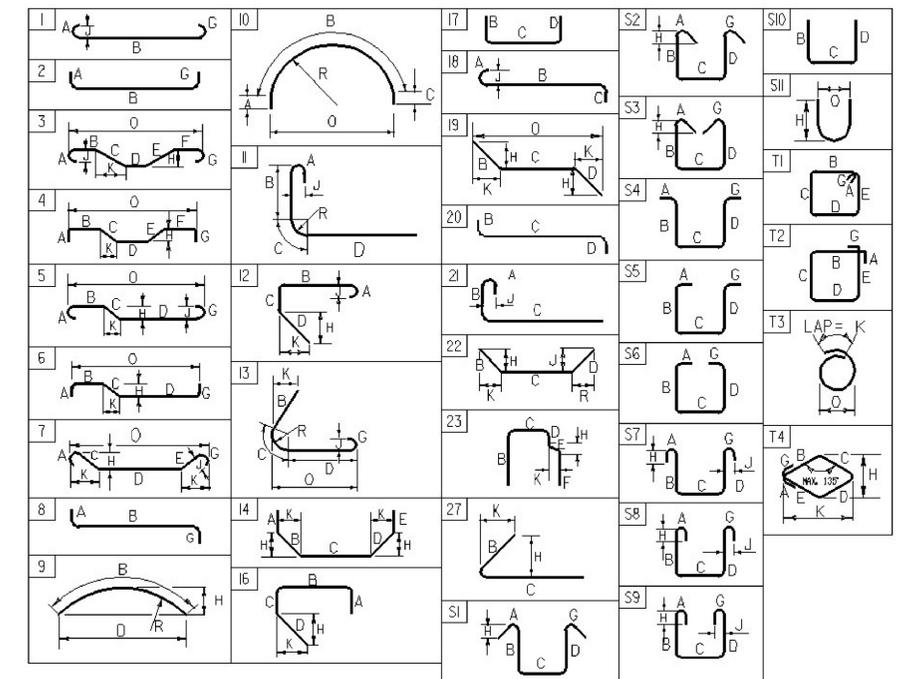


# REINFORCING STEEL SCHEDULE

ITEM	EACH	SIZE	LENGTH	MARK	TYPE	A	B	C	D	E	F	G	H	J	K	R	O	ITEM	EACH	SIZE	LENGTH	MARK	TYPE	A	B	C	D	E	F	G	H	J	K	R	O
<b>ABUTMENT NO. 1</b>																																			
*	14	5	35'-0"	1A501	STR																														
	8	5	35'-0"	1A502	STR																														
	16	5	7'-1"	1A503	STR																														
	12	5	3'-0"	1A504	STR																														
	37	5	15'-2"	1A550	T1	0'-5"	3'-2"	4'-2"	3'-2"	4'-2"		0'-5"																							
*	33	6	7'-2"	1A650	17		3'-7"	3'-7"	---																										
*	22	8	2'-0"	1A801	STR																														
<b>ABUTMENT NO. 2</b>																																			
*	14	5	35'-0"	2A501	STR																														
	8	5	35'-0"	2A502	STR																														
	16	5	7'-1"	2A503	STR																														
	12	5	3'-0"	2A504	STR																														
	37	5	15'-2"	2A550	T1	0'-5"	3'-2"	4'-2"	3'-2"	4'-2"		0'-5"																							
*	33	6	7'-2"	2A650	17		3'-7"	3'-7"	---																										
*	22	8	2'-0"	2A801	STR																														

~ NOTES ~

- UNLESS OTHERWISE DESIGNATED, ALL BAR REINFORCEMENT FOR CONCRETE IN SIZES UP TO AND INCLUDING NO. 18 SHALL CONFORM TO THE REQUIREMENTS OF THE "SPECIFICATIONS FOR DEFORMED BILLET-STEEL BARS FOR CONCRETE REINFORCEMENT", AASHTO M 31 (ASTM A 615-S1). ALL BARS SHALL BE GRADE 60, UNLESS OTHERWISE DESIGNATED.
- FOR TYPICAL BENDING DETAILS, RECOMMENDED PIN DIAMETER "D" OF BENDS AND HOOKS, AND OTHER STANDARD PRACTICE, SEE CURRENT CONCRETE REINFORCING STEEL INSTITUTE "MANUAL OF STANDARD PRACTICE".
- BARS WHICH REQUIRE MORE ACCURATE BENDING THAN STANDARD PRACTICES SHOULD HAVE LIMITS INDICATED.
- ALL DIMENSIONS ARE OUT TO OUT OF BAR EXCEPT "A" AND "G" ON STANDARD 180 DEGREE AND 135 DEGREE HOOKS.
- "J" DIMENSION ON 180 DEGREE HOOKS TO BE SHOWN ONLY WHERE NECESSARY TO RESTRICT HOOK SIZE. OTHERWISE, STANDARD HOOKS ARE TO BE USED.
- "H" DIMENSION ON STIRRUPS TO BE SHOWN ONLY WHEN NECESSARY TO MAINTAIN CLEARANCES.
- WHERE SLOPE DIFFERS FROM 45 DEGREES, DIMENSIONS "H" AND "K" MUST BE SHOWN.
- ▲ DENOTES BARS TO BE CUT IN FIELD.
- \* DENOTES ONE EXTRA BAR ADDED FOR TESTING PURPOSES.
- △ DENOTES TWO EXTRA BARS ADDED FOR TESTING PURPOSES.
- E IN BAR MARK PREFIX DENOTES EPOXY COATED REINFORCING STEEL.

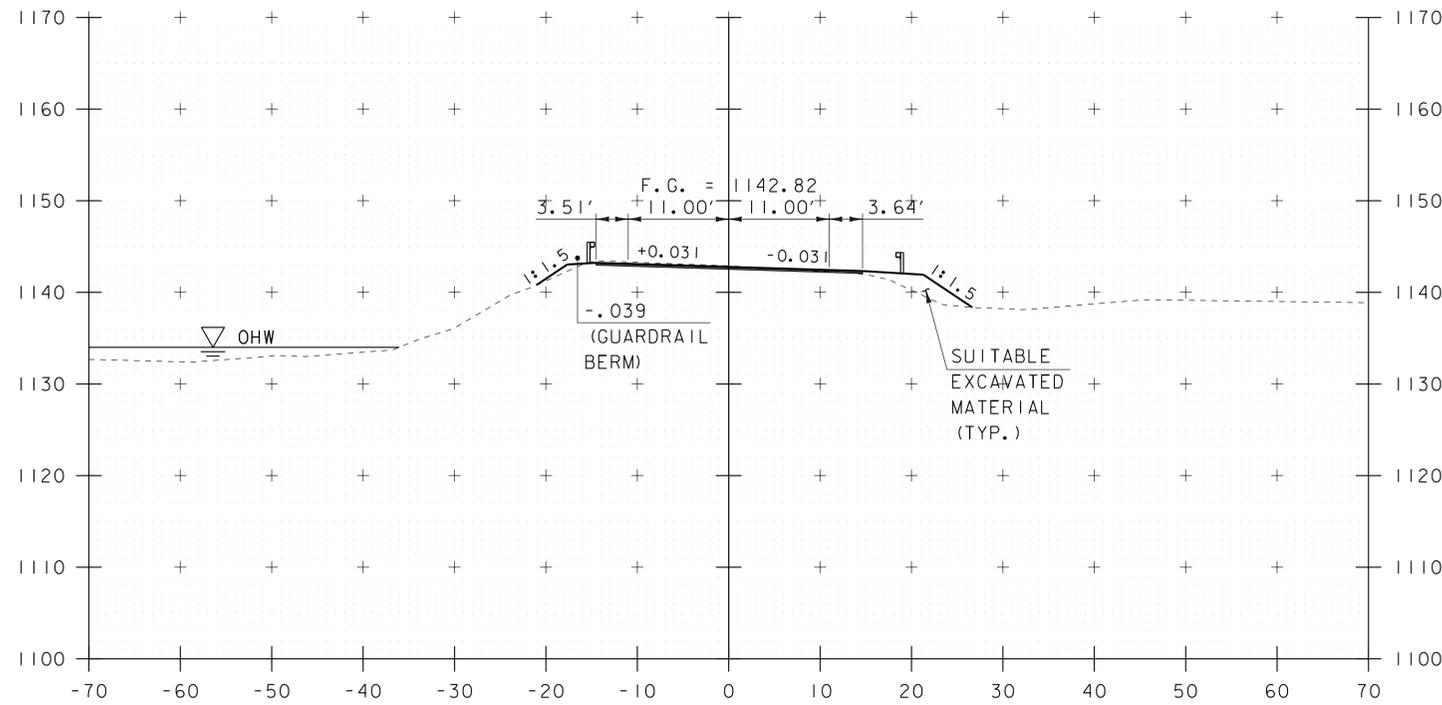


**ASTM STANDARD REINFORCING BARS**

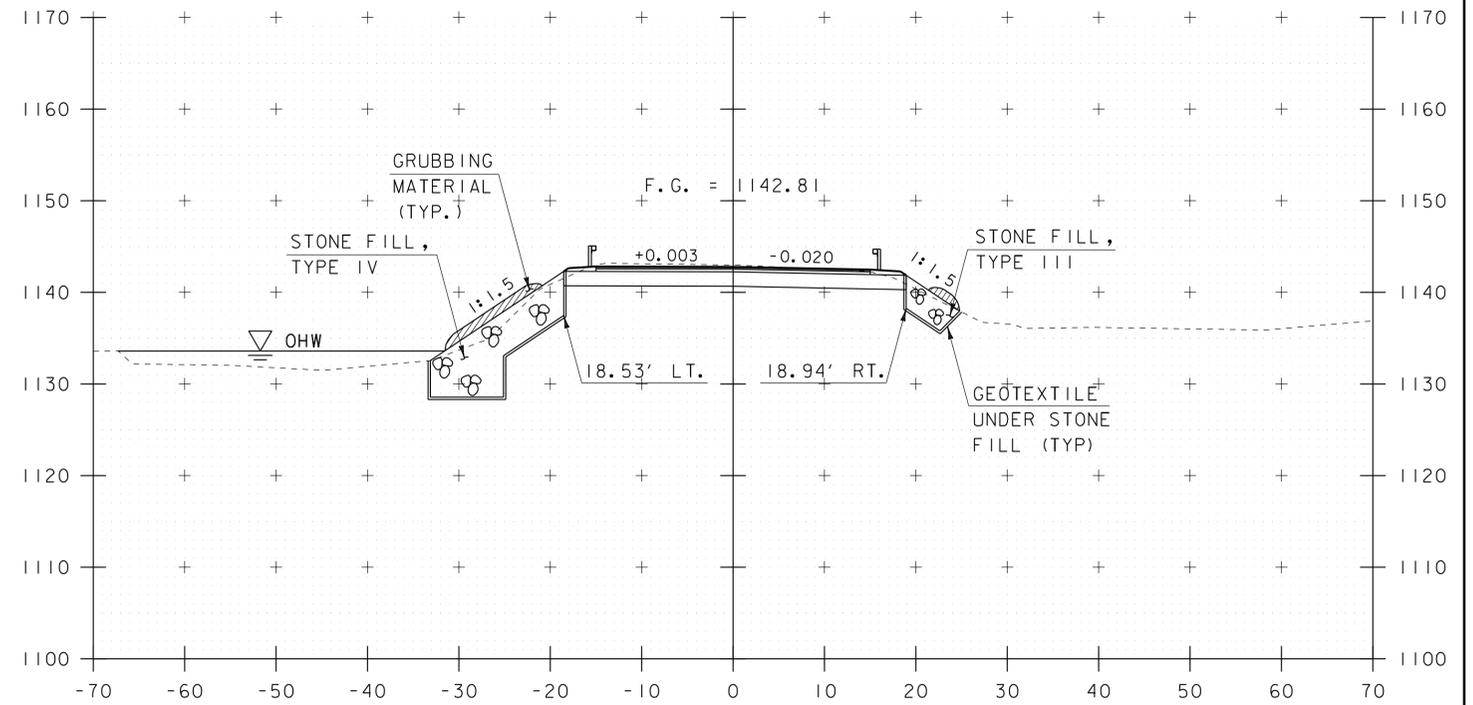
BAR SIZE DESIGNATION	WEIGHT POUNDS PER FOOT	NOMINAL DIMENSIONS ROUND SECTION		
		DIAMETER INCHES	AREA INCHES <sup>2</sup>	PERIMETER INCHES
#3	0.376	0.375	0.11	1.178
#4	0.668	0.500	0.20	1.571
#5	1.043	0.625	0.31	1.963
#6	1.502	0.750	0.44	2.356
#7	2.044	0.875	0.60	2.749
#8	2.670	1.000	0.79	3.142
#9	3.400	1.128	1.00	3.544
#10	4.303	1.270	1.27	3.990
#11	5.313	1.410	1.56	4.430
#14	7.65	1.693	2.25	5.32
#18	13.60	2.257	4.00	7.09

PROJECT NAME: **WARREN**  
PROJECT NUMBER: **BRF 013-4(32)**

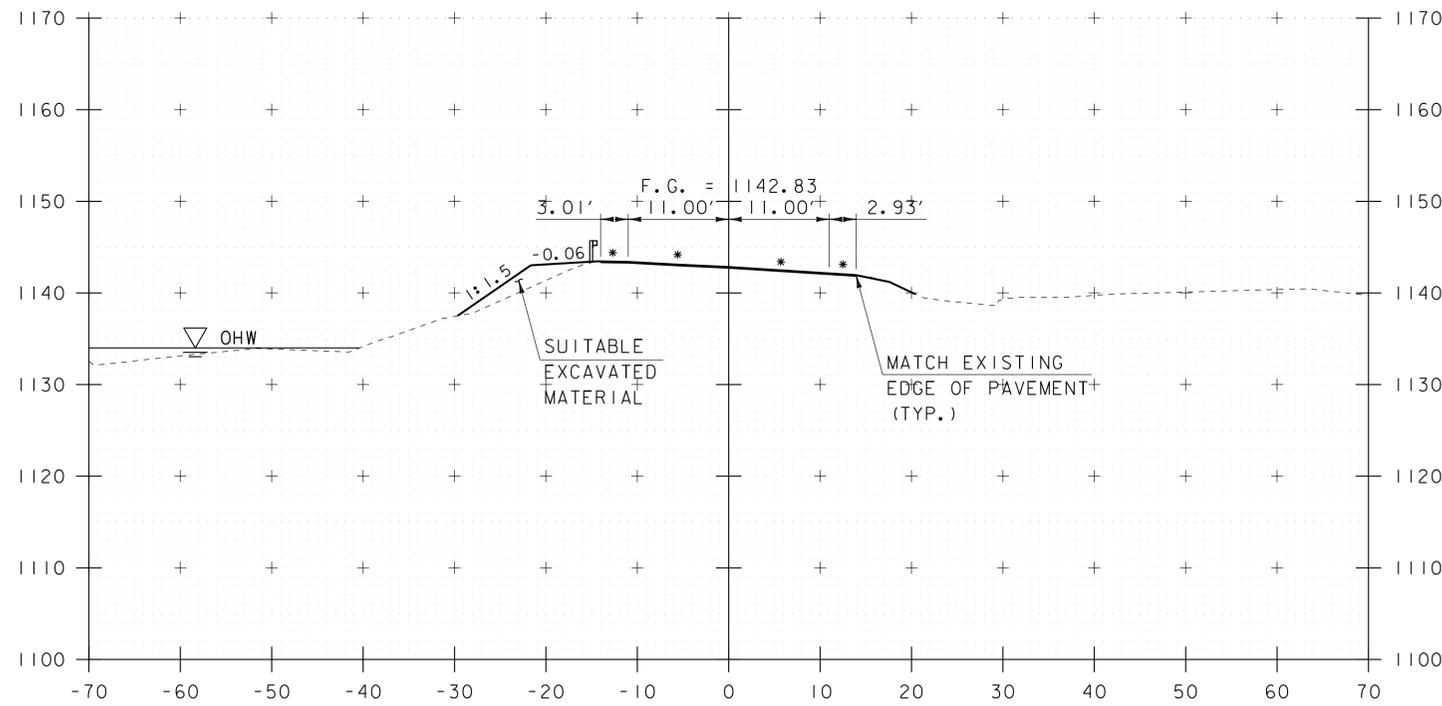
FILE NAME: **z10b424reinf.xls** PLOT DATE: **10/3/2013**  
PROJECT MANAGER: **R. YOUNG** DRAWN BY: **P. DUSTIN**  
DESIGNED BY: **D. KULL** CHECKED BY: **T. KENDRICK**  
**REINFORCING STEEL SCHEDULE** SHEET **28** OF **42**



2+50

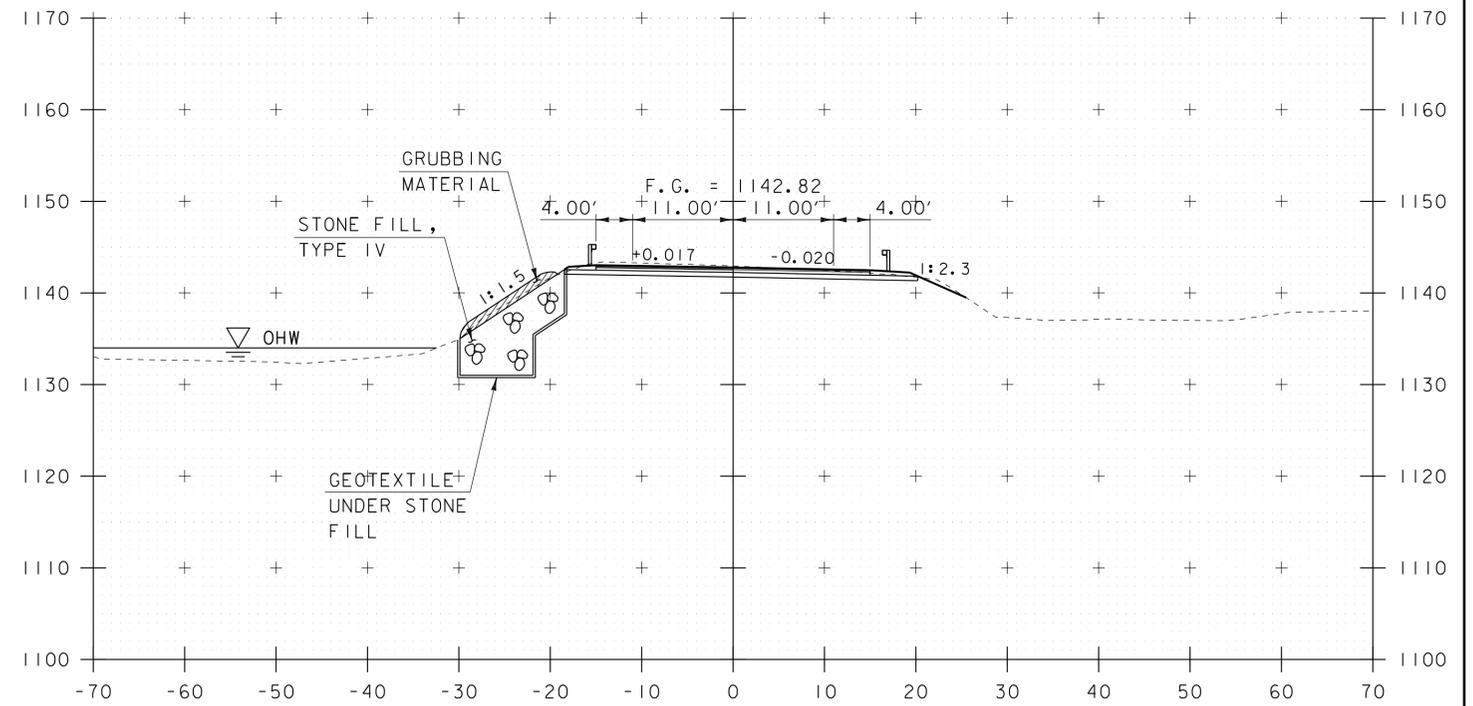


3+00



2+25

BEGIN APPROACH  
MATCH EXISTING

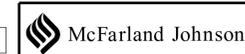


2+75

BEGIN PROJECT

\* MATCH EXISTING  
CROSS SLOPE

SCALE 1" = 10'-0"  
10 0 10

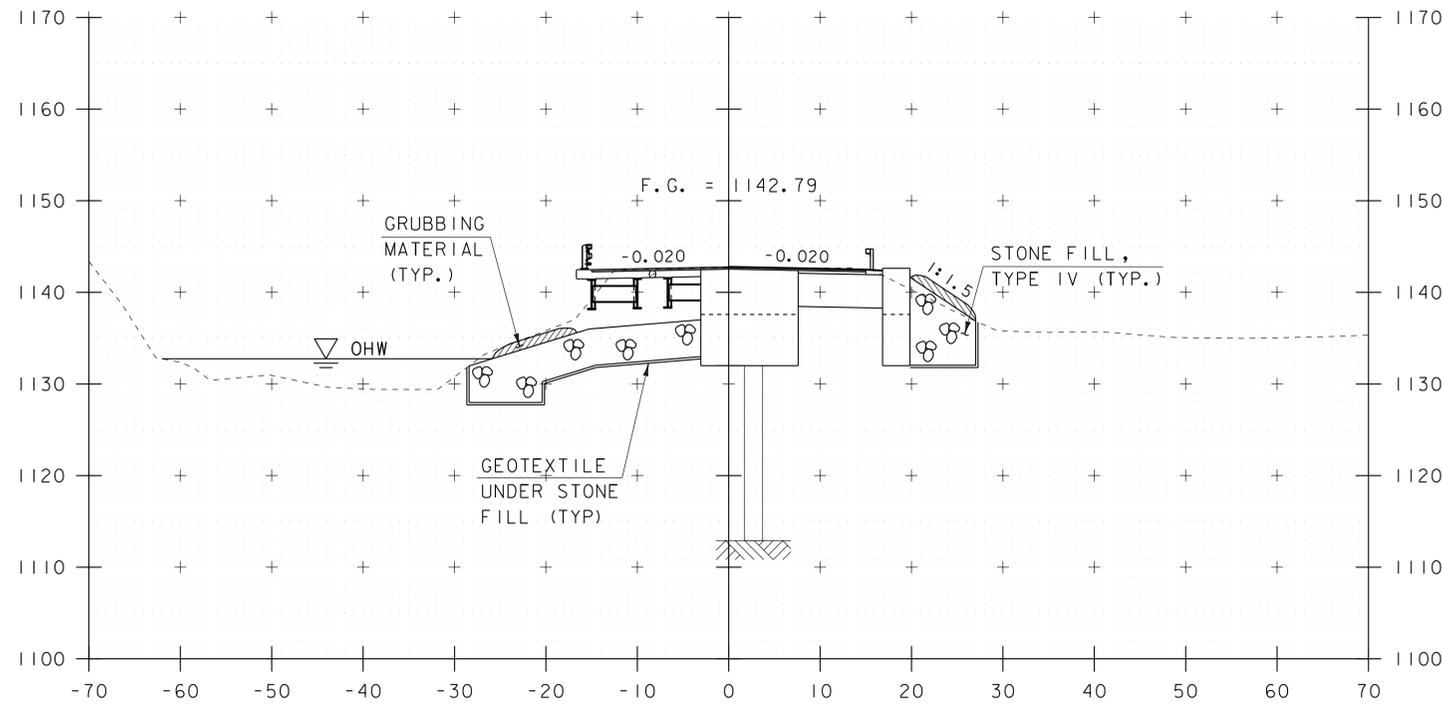


STA. 2+25 TO STA. 3+00

PROJECT NAME: WARREN  
PROJECT NUMBER: BRP 013-4(32)

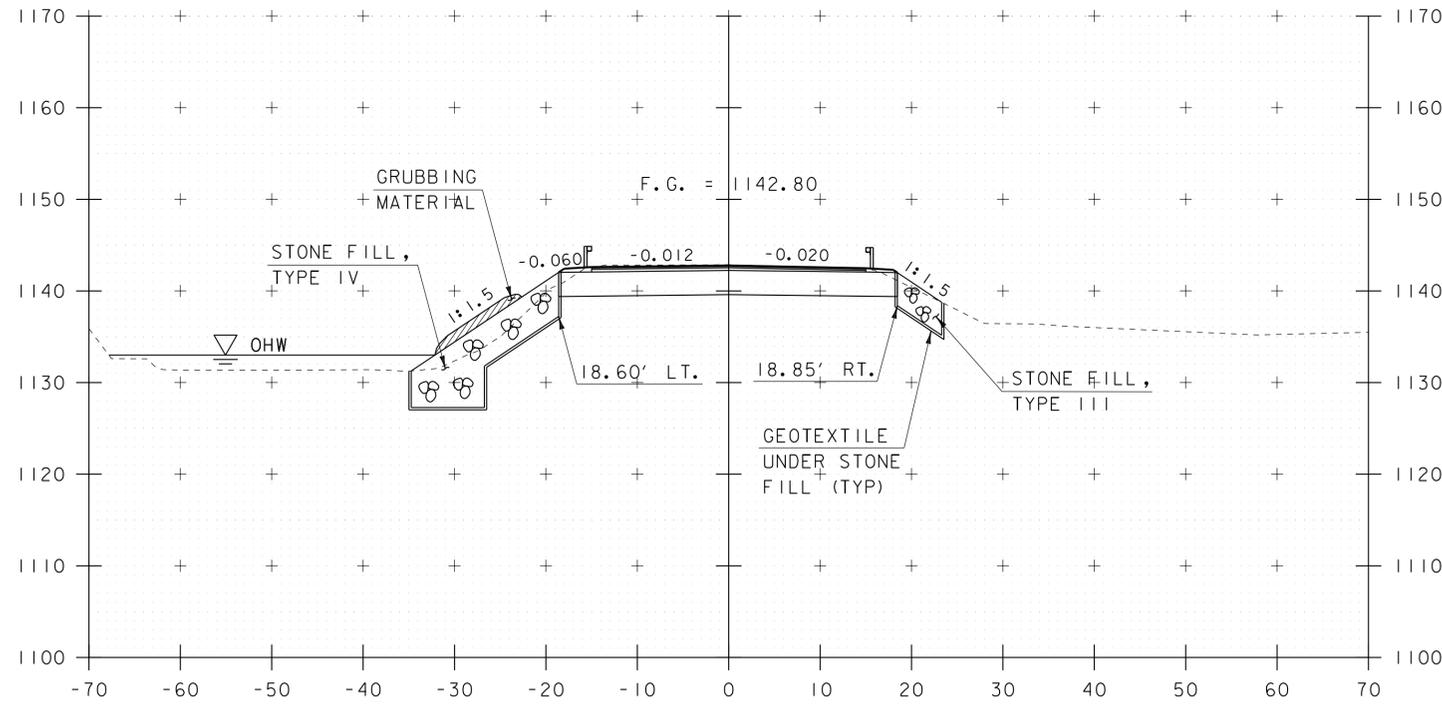
FILE NAME: z10b424xsl.dgn  
PROJECT LEADER: R. YOUNG  
DESIGNED BY: D. KULL  
ROADWAY CROSS SECTIONS (1 OF 4)

PLOT DATE: 03-OCT-2013  
DRAWN BY: S. MERKWAN  
CHECKED BY: T. KENDRICK  
SHEET 29 OF 42

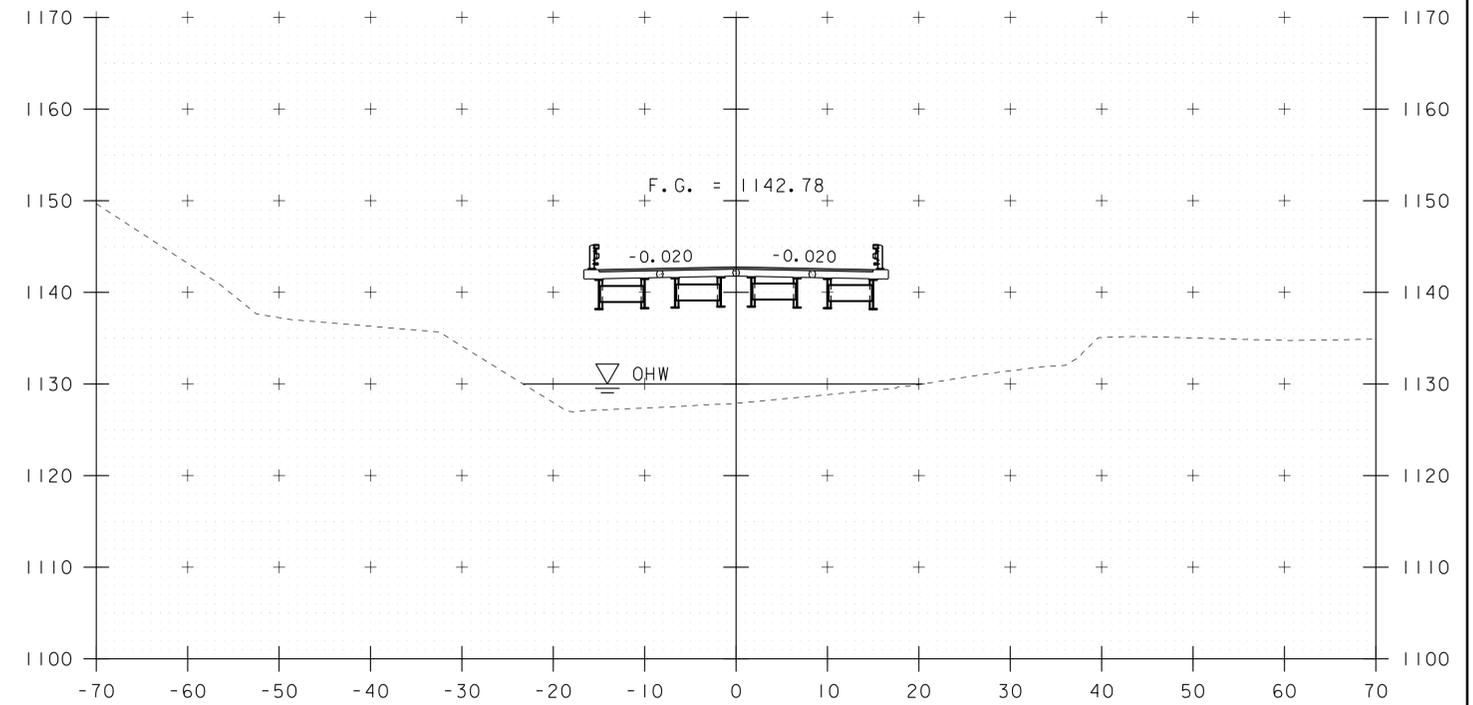


3+50

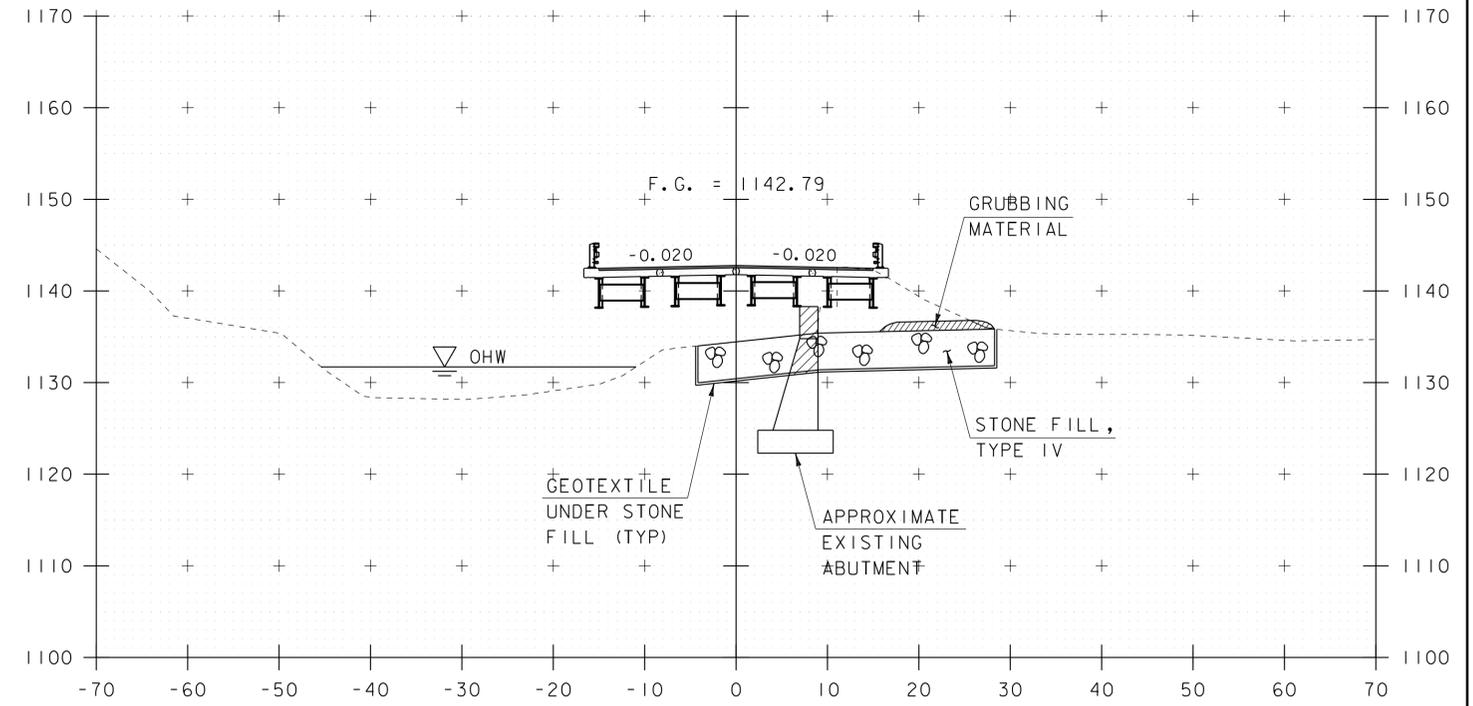
BEGIN BRIDGE - STA. 3+48.10



3+25

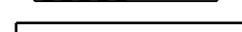


4+00



3+75

SCALE 1" = 10'-0"



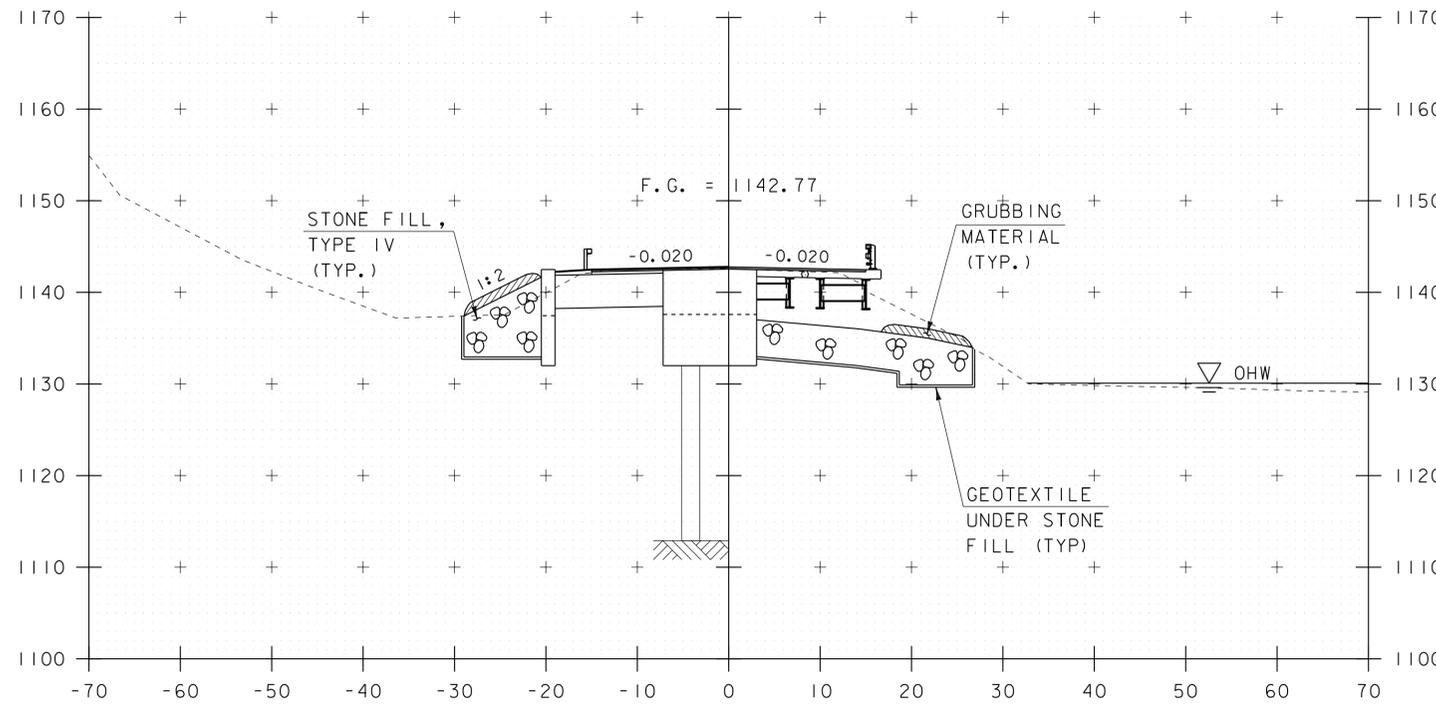
PROJECT NAME: WARREN  
 PROJECT NUMBER: BRF 013-4(32)

FILE NAME: z10b424xsl.dgn  
 PROJECT LEADER: R. YOUNG  
 DESIGNED BY: D. KULL

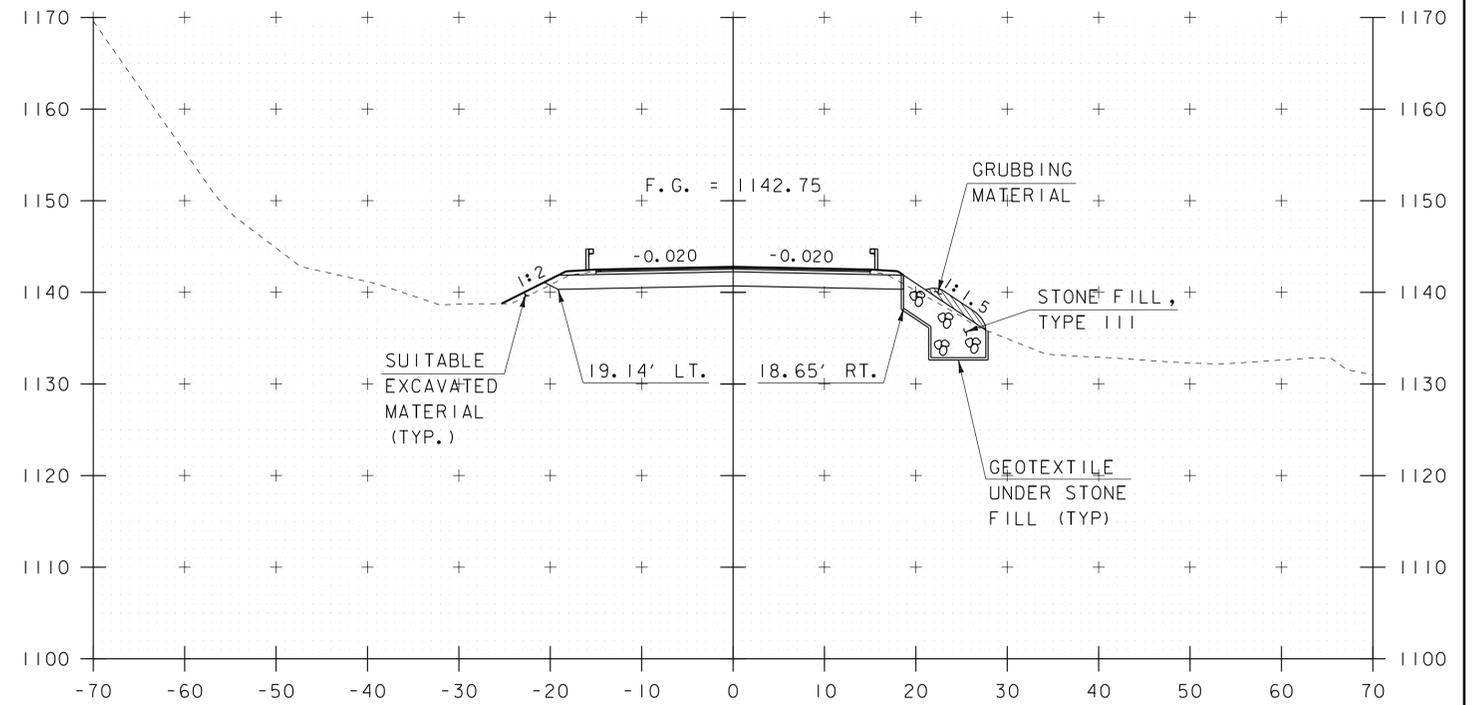
PLOT DATE: 03-OCT-2013  
 DRAWN BY: S. MERKWAN  
 CHECKED BY: T. KENDRICK  
 SHEET 30 OF 42

STA. 3+25 TO STA. 4+00

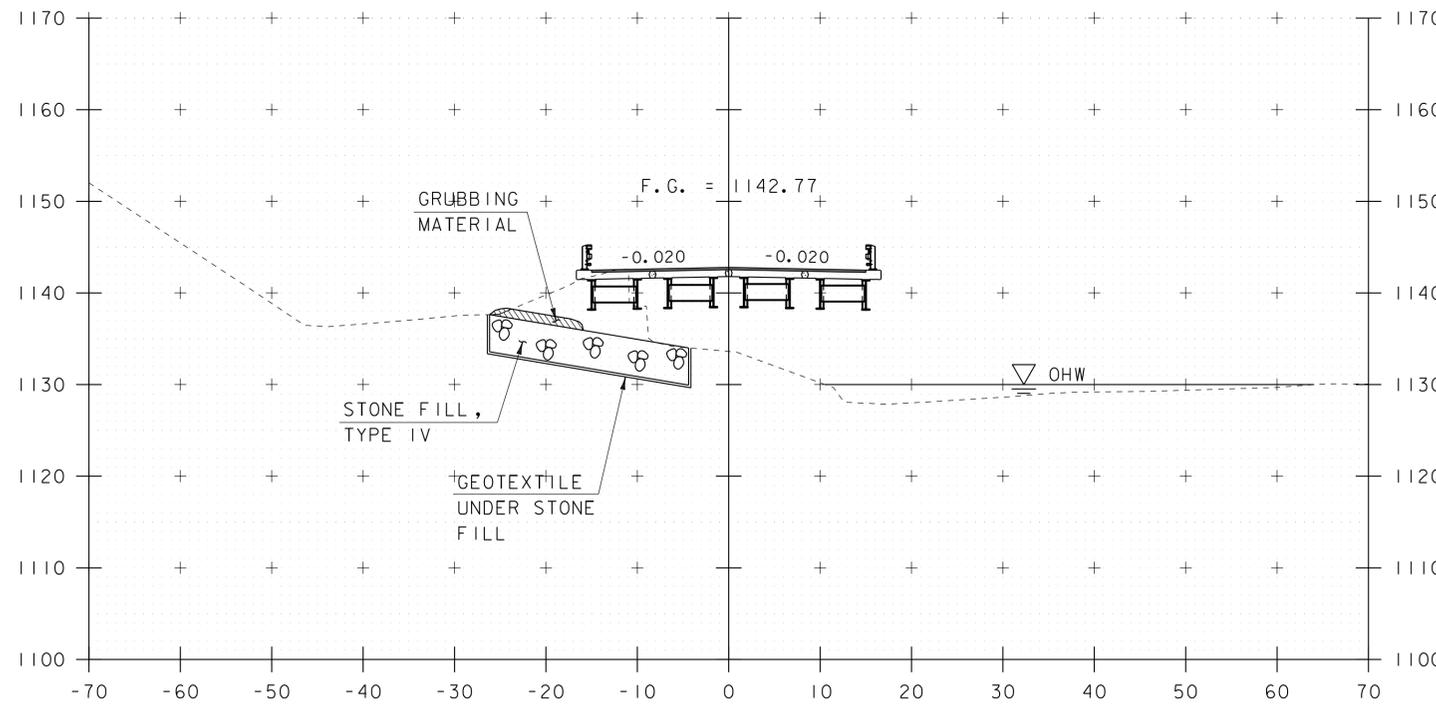
ROADWAY CROSS SECTIONS (2 OF 4)



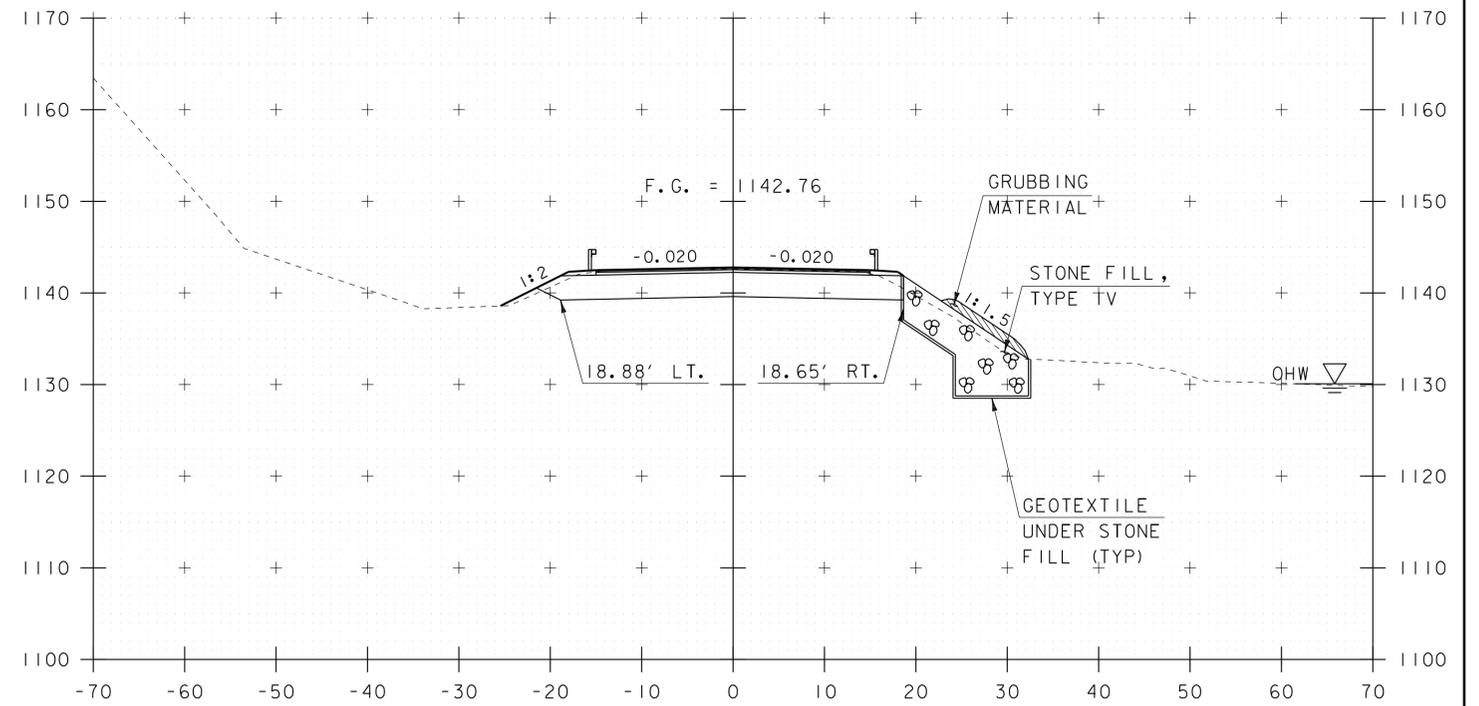
4+50



5+00



4+25



4+75

END BRIDGE - STA. 4+51.90

SCALE 1" = 10' - 0"



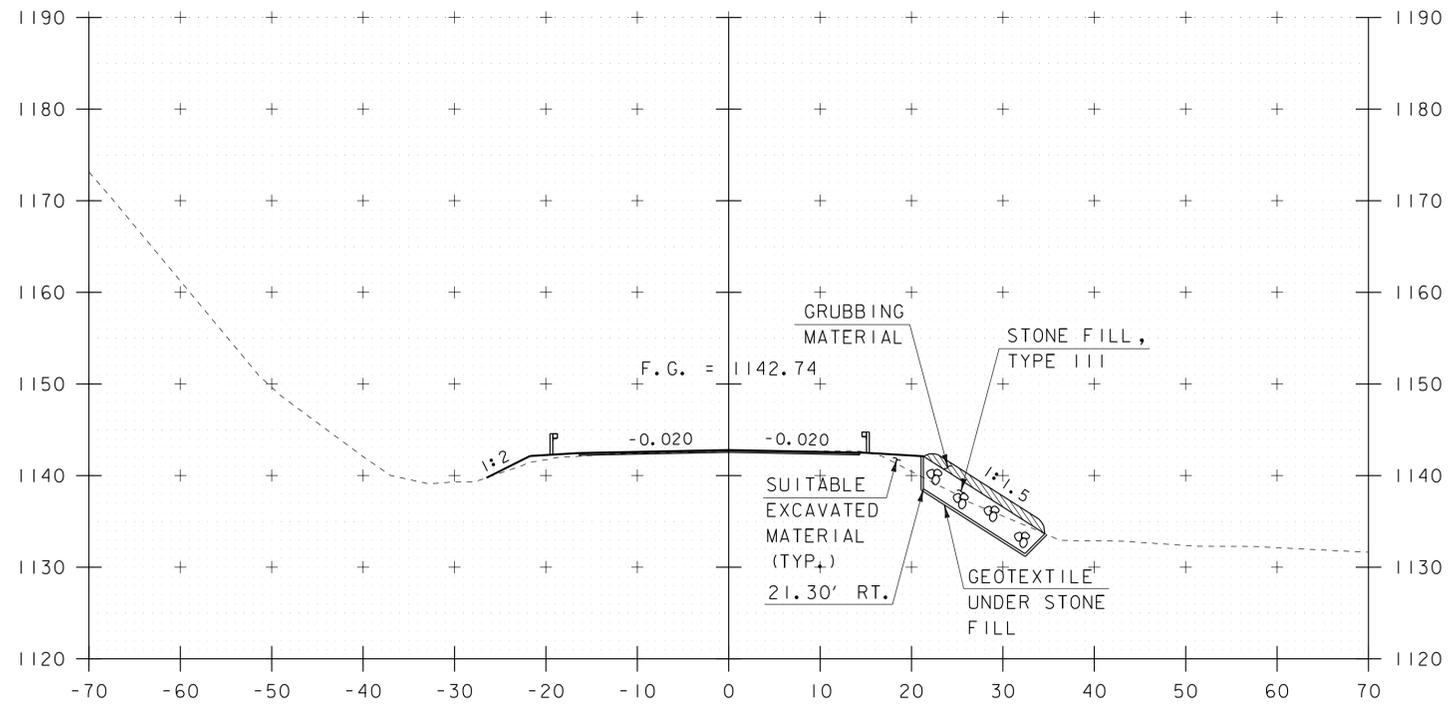
PROJECT NAME: WARREN  
PROJECT NUMBER: BRP 013-4(32)

FILE NAME: z10b424xsl.dgn  
PROJECT LEADER: R. YOUNG  
DESIGNED BY: D. KULL

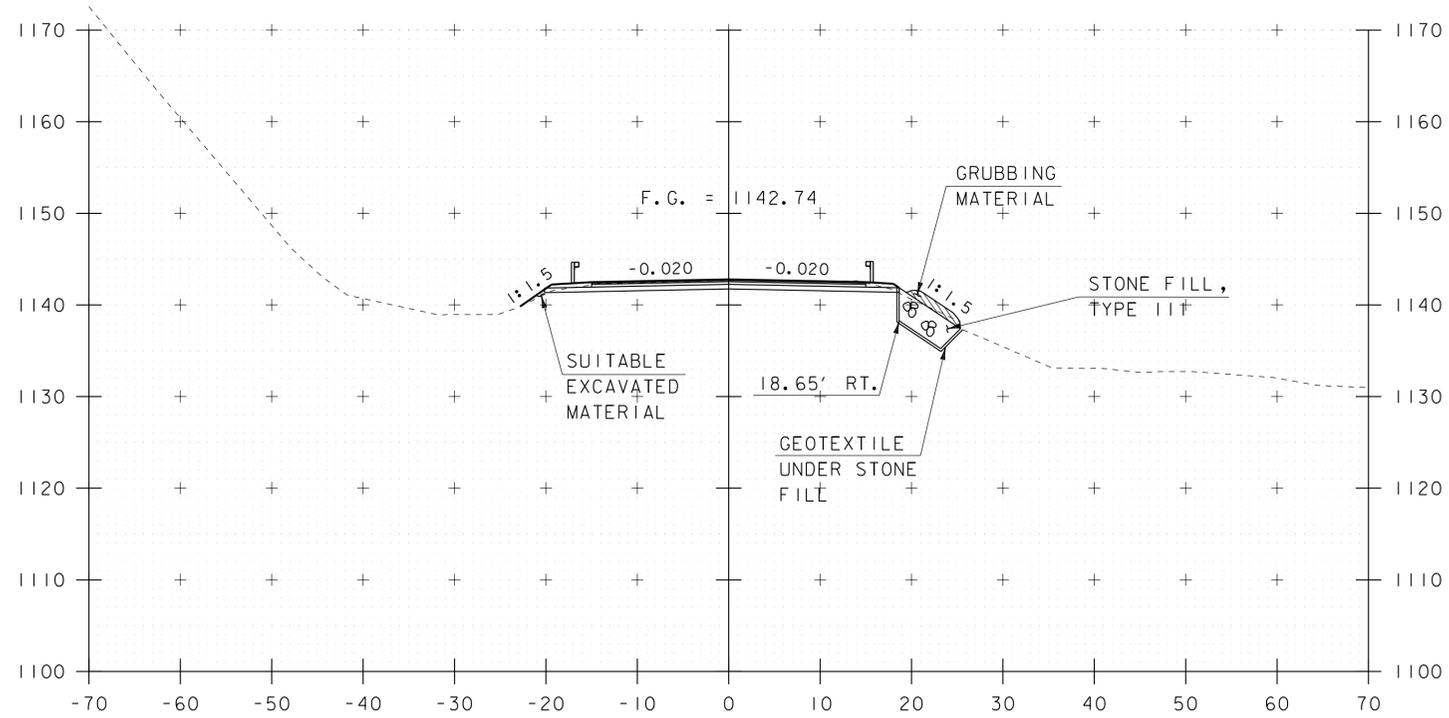
PLOT DATE: 03-OCT-2013  
DRAWN BY: S. MERKWAN  
CHECKED BY: T. KENDRICK  
SHEET 31 OF 42

STA. 4+25 TO STA. 5+00

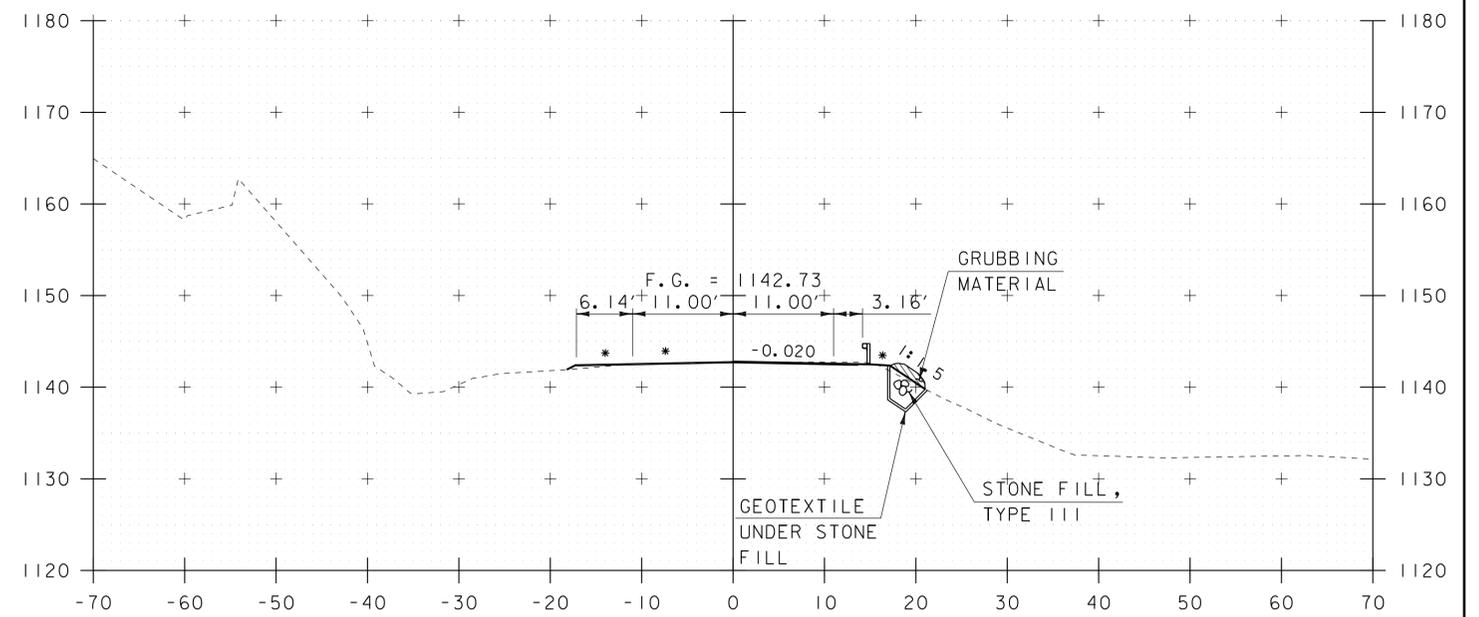
ROADWAY CROSS SECTIONS (3 OF 4)



5+50



5+25  
END PROJECT



\* MATCH EXISTING  
CROSS SLOPE

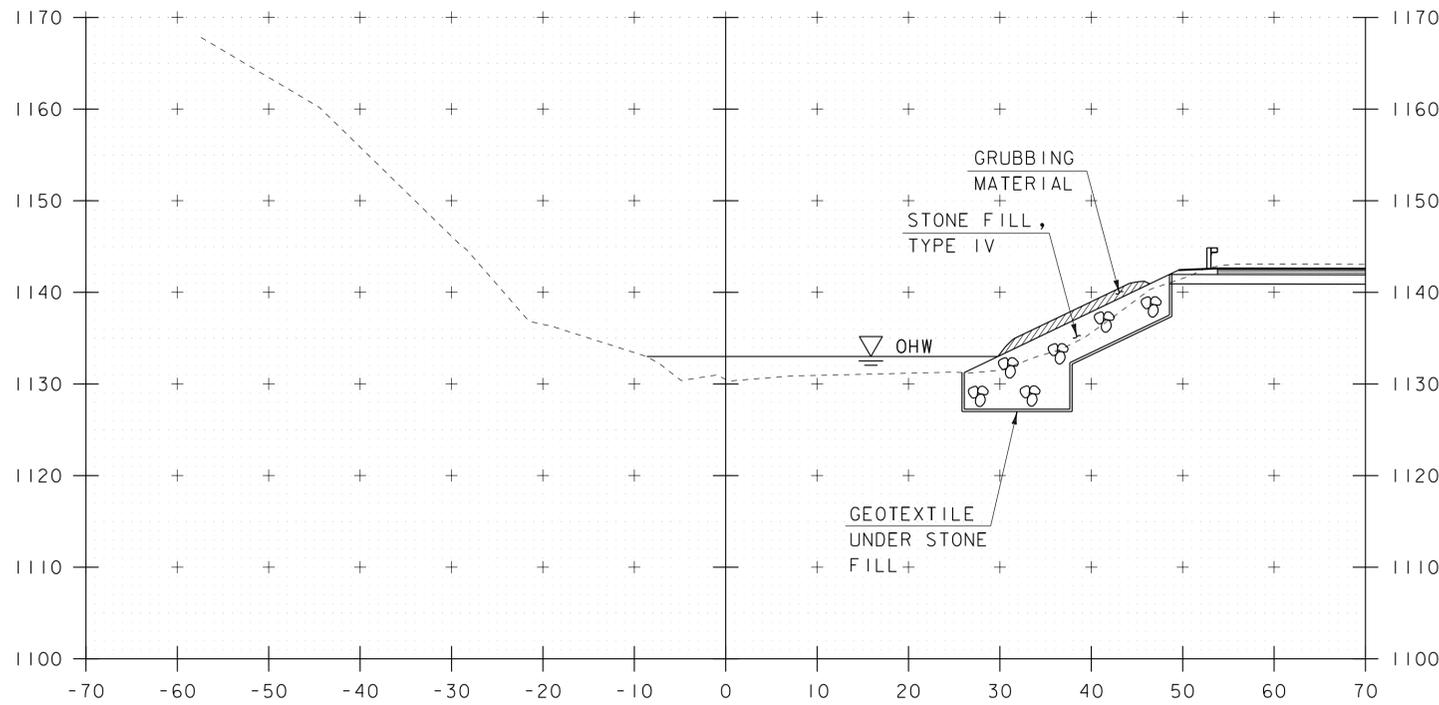
5+75  
END APPROACH  
MATCH EXISTING

SCALE 1" = 10'-0"  
10 0 10

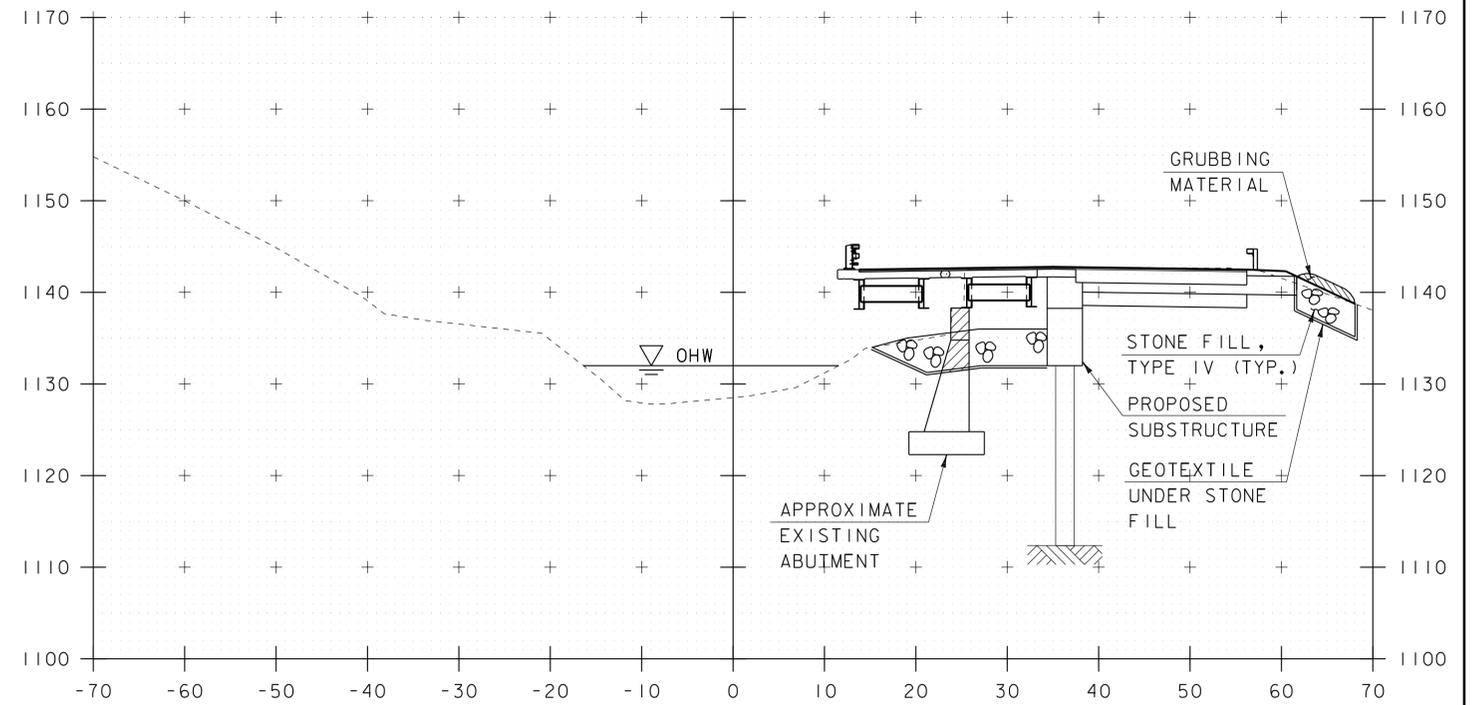


PROJECT NAME: WARREN	FILE NAME: z10b424xsl.dgn	PLOT DATE: 03-OCT-2013
PROJECT NUMBER: BRF 013-4(32)	PROJECT LEADER: R. YOUNG	DRAWN BY: S. MERKWAN
	DESIGNED BY: D. KULL	CHECKED BY: T. KENDRICK
	ROADWAY CROSS SECTIONS (4 OF 4)	SHEET 32 OF 42

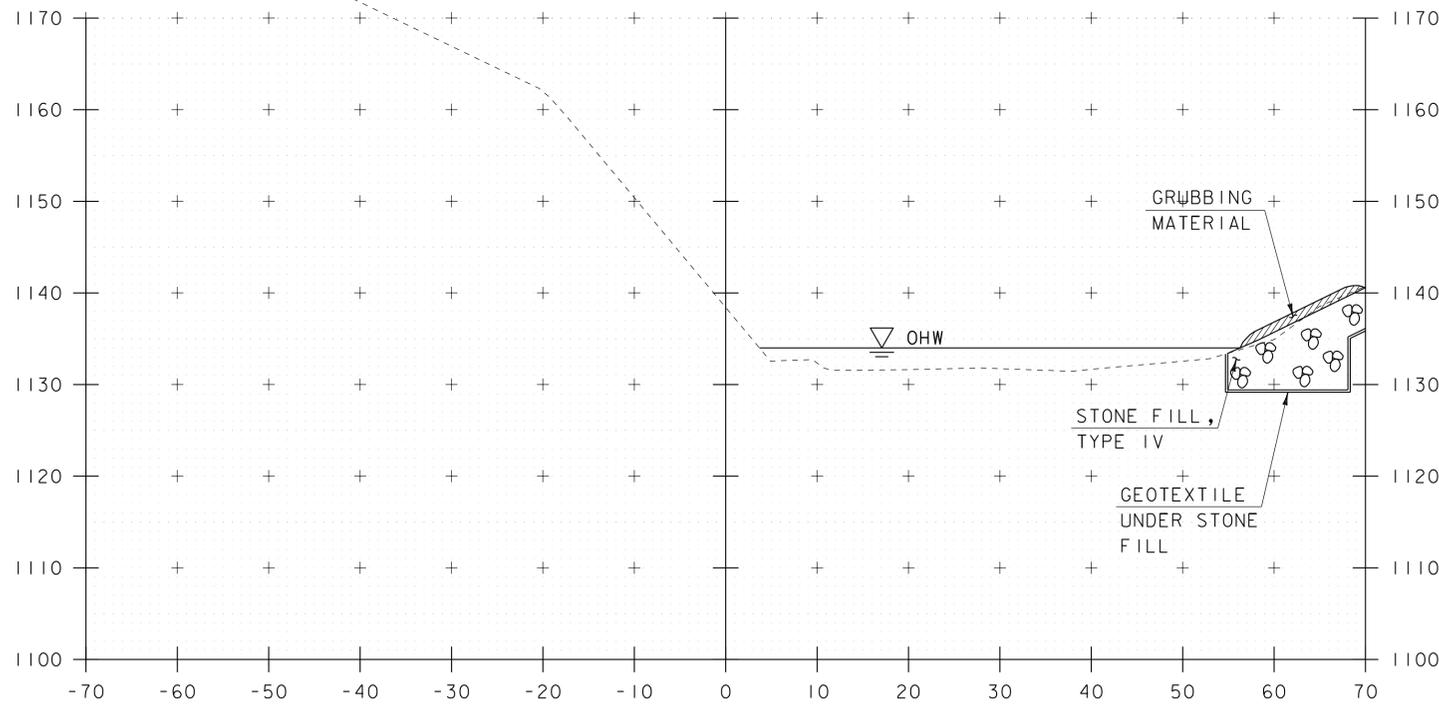
STA. 5+25 TO STA. 5+75



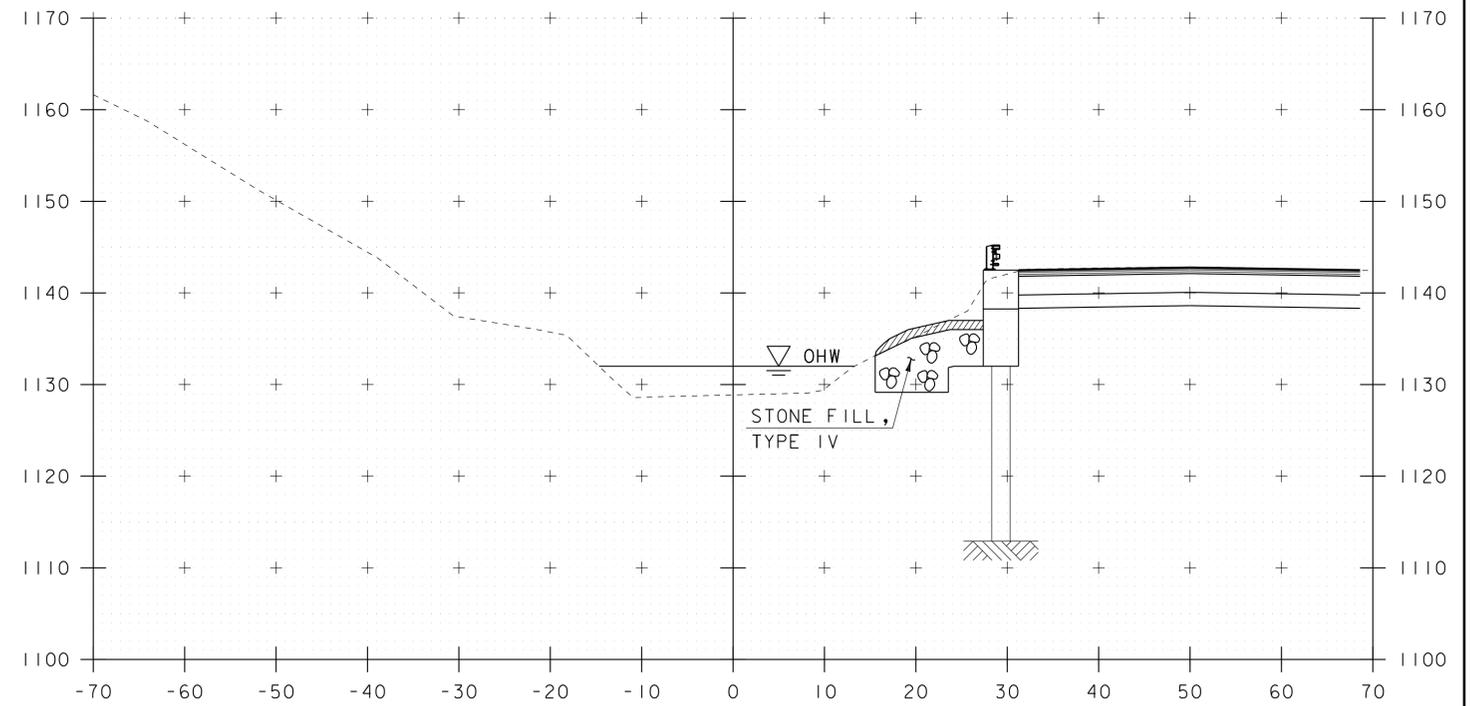
50+25



50+65



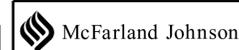
50+00



50+50

NOTE:  
FOR STONE FILL AND  
GRUBBING MATERIAL  
LIMITS, SEE LAYOUT SHEET

SCALE 1" = 10'-0"  
10 0 10

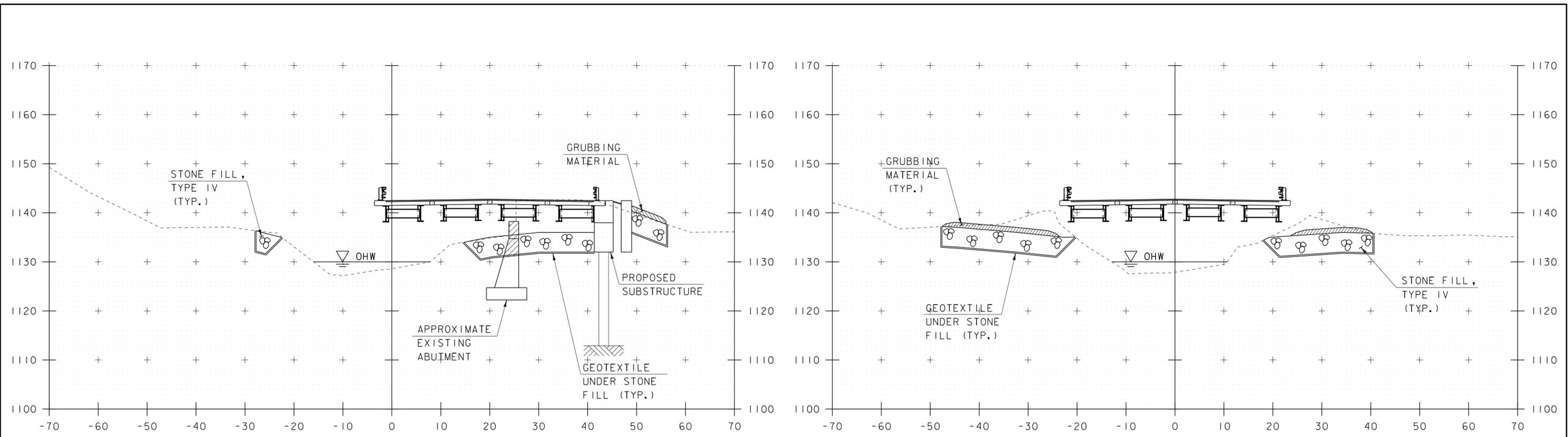


PROJECT NAME: WARREN  
PROJECT NUMBER: BRP 013-4(32)

FILE NAME: z10b424xsl.dgn  
PROJECT LEADER: R. YOUNG  
DESIGNED BY: D. KULL  
CHANNEL CROSS SECTIONS (1 OF 4)

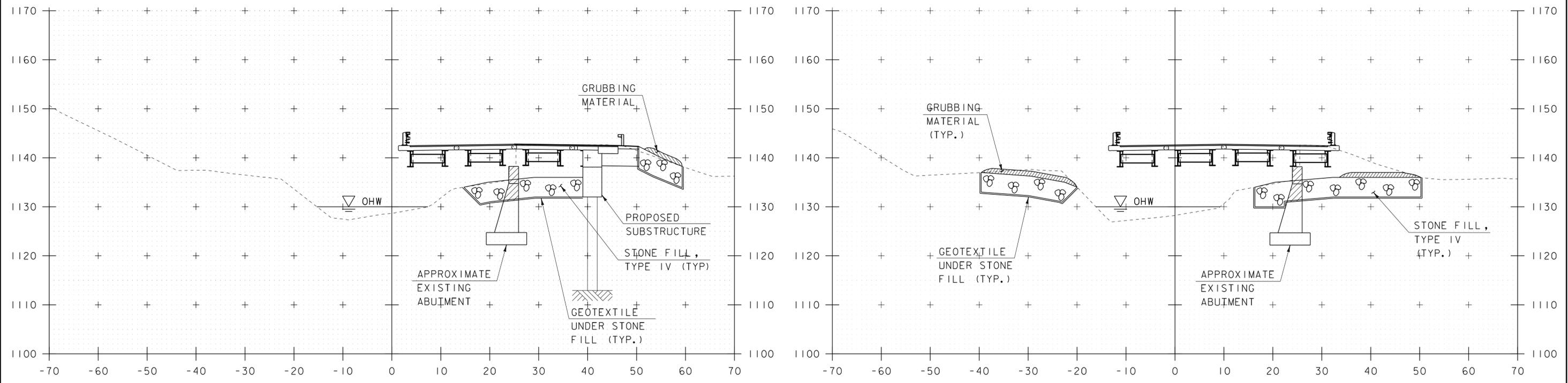
PLOT DATE: 03-OCT-2013  
DRAWN BY: S. MERKWAN  
CHECKED BY: T. KENDRICK  
SHEET 33 OF 42

STA. 50+00 TO STA. 50+65



50+80

51+00



50+75

50+90

NOTE:  
FOR STONE FILL AND  
GRUBBING MATERIAL  
LIMITS, SEE LAYOUT SHEET

SCALE 1" = 10'-0"  
10 0 10

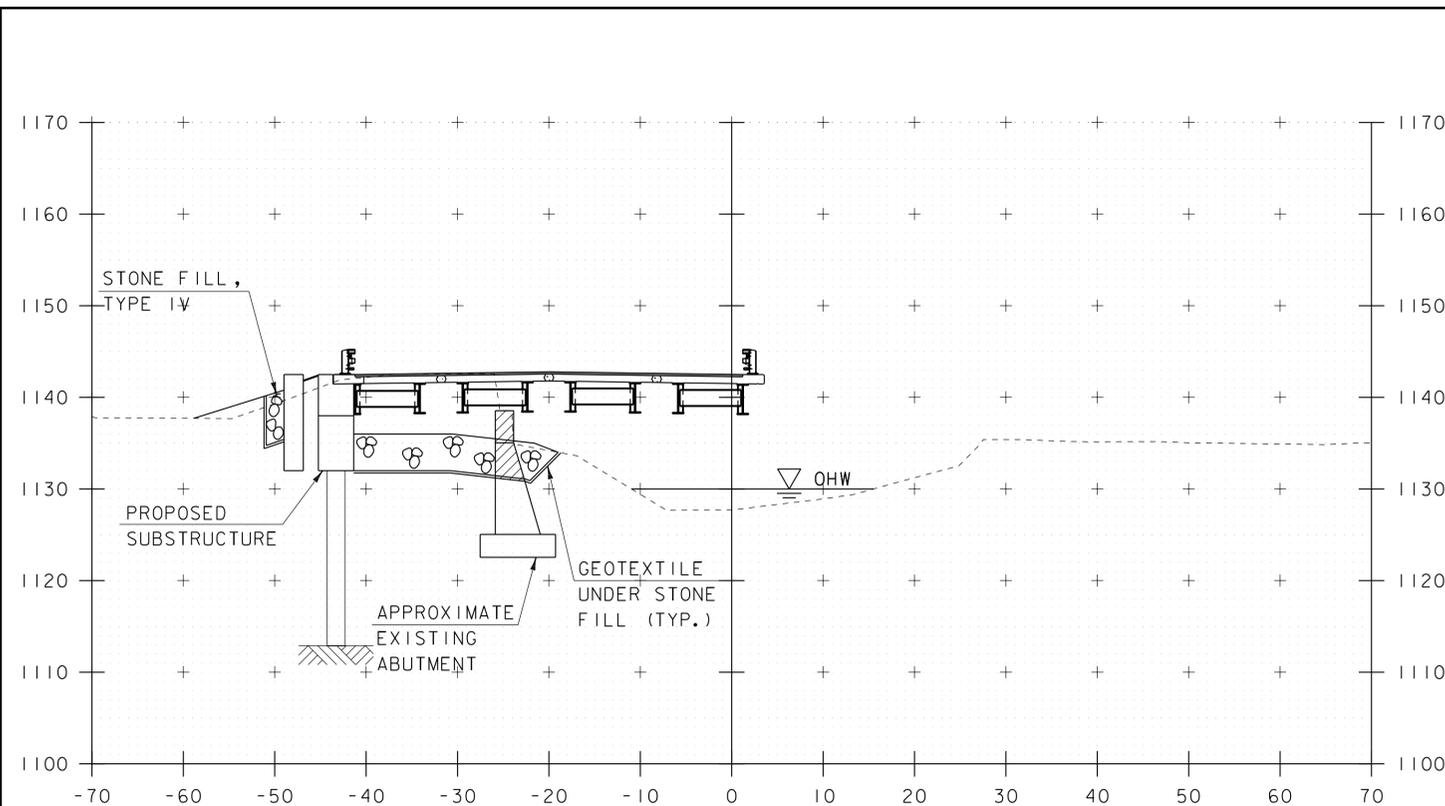
PROJECT NAME: WARREN  
PROJECT NUMBER: BRP 013-4(32)

FILE NAME: z10b424xsl.dgn  
PROJECT LEADER: R. YOUNG  
DESIGNED BY: D. KULL  
CHANNEL CROSS SECTIONS (2 OF 4)

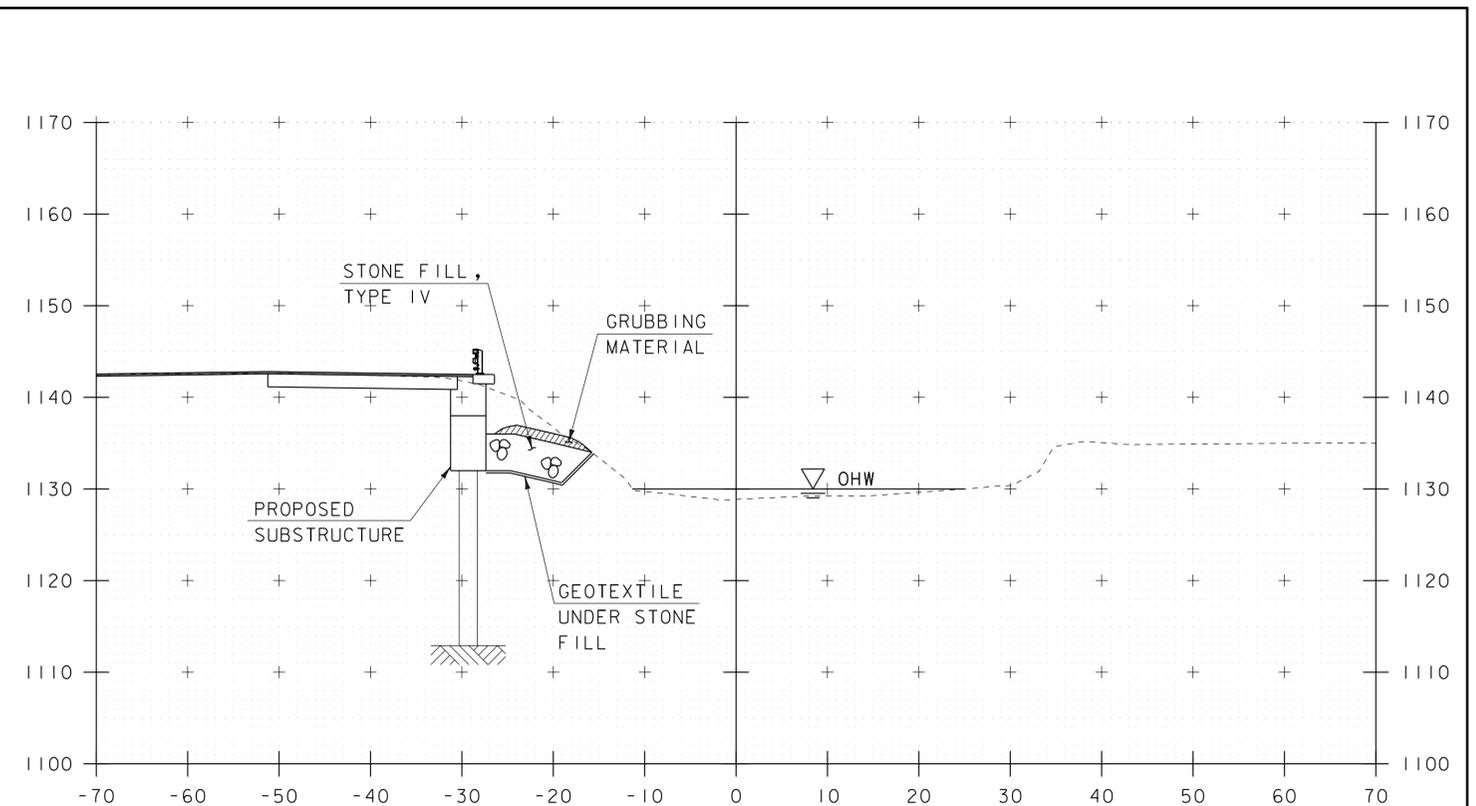
PLOT DATE: 03-OCT-2013  
DRAWN BY: S. MERKWAN  
CHECKED BY: T. KENDRICK  
SHEET 34 OF 42

STA. 50+75 TO STA. 51+00

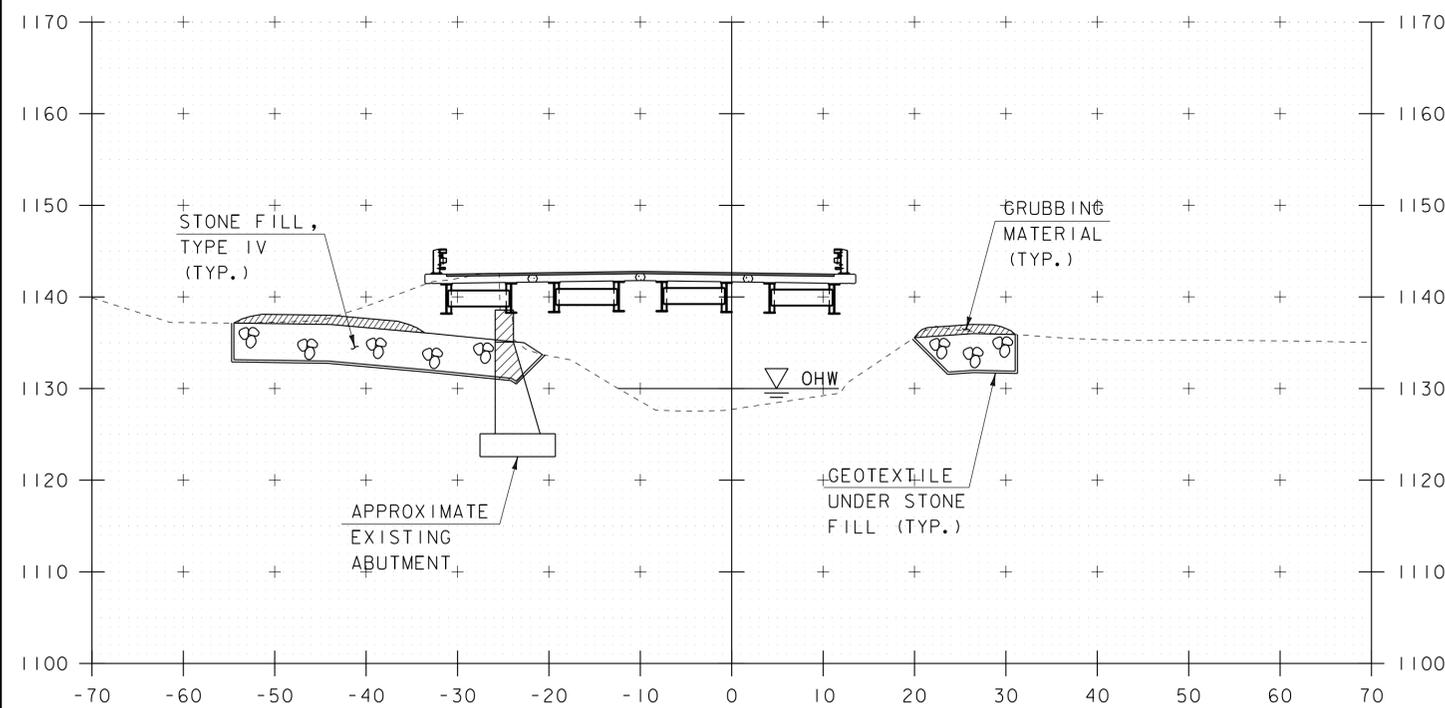




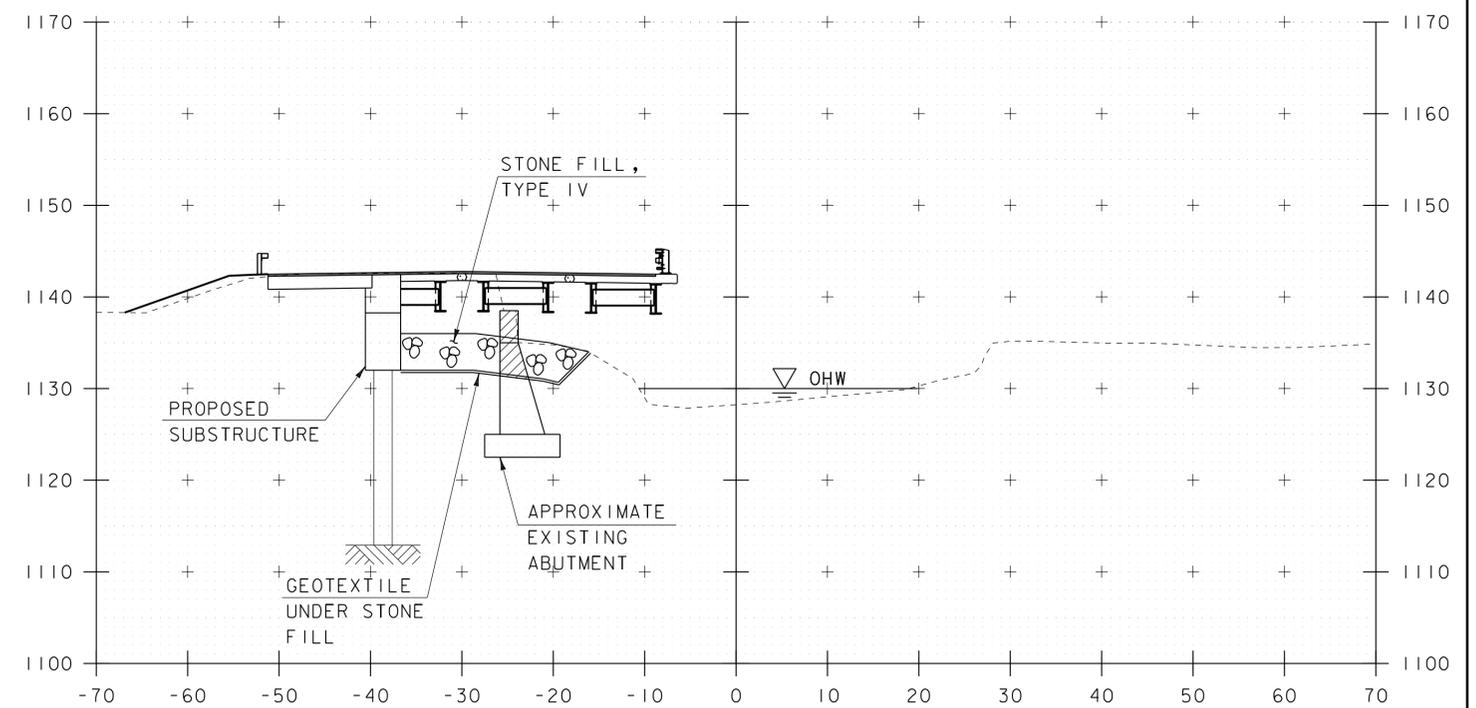
51+20



51+50



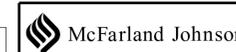
51+10



51+30

NOTE:  
FOR STONE FILL AND  
GRUBBING MATERIAL  
LIMITS, SEE LAYOUT SHEET

SCALE 1" = 10'-0"  
10 0 10



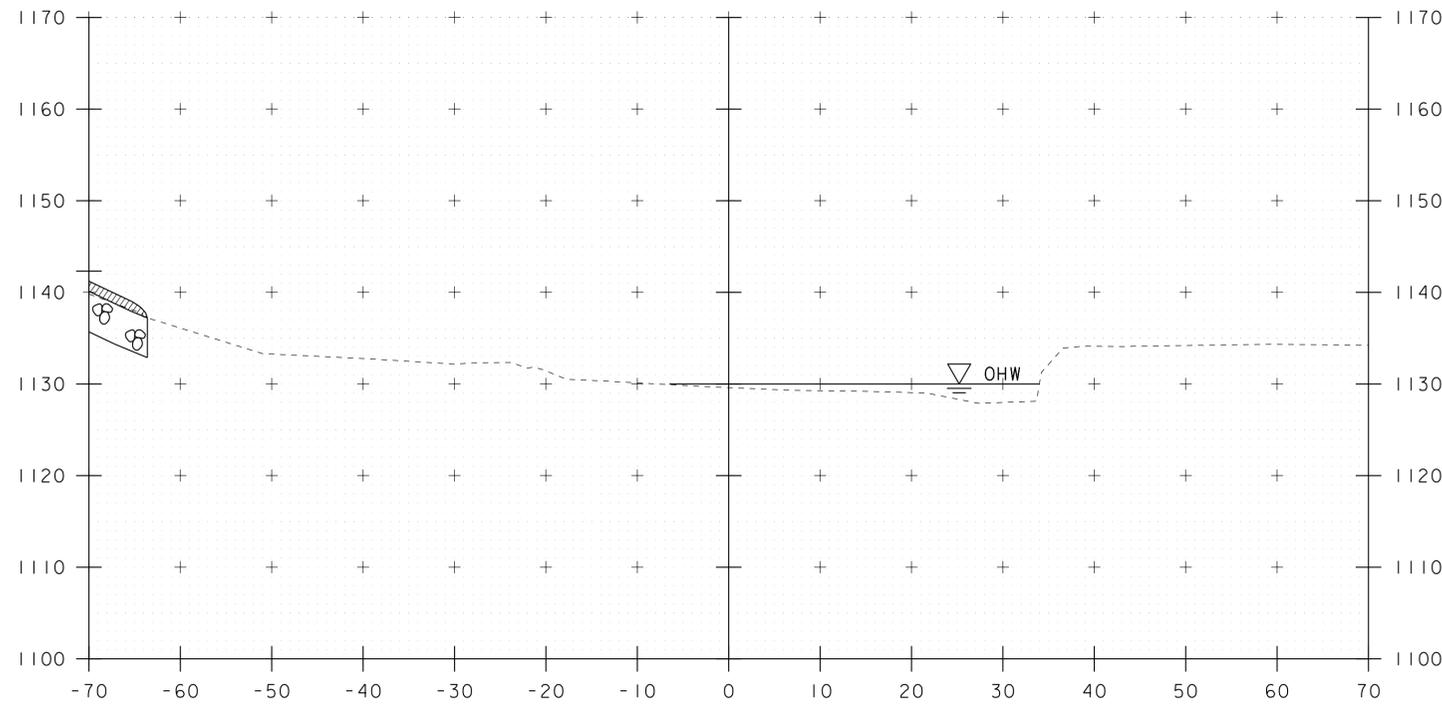
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PROJECT NUMBER: BRP 013-4(32)

FILE NAME: z10b424xsl.dgn  
PROJECT LEADER: R. YOUNG  
DESIGNED BY: D. KULL

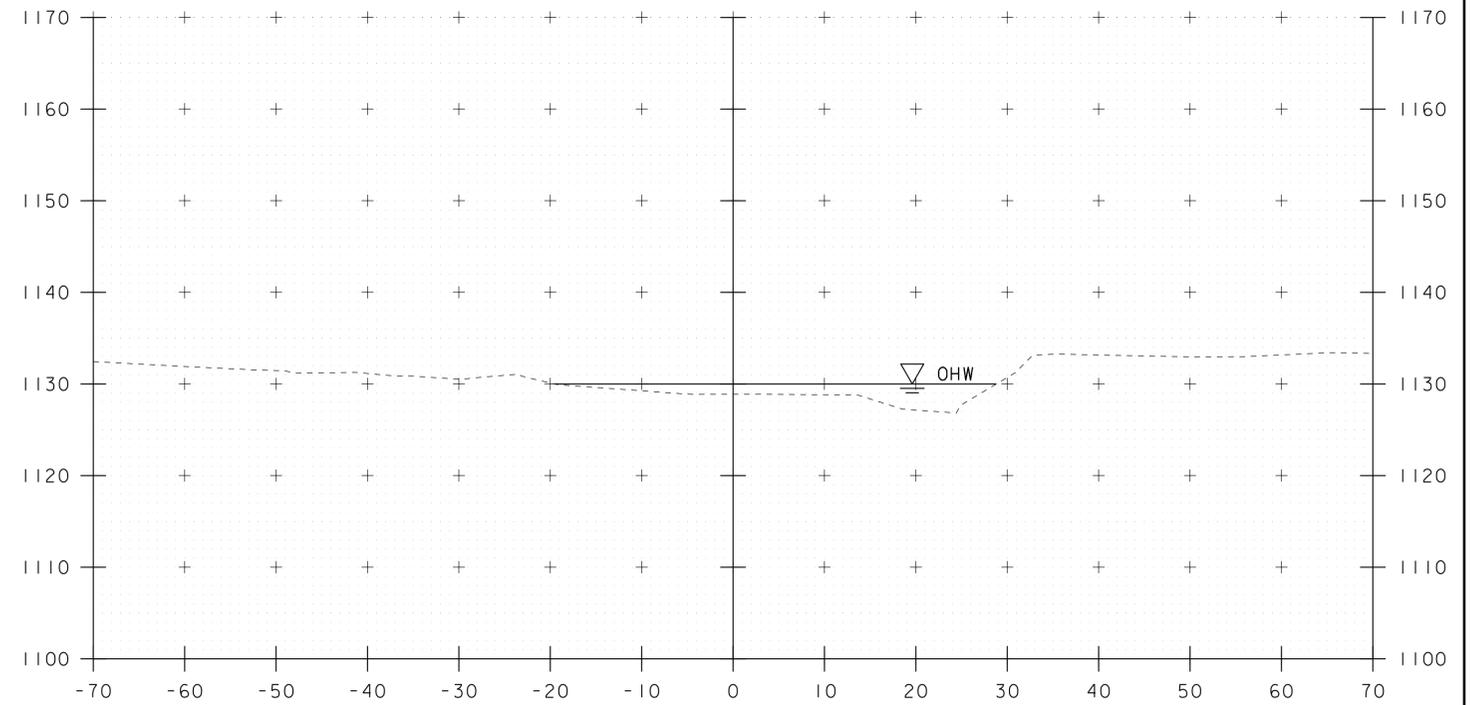
PLOT DATE: 03-OCT-2013  
DRAWN BY: S. MERKWAN  
CHECKED BY: T. KENDRICK  
SHEET 35 OF 42

STA. 51+10 TO STA. 51+50

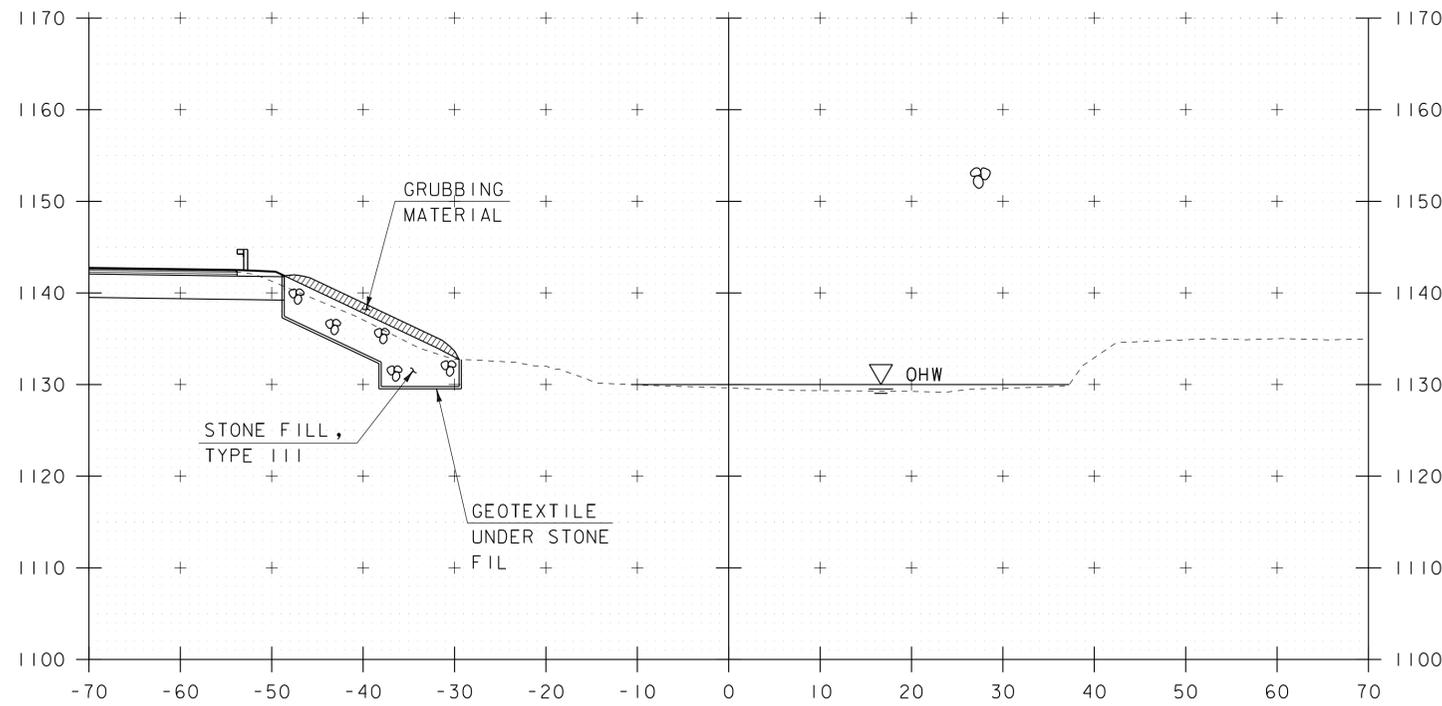
CHANNEL CROSS SECTIONS (3 OF 4)



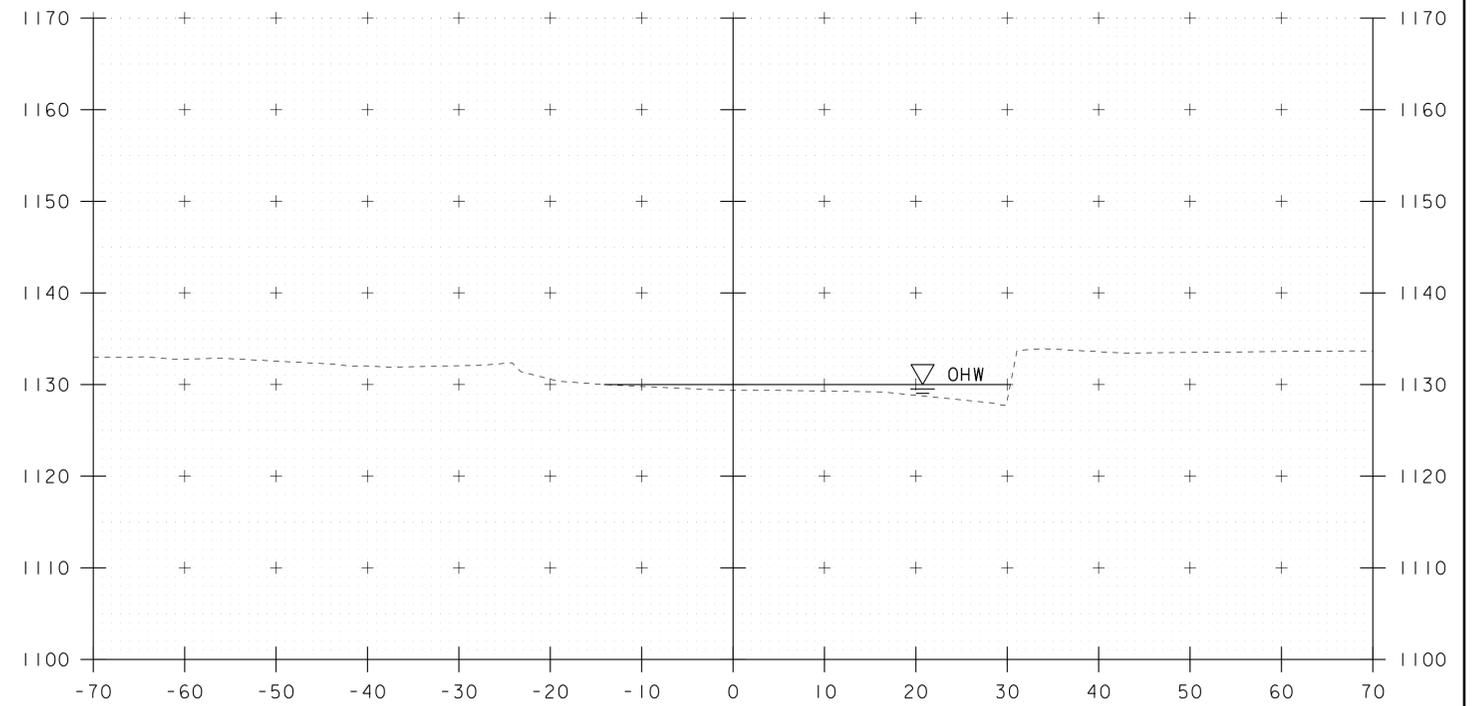
52+00



52+50



51+75



52+25

NOTE:  
FOR STONE FILL AND  
GRUBBING MATERIAL  
LIMITS, SEE LAYOUT SHEET

SCALE 1" = 10' - 0"  
10 0 10



PROJECT NAME: WARREN  
PROJECT NUMBER: BRP 013-4(32)

FILE NAME: z10b424xsl.dgn  
PROJECT LEADER: R. YOUNG  
DESIGNED BY: D. KULL  
CHANNEL CROSS SECTIONS (4 OF 4)

PLOT DATE: 03-OCT-2013  
DRAWN BY: S. MERKWAN  
CHECKED BY: T. KENDRICK  
SHEET 36 OF 42

STA. 51+75 TO STA. 52+50

## **EPSC PLAN NARRATIVE**

### **1.1 PROJECT DESCRIPTION**

THIS PROJECT INVOLVES THE REMOVAL OF BRIDGE #166 WHICH IS A 71 FOOT LONG MULTI-STRINGER ROLLED STEEL BEAM BRIDGE. BRIDGE #166 WILL BE REPLACED BY A 105 FOOT SIMPLE SPAN STRUCTURE FOUNDED ON PRECAST INTEGRAL ABUTMENTS AND STEEL BEARING PILES ALONG THE EXISTING VT 100 ALIGNMENT. BRIDGE #166 IS LOCATED IN THE TOWN OF WARREN, ON VT ROUTE 100, APPROXIMATELY 8.3 MILES SOUTH OF THE INTERSECTION OF VT 17 AND VT 100. THIS PROJECT WILL UTILIZE ACCELERATED BRIDGE CONSTRUCTION METHODS SO THE BRIDGE WILL BE CLOSED TO TRAFFIC FOR APPROXIMATELY 14 DAYS.

NOTE: AREA OF DISTURBANCE INCLUDES LIMITS OF EARTH DISTURBANCE WITHIN THE PROJECT AREA, AS WELL AS WASTE, BORROW AND STAGING AREAS, AND OTHER EARTH DISTURBING ACTIVITIES WITHIN OR DIRECTLY ADJACENT TO THE PROJECT LIMITS AS SHOWN ON THE ATTACHED EPSC PLAN.

TOTAL AREA OF DISTURBANCE AS SHOWN ON THE ATTACHED EPSC PLAN IS APPROXIMATELY 0.40 ACRES.

IT IS ANTICIPATED THAT THIS PROJECT WILL BE COMPLETED IN LESS THAN ONE CONSTRUCTION SEASON.

### **1.2 SITE INVENTORY**

#### **1.2.1 TOPOGRAPHY**

THE TOPOGRAPHY OF THE AREA IS HILLY WITH MOSTLY WELL ESTABLISHED FOREST AND OCCASIONAL OPEN AREAS WITHIN THE GREEN MOUNTAIN NATIONAL FOREST. ROADWAY SIDE SLOPES CONSIST OF VEGETATED UNDERGROWTH WITH SEVERAL EXPOSED LEDGE FACES.

#### **1.2.2 DRAINAGE, WATERWAYS, BODIES OF WATER, AND PROXIMITY TO NATURAL OR MAN-MADE WATER FEATURES**

THE MAD RIVER IS THE ONLY WATER SOURCE ON THE PROJECT SITE. THE MAD RIVER IS CLASSIFIED AS FLAT, WITH A NARROW SEMI-ARMORED CHANNEL UPSTREAM AND A WIDE EARTH LINED CHANNEL DOWNSTREAM OF THE SITE. THE STREAM BED CONSISTS OF GRAVEL, COBBLES AND BOULDERS.

#### **1.2.3 VEGETATION**

THE VEGETATION IN THE PROJECT AREA CONSISTS OF MIXED HARDWOOD AND SOFTWOOD TREES AND UNDERGROWTH. THE IMPACT TO VEGETATION WILL BE LIMITED TO THAT WHICH IS DIRECTLY AFFECTED BY REPLACEMENT OF THE EXISTING BRIDGE AND RECONSTRUCTION OF THE ROADWAY AND SIDE SLOPES WITHIN THE PROJECT LIMITS. UPON PROJECT COMPLETION, THE CHANNEL SIDE SLOPE ADJACENT TO THE BRIDGE WILL BE ARMORED WITH STONE FILL TYPE IV AS SPECIFIED ON THE PLANS. DISTURBED VEGETATION WILL BE REESTABLISHED WITH STANDARD SEED AND MULCH PRACTICES. BECAUSE THIS AREA IS WITHIN THE GREEN MOUNTAIN NATIONAL FOREST, CLEARING SHALL BE KEPT TO A MINIMUM.

#### **1.2.4 SOILS**

ALL SOIL DATA CAME FROM THE U.S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE FOR THE COUNTY OF WASHINGTON, VERMONT. SOILS ON THE PROJECT SITE ARE ADAMS LOAMY FINE SAND, 3% TO 8% SLOPES, "K FACTOR" = 0.17. THE SOIL IS CONSIDERED SLIGHTLY ERODIBLE.

**NOTE:** K-VALUES GENERALLY INDICATE THE FOLLOWING:  
0.0-0.23 = LOW EROSION POTENTIAL  
0.24-0.36 = MODERATE EROSION POTENTIAL  
0.37 AND HIGHER = HIGH EROSION POTENTIAL

#### **1.2.5 SENSITIVE RESOURCE AREAS**

CRITICAL HABITATS: EXISTING MAPPED DEER YARDS ON THE EASTERN SIDE OF THE ROADWAY.  
HISTORICAL OR ARCHEOLOGICAL AREAS: NO  
PRIME AGRICULTURAL LAND: NO  
THREATENED AND ENDANGERED SPECIES: NO  
WATER RESOURCE: MAD RIVER  
WETLANDS: NO

### **1.3 RISK EVALUATION**

THIS PROJECT DOES NOT FALL UNDER THE JURISDICTION OF GENERAL PERMIT 3-9020 FOR STORMWATER RUNOFF FROM CONSTRUCTION SITES. SHOULD CHANGES PRIOR TO OR DURING CONSTRUCTION RESULT IN ONE OR MORE ACRES OF EARTH DISTURBANCE OR SHOULD THE

PROJECT BECOME PART OF A LARGER PLAN OF DEVELOPMENT, THE CONTRACTOR WILL BE RESPONSIBLE FOR ANY ADDITIONAL PERMITTING.

### **1.4 EROSION PREVENTION AND SEDIMENT CONTROL**

THE EROSION CONTROL PLANS ARE MEANT AS A GUIDELINE FOR PREVENTING EROSION AND CONTROLLING SEDIMENT TRANSPORT. THE PRINCIPLES OUTLINED IN THIS NARRATIVE CONSIST OF APPLYING MEASURES THROUGHOUT CONSTRUCTION OF THE PROJECT IN ORDER TO MINIMIZE SEDIMENT TRANSPORT TO THE RECEIVING WATERS. THE MEASURES INCLUDE STABILIZATION AND STRUCTURAL PRACTICES, STORM WATER CONTROLS AND OTHER POLLUTION PREVENTION PRACTICES. THEY HAVE BEEN PROPOSED BY THE DESIGNER AS A BASIS FOR PROTECTING RESOURCES AND WILL NEED TO BE BUILT UPON BASED ON THE SPECIFIC MEANS AND METHODS OF THE CONTRACTOR. REFER TO THE LOW RISK SITE HANDBOOK AND APPROPRIATE DETAIL SHEETS FOR SPECIFIC GUIDANCE AND CONSTRUCTION DETAILING.

ALL MEASURES SHALL BE REGULARLY MAINTAINED AND SHALL BE CHECKED FOR SEDIMENT BUILD-UP. SEDIMENT SHALL BE DISPOSED OF AT AN APPROVED SITE WHERE IT WILL NOT BE SUBJECT TO EROSION.

#### **1.4.1 MARK SITE BOUNDARIES**

SITE BOUNDARIES AND AREAS CONSTRUCTION EQUIPMENT CAN ACCESS SHALL BE DELINEATED.

PROJECT DEMARCATION FENCING (PDF) SHALL BE PLACED 5 FEET FROM THE TOE OF SLOPE TO PHYSICALLY MARK SITE BOUNDARIES. PDF CAN BE LOCATED CLOSER TO THE PROPOSED SLOPE LIMITS IN SENSITIVE AREAS OR AS DIRECTED BY THE ENGINEER. PDF SHALL BE INSTALLED PRIOR TO THE BEGINNING OF ANY EARTHWORK ON THE PROJECT.

#### **1.4.2 LIMIT DISTURBANCE AREA**

PREVENTING INITIAL SOIL EROSION BY MINIMIZING THE EXPOSED AREA IS MUCH MORE EFFECTIVE THAN TREATING ERODED SEDIMENT. EARTH DISTURBANCE CAN BE MINIMIZED THROUGH CONSTRUCTION PHASING BY ONLY OPENING UP EARTH AS NECESSARY. THIS CAN LIMIT THE AREA THAT WILL BE DISTURBED AND EXPOSED TO EROSION. EMPLOY TEMPORARY CONSTRUCTION STABILIZATION PRACTICES IN INCREMENTAL STAGES AS CONSTRUCTION CHANGES.

MAINTAINING VEGETATED BUFFERS ALONG STREAM BANKS, WETLANDS OR OTHER SENSITIVE AREAS IS A CRUCIAL EROSION AND SEDIMENT CONTROL MEASURE THAT SHOULD BE ESTABLISHED WHEREVER POSSIBLE.

#### **1.4.3 SITE ENTRANCE/EXIT STABILIZATION**

TRACKING OF SEDIMENT ONTO PUBLIC HIGHWAYS SHALL BE MINIMIZED TO REDUCE THE POTENTIAL FOR RUNOFF ENTERING RECEIVING WATERS. INSTALLATION SHALL COINCIDE WITH THE CONTRACTOR'S PROGRESS SCHEDULE.

STABILIZED CONSTRUCTION ENTRANCES SHOULD BE INSTALLED AS PROPOSED ON THE EPSC PLAN AND ANYWHERE EQUIPMENT WILL BE GOING FROM AREAS OF EXPOSED SOILS TO PAVED SURFACES.

#### **1.4.4 INSTALL SEDIMENT BARRIERS**

SEDIMENT BARRIERS SHALL BE UTILIZED TO INTERCEPT RUNOFF AND ALLOW SUSPENDED SEDIMENT TO SETTLE OUT. THEY SHALL BE INSTALLED PRIOR TO ANY UP SLOPE EARTHWORK IN ACCORDANCE WITH THE EROSION PREVENTION AND CONTROL PLANS.

SILT FENCE WILL BE INSTALLED AT THE TOE OF SLOPE AS PROPOSED ON THE EPSC PLAN.

AT LOCATIONS WHERE CONSTRUCTION IS IN OR NEAR WATERCOURSES OF THE STATE OF VERMONT, GEOTEXTILE FOR FILTER CURTAIN SHALL BE USED TO MINIMIZE SEDIMENT FROM ENTERING THESE WATERCOURSES. THE FILTER CURTAIN SHALL EXTEND FROM THE BOTTOM OF THE WATERCOURSE TO THE TOP OF THE WATER SURFACE. GEOTEXTILE SHALL ALSO BE PLACED ALONG THE BOTTOM OF THE WATERCOURSE WITHIN THE LIMITS OF THE FILTER CURTAIN TO FACILITATE THE REMOVAL OF SEDIMENT AND PROTECT THE EXISTING WATERCOURSE BOTTOM. IF THE CONTRACTOR CHOOSES TO USE A DIFFERENT METHOD FOR CONTAINING SEDIMENT IN THE WATERCOURSES, THE CONTRACTOR SHALL SUBMIT THE ALTERNATE METHOD TO THE ENGINEER FOR APPROVAL AT LEAST 14 DAYS PRIOR TO THE PRE-CONSTRUCTION MEETING. FILTER CURTAIN SHALL BE INSTALLED AS SHOWN ON THE EROSION PREVENTION AND SEDIMENT CONTROL PLANS PRIOR TO ANY CONSTRUCTION WITHIN 50 FEET OF WATERS OF THE STATE.

#### **1.4.5 DIVERT UPLAND RUNOFF**

DIVERSIONARY MEASURES SHALL BE USED TO INTERCEPT RUNOFF FROM ABOVE THE CONSTRUCTION AND DIRECT IT AROUND THE DISTURBED AREA SO THAT CLEAN WATER DOES NOT BECOME MUDDIED WHILE TRAVELING OVER EXPOSED SOILS ON THE CONSTRUCTION SITE.

THE PROJECT AREA IS RELATIVELY FLAT. THEREFORE IT IS NOT ANTICIPATED THAT DIVERSION MEASURES WILL BE NECESSARY.

#### **1.4.6 SLOW DOWN CHANNELIZED RUNOFF**

CHECK STRUCTURES SHALL BE UTILIZED TO REDUCE THE VELOCITY, AND THUS THE EROSION POTENTIAL, OF CONCENTRATED FLOW IN CHANNELS.

TEMPORARY STONE CHECK DAMS, TYPE I WILL BE INSTALLED AS PROPOSED ON THE EPSC PLAN, AT A MINIMUM.

#### **1.4.7 CONSTRUCT PERMANENT CONTROLS**

PERMANENT STORMWATER TREATMENT DEVICES, SUCH AS STONE SLOPES, SHALL BE INSTALLED AS SHOWN ON THE PLANS.

#### **1.4.8 STABILIZE EXPOSED SOILS DURING CONSTRUCTION**

ALL AREAS OF DISTURBANCE MUST HAVE TEMPORARY STABILIZATION IN PLACE WITHIN 48 HOURS OF DISTURBANCE.

SURFACE ROUGHENING OF ALL EXPOSED SLOPES, COMBINED WITH TEMPORARY MULCHING, SHALL BE UTILIZED ON A REGULAR BASIS. BIODEGRADABLE EROSION CONTROL MATTING OR AN EQUIVALENT SHALL BE USED TO STABILIZE ALL SLOPES STEEPER THAN 1:3.

THE FORECAST OF RAINFALL EVENTS SHALL TRIGGER IMMEDIATE PROTECTION OF EXPOSED SOILS.

#### **1.4.9 WINTER STABILIZATION**

VARIOUS MEASURES SPECIFIC TO WINTER MAY BE NECESSARY SHOULD THE PROJECT EXTEND INTO WINTER (OCTOBER 15 THROUGH APRIL 15). REFER TO THE LOW RISK SITE HANDBOOK FOR GUIDANCE.

#### **1.4.10 STABILIZE SOIL AT FINAL GRADE**

EXPOSED SOIL MUST BE STABILIZED WITHIN 48 HOURS OF REACHING FINAL GRADE. SEEDING AND MULCHING SHALL BE USED TO STABILIZE SOIL. SEE THE EROSION CONTROL DETAILS FOR SEED TYPES AND APPLICATION RATES.

SEED, MULCH, FERTILIZER AND LIME SHALL BE USED TO ESTABLISH PERMANENT VEGETATION. FOR SLOPES STEEPER THAN 1:3, BIODEGRADABLE EROSION CONTROL MATTING OR AN EQUIVALENT SHALL BE USED INSTEAD OF MULCH.

#### **1.4.11 DE-WATERING ACTIVITIES**

DISCHARGE FROM DEWATERING ACTIVITIES THAT FLOWS OFF OF THE CONSTRUCTION SITE MUST NOT CAUSE OR CONTRIBUTE TO A VIOLATION OF THE VERMONT WATER QUALITY STANDARDS.

TREATMENT OF DEWATERING COFFERDAM IS NOT ANTICIPATED ON THIS PROJECT.

#### **1.4.12 INSPECT YOUR SITE**

INSPECT THE PROJECT SITE BASED ON SPECIAL PROVISION REQUIREMENTS OR AFTER ANY RAINFALL EVENT THAT RESULTS IN DISCHARGE FROM THE SITE.

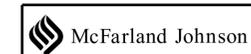
### **1.5 SEQUENCE AND STAGING**

THIS SECTION WILL BE DEVELOPED BY THE CONTRACTOR USING THE GUIDANCE OUTLINED IN THE VTRANS EPSC PLAN CONTRACTOR CHECKLIST.

#### **1.5.1 CONSTRUCTION SEQUENCE**

#### **1.5.2 OFF-SITE ACTIVITIES**

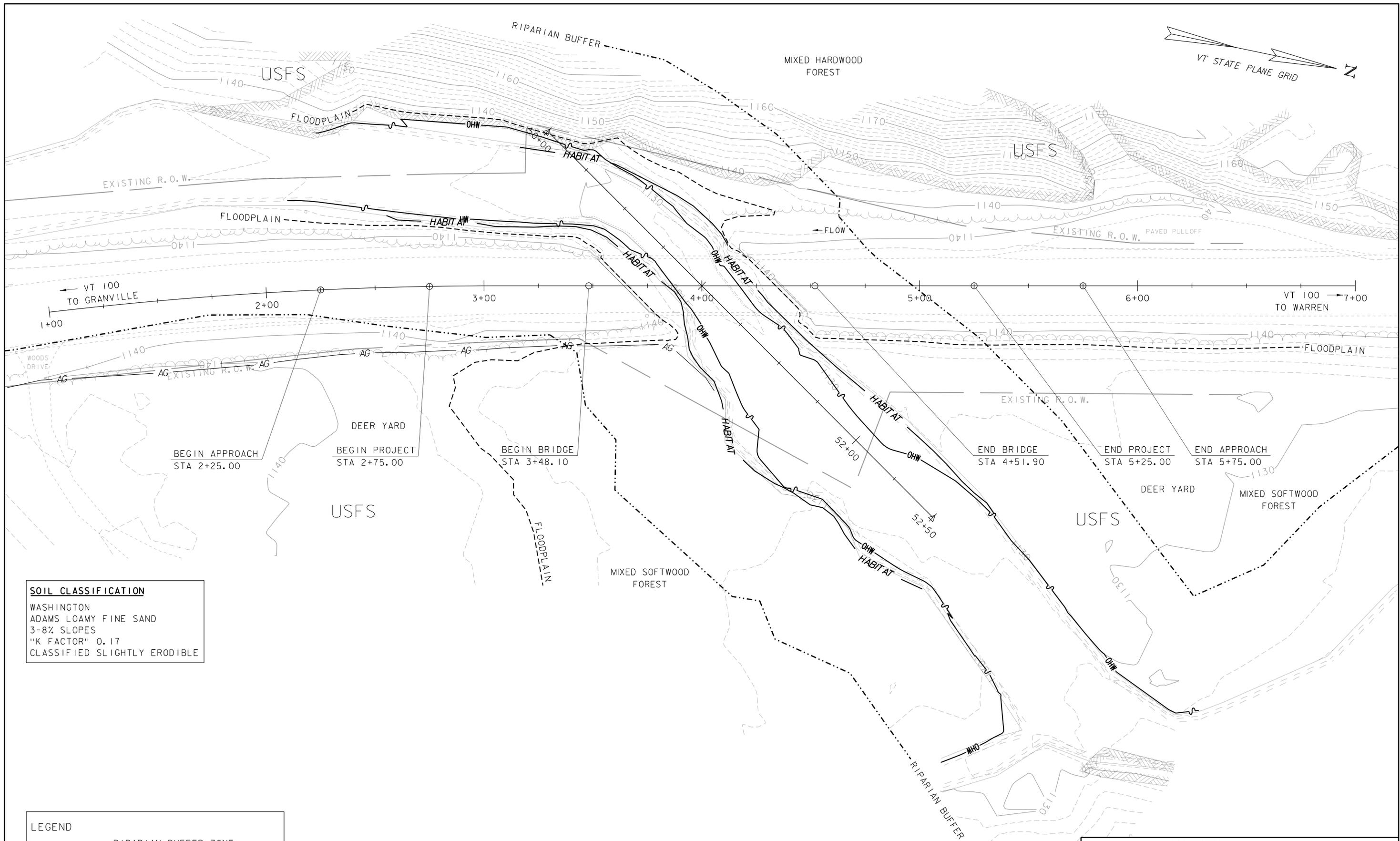
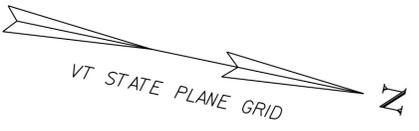
IN ADDITION TO THE CONTRACTOR CHECKLIST ANY ACTIVITIES OUTSIDE THE CONSTRUCTION LIMITS SHALL FOLLOW SUBSECTIONS 105.25- 105.29 OF THE STANDARD SPECIFICATIONS FOR CONSTRUCTION.



PROJECT NAME: WARREN  
PROJECT NUMBER: BRP 013-4(32)

FILE NAME: z10b424ero\_nar.dgn  
PROJECT LEADER: R. YOUNG  
DESIGNED BY: J. SANTACRUCI  
EPSC PLAN NARRATIVE

PLOT DATE: 03-OCT-2013  
DRAWN BY: J. SANTACRUCI  
CHECKED BY: T. KENDRICK  
SHEET 37 OF 42

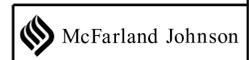


**SOIL CLASSIFICATION**  
 WASHINGTON  
 ADAMS LOAMY FINE SAND  
 3-8% SLOPES  
 "K FACTOR" 0.17  
 CLASSIFIED SLIGHTLY ERODIBLE

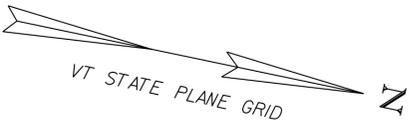
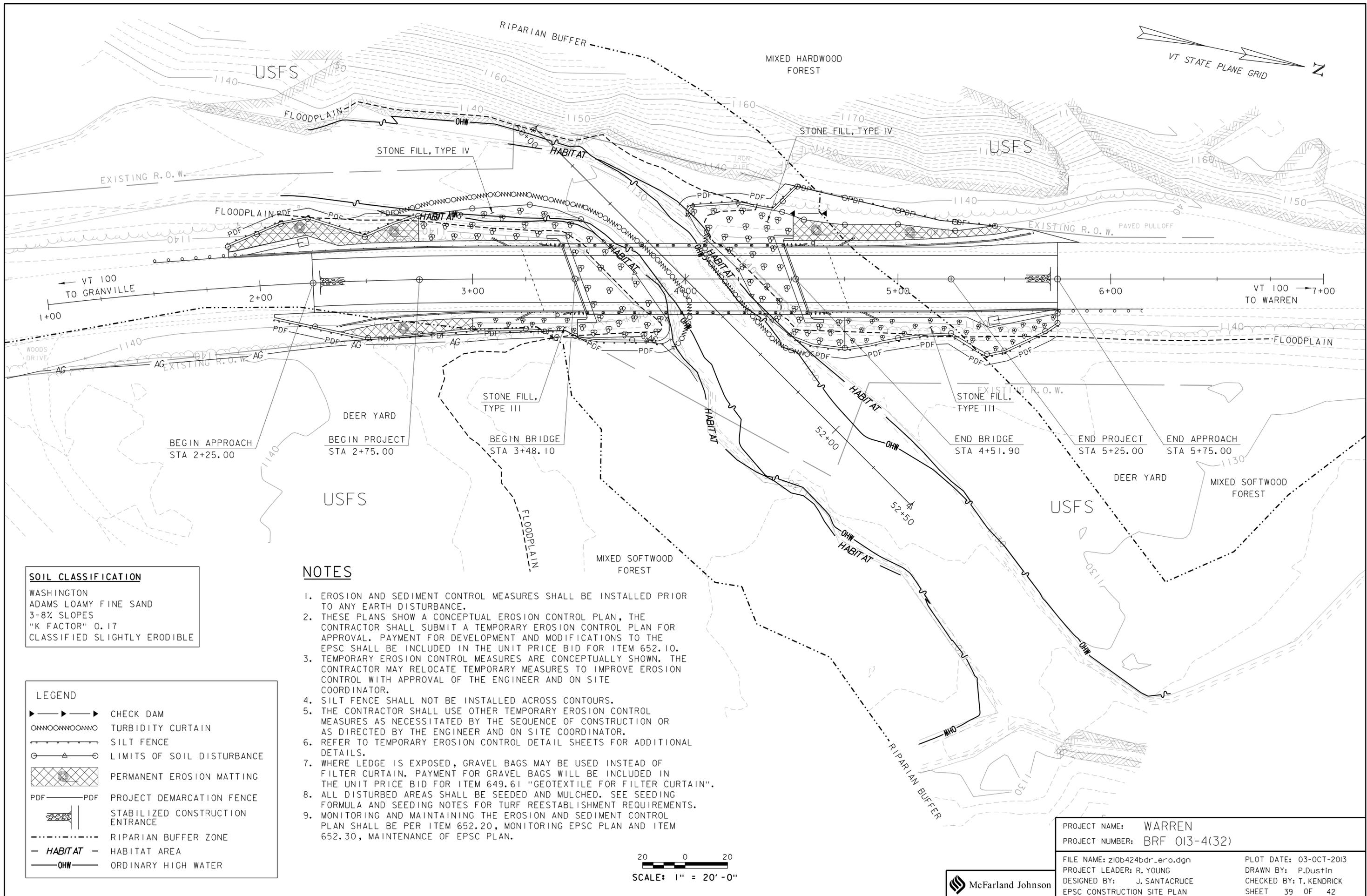
**LEGEND**

- RIPARIAN BUFFER ZONE
- FLOODPLAIN
- HABITAT - HABITAT AREA
- OHW — ORDINARY HIGH WATER

20 0 20  
 SCALE: 1" = 20'-0"



PROJECT NAME: WARREN  
 PROJECT NUMBER: BRP 013-4(32 101/100)  
 FILE NAME: z10b424bdr\_ero.dgn  
 PROJECT LEADER: R. YOUNG  
 DESIGNED BY: J. SANTACRUCE  
 EPSC EXISTING CONDITIONS SITE PLAN  
 PLOT DATE: 03-OCT-2013  
 DRAWN BY: P.DUSTIN  
 CHECKED BY: T. KENDRICK  
 SHEET 38 OF 42

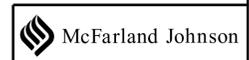
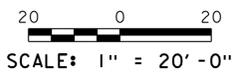


**SOIL CLASSIFICATION**  
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 ADAMS LOAMY FINE SAND  
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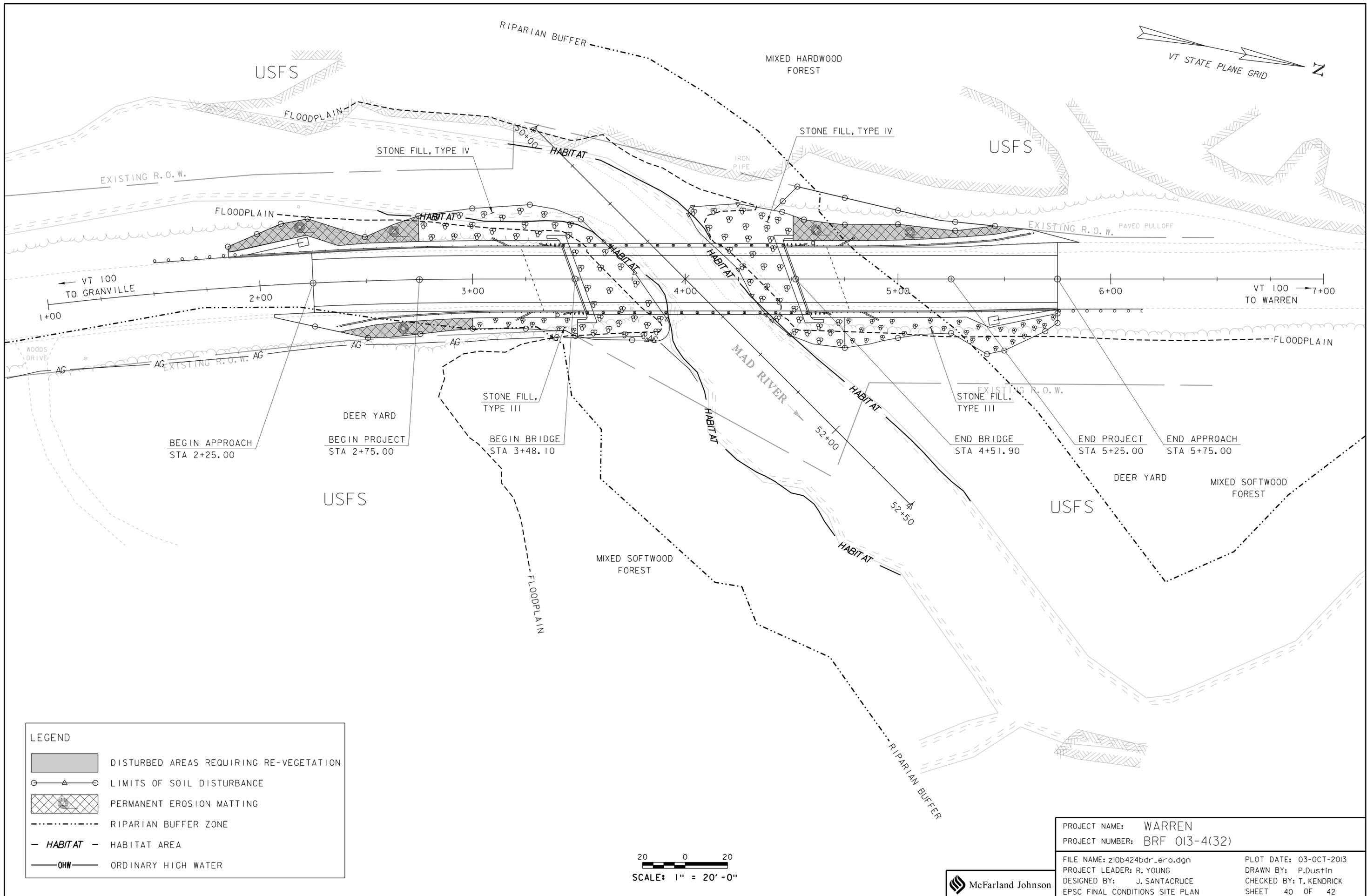
LEGEND	
	CHECK DAM
	TURBIDITY CURTAIN
	SILT FENCE
	LIMITS OF SOIL DISTURBANCE
	PERMANENT EROSION MATTING
	PROJECT DEMARCATION FENCE
	STABILIZED CONSTRUCTION ENTRANCE
	RIPARIAN BUFFER ZONE
	HABITAT AREA
	ORDINARY HIGH WATER

**NOTES**

1. EROSION AND SEDIMENT CONTROL MEASURES SHALL BE INSTALLED PRIOR TO ANY EARTH DISTURBANCE.
2. THESE PLANS SHOW A CONCEPTUAL EROSION CONTROL PLAN, THE CONTRACTOR SHALL SUBMIT A TEMPORARY EROSION CONTROL PLAN FOR APPROVAL. PAYMENT FOR DEVELOPMENT AND MODIFICATIONS TO THE EPSC SHALL BE INCLUDED IN THE UNIT PRICE BID FOR ITEM 652.10.
3. TEMPORARY EROSION CONTROL MEASURES ARE CONCEPTUALLY SHOWN. THE CONTRACTOR MAY RELOCATE TEMPORARY MEASURES TO IMPROVE EROSION CONTROL WITH APPROVAL OF THE ENGINEER AND ON SITE COORDINATOR.
4. SILT FENCE SHALL NOT BE INSTALLED ACROSS CONTOURS.
5. THE CONTRACTOR SHALL USE OTHER TEMPORARY EROSION CONTROL MEASURES AS NECESSITATED BY THE SEQUENCE OF CONSTRUCTION OR AS DIRECTED BY THE ENGINEER AND ON SITE COORDINATOR.
6. REFER TO TEMPORARY EROSION CONTROL DETAIL SHEETS FOR ADDITIONAL DETAILS.
7. WHERE LEDGE IS EXPOSED, GRAVEL BAGS MAY BE USED INSTEAD OF FILTER CURTAIN. PAYMENT FOR GRAVEL BAGS WILL BE INCLUDED IN THE UNIT PRICE BID FOR ITEM 649.61 "GEOTEXTILE FOR FILTER CURTAIN".
8. ALL DISTURBED AREAS SHALL BE SEEDED AND MULCHED. SEE SEEDING FORMULA AND SEEDING NOTES FOR TURF REESTABLISHMENT REQUIREMENTS.
9. MONITORING AND MAINTAINING THE EROSION AND SEDIMENT CONTROL PLAN SHALL BE PER ITEM 652.20, MONITORING EPSC PLAN AND ITEM 652.30, MAINTENANCE OF EPSC PLAN.

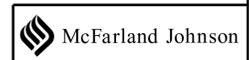


PROJECT NAME: WARREN	PROJECT NUMBER: BRF 013-4(32)
FILE NAME: z10b424bdr_ero.dgn	PLOT DATE: 03-OCT-2013
PROJECT LEADER: R. YOUNG	DRAWN BY: P.Dustin
DESIGNED BY: J. SANTACRUCE	CHECKED BY: T. KENDRICK
EPSC CONSTRUCTION SITE PLAN	SHEET 39 OF 42

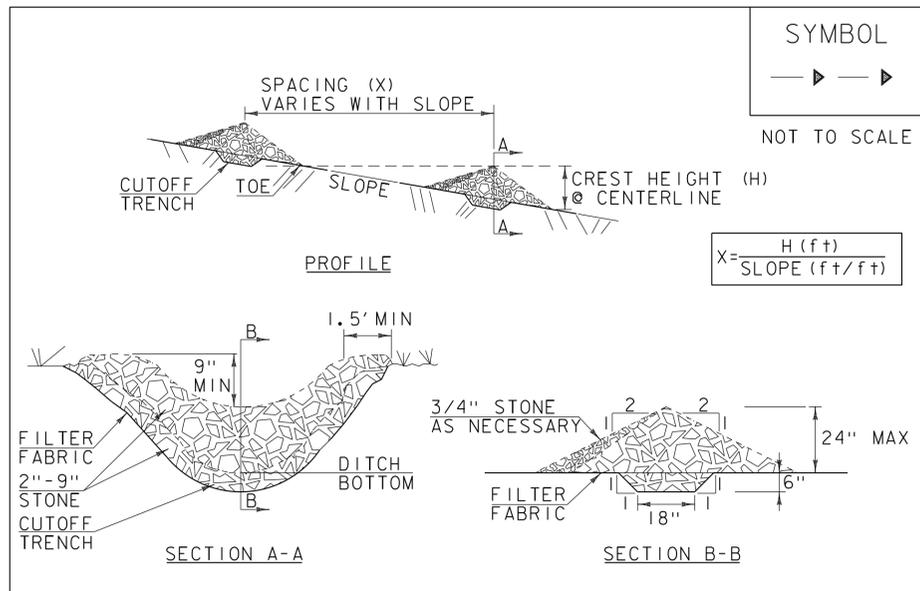


**LEGEND**

	DISTURBED AREAS REQUIRING RE-VEGETATION
	LIMITS OF SOIL DISTURBANCE
	PERMANENT EROSION MATTING
	RIPARIAN BUFFER ZONE
	HABITAT AREA
	ORDINARY HIGH WATER



PROJECT NAME: WARREN	PLLOT DATE: 03-OCT-2013
PROJECT NUMBER: BRF 013-4(32)	DRAWN BY: P.Dustin
FILE NAME: z10b424bdr_ero.dgn	CHECKED BY: T. KENDRICK
PROJECT LEADER: R. YOUNG	SHEET 40 OF 42
DESIGNED BY: J. SANTACRUCE	
EPSC FINAL CONDITIONS SITE PLAN	



SYMBOL  
 —▶▶  
 NOT TO SCALE

$$X = \frac{H(f+1)}{\text{SLOPE}(f+1/f)}$$

**CONSTRUCTION SPECIFICATIONS**

1. STONE WILL BE PLACED ON A FILTER FABRIC FOUNDATION.
2. CHECK DAMS SHALL BE SPACED SO THAT THE ELEVATION OF THE CREST OF THE DOWNSTREAM DAM IS AT THE SAME ELEVATION AS THE TOE OF THE UPSTREAM DAM.
3. 3/4" FILTERING STONE MAY BE ADDED TO THE FACE OF THE CHECK DAM AS NECESSARY.
4. EXTEND THE STONE A MINIMUM OF 1.5' BEYOND THE DITCH BANKS TO PREVENT CUTTING AROUND THE DAM.
5. PROTECT CHANNEL DOWNSTREAM OF THE LOWEST CHECK DAM FROM SCOUR AND EROSION WITH STONE OR LINER AS APPROPRIATE.
6. ENSURE THAT CHANNEL APPURTENANCES SUCH AS CULVERT ENTRANCES BELOW CHECK DAMS ARE NOT SUBJECT TO DAMAGE OR BLOCKAGE FROM DISPLACED STONE.
7. MAXIMUM DRAINAGE AREA 2 ACRES.

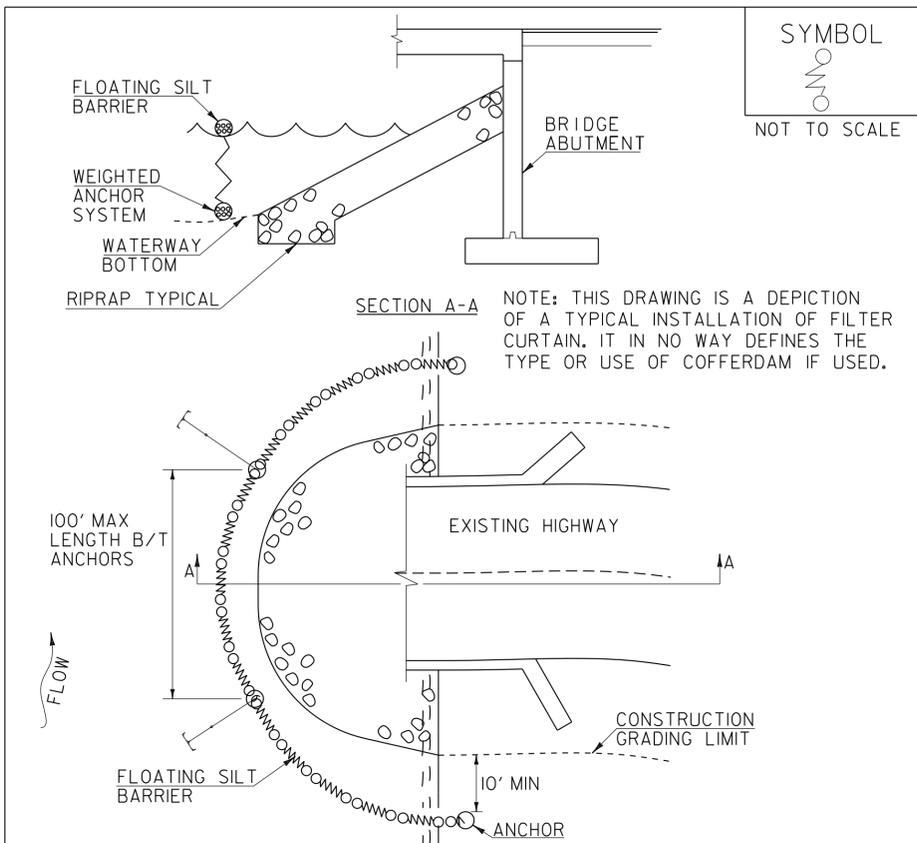
ADAPTED FROM DETAILS PROVIDED BY: NEW YORK STATE DEC  
 ORIGINALLY DEVELOPED BY USDA-NRCS  
 VERMONT DEPARTMENT OF ENVIRONMENTAL CONSERVATION

**CHECK DAM**

NOTES:  
 REFER TO "THE VERMONT STANDARDS & SPECIFICATIONS FOR EROSION PREVENTION & SEDIMENT CONTROL -2006-" FROM THE VT AGENCY OF NATURAL RESOURCES FOR ADDITIONAL GUIDANCE.

THIS WORK SHALL BE PERFORMED IN ACCORDANCE WITH SECTION 653 FOR TEMPORARY STONE CHECK DAM, TYPE 1 (PAY ITEM 653.25)

REVISIONS	
MARCH 21, 2008	WHF
JANUARY 8, 2009	WHF



SYMBOL  
  
 NOT TO SCALE

**CONSTRUCTION SPECIFICATIONS**

1. FILTER CURTAIN SHALL NOT BE PLACED ACROSS A FLOWING WATERWAY, OR IN A WATERWAY WITH STREAM VELOCITIES GREATER THAN 1.5 FEET/SECOND.
2. MAXIMUM 100' LENGTH BETWEEN ANCHORS.
3. LAST SECTION SHALL TERMINATE A MINIMUM OF 10' BEYOND LIMIT OF DISTURBANCE.
4. THE WEIGHTED ANCHOR SYSTEM SHALL BE A TYPE WHICH ALLOWS THE CURTAIN TO CONFORM TO THE BOTTOM OF THE WATERWAY.
5. THE CURTAIN SHALL BE REMOVED BY SLOWLY PULLING TOWARD THE SHORE MINIMIZING THE ESCAPE OF SEDIMENTS INTO WATERWAY.

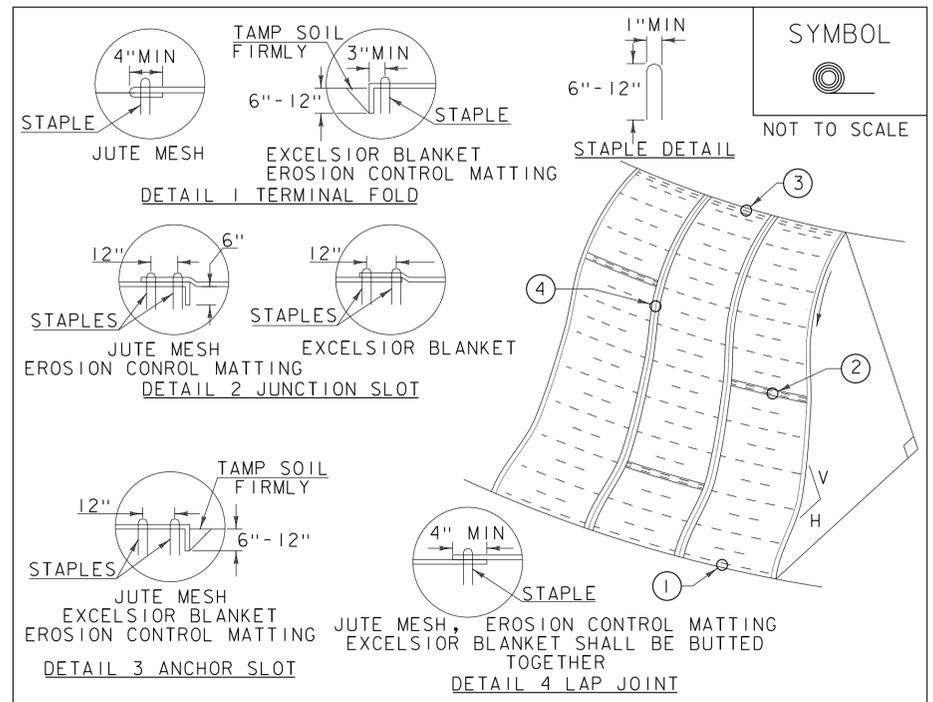
ADAPTED FROM DETAILS PROVIDED BY: NEW YORK STATE DEC  
 ORIGINALLY DEVELOPED BY USDA-NRCS  
 VERMONT DEPARTMENT OF ENVIRONMENTAL CONSERVATION

**FILTER CURTAIN**

NOTES:  
 REFER TO "THE VERMONT STANDARDS & SPECIFICATIONS FOR EROSION PREVENTION & SEDIMENT CONTROL -2006-" FROM THE VT AGENCY OF NATURAL RESOURCES FOR ADDITIONAL GUIDANCE.

THIS WORK SHALL BE PERFORMED IN ACCORDANCE WITH SECTION 649 FOR GEOTEXTILE FOR FILTER CURTAIN (PAY ITEM 649.6).

REVISIONS	
APRIL 1, 2008	WHF
JANUARY 13, 2009	WHF
SEPTEMBER 4, 2009	WHF



SYMBOL  
  
 NOT TO SCALE

**CONSTRUCTION SPECIFICATIONS**

1. APPLY TO SLOPES GREATER THAN 3H:1V OR WHERE NECESSARY TO AID IN ESTABLISHING VEGETATION.
2. APPLY FERTILIZER, LIME SEED PRIOR TO PLACING MATTING.
3. STAPLES ARE TO BE PLACED ALTERNATELY, IN COLUMNS APPROXIMATELY 2' APART AND IN ROWS APPROXIMATELY 3' APART. APPROXIMATELY 175 STAPLES ARE REQUIRED PER 4' X 225' ROLL OF MATERIAL AND 125 STAPLES ARE REQUIRED PER 4' X 150' ROLL OF MATERIAL.
4. DISTURBED AREAS SHALL BE SMOOTHLY GRADED. EROSION CONTROL MATERIAL SHALL BE PLACED LOOSELY OVER GROUND SURFACE. DO NOT STRETCH.
5. ALL TERMINAL ENDS AND TRANSVERSE LAPS SHALL BE STAPLED AT APPROXIMATELY 12" INTERVALS.

ADAPTED FROM DETAILS PROVIDED BY: NEW YORK STATE DEC  
 ORIGINALLY DEVELOPED BY USDA-NRCS  
 VERMONT DEPARTMENT OF ENVIRONMENTAL CONSERVATION

**ROLLED EROSION CONTROL PRODUCT (RECP) SIDE SLOPE**

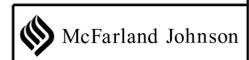
NOTES:  
 REFER TO "THE VERMONT STANDARDS & SPECIFICATIONS FOR EROSION PREVENTION & SEDIMENT CONTROL -2006-" FROM THE VT AGENCY OF NATURAL RESOURCES FOR ADDITIONAL GUIDANCE.  
 THIS WORK SHALL BE PERFORMED IN ACCORDANCE WITH SECTION 653 AND AS SHOWN IN THE PLANS FOR TEMPORARY EROSION MATTING (PAY ITEM 653.20) OR PERMANENT EROSION MATTING (PAY ITEM 653.21).

REVISIONS	
APRIL 16, 2007	JMF
JANUARY 13, 2009	WHF

PROJECT NAME: WARREN  
 PROJECT NUMBER: BR 013-4(32)

FILE NAME: z10b424ero.det  
 PROJECT LEADER: R. YOUNG  
 DESIGNED BY: J. SANTACRUCE  
 EPSC DETAILS SHEET (1 OF 2)

PLOT DATE: 03-OCT-2013  
 DRAWN BY: P. DUSTIN  
 CHECKED BY: T. KENDRICK  
 SHEET 41 OF 42



VAOT RURAL AREA MIX					
% WEIGHT	LBS/AC		NAME	GERM %	PURITY %
	BROADCAST	HYDROSEED			
37.5%	22.5	45	CREEPING RED FESCUE	85%	98%
37.5%	22.5	45	TALL FESCUE	90%	95%
5.0%	3	6	RED TOP	90%	95%
15.0%	9	18	BIRDSFOOT TREFOIL	85%	98%
5.0%	3	6	ANNUAL RYE GRASS	85%	95%
100%	60	120			

VAOT URBAN AREA MIX					
% WEIGHT	LBS/AC		NAME	GERM %	PURITY %
	BROADCAST	HYDROSEED			
42.5%	34	68	CREEPING RED FESCUE	85%	98%
10.0%	8	16	PERENNIAL RYE GRASS	90%	95%
42.5%	34	68	KENTUCKY BLUE GRASS	85%	85%
5.0%	4	8	ANNUAL RYE GRASS	85%	95%
100%	80	160			

SOIL AMENDMENT GUIDANCE			
FERTILIZER		LIME	
BROADCAST	HYDROSEED	BROADCAST	HYDROSEED
10-20-10	FOLLOW	PELLETIZED	FOLLOW
500 LBS/AC	MANUFACTURER	2 TONS/AC	MANUFACTURER

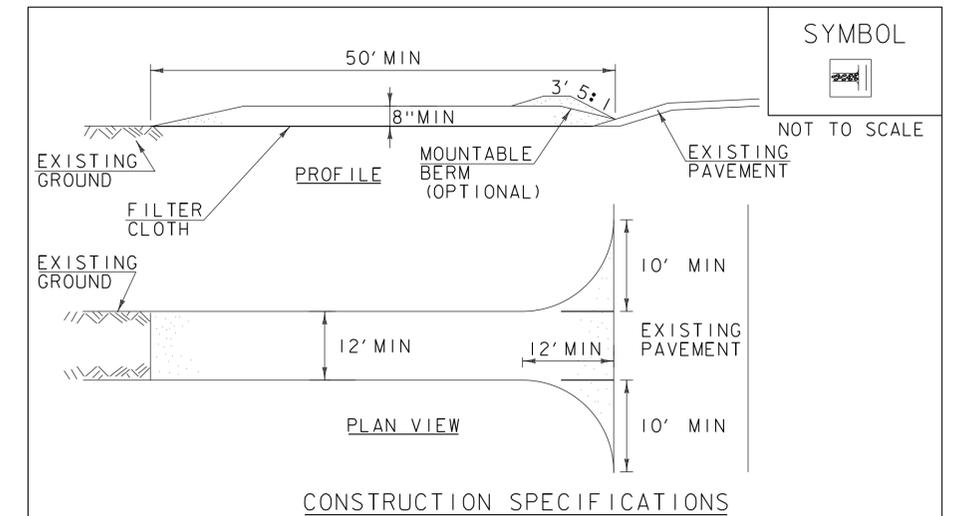
**CONSTRUCTION GUIDANCE**

1. RURAL SEED MIX: USE AS INDICATED IN THE PLANS AND/OR FOR ALL ESTABLISHED UPLAND (NON WETLAND) AREAS DISTURBED BY THE CONTRACTOR.
2. URBAN SEED MIX: USE AS INDICATED IN THE PLANS AND/OR FOR ALL ESTABLISHED LAWN AREAS DISTURBED BY THE CONTRACTOR.
3. ALL SEED MIXTURES: SHALL NOT HAVE A WEED CONTENT EXCEEDING 0.40% BY WEIGHT AND SHALL BE FREE OF ALL NOXIOUS SEED.
4. FERTILIZER AND LIMESTONE: SHALL FOLLOW RATES SHOWN ON PLAN OR AS DIRECTED BY THE ENGINEER
5. HAY MULCH: TO BE PLACED ON EARTH SLOPES AT THE RATE OF 2 TONS/ACRE, ACHIEVE 90% GROUND COVER OR AS DIRECTED BY THE ENGINEER.
6. TOPSOIL: TO BE USED WITH SEED AS INDICATED ON THE PLANS, OR AS DIRECTED BY THE ENGINEER.
7. HYDROSEEDING: ALTHOUGH GUIDANCE IS GIVEN ABOVE THE SITE CONDITIONS AND THE TYPE OF HYDROSEED WILL ULTIMATELY DICTATE THE AMOUNTS AND TYPES OF SOIL AMENDMENTS TO BE APPLIED
8. TURF ESTABLISHMENT: PLACING SEED, FERTILIZER, LIME AND MULCH PRIOR TO SEPTEMBER 15 AND AFTER APRIL 15 CAN BETTER ENSURE A VIGOROUS GROWTH OF GRASS.

ADAPTED FROM VTRANS TECHNICAL LANDSCAPE MANUAL FOR ROADWAYS AND TRANSPORTATION FACILITIES

**TURF ESTABLISHMENT**

REVISIONS		
JUNE 23, 2009	WHF	
JANUARY 15, 2010	WHF	
FEBRUARY 16, 2011	WHF	



- CONSTRUCTION SPECIFICATIONS**
1. STONE SIZE- USE 1-4" STONE, RECLAIMED OR RECYCLED CONCRETE EQUIVALENT.
  2. LENGTH- NOT LESS THAN 50' (EXCEPT ON A SINGLE RESIDENCE LOT WHERE A 30' MINIMUM LENGTH APPLIES).
  3. THICKNESS- NOT LESS THAN 8".
  4. WIDTH- 12' MINIMUM, BUT NOT LESS THAN THE FULL WIDTH AT POINTS WHERE INGRESS OR EGRESS OCCURS. 24' IF SINGLE ENTRANCE TO SITE.
  5. GEOTEXTILE MUST BE PLACED OVER THE ENTIRE AREA PRIOR TO PLACING STONE.
  6. SURFACE WATER- ALL SURFACE WATER FLOWING OR DIVERTED TOWARD CONSTRUCTION ENTRANCES SHALL BE PIPED BENEATH THE ENTRANCE. IF PIPING IS IMPRACTICAL, A MOUNTABLE BERM WITH 5:1 SLOPES WILL BE PERMITTED.
  7. MAINTENANCE- THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHTS-OF-WAY, ALL SEDIMENT SPILLED, DROPPED, WASHED OR TRACKED ONTO PUBLIC RIGHTS-OF-WAY MUST BE REMOVED IMMEDIATELY.
  8. WHEN WASHING IS REQUIRED, IT SHALL BE DONE ON AN AREA STABILIZED WITH STONE AND WHICH DRAINS INTO AN APPROVED SEDIMENT TRAPPING DEVICE.
  9. PERIODIC INSPECTION AND NEEDED MAINTENANCE SHALL BE PROVIDED ACCORDING TO PERMIT REQUIREMENTS.

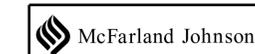
ADAPTED FROM DETAILS PROVIDED BY: NEW YORK STATE DEC  
ORIGINALLY DEVELOPED BY USDA-NRCS  
VERMONT DEPARTMENT OF ENVIRONMENTAL CONSERVATION

**STABILIZED CONSTRUCTION ENTRANCE**

NOTES:  
REFER TO "THE VERMONT STANDARDS & SPECIFICATIONS FOR EROSION PREVENTION & SEDIMENT CONTROL -2006-" FROM THE VT AGENCY OF NATURAL RESOURCES FOR ADDITIONAL GUIDANCE.

THIS WORK SHALL BE PERFORMED IN ACCORDANCE WITH SECTION 653 FOR VEHICLE TRACKING PAD (PAY ITEM 653.35) OR AS SPECIFIED IN THE CONTRACT.

REVISIONS		
MARCH 24, 2008	WHF	
JANUARY 13, 2009	WHF	



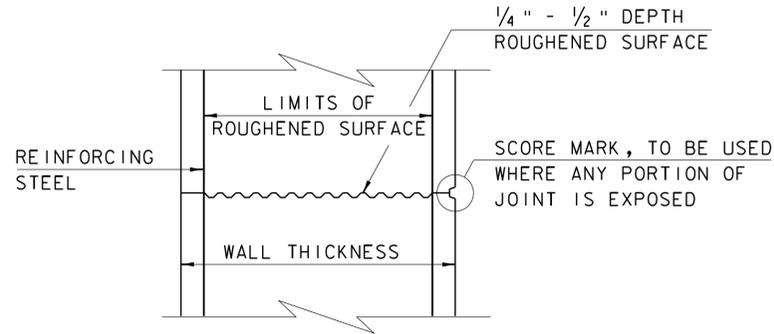
**PROJECT NAME:** WARREN  
**PROJECT NUMBER:** BRF 013-4(32)

**FILE NAME:** z10b424ero.det  
**PROJECT LEADER:** R. YOUNG  
**DESIGNED BY:** J. SANTCRUCE  
EPSC DETAILS SHEET (2 OF 2)

**PLOT DATE:** 03-OCT-2013  
**DRAWN BY:** P. DUSTIN  
**CHECKED BY:** T. KENDRICK  
**SHEET** 42 **OF** 42

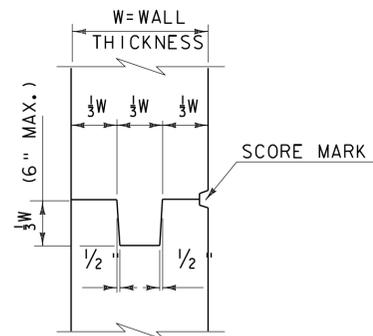
**CONCRETE GENERAL NOTES**

- ALL EXPOSED EDGES OF CONCRETE SHALL BE CHAMFERED 1" x 1"

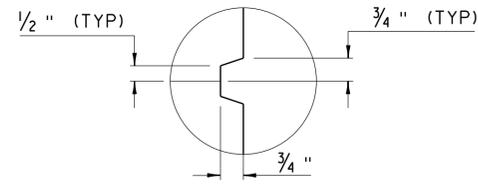


**TYPICAL HORIZONTAL CONSTRUCTION JOINT**  
(NOT TO SCALE)

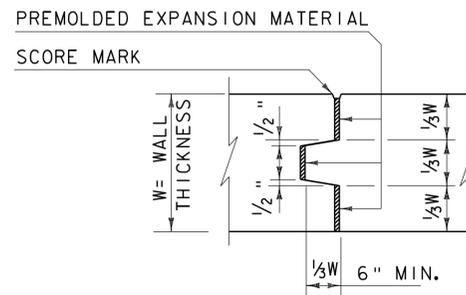
- THE SURFACE OF THE CONCRETE CONSTRUCTION JOINTS SHALL BE CLEANED AND FREE OF LAITANCE.
- IMMEDIATELY BEFORE NEW CONCRETE IS PLACED, ALL CONSTRUCTION JOINTS SHALL BE WETTED AND STANDING WATER REMOVED.



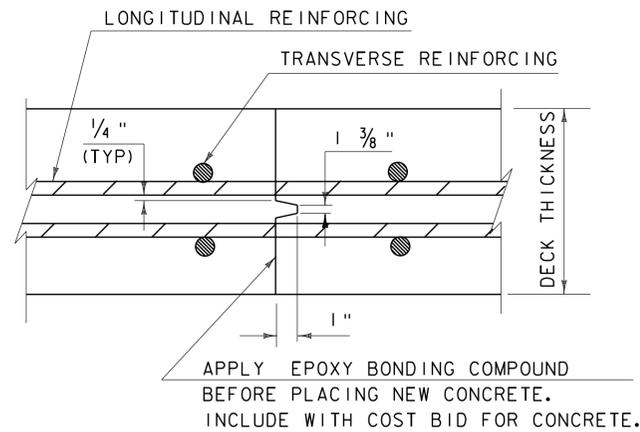
**TYPICAL CONCRETE CONSTRUCTION JOINT**  
(NOT TO SCALE)



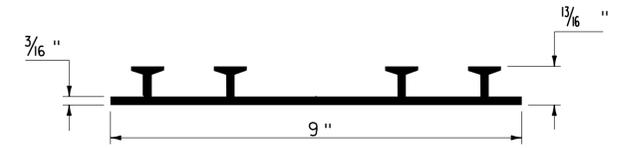
**SCORE MARK DETAIL**  
(NOT TO SCALE)



**TYPICAL CONCRETE EXPANSION JOINT**  
(NOT TO SCALE)



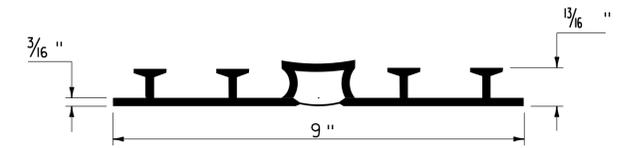
**TRANSVERSE BRIDGE SLAB CONSTRUCTION JOINT DETAILS**  
(NOT TO SCALE)



**P.V.C. WATERSTOP FOR CONSTRUCTION JOINTS**  
(NOT TO SCALE)

PAYMENT FOR THE P.V.C. WATERSTOP SHALL BE INCIDENTAL TO THE UNIT BID PRICE FOR THE ADJACENT CONCRETE.

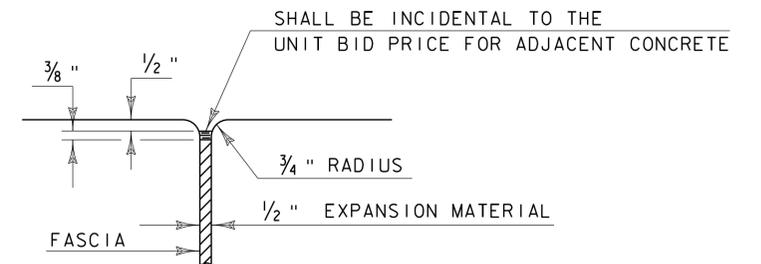
OTHER CONFIGURATIONS OF WATERSTOP MAY BE USED UPON APPROVAL OF THE ENGINEER.



**P.V.C. WATERSTOP FOR EXPANSION JOINTS**  
(NOT TO SCALE)

PAYMENT FOR THE P.V.C. WATERSTOP SHALL BE INCIDENTAL TO THE UNIT BID PRICE FOR THE ADJACENT CONCRETE.

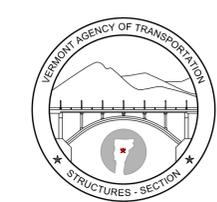
OTHER CONFIGURATIONS OF WATERSTOP MAY BE USED UPON APPROVAL OF THE ENGINEER.



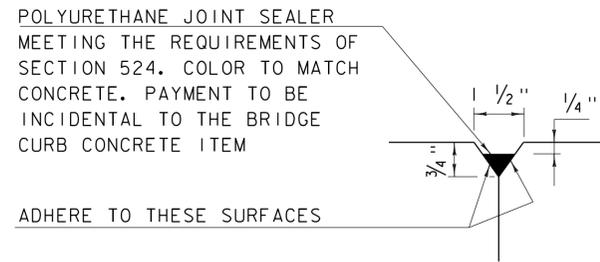
**JOINT BETWEEN FASCIA AND WINGWALL**  
(NOT TO SCALE)

REVISIONS	
MAY 7, 2010	APPROVED FOR USE BY VAOT STRUCTURES SECTION

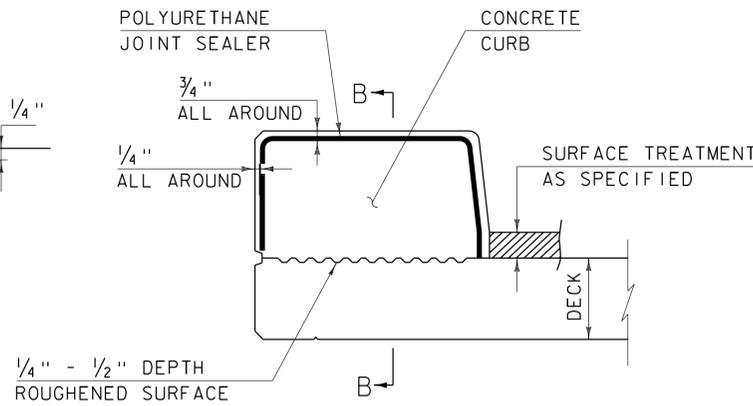
**CONCRETE  
DETAILS AND NOTES**



**STRUCTURES  
DETAIL  
SD-5 01.00**

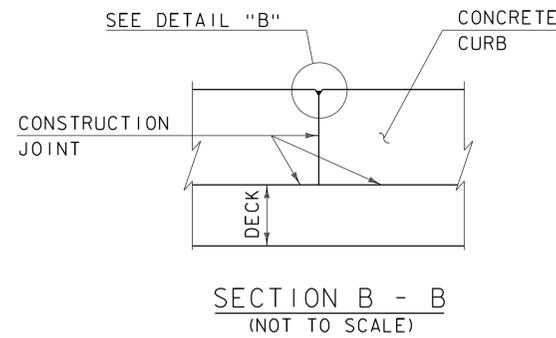


DETAIL "B"  
(NOT TO SCALE)

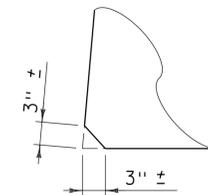


CONCRETE CURB JOINT SECTION  
(NOT TO SCALE)

1. SEE TYPICAL HORIZONTAL CONSTRUCTION JOINT DETAIL FOR ADDITIONAL INFORMATION



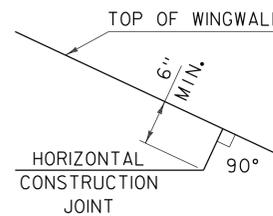
SECTION B - B  
(NOT TO SCALE)



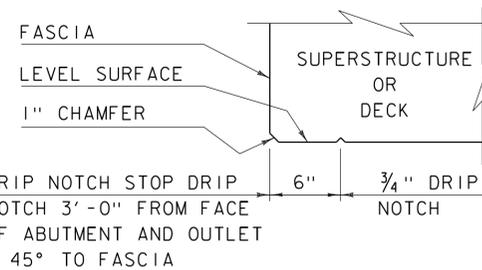
ACUTE ANGLE  
CLIP DETAIL  
(NOT TO SCALE)

CONCRETE CURB JOINT NOTES

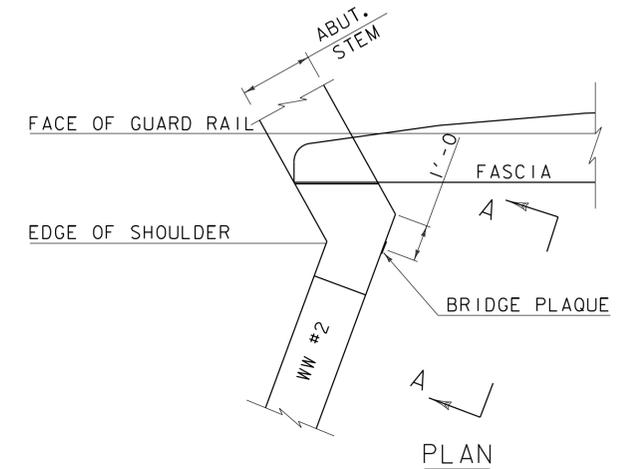
1. CONCRETE CURBS MAY BE PLACED IN ONE CONTINUOUS OPERATION IF AN APPROVED SHRINKAGE REDUCING ADMIXTURE LISTED IN THE SPECIAL PROVISIONS IS USED WITH THE CONCRETE MIX DESIGN. PAYMENT FOR THE SHRINKAGE REDUCING ADMIXTURE WILL BE INCIDENTAL TO THE BRIDGE CURB CONCRETE ITEM.
2. IF THE CONTRACTOR CHOOSES NOT TO USE AN APPROVED SHRINKAGE REDUCING ADMIXTURE, THE CURBS SHALL BE CONSTRUCTED WITH CONSTRUCTION JOINTS SPACED AT A MAXIMUM OF 15'-0" CENTER TO CENTER AND 2'-0" MINIMUM FROM THE CENTER OF NEAREST BRIDGE RAILING POST.
3. ON MULTI-SPAN CONTINUOUS SUPERSTRUCTURES, REGARDLESS OF WHETHER APPROVED SHRINKAGE REDUCING ADMIXTURE IS USED, CURB JOINTS SHALL BE LOCATED OVER THE CENTERLINE OF PIERS AND 7'-0" EACH SIDE OF THE CENTERLINE OF EACH PIER.
4. WHEN CURB JOINTS ARE USED THE CURBS SHALL BE PLACED IN ALTERNATE SECTIONS WITH A MINIMUM OF 48 HOUR DELAY BETWEEN ADJACENT PLACEMENTS.
5. LONGITUDINAL REINFORCING SHALL BE CONTINUOUS THROUGH CURB CONSTRUCTION JOINTS. CURB STIRRUP BARS SHALL BE TURNED AS NECESSARY TO MAINTAIN COVER IN THE FLARED CURB ENDS.
6. THE JOINT SPACING AND DETAILS SHOWN SHALL APPLY TO SIDEWALKS WHEN SHOWN IN THE PLANS.



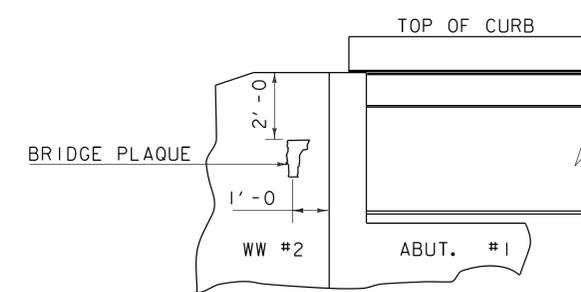
HORIZONTAL WINGWALL  
CONSTRUCTION JOINT  
(NOT TO SCALE)



DRIP NOTCH DETAIL  
(NOT TO SCALE)



PLAN



VIEW "A - A"

BRIDGE PLAQUE  
(NOT TO SCALE)

THE BRIDGE PLAQUE WILL BE SUPPLIED BY THE AGENCY OF TRANSPORTATION AND SHALL BE INSTALLED BY THE CONTRACTOR AT ABUTMENT #1 ON THE RIGHT SIDE AS SHOWN OR AS DIRECTED BY THE ENGINEER.

PAYMENT FOR INSTALLATION OF THE BRIDGE PLAQUE SHALL BE INCIDENTAL TO THE ADJACENT CONCRETE.

REVISIONS

MAY 7, 2010	APPROVED FOR USE BY VAOT STRUCTURES SECTION
JUNE 4, 2010	MODIFIED AND ADDED TWO DETAILS
OCTOBER 10, 2012	MODIFIED HORZ. JOINT WINGWALL ADD 6" MIN. DIMENSION

CONCRETE  
DETAILS AND NOTES



STRUCTURES  
DETAIL  
SD-502.00

ASPHALTIC PLUG JOINT NOTES

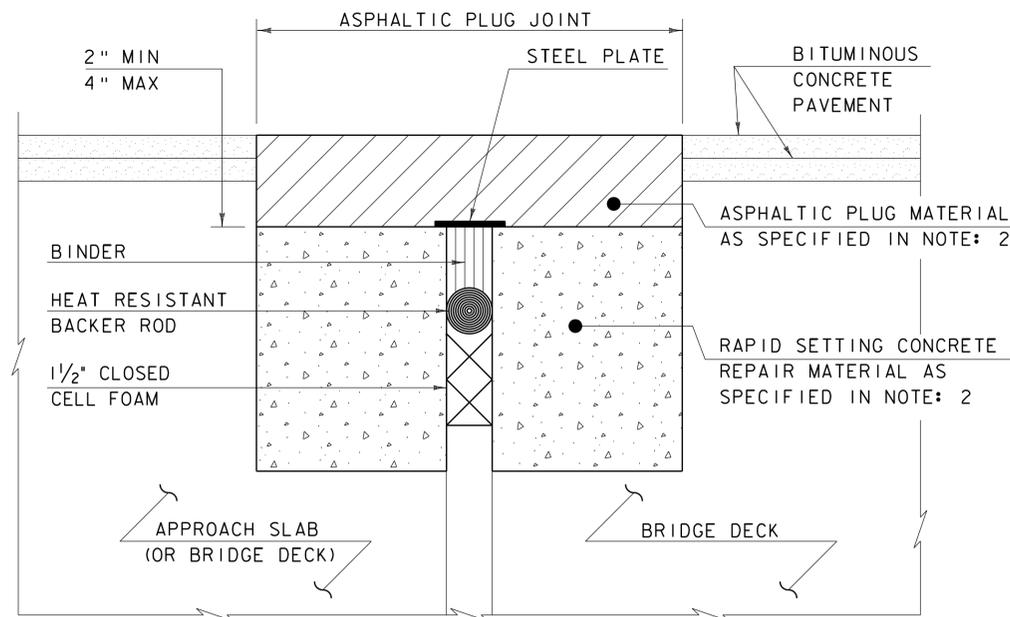
INSTALLATION:

1. LOCATE THE JOINT CENTRALLY OVER THE DECK OVERLAY EXPANSION GAP OR FIXED JOINT, MARKED OUT TO THE MANUFACTURER'S RECOMMENDED WIDTH.
2. REMOVE THE BITUMINOUS CONCRETE PAVEMENT FULL DEPTH AS SHOWN ON THE PLANS. THE PAVEMENT SHALL BE DRY AND SAW CUT TO THE LIMITS REQUIRED TO PLACE THE JOINT. A PNEUMATIC HAMMER AND CHISEL MAY BE USED ADJACENT TO THE CURB ONLY WHEN SAW CUTTING IS NOT POSSIBLE.
3. BLAST CLEAN THE JOINT AREA OF DEBRIS, ASPHALT AND SHEET MEMBRANE. THOROUGHLY DRY THE JOINT AREA WITH COMPRESSED AIR PRIOR TO APPLYING BINDER MATERIAL.
4. REPAIR MATERIAL GREATER THAN 4 INCHES FROM FINISHED GRADE WITH RAPID SETTING CONCRETE REPAIR MATERIAL WITH COARSE AGGREGATE MEETING THE REQUIREMENTS OF SUBSECTION 780.04.
5. PLACE PROPERLY SIZED HEAT RESISTANT BACKER ROD IN THE MOVEMENT GAP ALLOWING FOR 1" +/- OF BINDER ABOVE THE ROD.
6. HEAT AND PLACE THE BINDER MATERIAL AS RECOMMENDED BY THE MANUFACTURER.
7. PLACE 1/4" THICK BY 8" WIDE SECTIONS OF STEEL PLATE OVER THE CENTER OF THE MOVEMENT GAP. SECURE THE PLATES FROM MOVING BY INSERTING LOCATING PINS THROUGH THE PRE-STAMPED HOLES INTO BACKER ROD AND COVER WITH HOT BINDER. THE STEEL PLATES MAY BE OMITTED WHERE THE ENGINEER DETERMINES THAT THE APPROACH SLAB OR BRIDGE DECK WILL PROVIDE INADEQUATE SUPPORT AND WHERE VERTICAL MOVEMENT OF THE PLATES MIGHT OCCUR.
8. HEAT AND MIX THE BINDER MATERIAL AND AGGREGATE AS RECOMMENDED BY THE MANUFACTURER.
9. INSTALLATION OF MATERIAL, COMPACTION, AND TOP COATING SHALL BE AS RECOMMENDED BY THE MANUFACTURER.
10. IMMEDIATELY AFTER TOP COATING, CAST AN ANTI-SKID MATERIAL OVER THE JOINT TO REDUCE THE RISK OF TRACKING.
11. ONCE THE JOINT REACHES 82 DEG C (180 DEG F) +/-, WATER MAY BE USED TO EXPEDITE THE COOLING PROCESS.
12. PROTECT JOINT FROM TRAFFIC UNTIL THE MATERIAL HAS COOLED TO 51 DEG C (125 DEG F) +/-.

WEATHER LIMITATIONS

APPLY BINDER MATERIAL ONLY WHEN THE FOLLOWING CONDITIONS PREVAIL OR AS RECOMMENDED BY THE MANUFACTURER:

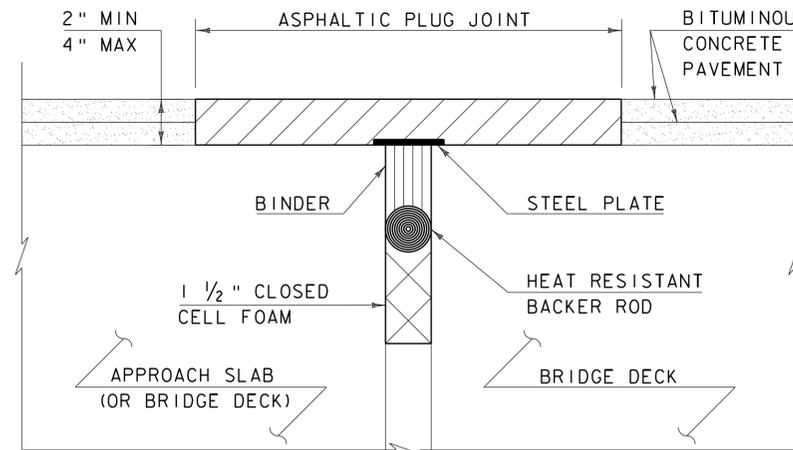
1. THE AMBIENT AIR TEMPERATURE IS AT LEAST 10 DEG C (50 DEG F) AND RISING.
2. THE ROAD SURFACE IS DRY.
3. WEATHER CONDITIONS OR OTHER CONDITIONS ARE FAVORABLE AND ARE EXPECTED TO REMAIN SO FOR THE PERFORMANCE OF SATISFACTORY WORK.



ASPHALTIC PLUG-JOINT DETAIL - REHAB

NOTES: (NOT TO SCALE)

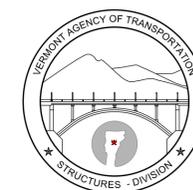
1. THE CONTRACTOR SHALL REMOVE ALL ASPHALTIC PLUG JOINT MATERIAL AND DETERIORATED CONCRETE AS DIRECTED BY THE ENGINEER. REMOVAL OF THE FIRST 4 INCHES OF MATERIAL SHALL BE INCLUDED IN THE BID PRICE FOR ITEM 516.10 BRIDGE EXPANSION JOINT, ASPHALTIC PLUG. ANY REMOVAL OF MATERIAL GREATER THAN 4 INCHES SHALL BE INCLUDED IN THE BID PRICE OF ITEM 580.20 RAPID SETTING CONCRETE REPAIR MATERIAL WITH COARSE AGGREGATE.
2. THE CONTRACTOR SHALL REPLACE REMOVED MATERIAL THAT IS LESS THAN 4" FROM FINISHED GRADE WITH ASPHALTIC PLUG JOINT MATERIAL MEETING THE REQUIREMENTS OF SUBSECTION 707.15. ALL REMOVED MATERIAL THAT IS GREATER THAN 4 INCHES FROM FINISHED GRADE SHALL BE REPLACED WITH RAPID SETTING CONCRETE REPAIR MATERIAL WITH COARSE AGGREGATE MEETING THE REQUIREMENTS OF SUBSECTION 780.04.
3. REINFORCING STEEL NOT SHOWN FOR CLARITY.



ASPHALTIC PLUG-JOINT DETAIL - NEW  
(NOT TO SCALE)

REVISIONS	
MAY 7, 2010	APPROVED FOR USE BY VAOT STRUCTURES SECTION

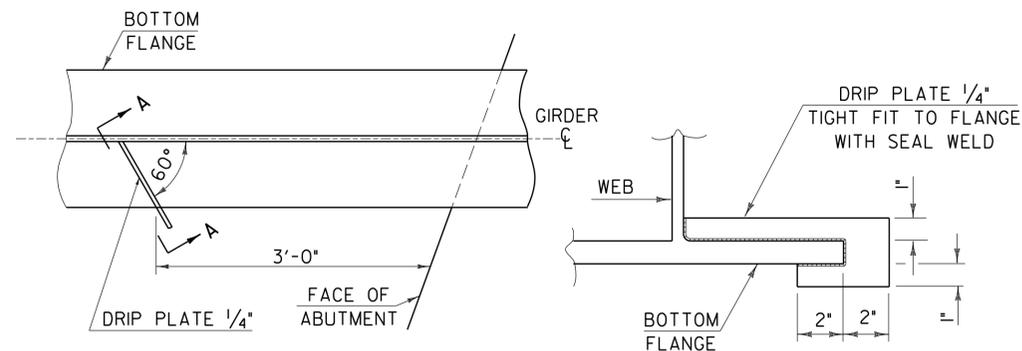
BRIDGE JOINT  
ASPHALTIC PLUG



STRUCTURES  
DETAIL  
SD-516.10

STRUCTURAL STEEL GENERAL NOTES:

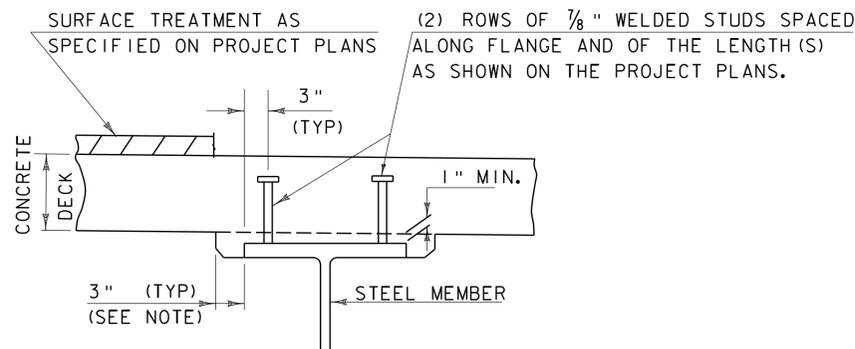
1. ALL FIELD CONNECTIONS SHALL BE MADE WITH 7/8" DIAMETER HIGH-STRENGTH BOLTS IN 15/16" DIAMETER HOLES, PER SUBSECTION 506.I9, UNLESS OTHERWISE SPECIFIED.
2. ALL HOLES IN THE WEBS OF THE FASCIA GIRDERS THAT ARE NOT OTHERWISE FILLED, SHALL BE FILLED WITH EITHER BUTTON HEAD OR HEX HEAD BOLTS. THESE BOLTS SHALL BE TIGHTENED IN ACCORDANCE WITH SUBSECTION 506.I9.
3. ALL WELDING SHALL CONFORM TO THE PROVISIONS OF SUBSECTION 506.I0.
4. ANY CONNECTIONS THAT ARE NOT DETAILED ON THE PLANS SHALL BE DETAILED BY THE FABRICATOR AND SUBMITTED TO THE STRUCTURES ENGINEER FOR APPROVAL.
5. STRUCTURAL STEEL MEMBERS DESIGNATED "CVN" IN THE PLANS SHALL BE CHARPY V-NOTCH TESTED IN ACCORDANCE WITH SUBSECTION 714.01 OF THE STANDARD SPECIFICATIONS.
6. ENDS OF GIRDERS ARE TO BE VERTICAL IN THEIR FINAL POSITION.
7. AFTER SUPERSTRUCTURE STEEL HAS BEEN ERECTED, ELEVATIONS ALONG THE TOP OF THE GIRDERS SHALL BE TAKEN AS DIRECTED BY THE RESIDENT ENGINEER FOR USE IN DETERMINING FINISHED GRADES.



PLAN DRIP PLATE

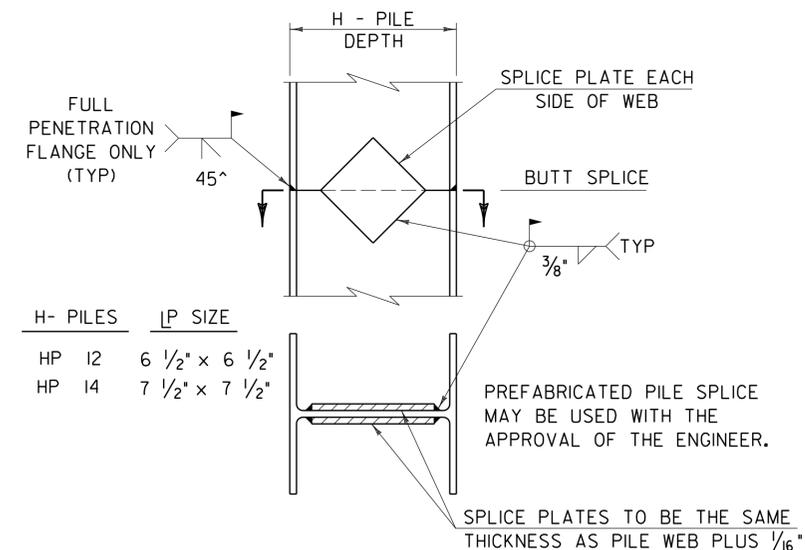
SECTION A - A

NOTE: DRIP PLATES SHALL BE PLACED ON OUTSIDE EDGE OF FASCIA GIRDERS ON THE HIGH SIDE OF ALL PIERS AND ABUTMENTS OR AS INDICATED ON PROJECT PLANS.



NOTE:  
THE 3" HORIZONTAL SECTION MAY BE ELIMINATED FOR FORMING SYSTEMS DESIGNED FOR THE CONSTRUCTION OF VERTICAL HAUNCHES. ANY VOIDS RESULTING FROM FORMING SYSTEM ELEMENTS SHALL BE FILLED WITH JOINT SEALER, POLYURETHANE MEETING THE REQUIREMENTS OF SECTION 524. THE COST OF THE JOINT SEALER, POLYURETHANE SHALL BE INCIDENTAL TO THE ADJACENT CONCRETE.

HAUNCH AND SHEAR CONNECTOR DETAIL

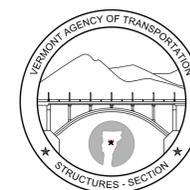


DETAIL OF PILE SPLICE

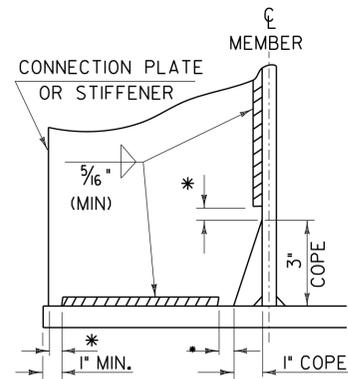
DETAILS ON THIS SHEET ARE "NOT TO SCALE" UNLESS NOTED OTHERWISE.

REVISIONS	
MAY 7, 2010	APPROVED FOR USE BY VAOT STRUCTURES SECTION
JUNE 4, 2010	MODIFIED NOTES

# STRUCTURAL STEEL DETAILS & NOTES

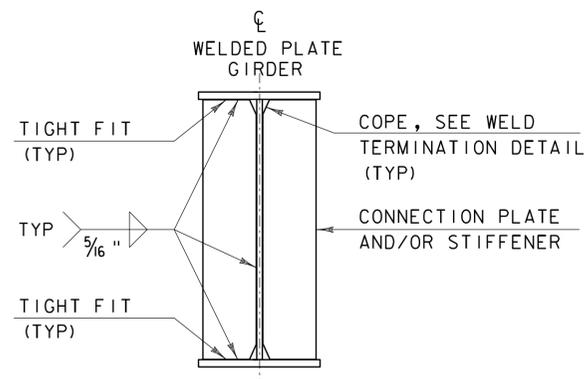


# STRUCTURES DETAIL SD-6 01.00



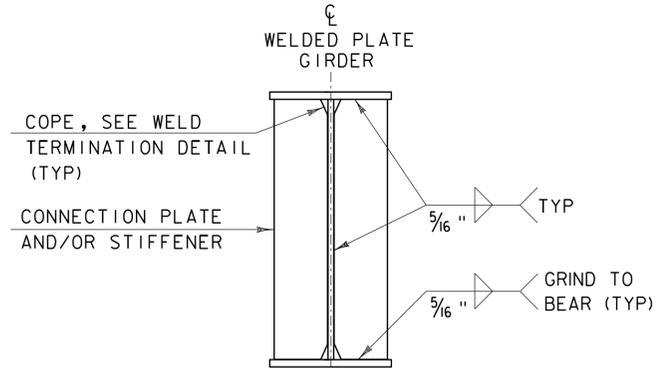
WELD TERMINATION AND COPING DETAILS FOR STEEL MEMBERS

\*NO WELD FOR 3/8" MIN. 7/8" MAX. (EXCEPT MUST MAINTAIN 1" MINIMUM FROM EDGE OF FLANGE)

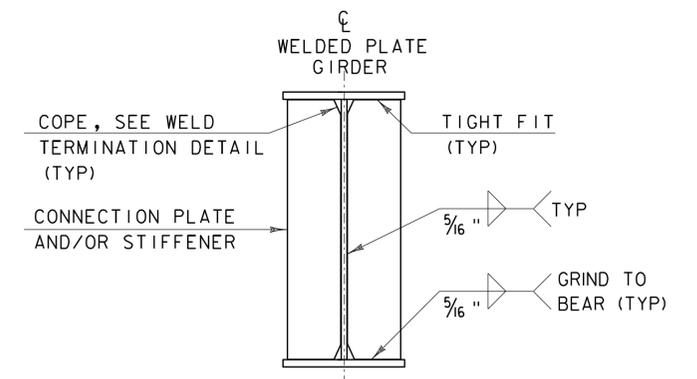


INTERMEDIATE CONNECTION PLATES AND/OR STIFFENERS FOR WELDED PLATE GIRDERS

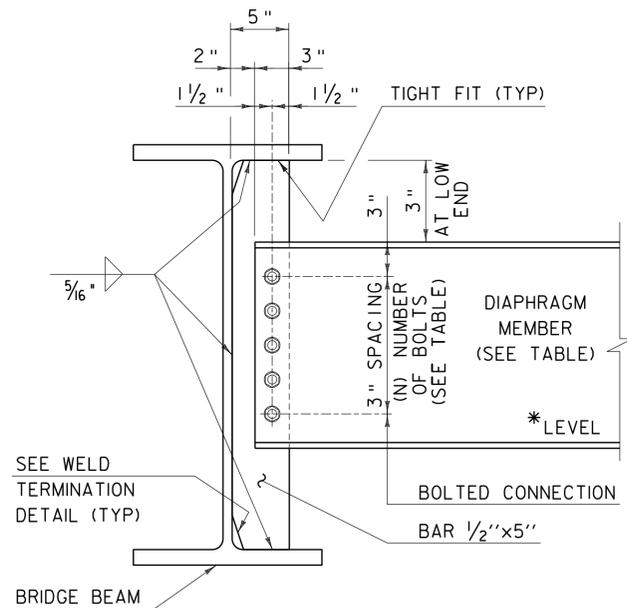
INTERMEDIATE DETAIL IS ONLY USED WHEN PLATE DOES NOT OCCUR AT AN ABUTMENT OR PIER.



ABUTMENT BEARING STIFFENERS AND/OR CONNECTION PLATES FOR WELDED PLATE GIRDERS



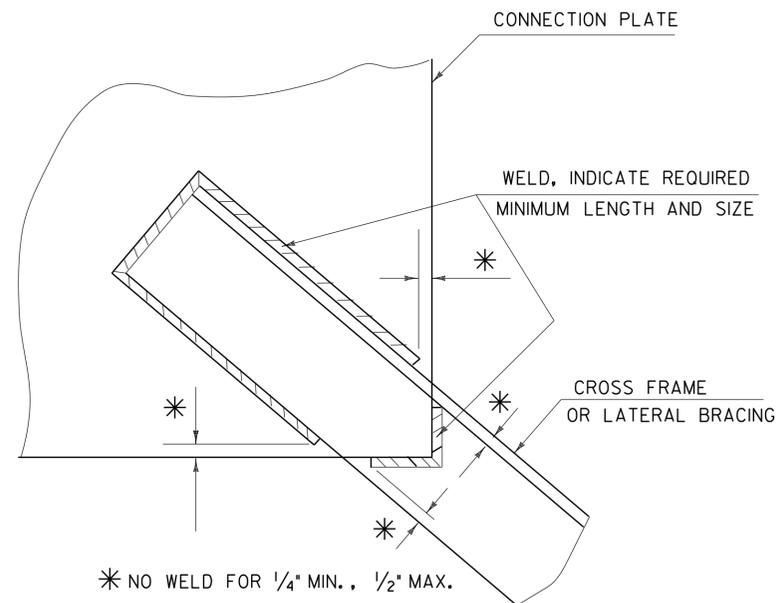
PIER BEARING STIFFENERS AND/OR CONNECTION PLATES FOR WELDED PLATE GIRDERS



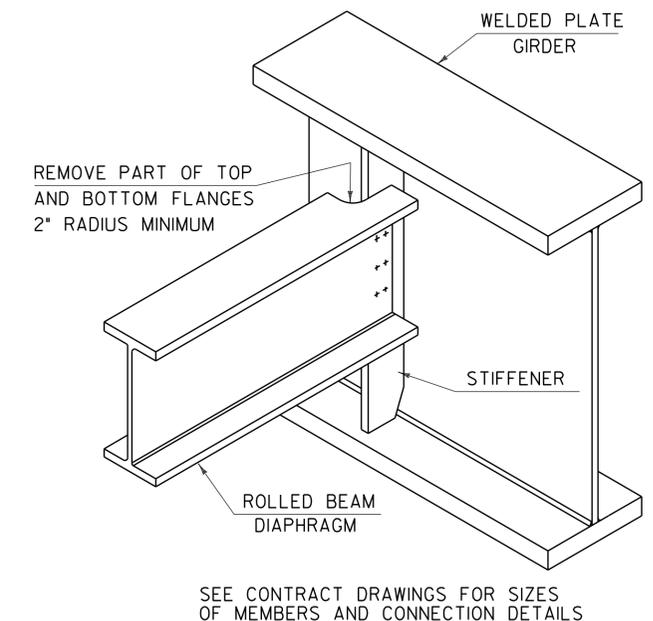
INTERMEDIATE DIAPHRAGMS FOR 24" TO 48" BRIDGE BEAMS

\* IF CLEARANCE CANNOT BE MET, DIAPHRAGM MAY BE SLOPED.

	DEPTH	DIAPHRAGM MEMBER	(N) BOLTS
ROLLED BEAM	24"	C15x33.9	4
	30"		
	31"	MC18x42.7	5
	36"		
PLATE GIRDER WEB	37"	W21x44	6
	42"		
	31"	W27x84	7
	36"		
37"	W33x118	9	
42"			
	43"	W36x135	10
	48"		



WELD LOCATION DETAIL AT CROSS FRAMES AND LATERAL BRACING

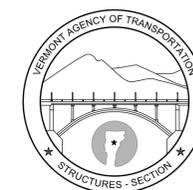


ROLLED BEAM USED AS DIAPHRAGM

DETAILS ON THIS SHEET ARE "NOT TO SCALE" UNLESS NOTED OTHERWISE.

REVISIONS	
MAY 7, 2010	APPROVED FOR USE BY VAOT STRUCTURES SECTION
MAY 2, 2011	ADD INTERMEDIATE DIAPHRAGMS DETAIL & ADD NOT TO SCALE NOTE

# STRUCTURAL STEEL PLATE GIRDER DETAILS AND NOTES



STRUCTURES  
DETAIL  
SD-6 02.00

1. TRAFFIC CONTROL DEVICES NOT DETAILED IN THE VERMONT AGENCY OF TRANSPORTATION (VAOT) "STANDARD DRAWINGS" OR THE PROJECT PLANS SHALL BE IN ACCORDANCE WITH THE "MANUAL ON TRAFFIC CONTROL DEVICES" (MUTCD) AND THE "STANDARD HIGHWAY SIGNS AND MARKINGS" BOOK (SHSM) PUBLISHED BY THE FEDERAL HIGHWAY ADMINISTRATION (FHWA).
2. CONSTRUCTION SIGNS SHALL BE ERECTED BEFORE THE START OF ANY WORK AND SHALL BE COVERED UNTIL WORK COMMENCES, DURING PERIODS OF INACTIVITY OR UPON COMPLETION OF THE WORK. EACH SIGN SHALL BE ERECTED IN A NEAT AND WORKMANLIKE MANNER.
3. CONSTRUCTION SIGN COVERS SHALL CONSIST OF A PANEL, PAINTED FLAT BLACK, THE SAME SIZE AS THE SIGN IT COVERS. THE PANEL SHALL BE OF WOOD, PLYWOOD, HARDBOARD OR ANY MATERIAL SATISFACTORY TO THE ENGINEER. NO MATERIAL WILL BE APPROVED THAT WILL DETERIORATE BY EXPOSURE TO THE WEATHER DURING THE PROJECT. MOUNTING OF THE PANEL SHALL BE DONE IN SUCH A WAY AS NOT TO DAMAGE THE SIGN FACE MATERIAL.
4. SIGNS SHALL BE MAINTAINED IN A CLEAN AND LEGIBLE CONDITION SATISFACTORY TO THE ENGINEER. THEY SHALL BE KEPT PLUMB AND LEVEL, AND ALWAYS PRESENT A NEAT APPEARANCE. DAMAGED, DEFACED OR DIRTY SIGNS SHALL BE REPAIRED, CLEANED OR REPLACED AS ORDERED BY THE ENGINEER.
5. NO CROSS-BRACING OR BACK-BRACING TO KEEP POSTS PLUMB WILL BE ALLOWED. CONCRETE FOUNDATIONS, COLLARS OR SOIL BEARING PLATES ARE NOT PERMITTED. CONSTRUCTION SIGNS SHALL BE PLACED ON TWO POSTS.
6. CONSTRUCTION SIGNS INSTALLED ON POSTS SHALL BE SET SECURELY IN THE GROUND. THE BOTTOM OF A SIGN SHALL BE AT LEAST FIVE FEET ABOVE THE EDGE OF PAVEMENT AND THE NEAREST EDGE OF A SIGN SHALL BE AT LEAST SIX FEET OUTSIDE THE SHOULDER POINT, FOUR FEET OUTSIDE GUARDRAIL, OR TWO FEET OUTSIDE CURBING OR SIDEWALK. THE INSTALLATION OF SIGNS SHALL BE SUBJECT TO APPROVAL OF THE ENGINEER. IN URBAN AREAS, THE BOTTOM OF THE SIGN SHALL BE AT LEAST SEVEN FEET ABOVE THE SIDEWALK OR EDGE OF PAVEMENT, WHICHEVER IS HIGHER.
7. PORTABLE SIGNS SHALL BE PLACED ON THE EDGE OF ROADWAY AND A MINIMUM OF ONE FOOT ABOVE THE TRAVELED WAY. ALL VEGETATION THAT INTERFERES WITH VISIBILITY OF THE SIGNS SHALL BE REMOVED. WHEN PLACED BEHIND GUARDRAIL, THE BOTTOM OF THE SIGN FACE SHALL BE ABOVE THE TOP OF THE GUARDRAIL.
8. SIGNS SHALL BE REMOVED UPON COMPLETION OF THE WORK AT THE DISCRETION OF THE ENGINEER.
9. ROLL UP CONSTRUCTION SIGNS SHALL HAVE RETROREFLECTIVE SHEETING EQUAL TO OR EXCEEDING THE "AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS" (AASHTO) M 268 ["AMERICAN SOCIETY FOR TESTING AND MATERIALS" (ASTM) D 4956] TYPE VI AND TYPE VII UNLESS OTHERWISE NOTED.
10. SOLID SUBSTRATE CONSTRUCTION SIGNS SHALL HAVE RETROREFLECTIVE SHEETING EQUAL TO OR EXCEEDING THE "AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS" (AASHTO) M 268 ["AMERICAN SOCIETY FOR TESTING AND MATERIALS" (ASTM) D 4956] TYPE VIII OR IX REQUIREMENTS UNLESS OTHERWISE NOTED.
11. WHERE CONSTRUCTION SIGN INSTALLATIONS ARE NOT PROTECTED BY GUARDRAIL OR OTHER APPROVED TRAFFIC BARRIERS, ALL SIGN STANDS AND POST INSTALLATIONS SHALL MEET "NATIONAL COOPERATIVE HIGHWAY RESEARCH PROGRAM" (NCHRP) REPORT 350 OR THE AASHTO "MANUAL FOR ASSESSING SAFETY HARDWARE" (MASH). THE APPROPRIATE RESOURCE SHALL BE DETERMINED AS DESCRIBED IN THE MASH PUBLICATION. NO SIGN POSTS SHALL EXTEND OVER THE TOP OF THE SIGN INSTALLED ON SAID POSTS. WHEN ANCHORS ARE INSTALLED, STUBS SHALL NOT BE GREATER THAN FOUR INCHES ABOVE EXISTING GROUND.
12. ROADWAY AND SHOULDER WIDTHS DEPICTED ON THE STANDARD DRAWINGS MAY VARY.
13. THESE STANDARD DRAWINGS ARE INTENDED TO SERVE AS VTRANS STANDARD OPERATING PROCEDURE. IT IS NOTED THAT COMPONENT PARTS OF A TEMPORARY TRAFFIC CONTROL WORK ZONE MAY BE MODIFIED DUE TO FIELD CONDITIONS, AT THE DISCRETION OF THE ENGINEER.

OTHER STDS. REQUIRED: **NONE**

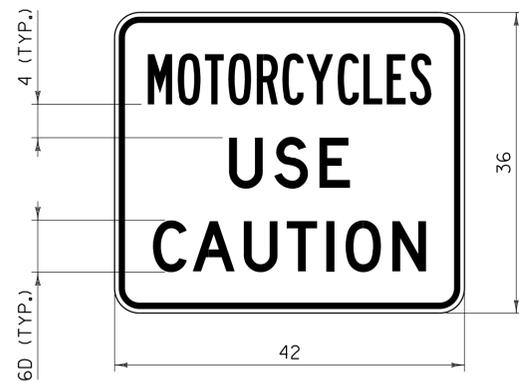
REVISIONS AND CORRECTIONS  
AUG. 6, 2012 - ORIGINAL APPROVAL DATE

APPROVED  
*W.A.P.*  
HIGHWAY SAFETY & DESIGN ENGINEER  
*Rubén J. Huante*  
DIRECTOR OF PROGRAM DEVELOPMENT  
*Mark D. Richter*  
FEDERAL HIGHWAY ADMINISTRATION

## TRAFFIC CONTROL GENERAL NOTES



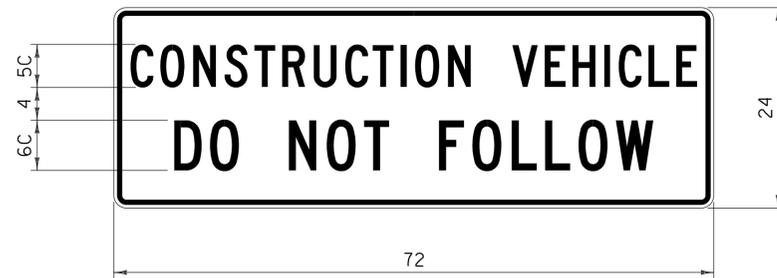
STANDARD  
T-1



**VC-004P**

**NOTES:**

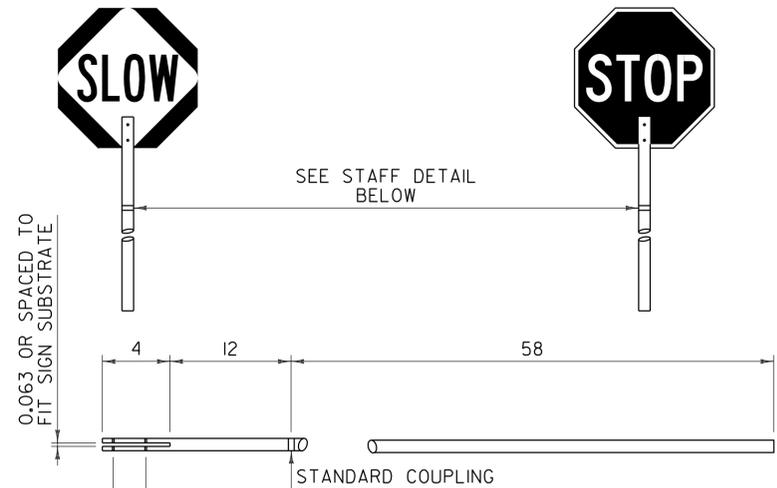
1. CORNERS SHALL BE ROUNDED TO A THREE INCH RADIUS.
2. THE BORDER SHALL BE 3/4 INCH WIDE WITH A 1/2 INCH INDENT FROM THE EDGE OF THE SIGN.
3. "MOTORCYCLES" SHALL HAVE A SPECIFIED WIDTH OF 34 INCHES.
4. "USE" SHALL HAVE A SPECIFIED WIDTH OF 14 1/2 INCHES.
5. "CAUTION" SHALL HAVE A SPECIFIED WIDTH OF 32 3/4 INCHES.
6. SIGN SHALL ONLY BE INSTALLED AS A SUPPLEMENTAL TO A PARENT WARNING SIGN AND SHALL NOT BE INSTALLED BY ITSELF.



**VC-007**

**NOTES:**

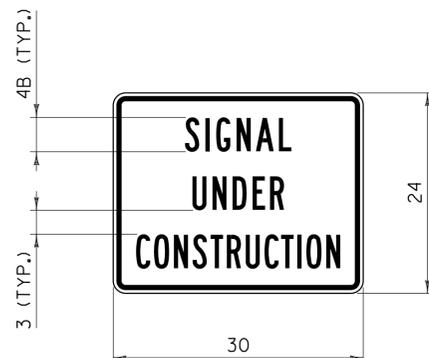
1. CORNERS SHALL BE ROUNDED TO A 1 1/2 INCH RADIUS.
2. THE BORDER SHALL BE 5/8 INCH WIDE WITH A 3/8 INCH INDENT FROM THE EDGE OF THE SIGN.
3. "CONSTRUCTION VEHICLE" SHALL HAVE A SPECIFIED WIDTH OF 68 INCHES.
4. "DO NOT FOLLOW" SHALL HAVE A SPECIFIED WIDTH OF 57 1/2 INCHES.
5. SIGN SHALL BE MOUNTED IN A CONSPICUOUS LOCATION ON THE REAR OF THE CONSTRUCTION VEHICLE.
6. THE SIGN SHALL BE MOUNTED AS NOT TO INTERFERE WITH THE VISIBILITY OF DIRECTIONAL SIGNALS OR TAIL LIGHTS AS REQUIRED BY LAW.
7. SIGN SHALL BE COVERED OR REMOVED WHEN NOT IN USE.



**STOP-SLOW PADDLE & STAFF DETAIL**

**NOTES:**

1. REFER TO THE "STANDARD HIGHWAY SIGNS AND MARKINGS" BOOK (SHSM) "TEMPORARY TRAFFIC CONTROL - WARNING SIGNS" FOR THE STOP-SLOW PADDLE DESIGN.
2. COLORS FOR THE SLOW SIDE OF THE PADDLE SHALL BE BLACK LEGEND AND BORDER ON A FLUORESCENT ORANGE DIAMOND WITH RETROREFLECTIVE SHEETING EQUAL TO OR EXCEEDING AASHTO M 268 [ASTM D 4956] TYPE VII, VIII OR IX REQUIREMENTS.
3. COLORS FOR THE STOP SIDE OF THE PADDLE SHALL BE WHITE RETROREFLECTIVE LEGEND AND BORDER ON A RED RETROREFLECTIVE OCTAGON. BOTH COLORS SHALL HAVE RETROREFLECTIVE SHEETING EQUAL TO OR EXCEEDING AASHTO M 268 [ASTM D 4956] TYPE III.
4. SIGN SUBSTRATE MATERIALS SHALL BE ALUMINUM, ACRYLONITRILE BUTADIENE STYRENE (ABS) PLASTIC OR EQUIVALENT.
5. THE STAFF MAY BE RIGID ABS PLASTIC OR WOOD WITH A ONE TO 1 1/2 INCH DIAMETER.
6. SIGNS SHALL BE MAINTAINED IN A CLEAN AND LEGIBLE CONDITION SATISFACTORY TO THE ENGINEER. THEY SHALL BE COMPLETELY VISIBLE TO APPROACHING TRAFFIC AT ALL TIMES. THEY SHALL BE KEPT PLUMB AND LEVEL, AND ALWAYS PRESENT A NEAT APPEARANCE. DAMAGED, DEFACTED OR DIRTY SIGNS SHALL BE REPAIRED, CLEANED OR REPLACED AS ORDERED BY THE ENGINEER.



**VC-820**

**NOTES:**

1. CORNERS SHALL BE ROUNDED TO A 1 1/2 INCH RADIUS.
2. THE BORDER SHALL BE 5/8 INCH WIDE WITH A 3/8 INCH INDENT FROM THE EDGE OF THE SIGN.
3. "SIGNAL" SHALL HAVE A SPECIFIED WIDTH OF 12 3/4 INCHES.
4. "UNDER" SHALL HAVE A SPECIFIED WIDTH OF 11 INCHES.
5. "CONSTRUCTION" SHALL HAVE A SPECIFIED WIDTH OF 24 1/2 INCHES.
6. SIGN SHALL ONLY BE INSTALLED AS A SUPPLEMENTAL TO A PARENT WARNING SIGN AND SHALL NOT BE INSTALLED BY ITSELF.

**GENERAL NOTES:**

1. ALL LEGEND SHALL BE CENTERED VERTICALLY AND HORIZONTALLY UNLESS OTHERWISE NOTED.
2. COLORS FOR SIGNS SHALL BE BLACK LEGEND AND BORDER ON FLUORESCENT ORANGE BACKGROUND UNLESS OTHERWISE NOTED.
3. ALL DIMENSIONS IN INCHES.

**OTHER STDS. REQUIRED: T-1**

REVISIONS AND CORRECTIONS  
AUG. 6, 2012 - ORIGINAL APPROVAL DATE

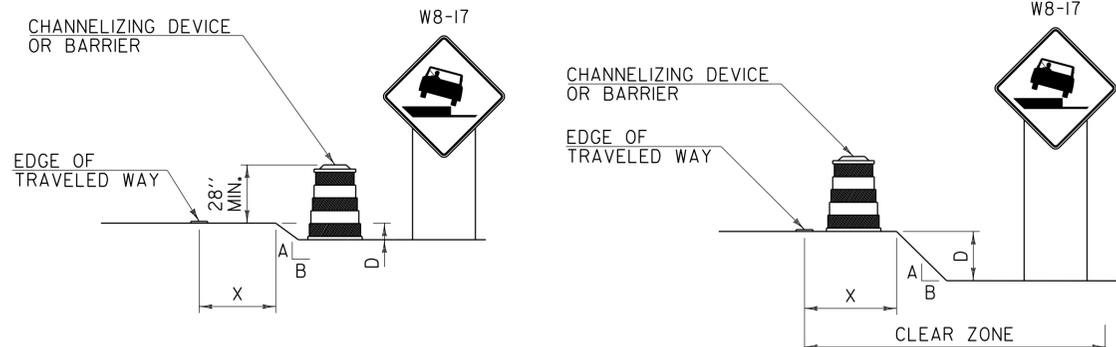
APPROVED  
*[Signature]*  
HIGHWAY SAFETY & DESIGN ENGINEER  
*[Signature]*  
DIRECTOR OF PROGRAM DEVELOPMENT  
*[Signature]*  
MARK D. RICHTER  
FEDERAL HIGHWAY ADMINISTRATION

CONSTRUCTION SIGN  
DETAILS



STANDARD  
T-30

**DROP-OFF ADJACENT TO TRAVELED WAY**



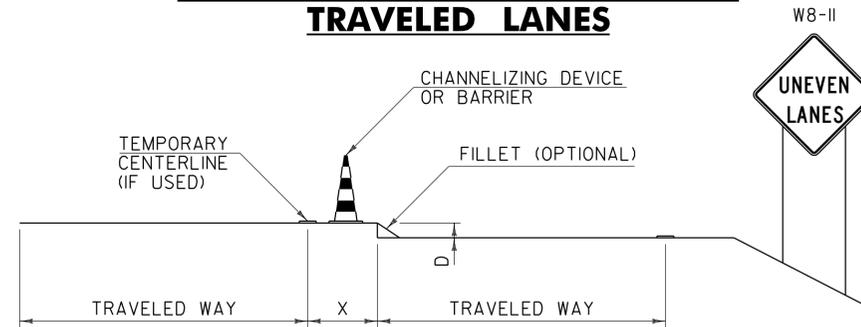
**TYPE 1**

**TYPE 2**

**NOTES:**

1. CHANNELIZING DEVICES OR BARRIER SHOULD BE PLACED TO MAXIMIZE THE WIDTH OF THE TRAVELED WAY.
2. SEE CHART "A" FOR SPECIFIC REQUIREMENTS.
3. IF THE DROP-OFF REQUIRES CHANNELIZING DEVICES TO REMAIN IN PLACE OVERNIGHT, THEN "SHOULDER DROP-OFF SYMBOL" (W8-17) SIGNS SHOULD BE INSTALLED.

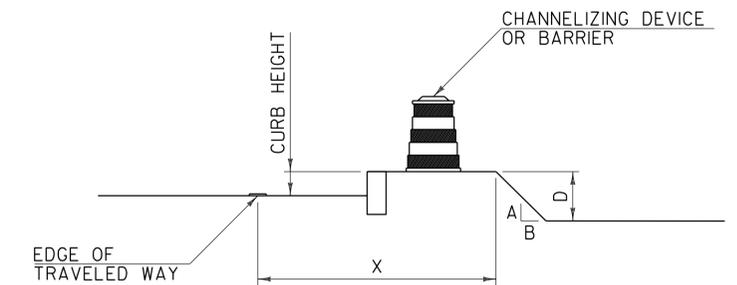
**DROP-OFF BETWEEN ADJACENT TRAVELED LANES**



**NOTES:**

1. WHENEVER A LONGITUDINAL DROP-OFF BETWEEN ADJACENT TRAVELED LANES IS TO BE LEFT OVERNIGHT, THEN "UNEVEN LANES" (W8-11) SIGNS AND CHANNELIZING DEVICES SHOULD BE INSTALLED.
2. IF REQUIRED, THE CHANNELIZING DEVICES USED SHOULD BE THOSE WHICH MAXIMIZE THE WIDTH OF THE TRAVELED LANE (I.E. CONES, VERTICAL PANELS OR TUBULAR MARKERS).
3. A BITUMINOUS CONCRETE FILLET WITH A 1.5:1 SLOPE MAY BE USED IN PLACE OF CHANNELIZING DEVICES, HOWEVER THE "UNEVEN LANES" (W8-11) SIGNS SHOULD STILL BE INSTALLED.
4. SEE CHART "A" FOR SPECIFIC REQUIREMENTS.

**DROP-OFF BEYOND SHOULDER OR CURB**



**NOTES:**

1. USE CHART "A" FOR VERTICAL CURBS UNDER SIX INCHES, MOUNTABLE CURBS OR ROADWAYS WITH A POSTED SPEED ABOVE 40 MPH.
2. USE CHART "B" FOR VERTICAL CURBS SIX INCHES OR GREATER.

**CHART "A"  
ALL SPEEDS WITH NO CURB  
OR MOUNTABLE CURB**

X (FEET)	DROP (D) (INCHES)	A:B SLOPE	RECOMMENDED DEVICE
0 TO 4'	LESS THAN 2"	ANY	NONE
	2" TO 6"	1:1.5 OR FLATTER	NONE
		STEEPER THAN 1:1.5	CHANNELIZING DEVICE
4' TO 10'	LESS THAN 6"	ANY	NONE
	6" TO 12"	1:3 OR FLATTER	NONE
		STEEPER THAN 1:3	BARRIER
10' TO CZ	LESS THAN OR EQUAL TO 12"	ANY	NONE
	GREATER THAN 12"	1:3 OR FLATTER	NONE
		STEEPER THAN 1:3	BARRIER

**NOTES:**

1. THE MINIMUM CLEAR ZONE FOR FREEWAYS IS TO BE DETERMINED PER THE CURRENT AASHTO ROADSIDE DESIGN GUIDE. ALL OTHER HIGHWAYS WILL BE DETERMINED PER THE CURRENT "VERMONT STATE STANDARDS" BOOK.
2. CHANNELIZING DEVICES MAY BE USED INSTEAD OF BARRIER FOR SHORT TERM OPERATIONS.
3. ON BORDERLINE CONDITIONS, THE ENGINEER SHOULD DETERMINE WHICH TREATMENT IS ADEQUATE FOR THE EXISTING CONDITIONS.

**CHART "B"  
40 MPH OR LESS WITH VERTICAL CURB**

X (FEET)	DROP (D) (INCHES)	DEVICE REQUIRED
0-10'	LESS THAN OR EQUAL TO 12"	NONE
0-10'	GREATER THAN 12"	CHANNELIZING DEVICE
GREATER THAN 10'	ANY	NONE

**GENERAL NOTES:**

1. THESE CONDITIONS AND TREATMENTS ARE ONLY PART OF THE TRAFFIC CONTROL SYSTEM AND SHOULD BE USED IN ADDITION TO THE PROPER WORK ZONE SIGNING.
2. THE FOLLOWING ARE "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES" (MUTCD) COMPLIANT CHANNELIZING DEVICES:
  - A. VERTICAL PANEL
  - B. TYPE I OR TYPE II BARRICADE
  - C. PLASTIC DRUM
  - D. CONE - WHERE APPLICABLE
  - E. TUBULAR MARKERS

IF CHANNELIZING DEVICES ARE REQUIRED TO STAY IN PLACE DURING NIGHTTIME HOURS, THEY SHALL BE STABILIZED WHILE UNATTENDED IN ACCORDANCE WITH THE MUTCD.
3. WHERE BARRIER IS NECESSARY, THE BARRIER SHALL BE TAPERED BEYOND THE CLEAR ZONE. WHEN THE BARRIER CANNOT BE TAPERED BEYOND THE CLEAR ZONE, A MUTCD COMPLIANT END TREATMENT SHALL BE USED. BARRIER AND END TREATMENT SHALL MEET "NATIONAL COOPERATIVE HIGHWAY RESEARCH PROGRAM" (NCHRP) REPORT 350 OR THE "AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS" (AASHTO) "MANUAL FOR ASSESSING SAFETY HARDWARE" (MASH). THE APPROPRIATE RESOURCE SHALL BE DETERMINED AS DESCRIBED IN THE MASH PUBLICATION.
4. CHANNELIZING DEVICE SPACING ALONG A LONGITUDINAL DROP-OFF (TANGENT) SHALL BE AS FOLLOWS:
  - TANGENT - CHANNELIZING DEVICES SHALL BE SPACED "2S" ("S" IS EQUAL TO THE POSTED SPEED LIMIT IN FEET) APART.
5. "LOW SHOULDER" (W8-9) AND "SHOULDER DROP-OFF SYMBOL" (W8-17) SIGNS, WHEN USED, SHOULD BEGIN PRIOR TO THE DROP-OFF CONDITION AND SHOULD BE REPEATED EVERY 1500 FEET.

**OTHER STDS. REQUIRED: T-1**

REVISIONS AND CORRECTIONS  
AUG. 6, 2012 - ORIGINAL APPROVAL DATE

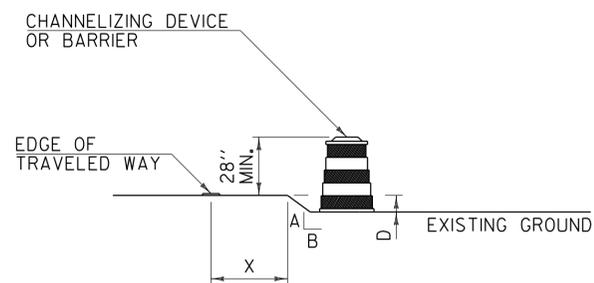
APPROVED  
*[Signature]*  
HIGHWAY SAFETY & DESIGN ENGINEER  
*[Signature]*  
DIRECTOR OF PROGRAM DEVELOPMENT  
*[Signature]*  
MARK D. RICHTER  
FEDERAL HIGHWAY ADMINISTRATION

**CONSTRUCTION ZONE  
LONGITUDINAL DROP-OFFS**



**STANDARD  
T-35**

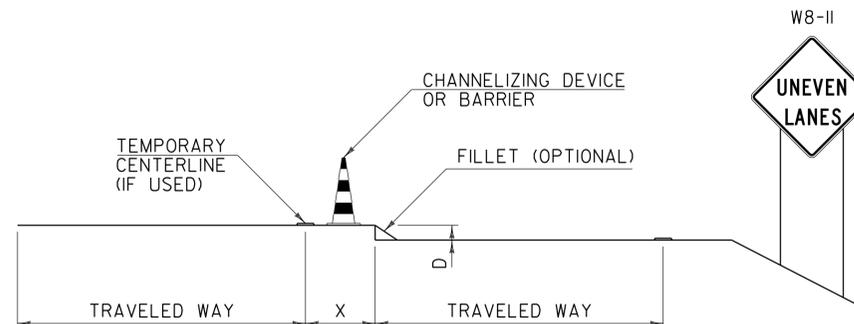
**DROP-OFF ADJACENT TO TRAVELED WAY**



**NOTES:**

1. CHANNELIZING DEVICES SHOULD BE PLACED TO MAXIMIZE THE WIDTH OF THE TRAVELED WAY.
2. SEE CHART "A" FOR SPECIFIC REQUIREMENTS.
3. IF THE DROP-OFF REQUIRES CHANNELIZING DEVICES TO REMAIN IN PLACE OVERNIGHT, THEN "LOW SHOULDER" (W8-9) OR "SHOULDER DROP-OFF SYMBOL" (W8-17) SIGNS SHOULD BE INSTALLED.

**DROP-OFF BETWEEN ADJACENT TRAVELED LANES**



**NOTES:**

1. WHENEVER A LONGITUDINAL DROP-OFF BETWEEN ADJACENT TRAVELED LANES IS TO BE LEFT OVERNIGHT, THEN "UNEVEN LANES" (W8-11) SIGNS AND CHANNELIZING DEVICES SHOULD BE INSTALLED.
2. IF REQUIRED, THE CHANNELIZING DEVICES USED SHALL BE THOSE WHICH MAXIMIZE THE WIDTH OF THE TRAVELED LANE (I.E. CONES, VERTICAL PANELS OR TUBULAR MARKERS).
3. A BITUMINOUS CONCRETE FILLET WITH A 1.5:1 SLOPE MAY BE USED IN PLACE OF CHANNELIZING DEVICES, HOWEVER THE "UNEVEN LANES" (W8-11) SIGNS SHOULD STILL BE INSTALLED.
4. SEE CHART "A" FOR SPECIFIC REQUIREMENTS.

**CHART "A"  
ALL SPEEDS WITH NO CURB**

X (FEET)	DROP (D) (INCHES)	A:B SLOPE	DEVICE REQUIRED
0 TO 4'	LESS THAN 2"	ANY	NONE
	2" TO 6"	1:1.5 OR FLATTER STEEPER THAN 1:1.5	NONE CHANNELIZING DEVICE
	GREATER THAN 6"	1:3 OR FLATTER STEEPER THAN 1:3	NONE BARRIER
4' TO 10'	LESS THAN 6"	ANY	NONE
	6" TO 12"	1:3 OR FLATTER STEEPER THAN 1:3	NONE BARRIER

**NOTE:**

1. ON BORDERLINE CONDITIONS, THE ENGINEER SHOULD DETERMINE WHICH TREATMENT IS ADEQUATE FOR THE EXISTING CONDITIONS.

**GENERAL NOTES:**

1. THESE CONDITIONS AND TREATMENTS ARE ONLY PART OF THE TRAFFIC CONTROL SYSTEM AND SHOULD BE USED IN ADDITION TO THE PROPER WORK ZONE SIGNING.
2. THE FOLLOWING ARE "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES" (MUTCD) COMPLIANT CHANNELIZING DEVICES:
  - A. VERTICAL PANEL
  - B. TYPE I OR TYPE II BARRICADE
  - C. PLASTIC DRUM
  - D. CONE - WHERE APPLICABLE
  - E. TUBULAR MARKERS

IF CHANNELIZING DEVICES ARE REQUIRED TO STAY IN PLACE DURING NIGHTTIME HOURS, THEY SHALL BE STABILIZED WHILE UNATTENDED IN ACCORDANCE WITH THE MUTCD.
3. WHERE BARRIER IS NECESSARY, THE BARRIER SHALL BE TAPERED BEYOND THE CLEAR ZONE. WHEN THE BARRIER CANNOT BE TAPERED BEYOND THE CLEAR ZONE, A MUTCD COMPLIANT END TREATMENT SHALL BE USED. BARRIER AND END TREATMENT SHALL MEET "NATIONAL COOPERATIVE HIGHWAY RESEARCH PROGRAM" (NCHRP) REPORT 350 OR THE "AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS" (AASHTO) "MANUAL FOR ASSESSING SAFETY HARDWARE" (MASH). THE APPROPRIATE RESOURCE SHALL BE DETERMINED AS DESCRIBED IN THE MASH PUBLICATION.
4. CHANNELIZING DEVICE SPACING ALONG A LONGITUDINAL DROP-OFF (TANGENT) SHALL BE AS FOLLOWS:
  - TANGENT - CHANNELIZING DEVICES SHALL BE SPACED "2S"
  - ("S" IS EQUAL TO THE POSTED SPEED LIMIT IN FEET) APART.
5. "LOW SHOULDER" (W8-9) AND "SHOULDER DROP-OFF SYMBOL" (W8-17) SIGNS, WHEN USED, SHOULD BEGIN PRIOR TO THE DROP-OFF CONDITION AND SHOULD BE REPEATED EVERY 1500 FEET.

**OTHER STDS. REQUIRED: T-1**

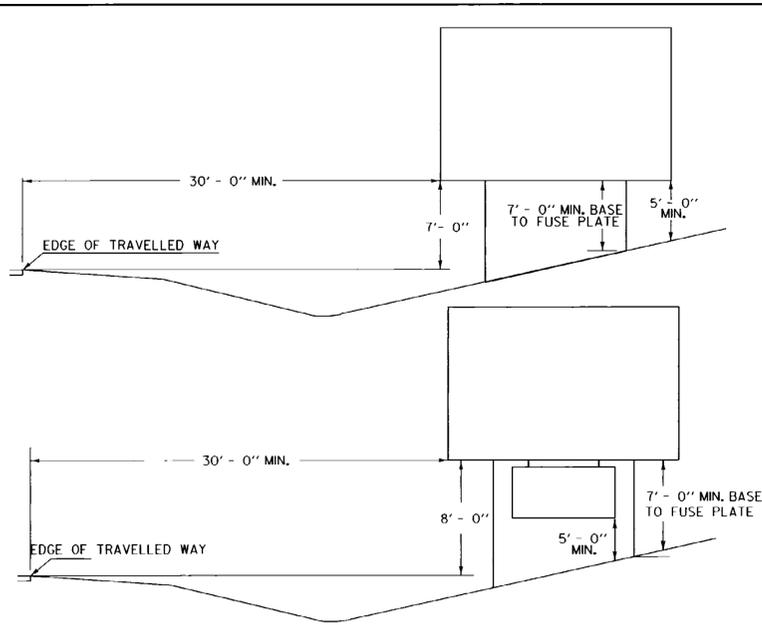
REVISIONS AND CORRECTIONS  
AUG. 6, 2012 - ORIGINAL APPROVAL DATE

APPROVED  
*W. A. M.*  
HIGHWAY SAFETY & DESIGN ENGINEER  
*Rickard Stewart*  
DIRECTOR OF PROGRAM DEVELOPMENT  
*Mark D. Richter*  
FEDERAL HIGHWAY ADMINISTRATION

**CONSTRUCTION ZONE  
LONGITUDINAL DROP-OFFS  
FOR PAVING**



**STANDARD  
T-36**

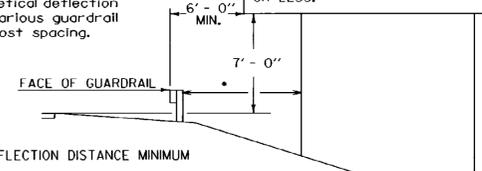


**GUARDRAIL DEFLECTION CHART**  
(PER AASHTO - ROADSIDE DESIGN GUIDE - 1988)

TYPE	SPACING	DEFLEC.
Three Cable w/Steel Posts	16'-0"	12 ft.
w/Wooden Posts	12'-6"	12 ft.
W-Beam w/WEAK Posts	12'-6"	7 ft.
w/Strong Posts	6'-3"	3 ft.
Box Beam	6'-0"	5 ft.
Thrie Beam w/Weak Posts	12'-6"	4 ft.
w/Strong Posts	6'-3"	2 ft.

WHEN PLACED BEHIND GUARDRAIL AND BEYOND THE DEFLECTION DISTANCE FOR THAT PARTICULAR RAIL SIGN POSTS DO NOT HAVE TO BE PLACED ON YIELDING SUPPORTS. SIGN POSTS SHALL BE PLACED ON YIELDING SUPPORTS WHEN THEY CAN BE STRUCK BY AN ERRANT VEHICLE LEAVING THE ROADWAY AT AN ENCROACHMENT ANGLE OF APPROXIMATELY IS DEGREES OR LESS.

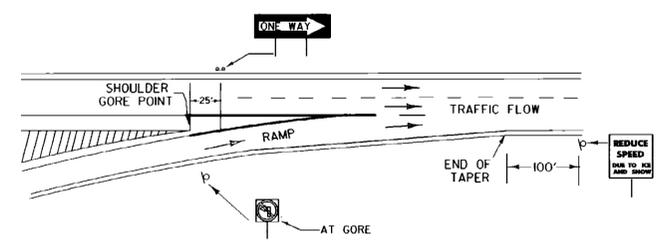
This chart lists the theoretical deflection distance upon impact of various guardrail with different type and post spacing.



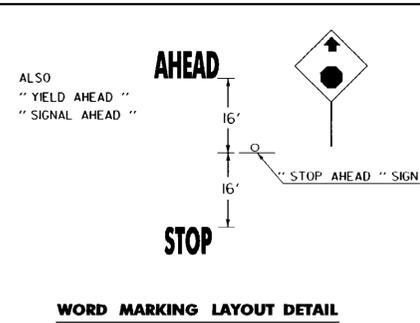
**INSTALLATION DETAILS**

NORMALLY SIGNS SHOULD BE MOUNTED AT 93° TO THE DIRECTION OF TRAFFIC. ON CURVED ALIGNMENT THE ANGLE OF PLACEMENT SHOULD BE DETERMINED BY THE PATH OF APPROACHING TRAFFIC RATHER THAN BY THE ROADSIDE EDGE AT THE POINT WHERE THE SIGN IS LOCATED. WHEN INSTALLING OVERHEAD SIGNS, CANT THE SIGN FROM THE TOP TOWARD APPROACHING TRAFFIC AT A THREE DEGREE TILT ANGLE.

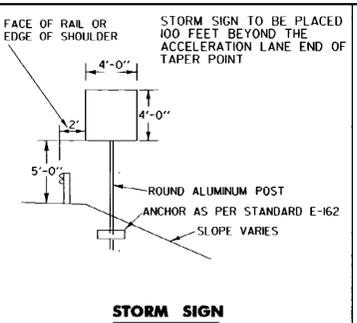
**GUIDE SIGNS**



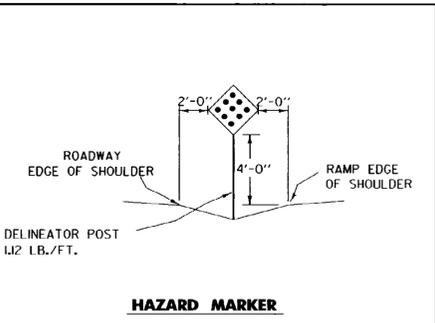
**SIGN PLACEMENT AT END OF RAMP**



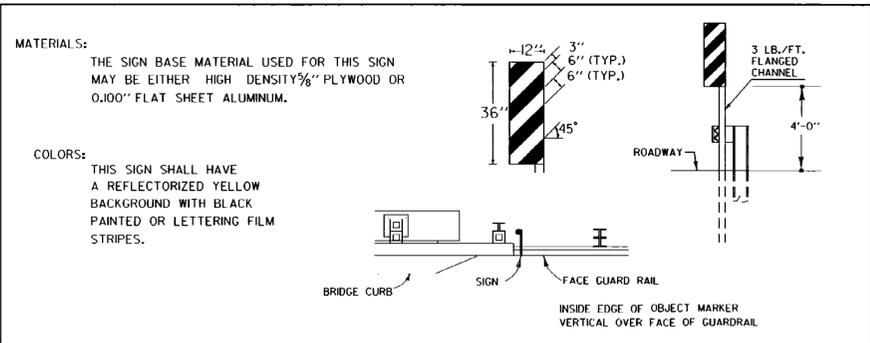
**WORD MARKING LAYOUT DETAIL**



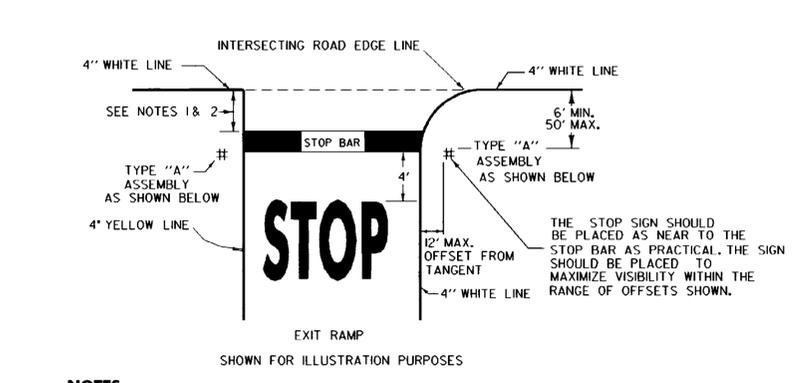
**STORM SIGN**



**HAZARD MARKER**



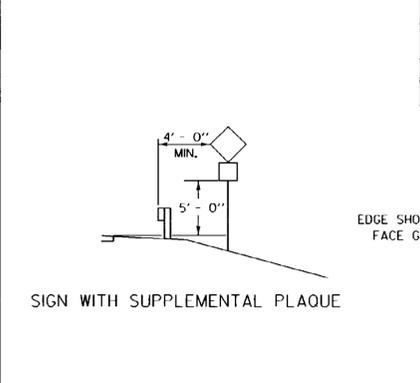
**OBJECT MARKER**



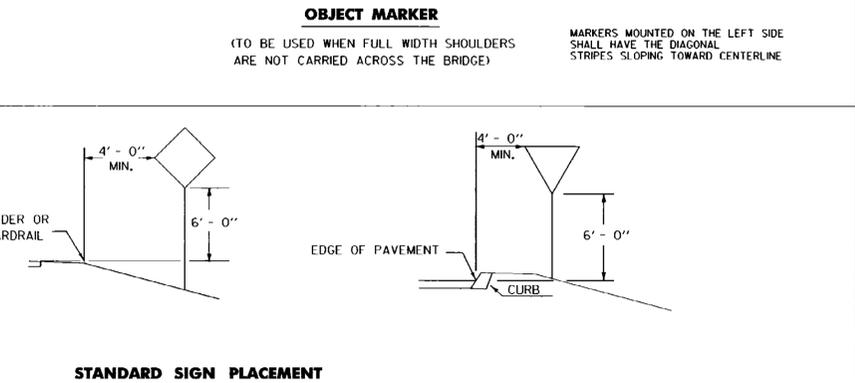
**NOTES:**

1. THE STOP BAR SHOULD BE PLACED AT THE DESIRED STOPPING POINT. IN NO CASE MORE THAN 30' OR LESS THAN 4' FROM THE NEAREST EDGE OF THE INTERSECTING ROADWAY.
2. AT A SIGNALIZED INTERSECTION, DELETE WORDING "STOP" AND THE STOP SIGN AND PLACE STOP BAR A MINIMUM OF 40' FROM THE NEAREST SIGNAL HEAD FOR THE APPROACH.
3. EXCLUDE THE STOP BAR FOR A YIELD CONDITION.

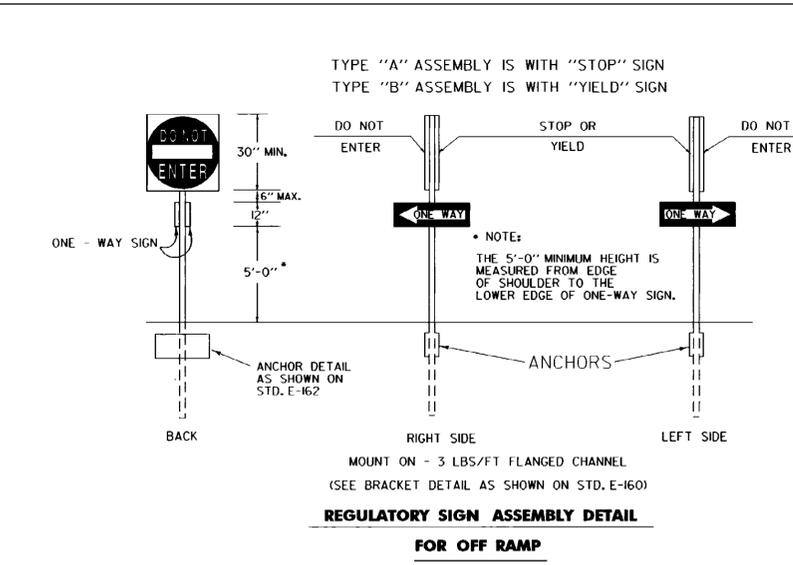
**PAVEMENT MARKING & STOP SIGN LOCATION DETAILS FOR OFF RAMP**



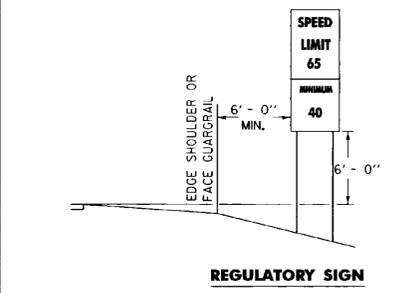
**SIGN WITH SUPPLEMENTAL PLAQUE**



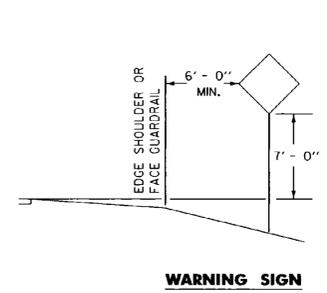
**STANDARD SIGN PLACEMENT RAMP**



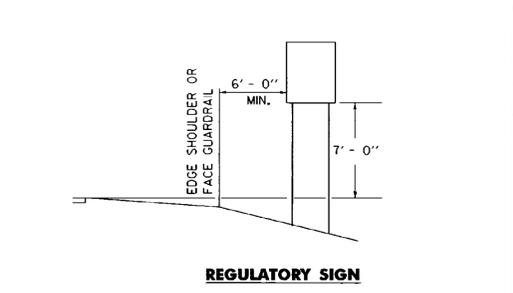
**REGULATORY SIGN ASSEMBLY DETAIL FOR OFF RAMP**



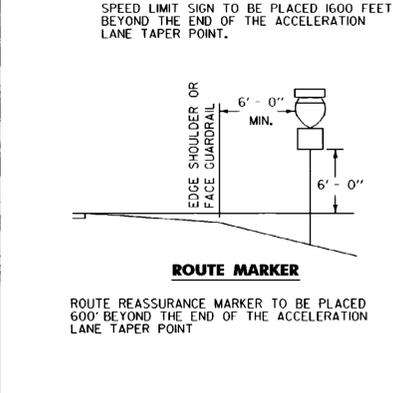
**REGULATORY SIGN**



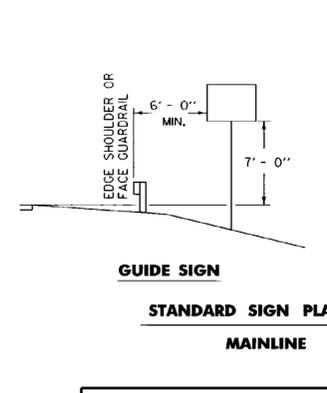
**WARNING SIGN**



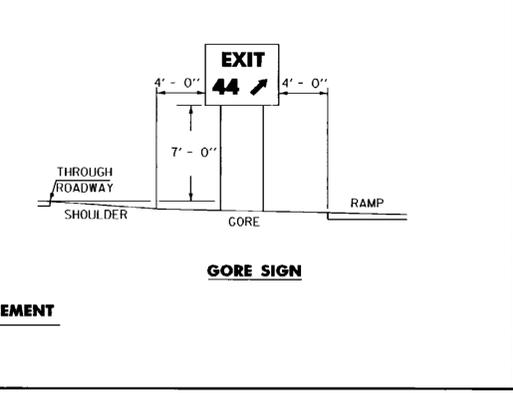
**REGULATORY SIGN**



**ROUTE MARKER**



**GUIDE SIGN**



**GORE SIGN**

**STANDARD SIGN PLACEMENT MAINLINE**

**OTHER STDS. E-160 E-161 E-162 E-163 REQUIRED:**

**REVISIONS AND CORRECTIONS**

APR. 01, 1988 - DATE OF ORIGINAL ISSUE

JUNE 21, 1989 - FHWA - CHANGE TO 7" FUSE PLATE CLEARANCE

AUG. 08, 1995 - DELETED TWO RAIL ALUMINUM FROM DEFLECTION CHART AND MINOR NOTE REVISIONS

APPROVED FOR THIS PROJECT AND/OR DESIGN IMPLEMENTATION, FHWA FINAL APPROVAL PENDING.

**APPROVED**

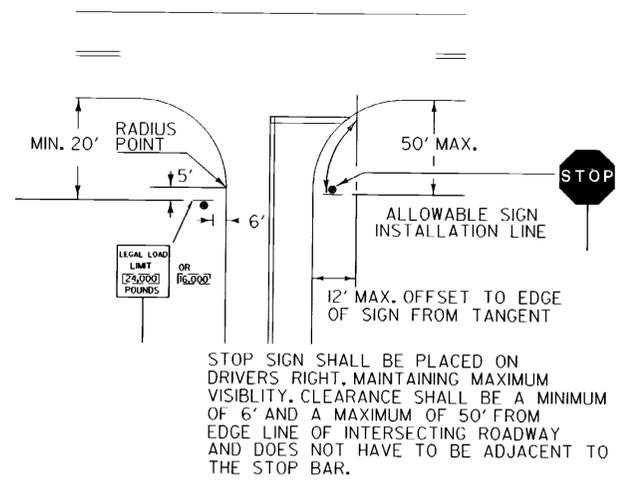
*Edward J. MacArthur*  
DIRECTOR OF ENGINEERING

*David A. Ross*  
TRAFFIC AND SAFETY ENGINEER

**STANDARD SIGN PLACEMENT EXPRESSWAY AND FREEWAY**

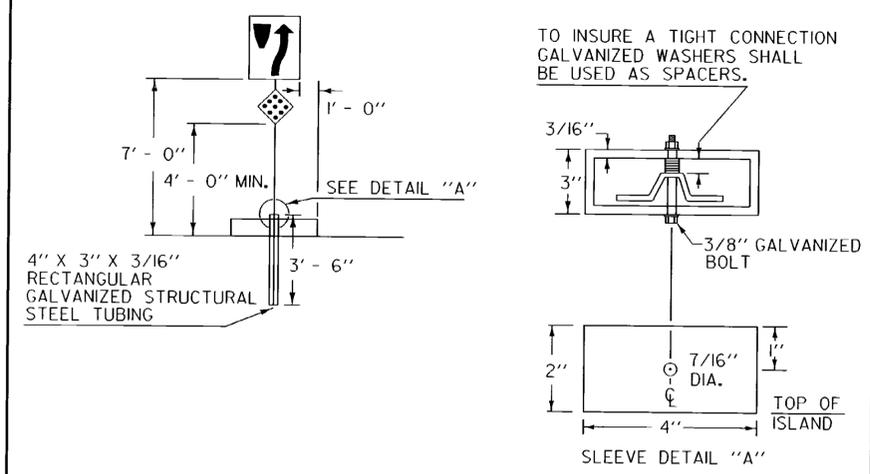
**STANDARD E-120**

/traf/std/stdel20.dgn : stdel20.i



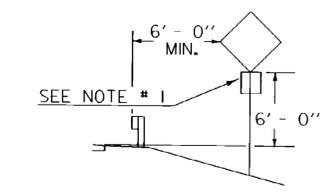
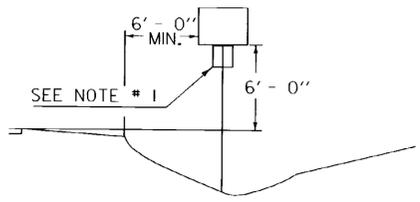
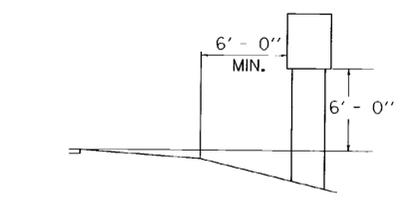
**LEGAL LOAD LIMIT AND STOP SIGNS AT INTERSECTIONS WITH TOWN HIGHWAYS**

STOP SIGN SHALL BE PLACED ON DRIVERS RIGHT, MAINTAINING MAXIMUM VISIBILITY. CLEARANCE SHALL BE A MINIMUM OF 6' AND A MAXIMUM OF 50' FROM EDGE LINE OF INTERSECTING ROADWAY AND DOES NOT HAVE TO BE ADJACENT TO THE STOP BAR.

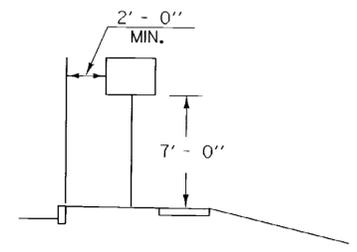
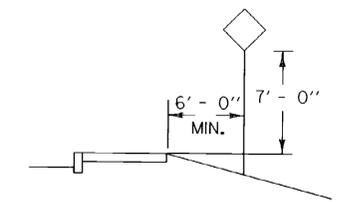


**SIGNS ON MEDIAN ISLANDS IN THE LINE OF TRAFFIC**

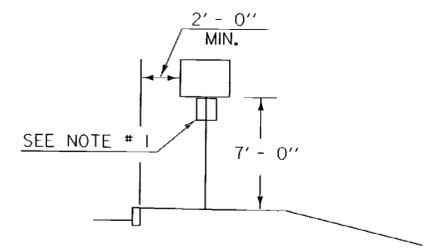
INCREASE VERTICAL CLEARANCE TO 7' IN AREAS OF FREQUENT ROADSIDE PARKING OR PEDESTRIAN ACTIVITY



**RURAL**



IF SUFFICIENT CLEARANCE IS NOT AVAILABLE BETWEEN CURB AND SIDEWALK MOUNT SIGN BEHIND SIDEWALK AS SHOWN AT TOP. CHECK FOR ADEQUATE R.O.W..



**URBAN**

**NOTES:**

1. IN BOTH RURAL AND URBAN LOCATIONS, IF A SECONDARY SIGN IS MOUNTED BELOW ANOTHER SIGN, THE MINIMUM CLEARANCE MAY BE REDUCED BY ONE FOOT.
2. IN RURAL AREAS WITH NO OR MINIMAL SHOULDER, THE LATERAL CLEARANCE TO THE EDGE OF A SIGN SHOULD BE A MINIMUM OF 12' FROM THE EDGE OF THE TRAVELED WAY.
3. ALSO SEE OTHER STANDARD SHEETS FOR MOUNTING CLEARANCE AND SPACING OF DESTINATION AND ROUTE MARKER ASSEMBLIES AND TOWN LINE SIGNS.

POST REFERENCE:  
REFER TO THE DETAILS ON THE APPROPRIATE STANDARD DRAWING FOR INFORMATION CONCERNING THE PROPER MOUNTING OF SIGNS ON APPROPRIATE POSTS.

**OTHER STDS. REQUIRED:** E-160 E-161 E-162 E-163 E-164

REVISIONS AND CORRECTIONS  
JAN. 23, 1995 - DATE OF ORIGINAL ISSUE  
AUG. 08, 1995 - VARIOUS MINOR NOTE REVISIONS

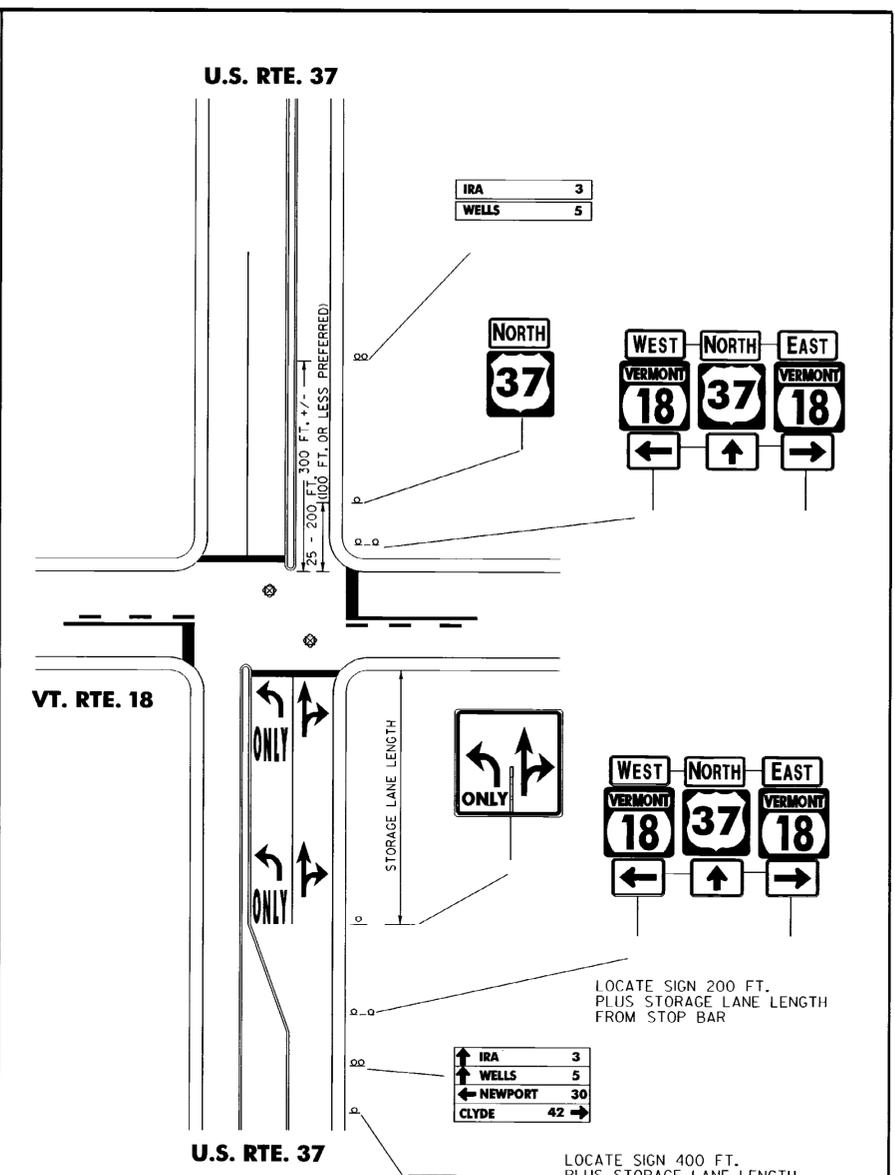
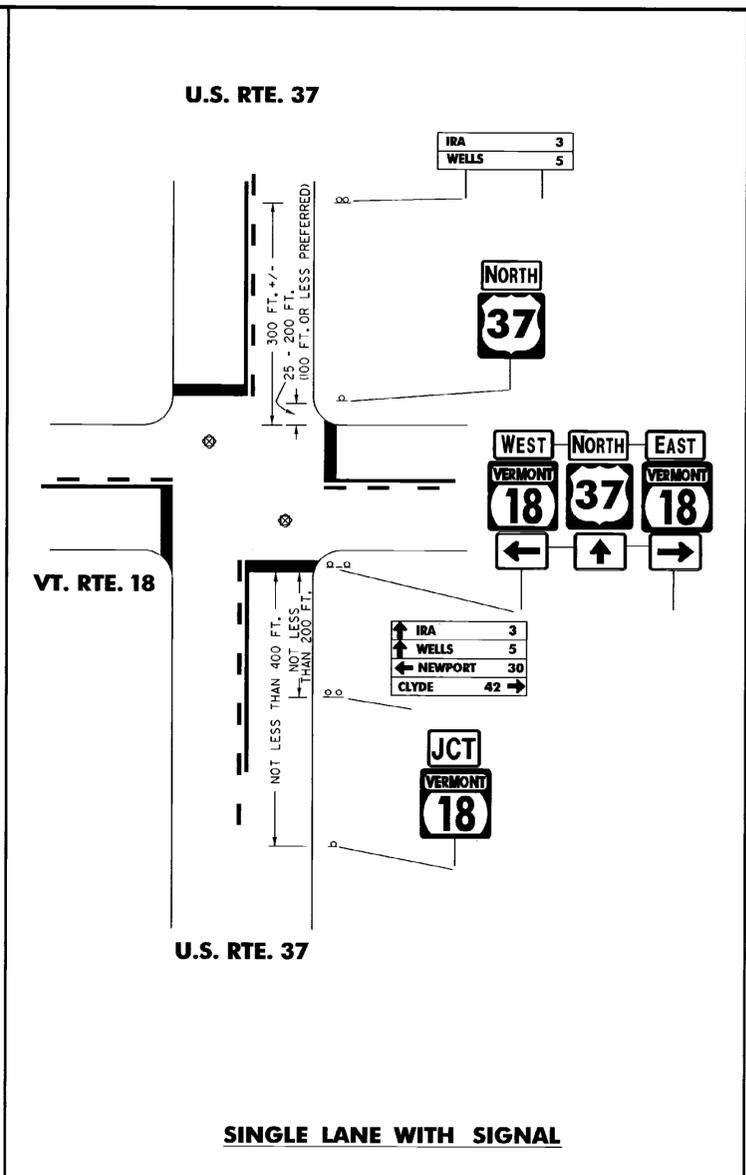
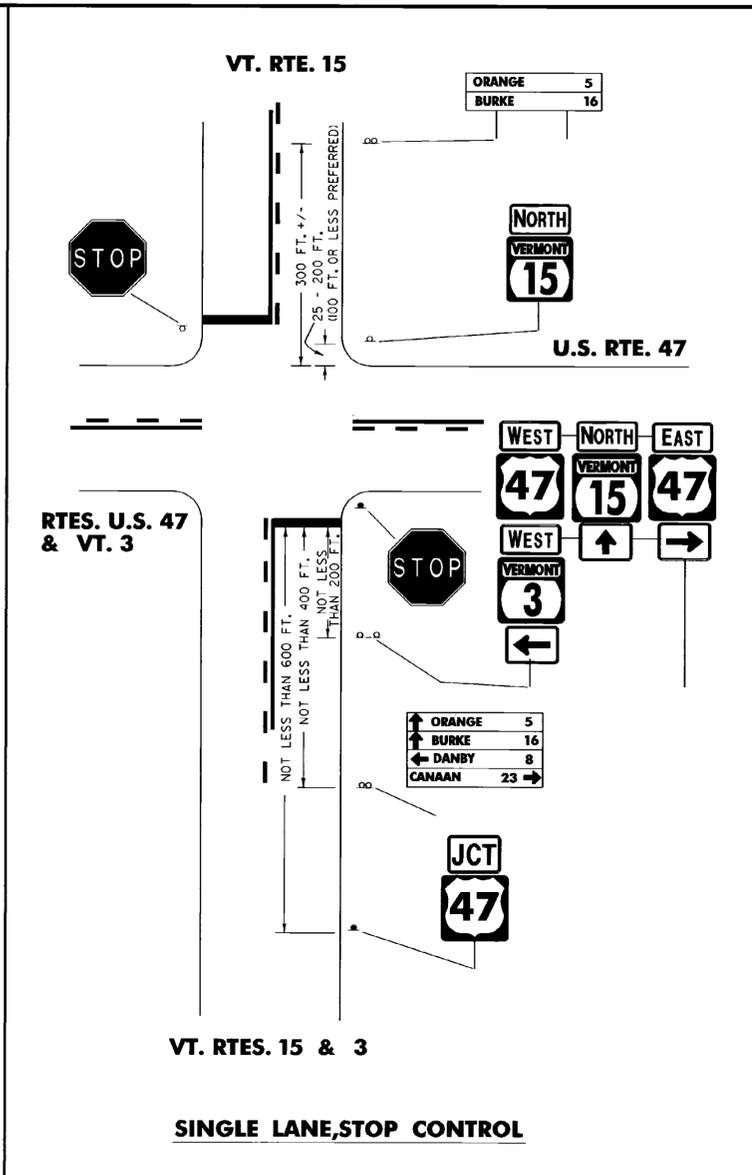
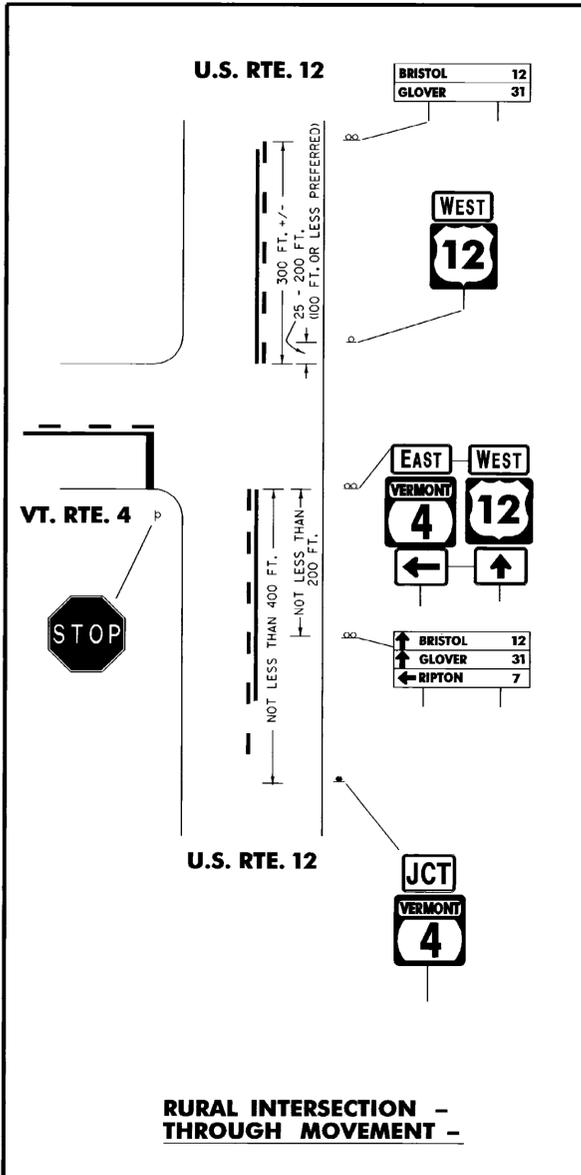
APPROVED  
*Stephen D. MacArthur*  
DIRECTOR OF ENGINEERING  
*David A. Ross*  
TRAFFIC AND SAFETY ENGINEER

**STANDARD SIGN PLACEMENT  
CONVENTIONAL ROAD**



**STANDARD  
E-121**

APPROVED FOR THIS PROJECT AND/OR DESIGN IMPLEMENTATION. FHWA FINAL APPROVAL PENDING.



**GENERAL NOTES:**

1. RECOMMENDED SIGN SPACING AS SHOWN IS SOMETIMES NOT OBTAINABLE DUE TO COMMERCIAL CONFLICTS ETC. AT BUSY INTERSECTIONS. JUDGEMENT MUST BE USED IN THESE CASES TO PLACE SIGNS AS TO GIVE ADEQUATE NOTICE. IT IS ESPECIALLY IMPORTANT TO PLACE SIGNS CLEAR OF OBSTRUCTION BY OTHER SIGNS, POLES, POSTS, FENCES, ETC.
2.  - BENT ARROWS ARE USED WHEN THE INTERSECTION CANNOT BE SEEN  
 - STRAIGHT ARROWS ARE TO BE USED WHEN THE INTERSECTION CAN BE SEEN.
3. SIGNING SHOWN FOR ONE DIRECTION OF TRAVEL ONLY.
4. TWO DESTINATION BOARDS FOR EACH DIRECTION ARE PERMISSABLE.

**OTHER STDS. REQUIRED:**

**REVISIONS AND CORRECTIONS**

DEC. 18, 1989 - DATE OF ORIGINAL ISSUE  
 AUG. 08, 1995 - MINOR SIGN AND NOTE REVISIONS

APPROVED FOR THIS PROJECT AND/OR DESIGN IMPLEMENTATION. FHWA FINAL APPROVAL PENDING.

APPROVED

*Andrew B. MacArthur*  
 DIRECTOR OF ENGINEERING

*David A. Ross*  
 TRAFFIC AND SAFETY ENGINEER

**ROUTE MARKINGS AT RURAL INTERSECTIONS**

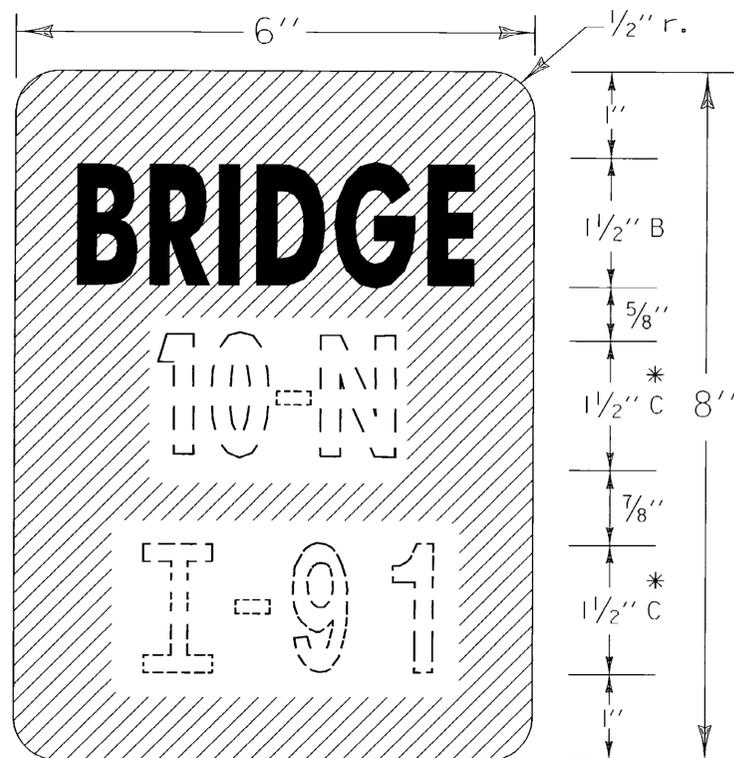
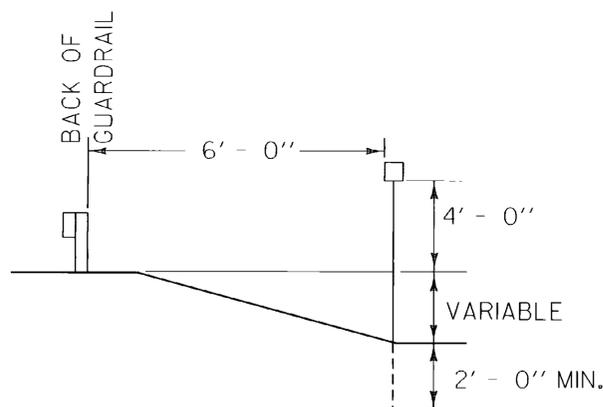
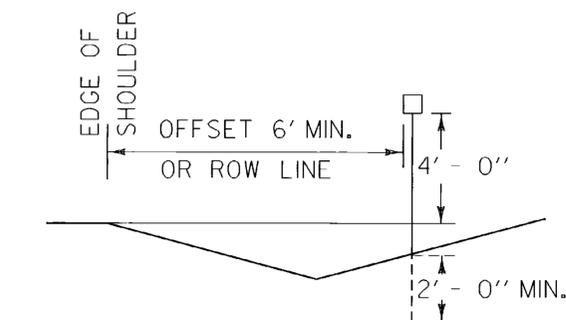


**STANDARD E-127**

I-91  
 ← 2" →

**HYPHENATED WORD DETAIL**

FOR EXAMPLE, ROUTE NUMBERS  
 SHALL APPEAR AS: I-91, US5, VT22



**VD-701**

\* OPTICALLY SPACE BRIDGE  
 AND ROUTE NUMBERS.  
 SERIES B LETTERS MAY  
 BE USED TO MAINTAIN  
 VISUAL INTEGRITY.

**NOTES:**

**GENERAL:**  
 DOTTED LINES AND NUMERALS INDICATE TEXT THAT VARIES.

**PAYMENT:**  
 BRIDGE PLAQUES SHALL BE PAID AS TRAFFIC SIGNS, TYPE 'A',  
 AND POSTS PAID AS FLANGED CHANNEL STEEL SIGN POSTS.

**MATERIAL:**  
 THE SIGN BASE MATERIAL SHALL BE 0.04" FLAT SHEET ALUMINUM.

**COLORS:**  
 THE SIGN SHALL HAVE A REFLECTORIZED WHITE TEXT ON REFLECTORIZED  
 GREEN BACKGROUND. THE COLORS SHALL CONFORM WITH THOSE FOUND  
 IN STANDARD COLOR TOLERANCE CHARTS AS APPROVED BY THE U.S.  
 DEPARTMENT OF TRANSPORTATION, FEDERAL HIGHWAY ADMINISTRATION.

**LETTERING:**  
 LETTERS AND DIGITS SHALL CONFORM WITH THE STANDARD ALPHABETS  
 FOR HIGHWAY SIGNS AS PRINTED BY THE FEDERAL HIGHWAY ADMINISTRATION.

**POSTS:**  
 FLANGED CHANNEL STEEL 2#/FT POSTS SHALL BE USED WHEN THE POST LENGTH  
 EXCEEDS 7 FEET. FOR LENGTH OF 7 FEET OR LESS, A 1.12#/FT STEEL SIGN POST  
 SHALL BE USED.

**OTHER STDS.  
 REQUIRED:**

**REVISIONS AND CORRECTIONS**

DEC. 17, 1989 - DATE OF ORIGINAL ISSUE  
 AUG. 08, 1995 - MISC NOTE REVISIONS

**APPROVED**

*Gordon S. MacArthur*  
 DIRECTOR OF ENGINEERING

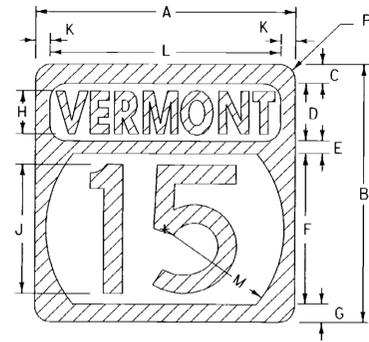
*David A. Ross*  
 TRAFFIC AND SAFETY ENGINEER

**BRIDGE NUMBER PLAQUE**

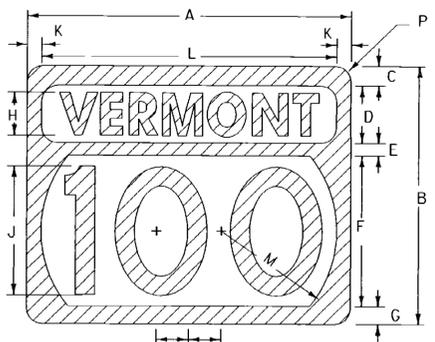


**STANDARD  
 E-134**

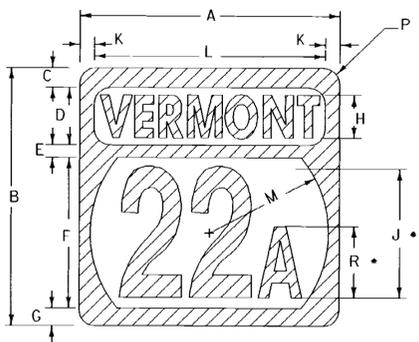
APPROVED FOR THIS PROJECT  
 AND/OR DESIGN IMPLEMENTATION,  
 FHWA FINAL APPROVAL PENDING.



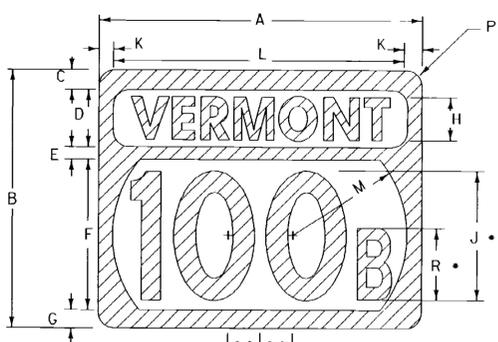
1 OR 2 DIGIT STATE ROUTE MARKER



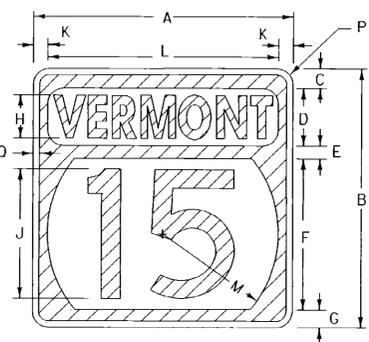
3 DIGIT STATE ROUTE MARKER



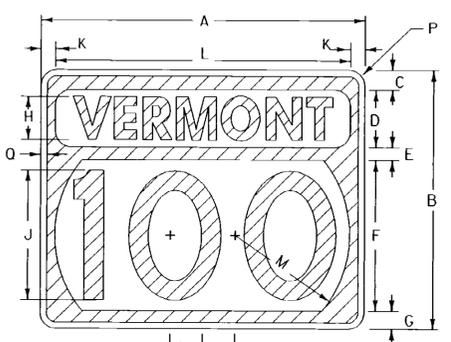
1 OR 2 DIGIT ALTERNATE STATE ROUTE MARKER



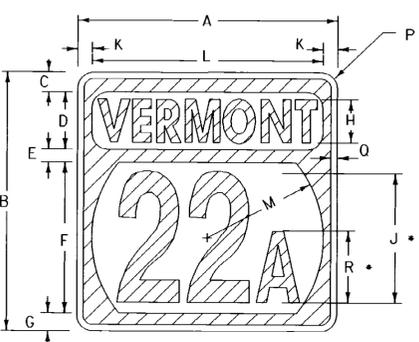
3 DIGIT ALTERNATE STATE ROUTE MARKER



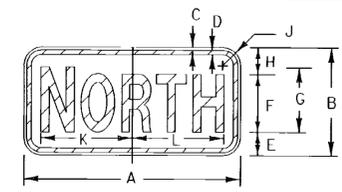
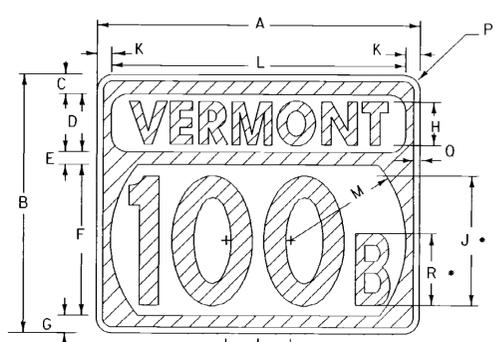
STATE ROUTE MARKER FOR GUIDE SIGN USE (INTERSTATE TYPICAL)



ALTERNATE ROUTE SIGNS: OPTICALLY SPACE NUMERALS ABOUT VERTICAL CENTER-LINE AND REDUCE SPACING AS NECESSARY FOR EACH ROUTE



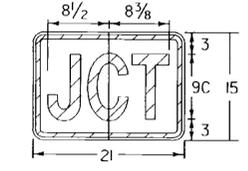
ALTERNATE STATE ROUTE MARKER FOR GUIDE SIGN USE (INTERSTATE TYPICAL)



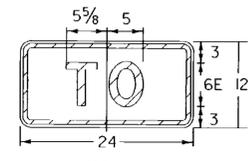
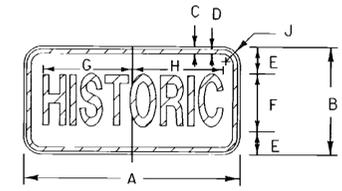
M3-1 M3-3 M3-2 M3-4

SIGN	DIMENSIONS (INCHES)										NORTH	SOUTH	EAST	WEST			
	A	B	C	D	E	F	G	H	J	K							
MIN. & STD.	24	12	3/8	5/8	2 3/4	6C	7C	3 3/4	1 1/2	10 1/4	10 1/4	10 1/4	9 3/4	7 7/8	8 3/8	8 3/4	8 3/4
SPECIAL	30	15	3/8	5/8	3 1/4	8C	9C	3 3/4	1 1/2	12 1/4	12 1/4	12 1/4	12 1/2	10 3/8	11 1/8	11 3/8	11 3/8

M2-1



CARDINAL DIRECTION MARKER



M4-5 TRAILBLAZER

SIGN	DIMENSIONS (INCHES)									
	A	B	C	D	E	F	G	H	J	
MIN. & STD.	24	12	3/8	5/8	3 1/2	5B	10 1/8	9 3/8	1 1/2	
SPECIAL	30	15	3/8	5/8	4	7B*	12 3/8	12 3/8	1 1/2	

\* REDUCE SPACING 35%

**MATERIALS**

THE SIGN BASE MATERIAL MAY BE ANY OF THE FOLLOWING, WITH THE MINIMUM THICKNESSES AS NOTED:  
 FLAT SHEET ALUMINUM  
 LESS THAN 24" X 24" 0.060"  
 WHEN USED ON GUIDE SIGNS 0.060"  
 24" X 24" - 30" X 24" 0.080"  
 36" X 36" - 45" X 36" 0.100"  
 GALVANIZED FLAT SHEET STEEL  
 LESS THAN 24" X 24" 18 GAGE  
 WHEN USED ON GUIDE SIGNS 18 GAGE  
 24" X 24" - 30" X 24" 16 GAGE  
 36" X 36" - 45" X 36" 14 GAGE

THE REFLECTIVE MATERIAL SHALL BE WHITE REFLECTIVE SHEETING APPLIED TO THE ENTIRE BACKGROUND. THE TEXTS MAY BE LETTERING FILM, SILK SCREENED, OR HAND PAINTED.

**COLORS**

COLORS FOR GUIDE USE: TEXT AND SHIELD - GREEN (REFL.) BACKGROUND AND BORDER - WHITE (REFL.)  
 STATE ROUTE MARKERS SHALL HAVE REFLECTIVE GREEN TEXT AND BORDERS ON REFLECTORIZED WHITE BACKGROUNDS.  
 GREEN AREAS ARE INDICATED BY SINGLE LINE CROSSHATCHING

**LETTERING**

LETTERS AND DIGITS SHALL CONFORM WITH THE "STANDARD ALPHABET FOR HIGHWAY SIGNS AND PAVEMENT MARKINGS" ADOPTED BY THE U.S. DEPARTMENT OF TRANSPORTATION AND FHWA.

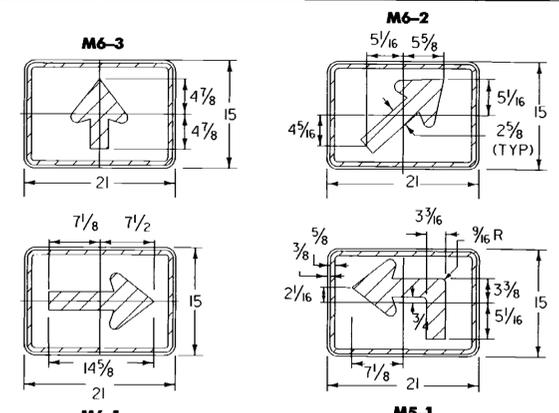
**SPECIFICATIONS**

STATE ROUTE MARKERS AND AUXILIARY ROUTE MARKERS SHALL MEET THE STANDARD STATE SPECIFICATIONS FOR TRAFFIC SIGNS.

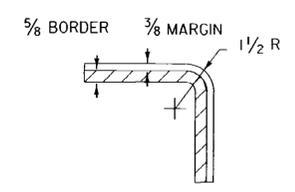
**DESIGNS**

THE DESIGNS OF STATE ROUTE MARKERS AND AUXILIARY MARKERS SHALL CONFORM WITH THE REQUIREMENTS SET FORTH IN THE "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES" ADOPTED BY THE U.S. DEPARTMENT OF TRANSPORTATION AND FHWA.

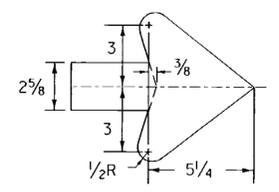
SIGN	DIMENSIONS (INCHES)																
	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	
1,2-digits	24	24	1 1/2	6	1	14	1 1/2	4C	12D	1	22	11	-	1 1/2	1/2	7B	
1,2-digits	36	36	2 3/8	8	1 3/4	21	2 3/8	6C	18D	2	32	16 1/2	-	2 1/4	3/8	10B	
3,-digits	30	24	1 1/2	6	1	14	1 1/2	4D	12D	1	28	11	3	1 1/2	1/2	7B	
3,-digits	45	36	2 3/8	8	1 3/4	21	2 3/8	6D	18D	2	41	16 1/2	4 1/2	2 1/4	3/8	10B	



M6-1 M5-1 M6-2 M6-3 DIRECTION ARROW OR ADVANCE TURN ARROWS



TYPICAL RADIUS DETAIL



TYPICAL ARROW DETAIL

(ALL DIMENSIONS IN INCHES)

REVISIONS AND CORRECTIONS  
 AUG. 08, 1995 - DATE OF ORIGINAL ISSUE

APPROVED

*Ernest S. MacArthur*  
 DIRECTOR OF ENGINEERING

*David A. Ross*  
 TRAFFIC AND SAFETY ENGINEER

STATE ROUTE MARKER SIGN DETAILS

OTHER STDS. REQUIRED:



STANDARD E-136 B

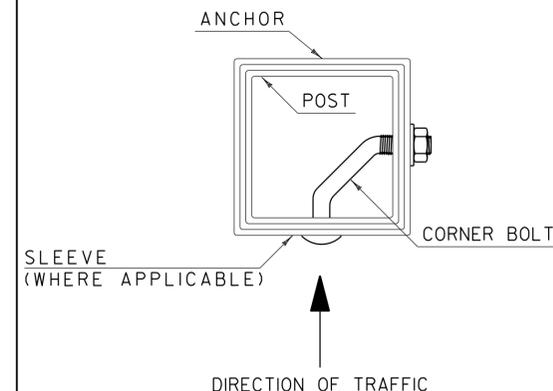
## POST AND ANCHOR SELECTION CHART

POST SIZE (IN.)	POST THICKNESS (IN.)	POST WEIGHT (LBS./FT.)	POST GAGE	SECTION MODULUS (IN. <sup>3</sup> )	ONE POST SV	TWO POST SV	THREE POST SV	POSTS PERMITTED IN 8' PATH	ANCHOR SIZE (IN.)	ANCHOR GAGE	MINIMUM ANCHOR LENGTH
1.75	.083	1.88	14	0.222	45	90	135	TWO	2.00	12	30
2.00	.109	2.42	12	0.393	80	160	240	TWO	2.25	12	48
2.50	.109	3.35	12	0.673	137	274	411	ONE	3.00	7	48

### NOTES:

- ALL SIGN POSTS SHALL HAVE  $\frac{7}{16}$  INCH HOLES EVERY ONE INCH ON CENTER (ALL FOUR SIDES).
- THE NUMBER OF SIGN POSTS PERMITTED WITHIN AN EIGHT FOOT PATH ASSUMES THAT THE SIGN ASSEMBLY IS NOT PROTECTED BY GUARDRAIL OR IS LOCATED WITHIN A GUARDRAIL'S DEFLECTION DISTANCE DETERMINED PER THE CURRENT "AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS" (AASHTO) ROADSIDE DESIGN GUIDE. ADDITIONAL POSTS MAY BE INSTALLED USING SLIP BASES THAT MEET "NATIONAL COOPERATIVE HIGHWAY RESEARCH PROGRAM" (NCHRP) REPORT 350 OR THE AASHTO "MANUAL FOR ASSESSING SAFETY HARDWARE" (MASH). THE APPROPRIATE RESOURCE SHALL BE DETERMINED AS DESCRIBED IN THE MASH PUBLICATION.
- TO USE THE SELECTION VALUE (SV) COLUMNS IN THE TABLE ABOVE, MULTIPLY A SIGN'S SURFACE AREA IN SQUARE FEET ( $H \times L$ ) BY THE SIGN'S HEIGHT IN FEET MEASURED FROM THE GROUND TO THE CENTROID OF THE SIGN ASSEMBLY ( $h$ ). THIS RESULT MUST BE LESS THAN OR EQUAL TO THE CORRESPONDING SELECTION VALUE. NOTE THAT FOR SIGNS WITH MULTIPLE POSTS, THE LARGEST HEIGHT DIMENSION SHALL BE USED TO CALCULATE THE POST SELECTION VALUE.
- THE DESIGN CRITERIA UTILIZED IN SIGN POST AND ANCHOR SELECTION IS AS FOLLOWS: WIND SPEED OF 70 MPH (10 YEAR MEAN RECURRENCE INTERVAL), WIND PRESSURE OF 19 PSF, STEEL MINIMUM YIELD OF 55,000 PSI, AND AN ALLOWABLE STRESS OF 1.4 (0.60 FY).

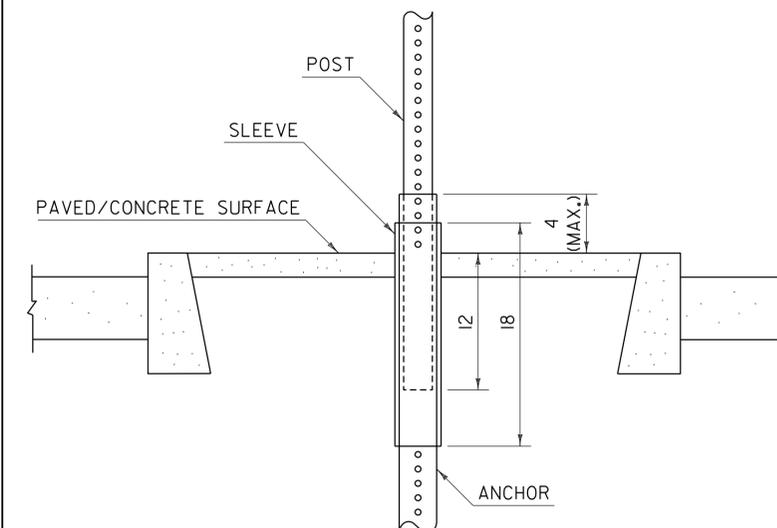
### CORNER BOLT INSTALLATION DETAIL



### NOTES:

- CORNER BOLTS SHALL BE  $\frac{5}{16}$  INCH DIAMETER WITH 18 THREADS PER INCH AND DIMENSIONS SHALL BE DETERMINED BASED ON THE OUTERMOST DIMENSION OF THE SLEEVE, ANCHOR OR POST. THREAD EXPOSURE MUST EXCEED THE CORRESPONDING NUT WIDTH. THE CORNER BOLT AND CORRESPONDING HARDWARE SHALL BE ZINC PLATED, MEETING OR EXCEEDING THE REQUIREMENTS OF THE "AMERICAN SOCIETY FOR TESTING AND MATERIALS" (ASTM) A307.

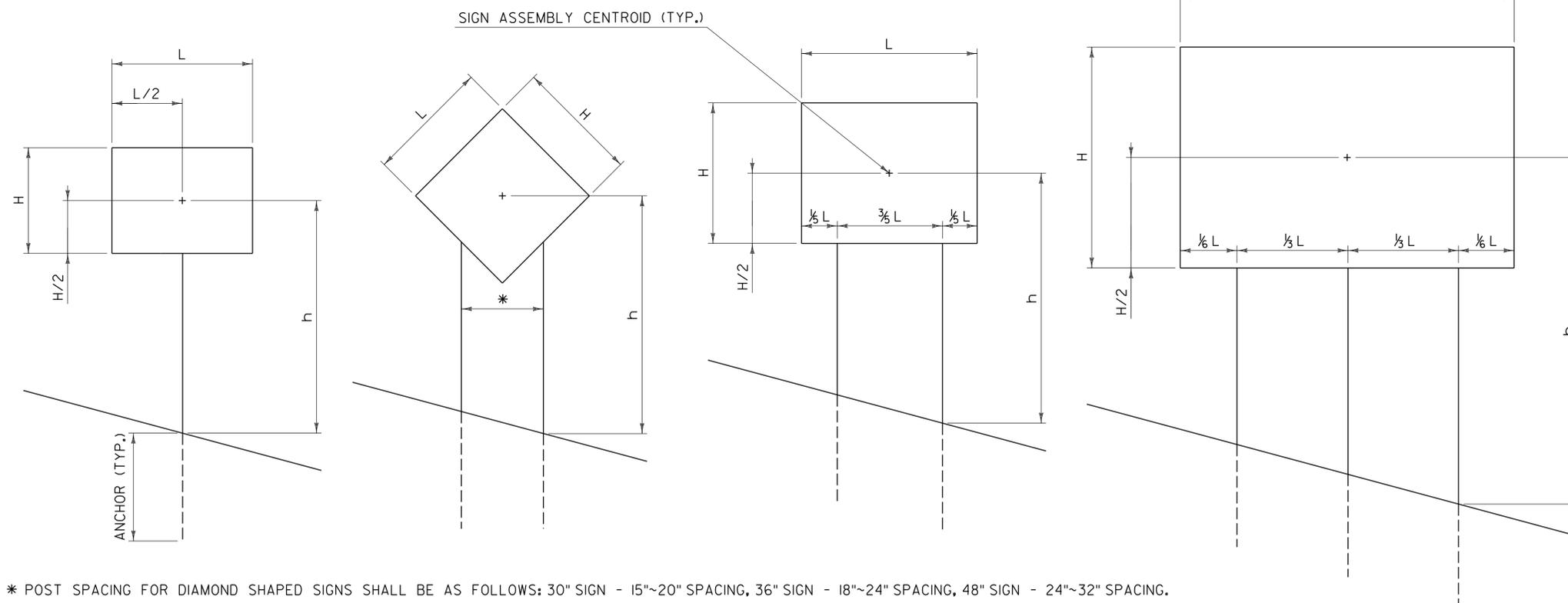
### SLEEVE /ANCHOR INSTALLATION DETAIL



### NOTES:

- A SLEEVE SHALL BE INSTALLED FOR SIGN INSTALLATIONS IN CONCRETE OR PAVEMENT.
- THE SLEEVE SHALL BE 18 INCHES MINIMUM IN LENGTH.
- THREE INCH SLEEVES THAT DO NOT HAVE HOLES WILL REQUIRE THAT  $\frac{7}{16}$  INCH HOLES ARE DRILLED TO FACILITATE CONNECTIONS.
- REFER TO CURRENT EDITION OF THE "VERMONT AGENCY OF TRANSPORTATION STANDARD SPECIFICATIONS FOR CONSTRUCTION" FOR MATERIAL REQUIREMENTS.

### POST SPACING DETAILS



\* POST SPACING FOR DIAMOND SHAPED SIGNS SHALL BE AS FOLLOWS: 30" SIGN - 15"~20" SPACING, 36" SIGN - 18"~24" SPACING, 48" SIGN - 24"~32" SPACING.

### GENERAL NOTES:

- ALL SQUARE TUBE STEEL POSTS AND ANCHORS SHALL BE FORMED INTO A SIZE AND SHAPE IN SUCH A MANNER THAT NEITHER FLASH NOR WELD SHALL INTERFERE WITH THE TELESCOPING PROPERTIES, NOR DAMAGE THE GALVANIZING.
- ANCHORS MAY BE DRIVEN OR SET INTO A DUG HOLE AND BACKFILLED. IF DRIVEN, A DRIVING CAP SHALL BE USED. THE DUG HOLE INSTALLATION METHOD SHALL BE UTILIZED IN AREAS WITH POOR SOIL CONDITIONS OR AS DIRECTED BY THE ENGINEER. BACKFILL SHALL BE COMPACTED AS DIRECTED BY THE ENGINEER.
- THE TOPS OF SIGN POSTS SHALL BE AT OR NEAR THE TOP OF SIGN. THE POST SHALL NOT EXTEND ABOVE THE TOP OF SIGN.
- SIGN POSTS SHALL BE INSTALLED A MINIMUM OF ONE FOOT BELOW GROUND, INSIDE THE ANCHOR. THE LENGTH OF ANCHOR EXPOSED ABOVE GROUND SHALL NOT EXCEED FOUR INCHES.
- ALL DIMENSIONS SHOWN IN INCHES.

**OTHER STDS. REQUIRED: NONE**

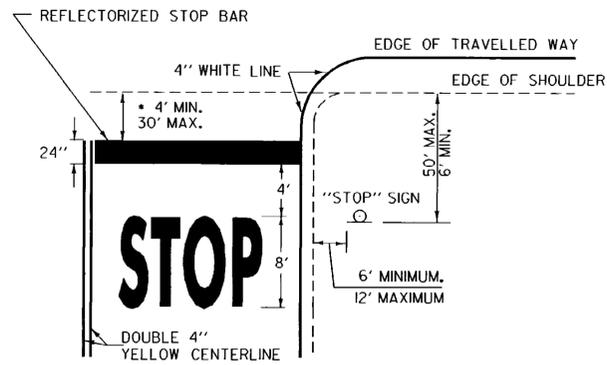
REVISIONS AND CORRECTIONS  
JAN. 2, 2013 - ORIGINAL APPROVAL DATE

APPROVED  
*[Signature]*  
HIGHWAY SAFETY & DESIGN ENGINEER  
*[Signature]*  
DIRECTOR OF PROGRAM DEVELOPMENT  
*[Signature]*  
MARK B. RICHTER  
FEDERAL HIGHWAY ADMINISTRATION

# SQUARE TUBE SIGN POST AND ANCHOR

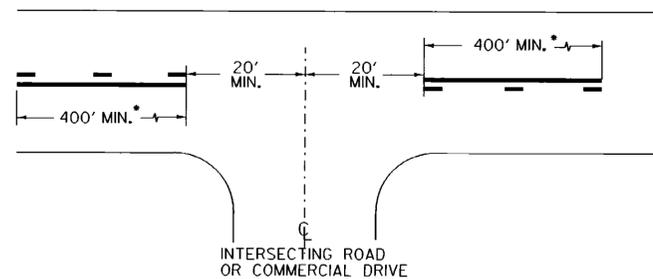


# STANDARD T-45



\* THE "DESIRED STOPPING POINT" IS THE LOCATION BASED ON SITE CONDITIONS THAT BEST ALLOWS THE STOPPED VEHICLE TO VIEW THE APPROACHING TRAFFIC.

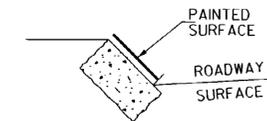
**STOP BAR LAYOUT**



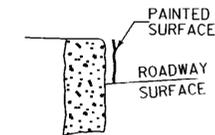
\* THE SOLID LINE SHALL BE PAIRED WITH EITHER A SOLID OR DASHED LINE DEPENDING ON SIGHT DISTANCE AVAILABILITY IN THE OPPOSING DIRECTION. ADJUSTMENTS TO THE 40 FOOT CENTERLINE OPENING MAY BE MADE TO ACCOMMODATE SKEWED INTERSECTIONS.

- CENTERLINE BREAKS:
- AT ALL STATE HIGHWAYS AND TOWN HIGHWAYS, INCLUDING CLASS 4 TH'S, THAT HAVE STOP AND LEGAL LOAD LIMIT SIGNS INSTALLED
  - COMMERCIAL DRIVES:
    - WHERE A SEPERATE TURN LANE EXISTS ON THE MAIN LINE (LT. OR RT.)
    - SIGNIFICANT TRAFFIC VOLUMES EXISTS.
    - IF MOTORISTS NEED ASSISTANCE TO DEFINE ENTRANCE POINTS.

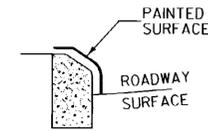
**CENTERLINE LAYOUT**



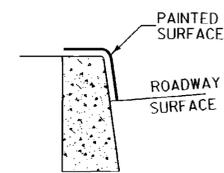
**GRANITE SLOPE EDGING**



**VERTICAL GRANITE CURB**

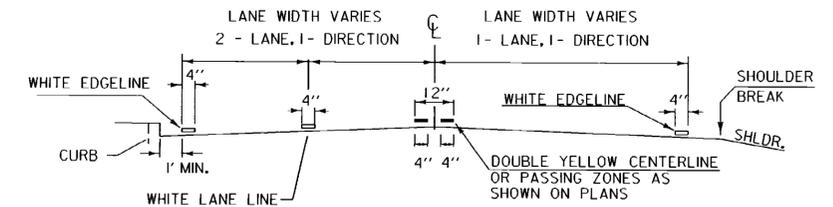


**TYPE A (CONCRETE)**

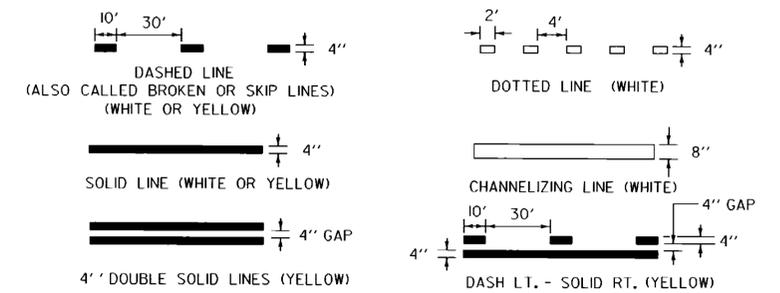


**TYPE B (CONCRETE)**

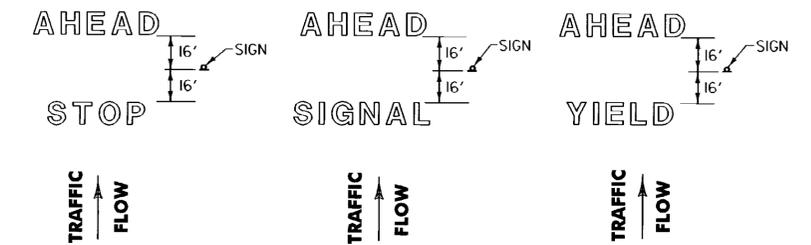
**PAINTED CURB**



**PAVEMENT MARKING PLACEMENT DETAIL**

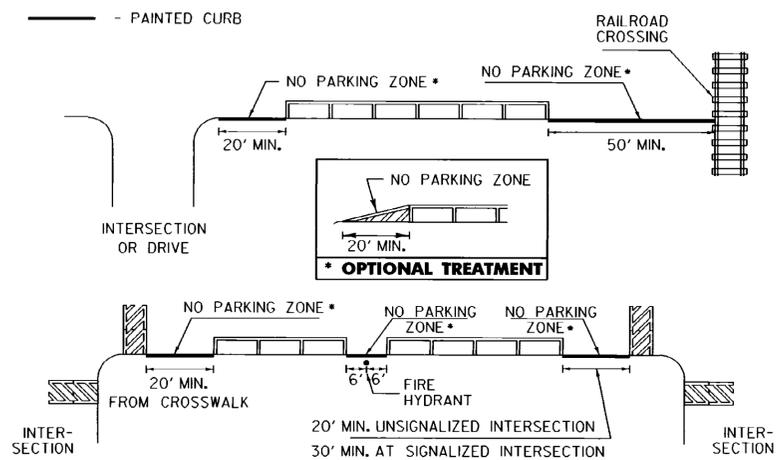


**PAVEMENT MARKING LINE DETAILS**

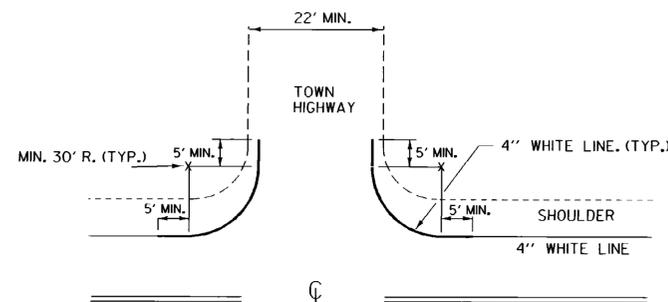


**LETTER IN WORD MARKING SPACING DETAIL**

NOTE: SINGLE WORDS CENTERED ON SIGN ie: SCHOOL OR YIELD



**NO PARKING LAYOUT DETAILS**

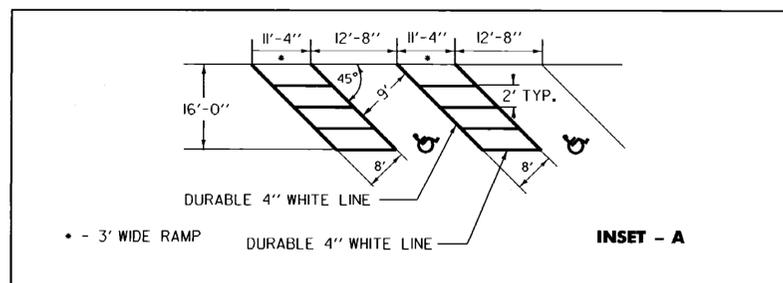


EDGE LINES SHALL BE APPLIED TO ALL STATE HIGHWAYS AND SHOULD BE MAINTAINED AT A CONSTANT DISTANCE FROM THE CENTERLINE UNLESS PAVEMENT WIDTH INCREASES TO ALLOW WIDER LANES.

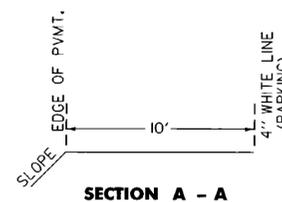
APPLY EDGE LINE AS DETAILED ON ALL PAVED CLASS 1 & CLASS 2 TOWN HIGHWAYS AND ANY CLASS 3 TOWN HIGHWAY 22 FEET OR MORE IN WIDTH.

IF MIN. 30 FOOT RADIUS CANNOT BE OBTAINED, OR THE TOWN HIGHWAY IS NOT PAVED, BREAK THE EDGE LINE USING AN 80 FOOT GAP AT INTERSECTION.

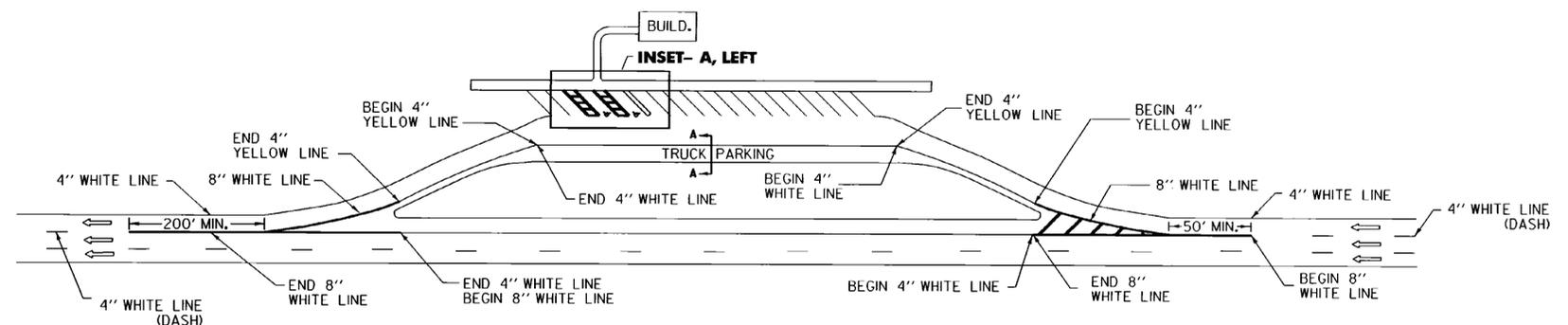
**EDGE LINE LAYOUTS**



NOTE: SEE STANDARD SHEET E-191 FOR HANDICAP SYMBOL POSITIONING AND DETAIL.



**TRUCK PARKING DETAIL**



**REST AREA PARKING DETAILS**

THIS SHEET IS NOT TO SCALE

OTHER STDS. E - 191, E - 192 REQUIRED

**REVISIONS AND CORRECTIONS**

AUG. 18, 1995 - DATE OF ORIGINAL ISSUE

**APPROVED**

*Sandra S. McCutchen*  
DIRECTOR OF ENGINEERING

*David A. Ross*  
TRAFFIC AND SAFETY ENGINEER

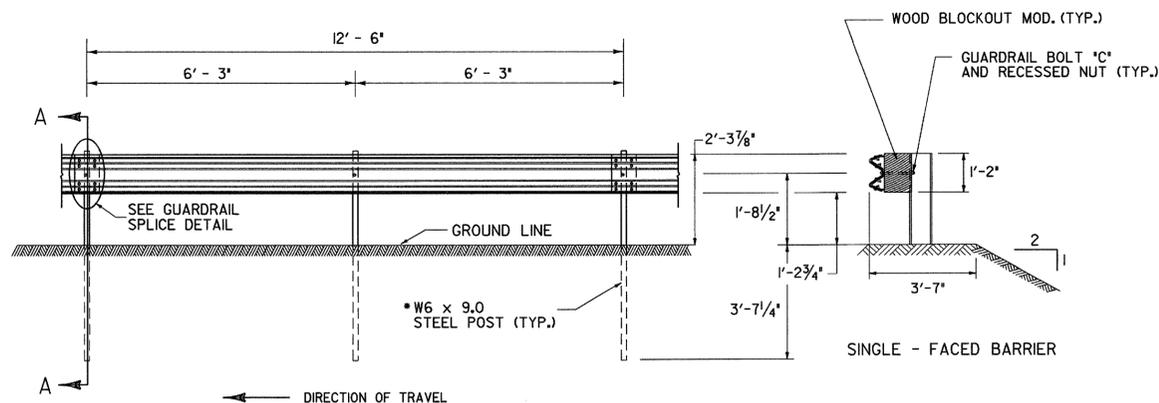
APPROVED FOR THIS PROJECT AND/OR DESIGN IMPLEMENTATION. FHWA FINAL APPROVAL PENDING.

**PAVEMENT MARKING DETAILS**

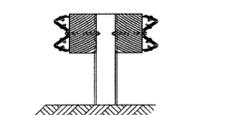


**STANDARD E-193**

"W" BEAM GUARDRAIL WITH STEEL POSTS

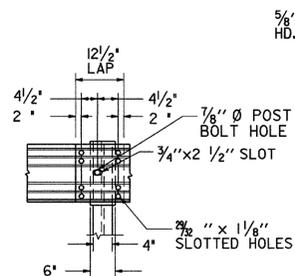


ELEVATION FROM CL OF ROAD

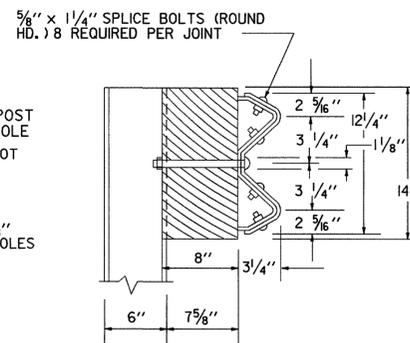


PLAN

SECTION A - A

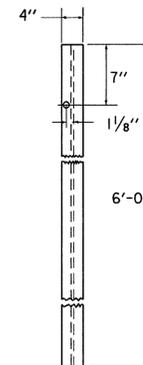


ELEVATION

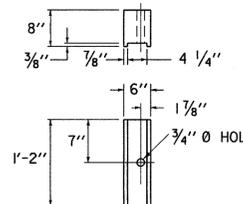


SECTION

GUARDRAIL SPLICE DETAIL



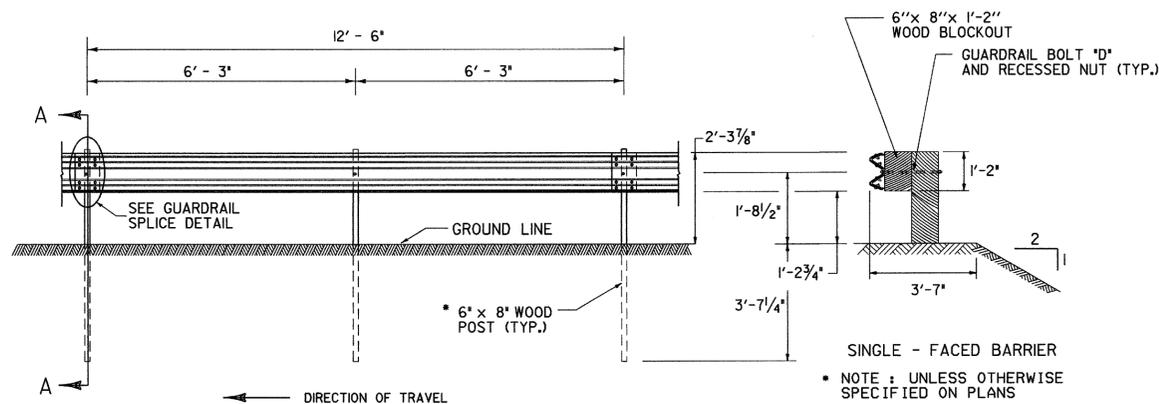
FRONT FACE STEEL POST



POST FACE  
MODIFIED WOOD BLOCKOUT - ROUTED  
6" X 8" X 1'-2"  
FOR USE W/ STEEL POSTS ONLY

- NOTES:
- BLOCKS SHALL BE MADE OF TIMBER WITH A STRESS GRADE OF 1200 PSI OR MORE. TESTING SHALL BE IN ACCORDANCE WITH WEST COAST LUMBER INSPECTION BUREAU, SOUTHERN PINE INSPECTION BUREAU OR OTHER APPROPRIATE ASSOCIATION. TIMBER FOR BLOCKS SHALL BE ROUGH SAWN (UNPLANED) WITH DIMENSIONS INDICATED. THE SIZE TOLERANCE OF ROUGH SAWN BLOCKS IN THE DIRECTION OF THE BOLT HOLES SHALL BE NOT MORE THAN  $\pm 1/4"$ .
  - SUPPLY WOOD BLOCKS PER AASHTO M 168.
  - TREAT WITH PRESERVATIVE PER AASHTO M 133.
  - BLOCKOUTS MAY ALSO BE MADE OF APPROVED ALTERNATIVE MATERIAL.

"W" BEAM GUARDRAIL WITH WOOD POSTS

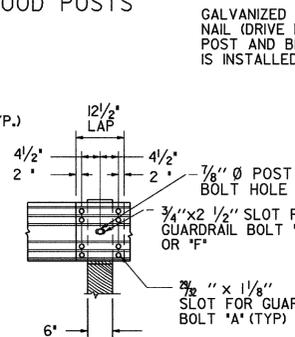


ELEVATION FROM CL OF ROAD

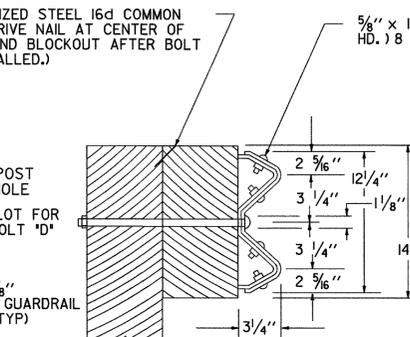


PLAN

SECTION A - A

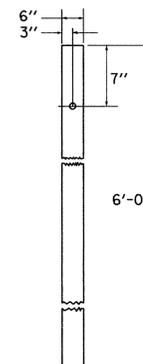


ELEVATION

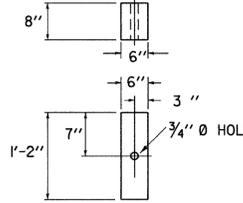


SECTION

GUARDRAIL SPLICE DETAIL



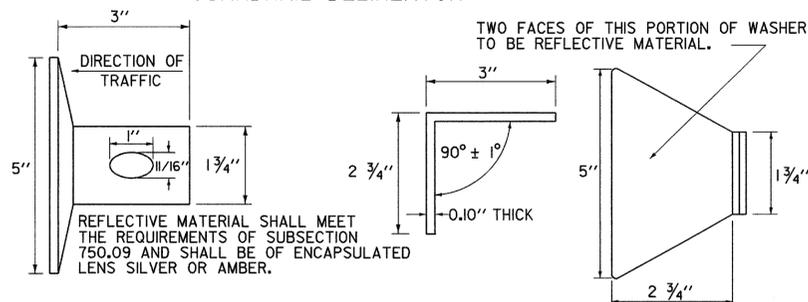
FRONT FACE WOOD POST



POST FACE  
WOOD BLOCKOUT  
6" X 8" X 1'-2"

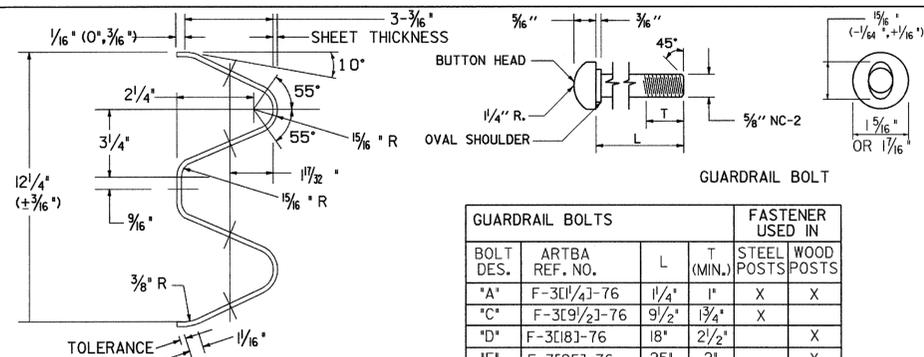
- NOTES:
- BLOCKS SHALL BE MADE OF TIMBER WITH A STRESS GRADE OF 1200 PSI OR MORE. TESTING SHALL BE IN ACCORDANCE WITH WEST COAST LUMBER INSPECTION BUREAU, SOUTHERN PINE INSPECTION BUREAU OR OTHER APPROPRIATE ASSOCIATION. TIMBER FOR BLOCKS SHALL BE ROUGH SAWN (UNPLANED) WITH DIMENSIONS INDICATED. THE SIZE TOLERANCE OF ROUGH SAWN BLOCKS IN THE DIRECTION OF THE BOLT HOLES SHALL BE NOT MORE THAN  $\pm 1/4"$ .
  - SUPPLY WOOD BLOCKS PER AASHTO M 168.
  - TREAT WITH PRESERVATIVE PER AASHTO M 133.
  - BLOCKOUTS MAY ALSO BE MADE OF APPROVED ALTERNATIVE MATERIAL.

GUARDRAIL DELINEATOR



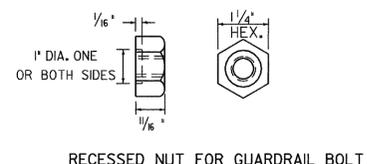
REFLECTIVE MATERIAL SHALL MEET THE REQUIREMENTS OF SUBSECTION 750.09 AND SHALL BE OF ENCAPSULATED LENS SILVER OR AMBER.

THIS REFLECTORIZED ALUMINUM WASHER IS TO BE PLACED IN VALLEY OF BEAM WHEN MOUNTING BEAM ONTO EACH FIFTH POST. WASHER SHALL MEET SPECIFICATION REQUIREMENTS FOR A.S.T.M. B-209 ALLOY 5052-H32

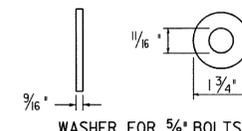


ARTBA RE-3[206]-3[12]-6" CLASS A, TYPE 13-73  
TYPICAL GUARDRAIL SECTION

BOLT DES.	ARTBA REF. NO.	L	T (MIN.)	FASTENER USED IN	
				STEEL POSTS	WOOD POSTS
*A	F-3[114]-76	1 1/4"	1"	X	X
*C	F-3[92]-76	9/2"	1 3/4"	X	
*D	F-3[18]-76	18"	2 1/2"		X
*F	F-3[25]-76	25"	2"		X



RECESSED NUT FOR GUARDRAIL BOLT



WASHER FOR 5/8" BOLTS

NOTE: WASHER IS USED UNDER RECESSED NUT WHERE GUARDRAIL BOLT IS USED WITH WOOD POSTS.

GENERAL NOTES:

- GUARDRAIL SHALL MEET THE REQUIREMENTS OF AASHTO M 180, CLASS A, TYPE 1, UNLESS OTHERWISE DESIGNATED
- GUARDRAIL SHALL BE SINGLE FACED UNLESS OTHERWISE DESIGNATED
- GUARDRAIL SECTIONS SHALL BE LAPPED IN THE DIRECTION OF TRAFFIC FLOW FOR THE LANE NEAREST THE GUARDRAIL.
- FOR DESCRIPTION AND SPECIFICATION OF PARTS IDENTIFIED BY (ARTBA ...) AND OTHER DETAILS OF POSTS, POST ACCESSORIES, FASTENERS & RAIL ELEMENTS, SEE AASHTO-AGC-ARTBA JOINT TASK FORCE NO. 13, TITLED "A GUIDE TO STANDARDIZED HIGHWAY BARRIER HARDWARE", LATEST EDITION.
- STANDARD STEEL BEAM TO BE 1/8" AND THE HEAVY DUTY TO BE 3/8" THICK.

OTHER STANDARD REQUIRED G-1d

REVISIONS AND CORRECTIONS  
JUNE 1, 1994 - REISSUED, WITHOUT CHANGE,  
UNDER NEW SIGNATURES.  
JAN.3,2000 - UPDATED TO REFLECT METRIC STD.  
CHANGES

APPROVED

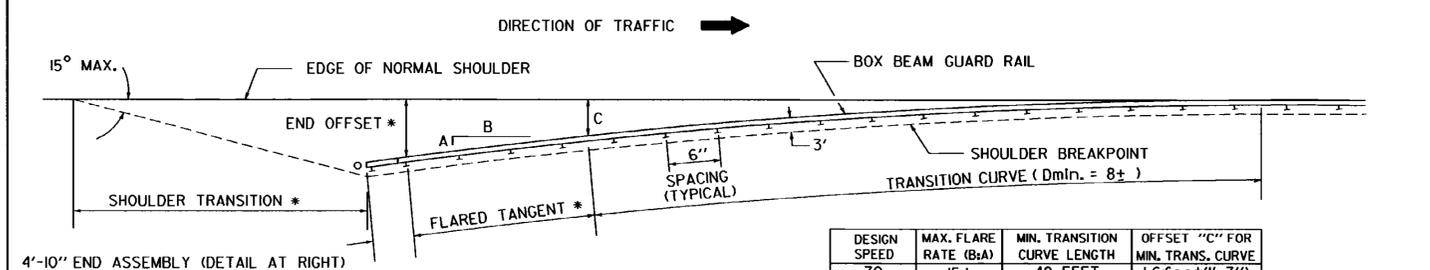
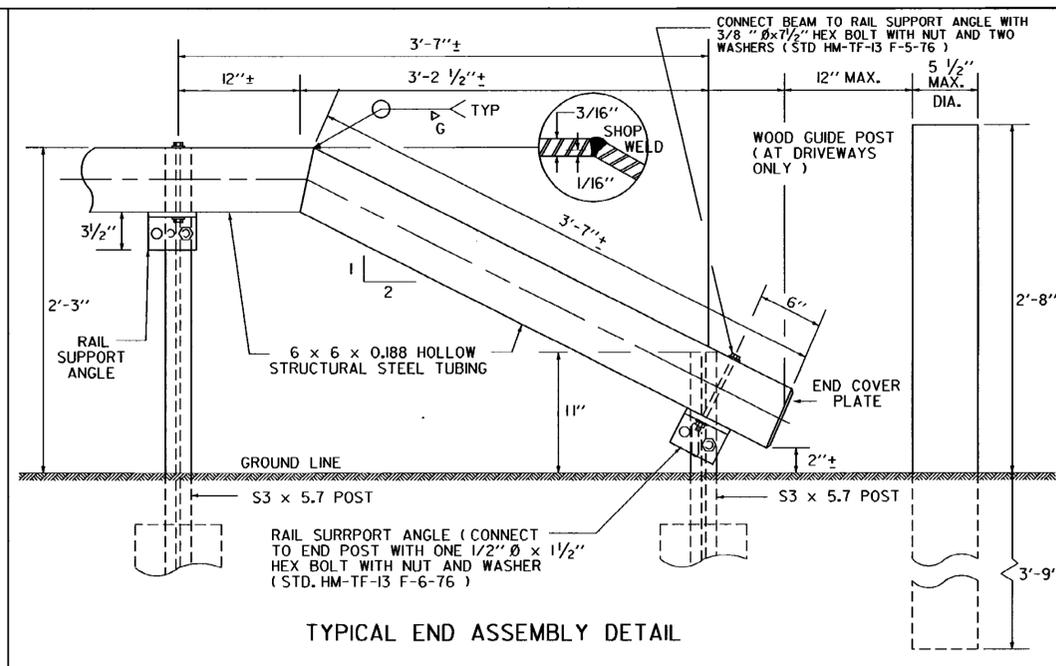
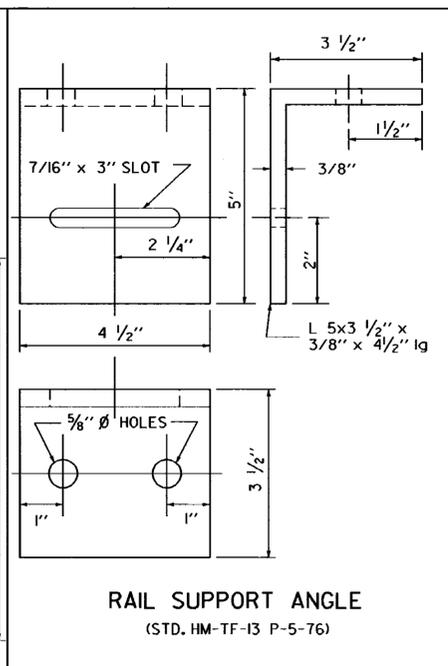
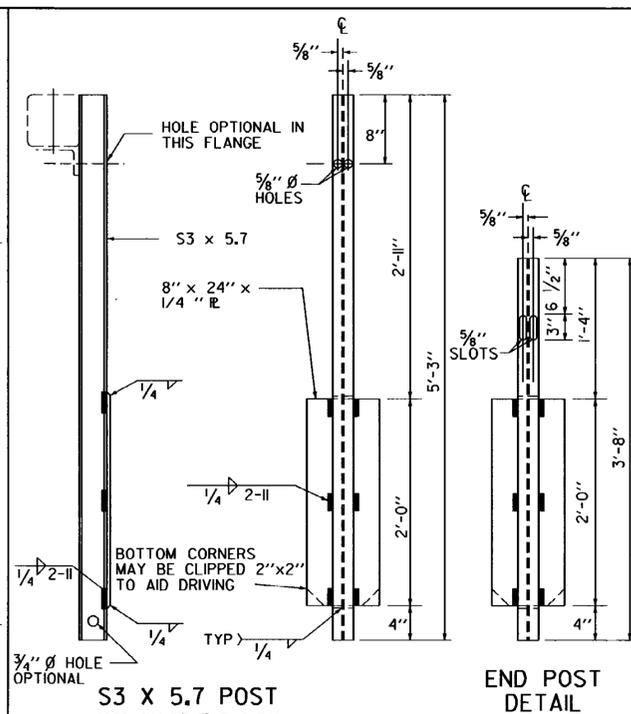
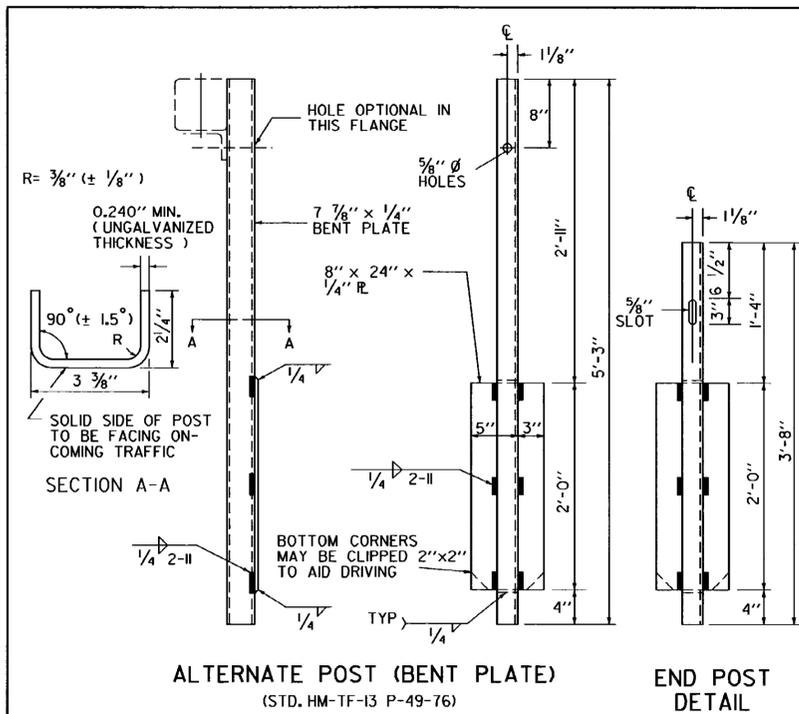
*Robert Steel*  
DIRECTOR OF PROJECT DEVELOPMENT

*Robert Steel*  
ROADWAY AND TRAFFIC DESIGN ENGINEER

STEEL BEAM GUARDRAIL WITH STEEL POSTS  
STEEL BEAM GUARDRAIL WITH WOOD POSTS

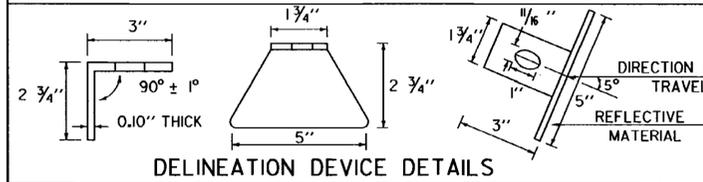


STANDARD  
G-1



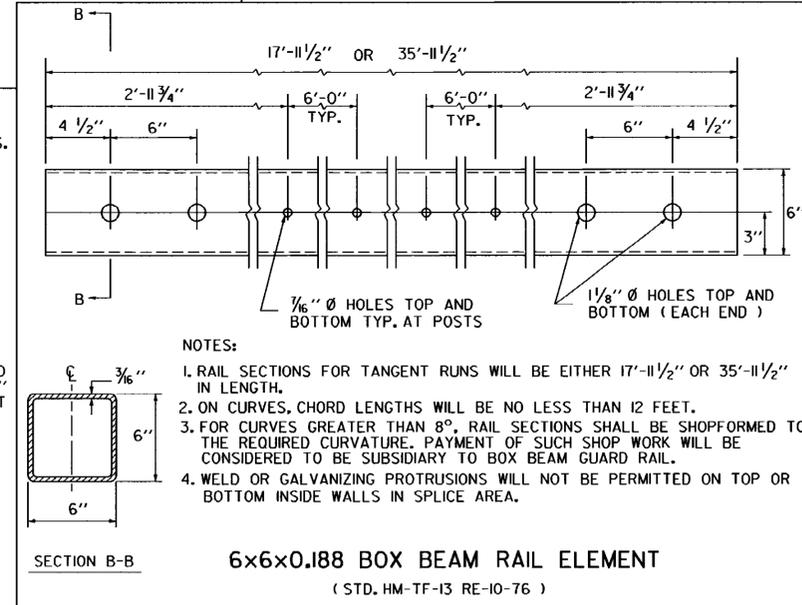
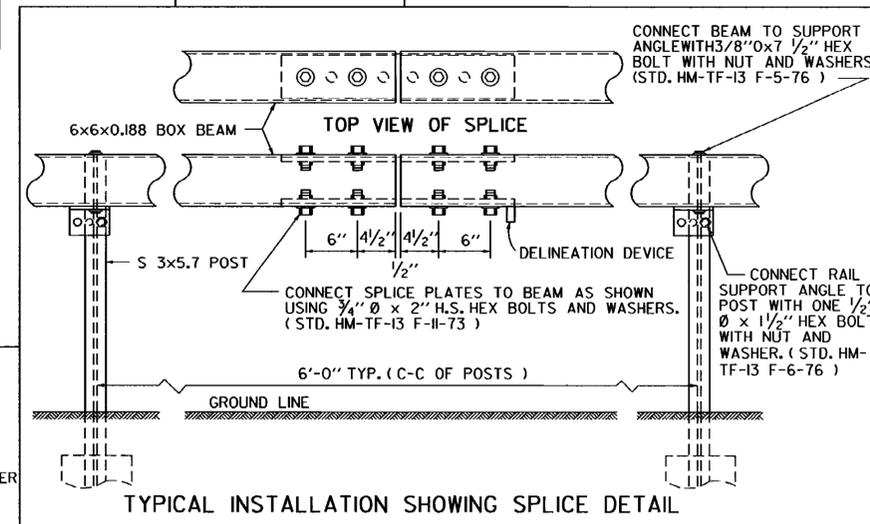
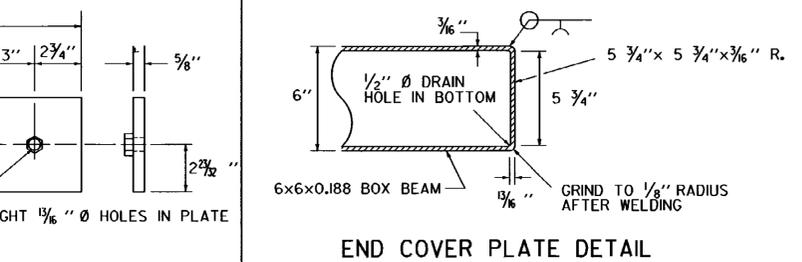
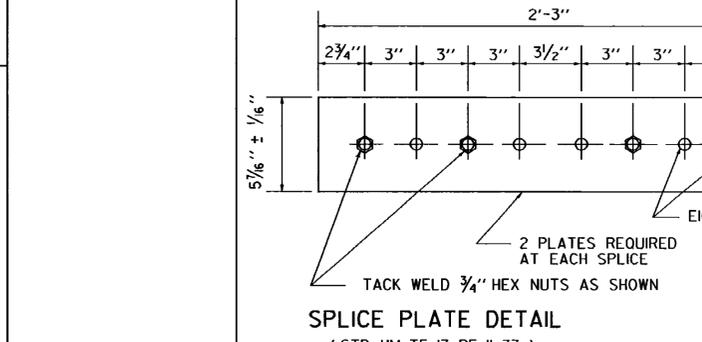
DESIGN SPEED	MAX. FLARE RATE (ft/ft)	MIN. TRANSITION CURVE LENGTH	OFFSET "C" FOR MIN. TRANS. CURVE
70	15:1	48 FEET	1.6feet(1'-7")
60	13:1	54 FEET	2.1feet(2'-1")
50	11:1	66 FEET	3.0feet(3'-0")
40	9:1	78 FEET	4.3feet(4'-4")

- GENERAL NOTES**
1. THE DESIRED APPROACH END OFFSET SHOULD BE AT LEAST 8' FROM THE EDGE OF NORMAL SHOULDER WHERE SPACE PERMITS; IN SPECIAL CASES, THE END OFFSET MAY BE REDUCED. IN NO CASE, HOWEVER, WILL THE END OFFSET BE LESS THAN 4'.
  2. POST SPACING WILL BE 6'-0" C-C, EXCEPT IN THE VICINITY OF THE JUNCTION OF BOX BEAM GUARD RAIL AND BRIDGE RAILING, AND AT OTHER LOCATIONS INDICATED ON THE PLANS. AT BRIDGE APPROACHES, THE 50' SECTION ADJACENT TO THE BRIDGE RAILING WILL HAVE A POST SPACING OF 4'-0" C-C.
  3. FOR MATERIAL REQUIREMENTS AND CONSTRUCTION DETAILS SEE SPECIFICATIONS FOR BOX BEAM GUARD RAIL.
  4. RAIL ALIGNMENT TO BE STRAIGHT AT SPLICES. NO LATERAL BENDS PERMITTED WITHIN THE SPLICE. THIS DOES NOT PRECLUDE THE SHOP FABRICATION OF BENT SPLICES.
  5. THE LINE OF BOX BEAM GUARD RAIL WHEN COMPLETED SHALL PRESENT A SMOOTH AND PLEASING GRADE LINE IN BOTH HORIZONTAL AND VERTICAL PLANES.
  6. ALL POSTS IN A GIVEN RUN TO BE OF THE SAME TYPE.



THIS REFLECTORIZED ALUMINUM DELINEATION DEVICE IS TO BE ERRECTED EVERY 36 FEET, AT SPLICES. DELINEATOR SHALL MEET SPECIFICATION REQUIREMENTS FOR ASTM B209 ALLOY 5052-H32.

REFLECTIVE MATERIAL SHALL MEET THE REQUIREMENTS OF SUBSECTION 750.09 AND SHALL BE OF ENCAPSULATED LENS SILVER OR AMBER. AMBER IS TO BE INSTALLED ON THE LEFT OR MEDIAN SIDE OF INTERSTATE ROADWAYS OR RAMPS.



**REVISIONS AND CORRECTIONS**

OCT. 17, 1979- ORIGINAL APPROVAL DATE

JULY 23, 1980- CHANGED DIAMETER OF GUIDE POST

DEC. 16, 1980- INCREASED SHOULDER WIDENING FOR GUARD RAIL

JUNE 17, 1984- DELINEATOR DEVICE ADDED

DEC. 21, 1984- HEIGHT OF RAIL LOWERED FROM 2'-6" TO 2'-3"

OCT. 31, 1985- REVISED TO CONFORM TO 1986 SPECIFICATIONS

JUNE 1, 1994 - REISSUED, WITHOUT CHANGE, UNDER NEW SIGNATURES.

**APPROVED**

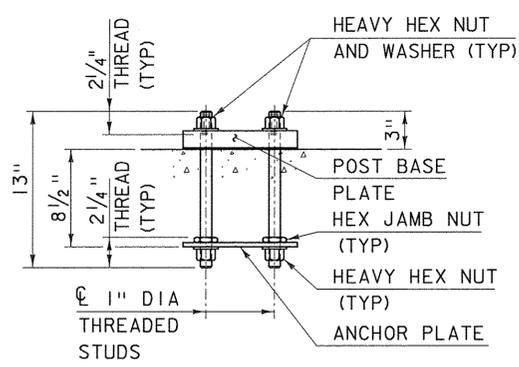
APPROVED FOR THIS PROJECT AND/OR DESIGN IMPLEMENTATION. FHWA FINAL APPROVAL PENDING.

*Stanley B. MacArthur, P.E.*  
DIRECTOR OF ENGINEERING

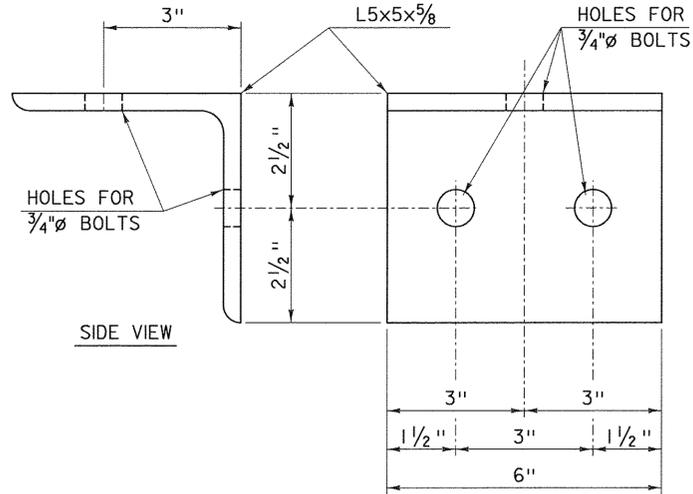
*Robert M. Murphy, P.E.*  
DESIGN ENGINEER

# BOX BEAM GUARD RAIL

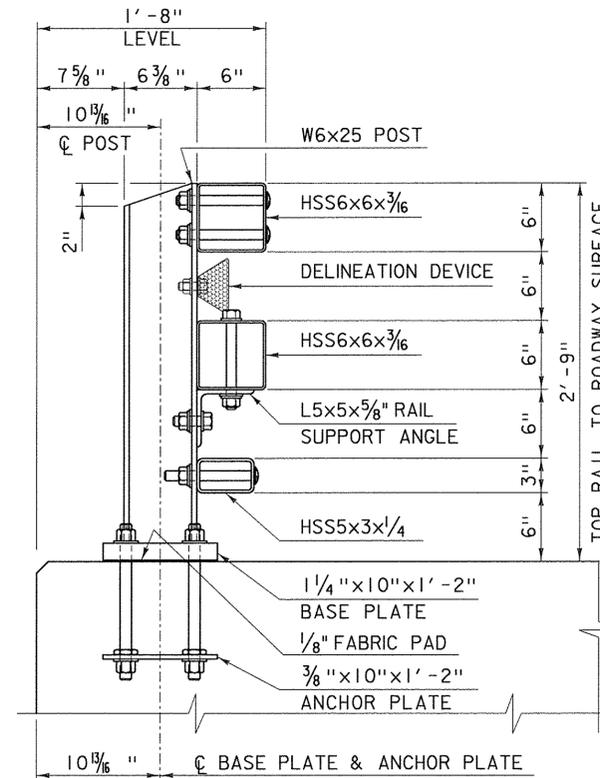




RAILING POST ANCHORAGE



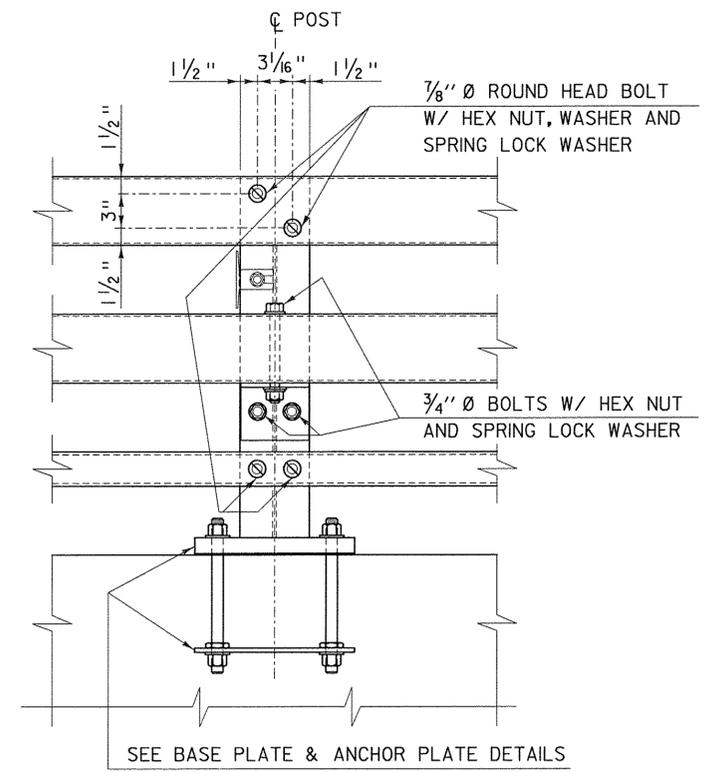
ELEVATION VIEW  
RAILING ANGLE DETAILS



RAILING SECTION

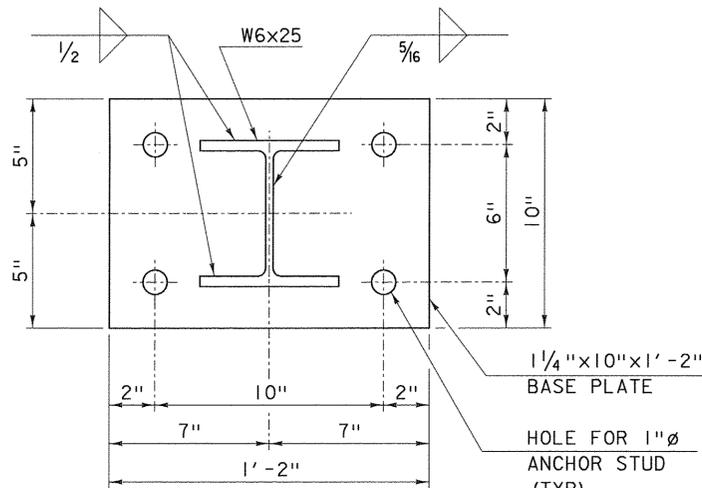
NOTES: 1. ALL WORK AND MATERIALS SHALL CONFORM TO SECTION 525.

2. PRIOR TO GALVANIZING THE ASSEMBLED POST, GRIND ALL EDGES TO A MINIMUM RADIUS OF 1/16".
3. ALL POSTS SHALL BE SET NORMAL TO GRADE. THE MAXIMUM CENTER TO CENTER SPACING OF BRIDGE RAIL POSTS IS 8'-3".
4. SECTIONS OF RAIL TUBE SHALL BE ATTACHED TO A MINIMUM OF TWO BRIDGE POSTS AND PREFERABLY TO AT LEAST 4 POSTS.
5. RAIL TUBE EXPANSION JOINTS SHALL BE PROVIDED IN ANY RAIL BAY SPANNING THE END OF AN INTEGRAL ABUTMENT BRIDGE AND AT ALL SUPERSTRUCTURE EXPANSION JOINTS. EXPANSION JOINT WIDTH SHALL BE 4" @ 68°F AND WILL BE ADJUSTED IN THE FIELD BY THE ENGINEER FOR OTHER TEMPERATURES.
6. HOLES IN RAILS FOR TUBE ATTACHMENT MAY BE FIELD-DRILLED. HOLES SHALL BE COATED WITH AN APPROVED ZINC-RICH PAINT PRIOR TO INSTALLATION.
7. BOLTS SHALL BE TORQUED SNUG TIGHT (APPROXIMATELY 100 FT-LB).
8. SEE STANDARD DRAWING G-1B FOR DETAILS OF DELINEATORS. A DELINEATOR SHALL BE INSTALLED AT 30 FOOT SPACING OR THE NEAREST POST. WHITE IS TO BE INSTALLED ON THE DRIVER'S RIGHT. FOR ONE WAY BRIDGES, YELLOW IS TO BE INSTALLED ON THE DRIVER'S LEFT. PAYMENT SHALL BE INCIDENTAL TO OTHER ITEMS.
9. ANY BENDING OF RAIL SHALL BE DONE AT THE FABRICATION PLANT ACCORDING TO A PROCEDURE PROVIDED BY THE FABRICATOR.
10. THE MINIMUM DISTANCE FROM THE POST TO AN EXPANSION JOINT SHALL BE DETERMINED BY THE MINIMUM EDGE DISTANCE OF 5" FROM ANY ANCHOR STUD TO THE END OF THE SLAB, OR TO THE EXPANSION JOINT RECESS POUR, IF ONE IS USED.
11. THIS RAILING MEETS THE REQUIREMENTS FOR A TL-4 SERVICE LEVEL.

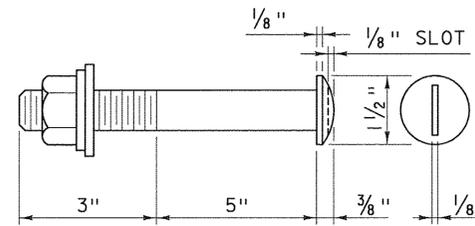


RAILING ELEVATION

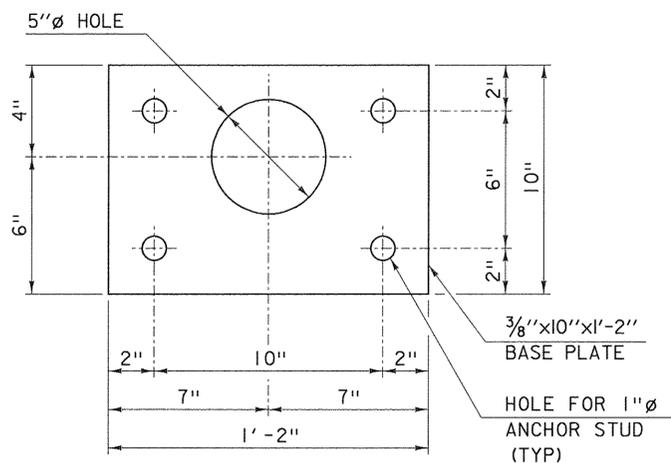
SEE BASE PLATE & ANCHOR PLATE DETAILS



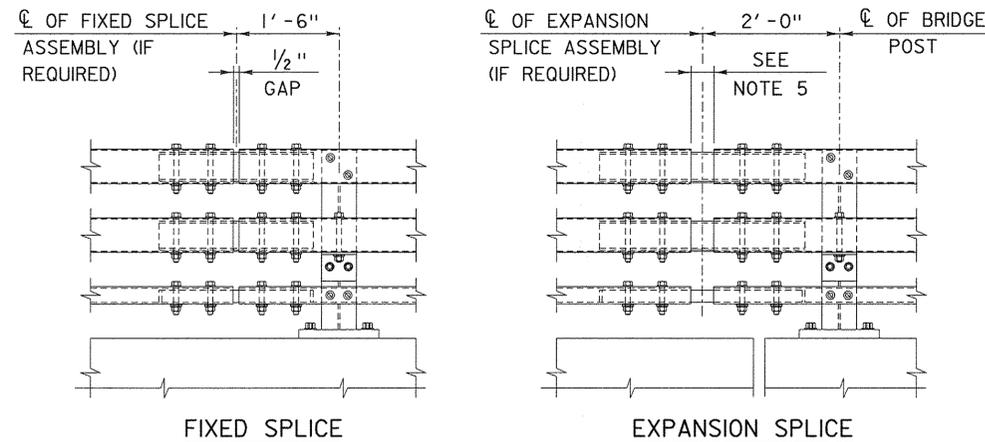
BASE PLATE DETAIL



ROUND HEAD BOLT DETAIL  
A449 (TYPE 1)



ANCHOR PLATE DETAIL



RAILING SPLICE DETAIL ELEVATION

A RAILING EXPANSION SPLICE IS REQUIRED IN ANY POST SPACING THAT CONTAINS A SUPERSTRUCTURE EXPANSION JOINT

REVISIONS AND CORRECTIONS  
AUGUST 9, 2010 - ORIGINAL APPROVAL  
APRIL 23, 2012 - GENERAL UPDATE 2012

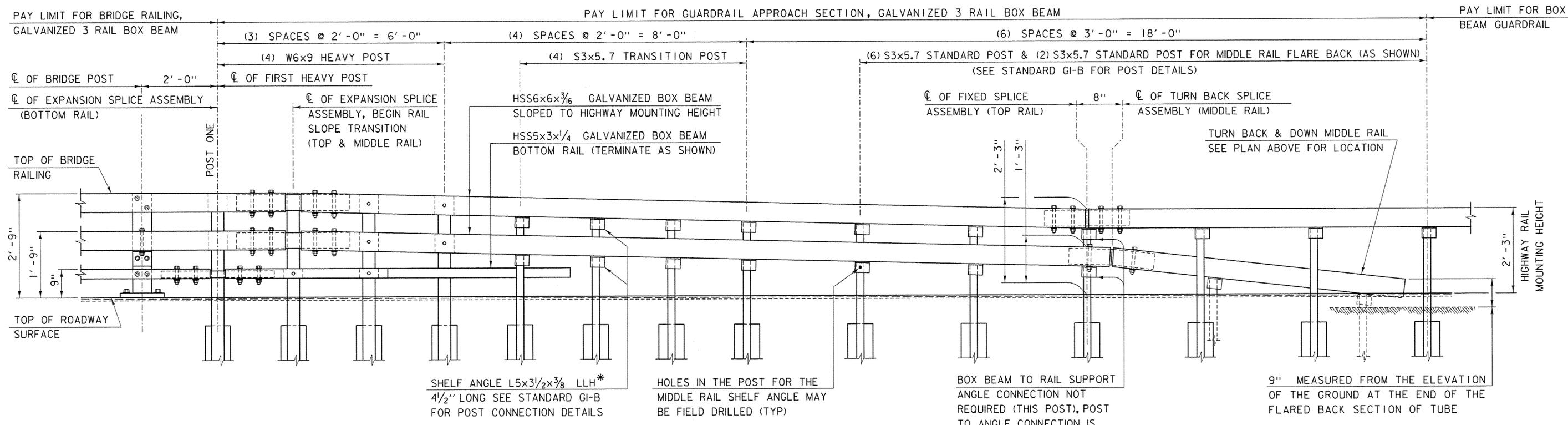
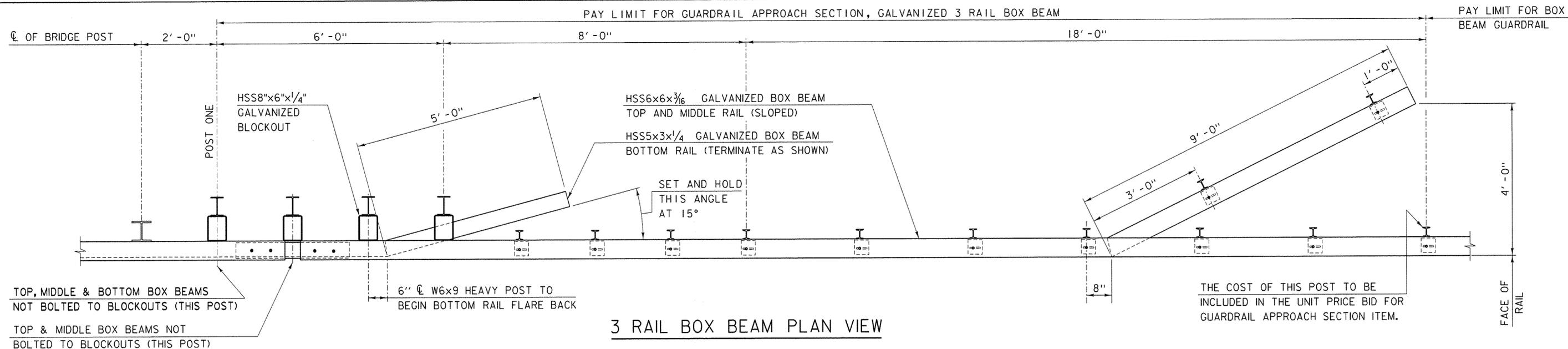
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# BRIDGE RAILING, GALVANIZED 3 RAIL BOX BEAM

OTHER STDS. REQUIRED: **G-1B, S-364C**



# STANDARD S-364A



**3 RAIL BOX BEAM ELEVATION**

\* LONG LEG HORIZONTAL

**NOTES:**

- BOX BEAM TUBE AND STEEL POST MATERIALS, DIMENSION SIZES AND NOTES SHALL BE THE SAME AS THOSE OF THE BRIDGE RAIL, UNLESS OTHERWISE NOTED.

**OTHER STDS. REQUIRED: G-1B, S-364A**

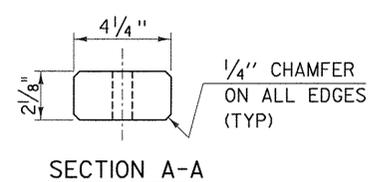
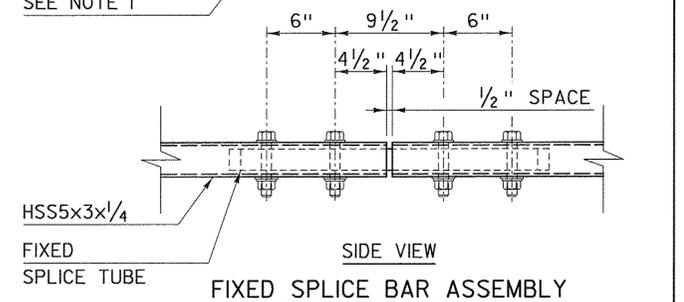
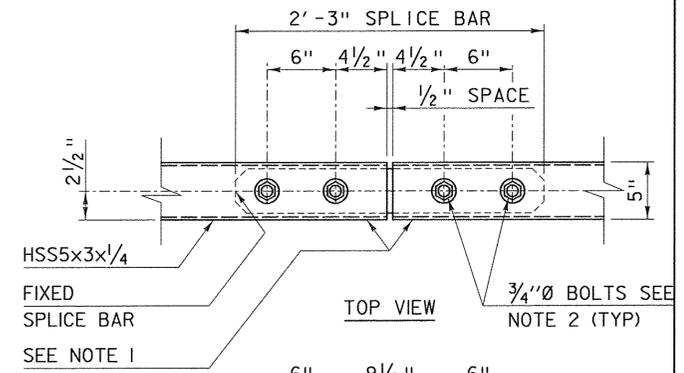
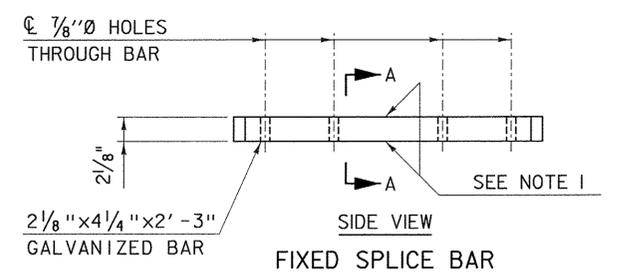
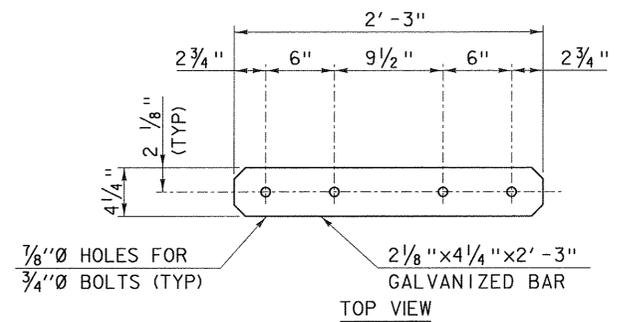
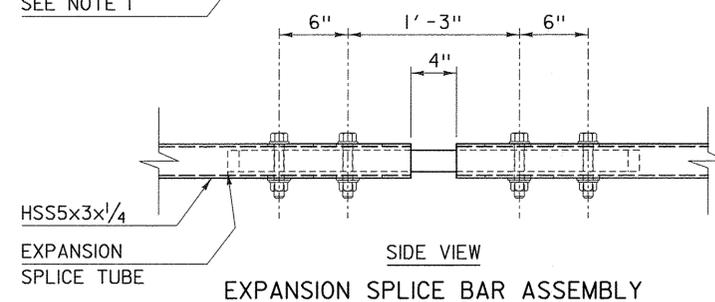
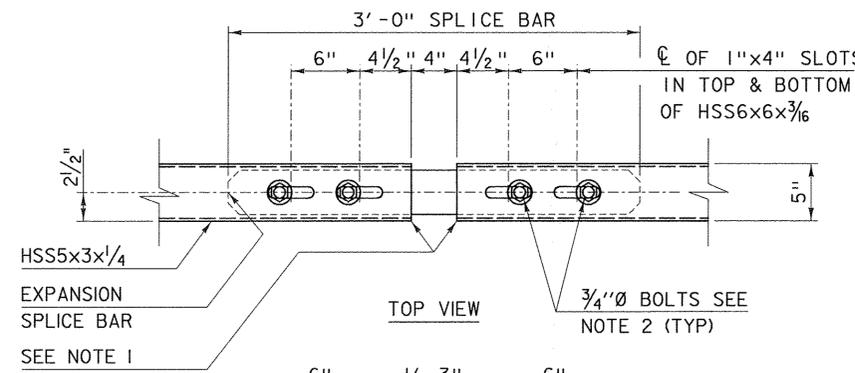
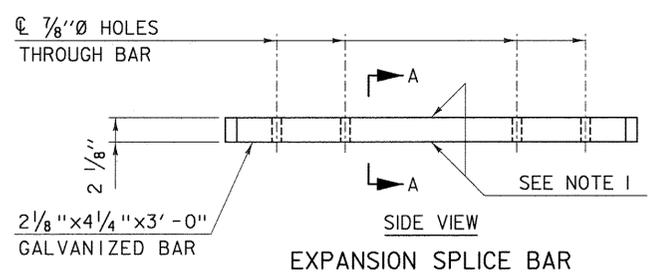
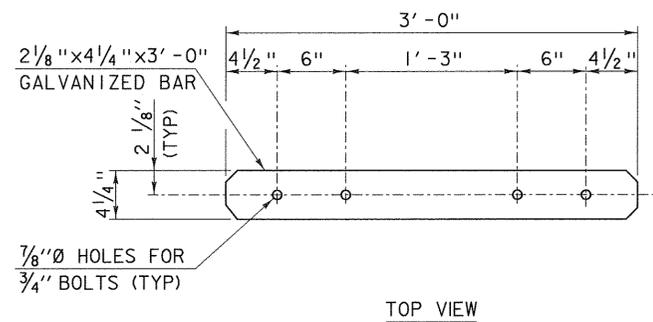
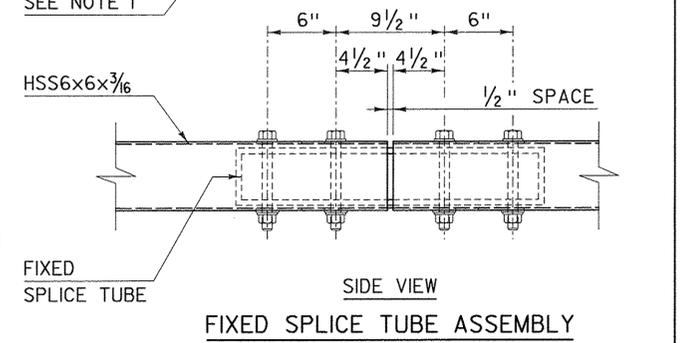
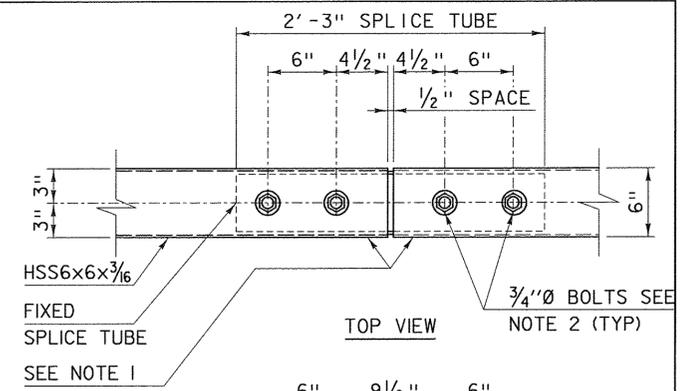
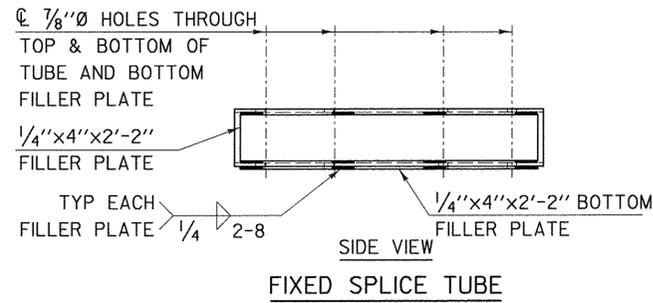
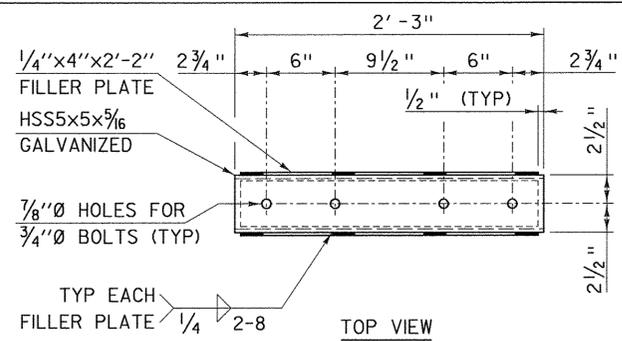
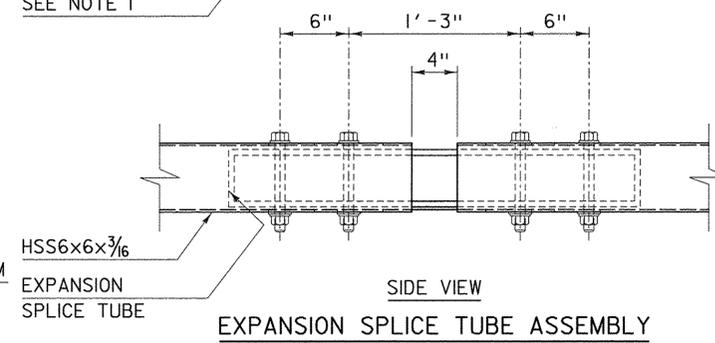
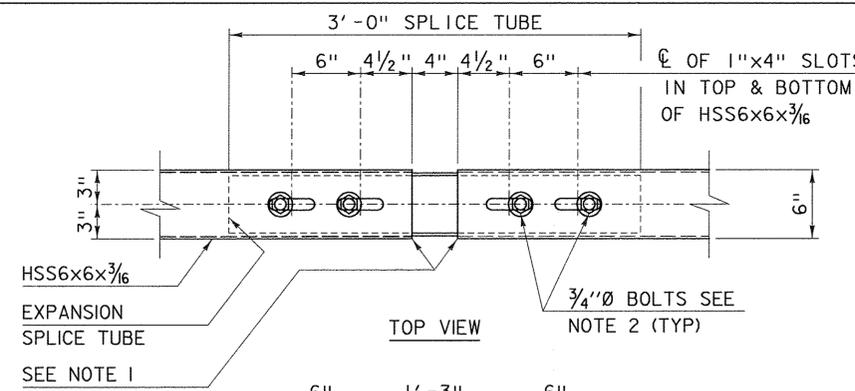
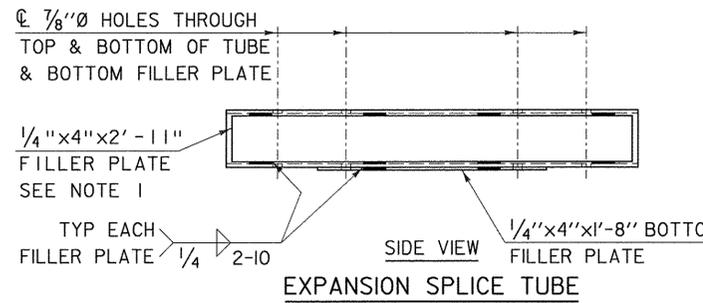
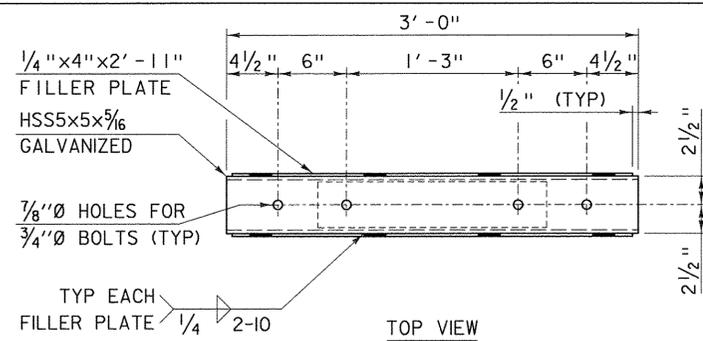
REVISIONS AND CORRECTIONS  
 AUGUST 9, 2010 - ORIGINAL APPROVAL  
 APRIL 23, 2012 - GENERAL UPDATE 2012

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**GUARDRAIL APPROACH SECTION, GALVANIZED 3 RAIL BOX BEAM**



**STANDARD S-364B**



NOTES:

1. PROTRUSIONS CAUSED BY WELDING OR GALVANIZING ARE NOT PERMITTED ON THE ADJOINING SURFACES OF THE BOX BEAM RAILS, SPLICE TUBES AND FILL PLATES.
2. FOUR (4) 3/4" DIAMETER FULLY THREADED BOLTS, 7 1/2" LONG WITH TWO (2) WASHERS AND A HEAVY HEX NUT ON EACH BOLT. NUT TO BE FINGER TIGHT AND THE FIRST THREAD BELOW THE NUT TO BE BURRED TO PREVENT DISLODGING. FOUR (4) BOLTS AT EACH SPLICE.

REVISIONS AND CORRECTIONS  
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APRIL 23, 2012 - GENERAL UPDATE 2012

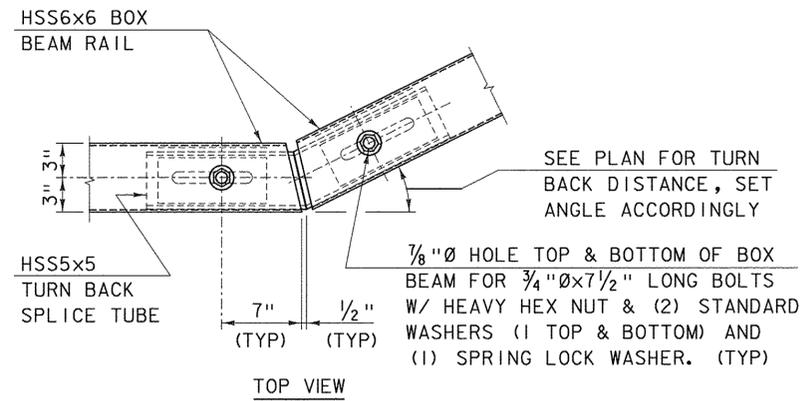
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# GUARDRAIL APPROACH SECTION, GALVANIZED 3 RAIL BOX BEAM

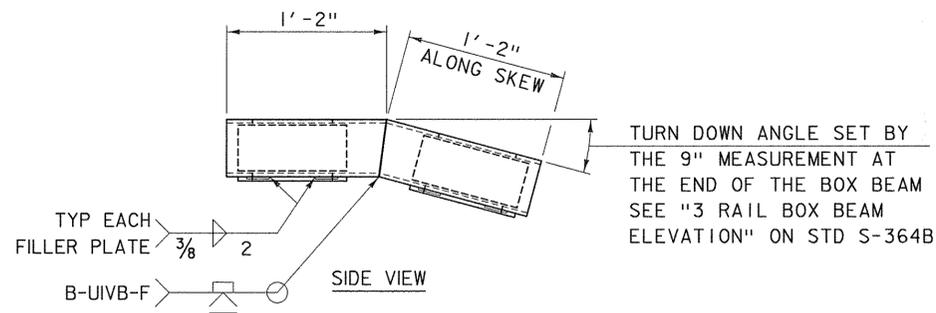
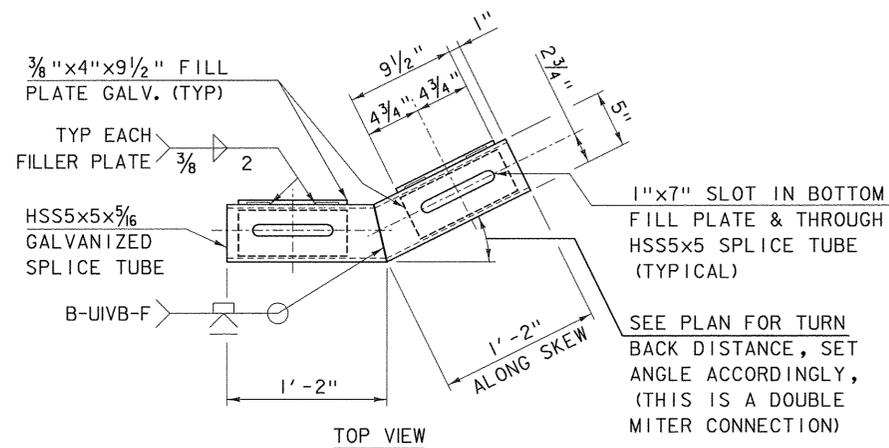
OTHER STDS. REQUIRED:



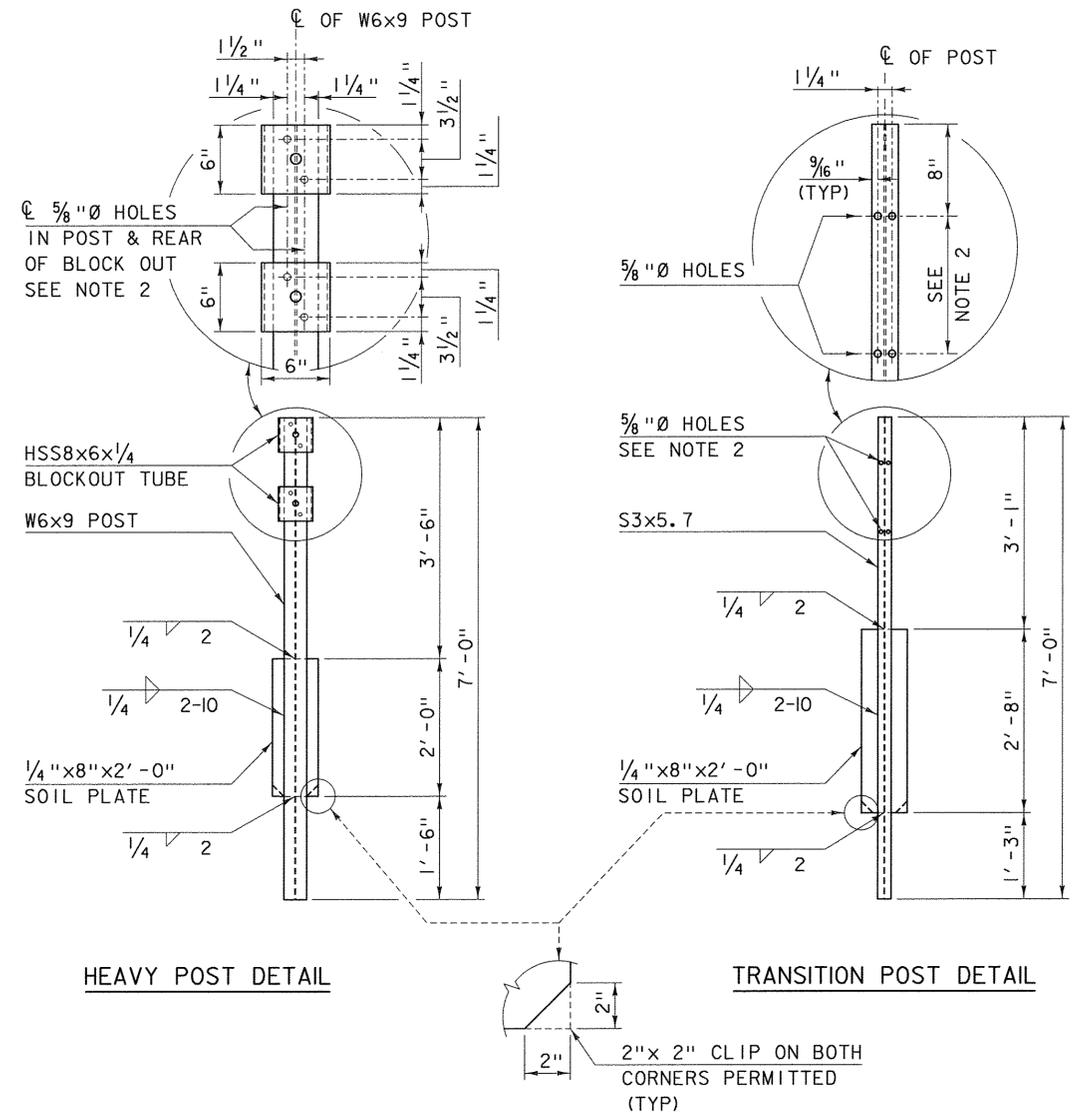
# STANDARD S-364C



**TURN BACK SPLICE TUBE ASSEMBLY**



**TURN BACK SPLICE TUBE DETAIL  
TURN BACK & TURN DOWN TUBE JOINT**



**HEAVY POST DETAIL**

**TRANSITION POST DETAIL**

**NOTES:**

1. PROTRUSIONS CAUSED BY WELDING OR GALVANIZING ARE NOT PERMITTED ON THE ADJOINING SURFACES OF THE BOX BEAM RAILS, SPLICE TUBES AND FILL PLATES.
2. HOLES IN THE POST FOR THE LOWER RAIL MAY BE LOCATED AND DRILLED IN THE FIELD. IF SO, THE GALVANIZING SHALL BE REPAIRED IN ACCORDANCE WITH SPECIFICATION SECTION 525.

**OTHER STDS.  
REQUIRED:**

REVISIONS AND CORRECTIONS  
AUGUST 9, 2010 - ORIGINAL APPROVAL  
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*Mark D. Richter*  
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**GUARDRAIL APPROACH  
SECTION, GALVANIZED  
3 RAIL BOX BEAM**



**STANDARD  
S - 364D**