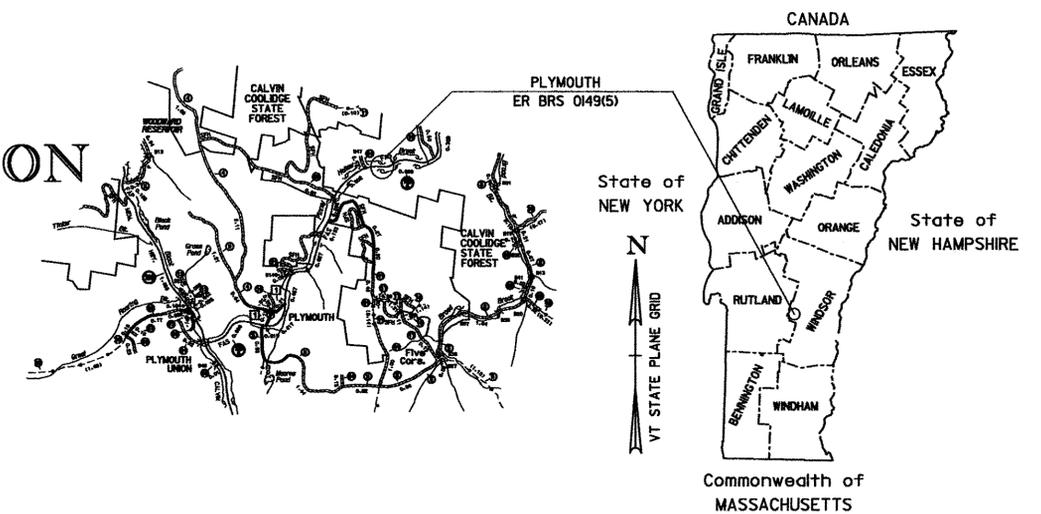


SEE SHEET 2 FOR INDEX OF SHEETS AND LIST OF STANDARDS

# STATE OF VERMONT AGENCY OF TRANSPORTATION



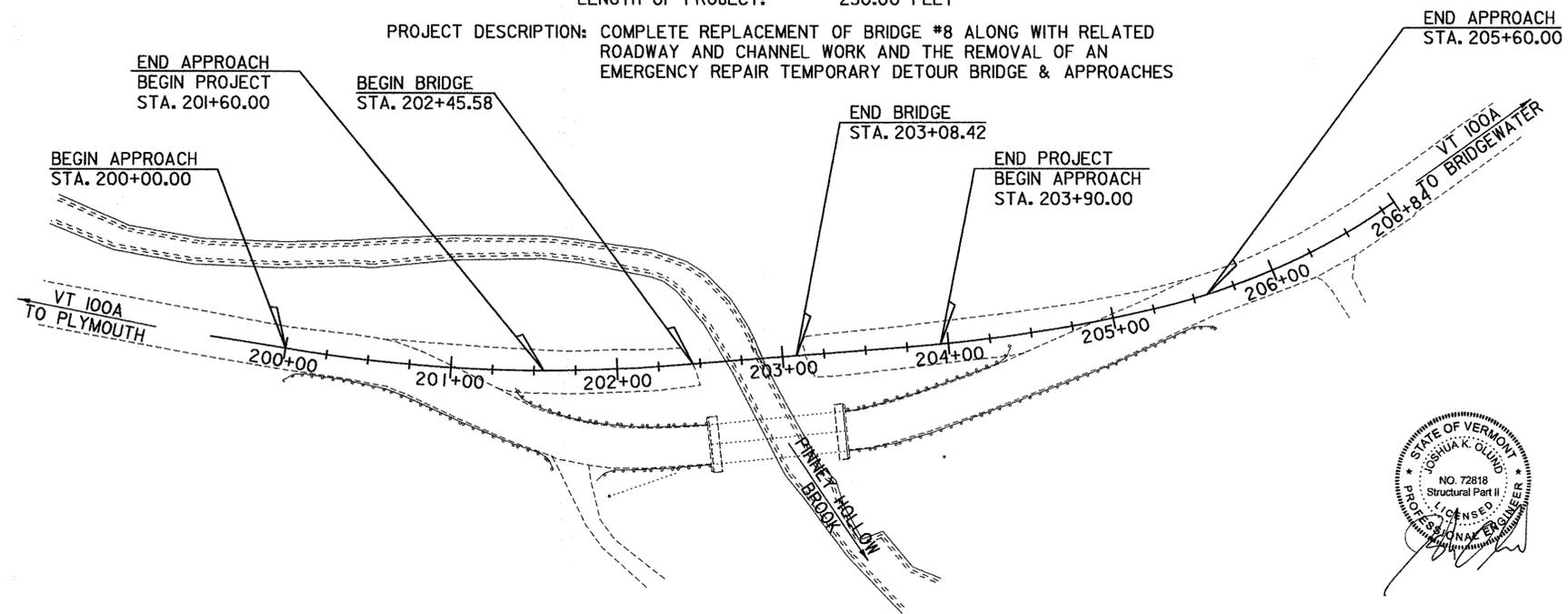
## PROPOSED IMPROVEMENT BRIDGE PROJECT TOWN OF PLYMOUTH COUNTY OF WINDSOR VT 100A (MAJOR COLLECTOR) BRIDGE NO. 8



PROJECT LOCATION: ON VT 100A APPROXIMATELY ONE MILE SOUTH OF THE BRIDGEWATER TOWN LINE IN THE TOWN OF PLYMOUTH

LENGTH OF STRUCTURE: 62.84 FEET  
LENGTH OF ROADWAY: 167.16 FEET  
LENGTH OF PROJECT: 230.00 FEET

PROJECT DESCRIPTION: COMPLETE REPLACEMENT OF BRIDGE #8 ALONG WITH RELATED ROADWAY AND CHANNEL WORK AND THE REMOVAL OF AN EMERGENCY REPAIR TEMPORARY DETOUR BRIDGE & APPROACHES



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 : Vermont Survey & Engineering, Inc.

SURVEYED DATE : 12/2011

DATUM

VERTICAL : NAVD 88  
HORIZONTAL : NAD 83

SCALE 1" = 50'-0"



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.

**TYLIN INTERNATIONAL**

DIRECTOR OF PROGRAM DEVELOPMENT

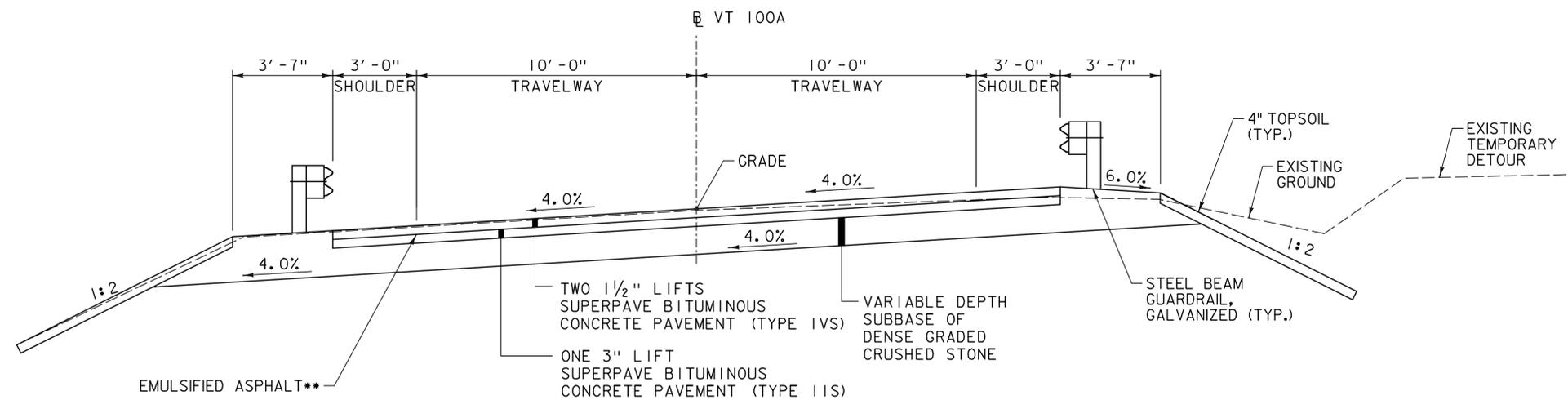
APPROVED DATE 2/25/12

PROJECT MANAGER : ROB YOUNG

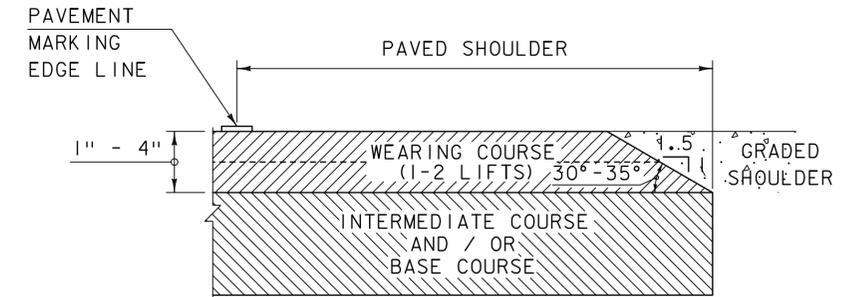
PROJECT NAME : PLYMOUTH  
PROJECT NUMBER : ER BRS 0149 (5)

SHEET 1 OF 46 SHEETS

INDEX OF SHEETS						FINAL HYDRAULIC REPORT																	
<b>PLAN SHEETS</b>						<b>STANDARDS LIST</b>						<b>HYDROLOGIC DATA</b>						<b>PROPOSED STRUCTURE</b>					
1	TITLE SHEET					C-10	CURBING					02-11-2008						DATE:					
2	PRELIMINARY INFORMATION SHEET					E-100	CONSTRUCTION APPROACH SIGNS					01-02-2004						DRAINAGE AREA: 8.6 sq. mi.					
3	TYPICAL ROADWAY SECTIONS					E-101	CONSTRUCTION SIGN DETAILS					05-30-2003						CHARACTER OF TERRAIN: Rolling, Mountainous, Narrow floodplain					
4	BRIDGE, EARTHWORK, & CHANNEL SECTIONS					E-102	CONSTRUCTION SIGN DETAILS					06-30-2003						STREAM CHARACTERISTICS: Meandering; Bend at bridge					
5 - 6	QUANTITY SHEETS					E-102A	CONSTRUCTION SIGN DETAILS					05-01-2004						NATURE OF STREAMBED: Cobbles, Gravel					
7	BRIDGE QUANTITY SHEET					E-106	TRAFFIC CONTROL- MISCELLANEOUS DETAILS					03-01-2004						Q 2.33 = 500 cfs					
8	PROJECT NOTES					E-107	DELINEATION, BARRICADES AND DETOURS FOR CONSTRUCTION AREAS					06-30-2003						Q 10 = 1000 cfs					
9	EARTHWORKS					E-107A	BREAKAWAY BARRICADE DETAILS					06-08-2009						Q 25 = 1300 cfs					
10	TIE SHEET					E-108	CONSTRUCTION ZONE LONGITUDINAL DROP OFFS					06-08-2009						Q50 = 1550 cfs					
11 - 12	LAYOUT SHEETS					E-108A	CONSTRUCTION ZONE LONGITUDINAL DROP OFFS FOR PAVING					06-08-2009						Q 100 = 1800 cfs					
13 - 14	PROFILE SHEETS					E-110	MAJOR MAINTENANCE OPERATION LANE CLOSURE					08-08-1995						Q 500 = 2500 cfs					
15	TRAFFIC SIGN SUMMARY SHEET					E-121	STANDARD SIGN PLACEMENT CONVENTIONAL ROAD					08-08-1995						DATE OF FLOOD OF RECORD: August 28, 2011					
16	BORING INFORMATION & LAYOUT SHEET					E-134	BRIDGE NUMBER PLAQUE					08-08-1995						ESTIMATED DISCHARGE: 1800 cfs					
17	BORING LOGS					E-151	WARNING SIGN DETAILS					05-01-2004						WATER SURFACE ELEVATION: Unknown					
18	PLAN & ELEVATION					E-155	WARNING SIGN DETAILS					05-01-2004						NATURAL STREAM VELOCITY: 6.1 fps					
19	FRAMING PLAN					E-164	SQUARE STEEL SIGN POST					06-08-2009						ICE CONDITIONS: High Potential					
20 - 21	NEXT D BEAM DETAILS					E-193	PAVEMENT MARKING DETAILS					08-18-1995						DEBRIS: High Potential					
22	APPROACH SLAB DETAILS					G-1	STEEL BEAM GUARDRAIL DETAILS (POST, DELINEATOR, TYPICALS)					01-03-2000						DOES THE STREAM REACH MAXIMUM HIGHWATER ELEV. RAPIDLY? No					
23	ABUTMENT 1 PLAN, ELEVATION & SECTION					G-1D	STEEL BEAM GUARDRAIL DETAILS (END TERMINAL, ANCHOR, MEDIUM)					01-03-2000						IS ORDINARY RISE RAPID? No					
24	ABUTMENT 2 PLAN, ELEVATION & SECTION					G-19	GENERIC PLANS FOR GUARDRAIL END TERMINALS					11-15-2002						IS STAGE AFFECTED BY UPSTREAM OR DOWNSTREAM CONDITIONS? No					
25	ABUTMENT REINFORCEMENT					S-363	THREE BEAM TO STANDARD BEAM TRANSITION SECTION					04-23-2012						IF YES, DESCRIBE N/A					
26	ABUTMENT CLOSURE POUR DETAILS					S-364A	BRIDGE RAILING, GALVANIZED 3 RAIL BOX BEAM					04-23-2012						WATERSHED STORAGE: < 1%					
27	TRANSITION BARRIER DETAILS																	HEADWATERS: UNIFORM: X					
28	TL3 TRANSITION RAIL DETAILS																	IMMEDIATELY ABOVE SITE:					
29	REINFORCING STEEL SCHEDULE																	<b>EXISTING STRUCTURE INFORMATION</b>					
30 - 31	RESOURCE LAYOUTS																	STRUCTURE TYPE: Single Span, Vertical Abutments					
32	EPSC NARRATIVE																	YEAR BUILT: 1947					
33 - 34	EPSC EXISTING CONDITION LAYOUTS																	CLEAR SPAN (NORMAL TO STREAM): 27					
35 - 36	EPSC CONSTRUCTION CONDITION LAYOUTS																	VERTICAL CLEARANCE ABOVE STREAMBED: 6.5 ft					
37 - 38	EPSC FINAL CONDITION LAYOUTS																	WATERWAY OF FULL OPENING: Unknown					
39 - 41	EPSC DETAILS																	DISPOSITION OF STRUCTURE: Unstable/Compromised; Removed					
42 - 44	VT 100A CROSS SECTIONS																	TYPE OF MATERIAL UNDER SUBSTRUCTURE: Unknown					
45 - 46	CHANNEL SECTIONS																	WATER SURFACE ELEVATIONS AT:					
<b>STRUCTURES DETAILS SHEETS</b>																							
SD-501.00	CONCRETE DETAILS AND NOTES				05-07-2010													Q 2.33 = 1039.9 ft					
SD-502.00	CONCRETE DETAILS AND NOTES				06-04-2010													Q 10 = 1041.2 ft					
SD-516.10	BRIDGE JOINT, ASPHALTIC PLUG				05-07-2010													Q 25 = 1041.9 ft					
SD-601.00	STRUCTURAL STEEL, DETAILS & NOTES				06-04-2010													Q50 = 1042.4 ft					
																		Q 100 = 1042.9 ft					
																		VELOCITY = 8.5 fps					
																		LONG TERM STREAMBED CHANGES: Abutment Scour, Bank Erosion					
																		IS THE ROADWAY OVERTOPPED BELOW Q100? No					
																		FREQUENCY: N/A					
																		RELIEF ELEVATION: N/A					
																		DISCHARGE OVER ROAD @ Q100: N/A					
																		<b>UPSTREAM STRUCTURE</b>					
																		TOWN: Plymouth					
																		HIGHWAY #: T.H. 54					
																		CLEAR SPAN: 28 ft					
																		YEAR BUILT: 1974					
																		STRUCTURE TYPE: Prestressed Concrete Slab					
																		<b>DOWNSTREAM STRUCTURE</b>					
																		TOWN: Plymouth					
																		HIGHWAY #: VT 100A					
																		CLEAR SPAN: 29 ft					
																		YEAR BUILT: 1984					
																		STRUCTURE TYPE: Concrete Slab					
																		<b>LRFR LOAD RATING FACTORS</b>					
																		<b>LOADING LEVELS</b>					
																		<b>TRUCK</b>					
																		H-20					
																		HL-93					
																		3S2					
																		6 AXLE					
																		3A. STR.					
																		4A. STR.					
																		5A. SEMI					
																		TONNAGE					
																		20					
																		INVENTORY					
																		2.25					
																		POSTING					
																		OPERATING					
																		3.09					
																		COMMENTS: Service III not considered for Legal Loads					
																		<b>AS BUILT "REBAR" DETAILS</b>					
																		LEVEL I					
																		LEVEL II					
																		LEVEL III					
																		TYPE:					
																		GRADE:					
																		<b>TEMPORARY BRIDGE PROFILE ALONG TEMP CL</b>					
																		BOTTOM OF BEAMS ELEV. = 1044.60 FT					
																		73.50 FT (MIN)					
																		6.00 FT (MIN)					
																		OPENING 441.00 FT (MIN)					
																		<b>TRAFFIC DATA</b>					
																		YEAR					
																		ADT					
																		DHV					
																		% D					
																		% T					
																		ADTT					
																		20 year ESAL for flexible pavement from 2014 to 2034 : 125000					
																		2014					
																		680					
																		95					
																		58					
																		7					
																		25					
																		40 year ESAL for flexible pavement from 2014 to 2054 : 287000					
																		2034					
																		720					
																		100					
																		58					
																		10.2					
																		35					
																		Design Speed : 50 mph					
																		<b>PILE DRIVING AND TESTING REQUIREMENTS</b>					
																		1. NOMINAL PILE DRIVING CAPACITY $R_{ndr}$ : 400.00 KIP					
																		2. PILE TEST RESISTANCE FACTOR $\phi$ : 0.65					
																		3. MAXIMUM PILE TIP ELEVATION $\phi$ : See Below					
																		4. PILES SHALL BE DRIVEN A MINIMUM OF 24 FEET BELOW THE BOTTOM OF ABUTMENT ELEVATIONS.					
																		<b>DESIGN VALUES</b>					
																		1. DESIGN LIVE LOAD HL-93					
																		2. FUTURE PAVEMENT $d_p$ : 0.0 INCH					
																		3. DESIGN SPAN $L$ : 60.00 FT					
																		4. MIN. MID-SPAN POS. CAMBER @ RELEASE (PRESTRESSED UNITS) $\Delta$ : 1.38 INCH					
																		5. PRESTRESSING STRAND (0.60 INCH DIAMETER - LOW RELAX) $f_y$ : 270 KSI					
																		6. PRESTRESSED CONCRETE STRENGTH $f'_c$ : 8.0 KSI					
																		7. PRESTRESSED CONCRETE RELEASE STRENGTH $f'_{ci}$ : 6.0 KSI					
																		8. CONCRETE, HIGH PERFORMANCE CLASS AA $f'_c$ : ---					
																		9. SPECIAL PROVISION (HIGH PERFORMANCE CONCRETE, RAPID SET) $f'_c$ : 7.0 KSI					
																		10. CONCRETE, HIGH PERFORMANCE CLASS SCC $f'_c$ : 4.0 KSI					
																		11. CONCRETE, CLASS C $f'_c$ : ---					
																		12. REINFORCING STEEL $f_y$ : 60 KSI					
																		13. STRUCTURAL STEEL AASHTO M270 $f_y$ : ---					
																		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 $q_p$ : 545.0 KIPS					
																		20. PILE YIELD STRENGTH ASTM A572 $f_y$ : 50 KSI					
																		21. PILE SIZE HP 12X74					
																		22. EST. PILE LENGTHS (TWO SUBSTRUCTURES) $L_p$ : ---					
																		(ABUTMENT 1 = 59 AND ABUTMENT 2 = 38) FT					
																		23. PILE RESISTANCE FACTOR $\phi$ : 0.50					
																		24. LATERAL PILE DEFLECTION $\Delta$ : 0.26 INCH					
																		25. BASIC WIND SPEED $V_{3s}$ : ---					
																		26. MINIMUM GROUND SNOW LOAD $p_g$ : ---					
																		27. SEISMIC DATA $P_{GA}$ : 8 %g $S_s$ : 16 %g $S_1$ : 5 %g					
																		<b>PROJECT NAME: PLYMOUTH</b>					
																		<b>PROJECT NUMBER: ER BRS 0149(5)</b>					
																		FILE NAME: z11c330pi.dgn					
																		PLOT DATE: 9/19/2012					
																		PROJECT LEADER: JOSH OLUND					
																		DRAWN BY: SCOTT MORGAN					
																		DESIGNED BY: DANIEL MYERS					
																		CHECKED BY: JOSH OLUND					
																		<b>PRELIMINARY INFORMATION SHEET</b>					
																		SHEET 2 OF 46					

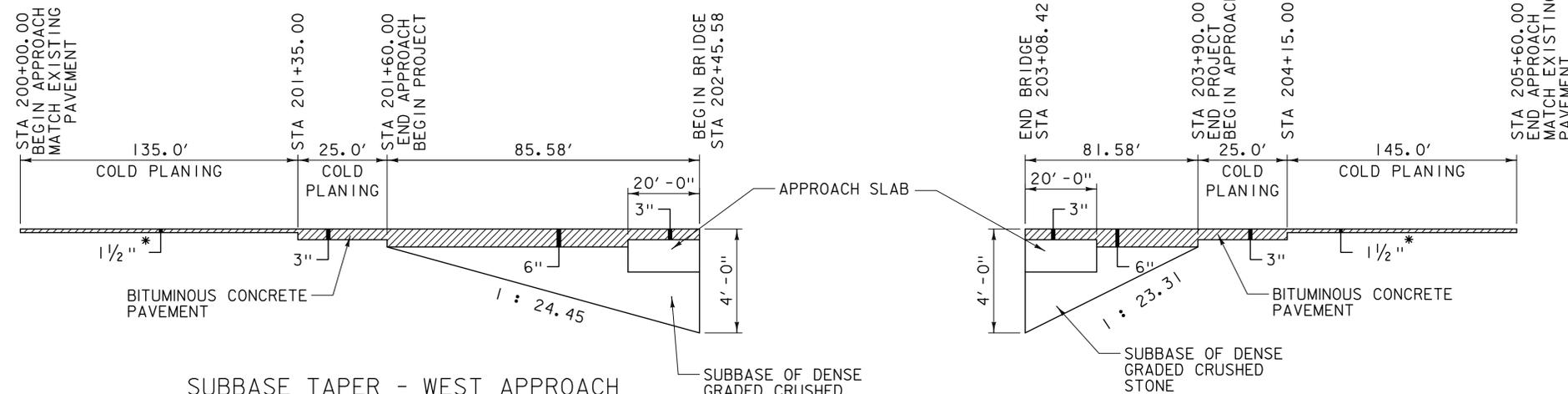


**FULL DEPTH WITH GUARDRAIL  
TYPICAL ROADWAY SECTION - VT 100A**  
NOT TO SCALE



**SAFETY EDGE DETAIL**  
NOT TO SCALE  
NOTE: LEVELING COURSE MAY INCLUDE THE "SAFETY EDGE" AT THE CONTRACTORS CHOICE.

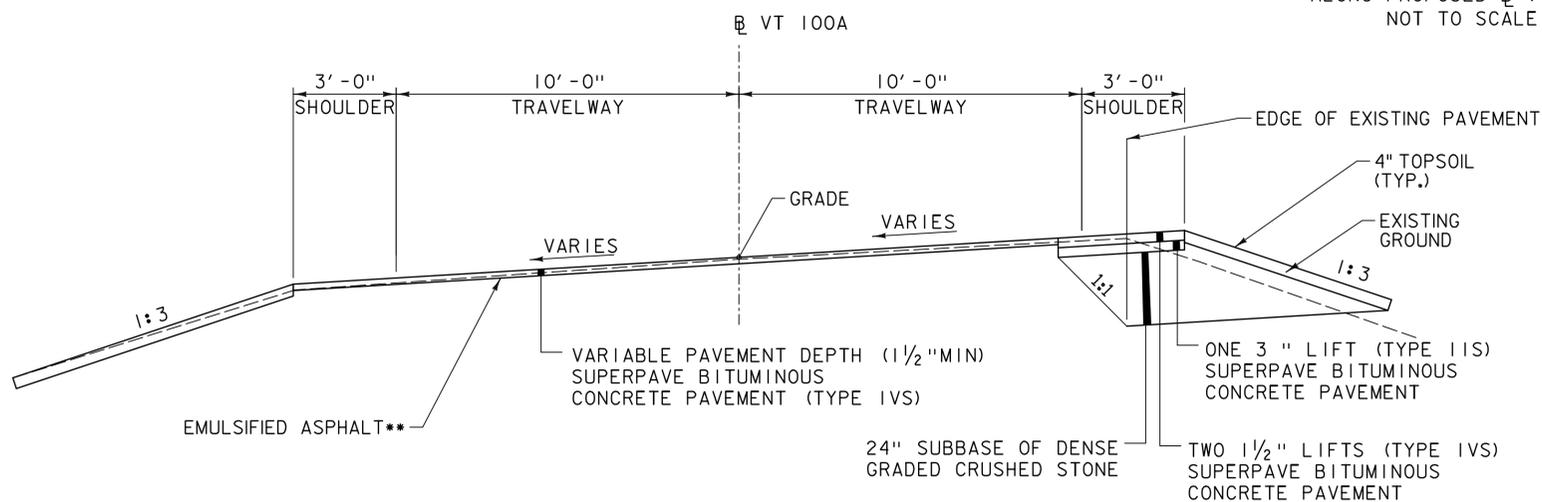
\*\* EMULSIFIED ASPHALT SHALL BE APPLIED TO THE COLD PLANED BITUMINOUS CONCRETE PAVEMENT SURFACE AT THE RATE OF 0.025 GAL/S.Y. OR AS DIRECTED BY THE ENGINEER. EMULSIFIED ASPHALT SHALL ALSO BE APPLIED BETWEEN ALL LIFTS OF PAVEMENT. THE COST SHALL BE PAID UNDER ITEM 404.65, "EMULSIFIED ASPHALT".



**SUBBASE TAPER - WEST APPROACH**  
ALONG PROPOSED VT 100A  
NOT TO SCALE

**SUBBASE TAPER - EAST APPROACH**  
ALONG PROPOSED VT 100A  
NOT TO SCALE

\* ALL EXISTING TEMPORARY DETOUR PAVEMENT SHALL BE REMOVED AND ORIGINAL PAVEMENT COLD PLANED TO A MINIMUM OF 1/2" BELOW PROPOSED ELEVATIONS. SHIM AS NEEDED TO RESTORE PAVEMENT TO PROPOSED ELEVATIONS.



**MILL AND OVERLAY  
TYPICAL ROADWAY SECTION - VT 100A**  
NOT TO SCALE

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

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

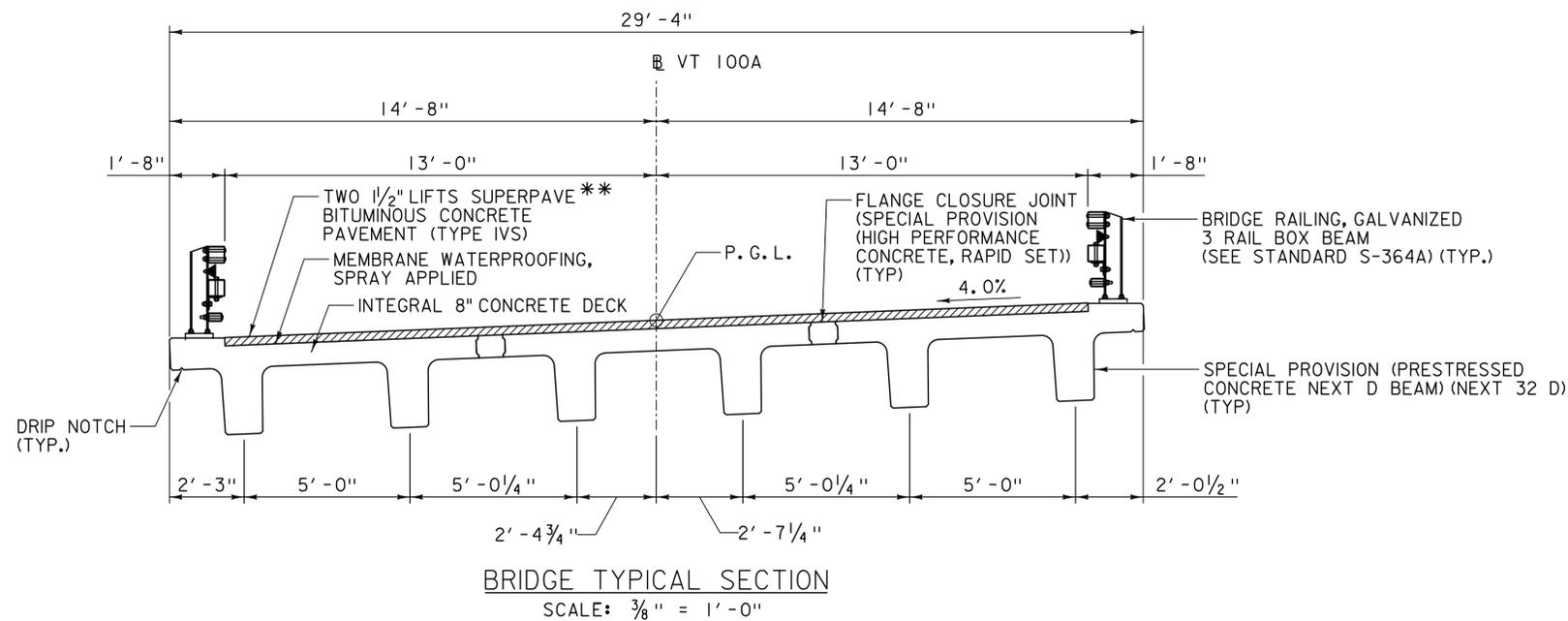
SHOULDER WIDENING STATION RANGE  
STA 203+57 RT TO STA 205+26.85 RT  
STA 204+74.80 LT TO STA. 205+60 LT

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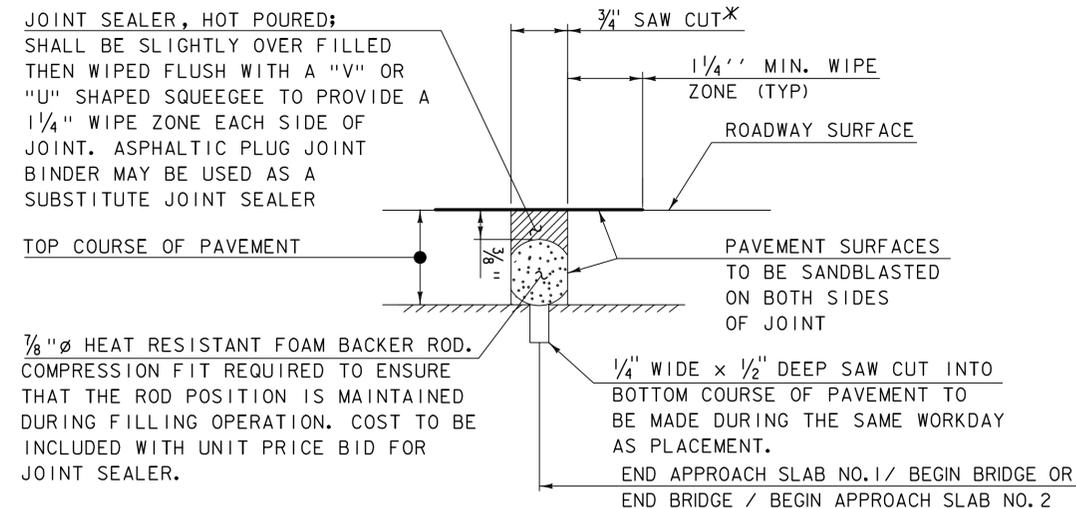
PROJECT NAME: PLYMOUTH  
PROJECT NUMBER: ER BRS 0149(5)

FILE NAME: zllc330typ\_road\_0l.dgn  
PROJECT LEADER: J. OLUND  
DESIGNED BY: A. GREENLAW  
TYPICAL ROADWAY SECTIONS

PLOT DATE: 9/20/2012  
DRAWN BY: S. MORGAN  
CHECKED BY: J. HOWE  
SHEET 3 OF 46

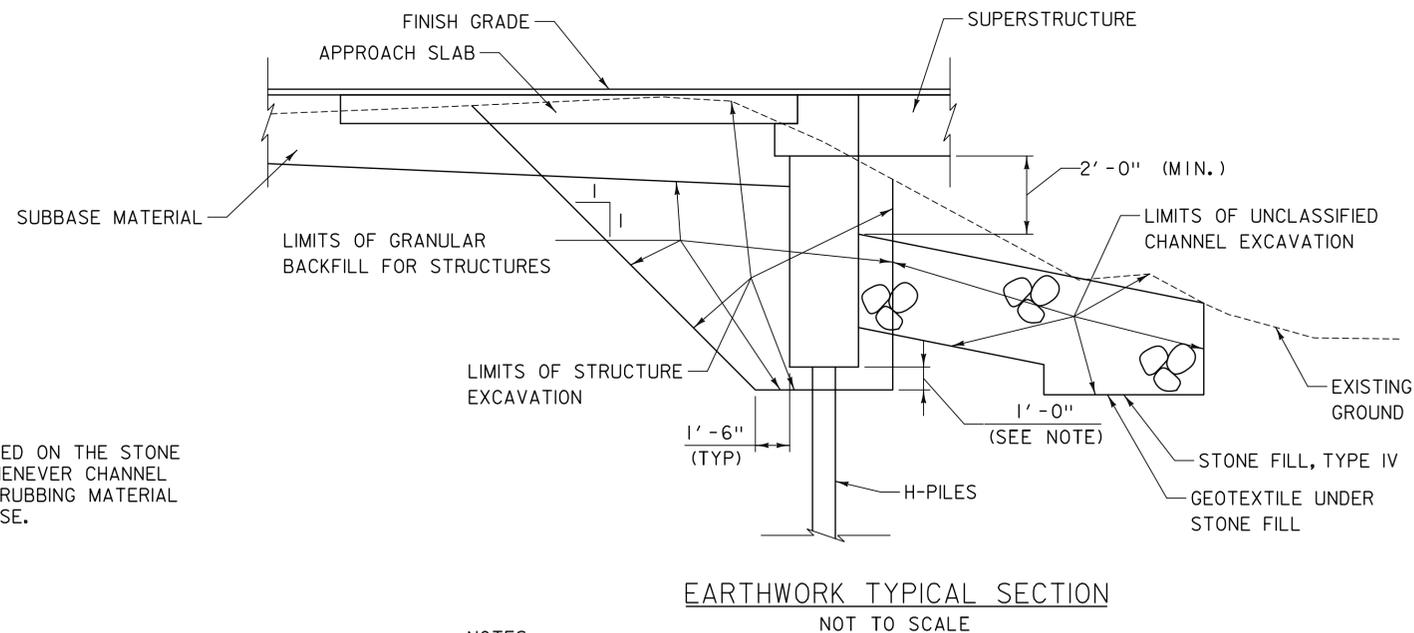


\*\* COMPACTED PAVEMENT SHALL BE 1/8" HIGHER THAN ADJACENT CONCRETE CURB ON EXTERIOR BEAMS



**ITEM 524.11, "JOINT SEALER, HOT Poured"**  
**SAWED PAVEMENT JOINT DETAIL**  
 (NOT TO SCALE)

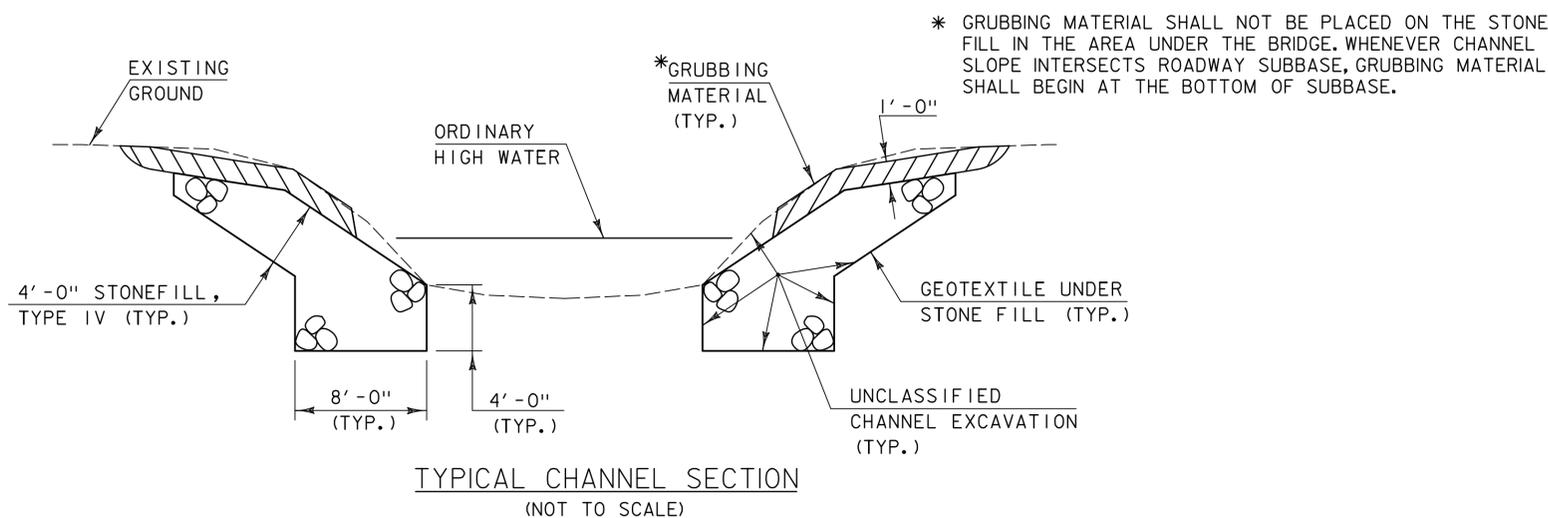
\* JOINT IS TO BE LOCATED ACCURATELY BY STRING LINING, OR OTHER MEANS, PRIOR TO PAVING, SO THAT THE SAW CUTS WILL BE MADE DIRECTLY OVER THE END OF CONCRETE DECK. JOINT SHALL BE CUT DRY IN A SINGLE PASS AND BE SEALED WITHIN 24 HOURS OR PRIOR TO EXPOSURE TO TRAFFIC. JOINT SHALL BE CLEANED PRIOR TO APPLYING THE JOINT SEALER.



**EARTHWORK TYPICAL SECTION**  
 NOT TO SCALE

**NOTES:**

- 1 FT UNDERCUT AS DETERMINED NECESSARY BY RESIDENT ENGINEER.
2. ACTUAL LIMITS OF STRUCTURE EXCAVATION TO BE DETERMINED BY THE CONTRACTOR. HOWEVER, ONLY THE EXCAVATION BETWEEN THE LIMITS SHOWN WILL BE PAID FOR UNDER ITEM 204.25, "STRUCTURE EXCAVATION." EXCAVATION BY THE CONTRACTOR OUTSIDE THESE LIMITS WILL BE AT THE EXPENSE OF THE CONTRACTOR.



**TYPICAL CHANNEL SECTION**  
 (NOT TO SCALE)

<b>TYLIN INTERNATIONAL</b>	PROJECT NAME: PLYMOUTH	PLOT DATE: 9/20/2012
	PROJECT NUMBER: ER BRS 0149(5)	DRAWN BY: S. MORGAN
	FILE NAME: zllc330bdr_typical.0l.dgn	CHECKED BY: S. KELLER
	PROJECT LEADER: J. OLUND	SHEET 4 OF 46
	DESIGNED BY: D. MYERS	
	BRIDGE, EARTHWORK, & CHANNEL SECTIONS	

# QUANTITY SHEET 1

SUMMARY OF ESTIMATED QUANTITIES										TOTALS		DESCRIPTIONS				DETAILED SUMMARY OF QUANTITIES			
						ROADWAY	TRAINING	EROSION CONTROL	BRIDGE	FULL C.E. ITEMS	GRAND TOTAL	FINAL	UNIT	ITEMS	ITEM NUMBER	ROUND	QUANTITIES	UNIT	ITEMS
						1					1		LS	CLEARING AND GRUBBING, INCLUDING INDIVIDUAL TREES AND STUMPS	201.10				NOTE:
						424					424		CY	COMMON EXCAVATION	203.15				
									550		550		CY	UNCLASSIFIED CHANNEL EXCAVATION	203.27				
						1					1		CY	TRENCH EXCAVATION OF EARTH, EXPLORATORY (N.A.B.I.)	204.22				
									580		580		CY	STRUCTURE EXCAVATION	204.25				
									210		210		CY	GRANULAR BACKFILL FOR STRUCTURES	204.30				
						960					960		SY	COLD PLANING, BITUMINOUS PAVEMENT	210.10				
						375					375		CY	SUBBASE OF DENSE GRADED CRUSHED STONE	301.35				
						4.5			0.7		5.2		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				
									390		390		LF	STEEL PILING, HP 12 X 74	505.16				
									2		2		EACH	DYNAMIC PILE LOADING TEST	505.45				
						2700					2700		LB	REINFORCING STEEL, LEVEL I	507.11				
						15					15		GAL	WATER REPELLENT, SILANE	514.10				
									56		56		LF	BRIDGE EXPANSION JOINT, ASPHALTIC PLUG	516.10				
									185		185		SY	SHEET MEMBRANE WATERPROOFING, SPRAY APPLIED	520.10				
									56		56		LF	JOINT SEALER, HOT POURED	524.11				
									108		108		LF	BRIDGE RAILING, GALVANIZED 3 RAIL BOX BEAM	525.335				
									1		1		LS	MAINTENANCE OF STRUCTURES AND APPROACHES	527.10				
									12		12		EACH	BEARING DEVICE ASSEMBLY, PLAIN ELASTOMERIC PAD	531.16				
									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				
								20			20		HR	POWER GRADER RENTAL	608.15				
								20			20		HR	ALL PURPOSE EXCAVATOR RENTAL, TYPE I	608.25				
								20			20		HR	TRUCK RENTAL	608.37				
								20			20		HR	LOADER RENTAL, TYPE I	608.40				
						70					70		MGAL	DUST CONTROL WITH WATER	609.10				
									530		530		CY	STONE FILL, TYPE IV	613.13				
						48					48		LF	PRECAST REINFORCED CONCRETE CURB, TYPE B	616.26				
						625					625		LF	STEEL BEAM GUARDRAIL, GALVANIZED	621.20				
						1					1		EACH	MANUFACTURED TERMINAL SECTION, TANGENT	621.51				
						5					5		EACH	ANCHOR FOR STEEL BEAM RAIL	621.60				
						4					4		EACH	GUARDRAIL APPROACH SECTION TO CONCRETE BRIDGE RAILING, TL-3	621.747				
						80					80		HR	UNIFORMED TRAFFIC OFFICERS	630.10				
						500					500		HR	FLAGGERS	630.15				
										1	1		LS	FIELD OFFICE, ENGINEERS	631.10				
										1	1		LS	TESTING EQUIPMENT, CONCRETE	631.16				

PROJECT NAME: **PLYMOUTH**  
 PROJECT NUMBER: **ER BRS 0149(5)**  
 FILE NAME: z11c330.xls PLOT DATE: 11/05/2012  
 PROJECT LEADER: J. OLUND DRAWN BY: S. MORGAN  
 DESIGNED BY: D. MYERS CHECKED BY: J. OLUND  
 QUANTITY SHEET #1 SHEET 5 OF 46

REVISION	DESCRIPTION	DATE
ADDENDUM #1	CHANGE REINFORCING STEEL TO LEVEL I	11/05/2012

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# QUANTITY SHEET 2

SUMMARY OF ESTIMATED QUANTITIES											TOTALS		DESCRIPTIONS				DETAILED SUMMARY OF QUANTITIES		
						ROADWAY	TRAINING	EROSION CONTROL	BRIDGE	FULL C.E. ITEMS	GRAND TOTAL	FINAL	UNIT	ITEMS	ITEM NUMBER	ROUND	QUANTITIES	UNIT	ITEMS
										1	1		LS	TESTING EQUIPMENT, BITUMINOUS	631.17				
										3000	3000		DL	FIELD OFFICE TELEPHONE (N.A.B.I.)	631.26				
							520				520		HR	EMPLOYEE TRAINEESHIP	634.10				
						1					1		LS	MOBILIZATION/DEMOBILIZATION	635.11				
						1					1		LS	TRAFFIC CONTROL	641.10				
						1120					1120		LF	4 INCH WHITE LINE	646.20				
						1120					1120		LF	4 INCH YELLOW LINE	646.21				
									395		395		SY	GEOTEXTILE UNDER STONE FILL	649.31				
								100			100		SY	GEOTEXTILE FOR SILT FENCE	649.51				
								50			50		LB	SEED	651.15				
								2			2		LB	SEED, WINTER RYE	651.17				
								246			246		LB	FERTILIZER	651.18				
								1			1		TON	AGRICULTURAL LIMESTONE	651.20				
								1			1		TON	HAY MULCH	651.25				
								135			135		CY	TOPSOIL	651.35				
						230					230		SY	GRUBBING MATERIAL	651.40				
								1			1		LS	EPSC PLAN	652.10				
								160			160		HR	MONITORING EPSC PLAN	652.20				
								1			1		LU	MAINTENANCE OF EPSC PLAN (N.A.B.I.)	652.30				
								820			820		SY	TEMPORARY EROSION MATTING	653.20				
								5			5		CY	TEMPORARY STONE CHECK DAM, TYPE I	653.25				
								1			1		EACH	INLET PROTECTION DEVICE, TYPE I	653.40				
								1230			1230		LF	PROJECT DEMARCATION FENCE	653.55				
						8.5					8.5		SF	TRAFFIC SIGNS, TYPE A	675.20				
						18					18		LF	SQUARE TUBE SIGN POST AND ANCHOR	675.341				
									35		35		CY	SPECIAL PROVISION (HIGH PERFORMANCE CONCRETE, RAPID SET) (FPQ)	900.608				
									4		4		EACH	SPECIAL PROVISION (BRIDGE RAILING CONCRETE TRANSITION BARRIER)	900.620				
									186		186		LF	SPECIAL PROVISION (PRESTRESSED CONCRETE NEXT D BEAMS) (NEXT 32 D)	900.640				
									1		1		LS	SPECIAL PROVISION (REMOVAL OF TEMPORARY BRIDGE AND APPROACHES)	900.645				
						1					1		LU	SPECIAL PROVISION (MAT DENSITY PAY ADJUSTMENT, SMALL QUANTITY) (N.A.B.I.)	900.650				
						1					1		LU	SPECIAL PROVISION (MXTURE PAY ADJUSTMENT) (N.A.B.I.)	900.650				
						257			60		317		TON	SPECIAL PROVISION (BITUMINOUS CONCRETE PAVEMENT, SMALL QUANTITY)	900.680				

PROJECT NAME: **PLYMOUTH**  
PROJECT NUMBER: **ER BRS 0149(5)**  
FILE NAME: z11c330.xls PLOT DATE: 09/20/2012  
PROJECT LEADER: J. OLUND DRAWN BY: S. MORGAN  
DESIGNED BY: D. MYERS CHECKED BY: J. OLUND  
QUANTITY SHEET #2 SHEET 6 OF 46



# BRIDGE QUANTITY SHEET

SUMMARY OF BRIDGE QUANTITIES										TOTALS		DESCRIPTIONS			DETAILED SUMMARY OF QUANTITIES		
							APPROACH SLABS	ABUTMENT #1	ABUTMENT #2	SUPERSTRUCTURE	BRIDGE TOTAL	UNIT	ITEMS	ITEM NUMBER	QUANTITIES	UNIT	ITEMS
								250	300		550	CY	UNCLASSIFIED CHANNEL EXCAVATION	203.27			
							20	275	285		580	CY	STRUCTURE EXCAVATION	204.25			
								100	110		210	CY	GRANULAR BACKFILL FOR STRUCTURES	204.30			
							0.3			0.4	0.7	CWT	EMULSIFIED ASPHALT	404.65			
								0.5	0.5		1	LS	FURNISHING EQUIPMENT FOR DRIVING PILING	504.10			
								240	150		390	LF	STEEL PILING, HP 12 X 74	505.16			
								1	1		2	EACH	DYNAMIC PILE LOADING TEST	505.45			
								1350	1350		2700	LB	REINFORCING STEEL, LEVEL I	507.11			
								5	5	5	15	GAL	WATER REPELLENT, SILANE	514.10			
							56				56	LF	BRIDGE EXPANSION JOINT, ASPHALTIC PLUG	516.10			
										185	185	SY	SHEET MEMBRANE WATERPROOFING, SPRAY APPLIED	520.10			
										56	56	LF	JOINT SEALER, HOT POURED	524.11			
										108	108	LF	BRIDGE RAILING, GALVANIZED 3 RAIL BOX BEAM	525.335			
										1	1	LS	MAINTENANCE OF STRUCTURES AND APPROACHES	527.10			
										12	12	EACH	BEARING DEVICE ASSEMBLY, PLAIN ELASTOMERIC PAD	531.16			
								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			
								230	300		530	CY	STONE FILL, TYPE IV	613.13			
								170	225		395	SY	GEOTEXTILE UNDER STONE FILL	649.31			
								17.5	17.5		35	CY	SPECIAL PROVISION (HIGH PERFORMANCE CONCRETE, RAPID SET) (FPQ)	900.608			
										4	4	EACH	SPECIAL PROVISION (BRIDGE RAILING CONCRETE TRANSITION BARRIER)	900.620			
										186	186	LF	SPECIAL PROVISION (PRESTRESSED CONCRETE NEXT D BEAMS) (NEXT 32 D)	900.640			
										1	1	LS	SPECIAL PROVISION (REMOVAL OF TEMPORARY BRIDGE AND APPROACHES)	900.645			
							24			36	60	TON	SPECIAL PROVISION (BITUMINOUS CONCRETE PAVEMENT, SMALL QUANTITY)	900.680			

PROJECT NAME: **PLYMOUTH**  
 PROJECT NUMBER: **ER BRS 0149(5)**  
 FILE NAME: z11c330.xls PLOT DATE: 11/05/2012  
 PROJECT LEADER: J. OLUND DRAWN BY: S. MORGAN  
 DESIGNED BY: D. MYERS CHECKED BY: J. OLUND  
 BRIDGE QUANTITY SHEET SHEET 7 OF 46

REVISION	DESCRIPTION	DATE
ADDENDUM #1	CHANGE REINFORCING STEEL TO LEVEL I	11/05/2012

**TYLIN**INTERNATIONAL

**GENERAL**

1. ALL MATERIALS AND CONSTRUCTION SHALL CONFORM TO STATE OF VERMONT AGENCY OF TRANSPORTATION STANDARD SPECIFICATIONS FOR CONSTRUCTION, DATED 2011, WITH ITS LATEST REVISIONS, THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 5TH EDITION WITH INTERIMS THROUGH 2011, AND THE PCI NORTHEAST NEXT D BEAM STANDARDS DATED JANUARY 2010.
2. ALL PRECAST CONCRETE ELEMENTS TO BE FABRICATED TO THE SPECIFIED DIMENSIONS WITHIN THE TOLERANCES DICTATED IN THE PRECAST/PRESTRESSED CONCRETE INSTITUTE TOLERANCE MANUAL FOR PRECAST AND PRESTRESSED CONCRETE CONSTRUCTION, MNL 135-00, AND ITS LATEST REVISIONS.
3. THE STONE FILL, TYPE IV UNDER THE BRIDGE AS SHOWN IN THE PLANS SHALL BE PLACED BEFORE THE SUPERSTRUCTURE IS SET.
4. A PORTION OF THE ORIGINAL EASTERN BRIDGE ABUTMENT FOUNDATION IS IN STILL PLACE. THE REMOVAL OF THIS NOTED REMNANT AND THE REMOVAL OF OTHER POTENTIAL FOUNDATION REMNANTS SHALL BE INCIDENTAL TO ITEM 203.27, "UNCLASSIFIED CHANNEL EXCAVATION."
5. NO ADJUSTMENTS TO THE BITUMINOUS WEARING SURFACE ON THE BRIDGE SHALL BE MADE TO ACCOUNT FOR THE DIFFERENCE BETWEEN BEAM CAMBER AND THE THEORETICAL ROADWAY PROFILE. THE WEARING SURFACE ON THE BRIDGE SHALL BE SHIMMED TRANSVERSELY AS NECESSARY TO ACCOUNT FOR POTENTIAL DIFFERENTIAL CAMBER OF ADJACENT BEAMS.
- TRAFFIC AND DETOUR**
6. THE EXISTING TEMPORARY DETOUR ROADWAY AND BRIDGE SHALL BE USED TO MAINTAIN TRAFFIC DURING CONSTRUCTION. TEMPORARY SIGNING IS CURRENTLY IN PLACE FOR THE TEMPORARY DETOUR. CONTRACTOR SHALL SUPPLEMENT EXISTING TEMPORARY APPROACH SIGNING AS NECESSARY PER THE FEDERAL MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD). CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTENANCE OF EXISTING TEMPORARY BRIDGE AND APPROACHES AND BOTH EXISTING AND NEW TEMPORARY SIGNS DURING CONSTRUCTION. TRAFFIC CONTROL SHALL BE PROVIDED IN ACCORDANCE WITH SECTION 641 OF THE STANDARD SPECIFICATION, THE MUTCD, ITS REVISIONS AND AMENDMENTS, ANY PROVISIONS IN THE PLANS AND/OR PROPOSAL OF THIS PROJECT, AND STATE OF VERMONT STANDARDS. WHERE CONFLICTS EXIST BETWEEN THE STANDARDS AND THE MUTCD, THE MUTCD SHALL GOVERN.
7. A TEMPORARY BRIDGE IS IN PLACE DOWNSTREAM OF THE EXISTING, FAILED STRUCTURE. AFTER CONSTRUCTION OF THE NEW BRIDGE AND APPROACH ROADWAY IS COMPLETED, THE EXISTING TEMPORARY BRIDGE AND APPROACHES SHALL BE REMOVED. THE ESTIMATED SOIL VOLUME TO BE REMOVED WITHIN THE TEMPORARY DETOUR APPROACHES IS NOTED ON THE EARTHWORKS SHEET AND IS BOUND BY THE EXISTING DETOUR ROAD SURFACE, THE PROPOSED SIDE SLOPE SURFACE, AND THE APPROXIMATED PRE-DETOUR GROUND SURFACE SHOWN IN THE CROSS SECTIONS. CONTRACTOR SHALL RE-GRADE THE AREA UNDER THE TEMPORARY ROADWAY TO REPLICATE CONDITIONS PRIOR TO ITS CONSTRUCTION TO THE EXTENT POSSIBLE, INCLUDING REESTABLISHMENT OF THE FIELD DRIVE. PAYMENT FOR REMOVAL OF TEMPORARY BRIDGE AND APPROACHES (INCLUDING BUT NOT LIMITED TO EMBANKMENT, PAVEMENT, SUBBASE, GUARDRAIL, AND BRIDGE) AND REESTABLISHMENT OF THE PRE-EXISTING CONDITIONS SHALL BE PAID FOR UNDER ITEM 900.645, "SPECIAL PROVISION (REMOVAL OF TEMPORARY BRIDGE AND APPROACHES)".
8. THE CONTRACTOR SHALL SUBMIT SITE SPECIFIC TRAFFIC CONTROL PLANS SHOWING THE PROPOSED TRAFFIC CONTROL MEASURES THAT ARE TO BE IMPLEMENTED IN ADDITION TO THE EXISTING TEMPORARY MEASURES TO THE ENGINEER ONE WEEK PRIOR TO THE PRE-CONSTRUCTION CONFERENCE.
9. INSTALL SIGNS AND ANY NECESSARY PAVEMENT MARKINGS PRIOR TO OPENING ANY PORTION OF THE PROJECT TO FINAL AND/OR DETOUR TRAFFIC. CARE MUST BE TAKEN TO ENSURE THAT FINAL SIGNS AND PAVEMENT MARKINGS DO NOT CONFLICT WITH PROPOSED TRAFFIC PATTERNS IN ANY ONE STAGE. FINAL SIGNS THAT ARE IN PLACE BUT ARE NOT BEING USED SHALL BE COVERED.
10. THE COVERING AND REMOVAL OF EXISTING SIGNS SHALL BE AS ORDERED BY THE RESIDENT ENGINEER. PAYMENT FOR COVERING SIGNS WILL BE INCLUDED IN THE PRICE BID FOR ITEM 641.10, "TRAFFIC CONTROL". PAYMENT FOR REMOVAL OF EXISTING SIGNS RELATED TO THE EXISTING TEMPORARY DETOUR WILL ALSO BE INCLUDED IN THE PRICE BID FOR ITEM 641.10, "TRAFFIC CONTROL".
11. CONSTRUCTION SIGNS WITH YIELDING POSTS AND ALL OTHER TEMPORARY TRAFFIC CONTROL DEVICES SHALL BE INCLUDED IN ITEM 641.10, "TRAFFIC CONTROL". TEMPORARY STRIPING WHICH MAY BE REQUIRED WHEN CONSTRUCTING THE INTERFACE BETWEEN THE TEMPORARY DETOUR AND FINAL ALIGNMENT SHALL BE INCLUDED IN ITEM 641.10, "TRAFFIC CONTROL".
12. THE CONTRACTOR SHALL SCHEDULE OPERATIONS IN A MANNER THAT LIMITS THE AMOUNT OF TIME THAT NORMAL TRAFFIC FLOWS ARE DISRUPTED.
13. SIGNS SHALL ONLY BE VISIBLE AT THE TIMES WHEN THE MESSAGE IS PERTINENT, I.E. A "FLAGGER AHEAD" SIGN SHALL ONLY BE VISIBLE TO MOTORISTS WHEN THE FLAGGER IS ACTUALLY DIRECTING TRAFFIC.
14. CONTRACTOR SHALL ASSUME LIABILITY OF EXISTING TEMPORARY BRIDGE AND APPROACHES AND EXISTING DETOUR SIGNS UPON CONTRACT AWARD AND MAINTAIN THESE ITEMS IN ACCORDANCE WITH SECTION 527.
15. CONTRACTOR SHALL MAINTAIN DRAINAGE IN COMPLIANCE WITH EPSC STANDARD PRACTICES.

**CONCRETE**

16. WATER REPELLENT, SILANE, SHALL BE APPLIED TO ALL EXPOSED CONCRETE SURFACES, EXCEPT THE UNDERSIDE OF THE NEXT BEAMS BETWEEN DRIP NOTCHES.
17. ALL REINFORCING STEEL SHALL BE DETAILED AND FABRICATED USING PROCEDURES AND TOLERANCES IN ACCORDANCE WITH APPLICABLE PUBLICATIONS OF THE "CONCRETE REINFORCING STEEL INSTITUTE".
18. ALL REINFORCING STEEL SHALL BE LEVEL I, EPOXY COATED, IN ACCORDANCE WITH SECTION 507 OF THE GENERAL SPECIAL PROVISIONS. MINIMUM CLEAR COVER SHALL BE AS FOLLOWS:
 

ALONG BACK FACES OF WALLS AGAINST EARTH	2.0 INCHES
ALONG TOP SURFACE OF DECK SLAB	2.5 INCHES
ALONG BOTTOM SURFACE OF DECK SLAB	1.5 INCHES
ELSEWHERE, UNLESS NOTED OTHERWISE	3.0 INCHES
- PILE FOUNDATIONS**
19. THE PILES SHALL BE HP 12 X 74.
20. PILE SHOES ARE BE REQUIRED AND SHALL CONFORM TO SUBSECTION 505.04(F) OF THE STANDARD SPECIFICATIONS.
21. THE TOPS OF PILES AFTER DRIVING SHALL NOT VARY FROM THE PLAN POSITION BY MORE THAN 3 INCHES. THE CONTRACTOR SHALL DEMONSTRATE TO THE SATISFACTION OF THE RESIDENT ENGINEER HOW THE TOLERANCES WILL BE MET REGARDLESS OF INSTALLATION METHOD AND BEFORE COMMENCING PILE INSTALLATION.
22. THE PILES SHALL BE DRIVEN TO A NOMINAL RESISTANCE OF 400 KIPS AS DETERMINED BY THE RESULTS OF DYNAMIC TESTING, AS INTERPRETED BY THE RESIDENT ENGINEER.
23. FOR ESTIMATING PURPOSES, THE PILE TIP ELEVATIONS WERE ASSUMED AS SHOWN ON THE BORING LOGS. THE ACTUAL LENGTHS MAY VARY.
24. TO ENSURE THAT THE NOMINAL RESISTANCE HAS BEEN ATTAINED AND TO PREVENT THE OVERSTRESSING OF THE PILES DURING DRIVING OPERATIONS, DYNAMIC TESTING SHALL BE PERFORMED IN ACCORDANCE WITH SUBSECTION 505.04(d)-2 OF THE STANDARD SPECIFICATIONS. ONE PILE TEST SHALL BE CONDUCTED ON THE FIRST PILE DRIVEN AT EACH ABUTMENT, FOR A TOTAL OF 2 TESTS. MORE TESTS MAY BE REQUIRED BY THE RESIDENT ENGINEER.
- PRECAST ABUTMENTS AND POST-TENSIONING**
25. IF VERTICAL CONSTRUCTION JOINTS ARE USED BY THE CONTRACTOR TO FACILITATE SHIPMENT AND INSTALLATION OF THE ABUTMENTS, THEN THE SECTIONS SHALL BE KEYS, EPOXY GROUTED, AND MATCH CAST. A JOINT DETAIL SHALL BE SHOWN ON THE FABRICATION DRAWINGS.
26. POST-TENSIONING STRANDS AND CONDUIT SHALL ADHERE TO THE REQUIREMENTS OF SECTION 510 OF THE STANDARD SPECIFICATIONS.
27. CONDUIT SHALL BE GROUTED AFTER POST-TENSIONING. THE GROUT SHALL BE A NON-BLEEDING GROUT MEETING THE REQUIREMENTS OF ASTM C 1107 (GRADE C). GROUTING SHALL BE PERFORMED BY QUALIFIED PERSONNEL WITH PREVIOUS EXPERIENCE.
28. CONTRACTOR SHALL BE RESPONSIBLE FOR POST-TENSIONING ELEMENTS IN THE ANCHORAGE ZONE, INCLUDING ADDITIONAL REINFORCEMENT WITHIN THE LOCAL ZONE (REGION IMMEDIATELY SURROUNDING THE POST-TENSIONING ANCHOR ASSEMBLY). DESIGN SHALL CONFORM TO AASHTO LRFD.
29. DESIGN VALUES
  - A. PRECAST CONCRETE COMPRESSIVE STRENGTH:  $f'_c = 5000$  PSI.
  - B. POST-TENSIONING STRANDS: 0.6 INCH DIAMETER, 270 KSI, LOW RELAXATION 7-WIRE STRANDS; NUMBER OF STRANDS PER CONDUIT NOTED IN THE PLANS.
  - C. APPARENT MODULUS OF ELASTICITY: 28,500 KSI.
  - D. JACKING FORCE PER STRAND = 44 KIPS.
30. THE CONCRETE FOR ABUTMENT PILE CAVITIES SHALL MEET THE REQUIREMENTS OF ITEM 900.608, "SPECIAL PROVISION (HIGH PERFORMANCE CONCRETE, RAPID SET)".
31. THE CORRUGATED STEEL PIPE SHALL MEET THE REQUIREMENTS OF SUBSECTION 711.01.
32. ALL COSTS ASSOCIATED WITH INSTALLING THE CORRUGATED STEEL PIPE, GALVANIZED ANCHOR HEADS AND TRUMPETS, CONDUIT, GROUT, AND POST-TENSIONING STRANDS SHALL BE INCIDENTAL TO ITEM 540.10, "PRECAST CONCRETE STRUCTURE (ABUTMENT NO. 1)" AND/OR ITEM 540.10, "PRECAST CONCRETE STRUCTURE (ABUTMENT NO. 2)".
33. PROPOSED SEQUENCE OF CONSTRUCTION
  - A. PREPARE AND GRADE FOUNDATION TO REQUIRED ELEVATION.
  - B. DRIVE PILES.
  - C. PLACE PRECAST ABUTMENTS, GROUT VERTICAL SHEAR KEYS, AND INSTALL TRANSVERSE STRANDS (IF MORE THAN 1 UNIT). USE A CALIBRATED JACK TO TENSION STRANDS TO 3 KIPS EACH TO REMOVE SAG.

- D. FILL PILE CAVITIES WITH ITEM 900.608, "SPECIAL PROVISION (HIGH PERFORMANCE CONCRETE, RAPID SET)".
- E. STRESS POST-TENSIONING STRANDS USING A CALIBRATED JACK, OPERATED BY QUALIFIED PERSONNEL WHO HAVE PREVIOUS EXPERIENCE IN POST-TENSIONING.
- F. GROUT CONDUITS.

ALTERNATE CONSTRUCTION SEQUENCES MAY BE SUBMITTED TO THE VTRANS PROJECT MANAGER FOR APPROVAL.

**NEXT D BEAMS**

34. NEXT D BEAMS ARE A NONPROPRIETARY SHAPE DEVELOPED BY PCI NORTHEAST (PCINE). STANDARDIZED SECTION PROPERTIES AND DETAILS MAY BE FOUND AT WWW.PCINE.ORG.
35. DESIGN VALUES
  - A. CONCRETE COMPRESSIVE STRENGTH:  $f'_c = 8000$  PSI.
  - B. CONCRETE COMPRESSIVE STRENGTH AT RELEASE:  $f'_{ci} = 6000$  PSI.
  - C. PRESTRESSING STRANDS: 0.6 INCH DIAMETER, 270 KSI, LOW RELAXATION, 7-WIRE STRANDS.
  - D. APPARENT MODULUS OF ELASTICITY = 28,500 KSI.
  - E. THE JACKING FORCE PER STRAND IS 44 KIPS.
  - F. SERVICE LOADS
 

MEMBER MOMENT (MIDSPAN)	772	KIP-FT
SUPERIMPOSED DEAD LOAD MOMENT (MIDSPAN)	72	KIP-FT
LIVE LOAD AND IMPACT MOMENT (MIDSPAN)	1295	KIP-FT
DEAD LOAD REACTION	66	KIP
LIVE LOAD AND IMPACT REACTION	80	KIP
TOTAL REACTION	146	KIP
MIDSPAN CAMBER AT RELEASE	1.38	INCH
MIDSPAN CAMBER AT END OF CONSTRUCTION	2.21	INCH
LONG-TERM MIDSPAN CAMBER	2.47	INCH
36. FLANGE EDGES AND BEAM STEMS IN CONTACT WITH HPC RAPID SET CONCRETE SHALL BE SANDBLASTED PRIOR TO DELIVERY AND POWER WASHED WITH WATER PRIOR TO ERECTION OF THE BEAMS.
37. FILL FLANGE CLOSURE POURS WITH HPC RAPID SET CONCRETE IN ACCORDANCE WITH ITEM 900.608, "SPECIAL PROVISION (HIGH PERFORMANCE CONCRETE, RAPID SET)". CONCRETE SHALL HAVE A 28 DAY MINIMUM COMPRESSIVE STRENGTH OF 7000 PSI.
38. METHOD OF FORMING THE FLANGE CONNECTION SHALL BE DETERMINED BY THE CONTRACTOR. THE FORMS SHALL BE REMOVABLE AND ABLE TO ACCOMMODATE DIFFERENTIAL CAMBER. FORM SUPPORTS SHALL NOT PENETRATE THROUGH THE TOP OF THE POUR UNLESS APPROVED BY THE ENGINEER.
39. THE FABRICATOR MAY ALTER THE DESIGN DETAILED WITHIN THESE PLANS TO ACCOMMODATE THEIR SPECIFIC OPERATION. THIS ALTERATION SHALL BE DESIGNED AND SEALED BY A PROFESSIONAL ENGINEER LICENSED IN THE STATE OF VERMONT AND MEET THE ABOVE CRITERIA.
40. PROPOSED SEQUENCE OF CONSTRUCTION
  - A. LAY OUT WORKING LINES FOR THE ENTIRE BRIDGE WIDTH ALONG CENTERLINE OF BEARING AT EACH ABUTMENT MEASURED FROM A SINGLE WORK POINT.
  - B. VERIFY BEAM SEAT ELEVATIONS AND TAKE CORRECTIVE ACTION IF NECESSARY.
  - C. PLACE TEMPORARY BEARINGS.
  - D. ERECT THE BEAMS ALONG WORKING LINES DETERMINED IN STEP A.
  - E. CONSTRUCT FORMS FOR THE FLANGE CONNECTIONS AND BACKWALL/DIAPHRAGMS.
  - F. PLACE HPC, RAPID SET AND CURE.
  - G. BACKFILL AND PREPARE GRADE FOR APPROACH SLABS.

ALTERNATE CONSTRUCTION SEQUENCES MAY BE SUBMITTED TO THE VTRANS PROJECT MANAGER FOR APPROVAL.

**ABUTMENT CLOSURE/END DIAPHRAGM**

41. THE ABUTMENT CLOSURE POUR SHALL BE MADE WITH HPC RAPID SET CONCRETE IN ACCORDANCE WITH ITEM 900.608, "SPECIAL PROVISION (HIGH PERFORMANCE CONCRETE, RAPID SET)". CONCRETE SHALL HAVE A 28 DAY MINIMUM COMPRESSIVE STRENGTH OF 7000 PSI.
- APPROACH SLABS**
42. PRECAST CONCRETE COMPRESSIVE STRENGTH:  $f'_c = 5000$  PSI.
43. SLAB EDGES IN CONTACT WITH HPC RAPID SET CONCRETE SHALL BE SANDBLASTED PRIOR TO DELIVERY AND POWER WASHED WITH WATER PRIOR TO INSTALLATION.
44. FILL CLOSURE POURS WITH HPC RAPID SET CONCRETE IN ACCORDANCE WITH ITEM 900.608, "SPECIAL PROVISION (HIGH PERFORMANCE CONCRETE, RAPID SET)". CONCRETE SHALL HAVE A 28 DAY MINIMUM COMPRESSIVE STRENGTH OF 7000 PSI.
45. THE FABRICATOR MAY ALTER THE DESIGN DETAILED WITHIN THESE PLANS TO ACCOMMODATE THEIR SPECIFIC OPERATION. THIS ALTERATION SHALL BE DESIGNED AND SEALED BY A PROFESSIONAL ENGINEER LICENSED IN THE STATE OF VERMONT AND MEET THE ABOVE CRITERIA.

PROJECT NAME: PLYMOUTH	
PROJECT NUMBER: ER BRS 0149(5)	
FILE NAME: zllc330notes.dgn	PLOT DATE: 11/5/2012
PROJECT LEADER: J. OLUND	DRAWN BY: S. MORGAN
DESIGNED BY: J. OLUND	CHECKED BY: D. MYERS
PROJECT NOTES	SHEET 8 OF 46

REVISION	DESCRIPTION	DATE
ADDENDUM #1	CHANGE REINFORCING STEEL TO LEVEL I	11/05/2012

**TYLIN**INTERNATIONAL



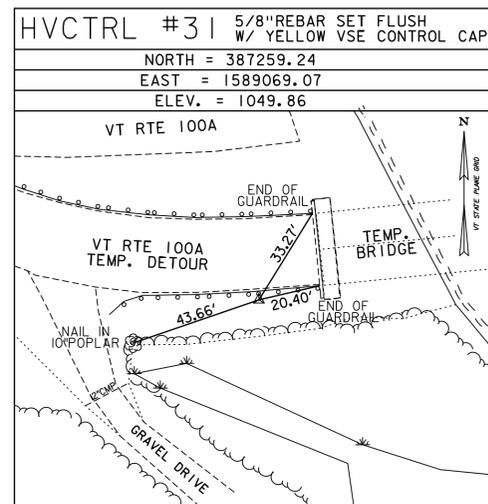
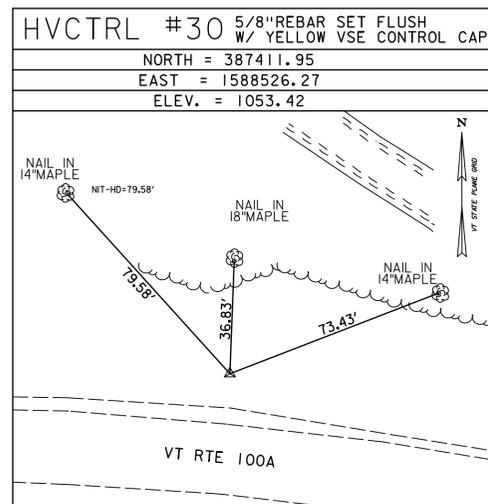
GPS CONTROL POINTS

DANBY CORS ARP

PID DL2318  
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 E = 1508688.75  
 ELLIP HEIGHT = 636.40

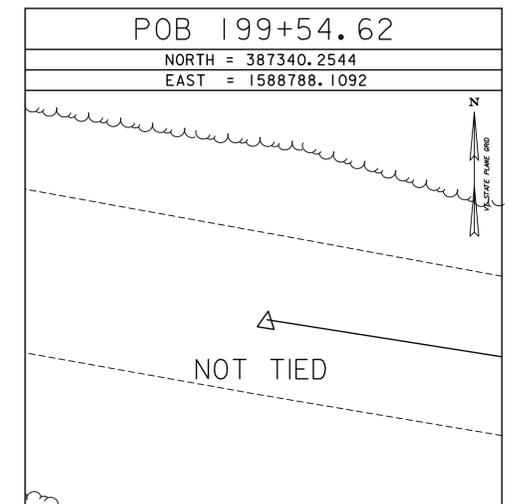
STATION IS A GPS CONTINUOUSLY OPERATING REFERENCE STATION. STATION IS THE ANTENNA REFERENCE POINT OF THE GPS ANTENNA. LOCATED AT THE DANBY, VERMONT CURRIER MEMORIAL SCHOOL, THE MONUMENT IS ATTACHED TO A TWO STORY CONCRETE & BRICK BUILDING WITH AN 8 FT CONCRETE FOUNDATION BUILT IN 1966. THE MAST IS A 1.75 INCH DIA. GALV PIPE THAT IS 108 INCHES LONG. THE MAST IS ATTACHED TO A STEEL MOUNTING FRAME WITH THREE ATTACHMENTS CONSISTING OF 3/8 INCH SS THROUGH BOLTS. THE MOUNTING FRAME IS ATTACHED TO THE BUILDING USING 8 ATTACHMENT POINTS. ALL 8 ATTACHMENTS ARE THROUGH BOLTED AND CONSIST OF 1/2 INCH SS THREADED ROD AND NUTS.

TRAVERSE TIES

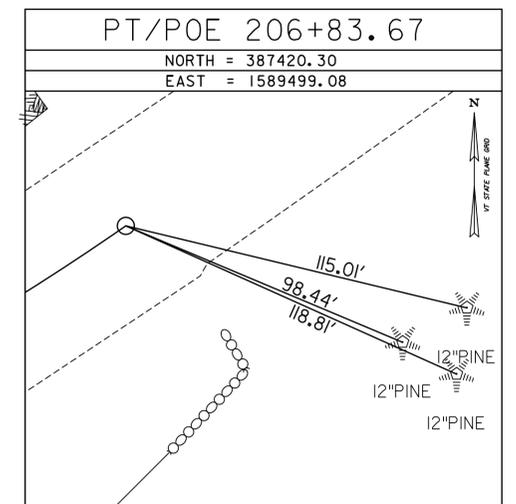
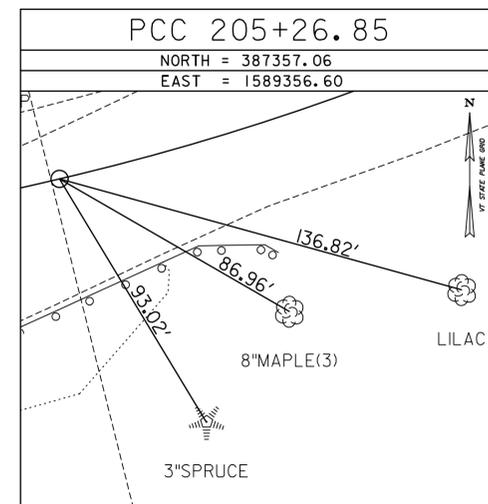
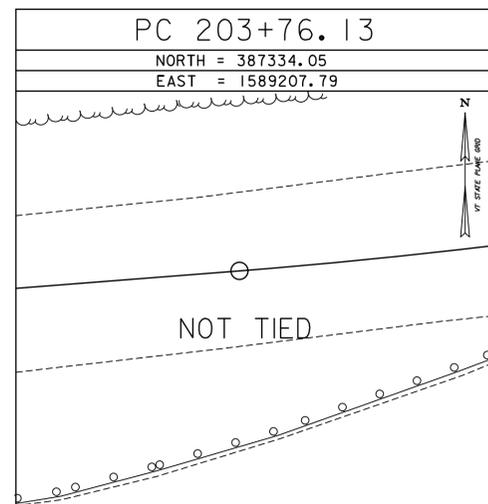
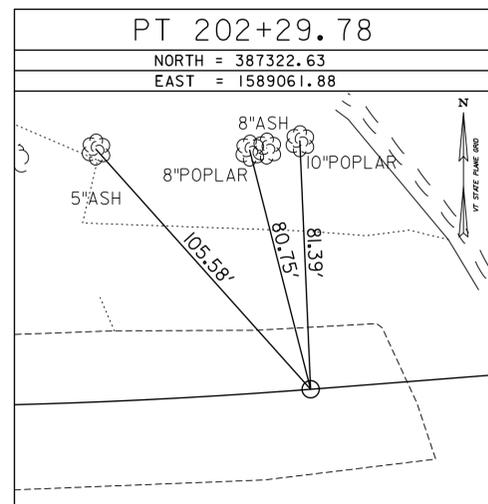
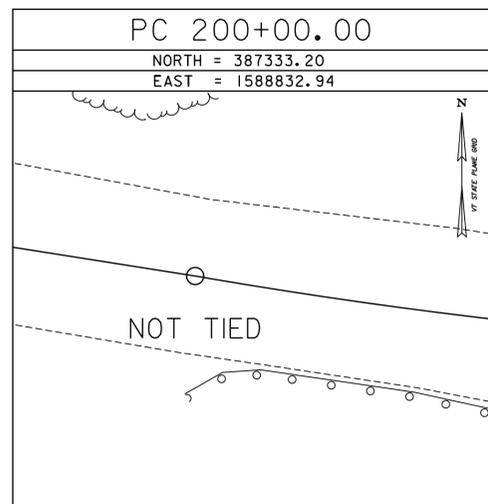


\* MAIN TRAVERSE COMPLETED: DECEMBER 13, 2011 BY VSE, T. CATTANEO-PC, T. COMSTOCK

ALIGNMENT TIES



ALIGNMENT TIES



DATUM	
VERTICAL	NAVD 88(GEOID09) FT
HORIZONTAL	NAD 83(CORS) sFT
ADJUSTMENT	LSQ

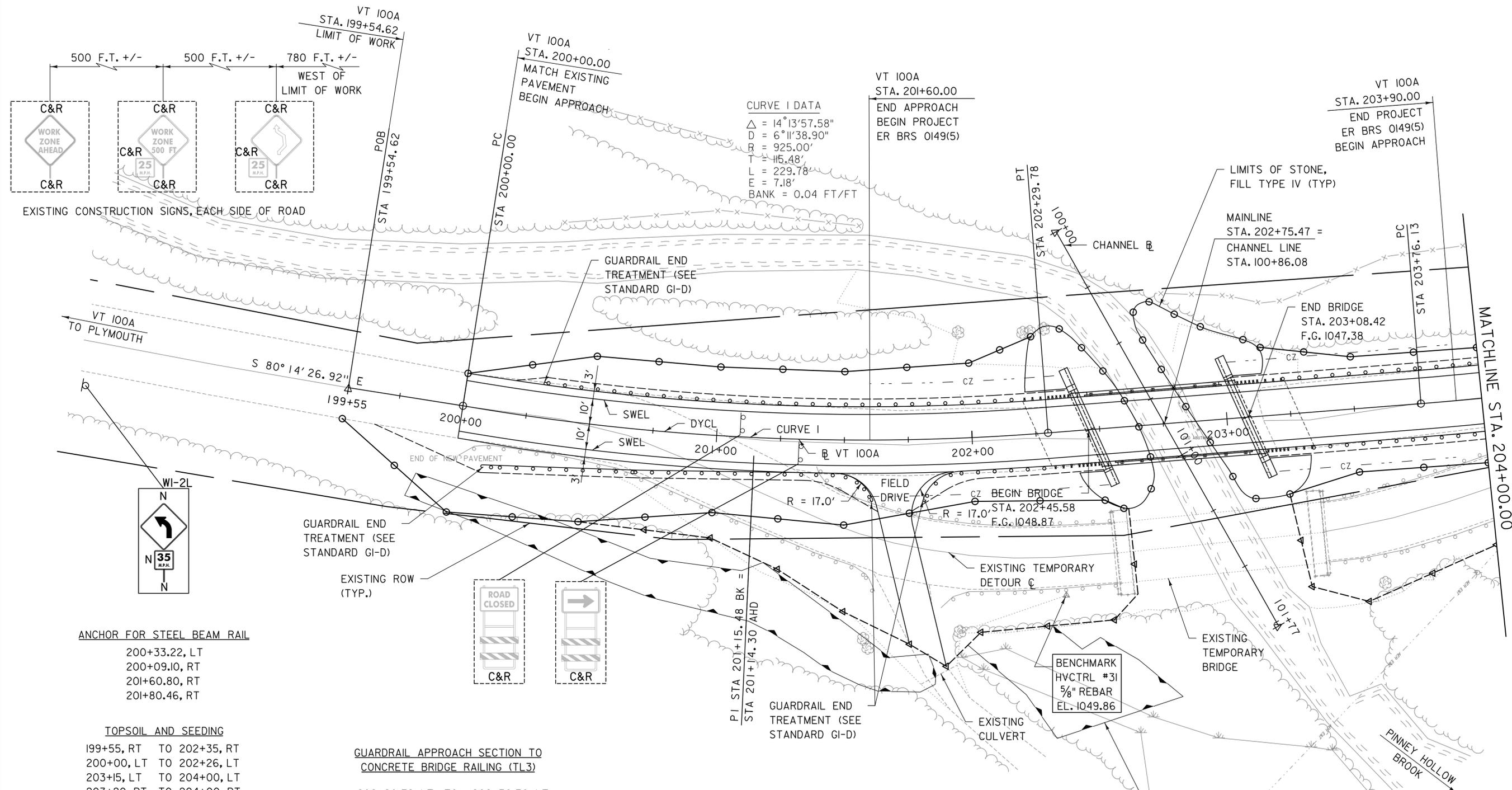


TYLIN INTERNATIONAL

PROJECT NAME: PLYMOUTH  
 PROJECT NUMBER: ER BRS 0149(5)

FILE NAME: zllc330+1.dgn  
 PROJECT LEADER: J. OLUND  
 DESIGNED BY: A. GREENLAW  
 TIE SHEET

PLOT DATE: 9/20/2012  
 DRAWN BY: T. KELLEY  
 CHECKED BY: D. BRYANT  
 SHEET 10 OF 46



**CURVE I DATA**  
 $\Delta = 14^\circ 13' 57.58''$   
 $D = 6^\circ 11' 38.90''$   
 $R = 925.00'$   
 $T = 115.48'$   
 $L = 229.78'$   
 $E = 7.18'$   
 $BANK = 0.04 \text{ FT/FT}$



**ANCHOR FOR STEEL BEAM RAIL**  
 200+33.22, LT  
 200+09.10, RT  
 201+60.80, RT  
 201+80.46, RT

**TOPSOIL AND SEEDING**  
 199+55, RT TO 202+35, RT  
 200+00, LT TO 202+26, LT  
 203+15, LT TO 204+00, LT  
 203+20, RT TO 204+00, RT

**4 INCH WHITE LINE**  
 200+00.00, 10' LT TO 204+00.00, 10' LT - SWEL  
 200+00.00, 10' RT TO 204+00.00, 10' RT - SWEL

**4 INCH YELLOW LINE**  
 200+00.00, CL TO 204+00.00, CL - DYCL

**CONSTRUCT DRIVE**  
 201+62.60, RT - 12' FIELD DRIVE

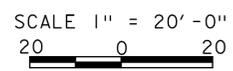
**GUARDRAIL APPROACH SECTION TO CONCRETE BRIDGE RAILING (TL3)**  
 202+20.72 LT TO 202+39.76 LT  
 202+30.31 RT TO 202+49.83 RT  
 203+04.17 LT TO 203+22.32 LT  
 203+14.24 RT TO 203+33.15 RT

**STEEL BEAM GUARDRAIL, GALVANIZED**  
 200+33.22 LT TO 202+20.72 LT  
 200+09.10 RT TO 201+60.80 RT  
 201+80.46 RT TO 202+30.31 RT  
 203+22.32 LT TO 204+00.00 LT  
 203+33.15 RT TO 204+00.00 RT

**PRECAST REINFORCED CONCRETE CURB, TYPE B**  
 202+27.76 LT TO 202+39.76 LT  
 202+37.83 RT TO 202+49.83 RT  
 203+04.17 LT TO 203+16.17 LT  
 203+14.24 RT TO 203+26.24 RT

**LAYOUT I**

**SIGN LEGEND:**  
 C&R: CONSTRUCTION, RETURN  
 R: REMOVE  
 RET: RETAIN  
 N: NEW

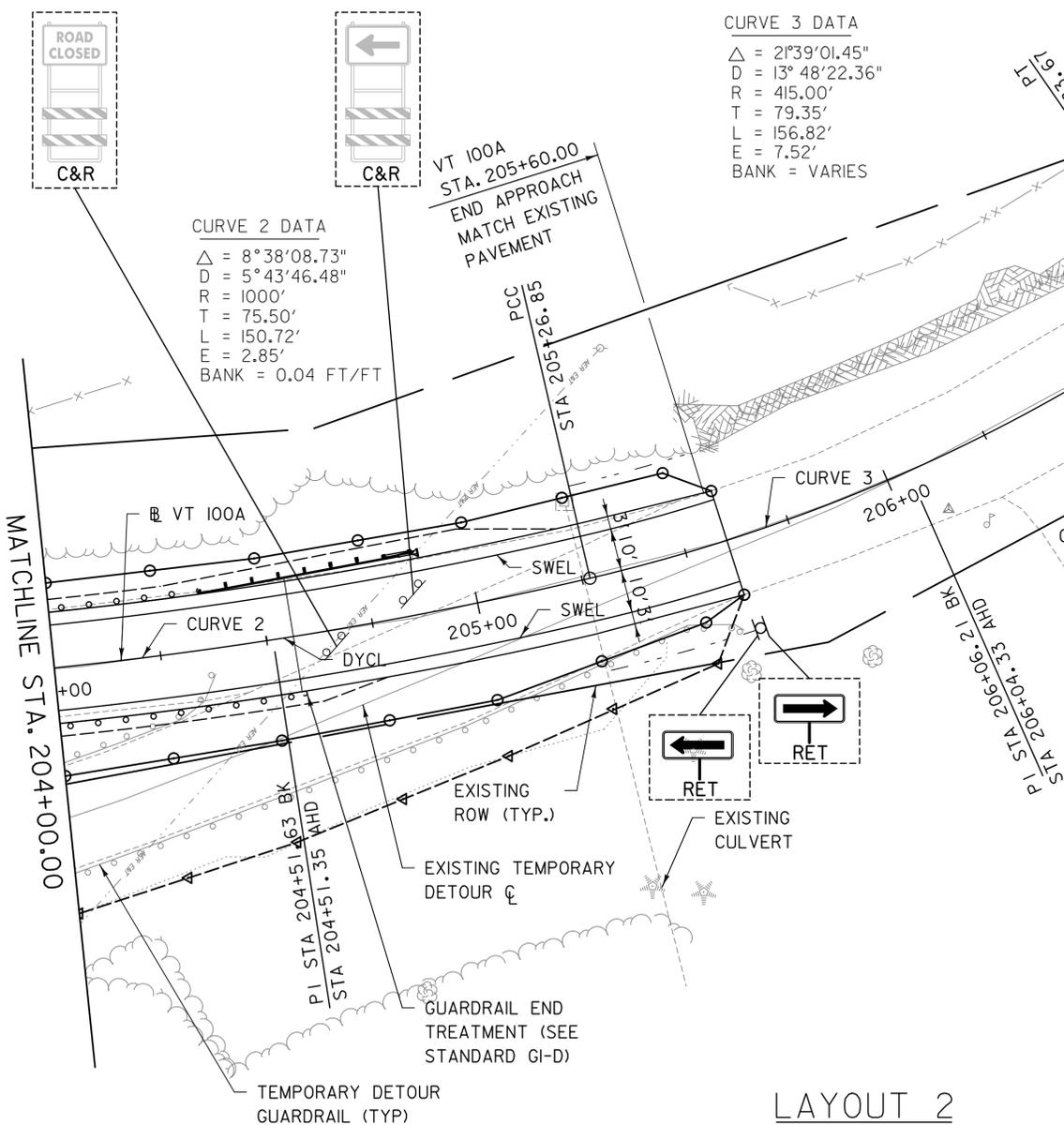


**TYLIN INTERNATIONAL**

**EXISTING TEMPORARY ACROW BRIDGE**  
 80' SINGLE SPAN STEEL TRUSS ON SPREAD FOOTING, STUB ABUTMENTS 24' BETWEEN RAILS  
 STEEL TRUSS OWNED BY STATE

PROJECT NAME: PLYMOUTH  
 PROJECT NUMBER: ER BRS 0149(5)  
 FILE NAME: zllc330bdr\_pl.01.dgn  
 PROJECT LEADER: J. OLUND  
 DESIGNED BY: A. GREENLAW  
 LAYOUT I

PLOT DATE: 9/20/2012  
 DRAWN BY: S. MORGAN  
 CHECKED BY: J. HOWE  
 SHEET II OF 46



**CURVE 3 DATA**  
 $\Delta = 21^{\circ}39'01.45''$   
 $D = 13^{\circ}48'22.36''$   
 $R = 415.00'$   
 $T = 79.35'$   
 $L = 156.82'$   
 $E = 7.52'$   
 BANK = VARIES

**CURVE 2 DATA**  
 $\Delta = 8^{\circ}38'08.73''$   
 $D = 5^{\circ}43'46.48''$   
 $R = 1000'$   
 $T = 75.50'$   
 $L = 150.72'$   
 $E = 2.85'$   
 BANK = 0.04 FT/FT

**LAYOUT 2**

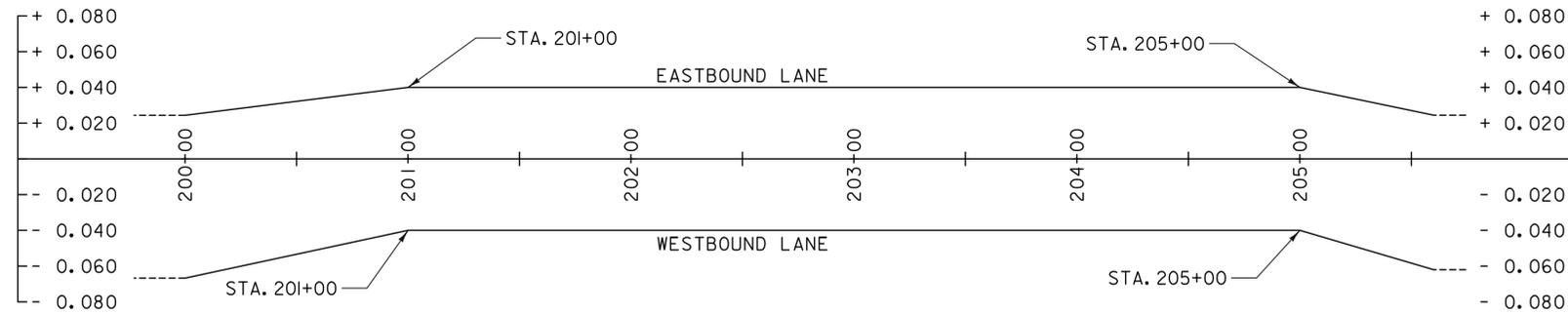
**SIGN LEGEND:**  
 C&R: CONSTRUCTION, RETURN  
 R: REMOVE  
 RET: RETAIN  
 N: NEW

- MANUFACTURED TERMINAL SECTION, TANGENT  
204+34.82, LT TO 204+88.82, LT
- TOPSOIL AND SEED  
204+00, LT TO 205+60, LT  
204+00, RT TO 205+60, RT
- ANCHOR FOR STEEL BEAM RAIL  
204+57.64, RT
- STEEL BEAM GUARDRAIL, GALVANIZED  
204+00.00 LT TO 204+34.82 LT  
204+00.00 RT TO 204+57.64 RT
- 4 INCH WHITE LINE  
204+00.00, 10' LT TO 205+60.00, 10' LT - SWEL  
204+00.00, 10' RT TO 205+60.00, 10' RT - SWEL
- 4 INCH YELLOW LINE  
204+00.00, CL TO 205+60.00, CL - DYCL

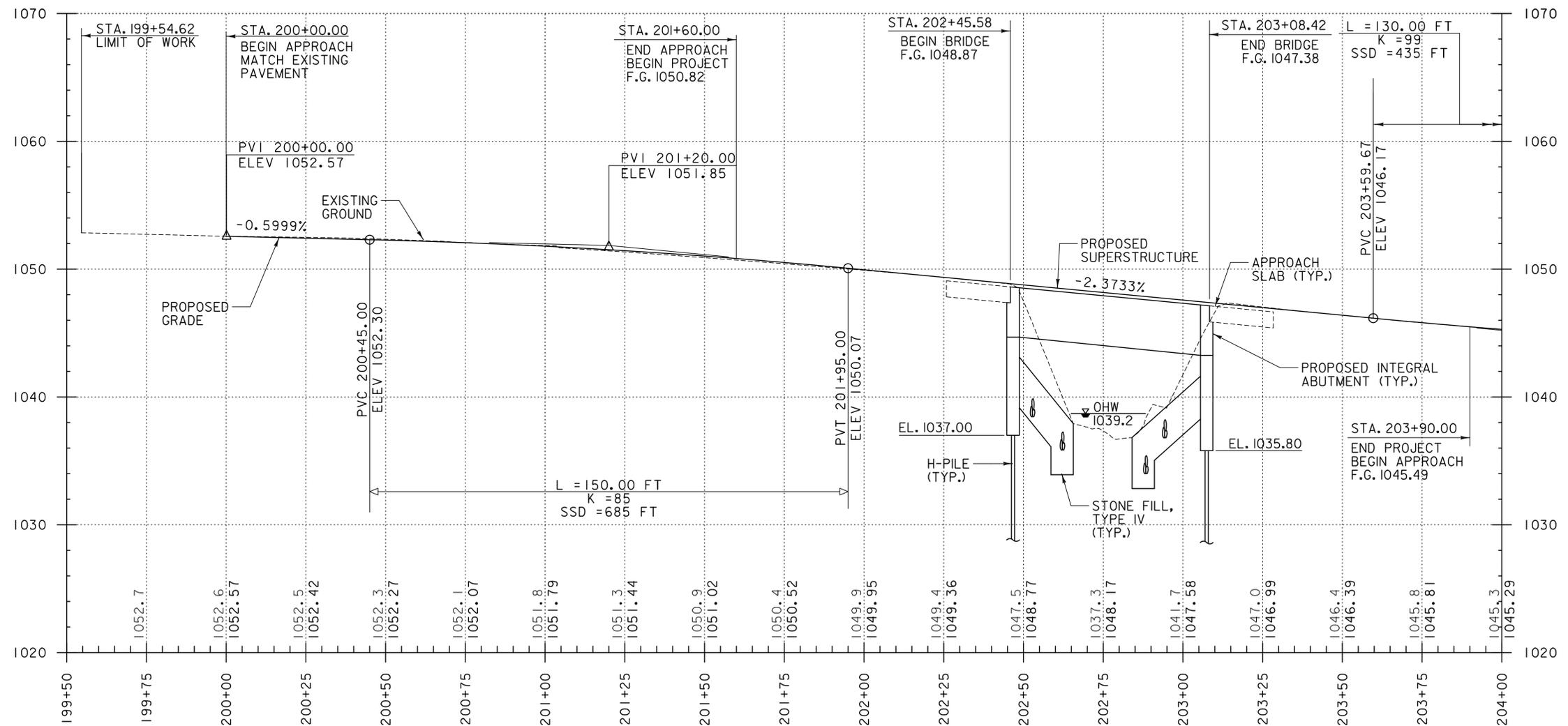
SCALE 1" = 20' - 0"  
 20 0 20



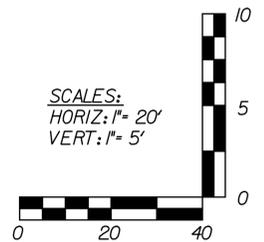
PROJECT NAME: PLYMOUTH	
PROJECT NUMBER: ER BRS 0149(5)	
FILE NAME: zllc330bdr_pl.02.dgn	PLOT DATE: 9/20/2012
PROJECT LEADER: J. OLUND	DRAWN BY: S. MORGAN
DESIGNED BY: A. GREENLAW	CHECKED BY: J. HOWE
LAYOUT 2	SHEET 12 OF 46



BANKING DIAGRAM



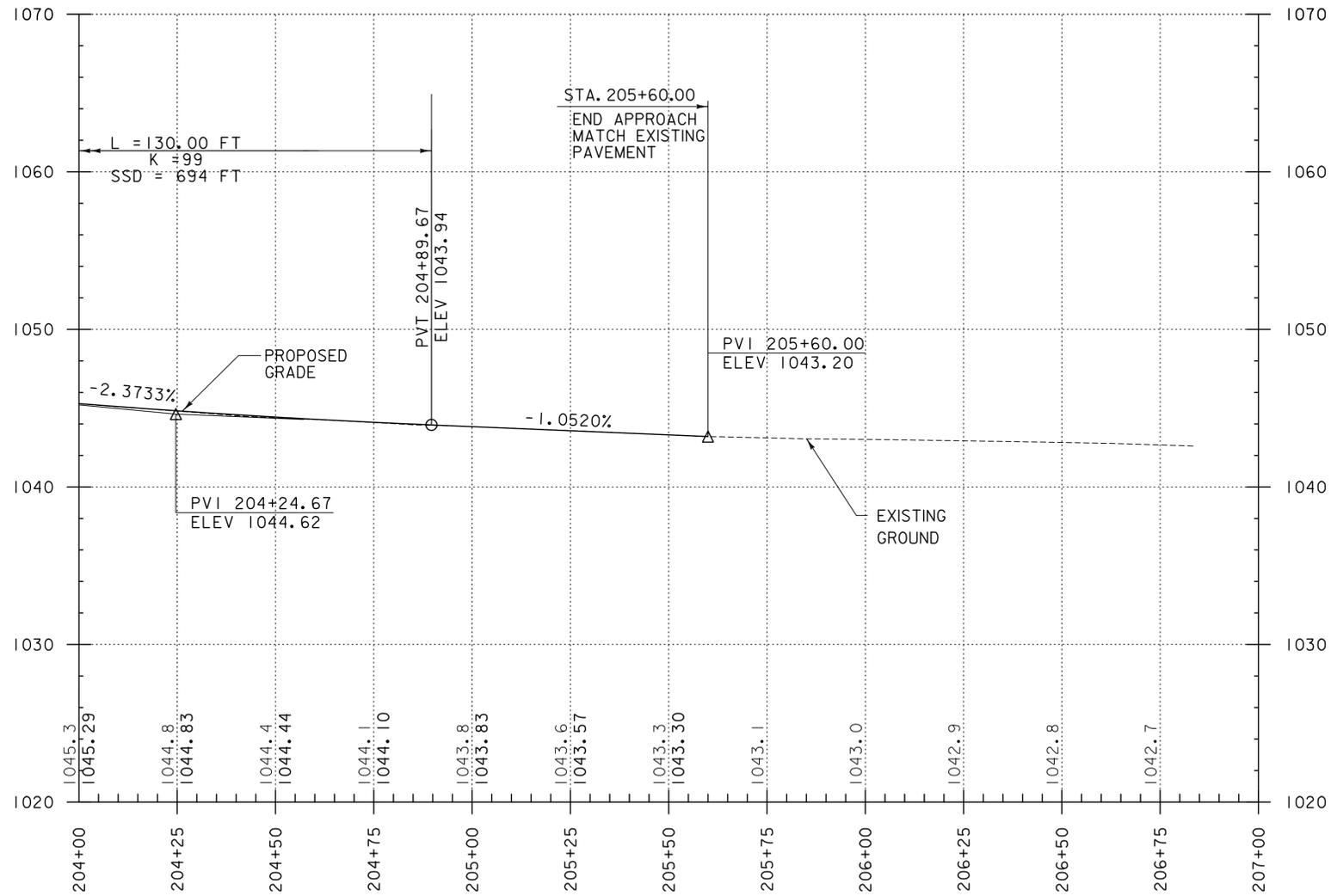
PROFILE - VT 100A



THE GRADES SHOWN TO THE NEAREST TENTH ARE THE EXISTING GROUND ELEVATIONS ALONG THE PROPOSED ALIGNMENT

THE GRADES SHOWN TO THE NEAREST HUNDRETH ARE THE PROPOSED GRADES FOR THE NEW ALIGNMENT

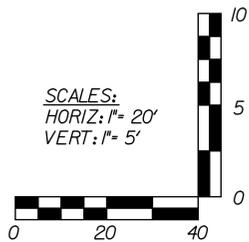
<b>TYL</b> INTERNATIONAL	PROJECT NAME: PLYMOUTH	PLOT DATE: 9/20/2012
	PROJECT NUMBER: ER BRS 0149(5)	DRAWN BY: S. MORGAN
	FILE NAME: zllc330bdr_pro_01.dgn	CHECKED BY: J. HOWE
	PROJECT LEADER: J. OLUND	SHEET 13 OF 46
	DESIGNED BY: A. GREENLAW	
	PROFILE 1	



PROFILE - VT 100A

THE GRADES SHOWN TO THE NEAREST TENTH ARE THE EXISTING GROUND ELEVATIONS ALONG THE PROPOSED ALIGNMENT

THE GRADES SHOWN TO THE NEAREST HUNDRETH ARE THE PROPOSED GRADES FOR THE NEW ALIGNMENT



TYLIN INTERNATIONAL

PROJECT NAME: PLYMOUTH	PLOT DATE: 9/20/2012
PROJECT NUMBER: ER BRS 0149(5)	DRAWN BY: S. MORGAN
FILE NAME: zllc330bdr_pro_02.dgn	CHECKED BY: J. HOWE
PROJECT LEADER: J. OLUND	SHEET 14 OF 46
DESIGNED BY: A. GREENLAW	PROFILE 2



**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**

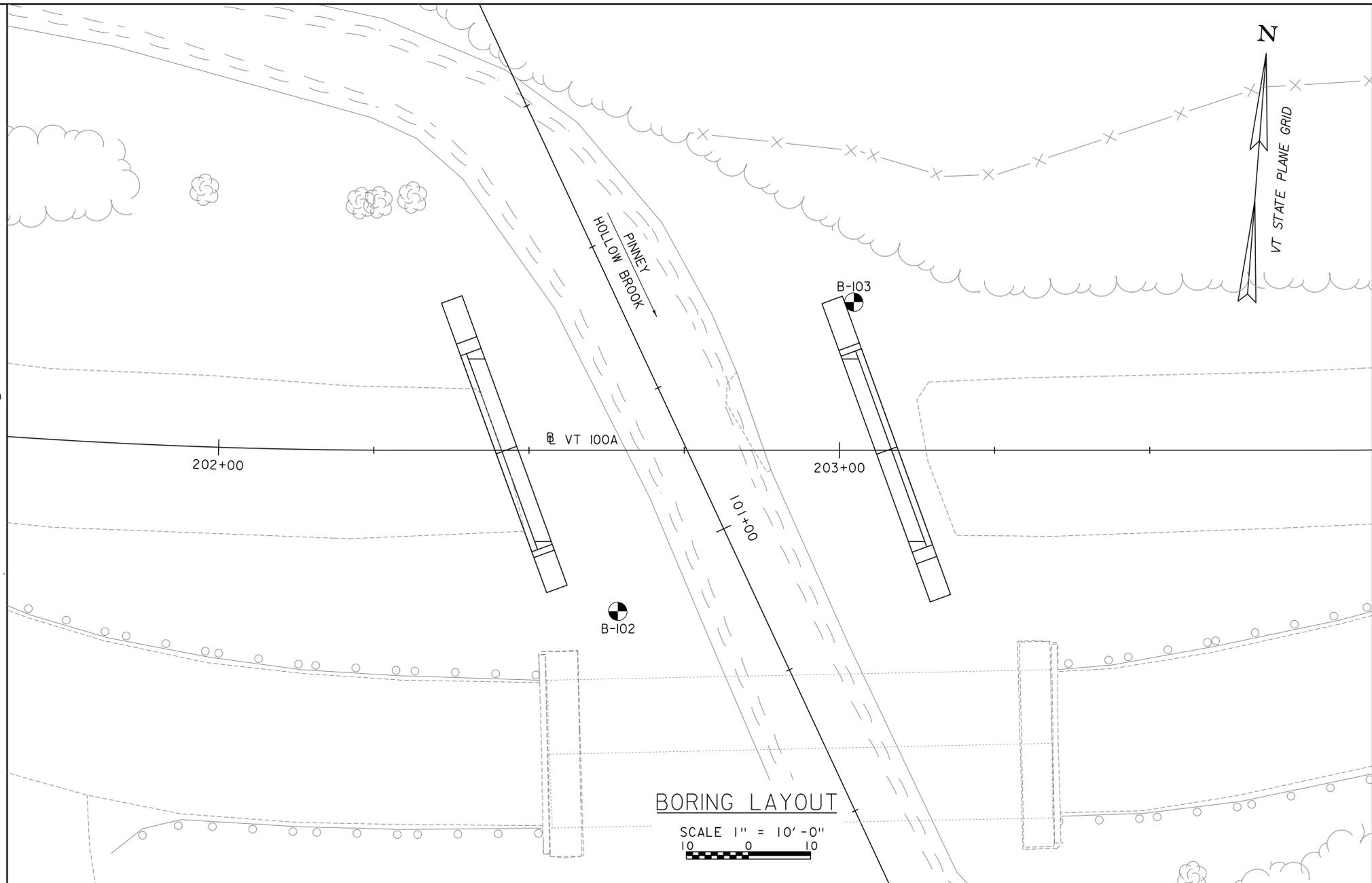
DENSITY (GRANULAR SOILS)		CONSISTENCY (COHESIVE SOILS)	
N	DESCRIPTIVE TERM	N	DESCRIPTIVE TERM
<5	Very Loose	<2	Very Soft
5-10	Loose	2-4	Soft
11-24	Med. Dense	5-8	Med. Stiff
25-50	Dense	9-15	Stiff
>50	Very Dense	16-30	Very Stiff
		31-60	Hard
		>60	Very Hard

**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 3/8"
- 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 To Ledge Or Boulder
- NR No Recovery
- Rec. Recovery
- %Rec. Percent Recovery
- ROD Rock Quality Designation
- CBR California Bearing Ratio
- < Less Than
- > Greater Than
- R Refusal (N > 100)

COLOR

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



**BORING LAYOUT**

SCALE 1" = 10'-0"

**GENERAL NOTES**

- The subsurface explorations shown herein were made between April 4, 2007 and May 8, 2007 by the Agency.
- 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 judgement 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 judgement 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.

**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 > 0.075" (#10 sieve).
- SAND** - Particles of rock < 0.075" (#10 sieve) and > 0.0029" (#200 sieve).
- SLT** - 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**

HOLE NO.	STATION	OFFSET	NORTHING	EASTING	GROUND ELEVATION	ELEVATION TLOB
B-102	202+64.30	25.88' RT	387299.52	1589098.32	1039.84	980.14
B-103	203+02.32	23.80' LT	387352.02	1589132.35	1045.30	1000.10

**TYLIN INTERNATIONAL**

PROJECT NAME: PLYMOUTH  
 PROJECT NUMBER: ER BRS 0149(5)  
 FILE NAME: zllc330bor.dgn  
 PROJECT LEADER: J. OLUND  
 DESIGNED BY: J. OLUND  
 BORING INFORMATION & LAYOUT SHEET  
 PLOT DATE: 9/20/2012  
 DRAWN BY: T. KELLEY  
 CHECKED BY: D. MYERS  
 SHEET 16 OF 46



STATE OF VERMONT  
AGENCY OF TRANSPORTATION  
MATERIALS & RESEARCH SECTION  
SUBSURFACE INFORMATION

BORING NUMBER: B-102  
SHEET 1 of 1  
DATE STARTED: 4/20/07  
DATE COMPLETED: 5/08/07

PROJECT NAME: PLYMOUTH PROJECT NUMBER: BRS 0149(3)S  
SITE NAME: VT 100A SITE NUMBER: BR-8  
STATION: 202+64.30 GROUND ELEVATION: 1039.84 ft  
OFFSET: 25.88' RT GROUNDWATER DEPTH: 5.3 ft 5/09/07  
VTSPG: N 387299.52 ft E 1589098.32 ft PROJECT PIN NUMBER: 84E057

BORING CREW BORING RIG: LARGE SKID RIG w/AUTO HAMMER  
CREW CHIEF: GARROW BORING TYPE: WASH BORE  
DRILLER: GARROW SAMPLE TYPE: SPLIT BARREL  
LOGGER: CARRIERE CHECKED BY: CAA

DEPTH (ft)	SYMBOL	CLASSIFICATION OF MATERIALS (Description)	BLOWS PER FOOT	M.C. (%)	GRAVEL (%)	SAND (%)	FINES (%)
			RUN	REC (%)	RQD (%)	Dip (deg)	Drill Rate (min/ft)
0-4		A-1-b, GrSa with root and wood material., brn, Moist, Rec. = 1.4 ft	4	38.6	30.3	56.1	13.6
4-5		NXDC, Boulders, Cleaned out casing., 3.5 ft - 4.5 ft					
5-6		NXDC, Boulders, Cleaned out casing., 4.5 ft - 6.0 ft					
6-12		No Sample, 10.0 ft - 12.0 ft	12				
12-17.4		A-1-b, SaGr, brn-gry, Moist, Rec. = 1.0 ft	44	12.1	51.1	38.3	10.6
17.4-20		A-2-4, SiGrSa, brn, Moist, Rec. = 1.8 ft	11	15.8	22.2	57.0	20.8
20-24.3		NXDC, Boulders, Cleaned out casing., 24.3 ft - 25.0 ft					
24.3-29.1		A-1-b, GrSa, gry-brn, Moist, Rec. = 1.7 ft	43	13.0	38.1	43.3	18.6
29.1-30.0		NXDC, Boulders, Cleaned out casing., 29.1 ft - 30.0 ft					
30.0-32.0		No Sample, 30.0 ft - 32.0 ft, Used drilling mud to advance casing, Flowing sand.	24				
32.0-37.5		A-4, SaSi, brn, Moist, Rec. = 0.4 ft	R	23.9	1.0	45.8	53.2
37.5-40		A-1-b, SiSaGr, brn, Moist, Rec. = 1.0 ft		11.2	42.8	36.7	20.5
40-50		NXDC, Boulders, Cleaned out casing., 37.5 ft - 50.0 ft, Sleeved 4.5" casing to 3.5" casing.					
50-59.7		A-1-b, GrSa, gry-brn, Moist, Rec. = 1.2 ft	80	13.5	32.4	50.2	17.4
59.7-60		BXDC, Boulders, Cleaned out casing., 52.5 ft - 59.51 ft					
60-61		Gray, Dolomite, with numerous highly weathered calcite veins along jointing. Dolomite is unweathered while the calcite joint infilling is severely weathered. Poor competency. Massively bedded. No discernable dip., Hard, BXMDC, 59.7 ft - 60.7 ft, Rec. = 0.3 ft	1	30	0		15
61-62			2	100	0		10
62-63.4		Gray, Dolomite, with numerous highly weathered calcite veins along jointing. Dolomite is unweathered while the calcite joint infilling is severely weathered. Poor competency. Massively bedded. No discernable dip., Hard, BXMDC, 60.7 ft - 63.4 ft, Rec. = 2.7 ft	3	100	16		12
63.4-64.4							16
64.4-65.4							8
65.4-66.4							10
66.4-67.4							10
67.4-68.4							14
68.4-69.4							14
69.4-70.4							
70.4-71.4							
71.4-72.4							
72.4-73.4							
73.4-74.4							
74.4-75.4							
75.4-76.4							
76.4-77.4							
77.4-78.4							
78.4-79.4							
79.4-80							

Bottom of Abut. #1  
Elev. = 1037.00

Approx. Pile Tip @ Abut. #1  
Elev. 979.8

NOTE: BORING LOGS SHOWN WERE PREPARED UNDER A PREVIOUS PROJECT NUMBER AND ARE PROVIDED HERE FOR INFORMATIONAL PURPOSES.



STATE OF VERMONT  
AGENCY OF TRANSPORTATION  
MATERIALS & RESEARCH SECTION  
SUBSURFACE INFORMATION

BORING NUMBER: B-103  
SHEET 1 of 1  
DATE STARTED: 4/04/07  
DATE COMPLETED: 4/11/07

PROJECT NAME: PLYMOUTH PROJECT NUMBER: BRS 0149(3)S  
SITE NAME: VT 100A SITE NUMBER: BR-8  
STATION: 203+02.32 GROUND ELEVATION: 1045.3 ft  
OFFSET: 23.80' LT GROUNDWATER DEPTH: 10.2 ft 4/12/07  
VTSPG: N 387352.02 ft E 1589132.35 ft PROJECT PIN NUMBER: 84E057

BORING CREW BORING RIG: LARGE SKID RIG w/AUTO HAMMER  
CREW CHIEF: GARROW BORING TYPE: WASH BORE  
DRILLER: GARROW SAMPLE TYPE: SPLIT BARREL  
LOGGER: CARRIERE CHECKED BY: CAA

DEPTH (ft)	SYMBOL	CLASSIFICATION OF MATERIALS (Description)	BLOWS PER FOOT	M.C. (%)	GRAVEL (%)	SAND (%)	FINES (%)
			RUN	REC (%)	RQD (%)	Dip (deg)	Drill Rate (min/ft)
0-1.5		A-1-b, GrSa, brn, Moist, Rec. = 1.5 ft	36	15.1	37.4	46.2	16.4
1.5-4		NXDC, Cleaned out casing., 4.0 ft - 5.0 ft					
4-10		Visual Class., A-1-b, Sa Gr, brn, Moist, Rec. = 0.6 ft, Insufficient sample for testing.	4	14.4			
10-19		NXDC, Cleaned out casing., 9.8 ft - 10.0 ft	19	14.2	33.7	51.6	14.7
19-22		A-1-b, GrSa, brn, Moist, Rec. = 1.3 ft					
22-26		A-1-b, SaGr, brn, Moist, Rec. = 1.5 ft	22	12.6	46.1	36.5	
26-26		NXDC, Cleaned out casing., 18.2 ft - 19.2 ft					
26-26		Visual Class., A-1-b, Sa Gr, Rec. = 0.4 ft, Rock in sampler. Insufficient sample for testing.	26				
26-26		No Sample., 25.0 ft - 27.0 ft	26				
26-30		A-1-b, Sa, brn, Moist, Rec. = 1.5 ft	18	16.7	18.5	68.0	13.5
30-39		A-1-b, SiGrSa, brn, Moist, Rec. = 0.9 ft	19	10.7	38.6	40.2	21.2
39-40		NXDC, Cleaned out casing., 39.5 ft - 40.0 ft	30	11.1	44.2	40.5	15.3
40-45.2		A-1-b, SaGr, brn, Moist, Rec. = 1.3 ft					
45.2-45.2		Visual Class., Broken Rock, Rec. = 0.2 ft	R	100	53	40	18
45.2-49.9		Gray, Biotite-Quartz Schist, Low RQD may be due to mechanical breakage along foliation., Moderately hard, Unweathered, NXMDC, 45.2 ft - 49.9 ft, Rec. = 4.7 ft	1	100	50	40	18
49.9-54.9		Gray, Biotite-Quartz Schist, Low RQD may be due to mechanical breakage along foliation., Moderately hard, Unweathered, NXMDC, 49.9 ft - 54.9 ft, Rec. = 5.0 ft	2	100	50	40	14
54.9-55.9							8
55.9-56.9							9
56.9-57.9							8
57.9-58.9							8
58.9-59.9							8
59.9-60							
60-61							
61-62							
62-63							
63-64							
64-65							
65-66							
66-67							
67-68							
68-69							
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71-72							
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73-74							
74-75							
75-76							
76-77							
77-78							
78-79							
79-80							

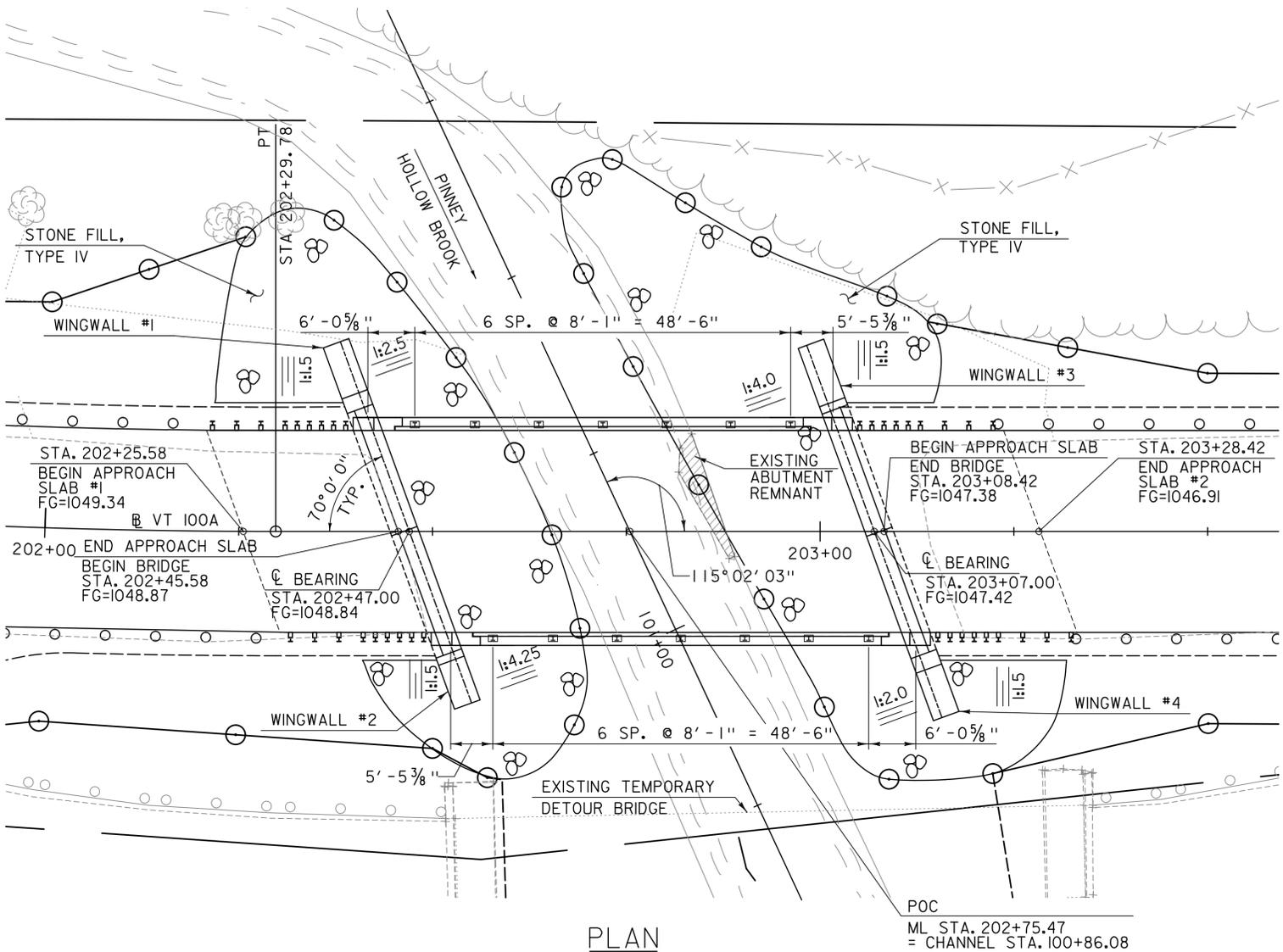
Bottom of Abut. #2  
Elev. = 1035.80

Approx. Pile Tip @ Abut. #2  
Elev. 999.8

PROJECT NAME: PLYMOUTH  
PROJECT NUMBER: ER BRS 0149(5)

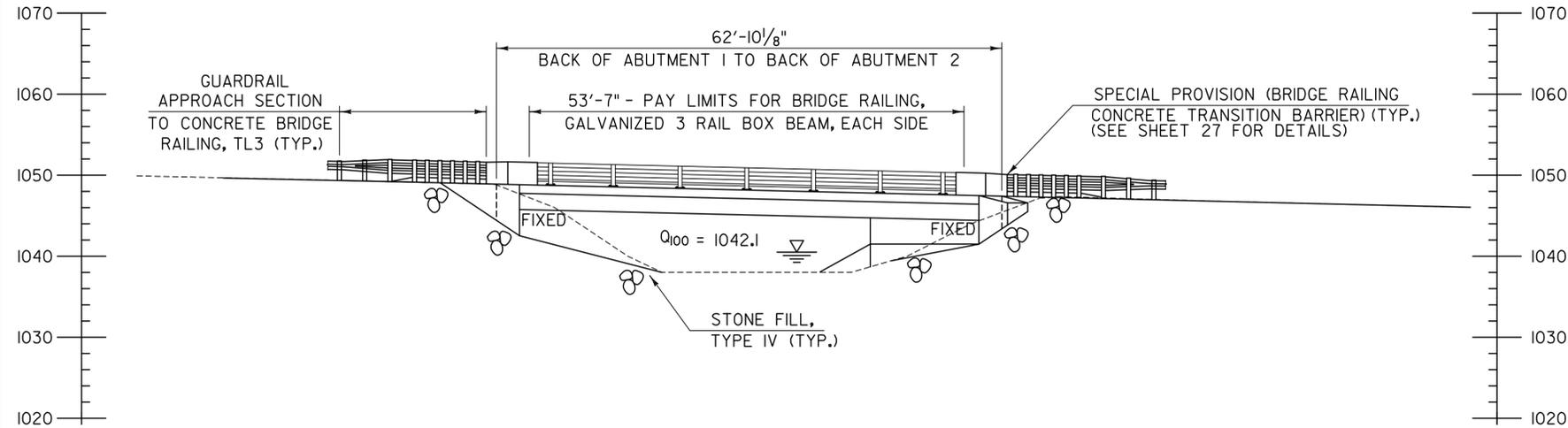
TYLIN INTERNATIONAL

FILE NAME: zllc330bor.dgn PLOT DATE: 9/20/2012  
PROJECT LEADER: J. OLUND DRAWN BY: T. KELLEY  
DESIGNED BY: J. OLUND CHECKED BY: D. MYERS  
BORING LOGS SHEET 17 OF 46



PLAN

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



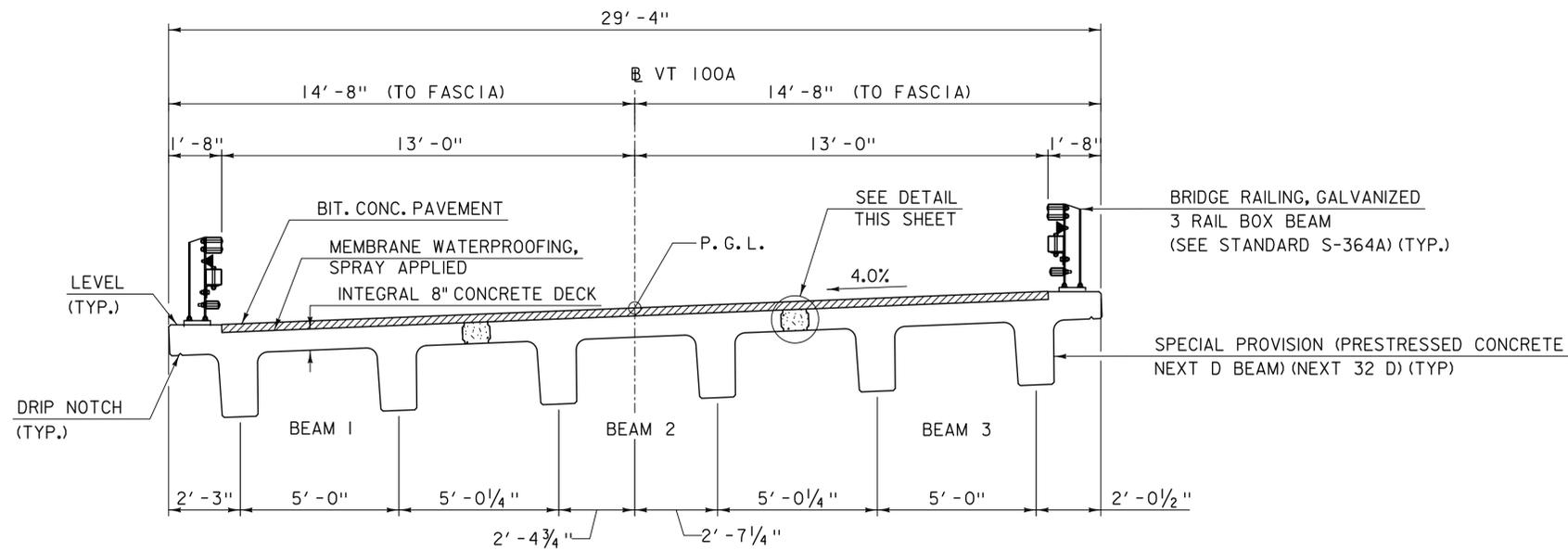
ELEVATION @ DOWNSTREAM FASCIA

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



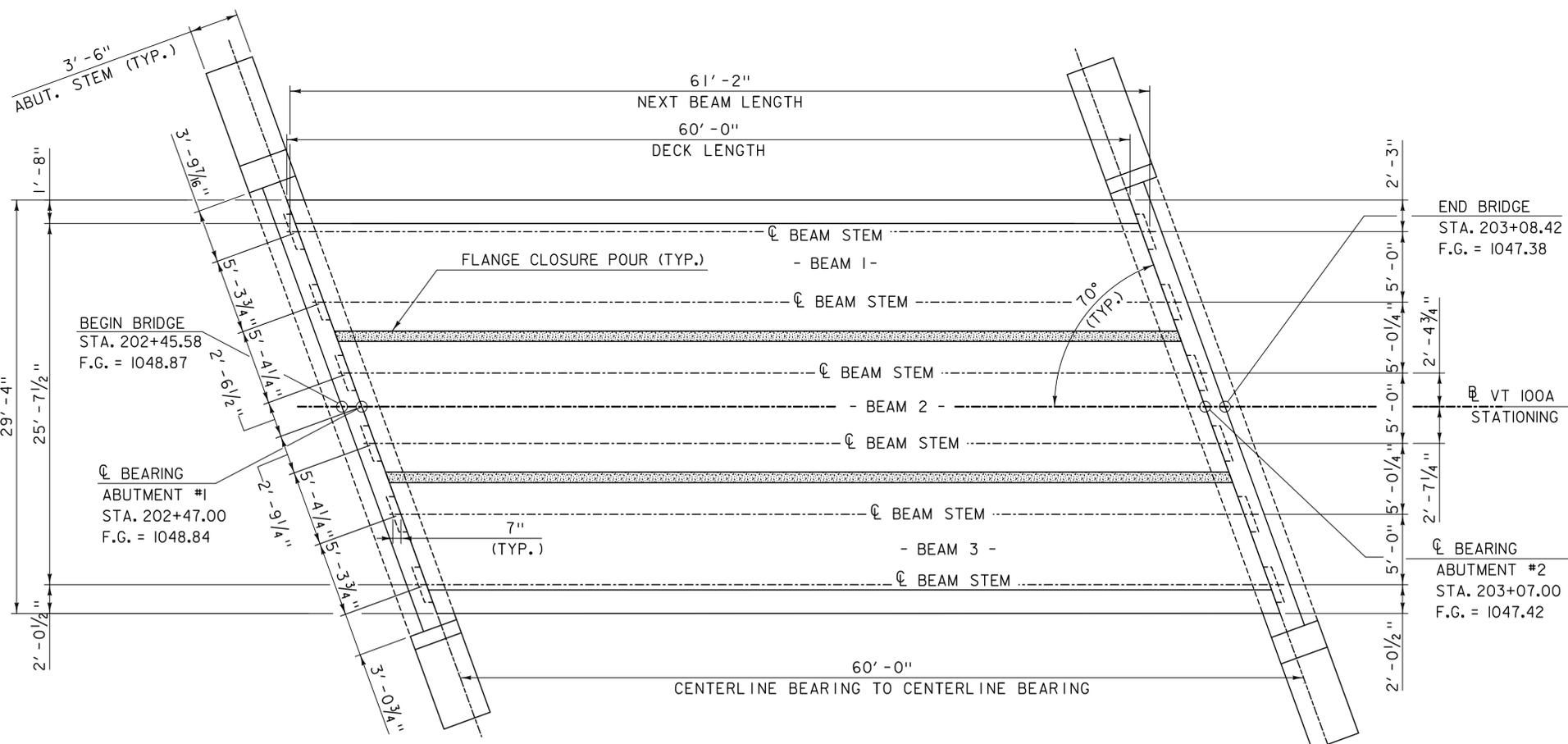
**TYLIN**INTERNATIONAL

PROJECT NAME: PLYMOUTH	PLOT DATE: 9/20/2012
PROJECT NUMBER: ER BRS 0149(5)	DRAWN BY: S. MORGAN
FILE NAME: zllc330bdr_pe_01.dgn	CHECKED BY: J. OLUND
PROJECT LEADER: J. OLUND	SHEET 18 OF 46
DESIGNED BY: D. MYERS	
BRIDGE PLAN & ELEVATION	



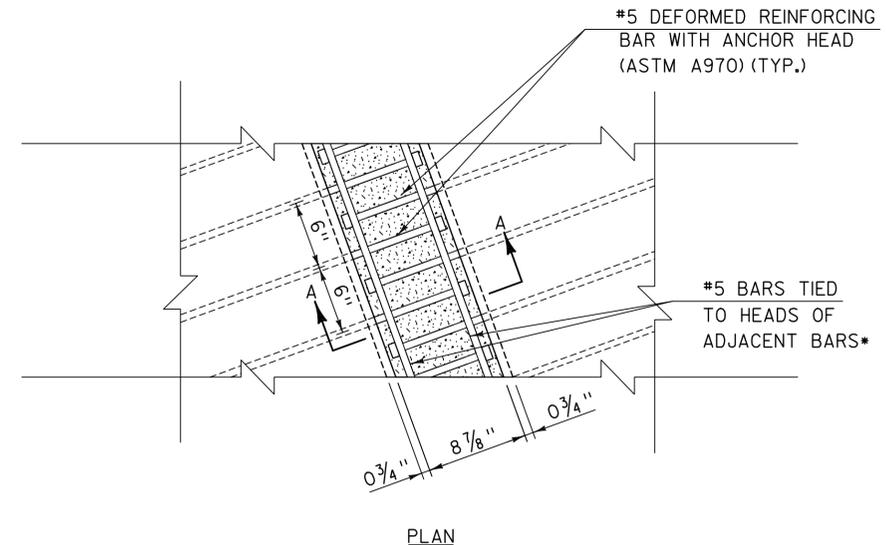
**BRIDGE TYPICAL SECTION**

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

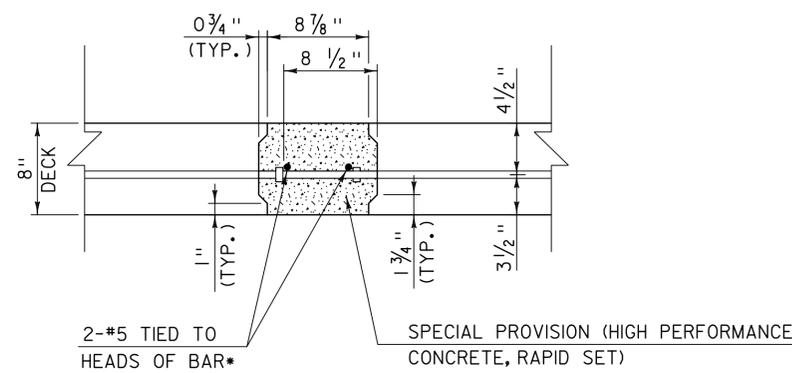


**BRIDGE PLAN**

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



PLAN



SECTION A-A

**FLANGE CLOSURE POUR DETAILS**

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

\* TWO LONGITUDINAL #5 BARS SHALL BE PLACED AS SHOWN ALONG ENTIRE LENGTH OF EACH FLANGE CLOSURE POUR AND TERMINATED WITH A STANDARD HOOK IN THE CAST-IN-PLACE PORTION OF THE ABUTMENTS. PAYMENT SHALL BE INCIDENTAL TO SPECIAL PROVISION (PRESTRESSED CONCRETE, NEXT D BEAM) (NEXT 32 D).

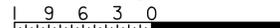
SCALE 3/8" = 1'-0"



SCALE 3/16" = 1'-0"



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



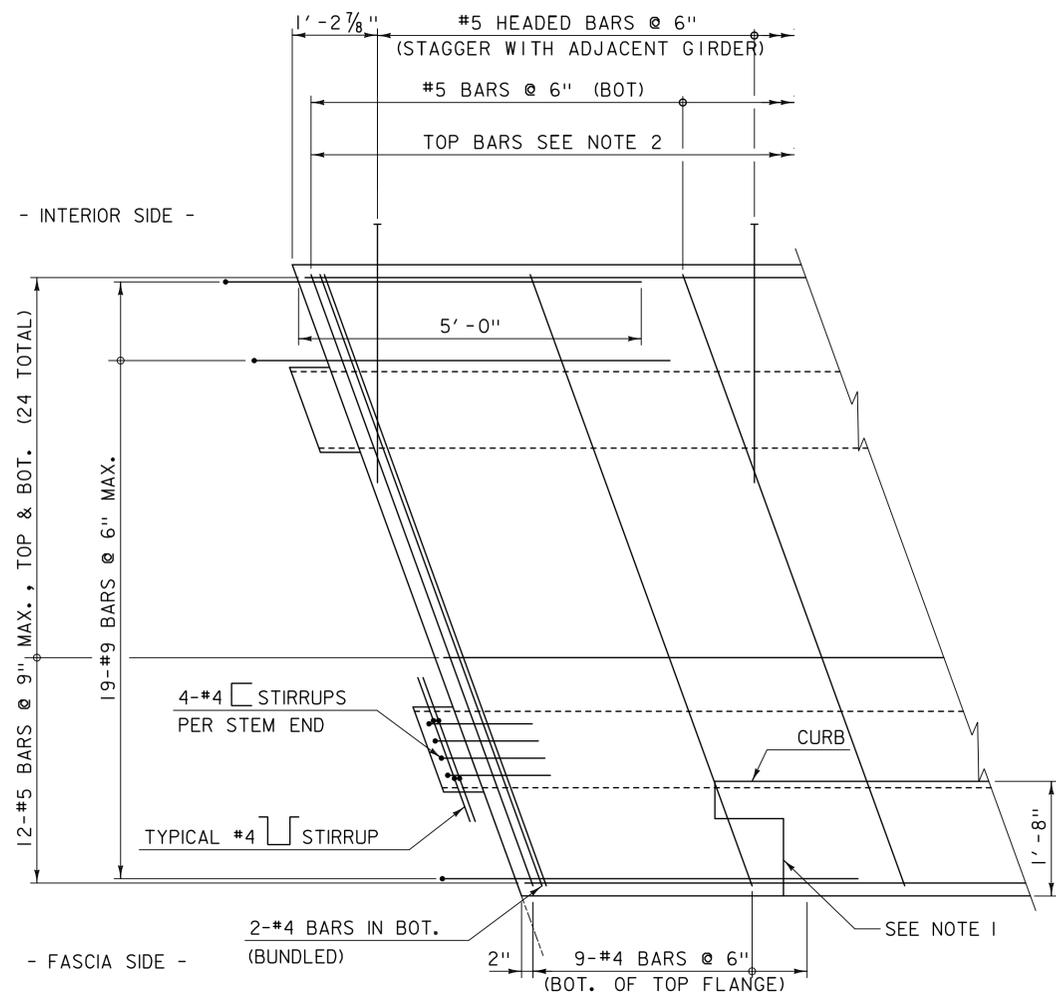
**TYLIN**INTERNATIONAL

PROJECT NAME: PLYMOUTH

PROJECT NUMBER: ER BRS 0149(5)

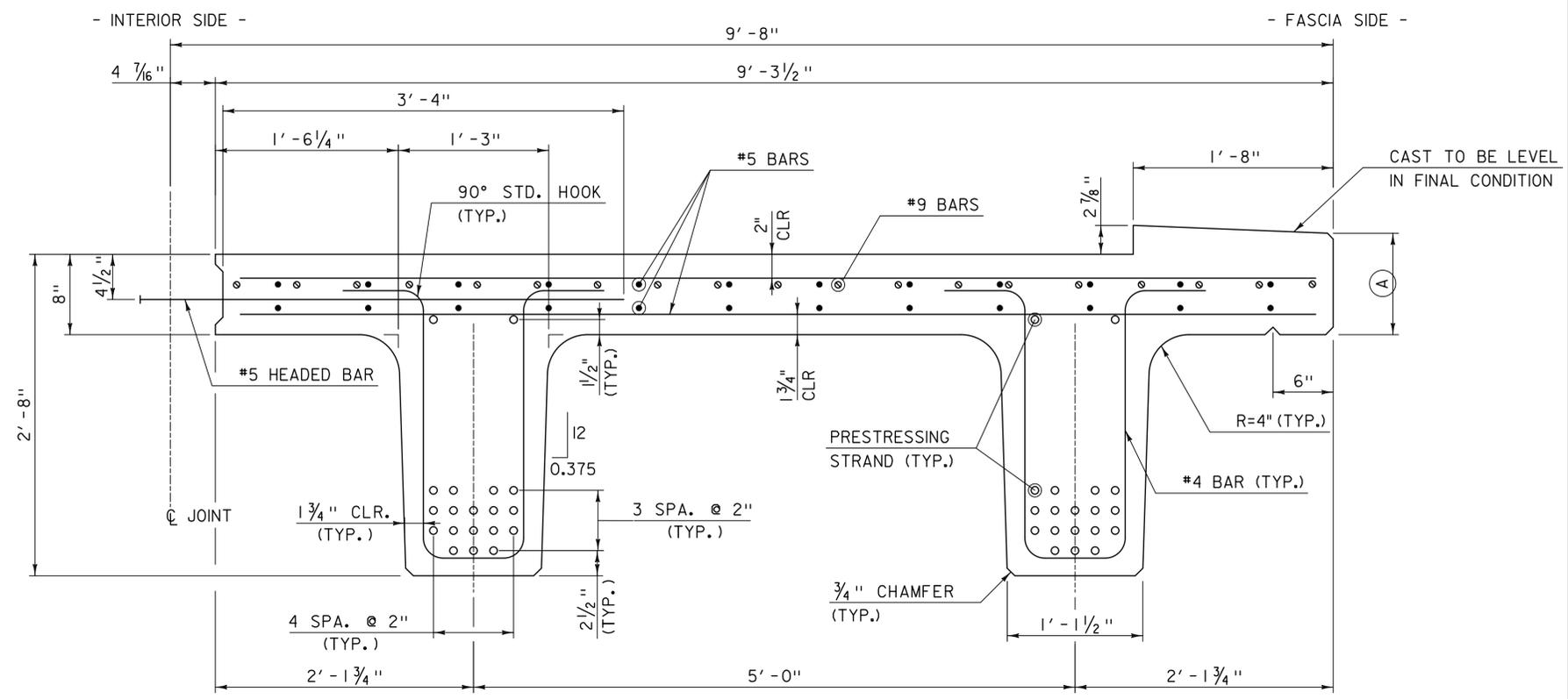
FILE NAME: zllc330sup.dgn  
PROJECT LEADER: J. OLUND  
DESIGNED BY: D. MYERS  
FRAMING PLAN

PLOT DATE: 9/20/2012  
DRAWN BY: T. KELLEY  
CHECKED BY: S. KELLER  
SHEET 19 OF 46



**NEXT BEAM REINFORCEMENT PLAN**

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

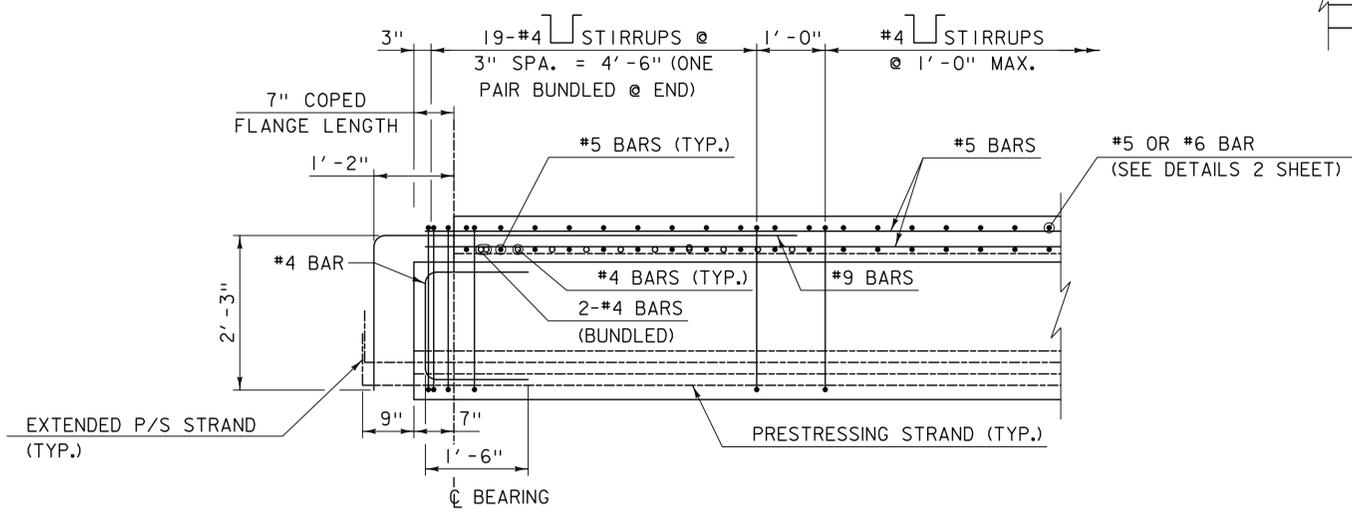


**TYPICAL NEXT BEAM SECTION**

(BETWEEN RAILING POSTS)  
SCALE: 1 1/2" = 1'-0"

**BEAM FLANGE DIMENSIONS**

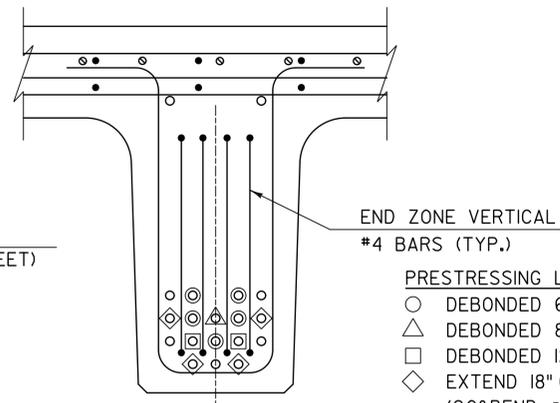
	BEAM 1 (UPSTREAM)	BEAM 3 (DOWNSTREAM)
(A)	11 5/8"	10 1/8"



**NEXT BEAM REINFORCEMENT ELEVATION**

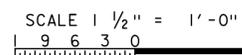
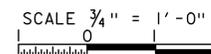
SCALE: 3/4" = 1'-0"

NOTE: #5 HEADED BARS NOT SHOWN FOR CLARITY



**TYPICAL END SECTION**

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

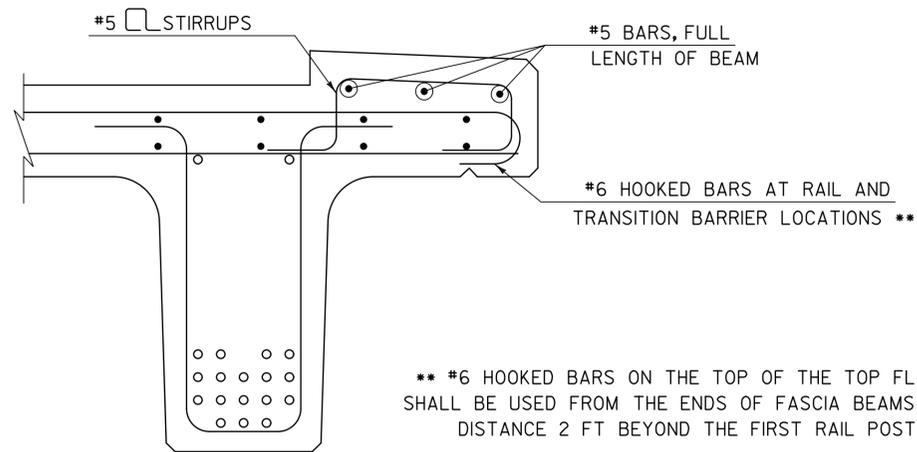


**NOTES:**

1. FOR DETAILS OF CURB BLOCKOUT & REINFORCING AT CONCRETE END POSTS, SEE SHEET "NEXT BEAM DETAILS 2".
2. FOR DETAILS OF NEXT BEAM TOP FLANGE TRANVERSE CURB REINFORCING, SEE SHEET "NEXT BEAM DETAILS 2".
3. BEAM REINFORCEMENT SHOWN IN PLAN AND ELEVATION IS TYPICAL ABOUT MIDSPAN OF THE BEAM.

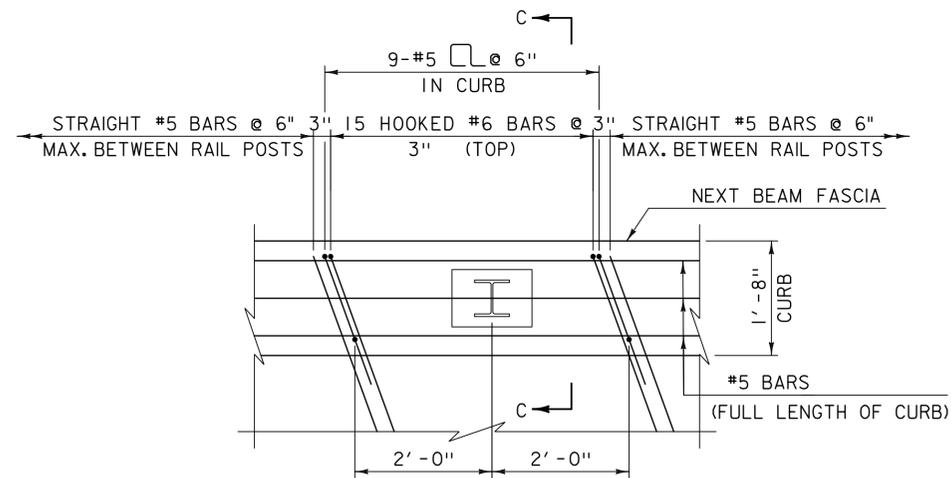
**TYLIN**INTERNATIONAL

PROJECT NAME: PLYMOUTH	PLOT DATE: 9/20/2012
PROJECT NUMBER: ER BRS 0149(5)	DRAWN BY: T. KELLEY
FILE NAME: zllc330dt100l.dgn	CHECKED BY: S. KELLER
PROJECT LEADER: J. OLUND	SHEET 20 OF 46
DESIGNED BY: D. MYERS	
NEXT D BEAM DETAILS 1	



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

\*\* #6 HOOKED BARS ON THE TOP OF THE TOP FLANGE SHALL BE USED FROM THE ENDS OF FASCIA BEAMS TO A DISTANCE 2 FT BEYOND THE FIRST RAIL POST.

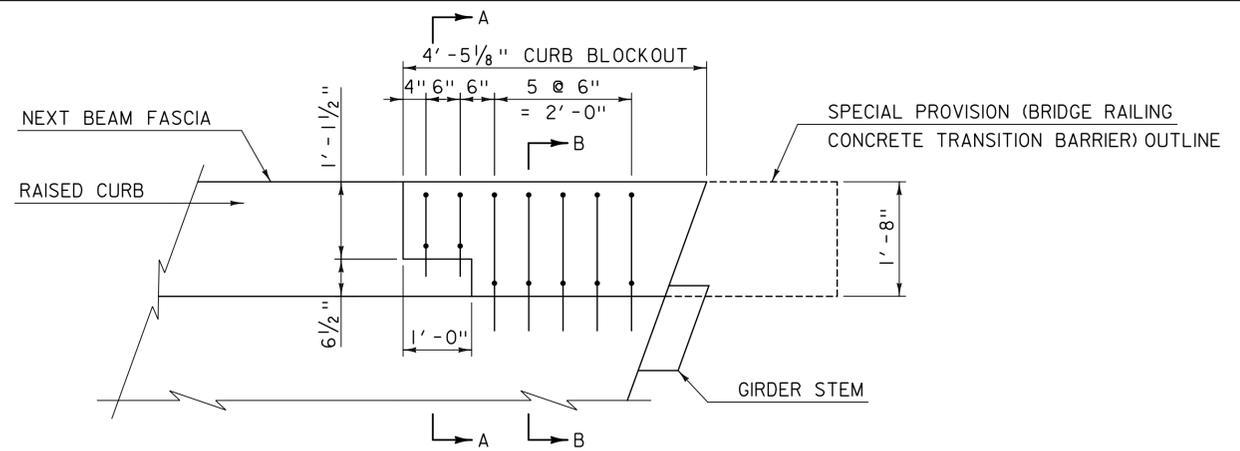


**NEXT BEAM TOP FLANGE REINFORCEMENT PLAN AT RAIL POST LOCATIONS**

(TOP FLANGE LONGITUDINAL & BOTTOM REINFORCEMENT NOT SHOWN FOR CLARITY)  
SCALE: 3/4" = 1'-0"

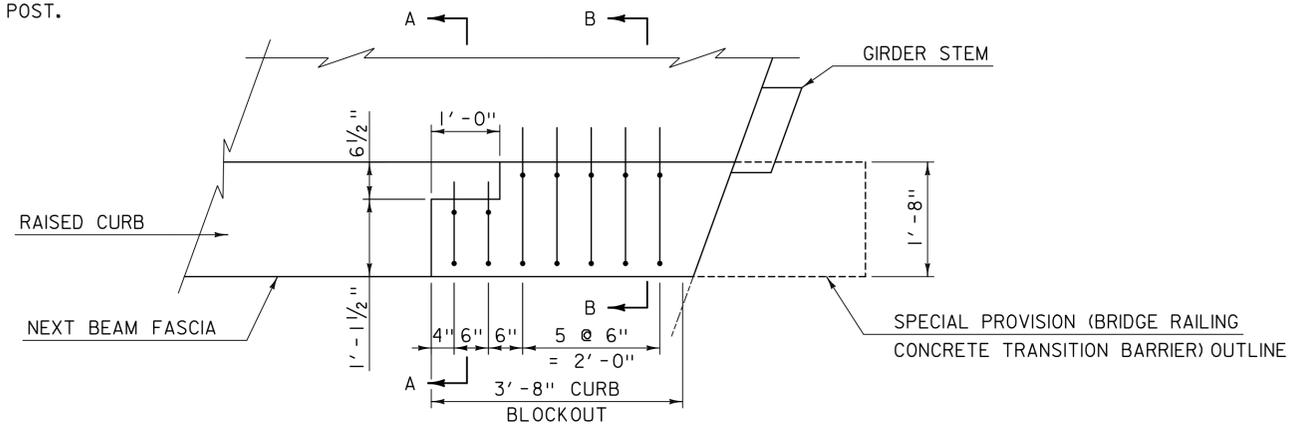
**NOTES:**

- FOR DETAILS OF CONCRETE TRANSITION BARRIER, SEE SHEET "TRANSITION BARRIER DETAILS".
- FOR DETAILS OF NEXT BEAM, SEE SHEET "NEXT D BEAM DETAILS I".
- CURB BLOCKOUT AND SURFACE ROUGHENING BETWEEN TRANSITION BARRIER STIRRUPS SHALL BE MADE BY THE PRECAST NEXT D BEAM FABRICATOR.



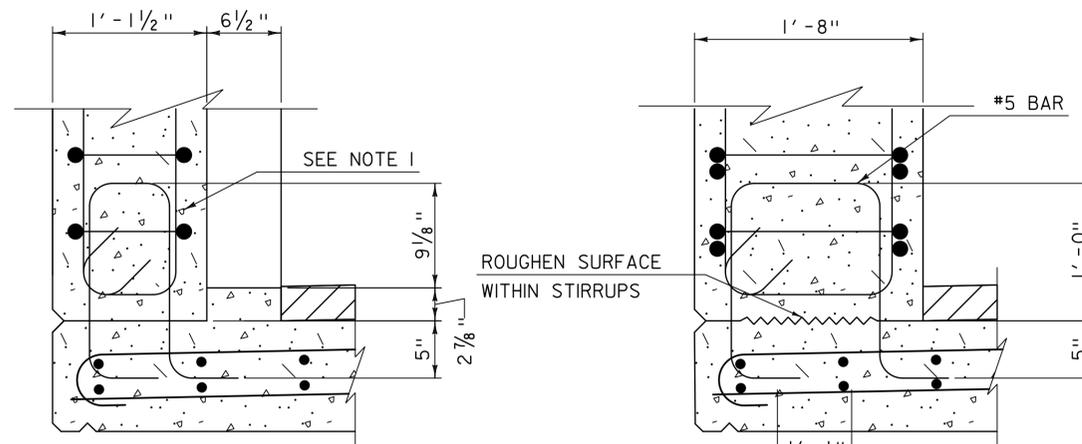
**NEXT BEAM TRANSITION DETAILS AT TRANSITION BARRIER LOCATIONS**

(ACUTE CORNERS)  
SCALE: 3/4" = 1'-0"



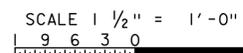
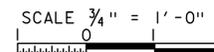
**NEXT BEAM TRANSITION DETAILS AT TRANSITION BARRIER LOCATIONS**

(OBTUSE CORNERS)  
SCALE: 3/4" = 1'-0"



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

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

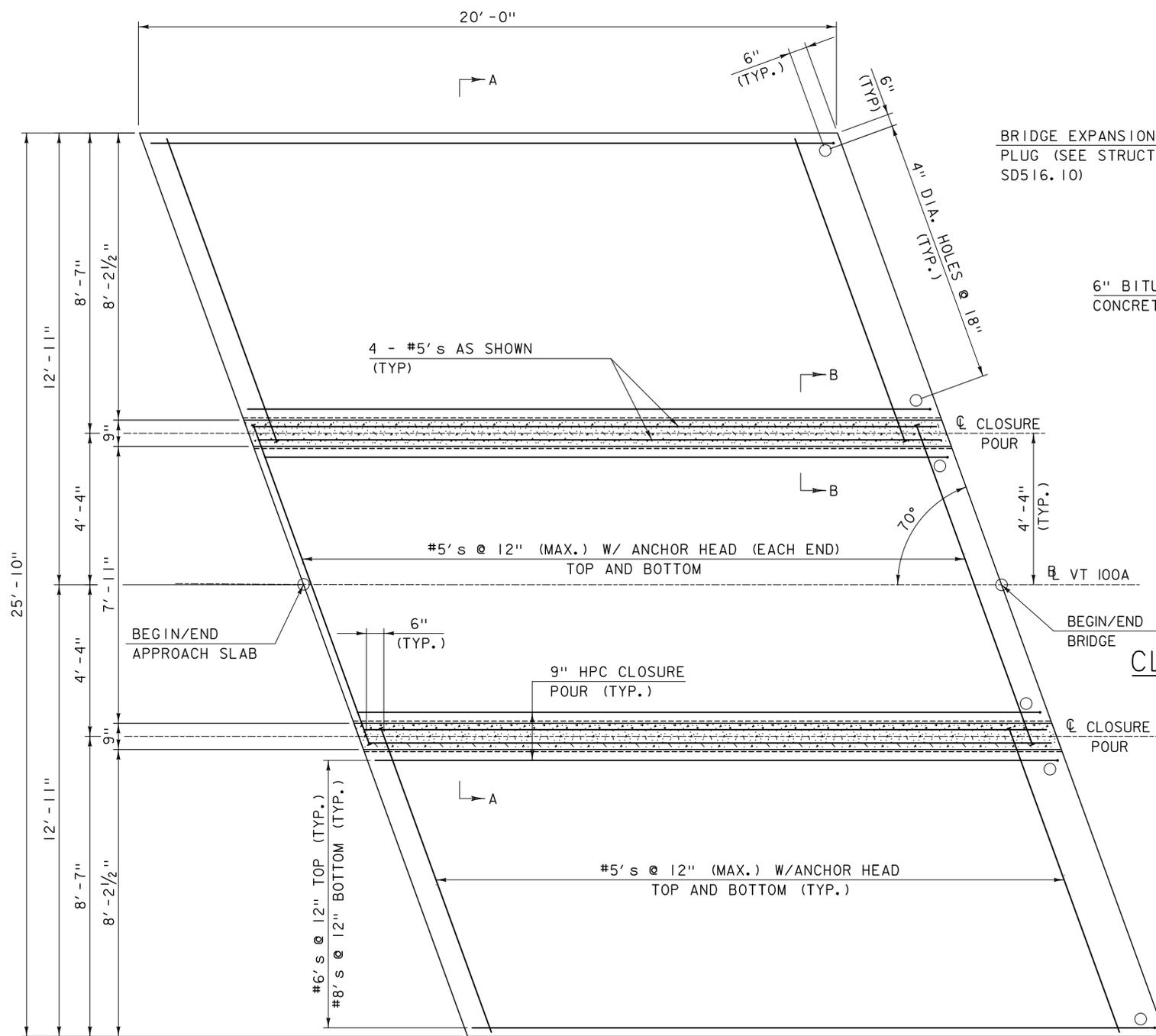


**TYLIN**INTERNATIONAL

PROJECT NAME: PLYMOUTH  
PROJECT NUMBER: ER BRS 0149(5)

FILE NAME: zllc330d1002.dgn  
PROJECT LEADER: J. OLUND  
DESIGNED BY: D. MYERS  
NEXT D BEAM DETAILS 2

PLOT DATE: 9/20/2012  
DRAWN BY: S. MORGAN  
CHECKED BY: D. MYERS  
SHEET 21 OF 46



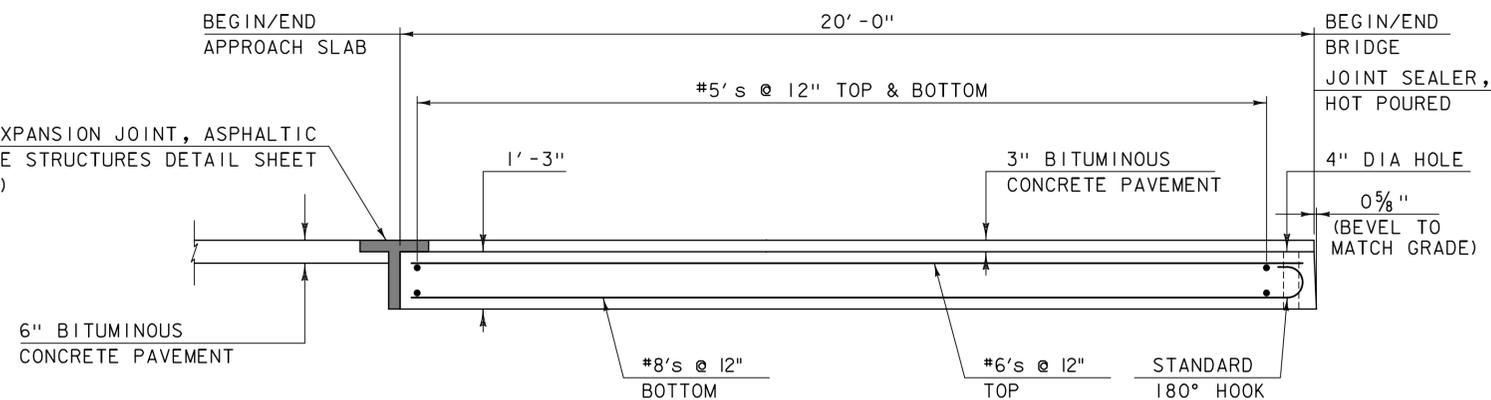
APPROACH SLAB PLAN VIEW

SCALE 1/2" = 1'-0"

**NOTES:**

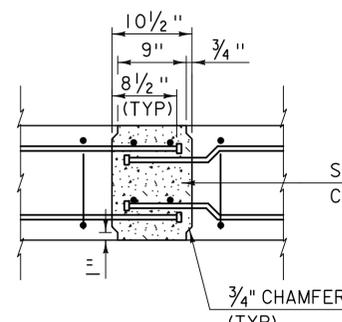
- LIFTING DEVICES AND ANY ASSOCIATED REINFORCEMENT SHALL BE DETERMINED BY THE FABRICATOR AND SHOWN IN THE FABRICATION DRAWINGS. LIFTING DEVICES SHALL BE LIMITED TO FOUR (4) PER PANEL AND BE RECESSED AND GROUTED AFTER INSTALLATION OF THE SLABS.
- THE LOCATION OF THE FOUR INCH DIAMETER HOLES CAST THROUGH THE BRIDGE-END OF THE APPROACH SLABS SHALL BE COORDINATED WITH REINFORCING STEEL EXTENDING FROM THE ABUTMENTS. SEE SHEET 25 FOR ABUTMENT REINFORCING STEEL LAYOUT.
- 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.
- PAYMENT FOR APPROACH SLABS, THE #5 REINFORCING BARS WITHIN THE CLOSURE POURS, AND ALL LABOR AND TOOLS NECESSARY TO INSTALL THE SLABS SHALL BE MADE UNDER ITEM 540.10, "PRECAST CONCRETE STRUCTURE (APPROACH SLAB NO. 1)" AND/OR ITEM 540.10, "PRECAST CONCRETE STRUCTURE (APPROACH SLAB NO. 2)".
- PAYMENT FOR HPC CONCRETE CLOSURE POURS SHALL BE MADE UNDER ITEM 900.608, "SPECIAL PROVISION (HIGH PERFORMANCE CONCRETE, RAPID SET)".

BRIDGE EXPANSION JOINT, ASPHALTIC PLUG (SEE STRUCTURES DETAIL SHEET SD516.10)



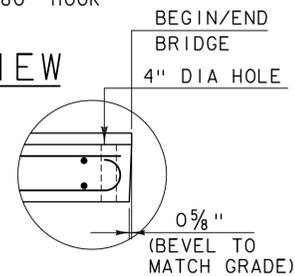
APPROACH SLAB ELEVATION VIEW

(APPROACH SLAB NO. 1 SHOWN)  
SCALE 1/2" = 1'-0"

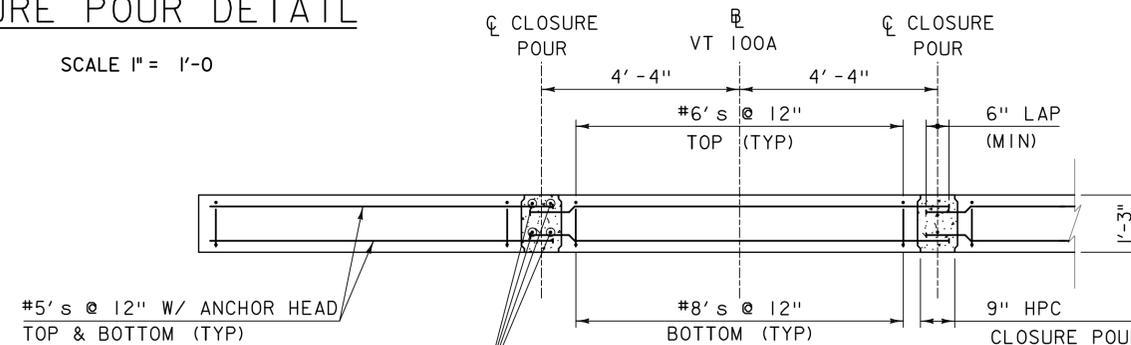


SECTION B-B  
CLOSURE POUR DETAIL

SCALE 1" = 1'-0"



APPROACH SLAB  
NO. 2 END DETAIL



SECTION A-A

SCALE 1/2" = 1'-0"

APPROACH SLAB ELEVATIONS

(ALL ELEVATIONS ARE TOP OF SLAB)

	LT EDGE	VT 100A	RT EDGE
BEGIN A. S. #1	1048.69	1049.10	1049.51
END A. S. #1	1048.22	1048.65	1049.03
BEGIN A. S. #2	1046.72	1047.13	1047.54
END A. S. #2	1046.25	1046.66	1047.06

**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: PLYMOUTH  
PROJECT NUMBER: ER BRS 0149(5)

TYLIN INTERNATIONAL

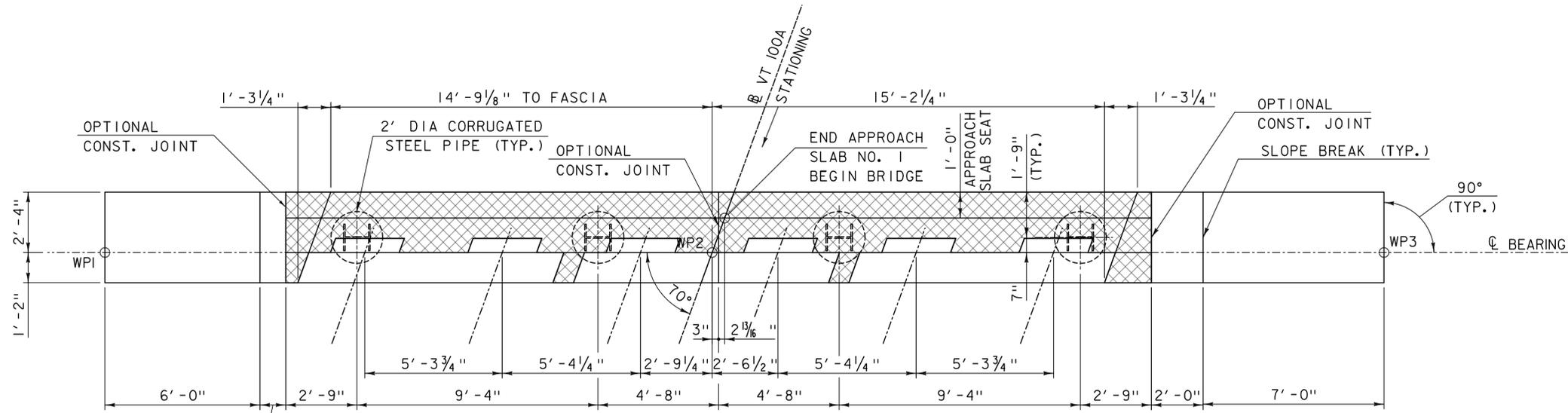
FILE NAME: zllc330slab.dgn  
PROJECT LEADER: J. OLUND  
DESIGNED BY: D. MYERS  
APPROACH SLAB DETAILS

PLOT DATE: 9/20/2012  
DRAWN BY: T. KELLEY  
CHECKED BY: D. MYERS  
SHEET 22 OF 46

# ABUTMENT I - ELEVATIONS

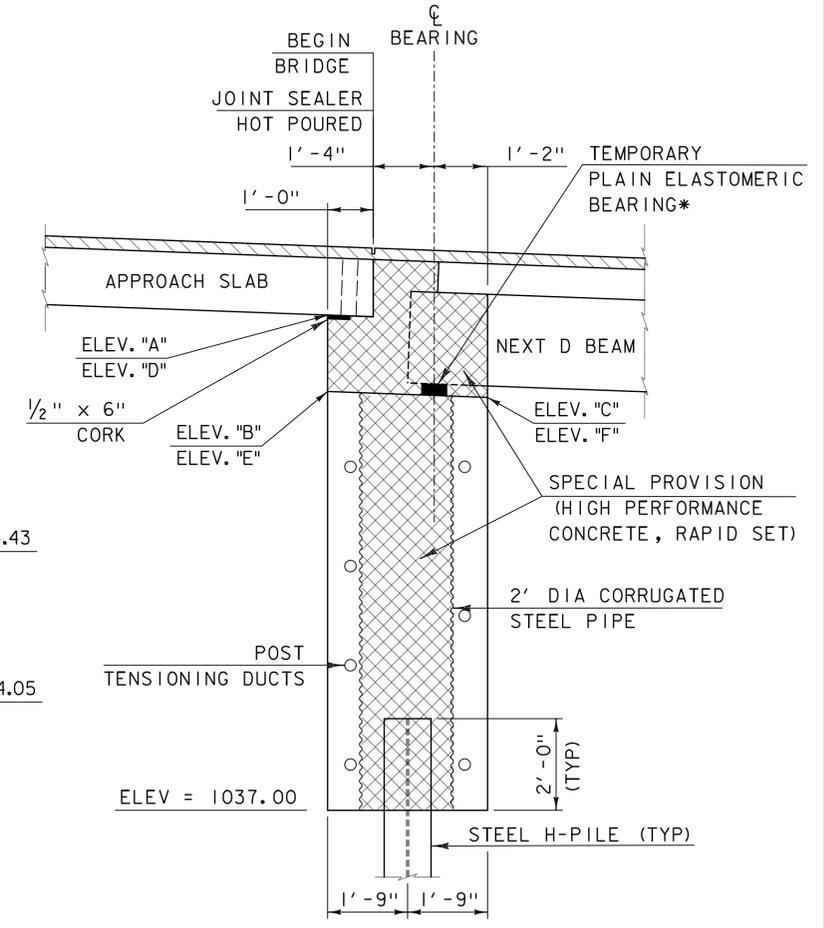
ELEV "A"	1047.91
ELEV "B"	1046.24
ELEV "C"	1046.12
ELEV "D"	1046.92
ELEV "E"	1045.26
ELEV "F"	1045.13

\*TEMPORARY BEARING SHALL BE 9"X9"X3" THICK AND BE CENTERED AT THE INTERSECTION OF  $\phi$  BEARING AND STEM CENTER. ORIENT BEARINGS ALONG STEMS.



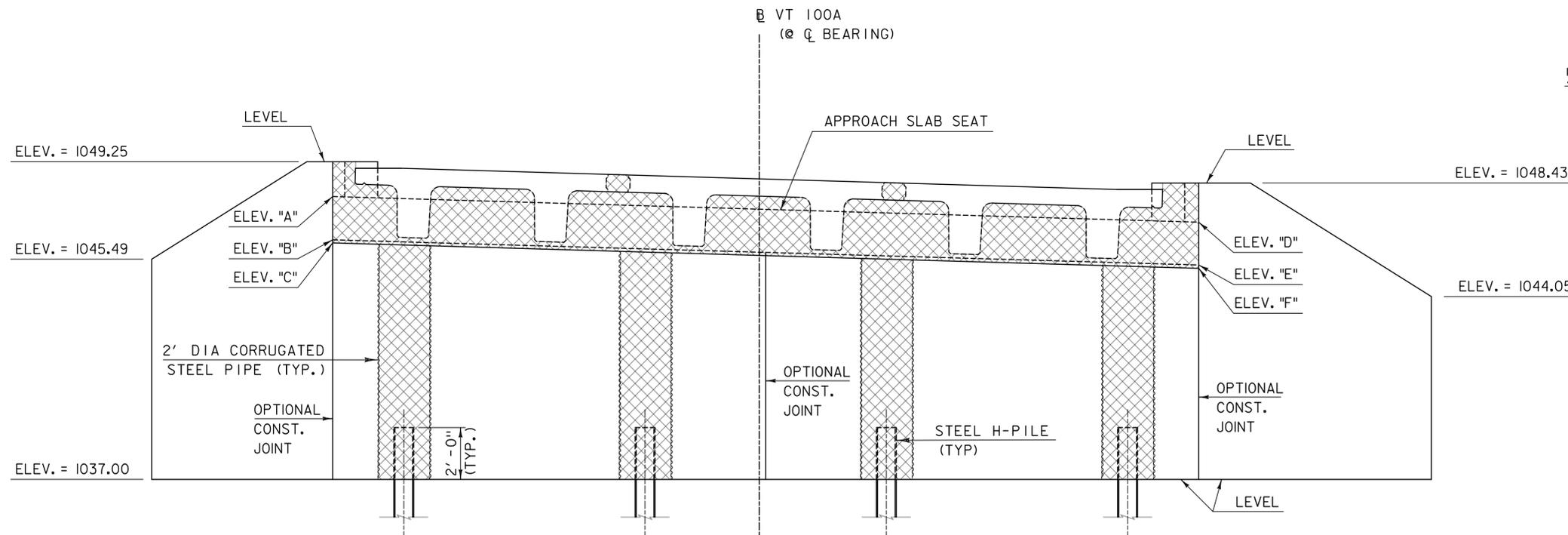
ABUTMENT I - PLAN

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



ABUTMENT I - TYPICAL SECTION

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



ABUTMENT I - ELEVATION

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

SCALE 3/8" = 1'-0"



SCALE 1/2" = 1'-0"



TYLIN INTERNATIONAL

PROJECT NAME: PLYMOUTH  
PROJECT NUMBER: ER BRS 0149(5)

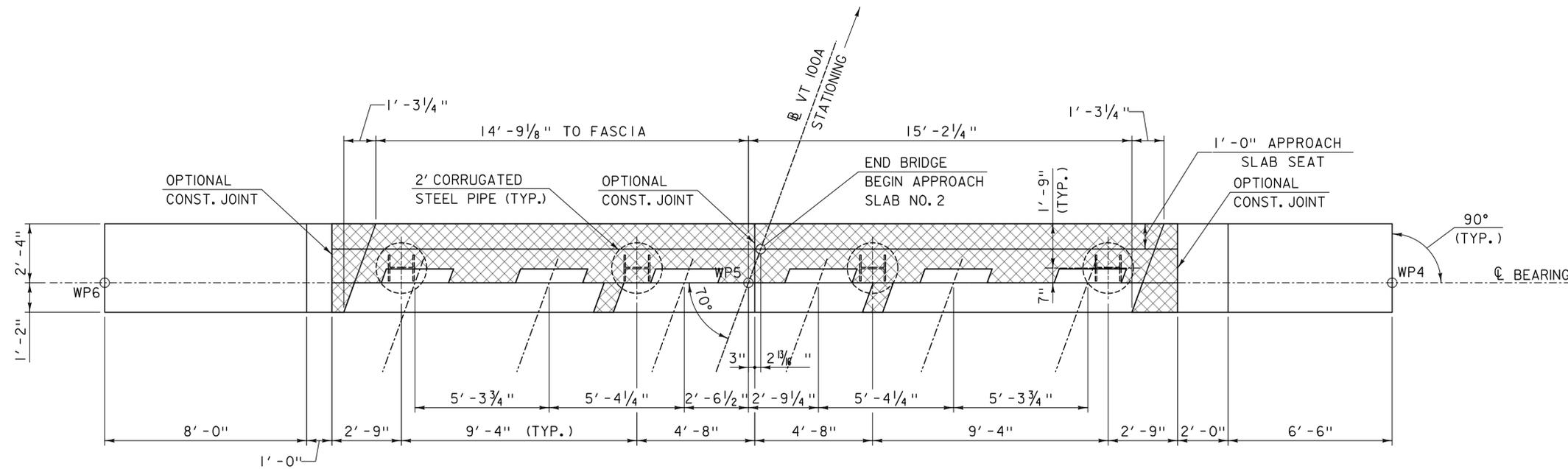
FILE NAME: zllc330sub\_01.dgn  
PROJECT LEADER: J. OLUND  
DESIGNED BY: D. MYERS  
ABUTMENT I PLAN, ELEVATION & SECTION

PLOT DATE: 9/20/2012  
DRAWN BY: T. KELLEY  
CHECKED BY: D. MYERS  
SHEET 23 OF 46

# ABUTMENT 2 - ELEVATIONS

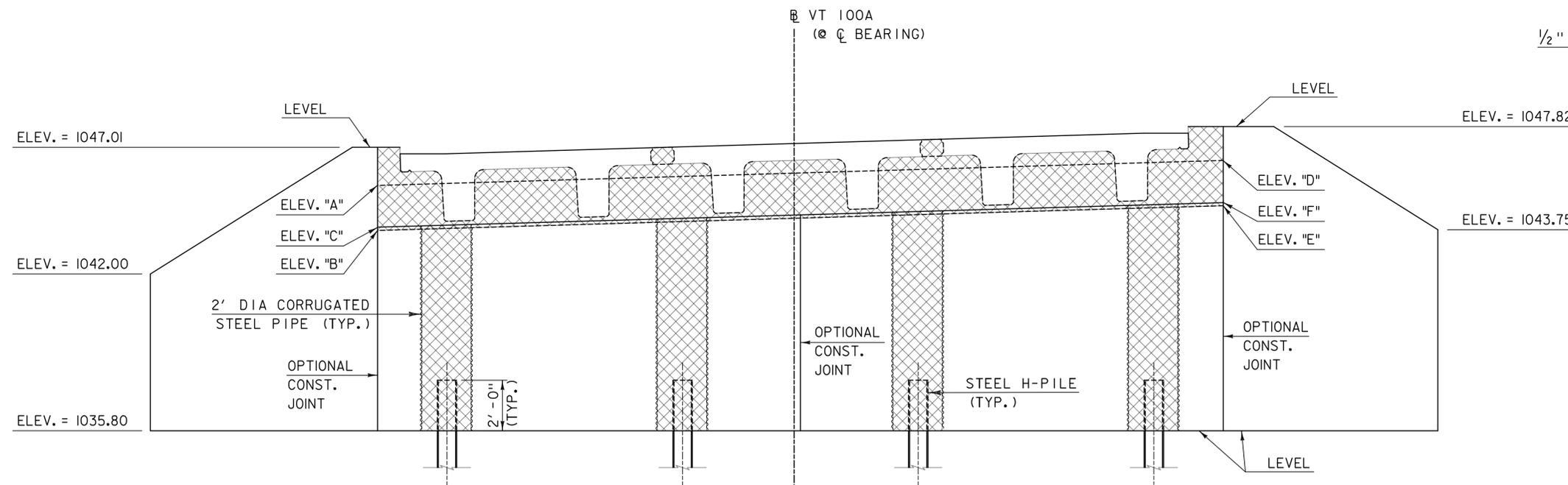
ELEV "A"	1045.34
ELEV "B"	1043.68
ELEV "C"	1043.80
ELEV "D"	1046.33
ELEV "E"	1044.67
ELEV "F"	1044.79

\*TEMPORARY BEARING SHALL BE 9"x9"x3" THICK AND BE CENTERED AT THE INTERSECTION OF  $\phi$  BEARING AND STEM CENTER. ORIENT BARRIERS ALONG STEMS.



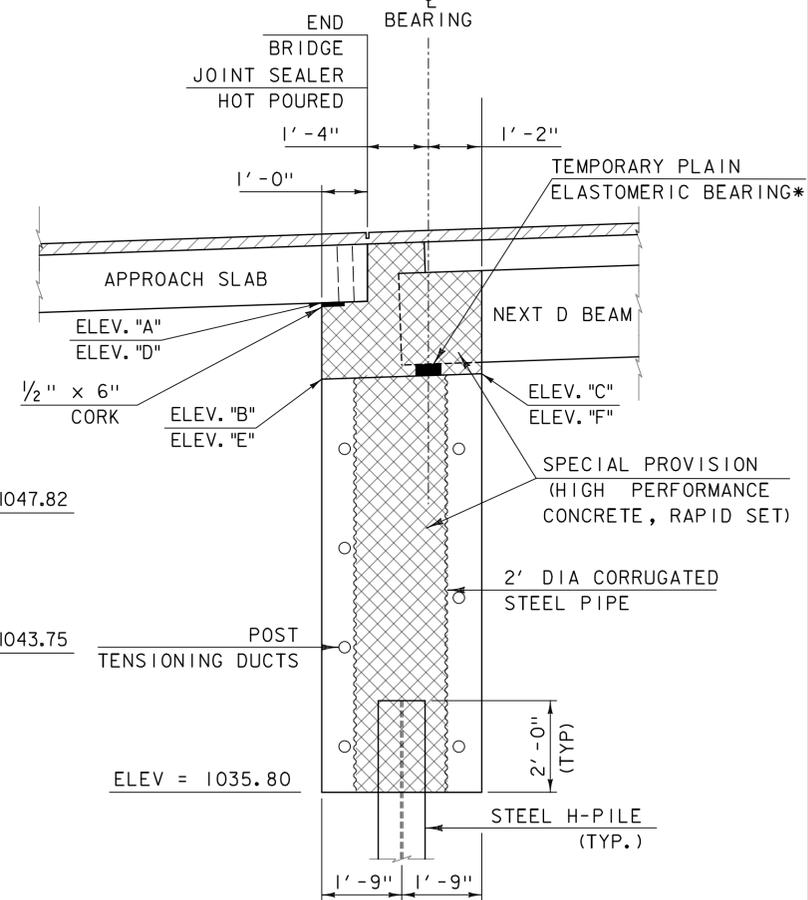
ABUTMENT 2 - PLAN

SCALE: 3/8" = 1'-0



ABUTMENT 2 - ELEVATION

SCALE: 3/8" = 1'-0



ABUTMENT 2 - TYPICAL SECTION

SCALE: 1/2" = 1'-0

SCALE 3/8" = 1'-0"

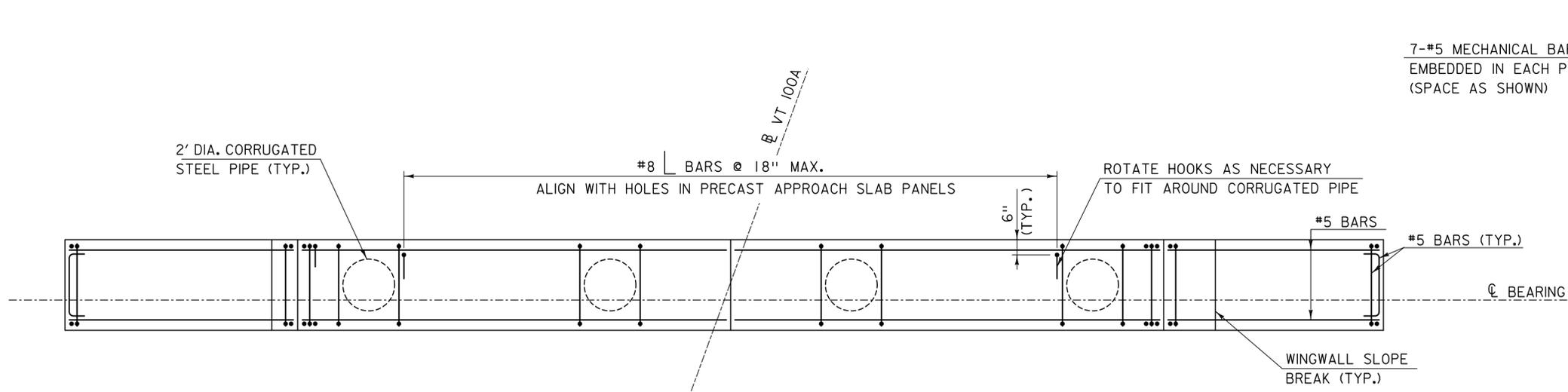


SCALE 1/2" = 1'-0"



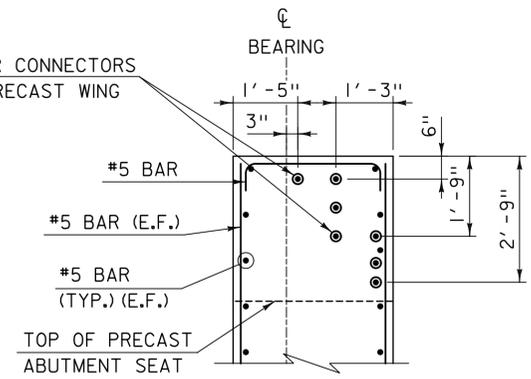
TYLIN INTERNATIONAL

PROJECT NAME:	PLYMOUTH	FILE NAME:	zllc330sub_02.dgn	PLOT DATE:	9/20/2012
PROJECT NUMBER:	ER BRS 0149(5)	PROJECT LEADER:	J. OLUND	DRAWN BY:	T. KELLEY
		DESIGNED BY:	D. MYERS	CHECKED BY:	D. MYERS
		ABUTMENT 2 PLAN, ELEVATION & SECTION			SHEET 24 OF 46



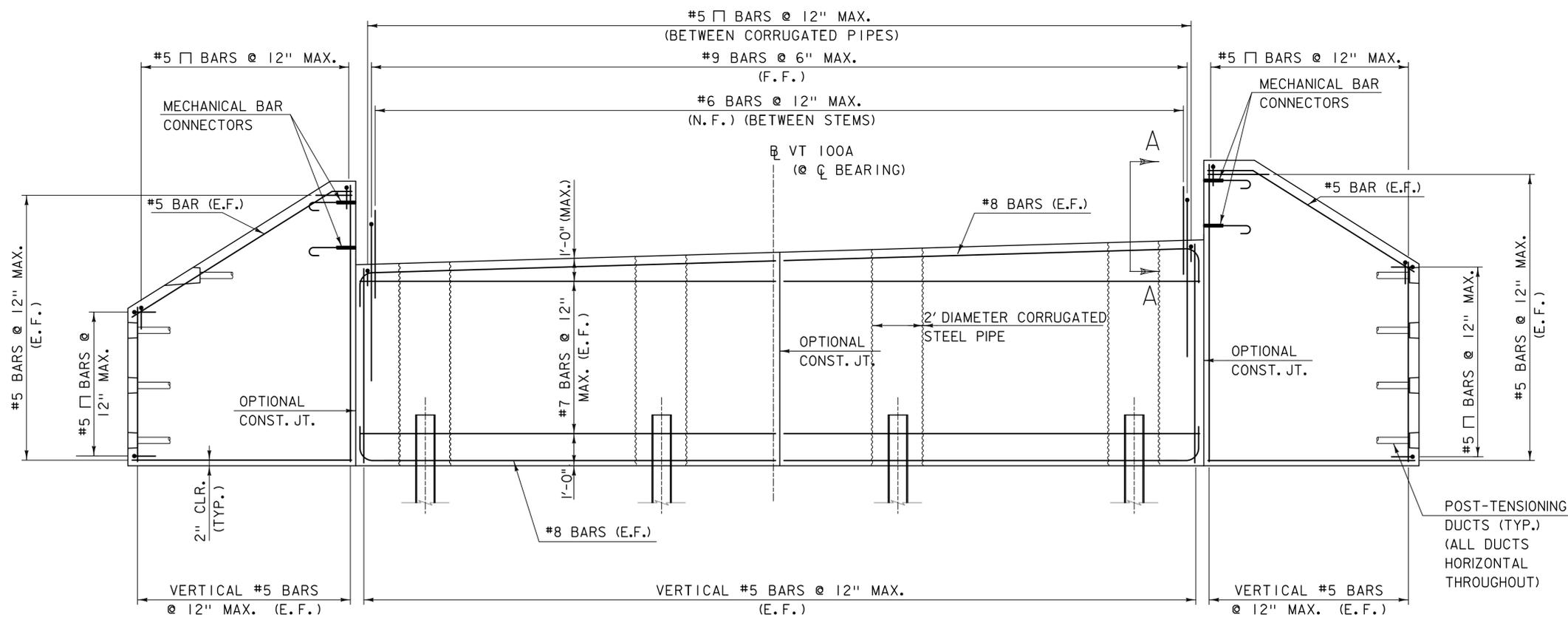
**TYPICAL ABUTMENT REINFORCEMENT PLAN**

POST TENSIONING DUCTS NOT SHOWN FOR CLARITY  
SCALE: 3/8"=1'-0"



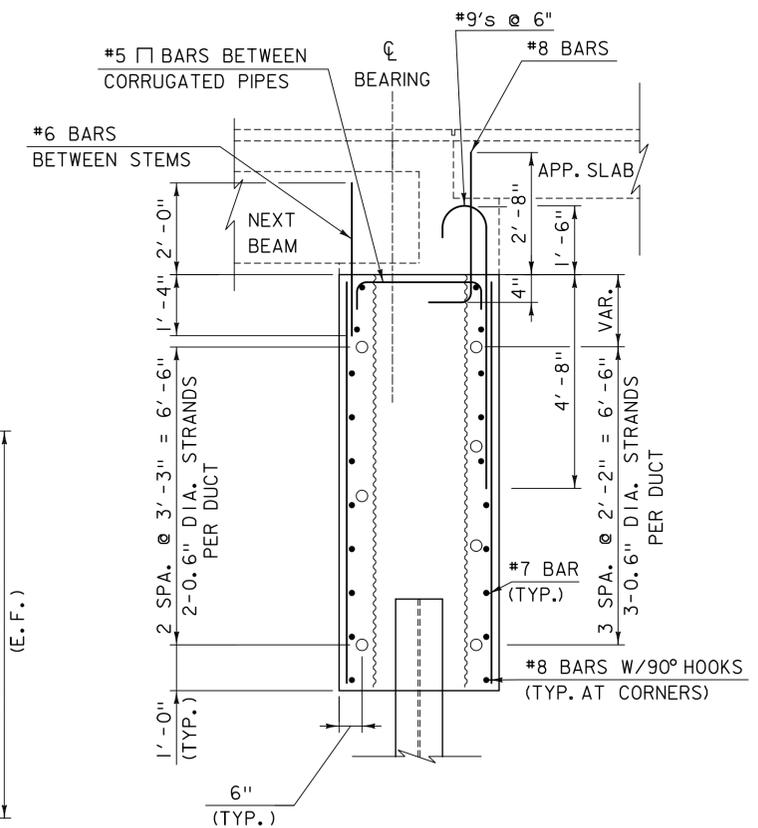
**VIEW A-A  
TOP OF WING**

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



**TYPICAL ABUTMENT REINFORCEMENT ELEVATION**

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



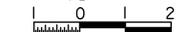
**TYPICAL ABUTMENT  
REINFORCEMENT SECTION**

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

SCALE 3/8" = 1'-0"



SCALE 1/2" = 1'-0"

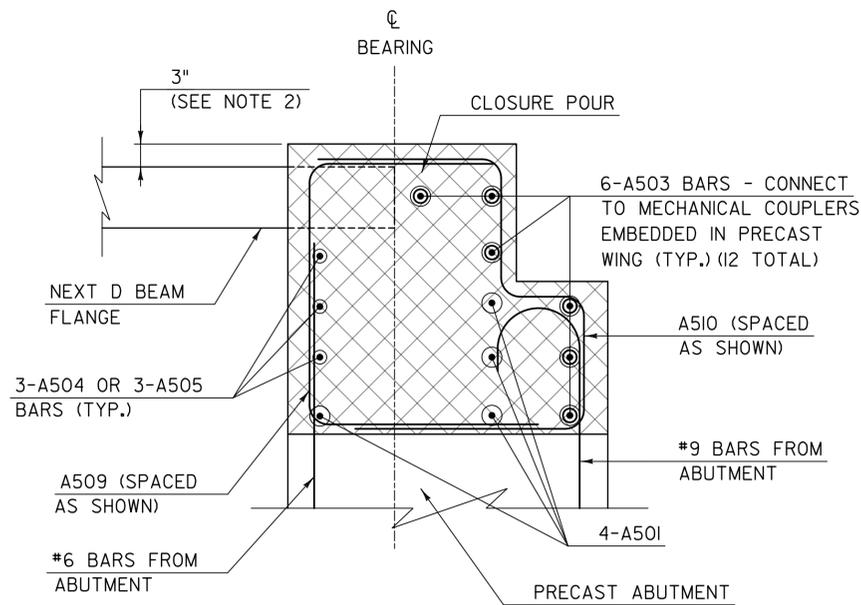


**TYLIN**INTERNATIONAL

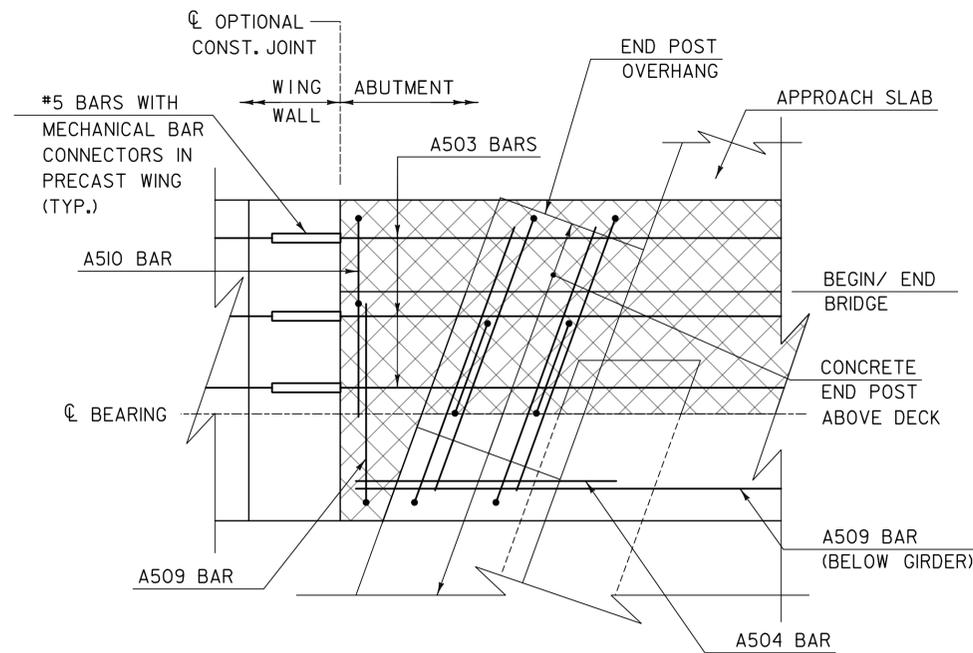
PROJECT NAME: PLYMOUTH  
PROJECT NUMBER: ER BRS 0149(5)

FILE NAME: zllc330d+1003.dgn  
PROJECT LEADER: J. OLUND  
DESIGNED BY: D. MYERS  
ABUTMENT REINFORCEMENT

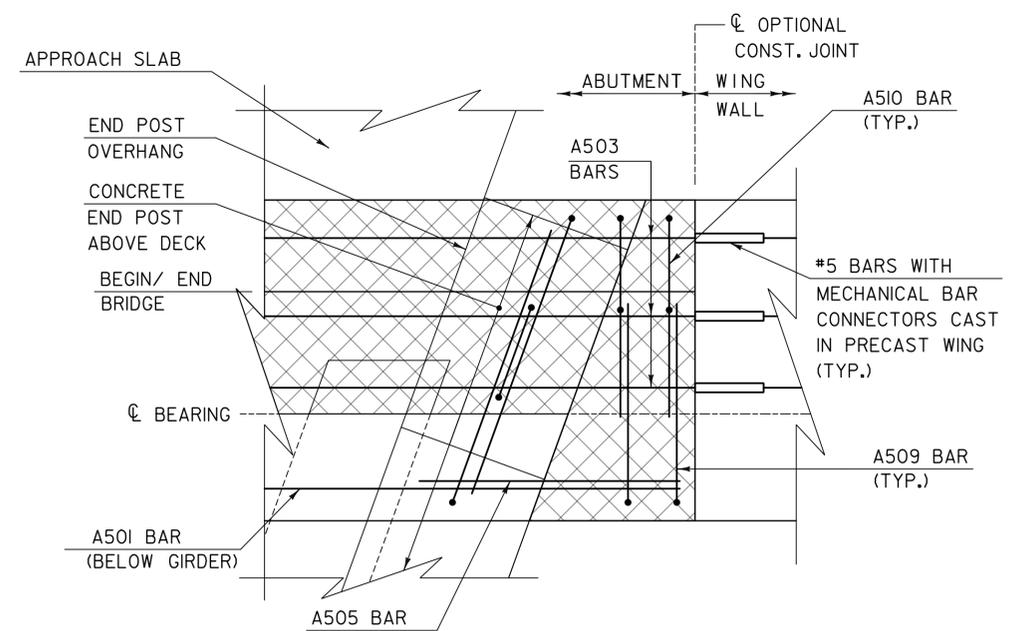
PLOT DATE: 9/20/2012  
DRAWN BY: T. KELLEY  
CHECKED BY: J. OLUND  
SHEET 25 OF 46



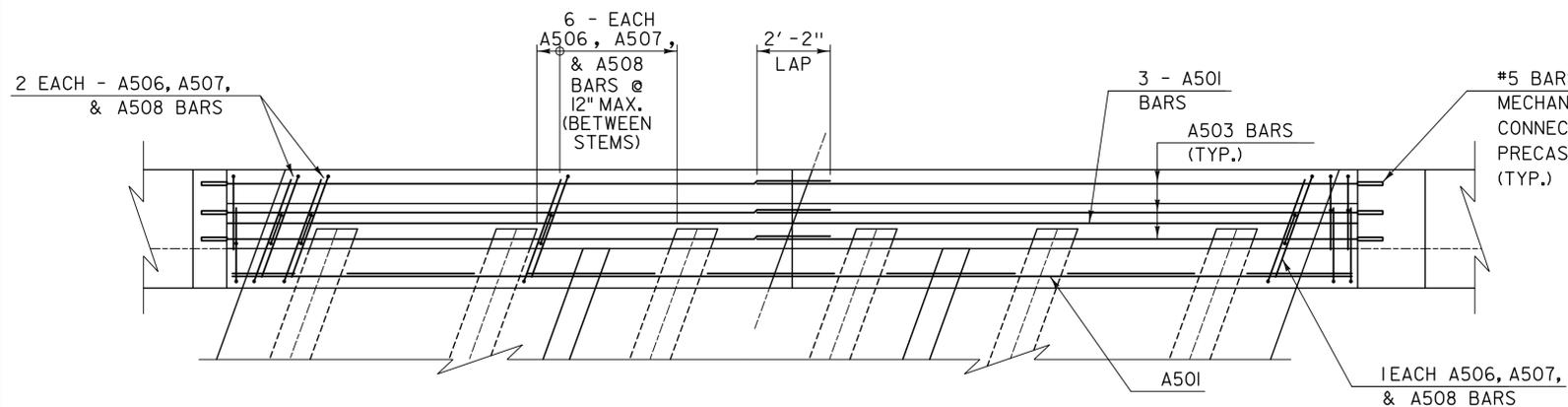
**SECTION A-A**  
SCALE: 1" = 1'-0"



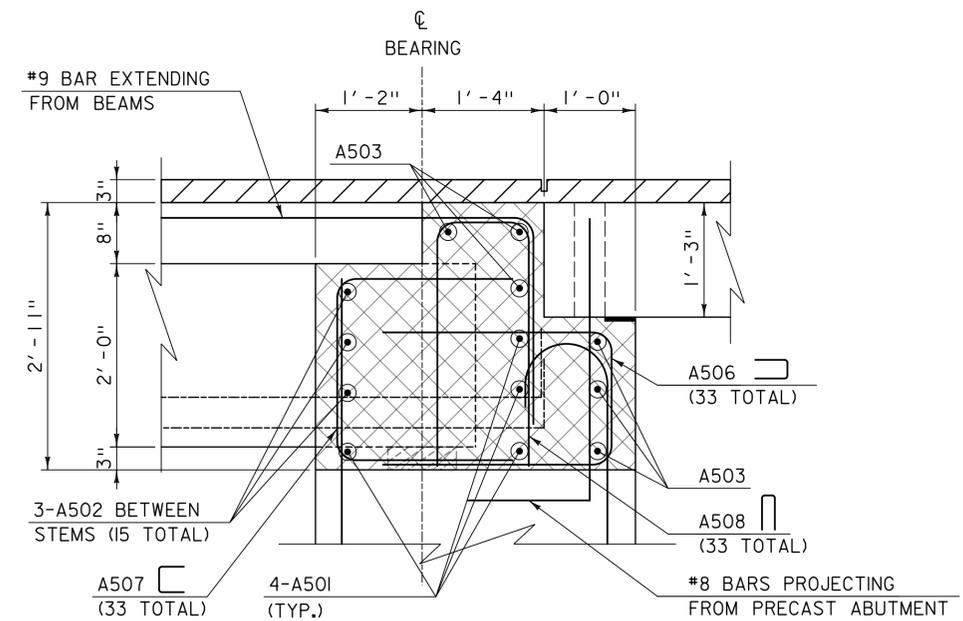
**VIEW B-B**  
SCALE: 1" = 1'-0"



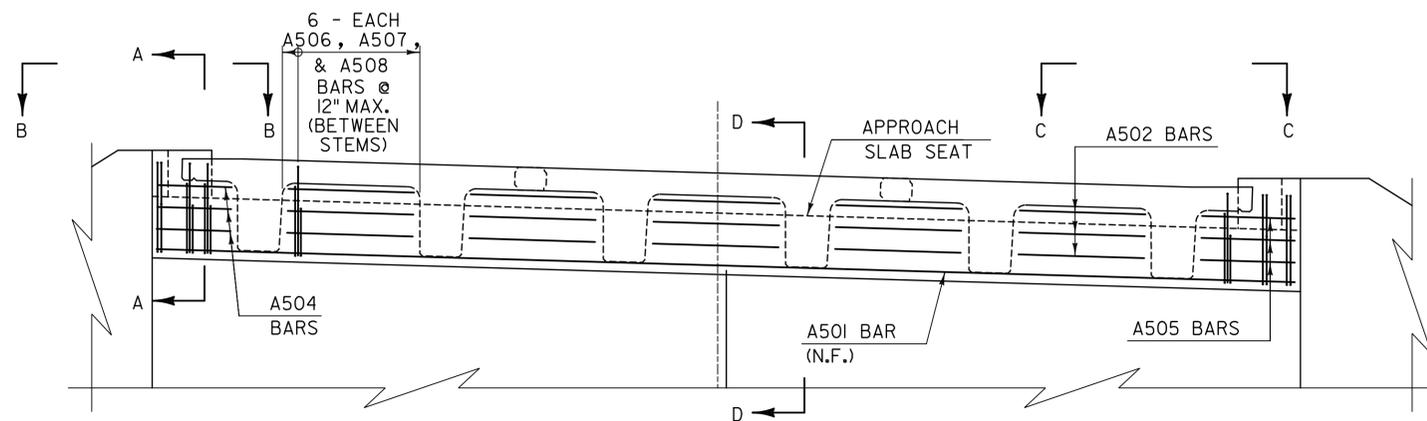
**VIEW C-C**  
SCALE: 1" = 1'-0"



**CLOSURE POUR - PLAN**  
SCALE: 3/8" = 1'-0"



**SECTION D-D: CLOSURE POUR**  
SCALE: 1" = 1'-0"



**CLOSURE POUR - ELEVATION**  
SCALE: 3/8" = 1'-0"  
(A501 & A503 BARS NOT SHOWN FOR CLARITY)

**NOTES:**

1. ABUTMENT NO. 1 SHOWN, ABUTMENT NO. 2 IS SIMILAR.
2. TOP OF CLOSURE POUR SHALL BE STRUCK FLUSH WITH NEXT D BEAM FLANGES WITHIN THE HORIZONTAL LIMITS OF THE NEXT D BEAM FLANGES. TOP OF CLOSURE POUR OUTSIDE OF NEXT D BEAM FLANGE LIMITS SHALL BE STRUCK LEVEL WITH TOP OF WINGWALLS.

 SPECIAL PROVISION (HIGH PERFORMANCE CONCRETE, RAPID SET)

SCALE 3/8" = 1'-0"



SCALE 1" = 1'-0"



**TYLIN** INTERNATIONAL

PROJECT NAME: PLYMOUTH

PROJECT NUMBER: ER BRS 0149(5)

FILE NAME: zllc330dt1004.dgn

PROJECT LEADER: J. OLUND

DESIGNED BY: D. MYERS

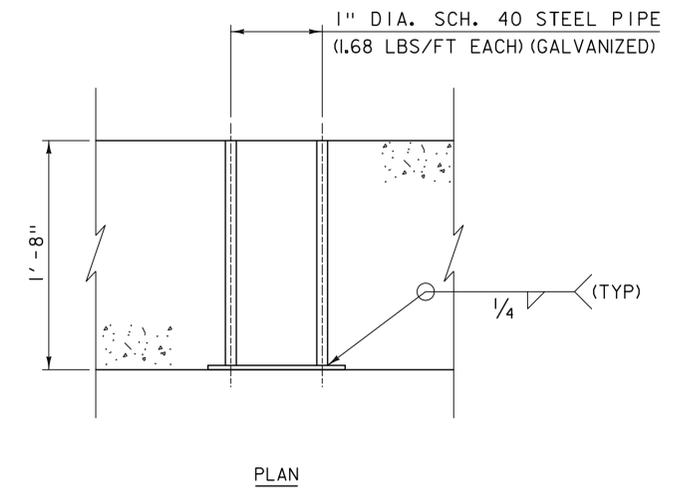
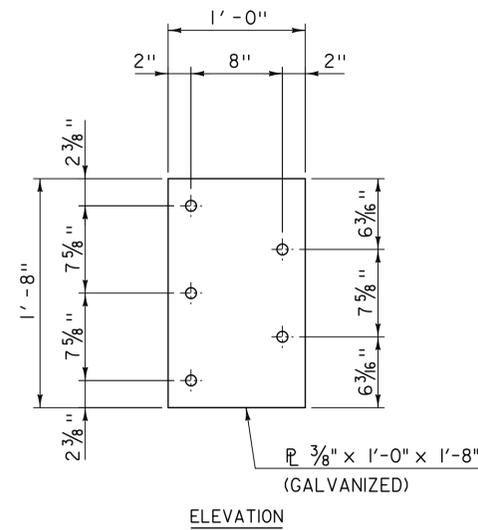
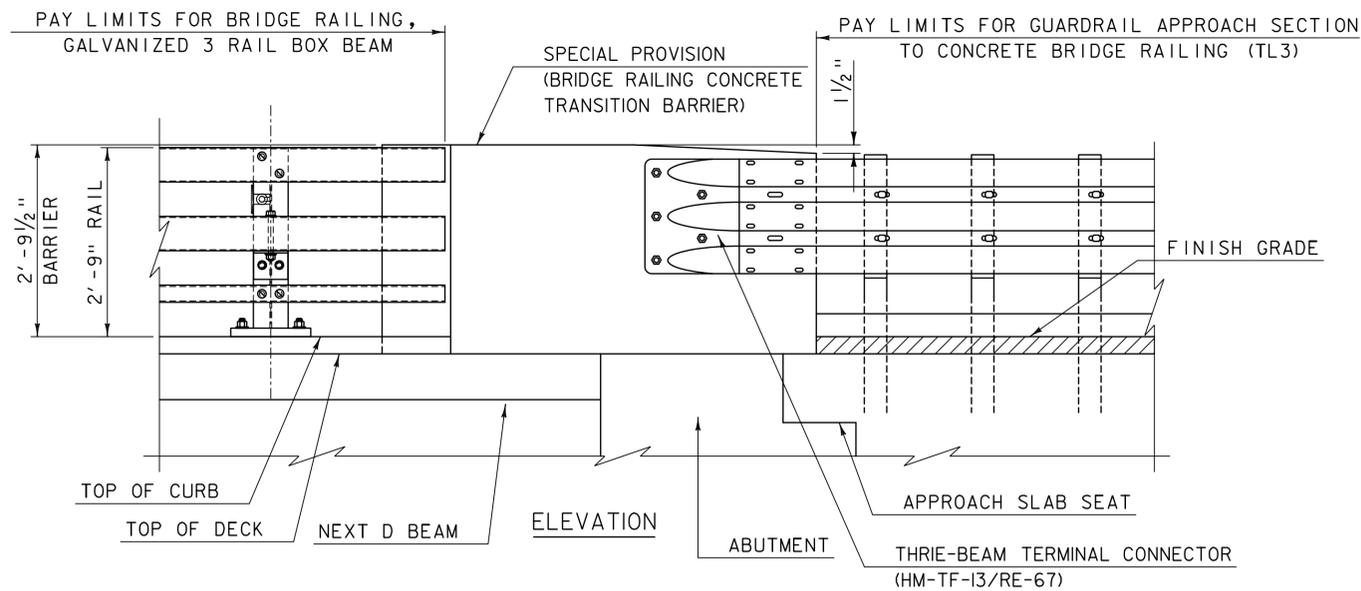
ABUTMENT CLOSURE POUR DETAILS

PLOT DATE: 9/20/2012

DRAWN BY: T. KELLEY

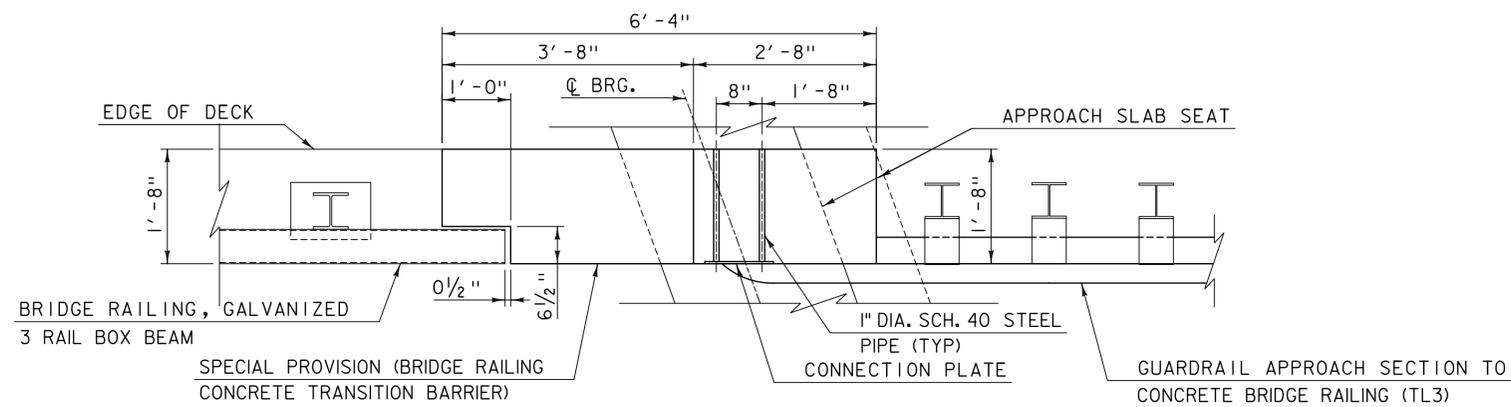
CHECKED BY: J. OLUND

SHEET 26 OF 46

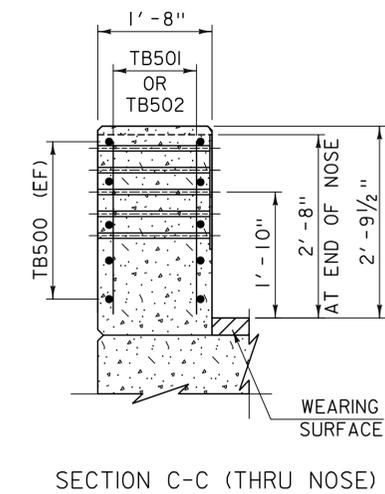
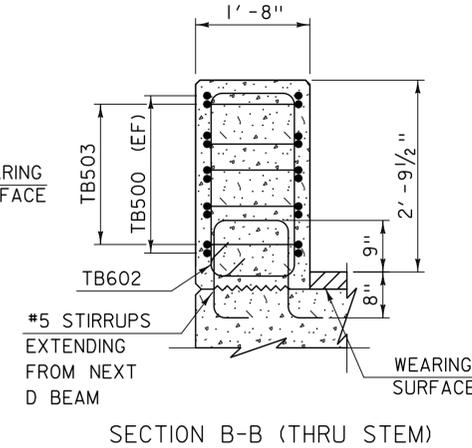
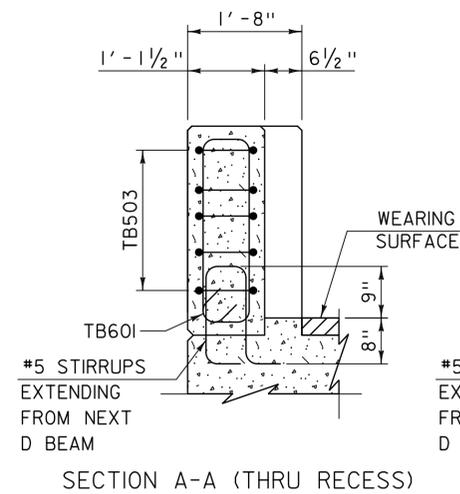
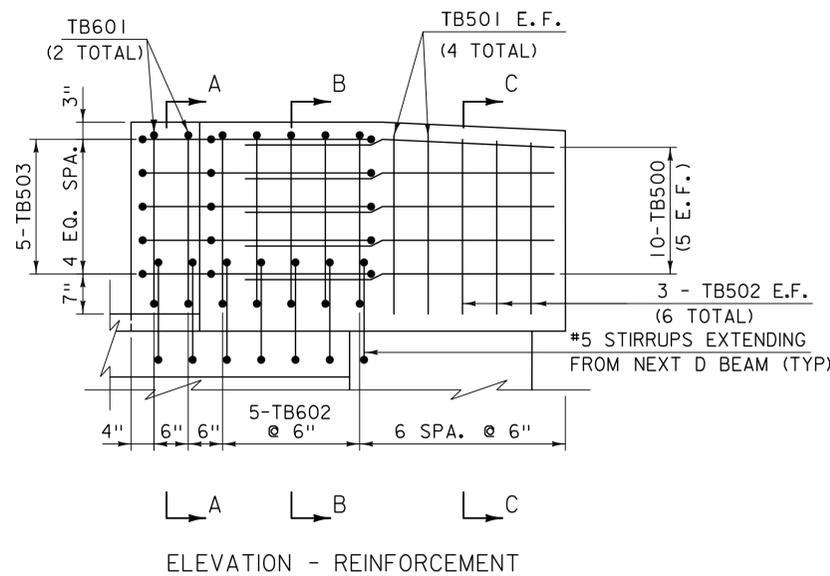


CONNECTION PLATE DETAIL  
SCALE: 1 1/2" = 1'-0"

NOTE: CONNECTION PLATES, PIPES, AND REINFORCEMENT NOTED WITH PREFIX 'TB' SHALL BE INCIDENTAL TO ITEM 900.620, "SPECIAL PROVISION (BRIDGE RAILING CONCRETE TRANSITION BARRIER)". BAR DETAILS, INCLUDING QUANTITY AND BEND DIMENSIONS, ARE SHOWN IN THE REINFORCEMENT SCHEDULE.



PLAN



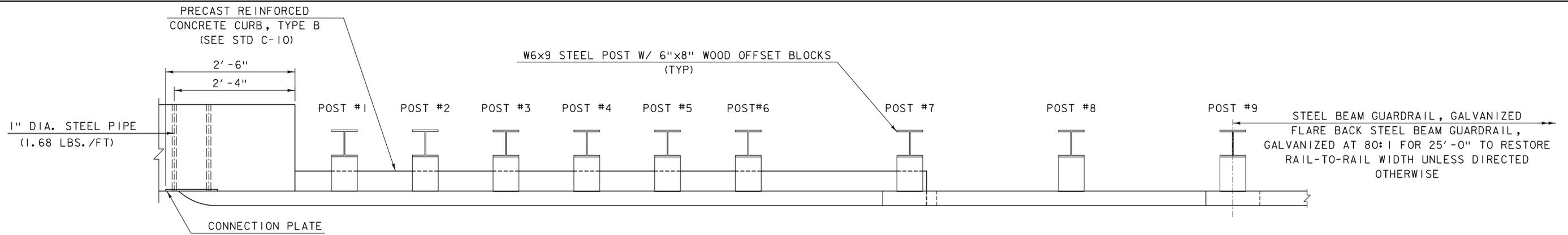
BRIDGE RAILING, CONCRETE TRANSITION BARRIER  
SCALE: 3/4" = 1'-0"

TYLIN INTERNATIONAL

PROJECT NAME: PLYMOUTH  
PROJECT NUMBER: ER BRS 0149(5)

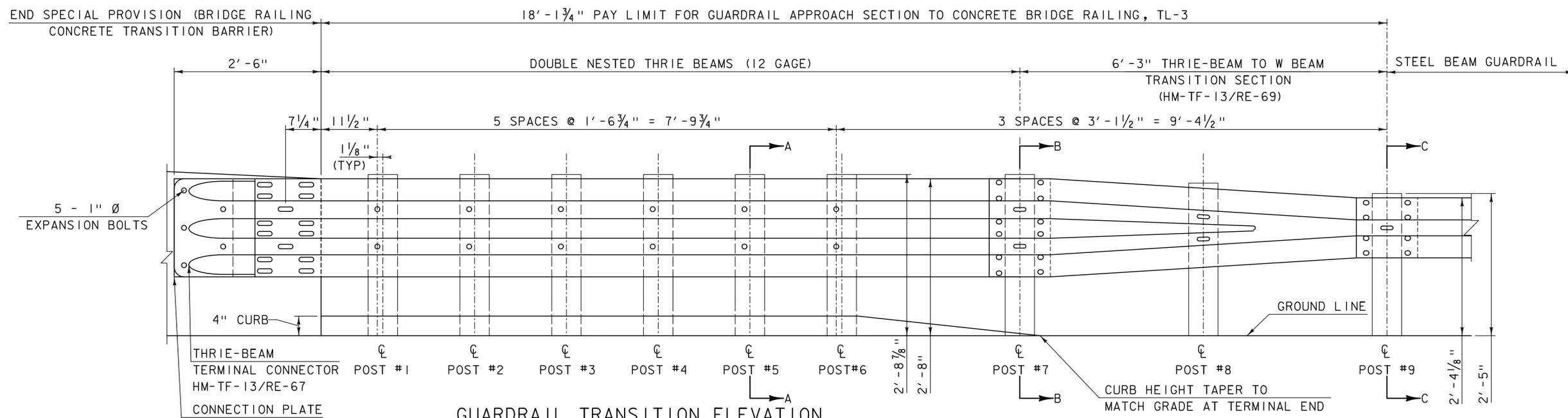
FILE NAME: zllc330trans\_barrier.dgn  
PROJECT LEADER: J. OLUND  
DESIGNED BY: J. OLUND  
TRANSITION BARRIER DETAILS

PLOT DATE: 9/20/2012  
DRAWN BY: T. KELLEY  
CHECKED BY: D. MYERS  
SHEET 27 OF 46



**GUARDRAIL TRANSITION PLAN**

SCALE: 1" = 1'-0"



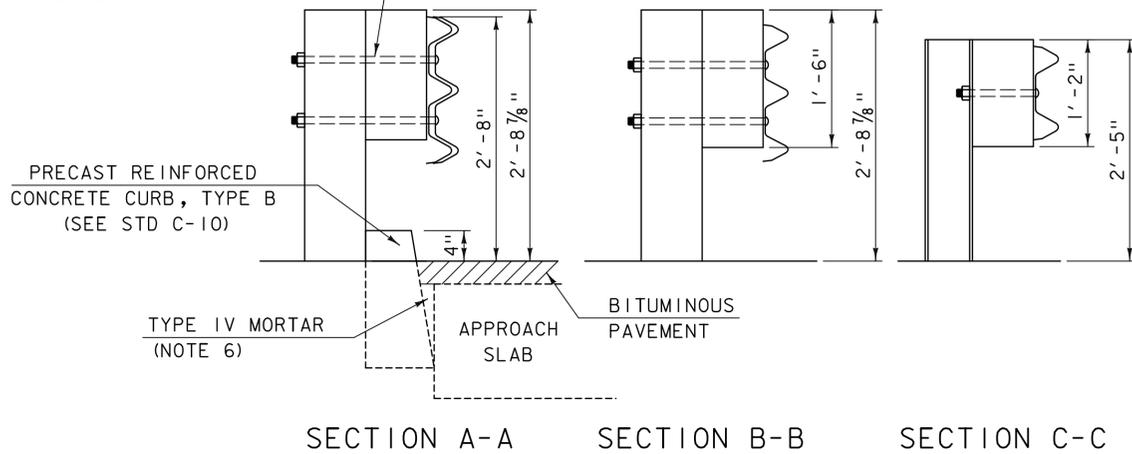
**GUARDRAIL TRANSITION ELEVATION**

SCALE: 1" = 1'-0"

**NOTES:**

1. THRIE-BEAM TERMINAL CONNECTOR SHALL BE INCLUDED IN THE UNIT BID PRICE OF ITEM 621.747, "GUARDRAIL APPROACH SECTION TO CONCRETE BRIDGE RAILING, TL3."
2. THE CONNECTION PLATE AND PIPE SHALL BE INCLUDED IN THE UNIT BID PRICE OF ITEM 900.620, "SPECIAL PROVISION (BRIDGE RAILING CONCRETE TRANSITION BARRIER)."
3. UNLESS OTHERWISE DIRECTED BY THE ENGINEER, A COMPOSITE MATERIAL POST AND/OR BLOCKOUT FROM THE APPROVED PRODUCTS LIST MAY BE SUBSTITUTED FOR A POST AND/OR BLOCKOUT OF SIMILAR DIMENSIONS.
4. REFER TO STANDARD DRAWINGS G-1 AND G-ID FOR ADDITIONAL DETAILS.
5. ALL APPROACH RAIL SPLICES SHALL BE LAPPED IN THE DIRECTION OF TRAFFIC FLOW.
6. THE TRIANGULAR SPACE BETWEEN THE APPROACH SLAB AND PRECAST CURB SHALL BE FILLED WITH TYPE IV MORTAR. PAYMENT SHALL BE INCIDENTAL TO ITEM 616.26, "PRECAST REINFORCED CONCRETE CURB, TYPE B."

5/8" POST BOLTS (A307) WITH  
1 3/4" O.D. WASHER AND NUT.  
7/8" DIA. HOLE IN POST AND  
SPACER (MIN.) (TYP)



**SECTION A-A**

**SECTION B-B**

**SECTION C-C**

PROJECT NAME: PLYMOUTH  
PROJECT NUMBER: ER BRS 0149(5)

**TYLIN**INTERNATIONAL

FILE NAME: zllc330rall.dgn  
PROJECT LEADER: J. OLUND  
DESIGNED BY: J. OLUND  
TL-3 TRANSITION RAIL DETAILS

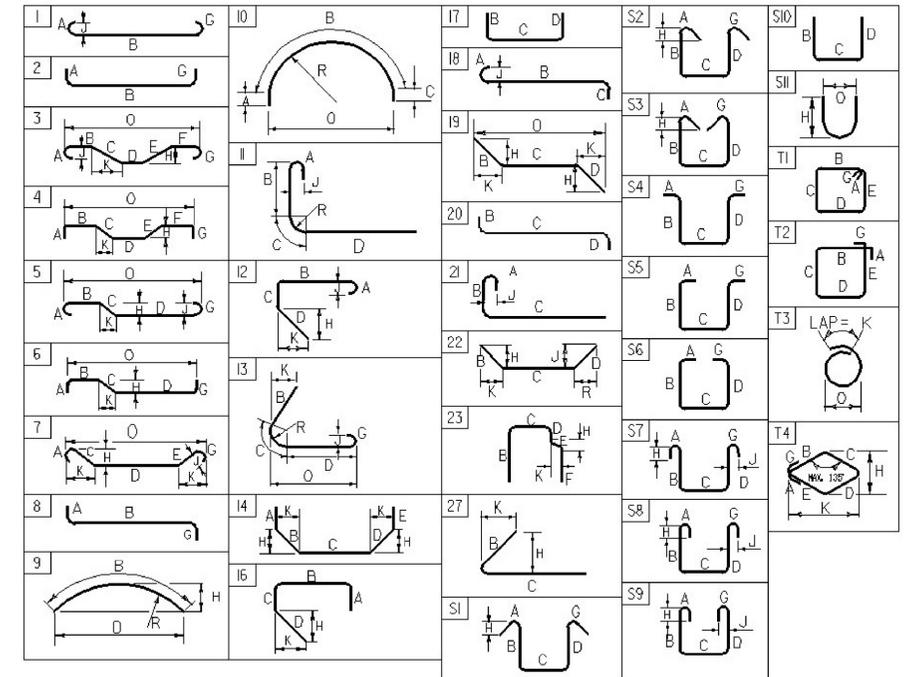
PLOT DATE: 9/20/2012  
DRAWN BY: T. KELLEY  
CHECKED BY: D. MYERS  
SHEET 28 OF 46

# 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 CLOSURE POUR REINFORCING</b>																																					
	8	5	33'- 2"	A501	STR.																																
△	32	5	3'- 8"	A502	STR.																																
	24	5	19'- 5"	A503	STR.																																
	6	5	1'- 9"	A504	STR.																																
	6	5	3'- 1"	A505	STR.																																
	66	5	7'- 10"	A506	17		3'- 3"	1'- 4"	3'- 3"																												
*	67	5	6'- 5"	A507	17		2'- 3"	1'- 11"	2'- 3"																												
	66	5	6'- 3"	A508	17		2'- 7"	1'- 1"	2'- 7"																												
	6	5	7'- 2"	A509	17		2'- 2"	2'- 10"	2'- 2"																												
	6	5	9'- 2"	A510	23		3'- 2"	1'- 4"	1'- 0"	1'- 6"	2'- 2"		0"				1'- 0"																				
<b>TRANSITION BARRIERS</b> (INCIDENTAL TO ITEM 900.620, SPECIAL PROVISION (BRIDGE RAILING, CONCRETE TRANSITION BARRIER))																																					
△	42	5	4'- 6"	TB500	STR.																																
	16	5	2'- 8"	TB501	STR.																																
△	26	5	2'- 7"	TB502	STR.																																
	20	5	10'- 2"	TB503	T2	0'- 11"	2'- 4"	1'- 4"	3'- 4"	0'- 9"		1'- 6"																									
	8	6	8'- 0"	TB601	T1	0'- 8"	0'- 8"	2'- 8"	0'- 8"	2'- 8"		0'- 8"																									
	20	6	9'- 2"	TB602	T1	0'- 8"	1'- 3"	2'- 8"	1'- 3"	2'- 8"		0'- 8"																									

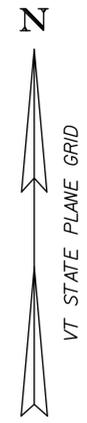
~ NOTES ~

- 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-SI). 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: **PLYMOUTH**  
PROJECT NUMBER: **ER BRS 0149(5)**  
FILE NAME: **zllc330rss.xls** PLOT DATE: **8/24/2012**  
PROJECT MANAGER: **J. OLUND** DRAWN BY: **D. MYERS**  
DESIGNED BY: **D. MYERS** CHECKED BY: **J. OLUND**  
**REINFORCING STEEL SCHEDULE** SHEET **29** OF **46**



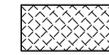
**LEGEND**



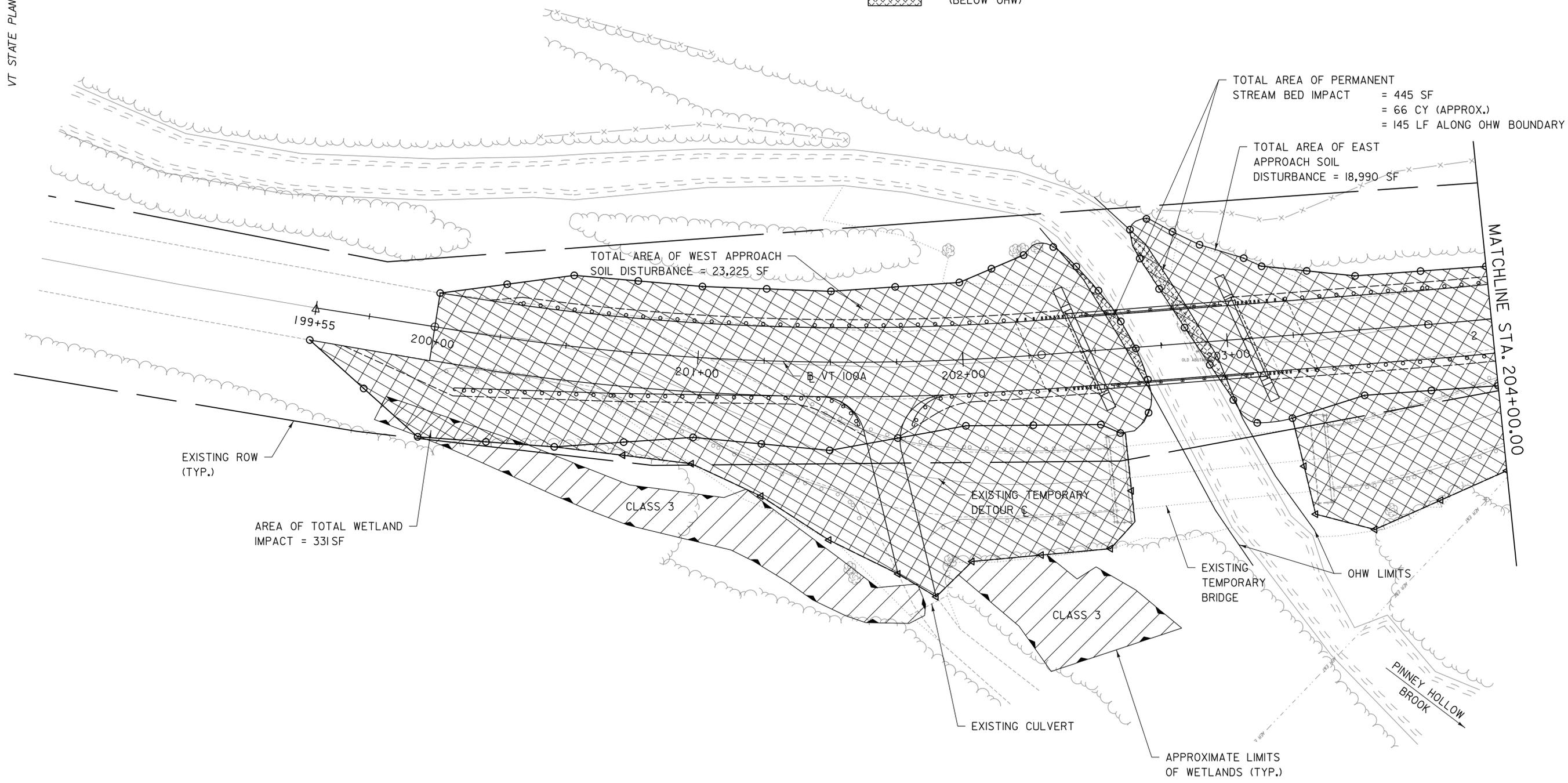
AREA OF SOIL DISTURBANCE



AREA OF APPROXIMATE WETLAND LIMITS



AREA OF PERMANENT STREAM IMPACT (BELOW OHW)



TOTAL AREA OF PERMANENT  
STREAM BED IMPACT = 445 SF  
= 66 CY (APPROX.)  
= 145 LF ALONG OHW BOUNDARY

TOTAL AREA OF EAST  
APPROACH SOIL  
DISTURBANCE = 18,990 SF

TOTAL AREA OF WEST APPROACH  
SOIL DISTURBANCE = 23,225 SF

AREA OF TOTAL WETLAND  
IMPACT = 331 SF

**RESOURCE LAYOUT I**

NOTE: APPROXIMATELY 650 SF OF WETLANDS WERE IMPACTED AS A RESULT OF THE CONSTRUCTION OF THE TEMPORARY DETOUR, PER J. LEPORE OF VTRANS, OCT. 25, 2011.

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

**TYLIN**INTERNATIONAL

PROJECT NAME: PLYMOUTH	PLOT DATE: 9/20/2012
PROJECT NUMBER: ER BRS 0149(5)	DRAWN BY: S. MORGAN
FILE NAME: zllc330bdr_RL01.dgn	CHECKED BY: D. BRYANT
PROJECT LEADER: J. OLUND	SHEET 30 OF 46
DESIGNED BY: J. OLUND	
RESOURCE LAYOUT I	

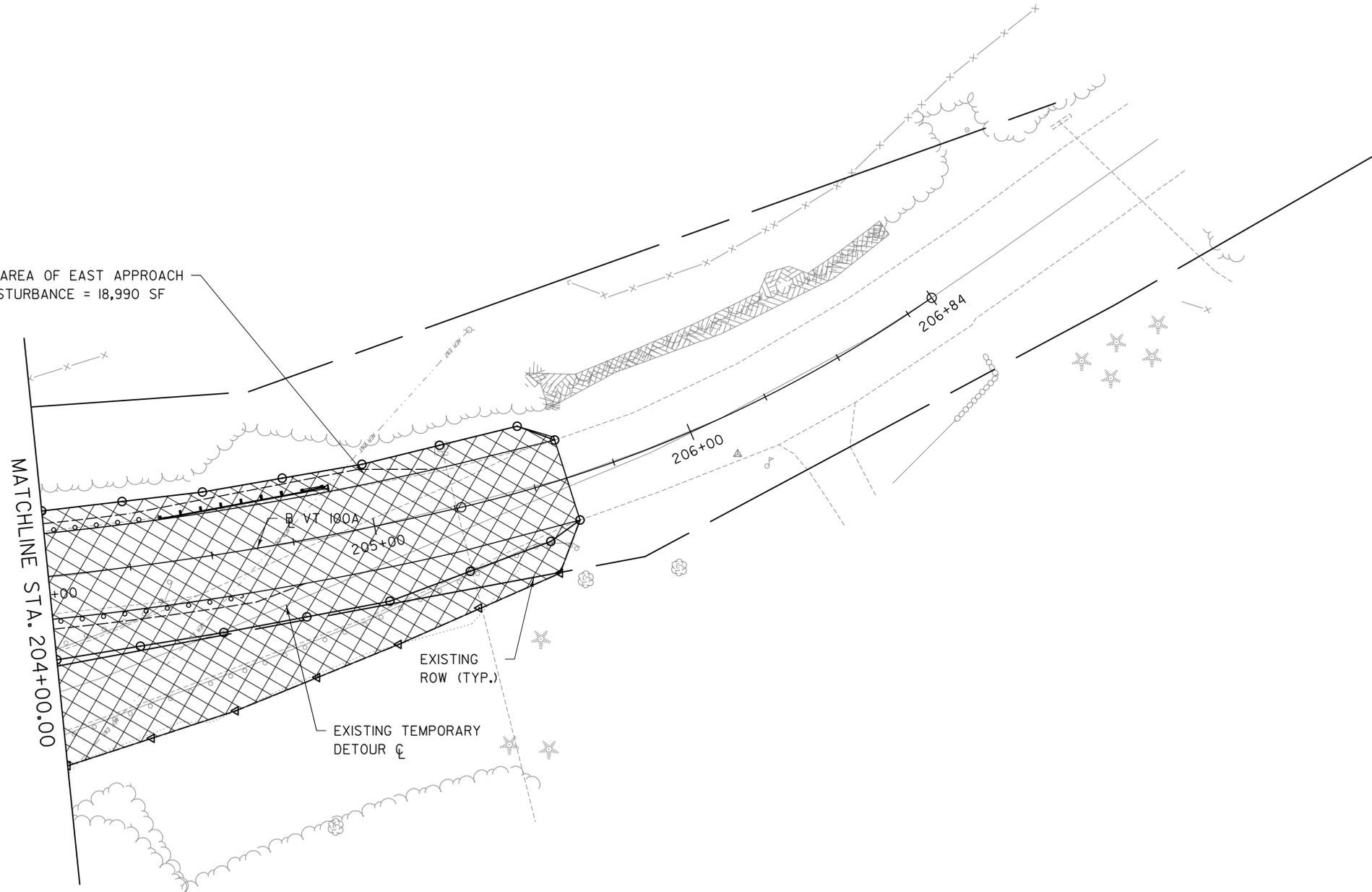


LEGEND



AREA OF SOIL DISTURBANCE

TOTAL AREA OF EAST APPROACH  
SOIL DISTURBANCE = 18,990 SF



RESOURCE LAYOUT 2

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

TYLIN INTERNATIONAL

PROJECT NAME: PLYMOUTH  
PROJECT NUMBER: ER BRS 0149(5)

FILE NAME: zllc330bdr\_RL02.dgn  
PROJECT LEADER: J. OLUND  
DESIGNED BY: J. OLUND  
RESOURCE LAYOUT 2

PLOT DATE: 9/20/2012  
DRAWN BY: S. MORGAN  
CHECKED BY: D. BRYANT  
SHEET 31 OF 46

# EROSION CONTROL NARRATIVE

## 1.1 PROJECT DESCRIPTION

THIS PROJECT INVOLVES THE REPLACEMENT OF BRIDGE #8 ON VT 100A SPANNING 63 FEET OVER THE BODY OF WATER KNOWN AS PINNEY HOLLOW BROOK IN THE TOWN OF PLYMOUTH. THE PROJECT BEGINS AT A POINT APPROXIMATELY 1.00 MILES SOUTH OF THE BRIDGEWATER TOWN LINE AND EXTENDS EASTERLY FOR 0.04 MILES. WORK WILL INVOLVE CONSTRUCTION OF NEW ABUTMENTS, CONSTRUCTION OF THE BRIDGE SUPERSTRUCTURE ALONG WITH RELATED ROADWAY, CHANNEL WORK, AND THE MAINTENANCE AND REMOVAL OF AN EMERGENCY REPAIR TEMPORARY DETOUR BRIDGE AND APPROACHES.

NOTE: AREA OF DISTURBANCE INCLUDES LIMITS OF EARTH DISTURBANCE WITHIN THE PROJECT AREA AS SHOWN ON THE ATTACHED EPSC PLAN. THE AREA OF DISTURBANCE DOES NOT INCLUDE WASTE, BORROW AND STAGING AREAS. THE CONTRACTOR IS RESPONSIBLE FOR SUBMITTING THE LOCATION OF THE WASTE, BORROW AND STAGING AREAS, AS WELL AS THE MATERIAL STOCKPILE, REFUELING AND MAINTENANCE AREAS. A MAP SHALL BE ATTACHED IF NECESSARY.

TOTAL AREA OF DISTURBANCE IS APPROXIMATELY 42,215 SQUARE FEET (0.97 ACRES).

IT IS ANTICIPATED THAT THE PROJECT WILL LAST ONE CONSTRUCTION SEASON.

## 1.2 SITE INVENTORY

### 1.2.1 TOPOGRAPHY, EXISTING ROADS, UTILITIES

THE TOPOGRAPHY SURROUNDING THE PROJECT SITE CONSISTS OF MODERATELY STEEP SLOPES ON THE NORTH SIDE OF THE PROJECT AND GENTLY SLOPING SLOPES ON THE SOUTH SIDE OF THE PROJECT. THERE IS ONE RESIDENTIAL PROPERTY ON THE SOUTHEAST CORNER OF THE PROJECT. THE GENERAL TOPOGRAPHY OF THE AREA SLOPES FROM THE NORTH TO THE SOUTH. ALL ROAD SURFACES IN THE PROJECT AREA ARE BITUMINOUS CONCRETE PAVEMENT.

THERE ARE OVERHEAD ELECTRICAL AND TELEPHONE LINES ON THE EAST END OF THE PROJECT THAT CROSS VT 100A AND PINNEY HOLLOW BROOK.

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

THE BRIDGE SPANS THE BODY OF WATER KNOWN AS PINNEY HOLLOW BROOK. IN GENERAL THE BROOK IS CLASSIFIED AS MEANDERING. WITHIN THE REACH INFLUENCED BY THE BRIDGE THE BROOK IS CHANNELIZED WITH A BEND UPRIVER. THE BROOK BOUNDARIES ARE ALLUVIAL AND STREAM BANKS ARE GENERALLY SHALLOW. THE STREAM BED CONSISTS OF GRAVEL AND COBBLE. THE TRIBUTARY AREA AT THE BRIDGE IS 8.6 SQUARE MILES. CONSTRUCTION OF THE NEW BRIDGE WILL REQUIRE SOME TEMPORARY AND PERMANENT IMPACTS TO PINNEY HOLLOW BROOK. THERE ARE ALSO EXISTING WETLANDS ON THE SOUTHWEST END OF THE PROJECT THAT WILL BE IMPACTED.

THE FOLLOWING DESCRIPTIONS ARE FOR THE EXISTING SITE PLANS: SURFACE DRAINAGE FROM VT 100A FLOWS DOWN WOODED SIDESLOPES INTO EXISTING DITCHES AND DRAINAGE STRUCTURES WHICH OUTLET TOWARDS PINNEY BROOK.

### 1.2.3 VEGETATION

THE VEGETATION IN THE PROJECT AREA CONSISTS OF A SMALL AREA OF A WELL ESTABLISHED LAWN AND MEDIUM TO HEAVILY WOODED AREAS. THE IMPACT TO VEGETATION WILL BE LIMITED TO THAT WHICH IS REQUIRED FOR REPLACEMENT OF THE EXISTING BRIDGE AND REMOVAL OF THE EMERGENCY REPAIR TEMPORARY DETOUR BRIDGE AND APPROACHES. DISTURBED VEGETATION WILL BE REESTABLISHED WITH STANDARD SEED AND MULCH PRACTICES.

### 1.2.4 SOILS

SOIL DATA CAME FROM THE U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE FOR THE COUNTY OF WINDSOR, VERMONT. SOILS ON THE PROJECT SITE ARE:

TUNBRIDGE-LYMAN COMPLEX;  
BERKSHIRE AND MONADNOCK;  
AND CROGHAN AND SHEEPSCOT.

SEE EPSC EXISTING CONDITIONS LAYOUT SHEETS FOR SOIL LOCATIONS AND ADDITIONAL INFORMATION.

## 1.2.4 SENSITIVE RESOURCE AREAS

CRITICAL HABITATS: NO  
HISTORICAL OR ARCHAEOLOGICAL AREAS: NO  
PRIME AGRICULTURE LAND: NO  
THREATENED AND ENDANGERED SPECIES: NO  
WATER RESOURCE: PINNEY HOLLOW BROOK  
WETLANDS: CLASS III WETLANDS ON SOUTHWEST CORNER OF PROJECT.  
TOTAL IMPACTED AREA IS 331 SF.

## 1.3 RISK EVALUATION

THE 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 THE LIFE OF THE PROJECT TO AVOID 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 BASED UPON 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 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 USED TO PHYSICALLY MARK SITE BOUNDARIES.

### 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 PHASES CHANGE. FOR PROJECTS WHICH FALL UNDER THE CONSTRUCTION GENERAL PERMIT, ONLY THE ACREAGE LISTED ON THE PERMIT AUTHORIZATION MAY BE EXPOSED AT ANY GIVEN TIME.

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

ENTRANCE/EXIT STABILIZATION MEASURES ARE NOT ANTICIPATED ON THIS PROJECT.

### 1.4.4 INSTALL SEDIMENT BARRIERS

SEDIMENT BARRIERS SHALL BE UTILIZED TO INTERCEPT RUNOFF AND ALLOW SUSPENDED SEDIMENT TO SETTLE OUT. THEY SHOULD BE INSTALLED PRIOR TO ANY UPSLOPE WORK.

SILT FENCE WILL BE INSTALLED AS PROPOSED ON THE EPSC PLAN AND DETAIL SHEETS.

DROP INLET PROTECTION WILL BE UTILIZED AS SHOWN ON THE EPSC PLAN AND DETAIL SHEETS.

## 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.

DIVERSION OF UPLAND RUNOFF IS NOT ANTICIPATED.

## 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. STONE CHECK DAMS SHALL BE INSTALLED AS PROPOSED ON THE EPSC PLAN AND OTHER AREAS AS DIRECTED BY THE RESIDENT ENGINEER.

## 1.4.7 CONSTRUCT PERMANENT CONTROLS

PERMANENT STORMWATER TREATMENT DEVICES SHALL BE INSTALLED AS SHOWN ON THE PLANS.

SEED AND MULCH WILL BE USED AS PERMANENT CONTROLS TO STABILIZE EXPOSED SOIL. RIPRAP AND STONE FILL WILL BE USED TO STABILIZE THE STREAMBED AROUND THE ABUTMENTS.

## 1.4.8 STABILIZE EXPOSED SOILS DURING CONSTRUCTION

ALL AREAS OF DISTURBANCE MUST HAVE TEMPORARY STABILIZATION IN PLACE WITHIN 48 HOURS OF DISTURBANCE. THE FORECAST OF RAINFALL EVENTS SHALL TRIGGER IMMEDIATE PROTECTION OF EXPOSED SOILS.

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 3:1.

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.

SHOULD EARTH DISTURBANCE BE PERFORMED OUTSIDE THE CONSTRUCTION SEASON, A WINTER EROSION AND SEDIMENT CONTROL PLAN DESCRIBING ALTERNATIVE STABILIZATION METHODS SHALL BE SUBMITTED TO THE RESIDENT ENGINEER PRIOR TO AUGUST 15<sup>TH</sup> FOR APPROVAL.

## 1.4.10 STABILIZE SOIL AT FINAL GRADE

EXPOSED SOIL MUST BE STABILIZED WITHIN 48 HOURS OF REACHING FINAL GRADE.

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

THE USE OF COFFERDAMS ARE NOT ANTICIPATED.

## 1.4.12 INSPECT YOUR SITE

INSPECT THE PROJECT SITE BASED ON SPECIAL PROVISION REQUIREMENTS.

## 1.5 SEQUENCE AND STAGING

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

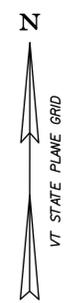
### 1.5.1 CONSTRUCTION SEQUENCE

### 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. WASTE, BORROW AND STAGING SITES MUST BE APPROVED BY VTRANS ENVIRONMENTAL SECTION.

TYLIN INTERNATIONAL	PROJECT NAME: PLYMOUTH	
	PROJECT NUMBER: ER BRS 0149(5)	
	FILE NAME: zllc330bdr_ero.dgn	PLOT DATE: 9/20/2012
	PROJECT LEADER: J. OLUND	DRAWN BY: S. AMOROSO
	DESIGNED BY: S. AMOROSO	CHECKED BY: D. BRYANT
	EPSC NARRATIVE	SHEET 32 OF 46

**SOIL CLASSIFICATION**  
 TUNBRIDGE-LYMAN COMPLEX  
 VERY ROCKY  
 35 TO 60% SLOPES  
 "K FACTOR" 0.28  
 HIGH ERODIBILITY



**SOIL CLASSIFICATION**  
 BERKSHIRE AND MONADNOCK  
 FINE SANDY LOAMS, VERY STONY  
 35 TO 60% SLOPES  
 "K FACTOR" 0.28  
 HIGH ERODIBILITY

**SOIL CLASSIFICATION**  
 CROGHAN AND SHEEPSCOT  
 FINE SANDY LOAMS  
 0 TO 8% SLOPES  
 "K FACTOR" 0.24  
 MEDIUM ERODIBILITY

**LEGEND:**

- WETLAND CLASS III
- AERIAL ELECTRIC & TELEPHONE
- SOIL CLASSIFICATION BOUNDARY

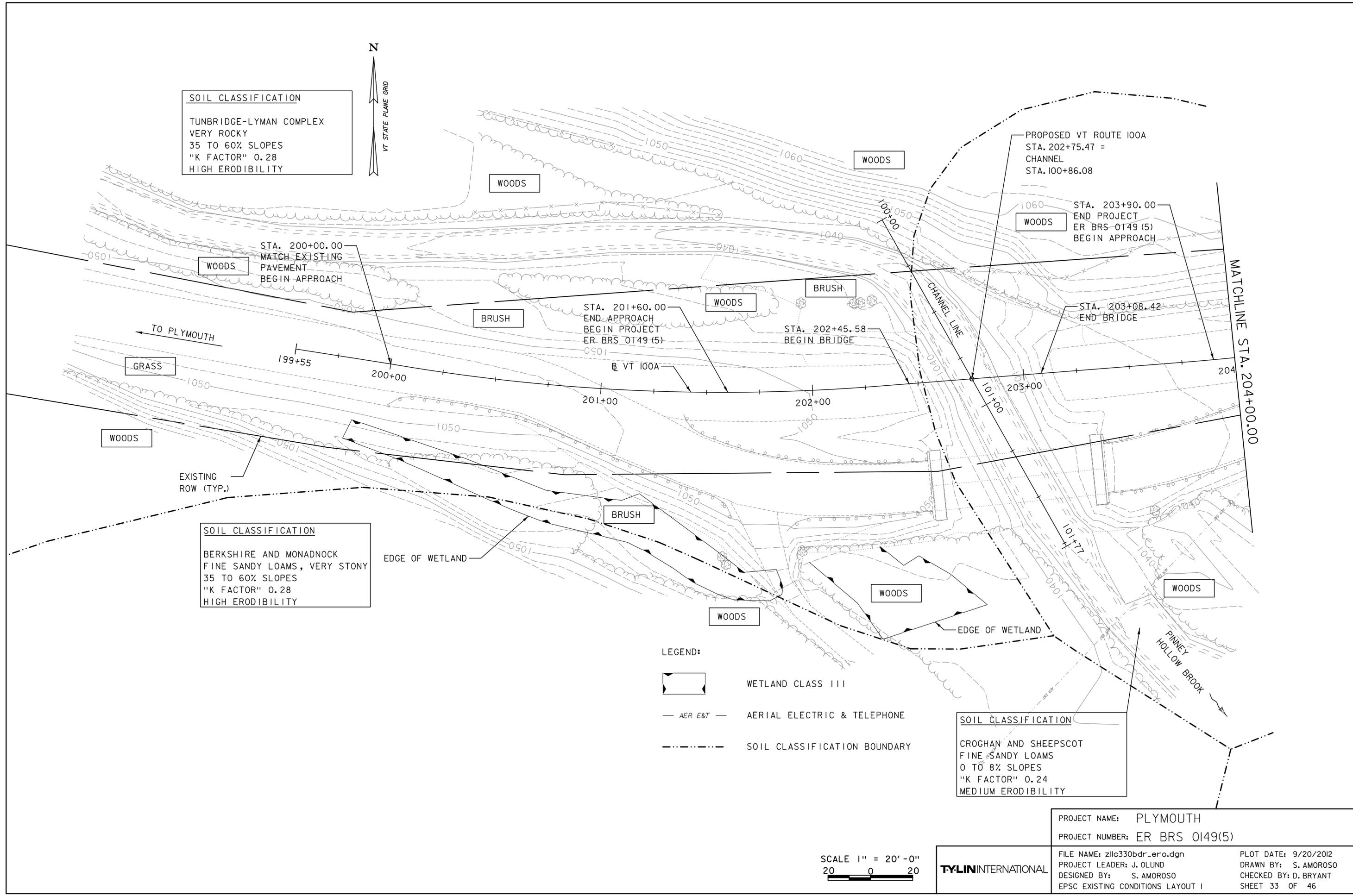
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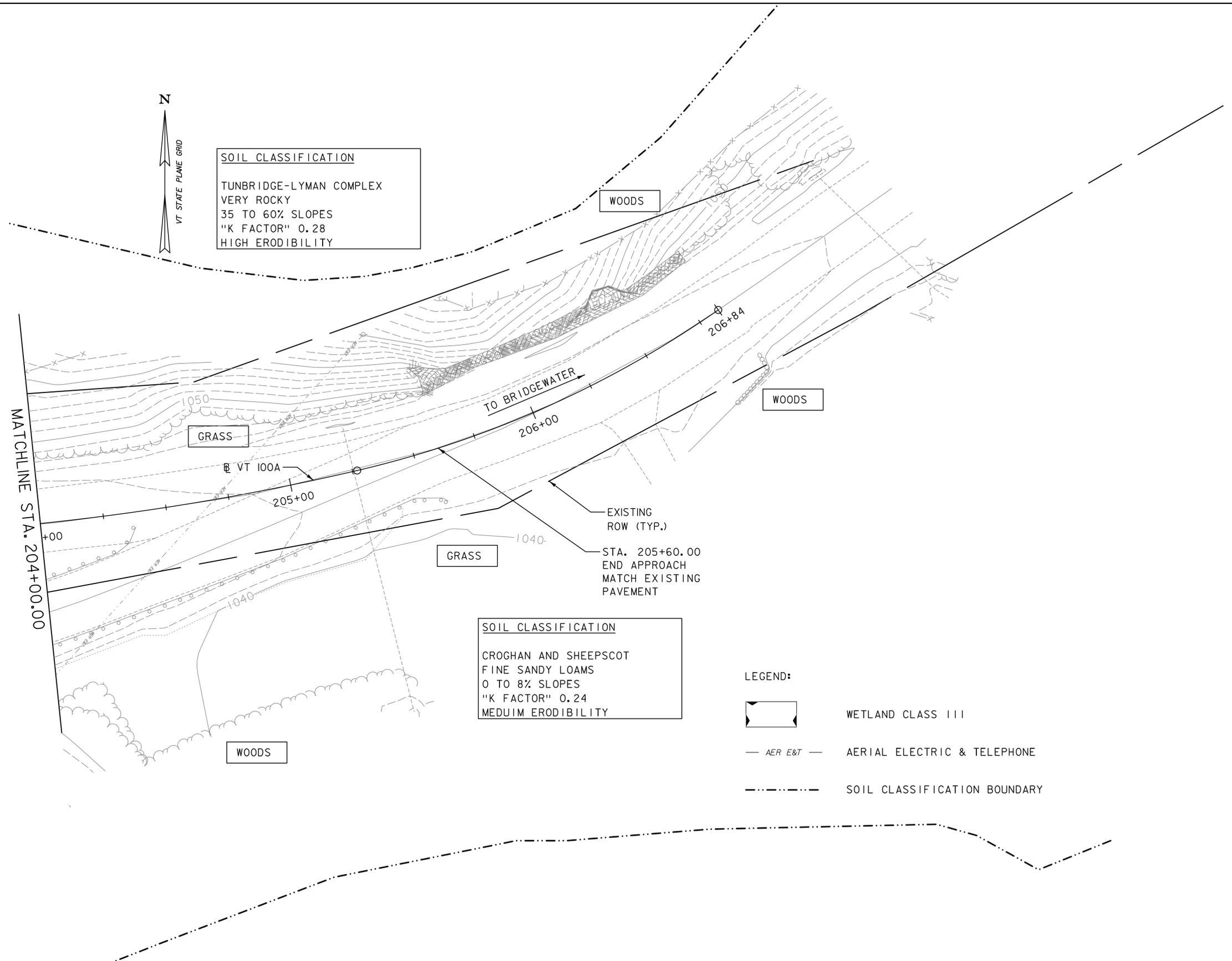
**TYLIN** INTERNATIONAL

PROJECT NAME: PLYMOUTH  
 PROJECT NUMBER: ER BRS 0149(5)

FILE NAME: zllc330bdr\_ero.dgn  
 PROJECT LEADER: J. OLUND  
 DESIGNED BY: S. AMOROSO  
 EPSC EXISTING CONDITIONS LAYOUT I

PLOT DATE: 9/20/2012  
 DRAWN BY: S. AMOROSO  
 CHECKED BY: D. BRYANT  
 SHEET 33 OF 46





**SOIL CLASSIFICATION**  
 TUNBRIDGE-LYMAN COMPLEX  
 VERY ROCKY  
 35 TO 60% SLOPES  
 "K FACTOR" 0.28  
 HIGH ERODIBILITY

**SOIL CLASSIFICATION**  
 CROGHAN AND SHEEPSCOT  
 FINE SANDY LOAMS  
 0 TO 8% SLOPES  
 "K FACTOR" 0.24  
 MEDIUM ERODIBILITY

- LEGEND:**
- WETLAND CLASS III
  - AER E&T
  - SOIL CLASSIFICATION BOUNDARY

MATCHLINE STA. 204+00.00

TO BRIDGEWATER

206+84

206+00

205+00

VT 100A

GRASS

WOODS

WOODS

GRASS

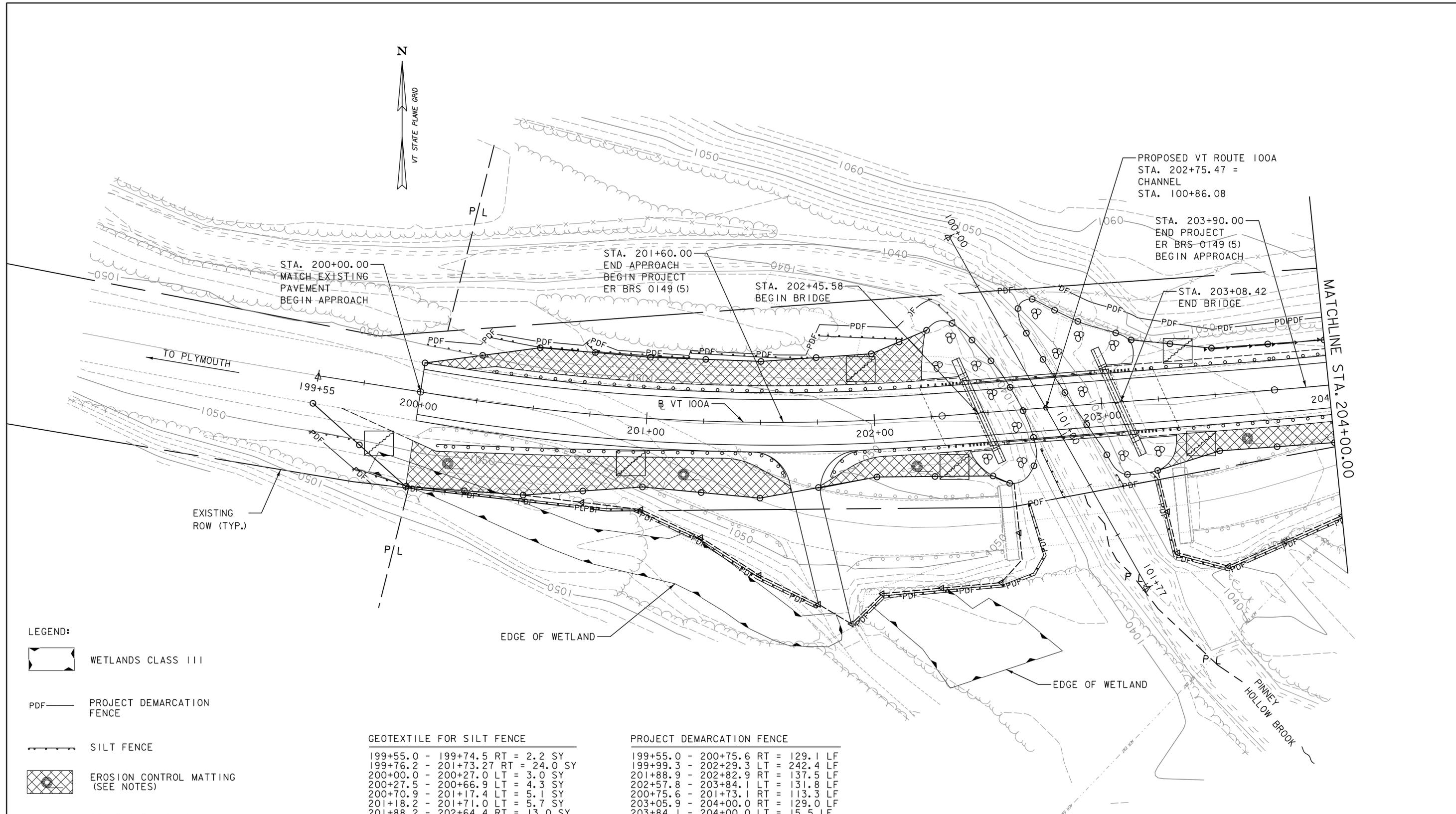
WOODS

EXISTING ROW (TYP.)  
 STA. 205+60.00  
 END APPROACH  
 MATCH EXISTING PAVEMENT

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

**TYLIN**INTERNATIONAL

PROJECT NAME: PLYMOUTH	
PROJECT NUMBER: ER BRS 0149(5)	
FILE NAME: zllc330bdr_ero.dgn	PLOT DATE: 9/20/2012
PROJECT LEADER: J. OLUND	DRAWN BY: S. AMOROSO
DESIGNED BY: S. AMOROSO	CHECKED BY: D. BRYANT
EPSC EXISTING CONDITION LAYOUT 2	SHEET 34 OF 46



LEGEND:

-  WETLANDS CLASS III
-  PROJECT DEMARCATION FENCE
-  SILT FENCE
-  EROSION CONTROL MATTING (SEE NOTES)
-  STONE CHECK DAMS
-  STONE FILL, TYPE IV
-  SURFACE ROUGHENING
-  INLET PROTECTION DEVICE, TYPE I

GEOTEXTILE FOR SILT FENCE

199+55.0 - 199+74.5	RT = 2.2	SY
199+76.2 - 201+73.27	RT = 24.0	SY
200+00.0 - 200+27.0	LT = 3.0	SY
200+27.5 - 200+66.9	LT = 4.3	SY
200+70.9 - 201+17.4	LT = 5.1	SY
201+18.2 - 201+71.0	LT = 5.7	SY
201+88.2 - 202+64.4	RT = 13.0	SY
202+71.8 - 202+80.2	RT = 2.6	SY
201+76.5 - 202+14.2	LT = 4.0	SY
202+28.1 - 202+38.0	LT = 1.6	SY
203+04.4 - 203+06.8	RT = 0.6	SY
203+19.6 - 204+00.0	RT = 14.3	SY

PROJECT DEMARCATION FENCE

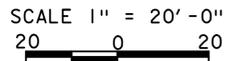
199+55.0 - 200+75.6	RT = 129.1	LF
199+99.3 - 202+29.3	LT = 242.4	LF
201+88.9 - 202+82.9	RT = 137.5	LF
202+57.8 - 203+84.1	LT = 131.8	LF
200+75.6 - 201+73.1	RT = 113.3	LF
203+05.9 - 204+00.0	RT = 129.0	LF
203+84.1 - 204+00.0	LT = 15.5	LF

TEMPORARY EROSION MATTING

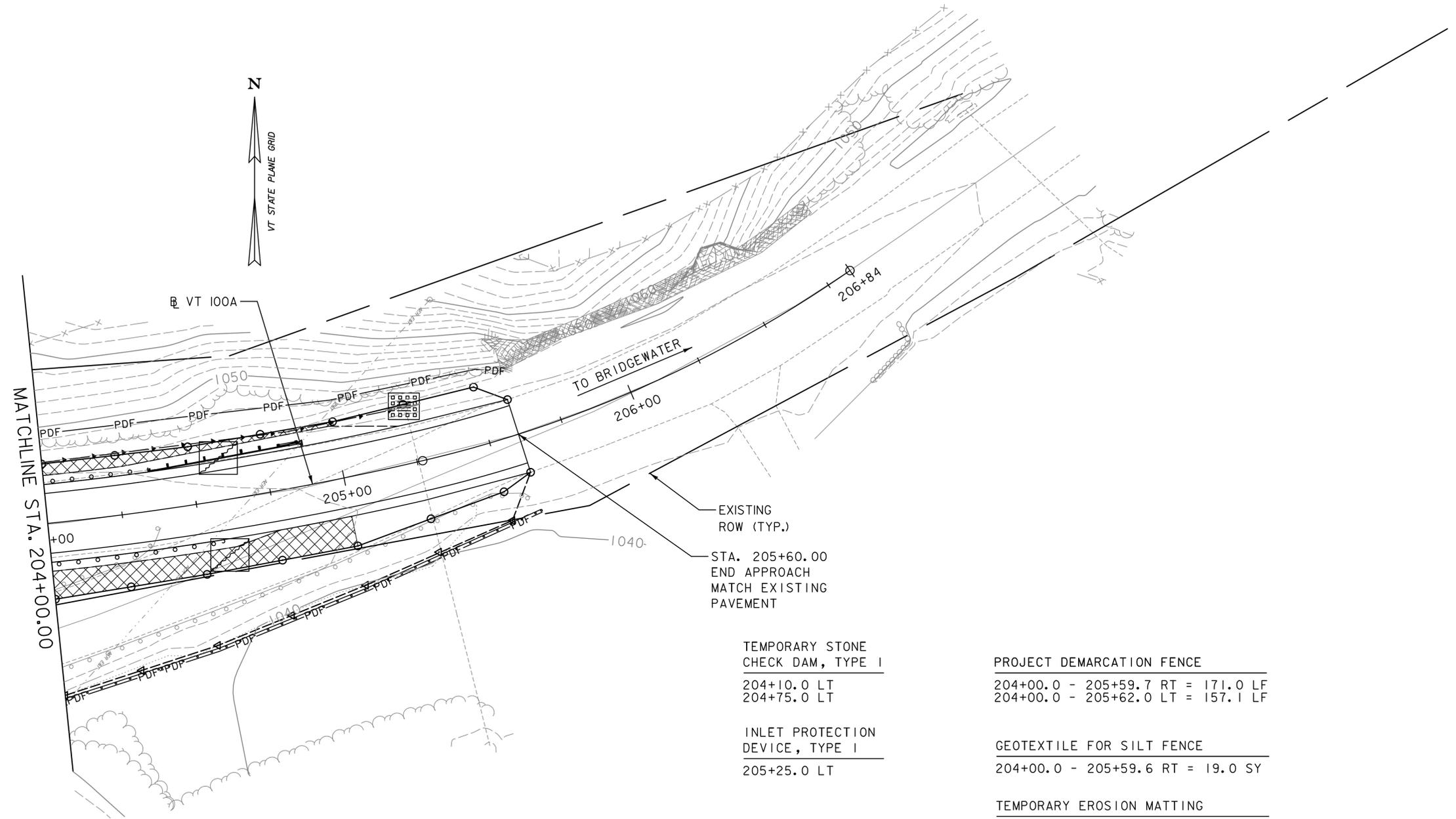
200+00.0 - 202+25.8	LT = 256.9	SY
200+00.0 - 201+63.7	RT = 282.9	SY
201+75.7 - 202+49.9	RT = 66.0	SY
203+22.3 - 204+00.0	RT = 74.7	SY

NOTES:  
TEMPORARY EROSION MATTING TO BE USED ON SLOPES STEEPER THAN 3:1.

PROJECT NAME: PLYMOUTH	
PROJECT NUMBER: ER BRS 0149(5)	
FILE NAME: zllc330bdr_ero.dgn	PLOT DATE: 9/20/2012
PROJECT LEADER: J. OLUND	DRAWN BY: S. AMOROSO
DESIGNED BY: S. AMOROSO	CHECKED BY: D. BRYANT
EPSC CONSTRUCTION CONDITION LAYOUT I	SHEET 35 OF 46



TYLIN INTERNATIONAL



LEGEND:

-  WETLANDS CLASS III
-  PROJECT DEMARCATION FENCE
-  SILT FENCE
-  EROSION CONTROL MATTING (SEE NOTES)
-  STONE CHECK DAMS
-  STONE FILL, TYPE IV
-  SURFACE ROUGHENING
-  INLET PROTECTION DEVICE, TYPE I

TEMPORARY STONE CHECK DAM, TYPE I  
 204+10.0 LT  
 204+75.0 LT

INLET PROTECTION DEVICE, TYPE I  
 205+25.0 LT

PROJECT DEMARCATION FENCE  
 204+00.0 - 205+59.7 RT = 171.0 LF  
 204+00.0 - 205+62.0 LT = 157.1 LF

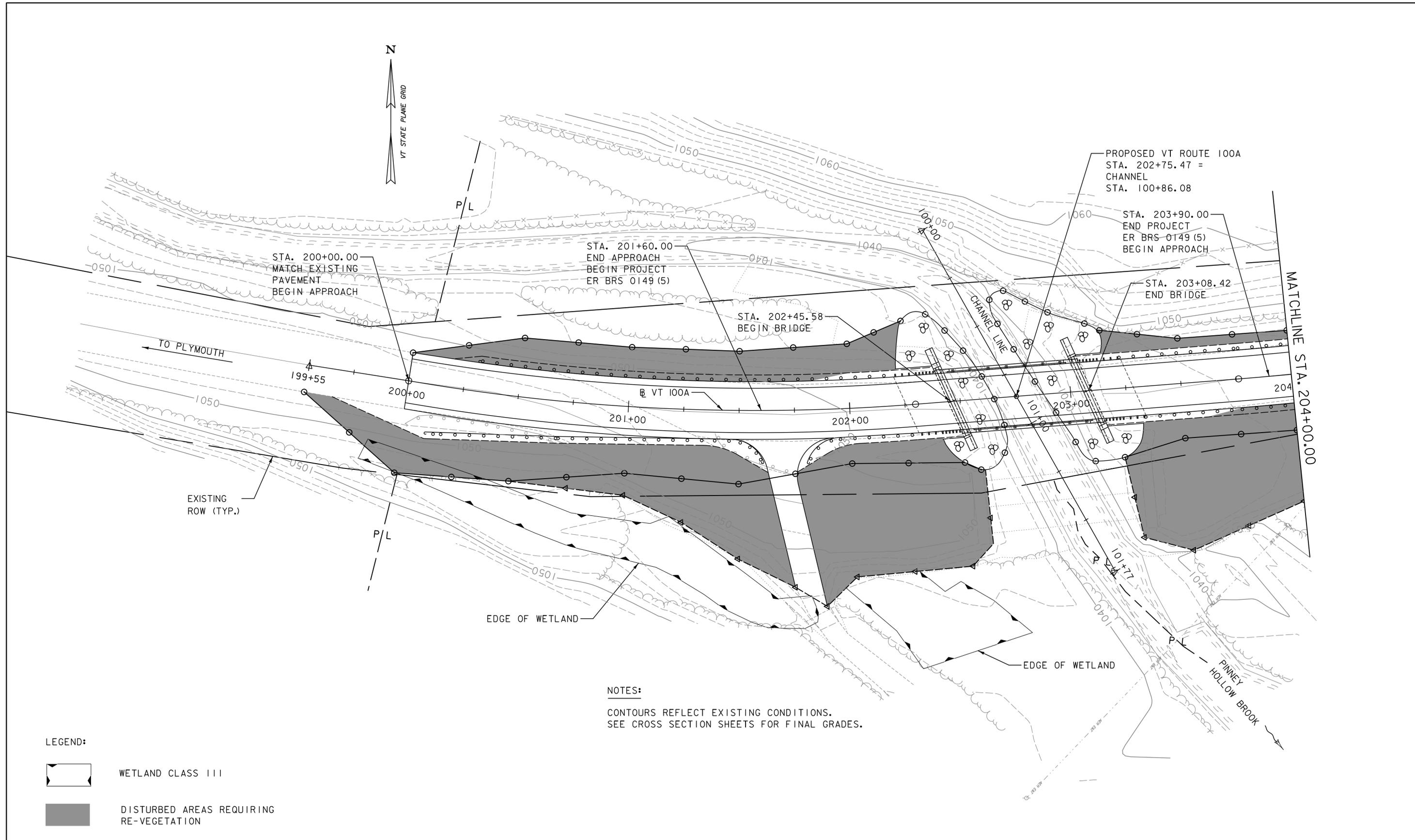
GEOTEXTILE FOR SILT FENCE  
 204+00.0 - 205+59.6 RT = 19.0 SY

TEMPORARY EROSION MATTING  
 204+00.0 - 205+00.0 RT = 97.6 SY  
 204+00.0 - 205+00.0 LT = 28.8 SY

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



PROJECT NAME: PLYMOUTH	
PROJECT NUMBER: ER BRS 0149(5)	
FILE NAME: zllc330bdr_ero.dgn	PLOT DATE: 9/20/2012
PROJECT LEADER: J. OLUND	DRAWN BY: S. AMOROSO
DESIGNED BY: S. AMOROSO	CHECKED BY: D. BRYANT
EPSC CONSTRUCTION CONDITION LAYOUT 2	SHEET 36 OF 46



STA. 200+00.00  
MATCH EXISTING  
PAVEMENT  
BEGIN APPROACH

STA. 201+60.00  
END APPROACH  
BEGIN PROJECT  
ER BRS 0149 (5)

STA. 202+45.58  
BEGIN BRIDGE

PROPOSED VT ROUTE 100A  
STA. 202+75.47 =  
CHANNEL  
STA. 100+86.08

STA. 203+90.00  
END PROJECT  
ER BRS 0149 (5)  
BEGIN APPROACH

STA. 203+08.42  
END BRIDGE

MATCHLINE STA. 204+00.00

EXISTING  
ROW (TYP.)

EDGE OF WETLAND

EDGE OF WETLAND

NOTES:  
CONTOURS REFLECT EXISTING CONDITIONS.  
SEE CROSS SECTION SHEETS FOR FINAL GRADES.

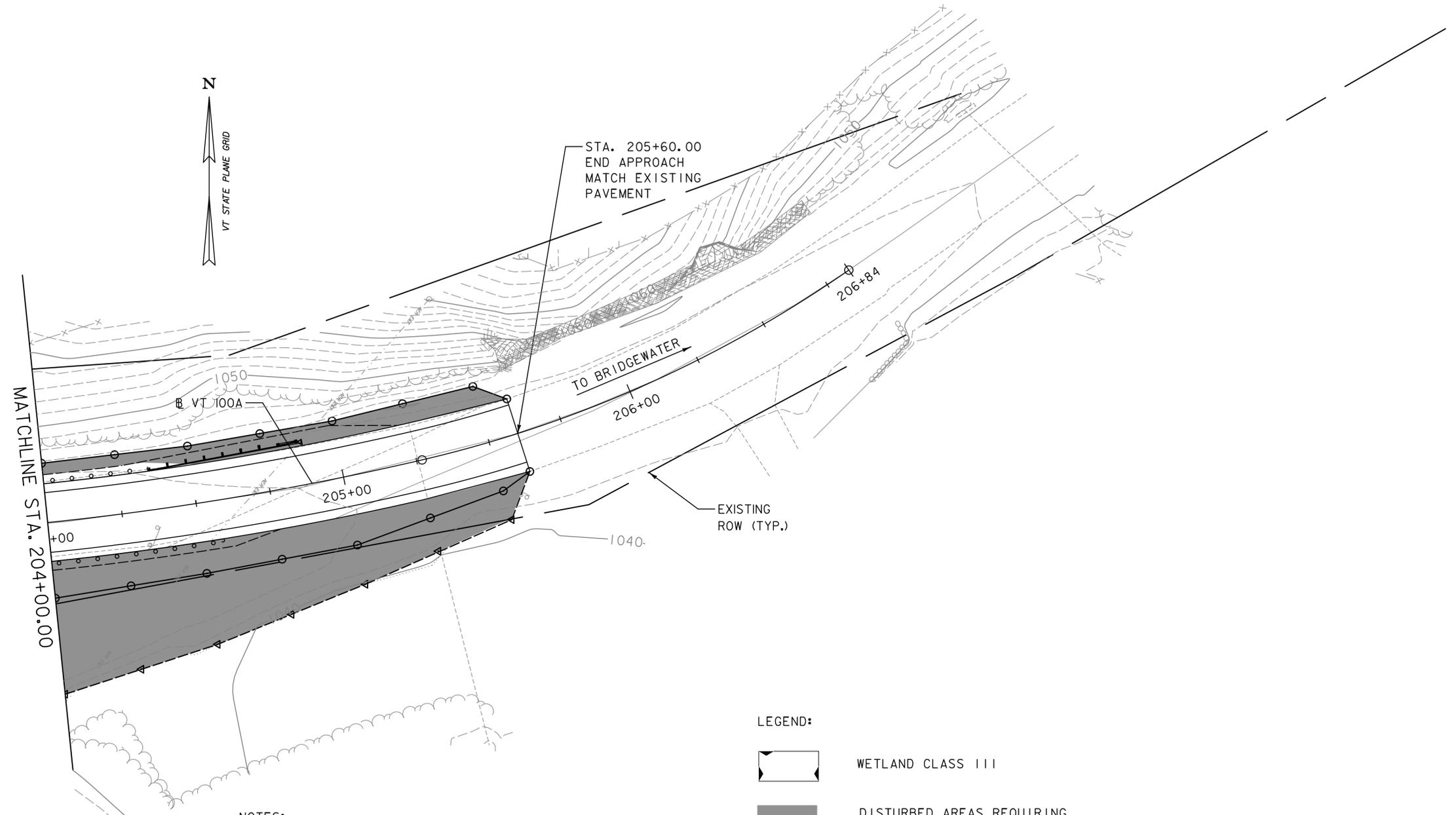
LEGEND:

-  WETLAND CLASS III
-  DISTURBED AREAS REQUIRING RE-VEGETATION
-  STONE FILL, TYPE IV

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

TYLIN INTERNATIONAL

PROJECT NAME: PLYMOUTH		PLOT DATE: 9/20/2012	
PROJECT NUMBER: ER BRS 0149(5)		DRAWN BY: S. AMOROSO	
FILE NAME: zllc330bdr_ero.dgn	DESIGNED BY: S. AMOROSO	CHECKED BY: D. BRYANT	
PROJECT LEADER: J. OLUND	EPSC FINAL CONDITIONS LAYOUT 1	SHEET 37	OF 46



MATCHLINE STA. 204+00.00



STA. 205+60.00  
END APPROACH  
MATCH EXISTING  
PAVEMENT

TO BRIDGEWATER

206+84

206+00

205+00

VT 100A

1040

EXISTING  
ROW (TYP.)

LEGEND:



WETLAND CLASS III



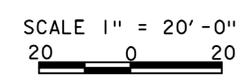
DISTURBED AREAS REQUIRING  
RE-VEGETATION



STONE FILL, TYPE IV

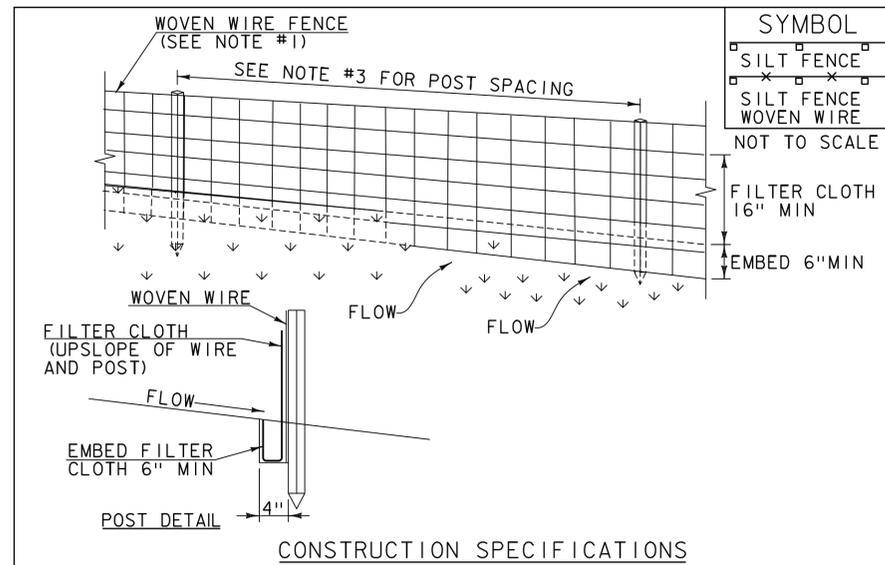
NOTES:

CONTOURS REFLECT EXISTING CONDITIONS.  
SEE CROSS SECTION SHEETS FOR FINAL GRADES.



**TYLIN**INTERNATIONAL

PROJECT NAME: PLYMOUTH	
PROJECT NUMBER: ER BRS 0149(5)	
FILE NAME: zllc330bdr_ero.dgn	PLOT DATE: 9/20/2012
PROJECT LEADER: J. OLUND	DRAWN BY: S. AMOROSO
DESIGNED BY: S. AMOROSO	CHECKED BY: D. BRYANT
EPSC FINAL CONDITIONS LAYOUT 2	SHEET 38 OF 46



1. WOVEN WIRE REINFORCED FENCE IS REQUIRED WITHIN 100' UPSLOPE OF RECEIVING WATERS WHEN THE PROJECT FALLS UNDER A CONSTRUCTION STORMWATER PERMIT. WOVEN WIRE SHALL BE A MIN. 14 GAUGE WITH A 6" MAX. MESH OPENING.
2. FILTER CLOTH SHALL BE EITHER FILTER X, MIRAFL100X, STABILINKA T140N OR APPROVED EQUIVALENT.
3. POST SPACING FOR WIRE-BACKED FENCE SHALL BE 10' MAXIMUM. FOR FILTER-CLOTH FENCE, WHEN ELONGATION IS >50%, POST SPACING SHALL NOT EXCEED 4' AND WHEN ELONGATION IS <50%, POST SPACING SHALL NOT EXCEED 6'.
4. WOVEN WIRE FENCE IS TO BE FASTENED SECURELY TO FENCE POSTS WITH WIRE TIES. FILTER CLOTH IS TO BE FASTENED SECURELY TO WOVEN WIRE FENCE WITH TIES SPACED EVERY 24" AT TOP AND MID SECTION.
5. WHEN TWO SECTIONS OF FILTER CLOTH ADJOIN EACH OTHER THEY SHALL BE OVER-LAPPED BY 6" AND FOLDED.
6. MAINTENANCE SHALL BE PERFORMED AS NEEDED AND MATERIAL REMOVED WHEN SEDIMENT REACHES HALF OF FABRIC HEIGHT.

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

**SILT FENCE**

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 AND AS SHOWN IN THE PLANS FOR GEOTEXTILE FOR SILT FENCE (PAY ITEM 649.51) OR GEOTEXTILE FOR SILT FENCE, WOVEN WIRE REINFORCED (PAY ITEM 649.515).

**REVISIONS**

MARCH 21, 2008	WHF
DECEMBER 11, 2008	WHF
JANUARY 13, 2009	WHF

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

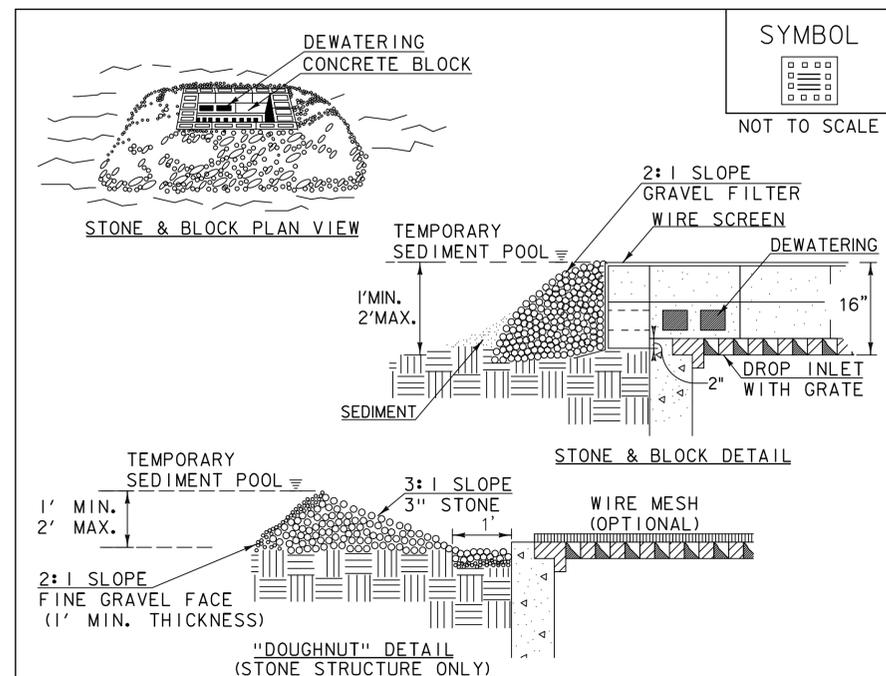
PROJECT NAME: PLYMOUTH

PROJECT NUMBER: ER BRS 0149(5)

**TYLIN** INTERNATIONAL

FILE NAME: zllc330bdr\_ero.dgn  
PROJECT LEADER: J. OLUND  
DESIGNED BY: S. AMOROSO  
EPSC DETAILS I

PLOT DATE: 9/20/2012  
DRAWN BY: S. AMOROSO  
CHECKED BY: D. BRYANT  
SHEET 39 OF 46



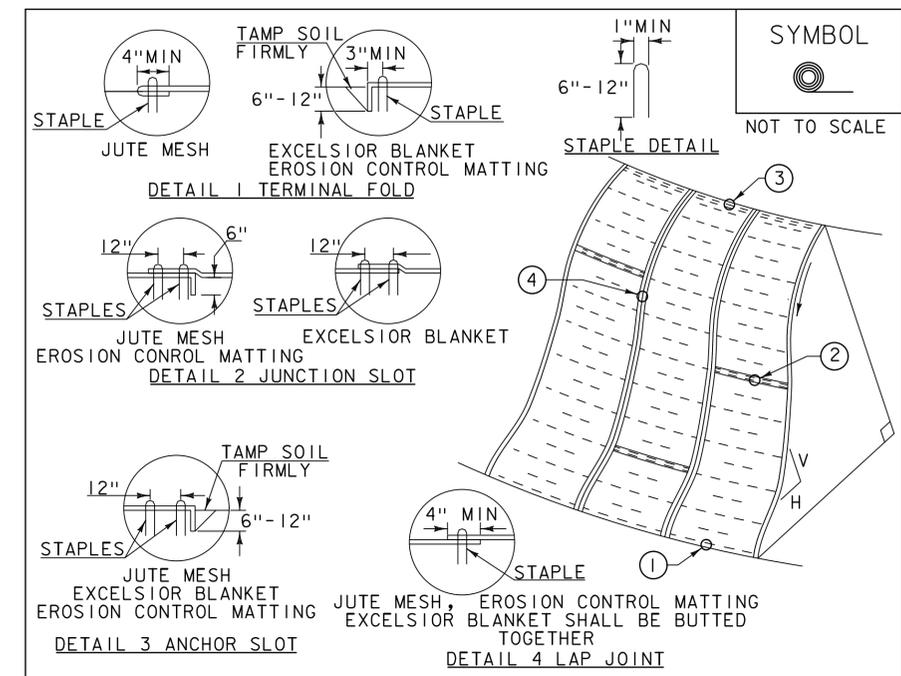
- CONSTRUCTION SPECIFICATIONS**
- LAY ONE BLOCK ON EACH SIDE OF THE STRUCTURE ON ITS SIDE FOR DEWATERING. FOUNDATION SHALL BE 2" MINIMUM BELOW REST OF INLET AND BLOCKS SHALL BE PLACED AGAINST INLET FOR SUPPORT.
  - HARDWARE CLOTH OR 1/2" WIRE MESH SHALL BE PLACED OVER BLOCK OPENINGS TO SUPPORT STONE.
  - USE CLEAN STONE OR GRAVEL 1/2"- 3/4" IN DIAMETER PLACED 2" BELOW TOP OF THE BLOCK ON A 2:1 SLOPE OR FLATTER.
  - FOR STONE STRUCTURES ONLY, A 1' THICK LAYER OF THE FILTER STONE WILL BE PLACED AGAINST THE 3" STONE AS SHOWN ON THE DRAWINGS.
  - MAXIMUM DRAINAGE AREA 1 ACRE

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

**STONE & BLOCK DROP INLET PROTECTION**

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 INLET PROTECTION DEVICE, TYPE I (PAY ITEM 653.40).

REVISIONS	
MARCH 6, 2008	WHF
JANUARY 13, 2009	WHF



- CONSTRUCTION SPECIFICATIONS**
- APPLY TO SLOPES GREATER THAN 3H: 1V OR WHERE NECESSARY TO AID IN ESTABLISHING VEGETATION.
  - APPLY FERTILIZER, LIME SEED PRIOR TO PLACING MATTING.
  - 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.
  - DISTURBED AREAS SHALL BE SMOOTHLY GRADED. EROSION CONTROL MATERIAL SHALL BE PLACED LOOSELY OVER GROUND SURFACE. DO NOT STRETCH.
  - ALL TERMINAL ENDS AND TRANSVERSE LAPS SHALL BE STAPLED AT APPROXIMATELY 12" INTERVALS.

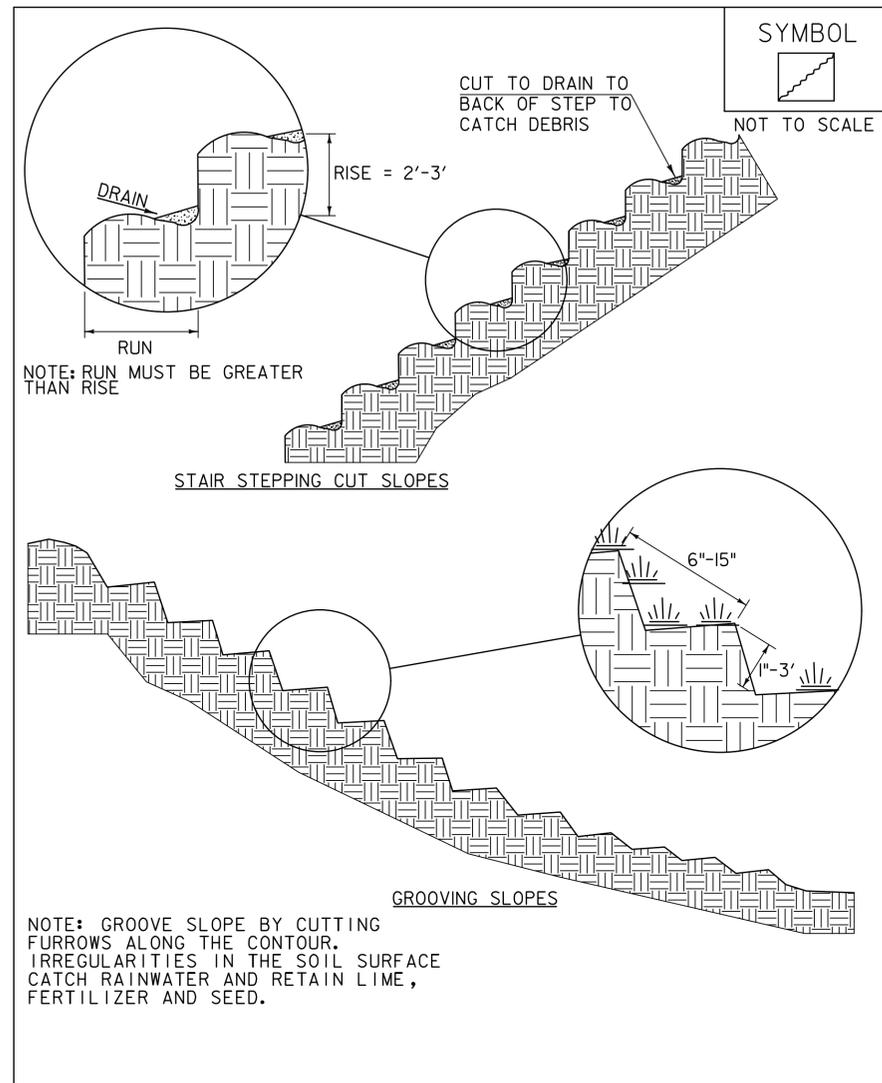
ADAPTED FROM DETAILS PROVIDED BY: NEW YORK STATE DEC  
 ORIGINALLY DEVELOPED BY USDA-NRCS  
 VERMONT DEPARTMENT OF ENVIRONMENTAL CONSERVATION

**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

<b>TYLIN INTERNATIONAL</b>	PROJECT NAME: PLYMOUTH	PLOT DATE: 9/20/2012
	PROJECT NUMBER: ER BRS 0149(5)	DRAWN BY: S. AMOROSO
FILE NAME: zllc330bdr_ero.dgn	DESIGNED BY: S. AMOROSO	CHECKED BY: D. BRYANT
EPSC DETAILS 2		SHEET 40 OF 46



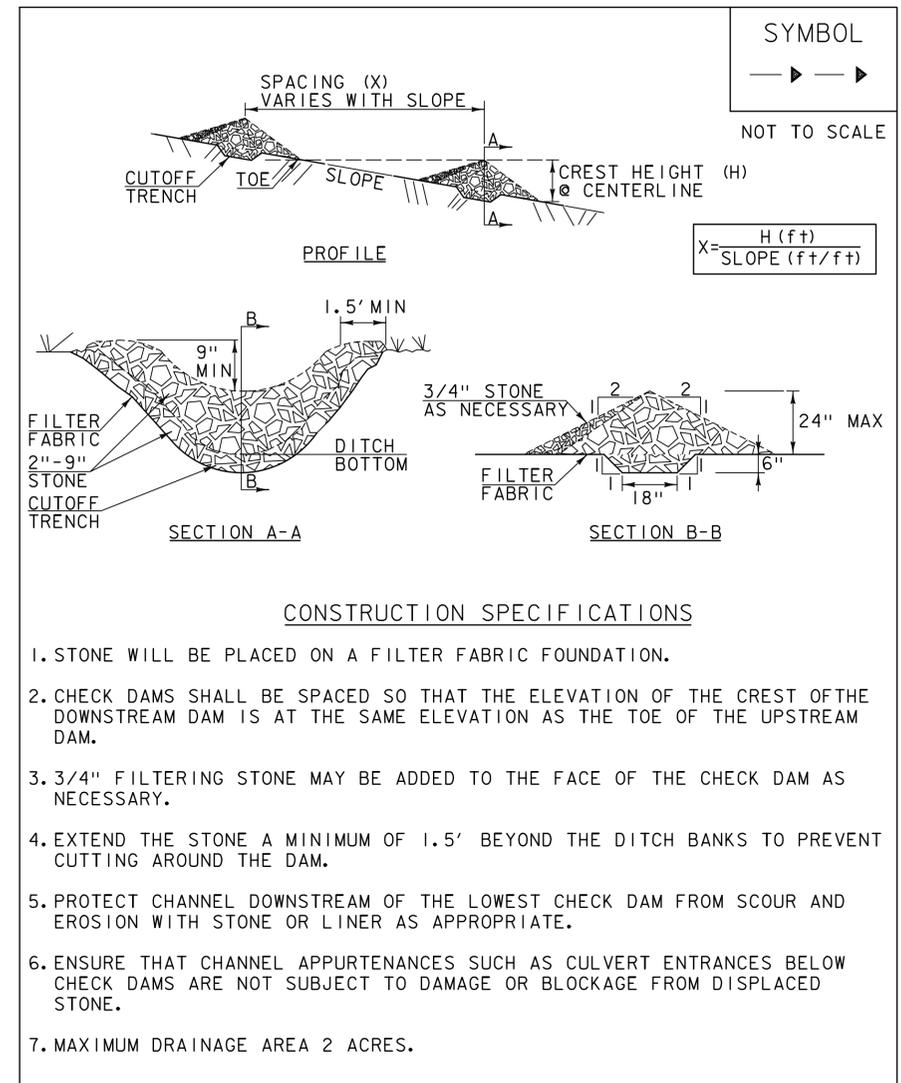
ADAPTED FROM DETAILS PROVIDED BY: NEW YORK STATE DEC  
 ORIGINALLY DEVELOPED BY USDA-NRCS  
 VERMONT DEPARTMENT OF ENVIRONMENTAL CONSERVATION

**SURFACE ROUGHENING**

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 CONSIDERED INCIDENTAL TO THE CONTRACT

REVISIONS	
APRIL 1, 2008	WHF
JANUARY 13, 2009	WHF



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)

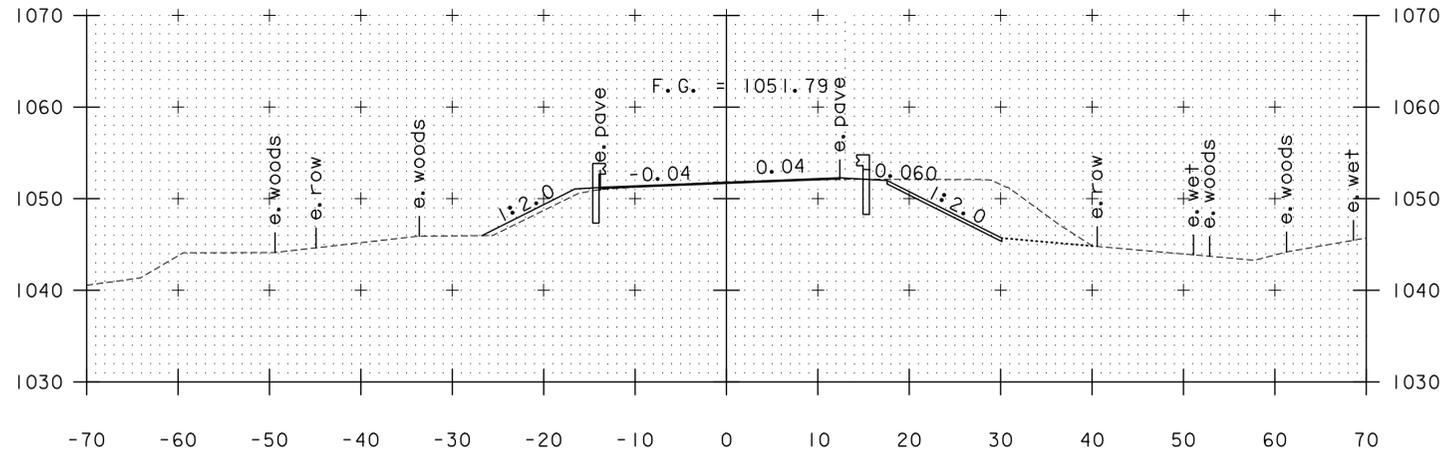
REVISIONS	
MARCH 21, 2008	WHF
JANUARY 8, 2009	WHF

**TYLIN INTERNATIONAL**

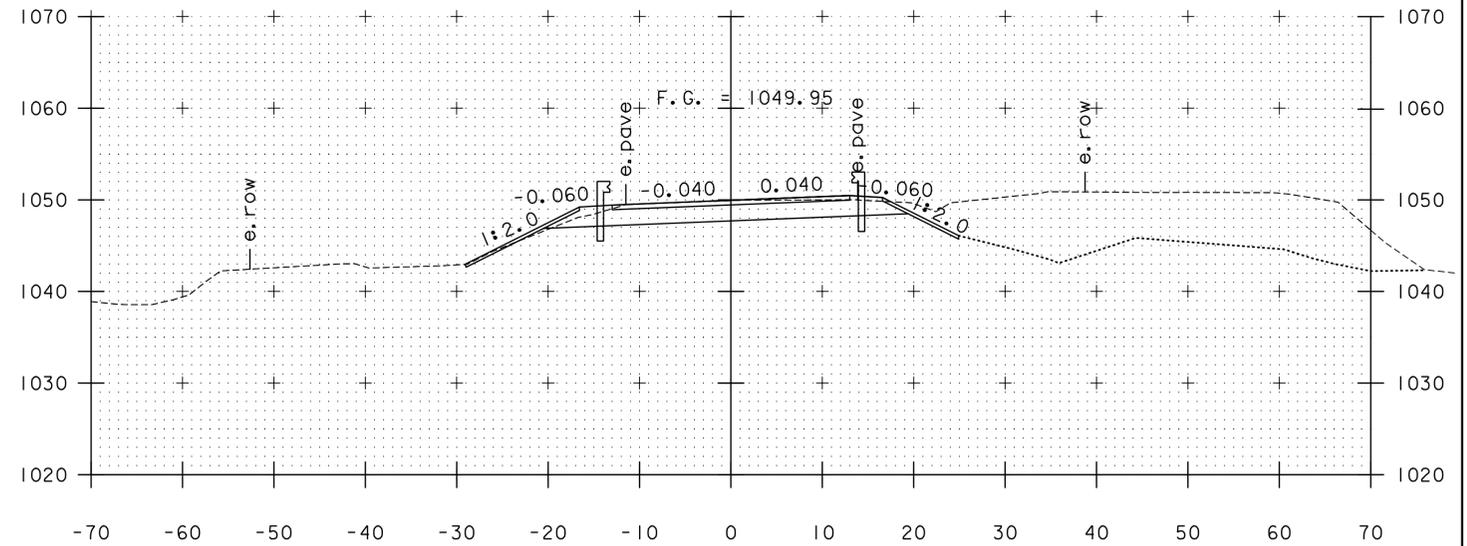
PROJECT NAME: PLYMOUTH  
 PROJECT NUMBER: ER BRS 0149(5)

FILE NAME: zllc330bdr\_ero.dgn  
 PROJECT LEADER: J. OLUND  
 DESIGNED BY: S. AMOROSO  
 EPSC DETAILS 3

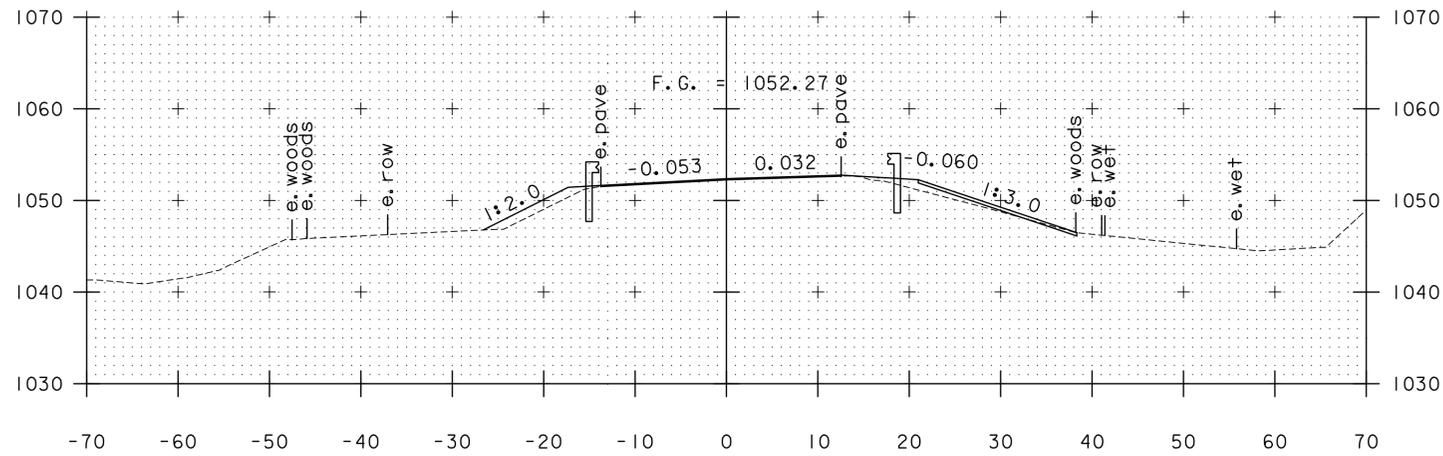
PLOT DATE: 9/20/2012  
 DRAWN BY: S. AMOROSO  
 CHECKED BY: D. BRYANT  
 SHEET 41 OF 46



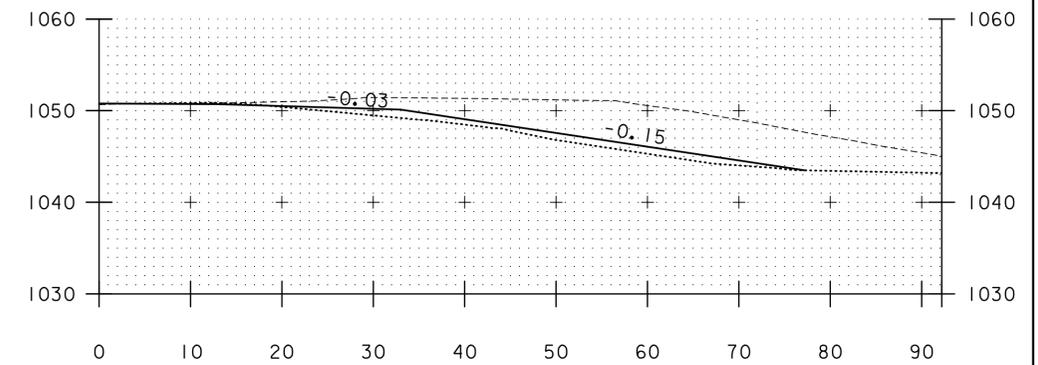
201+00



202+00

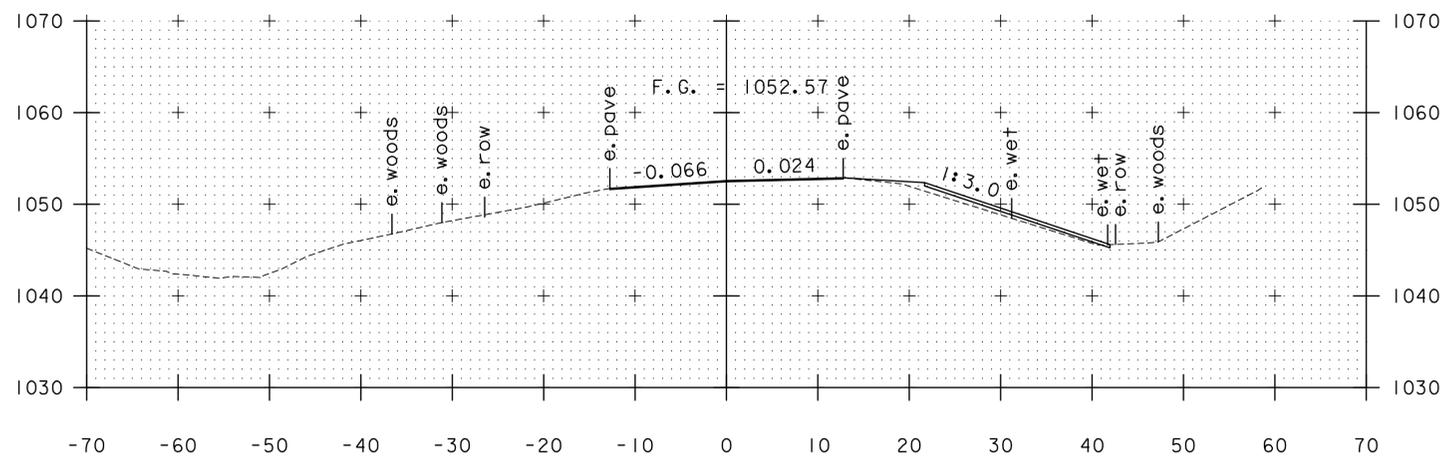


200+50

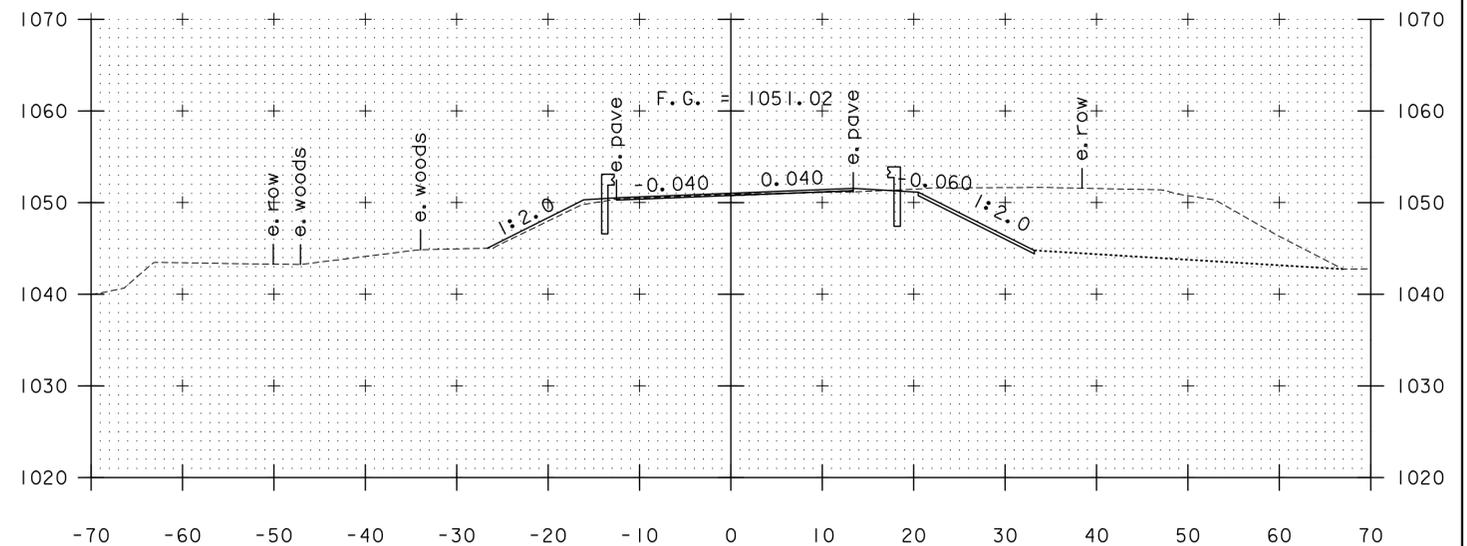


SKewed DRIVE 201+63

VT100A  
STA. 201+60.00  
END APPROACH  
BEGIN PROJECT



200+00



201+50

VT100A  
STA. 200+00.00  
MATCH EXISTING PAVEMENT  
BEGIN APPROACH

PROPOSED GROUND ELEVATIONS SHOWN WITH A SHORT DASH (-----) APPROXIMATE THE GROUND SURFACE PRIOR TO THE CONSTRUCTION OF THE TEMPORARY DETOUR. FINAL GRADING WITHIN THESE AREAS SHALL BE DETERMINED BY THE RESIDENT ENGINEER.

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

STA. 200+00 TO STA. 202+00

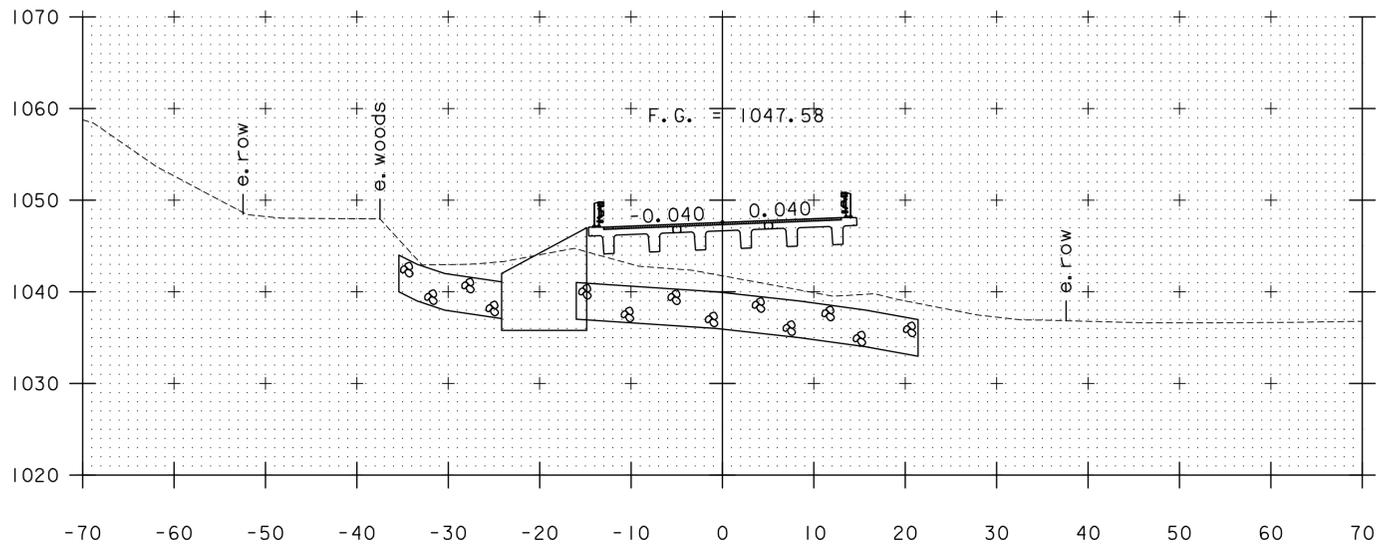
TYLINTERNATIONAL

PROJECT NAME: PLYMOUTH  
PROJECT NUMBER: ER BRS 0149(5)

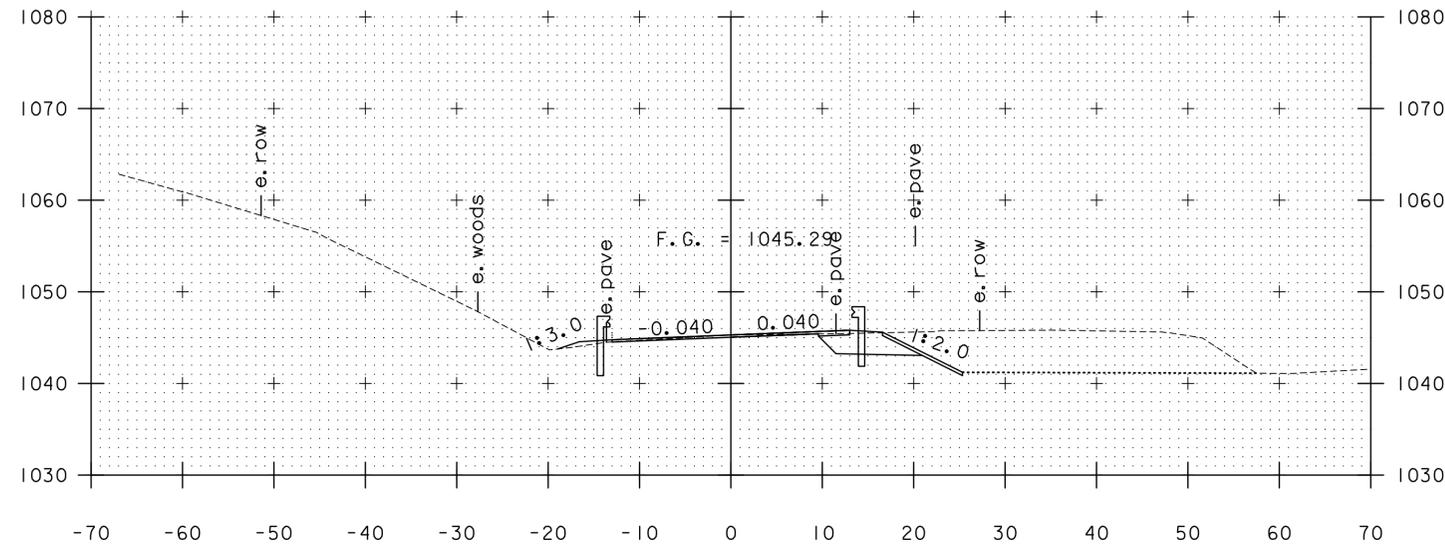
FILE NAME: zllc330xs.dgn  
PROJECT LEADER: J. OLUND  
DESIGNED BY: A. GREENLAW  
VT100A CROSS SECTION 1

PLOT DATE: 9/20/2012  
DRAWN BY: A. GREENLAW  
CHECKED BY: J. HOWE  
SHEET 42 OF 46

VT100A  
 STA. 203+08.42  
 END BRIDGE

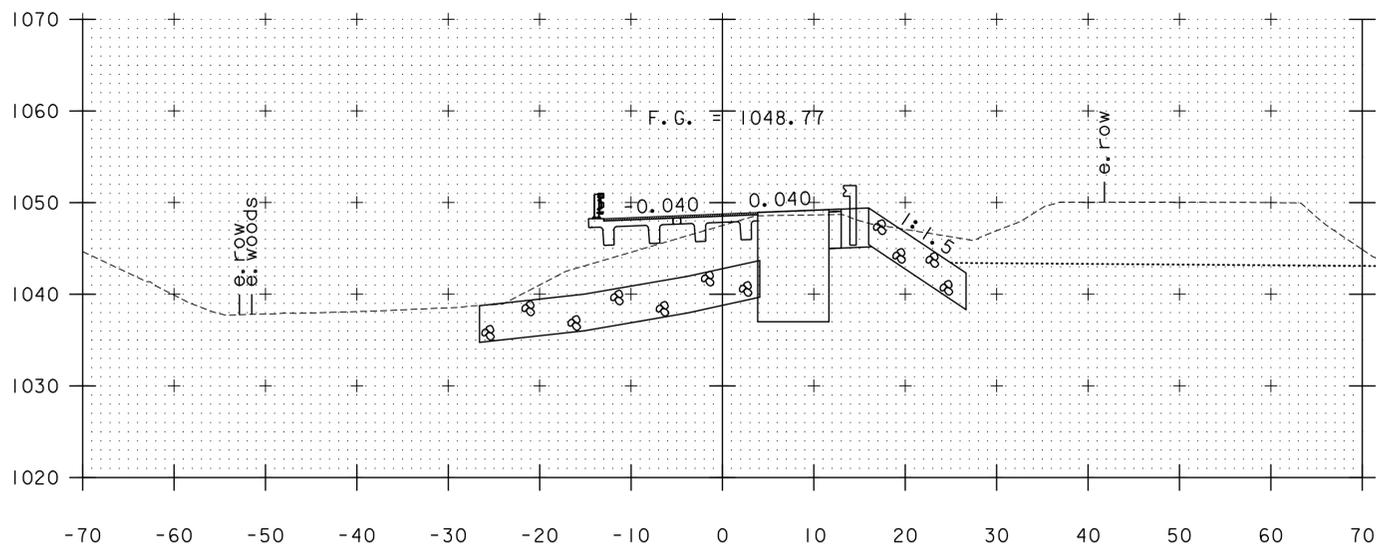


203+00



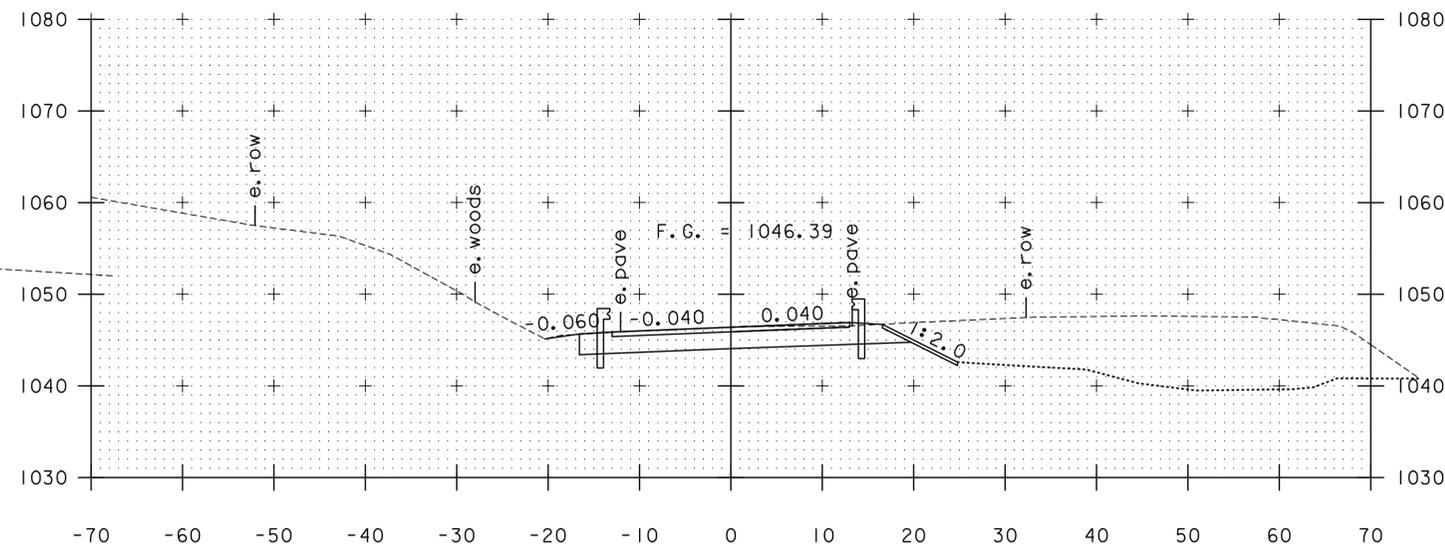
204+00

VT100A  
 STA. 203+90.00  
 END PROJECT  
 BEGIN APPROACH



202+50

VT100A  
 STA. 202+45.58  
 BEGIN BRIDGE



203+50

PROPOSED GROUND ELEVATIONS SHOWN WITH A SHORT DASH (-----) APPROXIMATE THE GROUND SURFACE PRIOR TO THE CONSTRUCTION OF THE TEMPORARY DETOUR. FINAL GRADING WITHIN THESE AREAS SHALL BE DETERMINED BY THE RESIDENT ENGINEER.

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

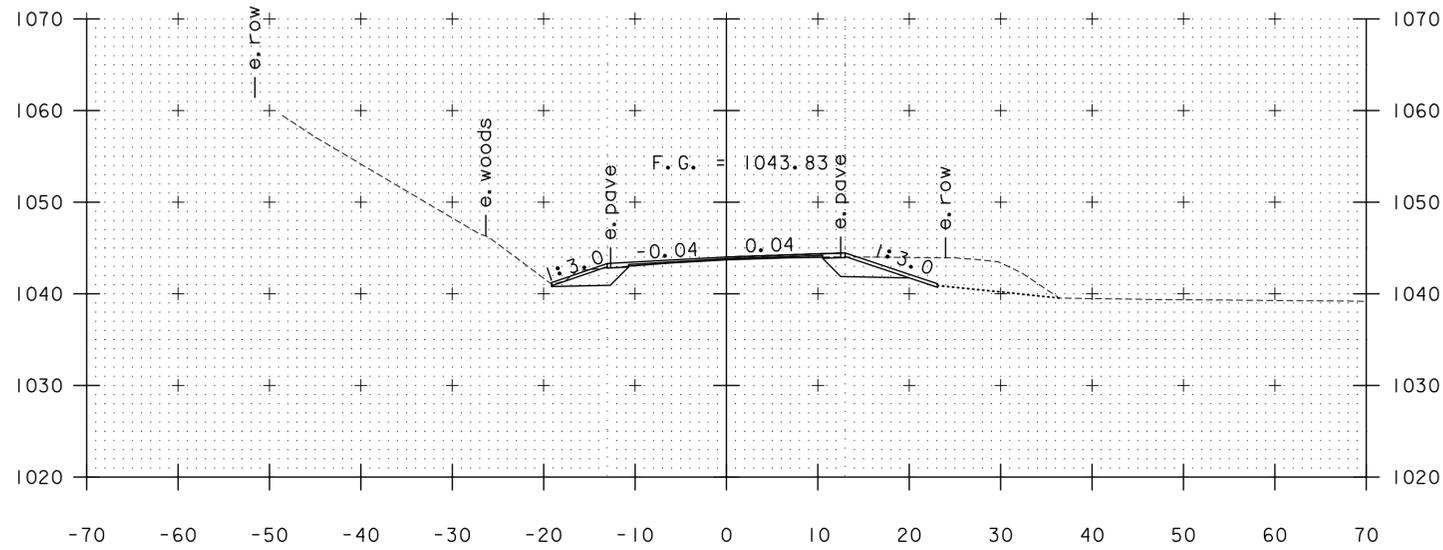
STA. 202+50 TO STA. 204+00

TYLIN INTERNATIONAL

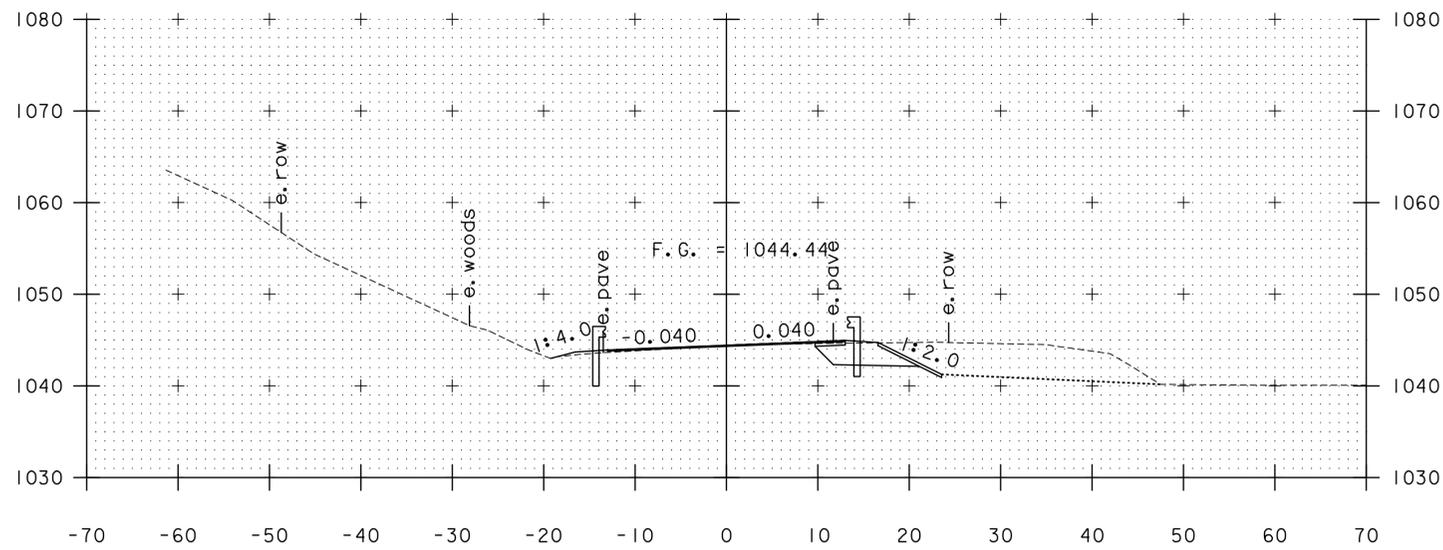
PROJECT NAME: PLYMOUTH  
 PROJECT NUMBER: ER BRS 0149(5)

FILE NAME: zllc330xs.dgn  
 PROJECT LEADER: J. OLUND  
 DESIGNED BY: A. GREENLAW  
 VT100A CROSS SECTION 2

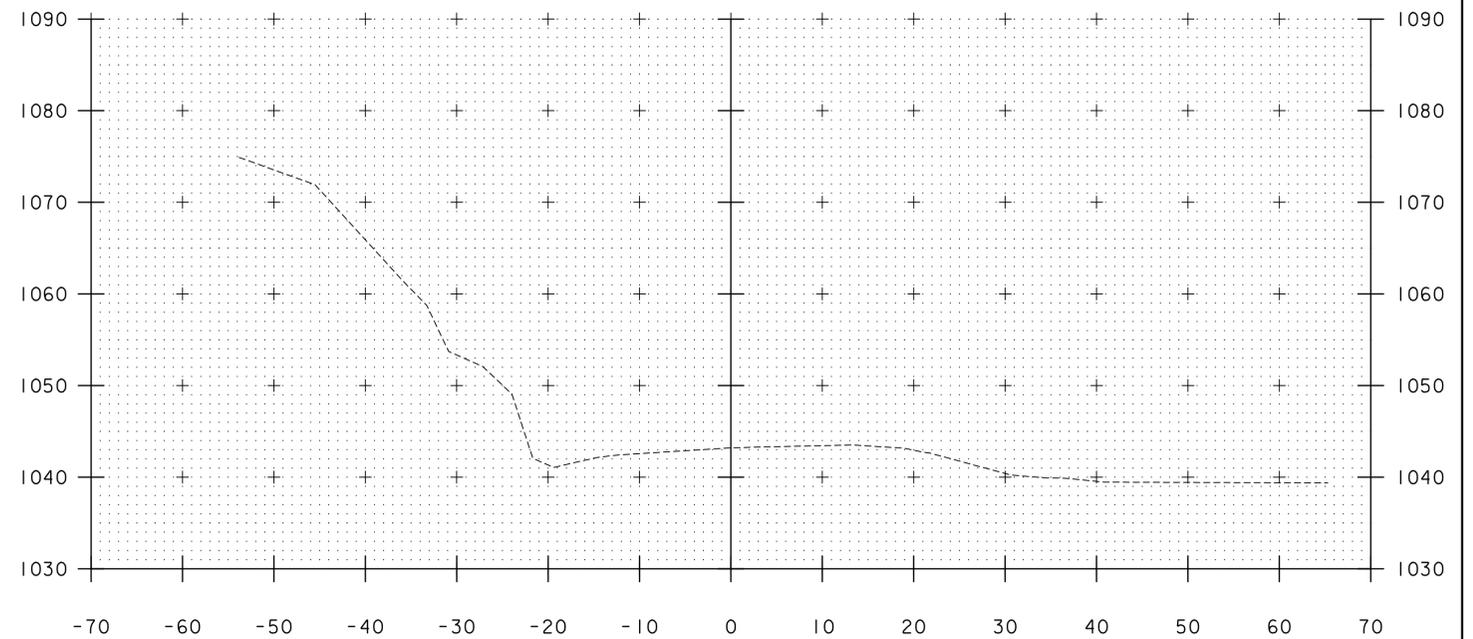
PLOT DATE: 9/20/2012  
 DRAWN BY: A. GREENLAW  
 CHECKED BY: J. HOWE  
 SHEET 43 OF 46



205+00

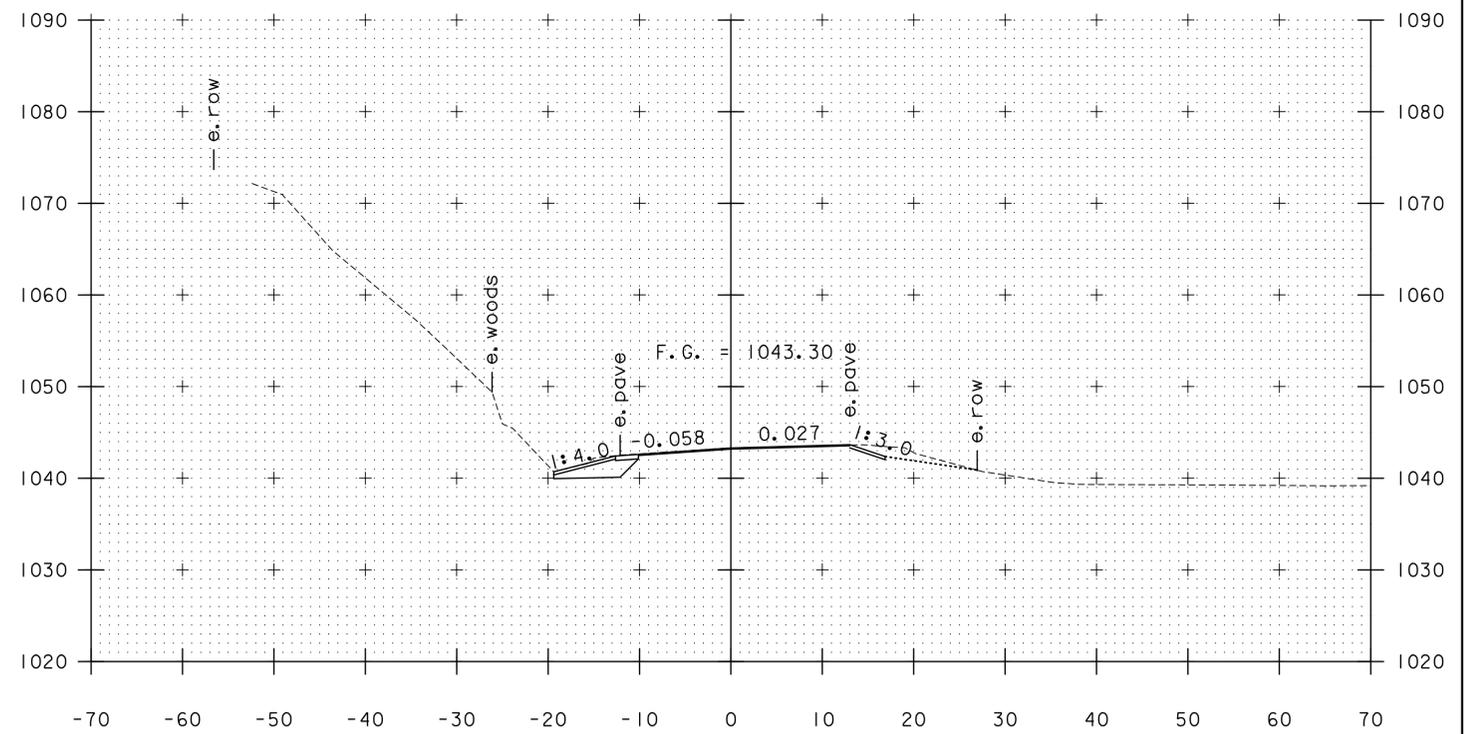


204+50



205+60

VT100A  
STA. 205+60.00  
MATCH EXISTING  
END APPROACH



205+50

PROPOSED GROUND ELEVATIONS SHOWN WITH A SHORT DASH (-----) APPROXIMATE THE GROUND SURFACE PRIOR TO THE CONSTRUCTION OF THE TEMPORARY DETOUR. FINAL GRADING WITHIN THESE AREAS SHALL BE DETERMINED BY THE RESIDENT ENGINEER.

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

STA. 204+50 TO STA. 205+60

TYLINTERNATIONAL

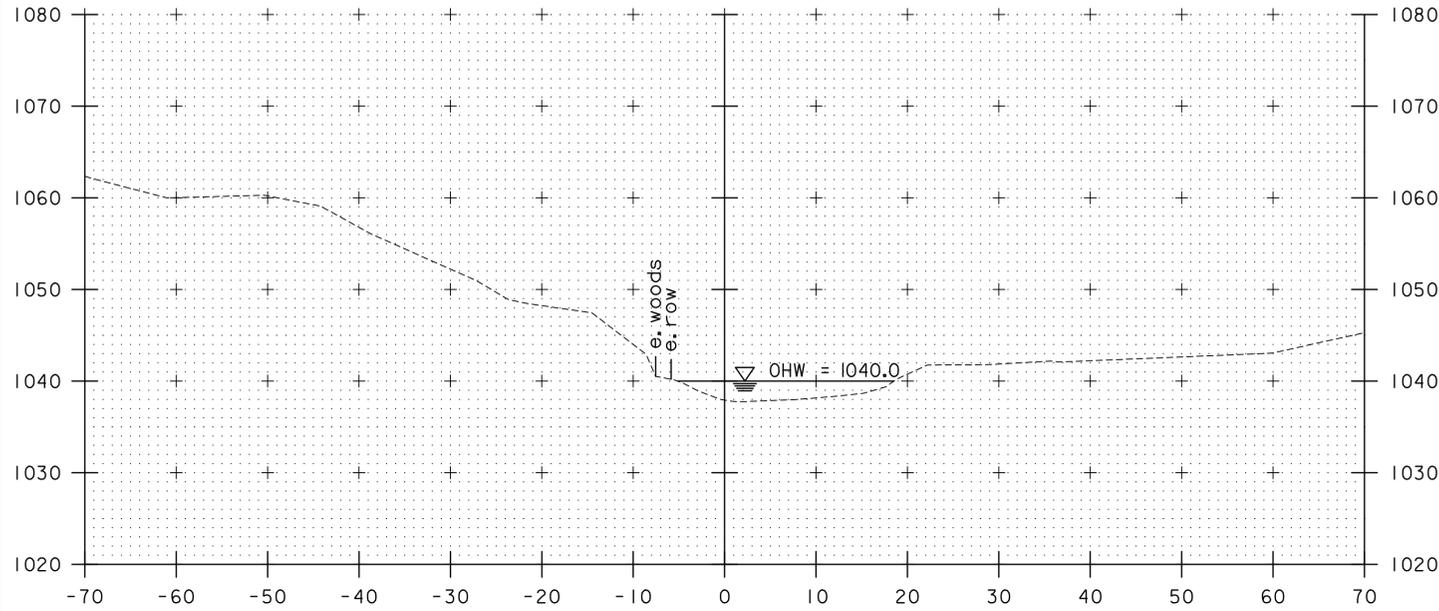
PROJECT NAME: PLYMOUTH  
PROJECT NUMBER: ER BRS 0149(5)

FILE NAME: zllc330xs.dgn  
PROJECT LEADER: J. OLUND  
DESIGNED BY: A. GREENLAW  
VT100A CROSS SECTION 3

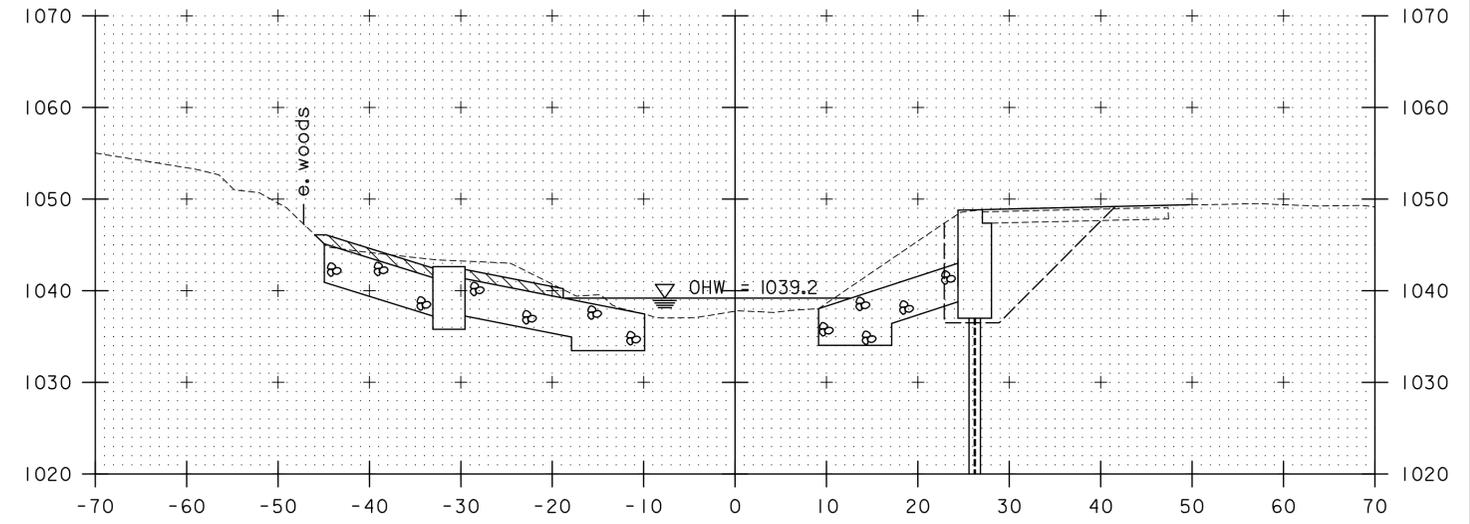
PLOT DATE: 9/20/2012  
DRAWN BY: A. GREENLAW  
CHECKED BY: J. HOWE  
SHEET 44 OF 46

STATION 100+40.50 LT.  
 BEGIN UNCLASSIFIED CHANNEL EXCAVATION  
 BEGIN STONE FILL, TYPE IV  
 BEGIN GEOTEXTILE UNDER STONE FILL  
 BEGIN GRUBBING MATERIAL

STATION 100+29.50 RT.  
 BEGIN UNCLASSIFIED CHANNEL EXCAVATION  
 BEGIN STONE FILL, TYPE IV  
 BEGIN GEOTEXTILE UNDER STONE FILL  
 BEGIN GRUBBING MATERIAL

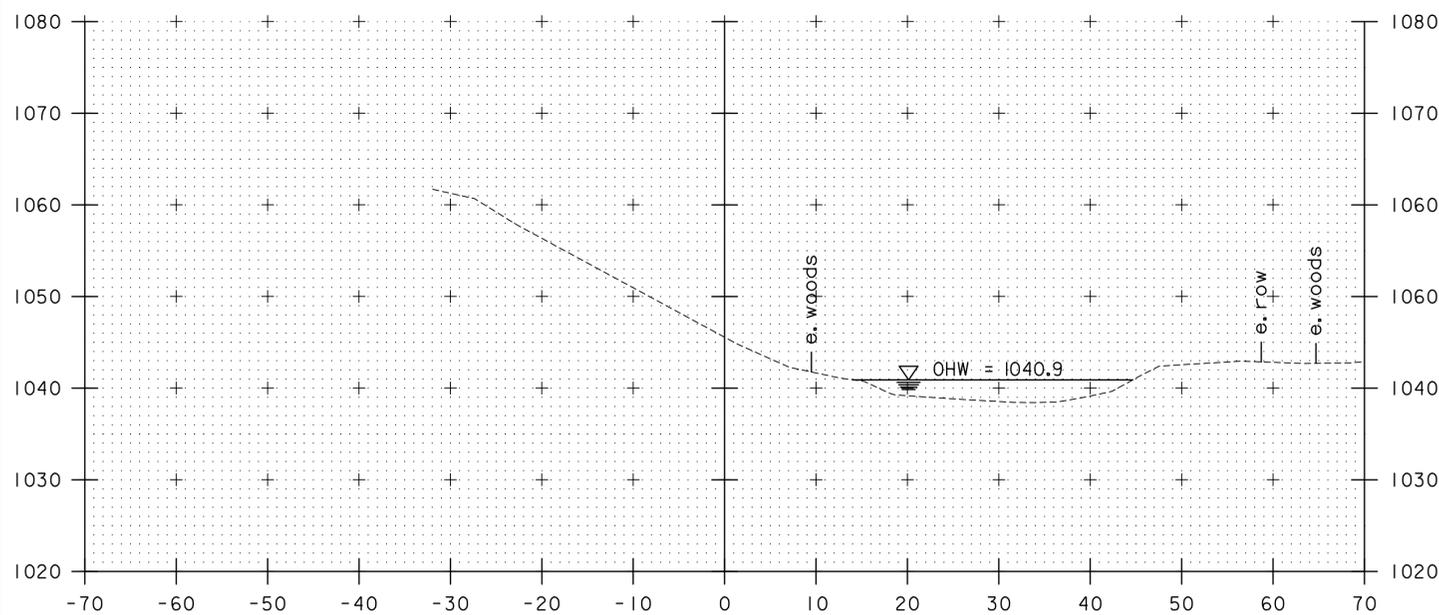


100+25

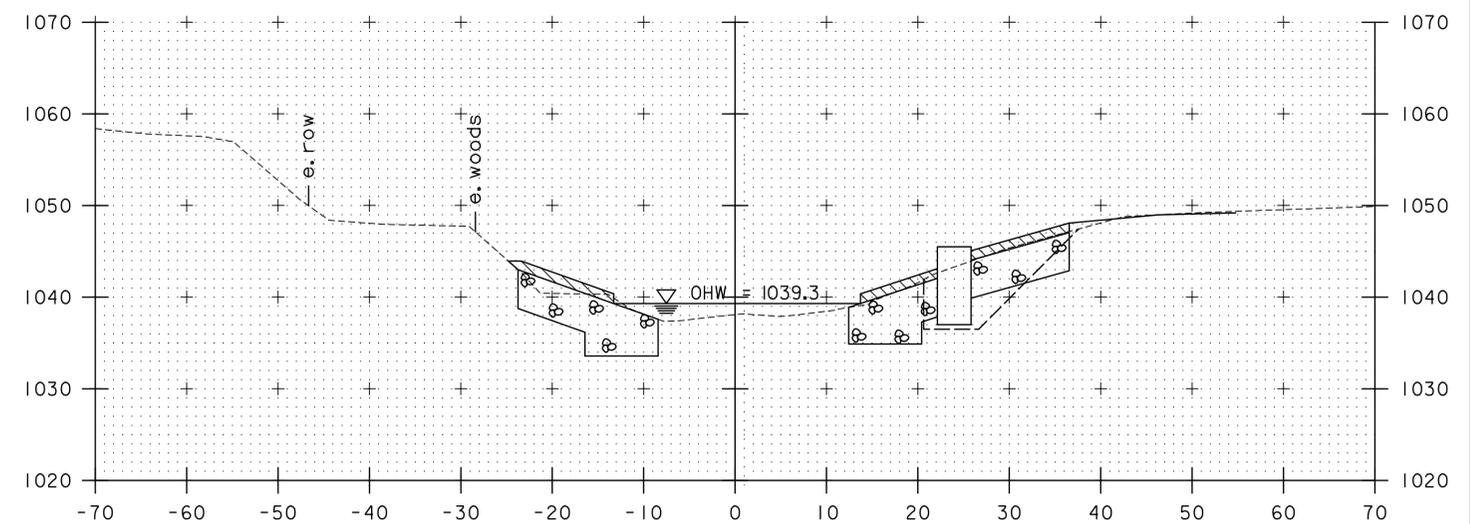


NO GRUBBING MATERIAL BENEATH SUPERSTRUCTURE

100+75



100+00

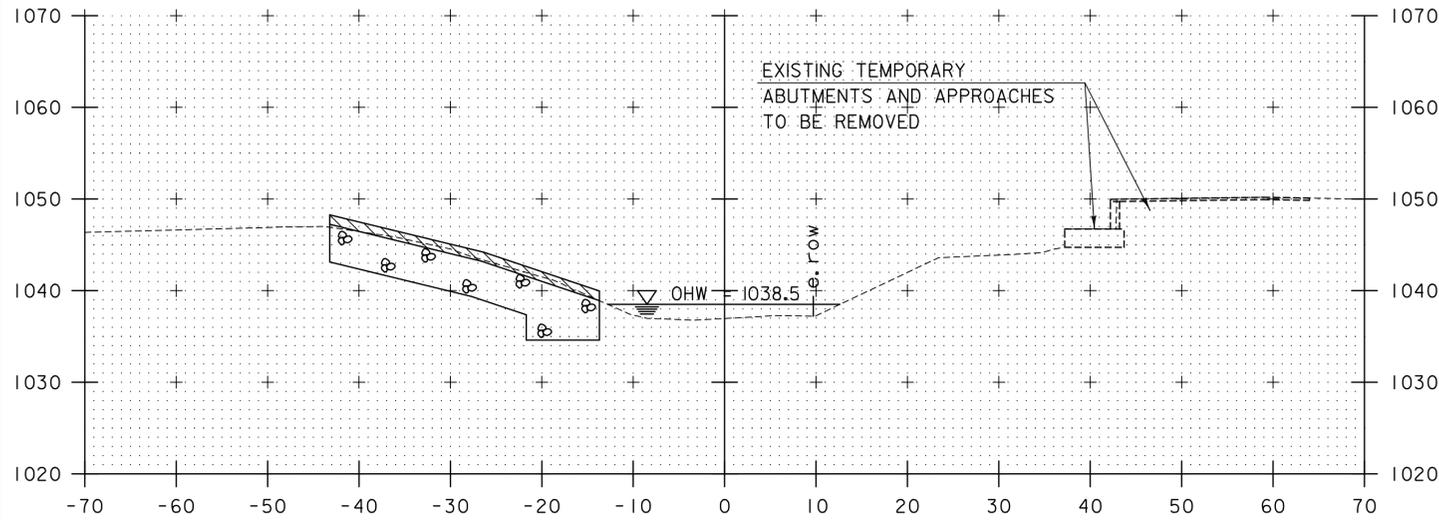


100+50



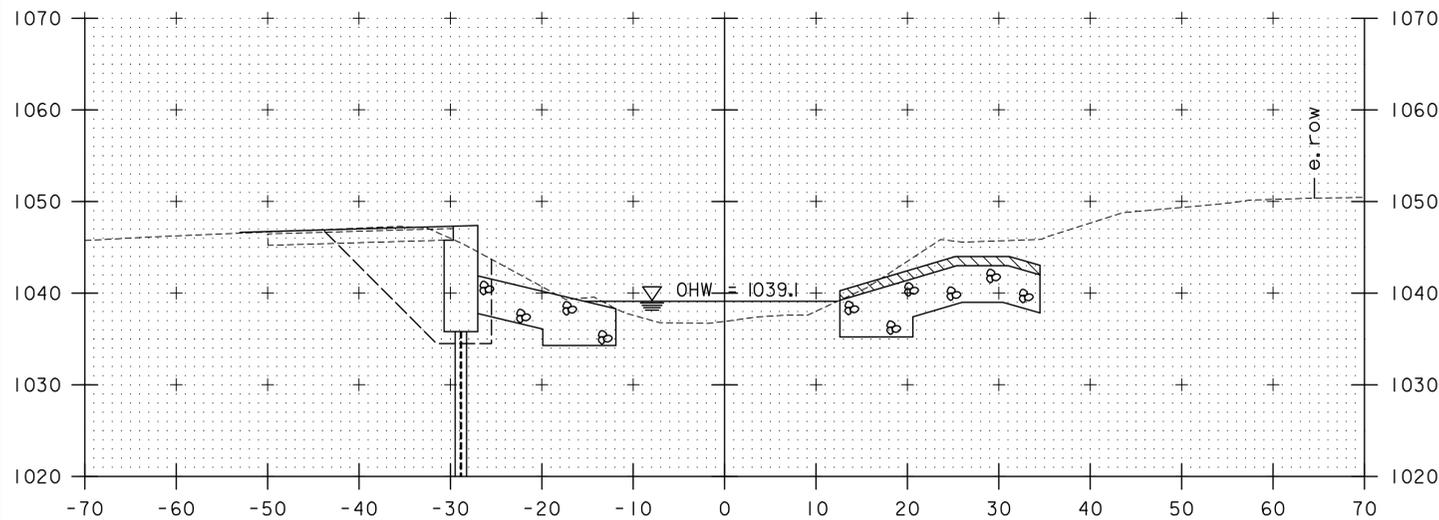
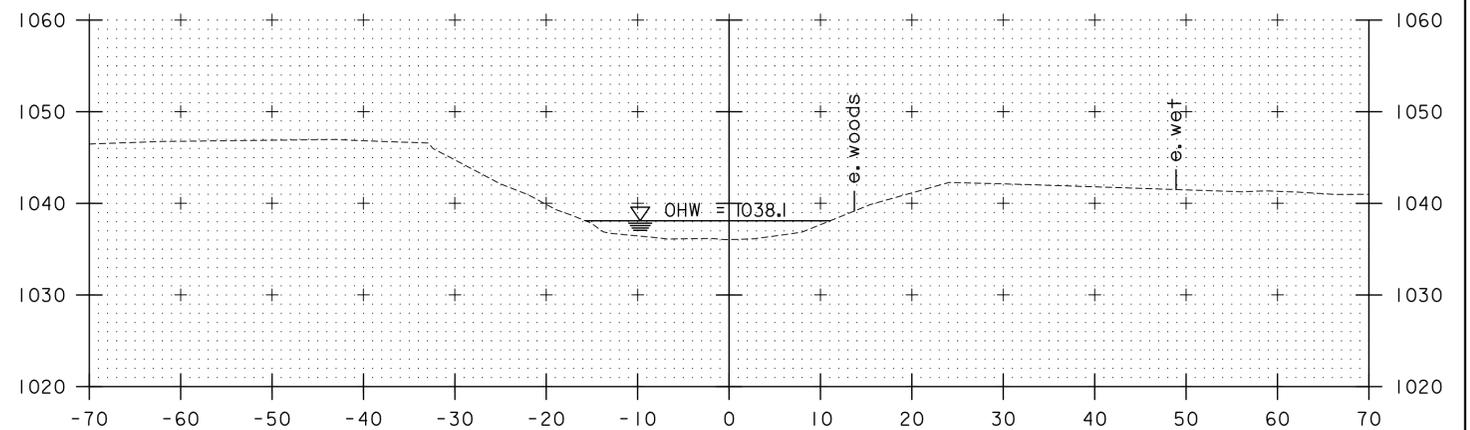
PROJECT NAME: PLYMOUTH	PLOT DATE: 9/20/2012
PROJECT NUMBER: ER BRS 0149(5)	DRAWN BY: S. MORGAN
FILE NAME: zllc330xs_ch.dgn	CHECKED BY: J. OLUND
PROJECT LEADER: J. OLUND	SHEET 45 OF 46
DESIGNED BY: A. GREENLAW	
CHANNEL SECTIONS 1	

STATION 101+34.50 LT.  
 END UNCLASSIFIED CHANNEL EXCAVATION  
 END STONE FILL, TYPE IV  
 END GEOTEXTILE UNDER STONE FILL  
 END GRUBBING MATERIAL



STATION 101+08.50 RT.  
 END UNCLASSIFIED CHANNEL EXCAVATION  
 END STONE FILL, TYPE IV  
 END GEOTEXTILE UNDER STONE FILL  
 END GRUBBING MATERIAL

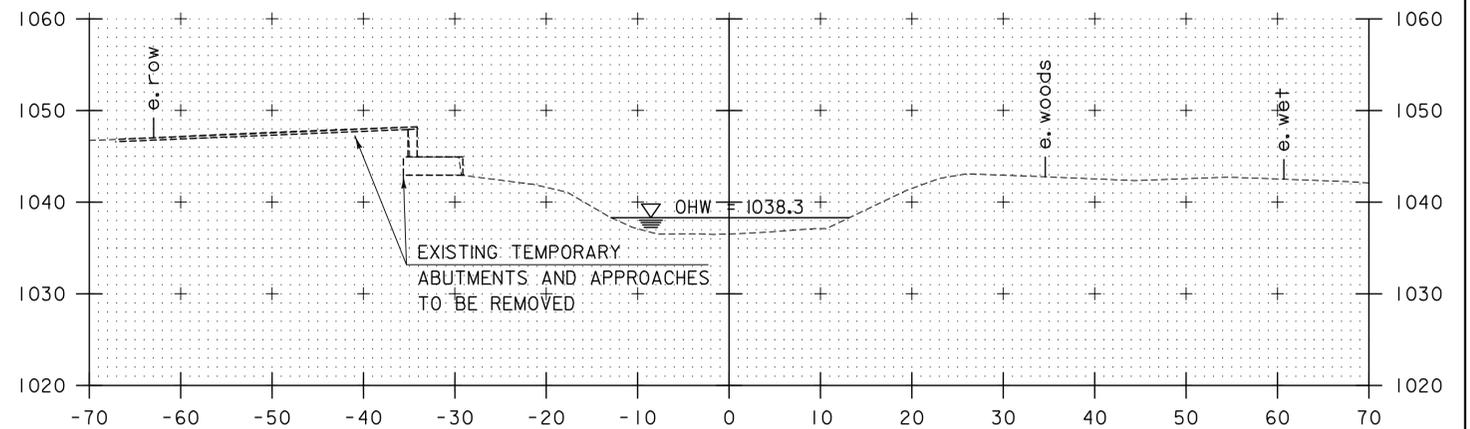
101+25



NO GRUBBING MATERIAL BENEATH SUPERSTRUCTURE

101+00

101+75



101+50

PROJECT NAME: PLYMOUTH  
 PROJECT NUMBER: ER BRS 0149(5)

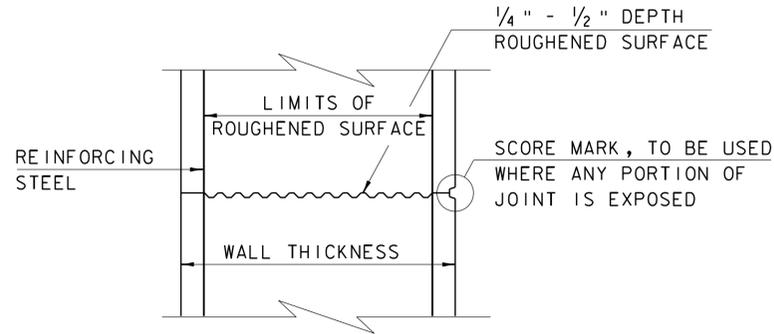
**TYL**INTERNATIONAL

FILE NAME: zllc330xs\_ch.dgn  
 PROJECT LEADER: J. OLUND  
 DESIGNED BY: A. GREENLAW  
 CHANNEL SECTIONS 2

PLOT DATE: 9/20/2012  
 DRAWN BY: S. MORGAN  
 CHECKED BY: J. OLUND  
 SHEET 46 OF 46

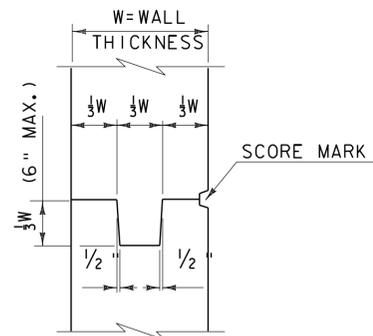
**CONCRETE GENERAL NOTES**

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

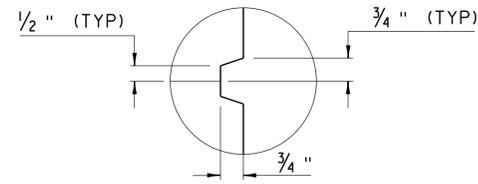


**TYPICAL HORIZONTAL CONSTRUCTION JOINT**  
(NOT TO SCALE)

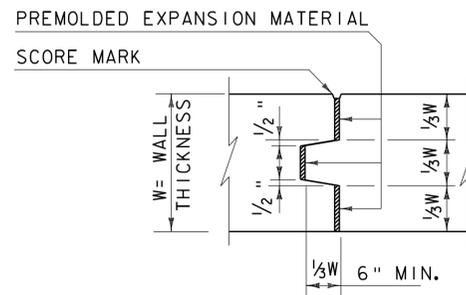
- THE SURFACE OF THE CONCRETE CONSTRUCTION JOINTS SHALL BE CLEANED AND FREE OF LAITANCE.
- IMMEDIATELY BEFORE NEW CONCRETE IS PLACED, ALL CONSTRUCTION JOINTS SHALL BE WETTED AND STANDING WATER REMOVED.



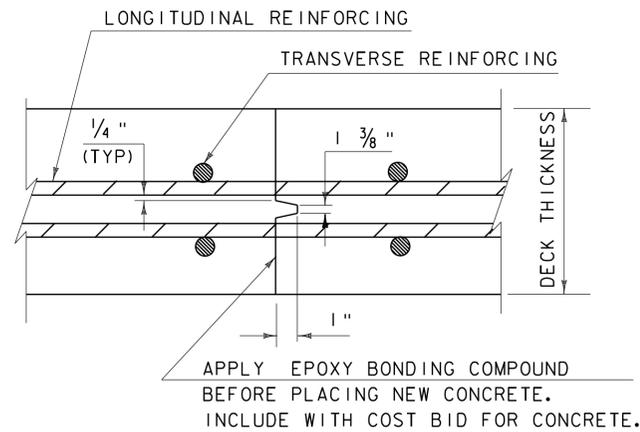
**TYPICAL CONCRETE CONSTRUCTION JOINT**  
(NOT TO SCALE)



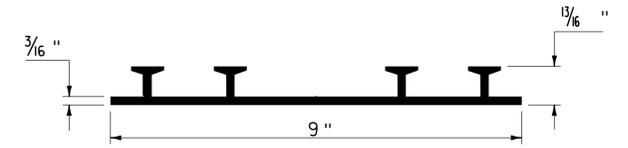
**SCORE MARK DETAIL**  
(NOT TO SCALE)



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



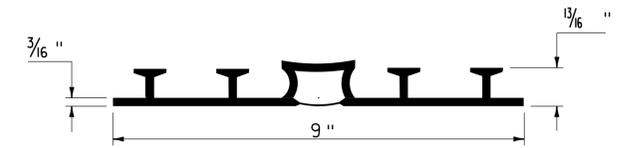
**TRANSVERSE BRIDGE SLAB CONSTRUCTION JOINT DETAILS**  
(NOT TO SCALE)



**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.

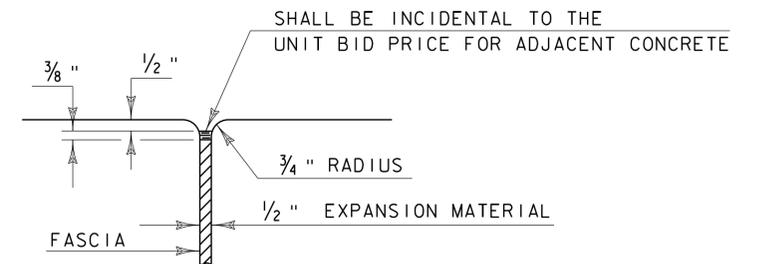
OTHER CONFIGURATIONS OF WATERSTOP MAY BE USED UPON APPROVAL OF THE ENGINEER.



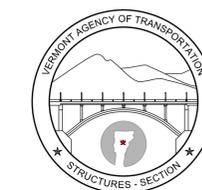
**P.V.C. WATERSTOP FOR EXPANSION JOINTS**  
(NOT TO SCALE)

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)



**STRUCTURES  
DETAIL  
SD-5 01.00**

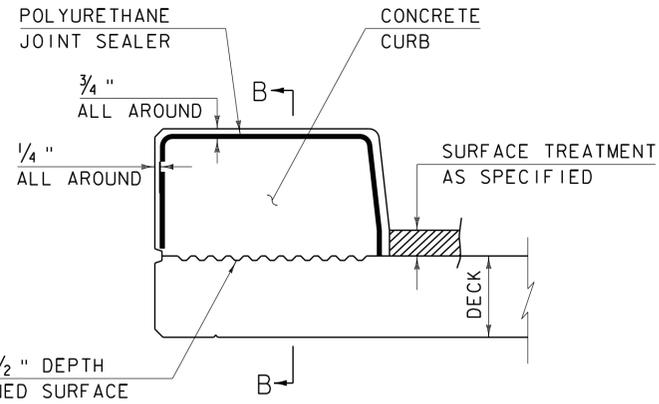
REVISIONS	
MAY 7, 2010	APPROVED FOR USE BY VAOT STRUCTURES SECTION

**CONCRETE  
DETAILS AND NOTES**

POLYURETHANE JOINT SEALER MEETING THE REQUIREMENTS OF SECTION 524. COLOR TO MATCH CONCRETE. PAYMENT TO BE INCIDENTAL TO THE BRIDGE CURB CONCRETE ITEM

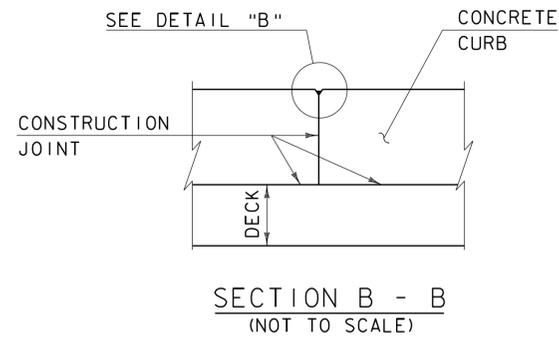
ADHERE TO THESE SURFACES

DETAIL "B"  
(NOT TO SCALE)

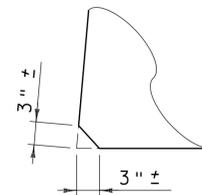


CONCRETE CURB JOINT SECTION  
(NOT TO SCALE)

1. SEE TYPICAL HORIZONTAL CONSTRUCTION JOINT DETAIL FOR ADDITIONAL INFORMATION



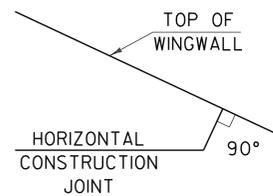
SECTION B - B  
(NOT TO SCALE)



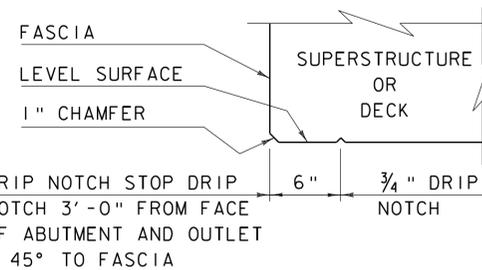
ACUTE ANGLE  
CLIP DETAIL  
(NOT TO SCALE)

CONCRETE CURB JOINT NOTES

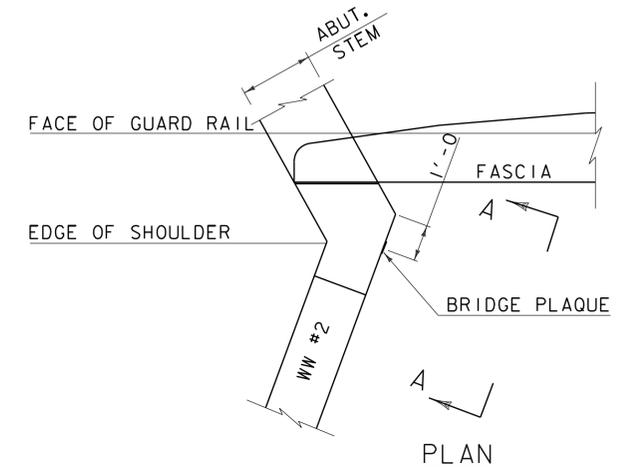
1. CONCRETE CURBS MAY BE PLACED IN ONE CONTINUOUS OPERATION IF AN APPROVED SHRINKAGE REDUCING ADMIXTURE LISTED IN THE SPECIAL PROVISIONS IS USED WITH THE CONCRETE MIX DESIGN. PAYMENT FOR THE SHRINKAGE REDUCING ADMIXTURE WILL BE INCIDENTAL TO THE BRIDGE CURB CONCRETE ITEM.
2. IF THE CONTRACTOR CHOOSES 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.



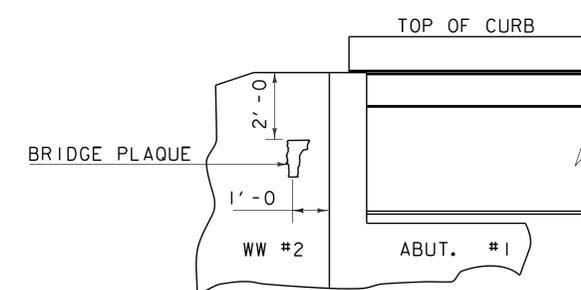
HORIZONTAL WINGWALL  
CONSTRUCTION JOINT  
(NOT TO SCALE)



DRIP NOTCH DETAIL  
(NOT TO SCALE)



PLAN



VIEW "A - A"

BRIDGE PLAQUE  
(NOT TO SCALE)

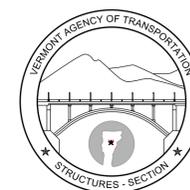
THE BRIDGE PLAQUE WILL BE SUPPLIED BY THE AGENCY OF TRANSPORTATION AND SHALL BE INSTALLED BY THE CONTRACTOR AT ABUTMENT #1 ON THE RIGHT SIDE AS SHOWN OR AS DIRECTED BY THE ENGINEER.

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

CONCRETE  
DETAILS AND NOTES



STRUCTURES  
DETAIL  
SD-5 02.00

ASPHALTIC PLUG JOINT NOTES

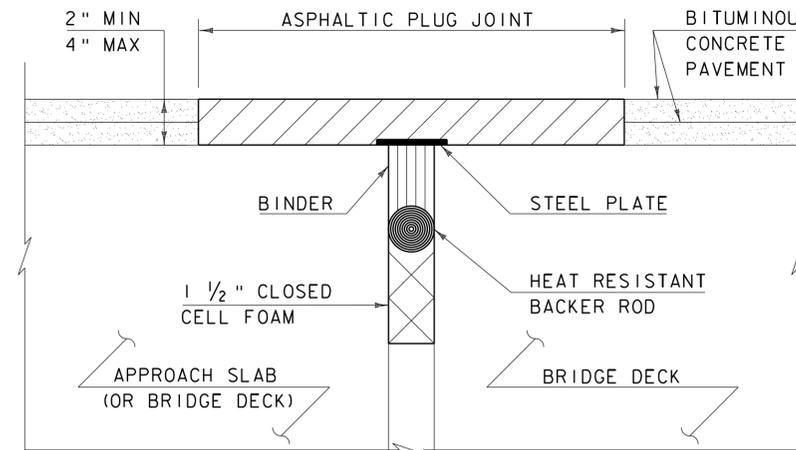
INSTALLATION:

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) +/-.

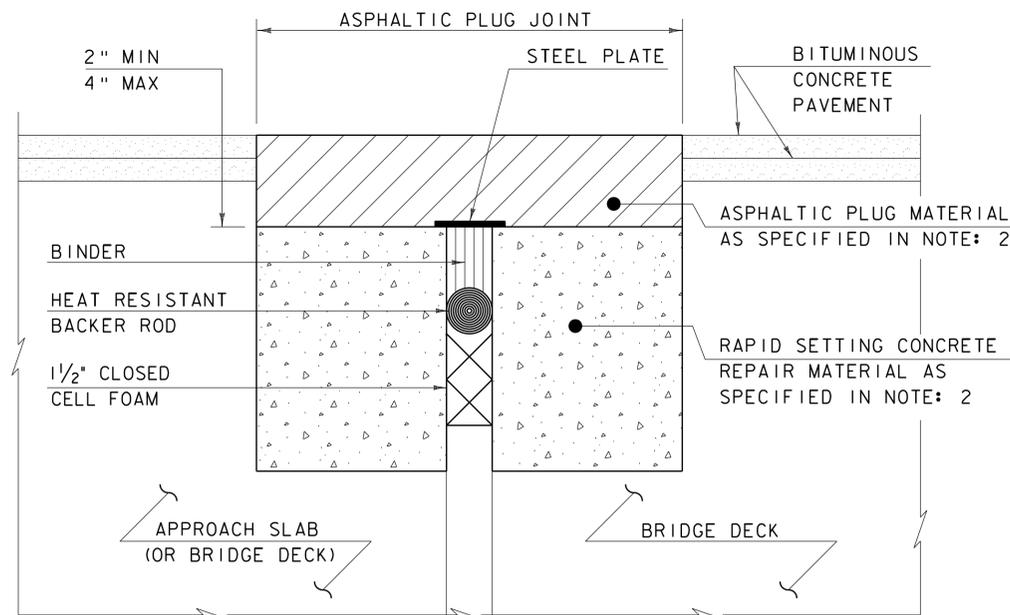
WEATHER LIMITATIONS

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-TYPE JOINT DETAIL - NEW  
(NOT TO SCALE)



ASPHALTIC PLUG-TYPE JOINT DETAIL - REHAB

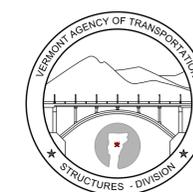
NOTES: (NOT TO SCALE)

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.

REVISIONS

MAY 7, 2010 APPROVED FOR USE BY VAOT STRUCTURES SECTION

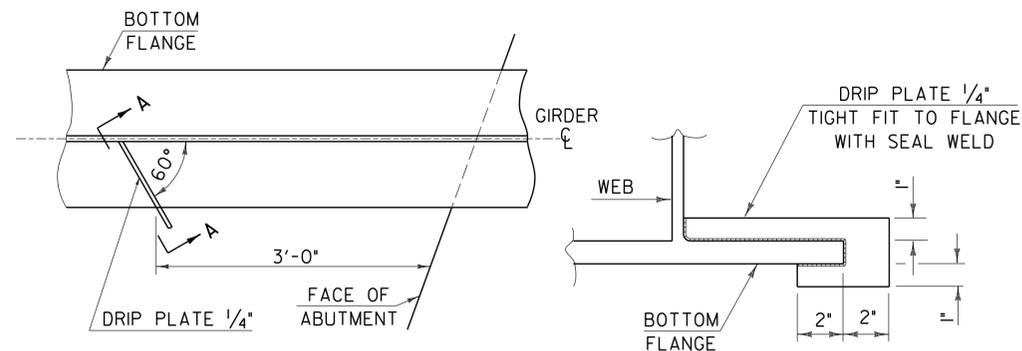
BRIDGE JOINT  
ASPHALTIC PLUG



STRUCTURES  
DETAIL  
SD-516.10

STRUCTURAL STEEL GENERAL NOTES:

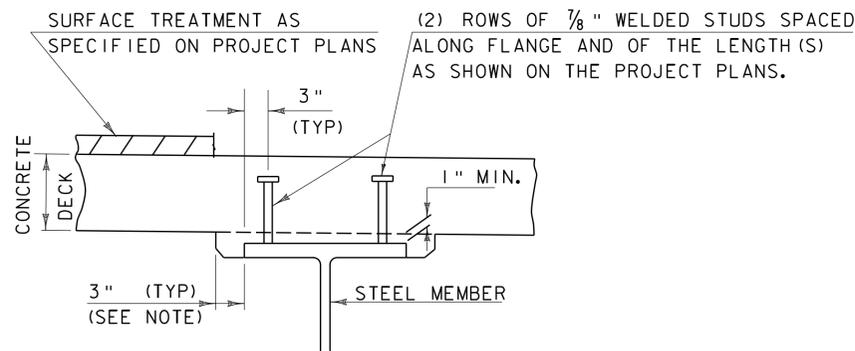
1. ALL FIELD CONNECTIONS SHALL BE MADE WITH 7/8" DIAMETER HIGH-STRENGTH BOLTS IN 15/16" DIAMETER HOLES, PER SUBSECTION 506.I9, UNLESS OTHERWISE SPECIFIED.
2. ALL HOLES IN THE WEBS OF THE FASCIA GIRDERS THAT ARE NOT OTHERWISE FILLED, SHALL BE FILLED WITH EITHER BUTTON HEAD OR HEX HEAD BOLTS. THESE BOLTS 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

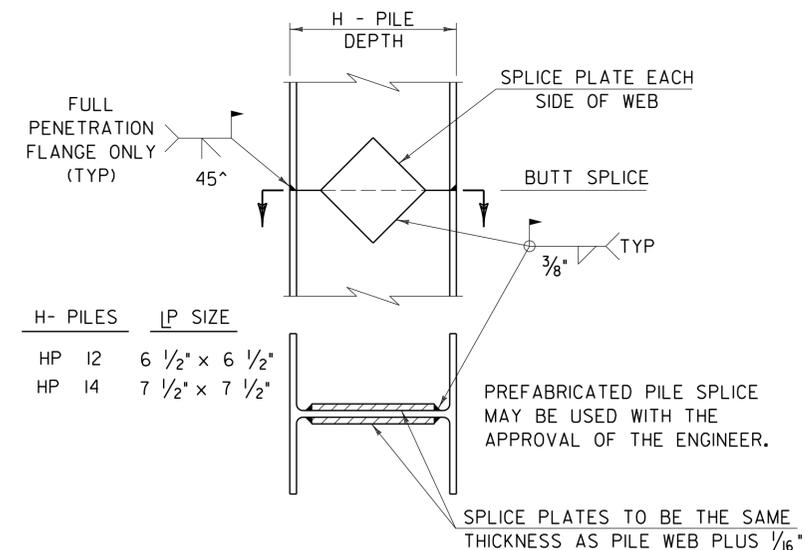
SECTION A - A

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

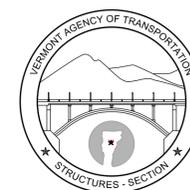


DETAIL OF PILE SPLICE

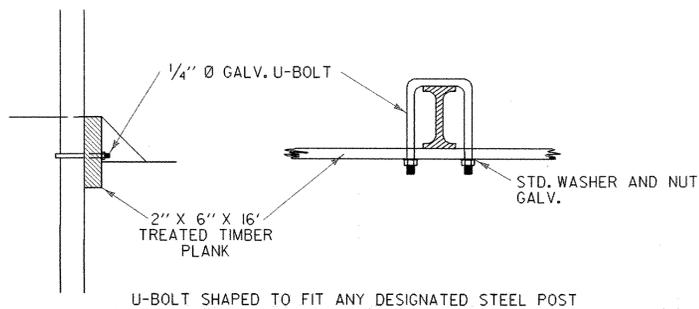
DETAILS ON THIS SHEET ARE "NOT TO SCALE" UNLESS NOTED OTHERWISE.

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

**STRUCTURAL STEEL  
 DETAILS & NOTES**

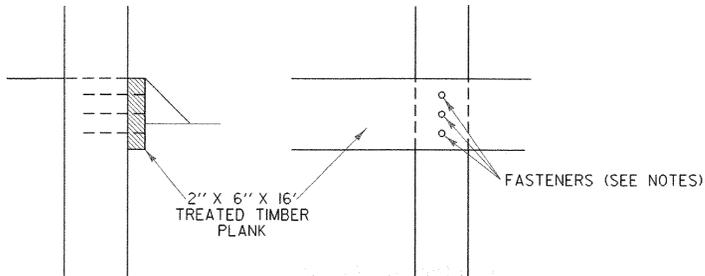


**STRUCTURES  
 DETAIL  
 SD-6 01.00**

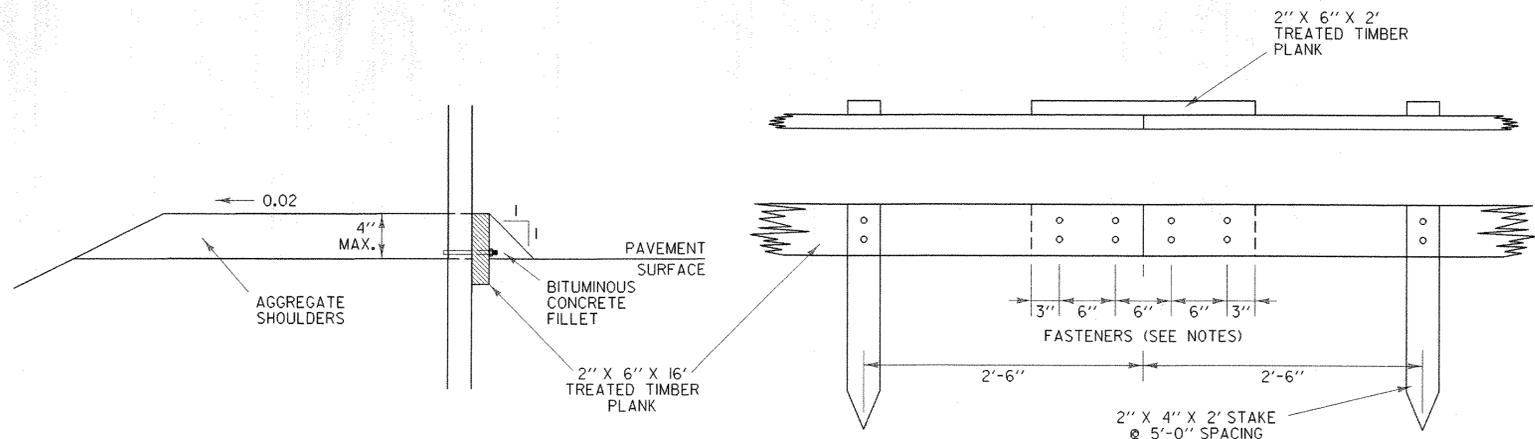


U-BOLT SHAPED TO FIT ANY DESIGNATED STEEL POST

WITH STEEL POSTS



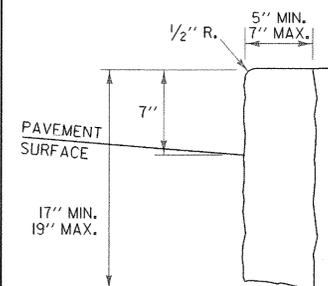
WITH WOOD POSTS (EXISTING CONDITION)



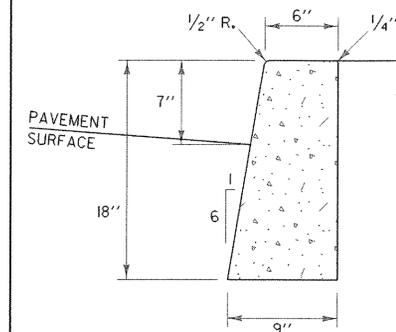
BITUMINOUS CONCRETE FILLET DETAIL

TREATED TIMBER CURB

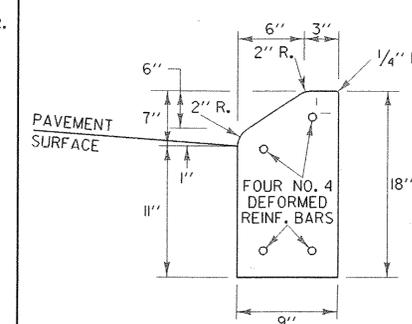
SPLICE DETAIL



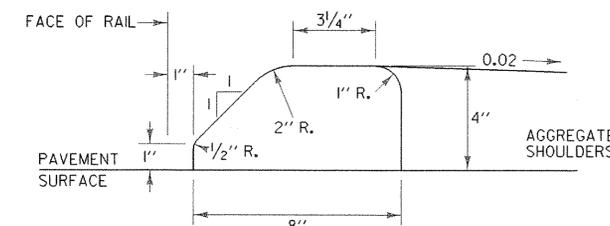
VERTICAL GRANITE CURB



CAST IN PLACE CONCRETE CURB, TYPE B

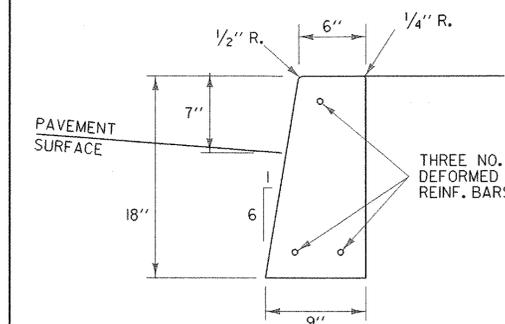


PRECAST REINFORCED CONCRETE CURB, TYPE A

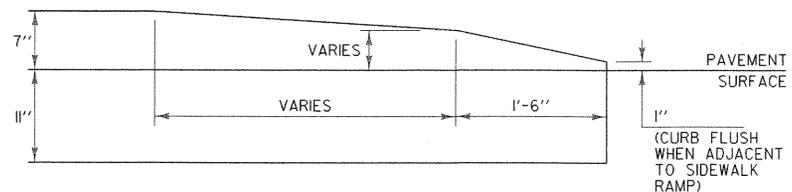


USE ONLY WITH STEEL BEAM GUARDRAIL

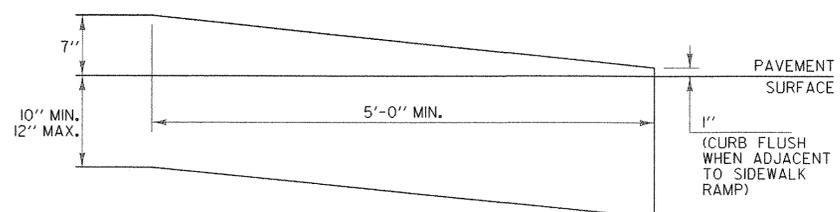
BITUMINOUS CONCRETE CURB, TYPE A



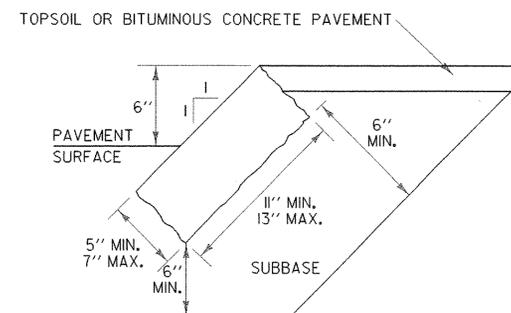
PRECAST REINFORCED CONCRETE CURB, TYPE B



CONCRETE CURB END



VERTICAL GRANITE CURB END



EDGING TO BE PLACED PRIOR TO PLACING TOP SURFACE COURSE.

GRANITE SLOPE EDGING

**GENERAL NOTES:**

1. HEIGHT OF REVEAL OF CURB SHALL NOT EXCEED FOUR INCHES WHERE DESIGN OR POSTED SPEED IS EQUAL TO OR GREATER THAN 40 MPH AND WHEN INSTALLED WITH GUARDRAIL (STANDARD SHAPE TO THIS DEPTH).
2. WHEN CONCRETE SIDEWALK IS CONSTRUCTED ADJACENT TO CONCRETE OR VERTICAL GRANITE CURB, ASPHALT TREATED FELT SHALL BE PLACED BETWEEN THE SIDEWALK AND CURB FOR THE TOTAL DEPTH OF THE SIDEWALK.
3. FASTENERS (20d NAILS OR SCREWS) SHALL BE CORROSION RESISTANT TO THE TREATED LUMBER.
4. FOR SPECIFICATIONS FOR EXPANSION/CONTRACTION JOINTS AND LENGTHS OF SECTIONS, SEE SECTION 616.
5. JOINTS BETWEEN CURB SECTIONS SHALL BE MORTARED IN CONFORMANCE WITH SECTION 616.
6. BITUMINOUS CONCRETE AND TREATED TIMBER CURB SHALL BE IN CONFORMANCE WITH SECTION 616.
7. TWO INCH MINIMUM CLEARANCE FROM FACE OF CONCRETE TO EDGE OF REINFORCING STEEL.

**OTHER STDS. REQUIRED: NONE**

REVISIONS AND CORRECTIONS  
FEB. II, 2008 - ORIGINAL APPROVAL DATE

APPROVED  
*Kevin S. Maushie*  
ROADWAY, TRAFFIC & SAFETY ENGINEER  
*Resta F. Johnson*  
DIRECTOR OF PROGRAM DEVELOPMENT  
*Mark D. Kuebler*  
FEDERAL HIGHWAY ADMINISTRATION

**CURBING**



**STANDARD  
C-10**

**NOTES CONT.**

**MAINTENANCE**

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, DEFACED, OR DIRTY SIGNS SHALL BE REPAIRED, CLEANED OR REPLACED AS ORDERED BY THE ENGINEER.

**GENERAL**

THE COST OF FURNISHING, INSTALLING, MAINTAINING AND REMOVING ALL CONSTRUCTION APPROACH SIGNS WILL BE CONSIDERED INCIDENTAL WORK PERTAINING TO THE PROJECT AS A WHOLE AND SHALL BE INCLUDED IN THE CONTRACT UNIT PRICE BID FOR VARIOUS ITEMS INVOLVED IN THE CONTRACT. DURING ALL PHASES OF CONSTRUCTION THE REQUIREMENTS SET FORTH IN THE "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES" SHALL BE MET.

**SIGN COVERS**

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.

CONTRACTORS SHALL COORDINATE THEIR SIGNING ACTIVITIES WITH OTHER CONTRACTORS WITHIN THE PROJECT LIMITS, AS DIRECTED BY THE REGIONAL CONSTRUCTION ENGINEER.

**SIGN POSTS**

WHERE CONSTRUCTION SIGN INSTALLATIONS ARE NOT PROTECTED BY GUARD RAIL OR OTHER APPROVED TRAFFIC BARRIERS, THE POSTS ON WHICH THE SIGNS ARE MOUNTED SHALL BE YIELDING METAL POSTS AS DESIGNATED IN THE E SERIES OF STANDARD DRAWINGS OR YIELDING WOODEN POSTS IN ACCORDANCE WITH THE FOLLOWING REQUIREMENTS:

WOODEN POSTS ARE ACCEPTABLE FOR USE WITH CONSTRUCTION SIGNS. THESE POSTS SHALL HAVE A UNIFORM CROSS-SECTION AND SHALL BE MADE FROM GRADE 2, AIR-DRIED SOUTHERN YELLOW PINE OR ANOTHER EQUIVALENT SOFTWOOD. AN ACCEPTABLE EQUIVALENT SOFTWOOD SHALL HAVE AN EXTREME FIBER IN BENDING "FB" DESIGN VALUE NOT TO EXCEED 1400 PSI AND HORIZONTAL SHEAR "FV" DESIGN VALUE NOT TO EXCEED 90 PSI SPECIFICATION. "DESIGN VALUES FOR WOOD CONSTRUCTION" AND RELATED SUPPLEMENT, LATEST EDITION.

AS ESTABLISHED BY THE NATIONAL FOREST PRODUCTS ASSOCIATION IN THEIR NATIONAL DESIGN. THE FOLLOWING ARE CONSIDERED TO BE ACCEPTABLE WOODEN POSTS:

- 1. 4" X 4" (ACTUAL DIMENSIONS ARE S4S 3.5" X 3.5")
- A) ACCEPTABLE FOR SINGLE OR DUAL POSTS INSTALLATION WITH NO MODIFICATIONS.

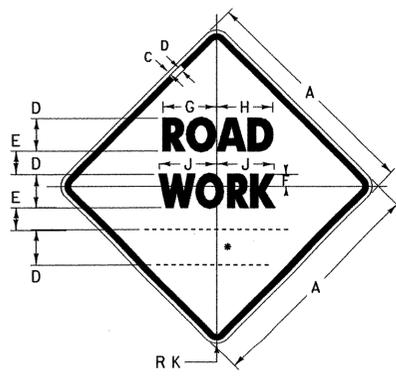
ALL WOODEN POSTS SHALL HAVE AN EMBEDMENT DEPTH OF 4 FEET. NO CROSS-BRACING OR BACK-BRACING TO KEEP THE POSTS PLUMB WILL BE ALLOWED. CONCRETE FOUNDATIONS, COLLARS, OR SOIL BEARING PLATES ARE NOT PERMITTED. CONSTRUCTION SIGNS SHALL BE PLACED ON TWO OR MORE POSTS WHEN ANY OF THE FOLLOWING CONDITIONS GOVERN:

- A) THE SIGN WIDTH (HORIZONTAL DIMENSIONS FOR DIAMOND SHAPED SIGNS) EXCEEDS 3 1/2 FEET.
- B) THE EXPOSED SIGN AREA OF ANY SINGLE SIGN OR ASSEMBLY EXCEEDS 7 SQ. FEET.
- C) THE Sv OF A SINGLE POST IS 64.

**OTHER STDS. REQUIRED:** E-100A, E-101, E-102

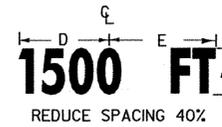
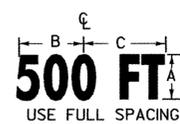


**STANDARD  
E-100**

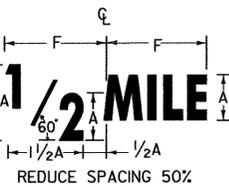
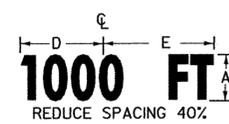


**W20-1**

• SEE DISTANCE DETAILS



REDUCE SPACING 40%



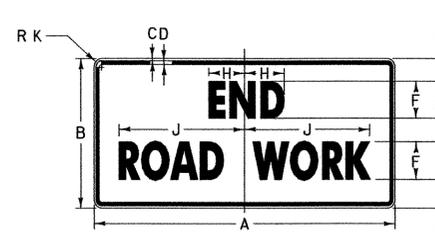
USE FULL SPACING

**DISTANCE DETAILS**

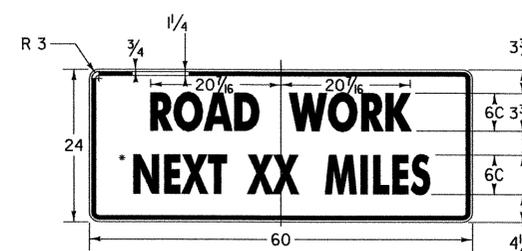
SIGN	DIMENSIONS (INCHES)									
	A	B	C	D	E	F	G	H	J	K
MIN.	36	3/8	7/8	5D	3 1/2	3 1/4	8 3/8	8 7/8	9	2 1/4
STD.	48	3/4	1 1/4	7D	4 3/4	4 1/2	11 1/8	12 1/8	12 5/8	3

DIMENSIONS (INCHES)							
A	B	C	D	E	F	G	H
5D	10 3/8	10 3/8	11 5/8	11 1/4	11 1/4	9 1/2	10 7/8
7D	14 1/4	15 1/8	14 7/8	15 3/4	15 3/4	13 1/8	15 1/2

( ALL DIMENSIONS SHOWN IN INCHES )



**G20-2A**



**G20-1**

• OPTICALLY CENTER

THIS SIGN TO BE USED WHEN PROJECT LENGTH EXCEEDS 2 MILES OR AS REQUESTED BY THE RESIDENT ENGINEER. SHOW MILEAGE TO NEAREST 1/4 MILE USING FRACTIONS, NOT DECIMALS. HAND LETTERING OF MILEAGE WILL NOT BE ALLOWED.

SIGN	DIMENSIONS (INCHES)										
	A	B	C	D	E	F	G	H	J	K	
MIN.	36	18	3/8	7/8	3 3/4	4C	2 1/2	4	12 5/8	2 1/4	
STD.	48	24	3/4	1 1/4	4 1/8	6C	3 3/4	5 7/8	22	3	

**NOTES**

THE SIGNS SHOWN ON THIS SHEET ARE INTENDED FOR USE IN PROVIDING ADVANCE WARNING AND INFORMATION ON CONSTRUCTION PROJECTS OVER WHICH TRAFFIC WILL BE MAINTAINED. WHEN ADDITIONAL APPROACH SIGNS OR OTHER TYPES OF ADVANCE SIGNING OR CONTROL ARE NECESSARY, THE PLANS AND/OR THE SPECIFICATIONS FOR THAT PROJECT WILL GIVE THE DETAILS OF THE SIGNS AND DEVICES REQUIRED. FOR ON-PROJECT CONSTRUCTION SIGNS, REFER TO APPROPRIATE STANDARD SHEETS.

**APPLICATION OF STANDARDS**

SINCE IT IS NOT POSSIBLE TO PRESCRIBE DETAILED STANDARDS OF APPLICATION FOR ALL OF THE SITUATIONS THAT MAY CONCEIVABLY ARISE ON A CONSTRUCTION PROJECT, REFERENCE SHALL BE MADE TO THE "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES" FOR THE PRINCIPLES, PROCEDURES, AND STANDARDS THAT WILL BE REQUIRED IN CONNECTION WITH ADVANCED WARNING AND ON-PROJECT CONSTRUCTION SIGNS AND BARRICADES. THE SIGNS SHOWN IN E-101 AND E-102 REPRESENT A SAMPLE OF THOSE MORE COMMONLY USED.

**LOCATION**

THE SIGNS SHALL BE LOCATED AS DETAILED ON THIS SHEET OR AS OTHERWISE SHOWN ON THE PLANS. THEY SHALL APPEAR AT EACH END OF THE HIGHWAY UNDER CONSTRUCTION AND ON ALL INTERSECTING PUBLIC HIGHWAYS. THE ENGINEER SHALL DETERMINE THE EXACT LOCATIONS.

**DESIGN**

LETTERS, DIGITS, ARROWS, SPACING AND TEXT DIMENSIONS SHALL CONFORM WITH THE "STANDARD HIGHWAY SIGNS BOOK" AND DESIGNS PRESCRIBED IN THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD) ADOPTED BY THE U.S. DEPARTMENT OF TRANSPORTATION, FEDERAL HIGHWAY ADMINISTRATION (FHWA).

**MATERIALS**

THE SIGN BASE MATERIAL USED FOR THE SIGNS ON THIS SHEET MAY BE ANY OF THE FOLLOWING, WITH MINIMUM THICKNESS AS NOTED.  
 FLAT SHEET ALUMINUM 0.125 INCHES  
 HIGH DENSITY OVERLAYED PLYWOOD 5/8 INCHES

**REFLECTORIZATION**

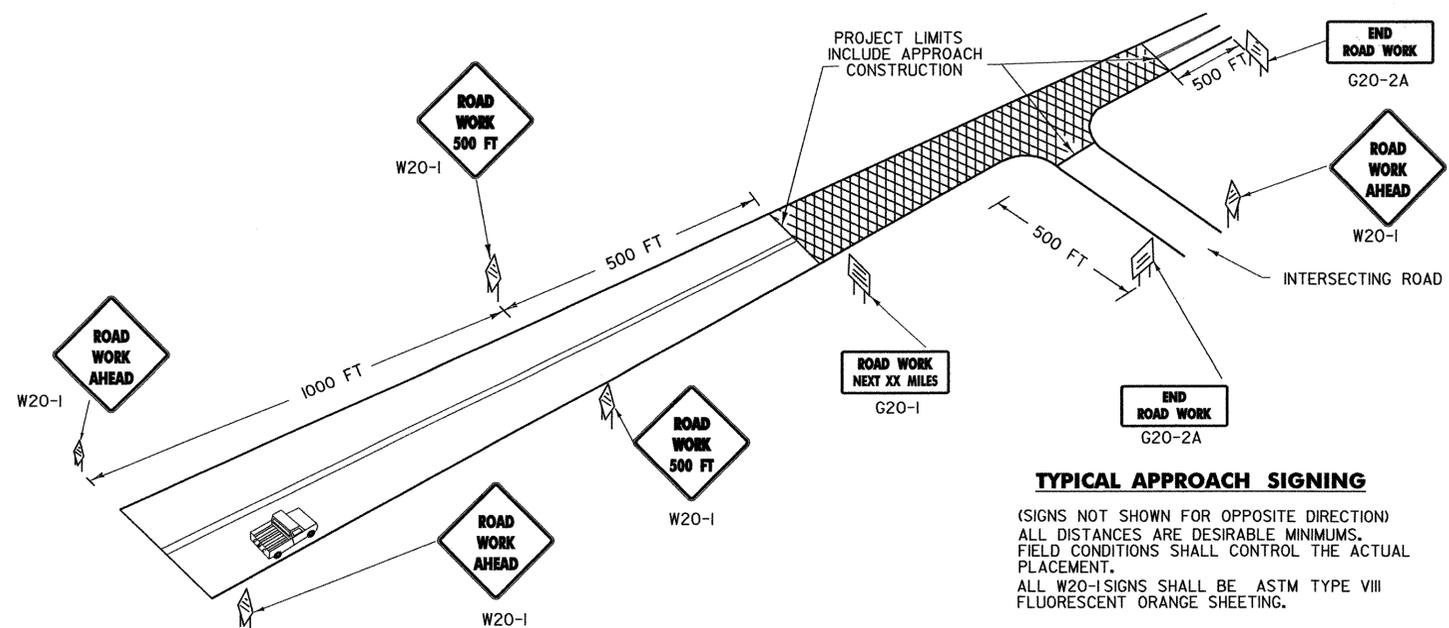
ALL LEAD SIGNS (W20-1) ON THIS SHEET SHALL BE ASTM TYPE VIII FLUORESCENT ORANGE SHEETING. ALL OTHER SIGNS ON THIS SHEET SHALL BE ASTM TYPE III RETROREFLECTORIZED SHEETING.

**COLORS**

THE COLORS SHALL CONFORM WITH THE STANDARD COLORS ADOPTED BY AASHTO AND APPROVED BY THE FHWA. COLORS SHOWN ON THIS SHEET CONSIST OF BLACK TEXT AND BORDER ON A RETROREFLECTORIZED ASTM TYPE III OR TYPE VIII ORANGE BACKGROUND.

**INSTALLATION**

THE 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 ON POSTS SET SECURELY IN THE GROUND. THE BOTTOM OF A SIGN SHALL BE AT LEAST 7 FEET ABOVE THE EDGE OF PAVEMENT, AND THE NEAREST EDGE OF A SIGN SHALL BE AT LEAST 6 FEET OUTSIDE THE SHOULDER POINT, 4 FEET OUTSIDE GUARD RAIL, OR 2 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 7 FEET ABOVE THE SIDEWALK. SIGNS MAY BE REMOVED UPON COMPLETION OF THE WORK AT THE DISCRETION OF THE ENGINEER.



**TYPICAL APPROACH SIGNING**

(SIGNS NOT SHOWN FOR OPPOSITE DIRECTION)  
 ALL DISTANCES ARE DESIRABLE MINIMUMS.  
 FIELD CONDITIONS SHALL CONTROL THE ACTUAL PLACEMENT.  
 ALL W20-1 SIGNS SHALL BE ASTM TYPE VIII FLUORESCENT ORANGE SHEETING.

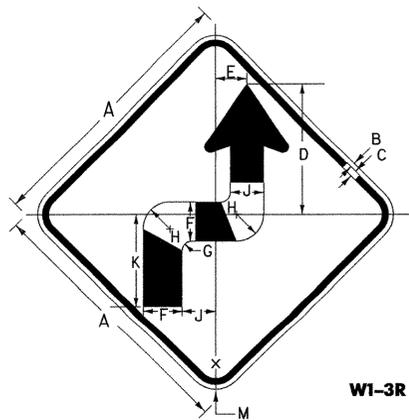
**REVISIONS AND CORRECTIONS**

- MAY 26, 1989 - DATE OF ORIGINAL ISSUE
- OCT 21, 1992 - REVISED WOOD POST REQUIREMENTS, ADDED SIGN DETAILS, & REVISED TITLE BLOCK
- AUG. 08, 1995 - MINOR NOTE REVISIONS
- JAN. 06, 1997 - MINOR NOTE AND DIMENSION REVISIONS
- JAN. 2, 2004 - CHANGED REFLECTIVE SHEETING TO ASTM TYPE III OR TYPE VIII

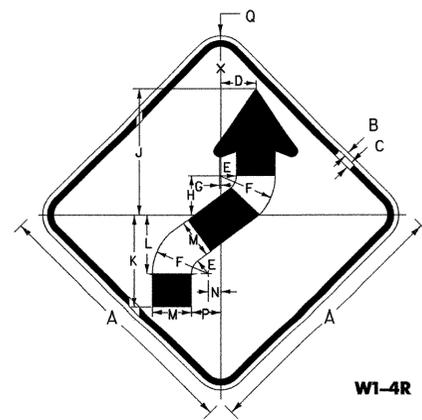
**APPROVED**

DIRECTOR OF PROGRAM DEVELOPMENT  
 TRAFFIC OPERATIONS ENGINEER  
 FEDERAL HIGHWAY ADMINISTRATION

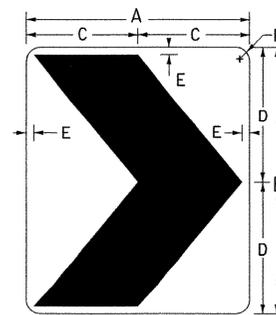
**CONSTRUCTION APPROACH  
SIGNS**



W1-3R

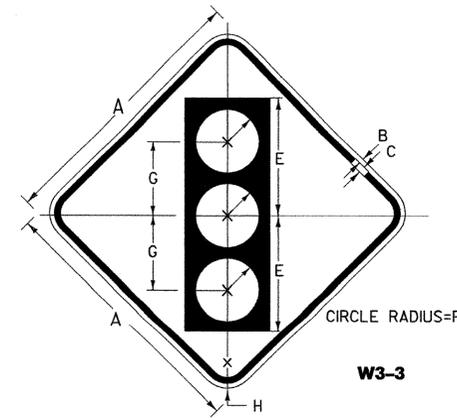


W1-4R



W1-8

SIGN	DIMENSIONS (INCHES)					
	A	B	C	D	E	F
STD.	18	24	9	12	3/4	1 1/2
SPECIAL	24	30	12	15	7/8	1 7/8
EXPWY.	30	36	15	18	1	1 7/8
FRWY.	36	48	18	24	1 1/8	2 1/4

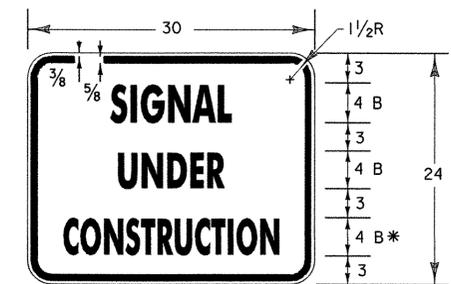


W3-3

SIGN	DIMENSIONS (INCHES)							
	A	B	C	D	E	F	G	H
STD. & MIN.	36	5/8	7/8	5 3/4	15 3/4	4 1/4	10	2 1/4
SPECIAL	48	3/4	1 1/4	7 1/2	20	5	12 1/2	3

**COLORS**

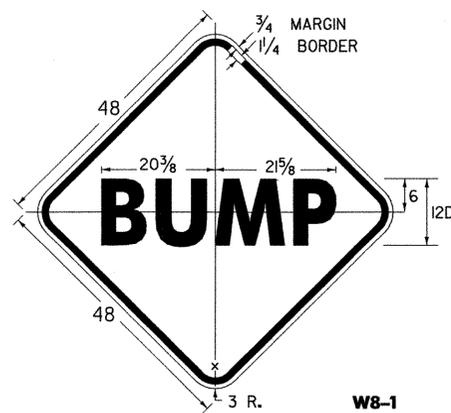
SYMBOL & LEGEND - BLACK (NON-REFL)  
BACKGROUND - ORANGE (REFL)  
TOP CIRCLE - RED (REFL)  
MIDDLE CIRCLE - YELLOW (REFL)  
BOTTOM CIRCLE - GREEN (REFL)



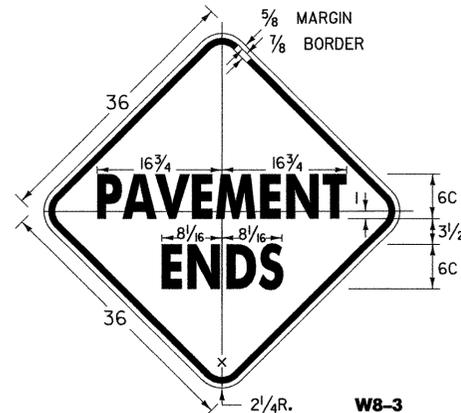
\* REDUCE SPACING 50%

SIGN	DIMENSIONS (INCHES)												
	A	B	C	D	E	F	G	H	J	K	L	M	
STD. & MIN.	36	5/8	7/8	17 1/16	4 1/32	5 1/4	1 1/4	3 5/8	4 1/2	12 5/32	1 7/32	2 1/4	
SPECIAL	48	3/4	1 1/4	23 3/16	5 5/8	7	1 5/8	4 7/8	6	16 5/8	2 3/16	3	

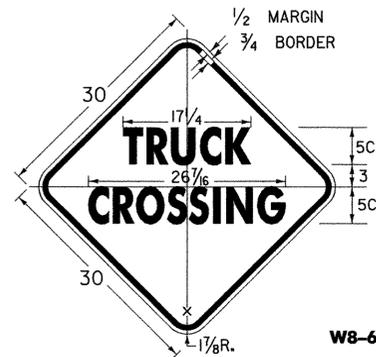
SIGN	DIMENSIONS (INCHES)															
	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	
STD. & MIN.	36	5/8	7/8	4 2/32	2 1/4	7 1/2	5 3/32	5 1/4	16 7/8	12 3/8	7 7/8	5 1/4	1 1/16	3 15/16	2 1/4	
SPECIAL	48	3/4	1 1/4	6 5/16	3	10	3 1/16	7	22 1/2	16 1/2	10 1/2	7	2 1/4	5 1/4	3	



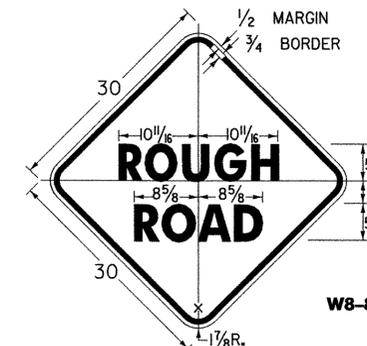
W8-1



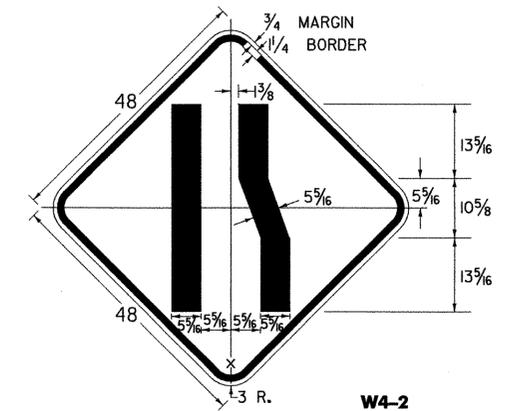
W8-3



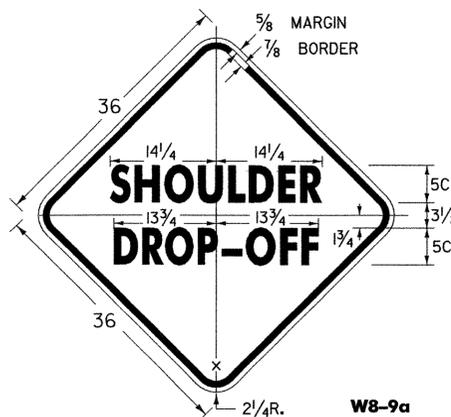
W8-6



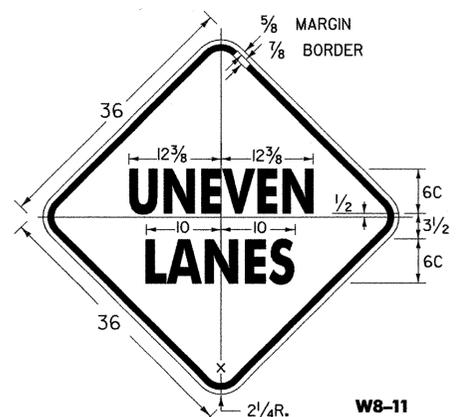
W8-8



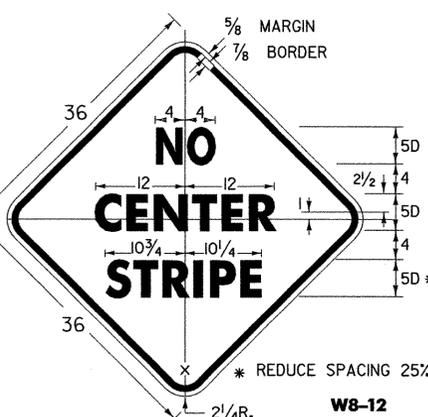
W4-2



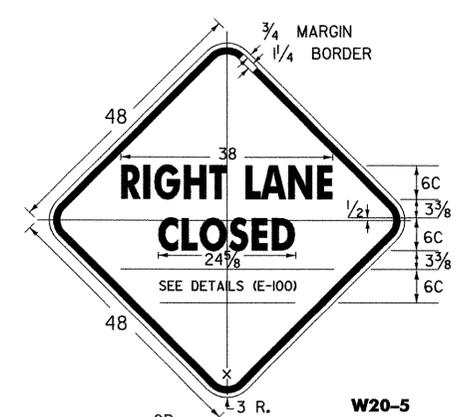
W8-9a



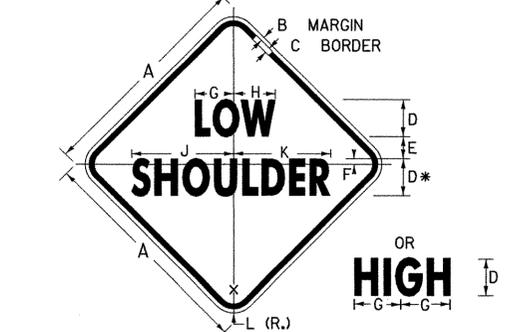
W8-11



W8-12



W20-5



W8-9

SIGN	DIMENSIONS (INCHES)										
	A	B	C	D	E	F	G	H	J	K	L
STD.	30	1/2	3/4	5C	3	3/4	5 5/8	5 5/8	13 1/16	13 1/16	1 7/8
FWY.	48	3/4	1 1/4	8C	5	1 1/4	8 1/4	9	21 5/8	20 5/8	3

\* REDUCE SPACING 25%

**NOTES**

SEE STANDARD SHEET E-100 FOR NOTES AND TEXT DETAILS  
COLORS FOR SIGNS SHOWN ON THIS SHEET SHALL BE BLACK TEXT,  
BORDER AND SYMBOLS ON ASTM TYPE III OR TYPE VI  
RETROREFLECTORIZED ORANGE BACKGROUND, UNLESS OTHERWISE NOTED.

(ALL DIMENSIONS SHOWN IN INCHES) LEFT LANE

OTHER STDS. E-100 REQUIRED:

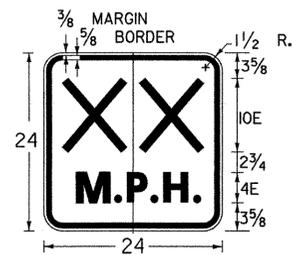
REVISIONS AND CORRECTIONS  
OCT. 30, 1987 - DATE OF ORIGINAL ISSUE  
OCT. 21, 1992 - ADDED ADDITIONAL SIGN DIMENSIONS,  
REVISED CHEVRON BACKGROUND TO ORANGE,  
& REVISED TITLE BLOCK  
AUG. 08, 1995 - ADDED AND DELETED VARIOUS  
SIGN DETAILS  
MAR., 10 1997 - REVISED SIGN DETAILS  
MAY 30, 2003 - CHANGED REFLECTIVE SHEETING TO ASTM  
TYPE III OR TYPE VI

APPROVED  
*John H. Kell*  
DIRECTOR OF PROGRAM DEVELOPMENT  
TRAFFIC OPERATIONS ENGINEER  
*Michael Lee*  
FEDERAL HIGHWAY ADMINISTRATION

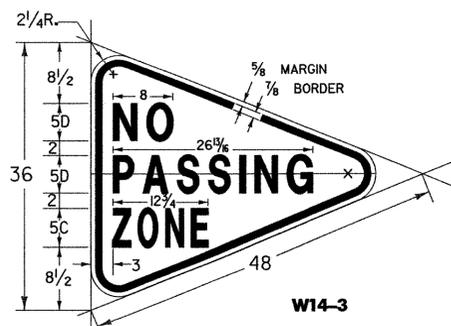
CONSTRUCTION SIGN  
DETAILS



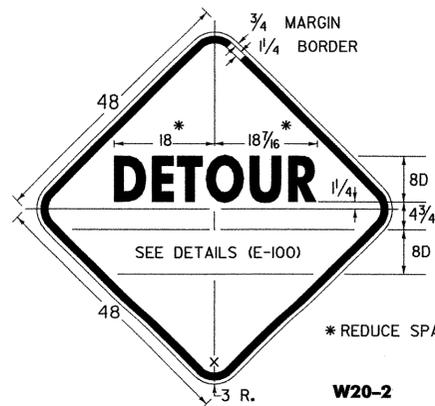
STANDARD  
E-101



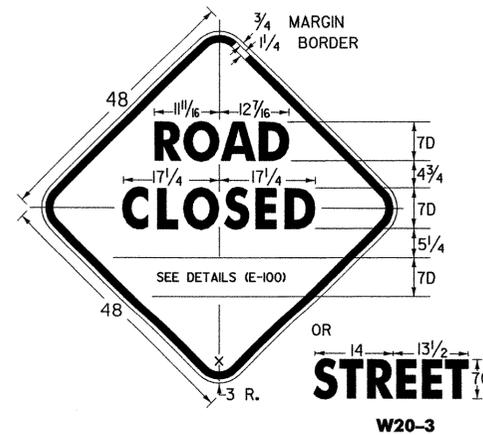
W13-1  
\*XX\* DENOTES ADVISORY SPEED AS SHOWN ON THE PLANS



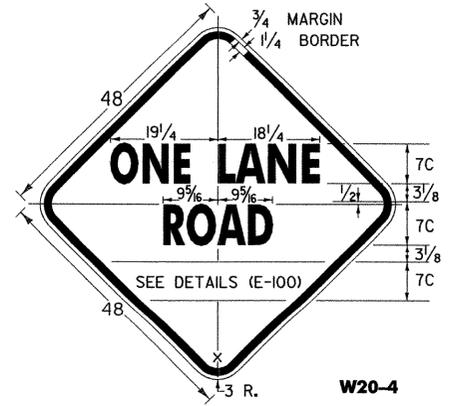
W14-3



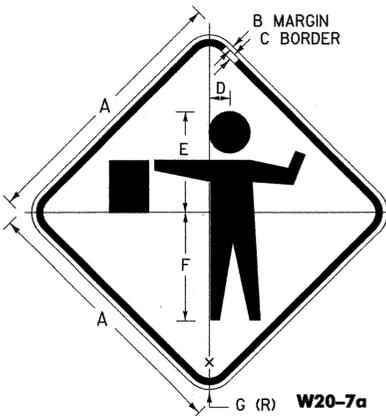
W20-2



W20-3



W20-4



W20-7a

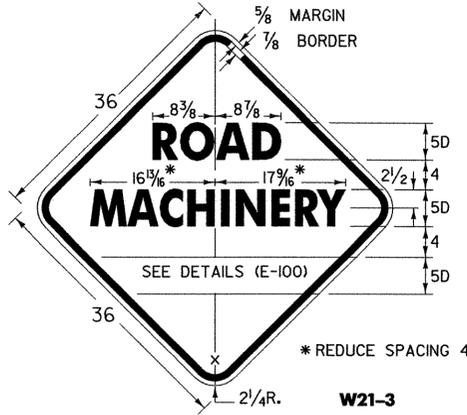


W20-7b

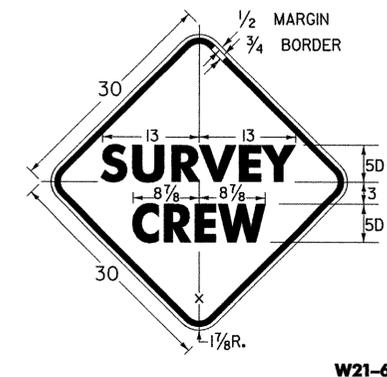
COLORS:  
BLACK BORDER AND TEXT (NON RETRORFL.)  
ORANGE BACKGROUND (RETRORFL.)

W3-4

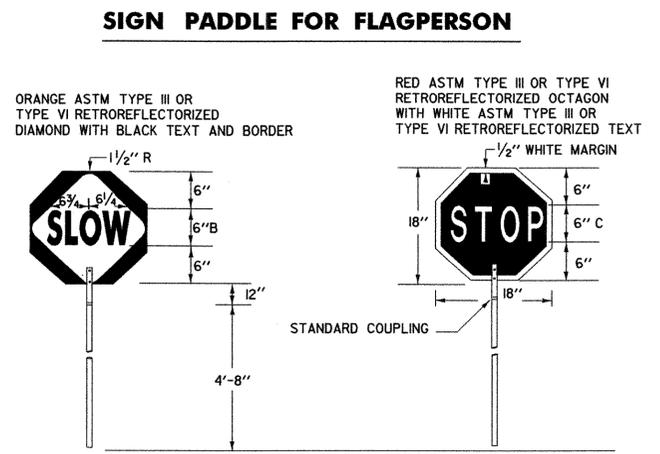
COLORS:  
BLACK BORDER AND TEXT (NON RETRORFL.)  
YELLOW BACKGROUND (RETRORFL.)



W21-3



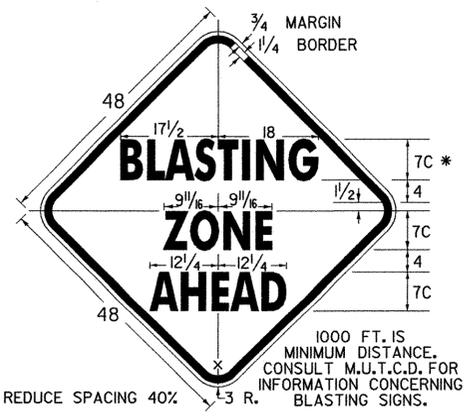
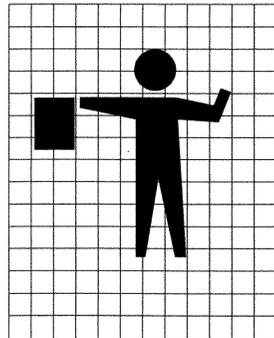
W21-6



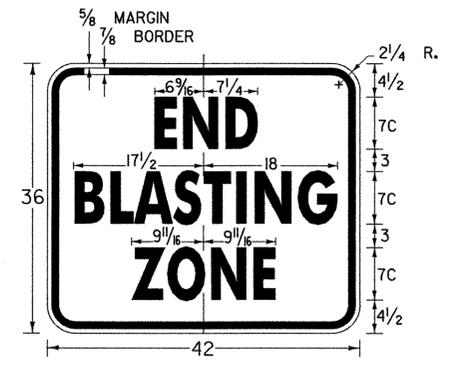
SIGN PADDLE FOR FLAGPERSON

SIGN	DIMENSIONS (INCHES)						
	A	B	C	D	E	F	G
STD.	36	5/8	7/8	2 3/4	13 1/2	14 5/8	2 1/4
FWY.	48	3/4	1 1/4	3 3/4	18	19 1/2	3

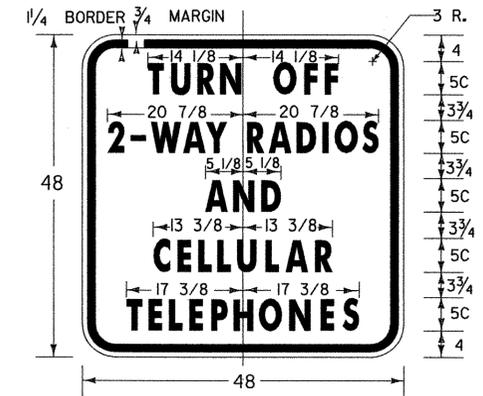
SIGN	DIMENSIONS ( INCHES )											
	A	B	C	D	E	F	G	H	J	K	L	
MIN.	36	5/8	7/8	6C	3 3/8	7/8	3 3/4	16 3/8	13	13 3/8	2 1/4	
STD.	48	3/4	1 1/4	8C	4 7/8	1 1/4	5	21 7/8	17 3/8	18 1/2	3	
EXPWY.	60	3/4	1 1/4	9C	5 3/8	1 3/8	5 5/8	24 3/4	19 3/8	20 1/4	3	



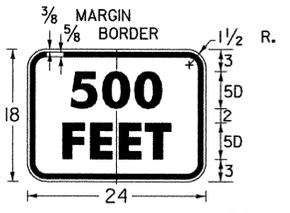
W22-1



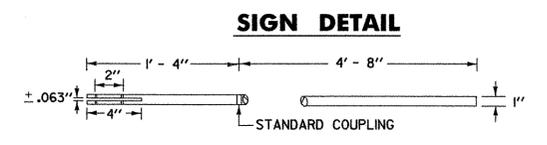
W22-3



VW22-1



W16-2a



SIGN DETAIL

STAFF DETAIL

MATERIALS  
THE SIGN MATERIALS SHALL BE 0.063" ALUMINUM WITH COLORS AS INDICATED ON DETAILS.  
THE STAFF SHALL BE 3/4" TO 1 1/4" DIAMETER RIGID ALUMINUM CONDUIT/TUBING WITH A WALL THICKNESS OF 0.125", OR 1" TO 1 1/2" DIAMETER RIGID PVC CONDUIT/TUBING WITH 0.125" WALL THICKNESS  
MOUNTING  
THE STAFF SHALL BE MOUNTED WITH EITHER TWO 1/4" DIAMETER ALUMINUM BOLTS OR TWO 1/4" DIAMETER ALUMINUM RIVETS.

NOTES

SEE STANDARD SHEET E-100 FOR NOTES AND TEXT DETAILS  
COLORS FOR SIGNS SHOWN ON THIS SHEET SHALL BE BLACK TEXT, BORDER AND SYMBOLS ON ASTM TYPE III OR TYPE VI RETROREFLECTORIZED ORANGE BACKGROUND, UNLESS OTHERWISE NOTED  
SIGN DETAILS INDICATE THE APPROPRIATE COLOR.

OTHER STDS. E-100  
REQUIRED:  
NOTE: ALL DIMENSIONS SHOWN IN INCHES EXCEPT WHERE NOTED

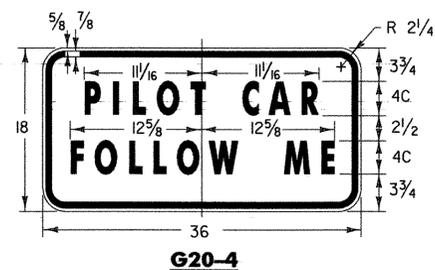
REVISIONS AND CORRECTIONS  
OCT. 30, 1987 - DATE OF ORIGINAL ISSUE  
JAN. 23, 1989 - DELETE MOTORCYCLE SYMBOL SIGN AND SPEED SIGN, ADDED TWO SIGNS  
OCT. 21, 1992 - ADDED A SIGN, REVISED A SIGN DIMENSION & TYPE ERROR & REVISED TITLE BLOCK  
AUG. 08, 1995 - ADDED FLAGGER GRID  
JUNE 30, 2003 - CHANGED REFLECTIVE SHEETING TO ASTM TYPE III OR TYPE VI CHANGED TEXT ON W20-7b SIGN

APPROVED  
*[Signature]*  
DIRECTOR OF PROGRAM DEVELOPMENT  
*[Signature]*  
TRAFFIC OPERATIONS ENGINEER  
*[Signature]*  
FEDERAL HIGHWAY ADMINISTRATION

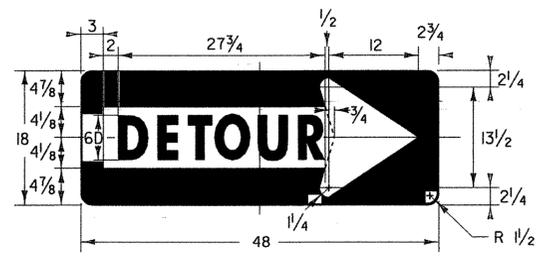
CONSTRUCTION SIGN  
DETAILS



STANDARD  
E-102



**G20-4**

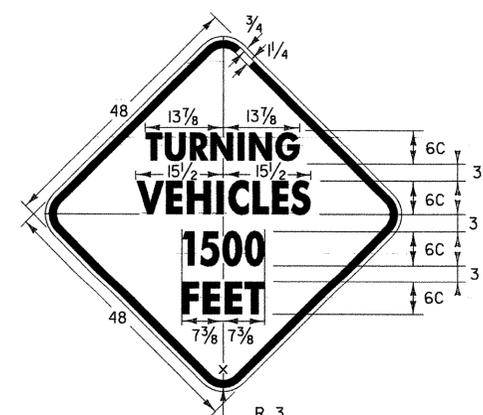


**M4-10(R)**

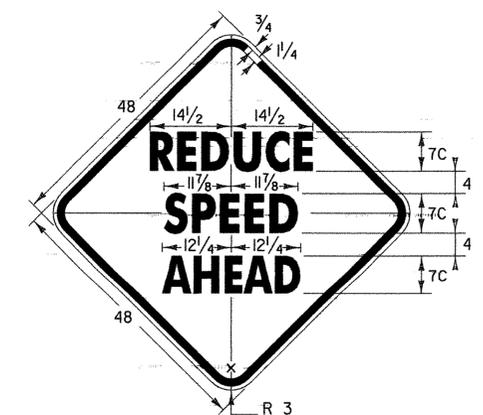


**R11-2**

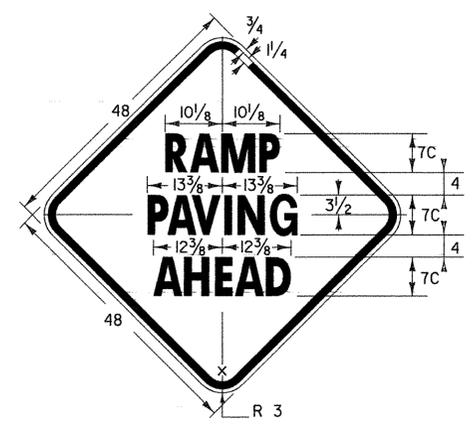
COLORS:  
BLACK TEXT AND BORDER  
WHITE RETROREFLECTORIZED BACKGROUND



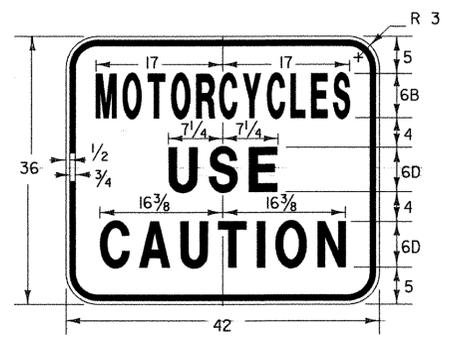
**VC-001**



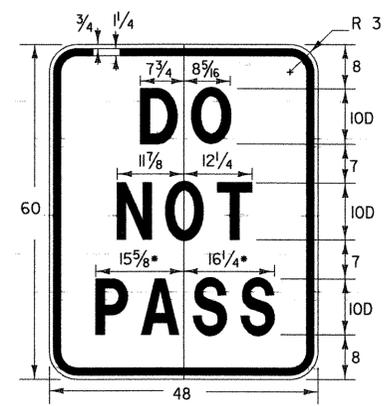
**VC-002**



**VC-003**

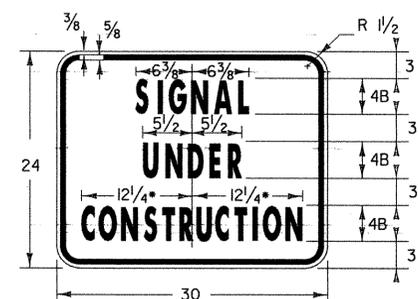


**VC-004**



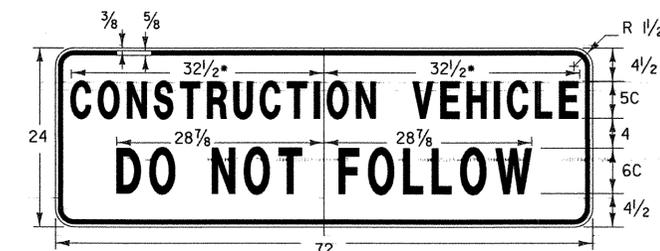
**VC-005**

\* REDUCE SPACING BY 40%



**VC-820**

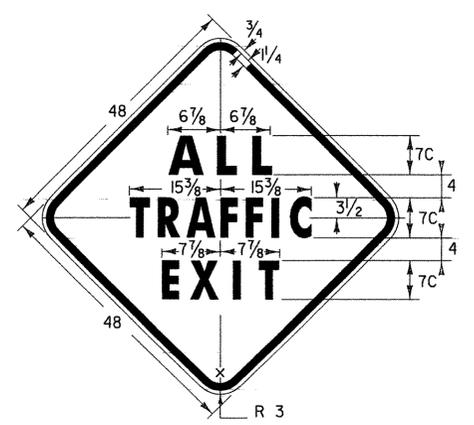
\* REDUCE SPACING 25%



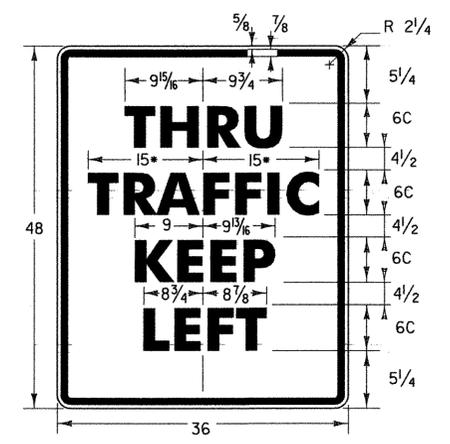
**VC-007**

\* REDUCE SPACING 20%

IT IS SUGGESTED THAT THIS SIGN BE DESIGNED TO FOLD, (DOWN OR ACROSS), BE COVERED, OR BE REMOVED WHEN NOT IN USE. THE SIGN SHOULD ALSO BE MOUNTED AS TO NOT INTERFERE WITH THE VISIBILITY OF DIRECTIONAL OR TAIL LIGHTS AS REQUIRED BY LAW.



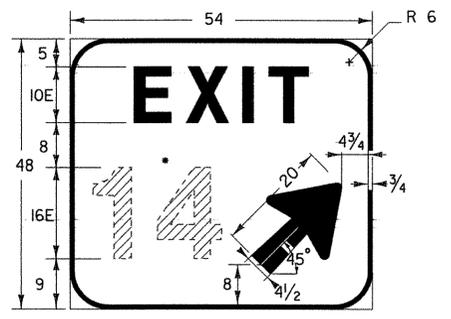
**VC-008**



**VR-118L**

\* REDUCE SPACING 25 %

COLORS:  
BLACK TEXT AND BORDER  
WHITE (RETROREFLECTORIZED) BACKGROUND



**E5-1a**

\* EXIT NUMBER AS PER PLANS OPTICALLY SPACED  
COLORS:  
WHITE RETROREFLECTORIZED BORDER, ARROW AND LEGEND  
GREEN RETROREFLECTORIZED BACKGROUND

(ALL DIMENSIONS SHOWN IN INCHES EXCEPT WHERE NOTED)

**NOTES**

SEE STANDARD SHEET E-100 FOR NOTES AND TEXT DETAILS

COLORS FOR SIGNS SHOWN ON THIS SHEET SHALL BE BLACK TEXT, BORDER AND SYMBOLS ON ASTM TYPE III OR TYPE VIII RETROREFLECTIVE ORANGE BACKGROUND, UNLESS OTHERWISE NOTED.

SIGN DETAILS INDICATE THE PROPER COLOR.

**OTHER STDS. E-100, E-151 REQUIRED:**

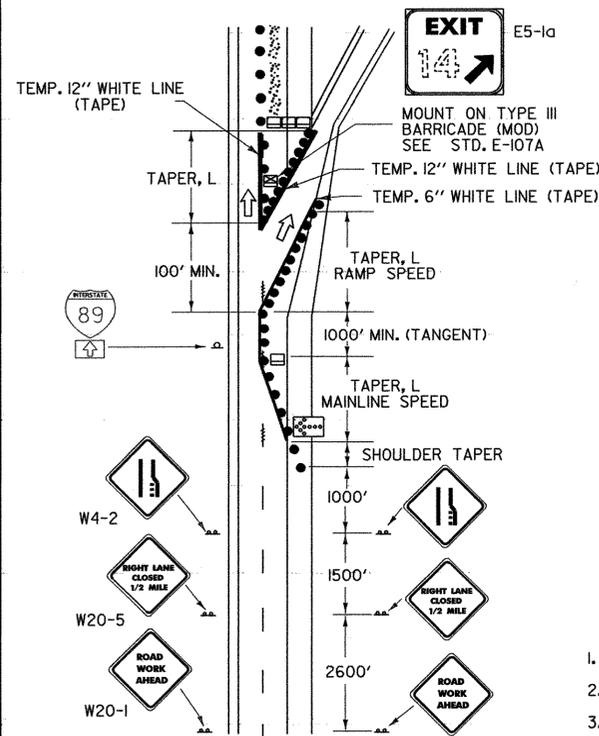
REVISIONS AND CORRECTIONS  
AUG 08, 1995 - DATE OF ORIGINAL ISSUE  
MAY 01, 2004 - CHANGED REFLECTIVE SHEETING TO TYPE III

APPROVED  
DIRECTOR OF PROGRAM DEVELOPMENT  
*John A. Fall*  
TRAFFIC OPERATIONS ENGINEER  
FEDERAL HIGHWAY ADMINISTRATION

CONSTRUCTION SIGN  
DETAILS



STANDARD  
E-102A



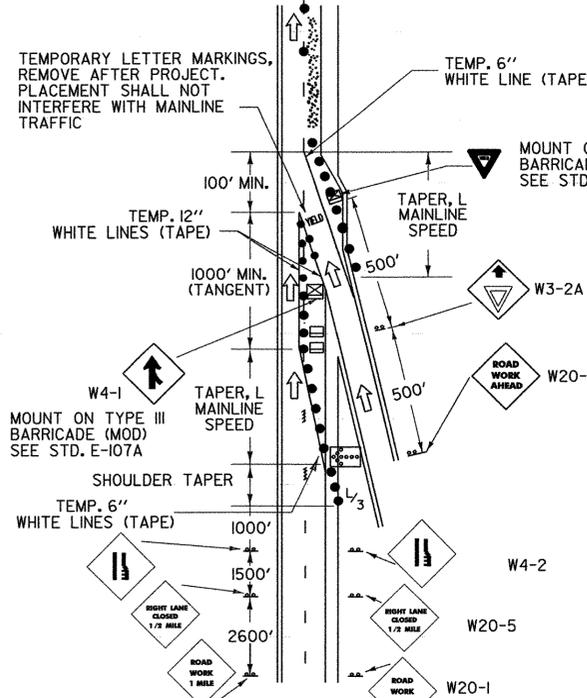
**MAINLINE LANE CLOSURE AT AN EXIT RAMP**

NOT TO SCALE  
THIS DETAIL SHALL BE USED WHEN THE WORK ZONE BEGINS AT THE GORE OR THE MAINLINE LANE CLOSURE DRUM PLACEMENT INTERFERES WITH THE EXIT RAMP.

- LEGEND**
- REFL. PLASTIC DRUMS
  - PAVEMENT MARKING REMOVAL
  - ↑ INDICATES TRAFFIC FLOW
  - WORK AREA
  - FLASHING ARROW PANEL
  - TYPE III BARRICADES
  - TYPE III BARRICADES (MOD.)

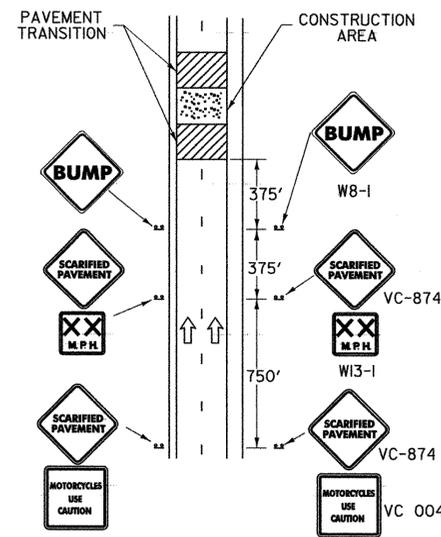
**NOTES**

1. ALL SIGNS SHALL BE MOUNTED ON FIXED POSTS (YIELDING TYPE) UNLESS OTHERWISE NOTED.
2. CHANNELIZING DEVICES SHALL BE PLACED IN ACCORDANCE WITH THE TABLE ON THIS SHEET
3. ALL DISTANCES ARE DESIRABLE MINIMUMS, FIELD CONDITIONS SHALL CONTROL THE ACTUAL PLACEMENT.
4. TAPER RATES ARE BASED ON THE POSTED MAINLINE AND EXIT SPEEDS.
5. TEMPORARY PAVEMENT MARKINGS ARE REQUIRED WHEN THE LAYOUT IS TO BE IN EFFECT FOR THREE DAYS OR MORE.
6. LANE CLOSURES AND TAPER LENGTHS, L, AS DETAILED ON THIS SHEET.
7. EXIT SIGN SHALL BE MOUNTED A MINIMUM OF 7 FEET ABOVE THE GROUND AND HIGH ENOUGH TO BE SEEN ABOVE CHANNELIZING DEVICES.



**MAINLINE LANE CLOSURE AT AN ENTRANCE RAMP**

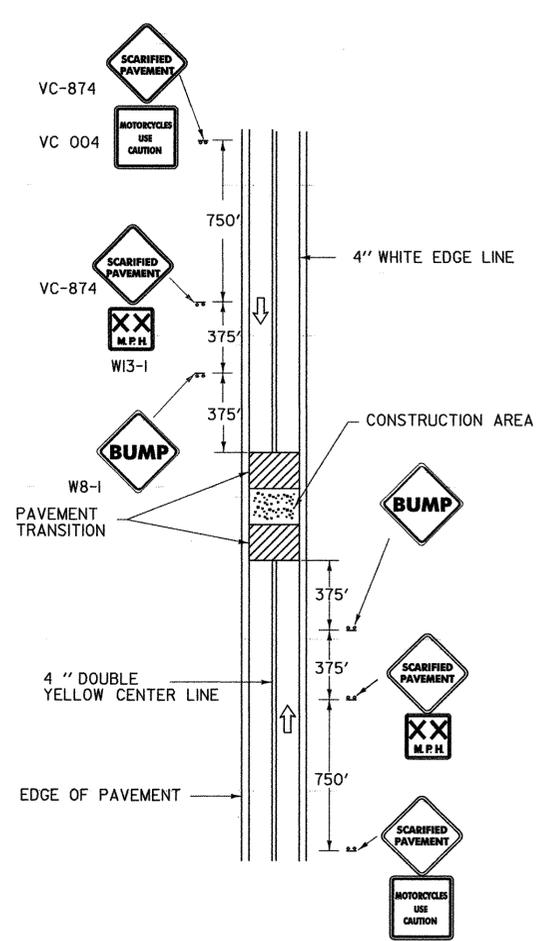
NOT TO SCALE  
THIS DETAIL SHALL BE USED WHEN THE WORK ZONE BEGINS AT THE END OF THE ACCELERATION LANE OR THE MAINLINE LANE CLOSURE DRUM PLACEMENT INTERFERES WITH THE ON-RAMP TRAFFIC. IF THE LENGTH OF THE ACCELERATION LANE IS NOT ADEQUATE, THE YIELD SIGN SHALL BE REPLACED WITH A STOP SIGN. IF A STOP SIGN IS USED, IT SHOULD BE ACCOMPANIED BY A STOP BAR.



**ADVANCED WARNING SIGN PACKAGE FOR COLD PLANED (SCARIFIED) SURFACES DIVIDED HIGHWAY**

**NOTES**

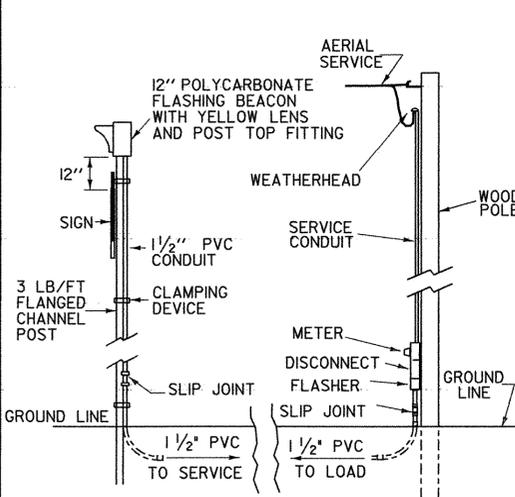
1. ADVISORY SPEED AS DETERMINED BY THE RESIDENT ENGINEER (40 MPH MINIMUM RECOMMENDED).
2. ALL SIGNS SHALL BE MOUNTED ON FIXED POSTS (YIELDING TYPE).
3. ALL DISTANCES ARE DESIRABLE MINIMUMS, FIELD CONDITIONS SHALL CONTROL THE ACTUAL PLACEMENT.
4. THE BUMP SIGN MAY BE ELIMINATED WHEN THERE IS NO BUMP. WHEN THE CONTRACTOR IS WORKING IN THE CONSTRUCTION AREA THE APPROPRIATE ADVANCED WARNING SIGN PACKAGE SHALL BE USED, SEE STD.E-103.
5. GATE POSTING OF SIGNS IS AN OPTION AS DETERMINED BY THE RESIDENT ENGINEER (WHEN PASSING, TURNING OR CLIMBING LANES LIMIT VISIBILITY).



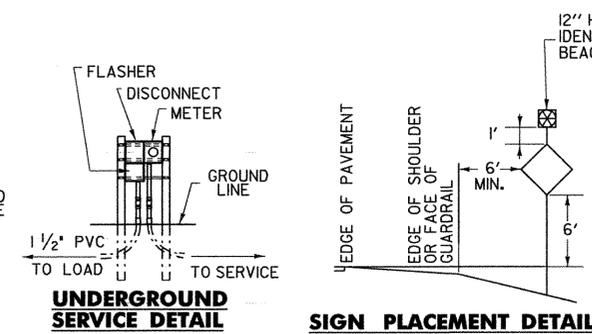
**ADVANCED WARNING SIGN PACKAGE FOR COLD PLANED (SCARIFIED) SURFACES 2 LANE ROADWAY**

**NOTES**

1. ADVISORY SPEED AS DETERMINED BY THE RESIDENT ENGINEER (40 MPH MINIMUM RECOMMENDED).
2. ALL SIGNS SHALL BE MOUNTED ON FIXED POSTS (YIELDING TYPE).
3. ALL DISTANCES ARE DESIRABLE MINIMUMS, FIELD CONDITIONS SHALL CONTROL THE ACTUAL PLACEMENT.
4. THE BUMP SIGN MAY BE ELIMINATED WHEN THERE IS NO BUMP. WHEN THE CONTRACTOR IS WORKING IN THE CONSTRUCTION AREA THE APPROPRIATE ADVANCED WARNING SIGN PACKAGE SHALL BE USED, SEE STD.E-110.
5. GATE POSTING OF SIGNS IS AN OPTION AS DETERMINED BY THE RESIDENT ENGINEER (WHEN PASSING, TURNING OR CLIMBING LANES LIMIT VISIBILITY).



**FLASHING BEACON DETAIL**

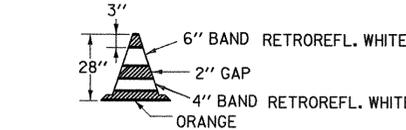


**UNDERGROUND SERVICE DETAIL**

**SIGN PLACEMENT DETAIL**

**NOTES**

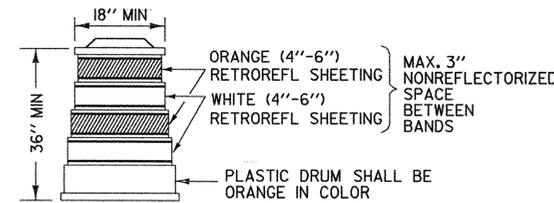
1. AT THE CONTRACTOR'S OPTION:
  - A. THE POWER SUPPLY MAY BE AERIAL OR UNDERGROUND (SEE DETAIL).
  - B. POWER FOR A FLASHING BEACON MAY BE COMBINED WITH POWER FOR A TRAFFIC SIGNAL OR THEY MAY HAVE SEPARATE POWER SOURCES.
  - C. THE FLASHER MAY BE INSTALLED ON A STANCHION NEAR THE SIGN, ON A UTILITY POLE (WITH UTILITY COMPANY APPROVAL) OR AT THE SAME LOCATION AS A TRAFFIC SIGNAL CONTROLLER.
2. THE FLASHER UNIT SHALL BE ONE CIRCUIT AND INCLUDE A RADIO INTERFERENCE FILTER.
3. BATTERY OPERATED FLASHERS WILL NOT BE ALLOWED.
4. BOTTOM OF THE BEACON SHALL BE A MIN. OF 8" AND A MAX. OF 12" ABOVE THE EDGE OF THE PAVEMENT.
5. FOR URBAN AREA PLACEMENT SEE STD. E-121.
6. FOR POWER DROP STANCHIONS SEE STD. E-175.



**28" REFLECTORIZED CONE**

**NOTES**

1. 28" CONES SHALL BE USED ON ROADWAYS WITH SPEED LIMITS OF 35 MPH OR MORE AND ON ALL ROADWAYS DURING HOURS OF DARKNESS.
2. CONES MAY BE WEIGHTED TO PREVENT OVERTURNING, HOWEVER THE WEIGHTS SHALL NOT PRESENT A HAZARD IF THE CONE IS STRUCK.
3. RETROREFLECTIVE SHEETING SHALL BE ASTM TYPE III OR TYPE VI.



**REFLECTORIZED PLASTIC DRUM**

SAND BAGS OR AN APPROPRIATE BALLASTING DEVICE, WHICH DOES NOT PRESENT A HAZARD TO THE IMPACTING VEHICLE OR BECOME A PROJECTILE UPON IMPACT, SHALL BE USED TO WEIGHT DRUMS. RETROREFLECTIVE SHEETING SHALL BE ASTM TYPE III OR TYPE VI.

**CHANNELIZING DEVICES**

TAPER RATES ARE DETERMINED USING THE FOLLOWING EQUATION:  
 $L = WS$  FOR DESIGN SPEEDS OF 45 MPH OR GREATER  
 $L = WS^2/60$  FOR DESIGN SPEEDS OF 40 MPH OR LESS  
 WHERE: L = MINIMUM LENGTH OF TAPER IN FEET  
 W = WIDTH OF OFFSET (USUALLY LANE WIDTH) IN FEET  
 S = DESIGN SPEED IN MPH

POSTED SPEED OR 85th PERCENTILE (mph)	DESIGN SPEED (mph)	TAPER LENGTHS (ft)			TANGENT SECTION LENGTHS (L/2) (ft)	MINIMUM BUFFER SPACE LENGTH (ft)	MAXIMUM CHANNELIZING DEVICE SPACING (ft)		BARRIER FLARE RATE (MIN)
		MERGING 12-ft LANE (L)	SHIFTING W=16ft (L/2)	SHOULDER W=10ft (L/3)			TAPER	ALONG LANE LINE & WORK ZONE	
≤40	40	320	215	90	160	160	35	70	1:9
45	45	540	360	150	270	270	40	80	1:9
50	50	600	400	170	300	300	50	100	1:11
55	55	660	440	185	330	330	55	110	1:13
60 & 65	60	720	480	200	360	360	60	120	1:13
70	70	840	560	235	420	440	65	130	1:13

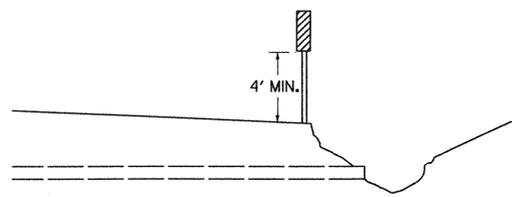
**REVISIONS AND CORRECTIONS**  
 APR 12, 1988 - DATE OF ORIGINAL ISSUE  
 JAN 23, 1989 - REVISED EXIT SIGN - CLARIFIED EXIT TAPER  
 SEPT 20, 1993 - REVISED RAMP CLOSURES, FLASHING BEACON DETAILS AND MOVED TYPE III BARRICADE (MOD) TO STDE-107A  
 AUG 08, 1995 - REVISED BEACON SIZE  
 MAR. 01, 2004 - ADDED ADVANCED WARNING SIGN PACKAGE FOR COLD PLANED TWO WAY HIGHWAYS, CHANNELIZING DEVICES CHART

APPROVED  
  
 DIRECTOR OF PROGRAM DEVELOPMENT  
 TRAFFIC OPERATIONS ENGINEER  
 FEDERAL HIGHWAY ADMINISTRATION

**TRAFFIC CONTROL MISCELLANEOUS DETAILS**

**OTHER STDS. E-101, E-102, E-102A, E-103, E-107A, E-110, E-121, E-136, REQUIRED: E-150, E-175**

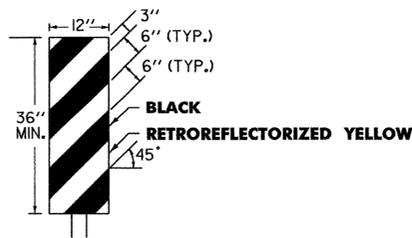
**STANDARD E-106**



**DELINEATOR TYPICAL**

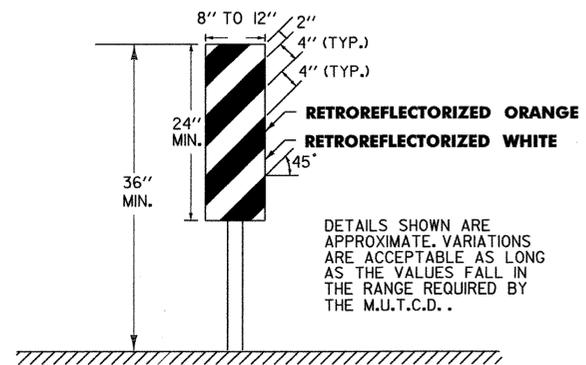
THE STANDARD COLOR FOR DELINEATORS USED ALONG BOTH SIDES OF TWO-WAY STREETS AND HIGHWAYS AND THE RIGHT SIDE OF ONE-WAY STREETS SHALL BE WHITE. DELINEATORS USED ALONG THE LEFT SIDE OF ONE-WAY ROADWAYS SHALL BE YELLOW THEY SHALL HAVE A MINIMUM AREA OF 7 SQUARE INCHES. THEY MAY BE ROUND, SQUARE OR OBLONG, FOR ALTERNATES SEE STD. E-198

SYMBOL



**OBJECT MARKER TYPICAL**

OBJECTS MARKERS ARE USED TO MARK OBSTRUCTIONS WITHIN OR ADJACENT TO THE ROADWAY. IN SOME CASES THERE MAY NOT BE A PHYSICAL OBJECT INVOLVED, BUT OTHER ROADSIDE CONDITIONS SUCH AS NARROW SHOULDER DROP-OFFS, GORES, D.I. EXCAVATIONS, AND ABRUPT CHANGES IN THE ROADWAY ALIGNMENT MAY MAKE IT UNDESIRABLE FOR A DRIVER TO LEAVE THE ROADWAY. THE INSIDE EDGE OF THE OBJECT MARKER SHALL BE IN LINE WITH THE INNER EDGE OF THE OBSTRUCTION, WHENEVER POSSIBLE. OBJECT MARKERS SHALL HAVE ALTERNATING BLACK AND RETROREFLECTORIZED YELLOW STRIPES. (SLOPING DOWNWARD IN THE DIRECTION TRAFFIC IS TO PASS).

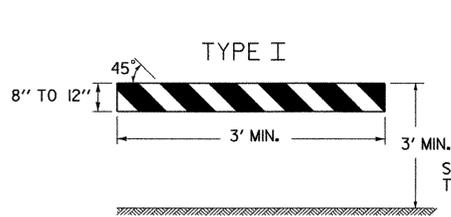


**VERTICAL PANEL**

VERTICAL PANELS SHALL HAVE ALTERNATING ORANGE AND WHITE RETROREFLECTORIZED STRIPES (SLOPING DOWNWARD IN THE DIRECTION TRAFFIC IS TO PASS). THESE DEVICES MAY BE USED FOR TRAFFIC SEPARATION, CHANNELIZING OR BARRICADING WHERE SPACE IS AT A MINIMUM.

DETAILS SHOWN ARE APPROXIMATE. VARIATIONS ARE ACCEPTABLE AS LONG AS THE VALUES FALL IN THE RANGE REQUIRED BY THE M.U.T.C.D..

**DELINEATOR, VERTICAL PANEL AND OBJECT MARKER DETAILS FOR CONSTRUCTION AREAS WHERE TRAFFIC IS MAINTAINED**



**TYPE I**

STRIPING IS SHOWN WITH TRAFFIC PASSING TO THE RIGHT.



**TYPE II**



**TYPE III**

A TYPE III (MODIFIED) BARRICADE SHALL CONSIST OF TYPE II RAILS MOUNTED ON A BREAKAWAY BARRICADE AS SHOWN ON STANDARD SHEET E-107A.

BARRICADE CHARACTERISTICS			
	I	II	III
WIDTH OF RAIL	8" MIN. 12" MAX.	8" MIN. 12" MAX.	8" MIN. 12" MAX.
LENGTH OF RAIL	3' MIN.	3' MIN.	4' MIN.
WIDTH OF STRIPES	6"	6"	6"
HEIGHT	3' MIN.	3' MIN.	5' MIN.
TYPE OF FRAME	SEE E-107A	SEE E-107A	SEE E-107A
FLEXIBILITY	PORTABLE	PORTABLE	PORTABLE
ANGLE OF STRIPE	45°	45°	45°
COLOR OF STRIPES	ORANGE AND WHITE	ORANGE AND WHITE	ORANGE AND WHITE

**BARRICADE CHARACTERISTICS**

DETOUR DESIGN SPEED (M.P.H.)	MINIMUM RADIUS (FT.) <sup>a</sup>				
	SUPERELEVATION (FT./FT.)				
	0.00 <sup>b</sup>	0.02	0.04	0.06	0.08
20	160	140	130	120	110
25	245	220	200	185	170
30	375	335	305	275	255
35	510	455	410	375	340
40	715	630	575	510	470
50	1190	1045	955	850	765

a. PER AASHTO REQUIREMENTS  
b. 0.00 SUPERELEVATION SHOULD BE AVOIDED IF POSSIBLE

**BARRICADES**

**APPLICATION NOTES**

TYPE I BARRICADES SHALL BE USED ON CONVENTIONAL ROADS OR URBAN STREETS AND ARTERIALS TO MARK A SPECIFIC HAZARD.

TYPE II BARRICADES SHALL BE USED ON EXPRESSWAYS AND FREEWAYS, SERVING THE SAME FUNCTIONS AS TYPE I BARRICADES.

TYPE III BARRICADES (SEE STD. E-107A) SHALL ONLY BE USED WHEN A ROAD SECTION OR LANE IS CLOSED TO TRAFFIC AND ARE TO BE ERRECTED AT THE POINT OF CLOSURE.

**MATERIALS**

THE BARRICADES SHOWN ON THIS SHEET SHOULD BE OF LIGHTWEIGHT MATERIAL. IF WOOD IS USED THE FOLLOWING CONDITIONS SHALL APPLY:

- WOODEN BARRICADES (TYPE I AND II)
  - SHALL NOT BE USED TO CHANNELIZE OR DELINEATE WORK AREAS WITHIN THE CLEAR ZONE OF ANY HIGHWAY WHERE OPERATING SPEEDS IN EXCESS OF 20 M.P.H. ARE EXPECTED UNLESS INSTALLED FOR PEDESTRIAN CONTROL BEHIND APPROVED POSITIVE BARRIERS.
  - MAY BE USED WHERE OPERATING SPEEDS OF 20 M.P.H. OR LESS ARE EXPECTED.
- TYPE III WOODEN BARRICADES SHALL NOT BE USED.

**COLORS**

THE BARRICADE PANELS SHOWN ON THIS SHEET SHALL HAVE ALTERNATING RETROREFLECTORIZED WHITE AND ORANGE STRIPES. THE ORANGE SHALL CONFORM WITH THE STANDARD COLORS ADOPTED BY AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS AND APPROVED BY THE US DEPARTMENT OF TRANSPORTATION FEDERAL HIGHWAY ADMINISTRATION. THE BARRICADE COMPONENTS SHALL BE WHITE UNLESS UNPAINTED METAL OR ALUMINUM IS USED.

**REFLECTORIZATION**

THE RETROREFLECTIVE SHEETING ON BARRICADE PANELS SHALL BE ASTM TYPE III.

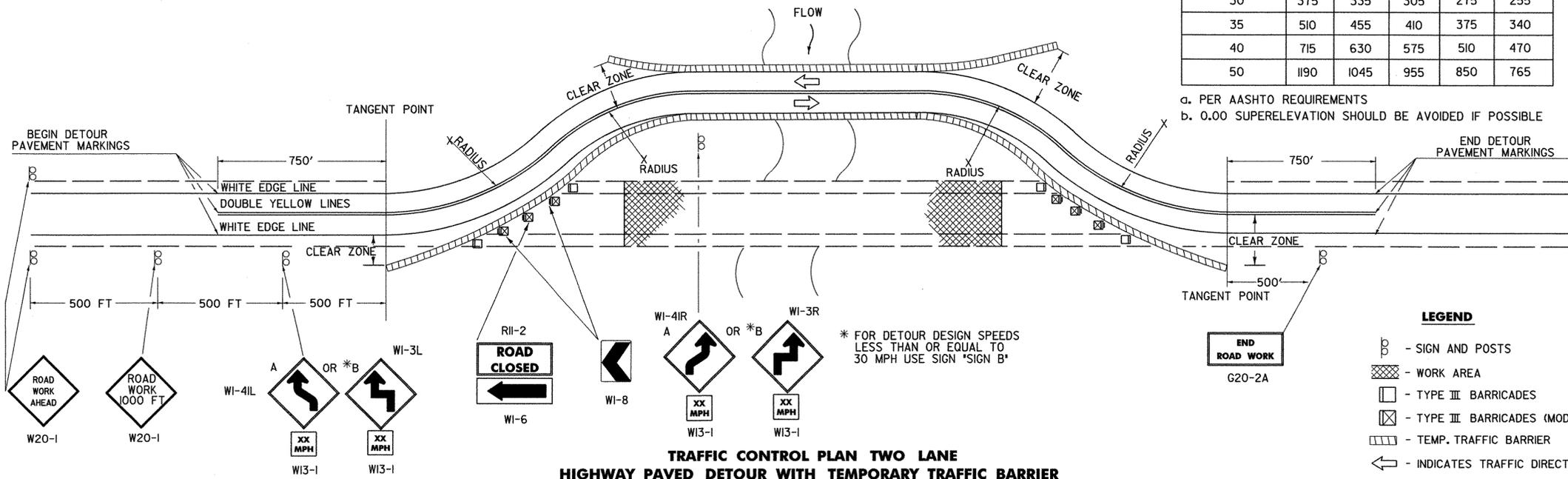
**LOCATION**

THE BARRICADES SHOWN ON THIS SHEET WILL BE LOCATED BY THE RESIDENT ENGINEER IN THE FIELD OR AS SHOWN ON THE PLANS. THE LOCATION OF THE BARRICADES SHALL FOLLOW THE PROCEDURES SET FORTH IN THE "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES", OR AS OTHERWISE NOTED.

**MAINTENANCE**

BARRICADES SHALL BE MAINTAINED IN CLEAN CONDITION, SATISFACTORY TO THE RESIDENT ENGINEER. THEY SHALL BE COMPLETELY VISIBLE TO THE APPROACHING TRAFFIC AT ALL TIMES. DAMAGED, DAFACED, OR DIRTY BARRICADES SHALL BE REPAIRED, CLEANED, OR REPLACED AS ORDERED BY THE RESIDENT ENGINEER.

ALL SIGN PLACEMENT DISTANCES ARE DESIRABLE SPECIFICATIONS. FIELD CONDITIONS SHALL CONTROL THE ACTUAL PLACEMENT. PROJECT CONSTRUCTION APPROACH SIGNING PLACEMENT SHALL TAKE INTO CONSIDERATION SPACING REQUIREMENTS FOR THE DETOUR SIGN LAYOUT REQUIREMENTS.



**TRAFFIC CONTROL PLAN TWO LANE HIGHWAY PAVED DETOUR WITH TEMPORARY TRAFFIC BARRIER**

**DETOUR NOTES**

- SIGNS AND DELINEATION SHOWN FOR ONE DIRECTION OF TRAFFIC ONLY.
- THE CONTRACTOR IS RESPONSIBLE FOR PAVEMENT MARKING AND SHALL REMOVE ANY CONFLICTING OR CONFUSING EXISTING MARKINGS.
- ADDITIONAL SIGNING MAY BE REQUIRED AT THE DISCRETION OF THE RESIDENT ENGINEER.
- UNPAVED DETOURS REQUIRE PAVEMENT MARKINGS FOR TRANSITIONS FROM EXISTING PAVEMENT.
- THE NUMBER OF CHANNELIZING DEVICES, BARRICADES AND OTHER TRAFFIC CONTROL DEVICES SHOWN ON THIS SHEET ARE FOR ILLUSTRATIVE PURPOSES ONLY. THE ACTUAL NUMBER REQUIRED SHALL BE DETERMINED BASED ON INDIVIDUAL DETOUR CONDITIONS (TAPERS, SPEED LIMITS, LENGTH OF DETOUR CURVE, ETC.).
- AASHTO CLEAR ZONE REQUIREMENTS SHOULD BE MET. IF NOT THEN AN APPROVED ENERGY ABSORPTION ATTENUATOR (SUITABLE FOR THE TEMPORARY TRAFFIC BARRIER USED AND FOR THE DESIGN SPEED) SHALL BE INSTALLED PER THE CURRENT AASHTO ROADSIDE DESIGN GUIDE.
- THE DETOUR DESIGN SPEED SHOULD BE NO LESS THAN 10 M.P.H. BELOW THE POSTED SPEED LIMIT, UNLESS PHYSICAL RESTRICTIONS PREVENT THIS.
- SEE STANDARD SHEETS E-100, E-101 AND E-102 FOR SIGN DETAIL AND MATERIAL REQUIREMENTS.
- IF THE USE OF TEMPORARY TRAFFIC BARRIER IS NOT REQUIRED, THEN REFLECTORIZED PLASTIC DRUMS SHALL BE USED.

<b>OTHER STDS. REQUIRED:</b>	<b>E-100</b>	<b>E-102</b>	<b>E-107a</b>
	<b>E-101</b>	<b>E-102a</b>	<b>E-198</b>

**REVISIONS AND CORRECTIONS**

- SEPT. 10, 1987 - DATE OF ORIGINAL ISSUE
- APRIL 29, 1988 - FHWA REVIEW COMMENTS
- SEPT. 20, 1993 - NEW RADIUS CHART, BARRICADE ALIGNMENT AND USE OF TEMPORARY TRAFFIC BARRIER
- AUG. 08, 1995 - REVISED SIGNING PER MUTCD
- JUNE 30, 2003 - CHANGED REFLECTIVE SHEETING TO TYPE III

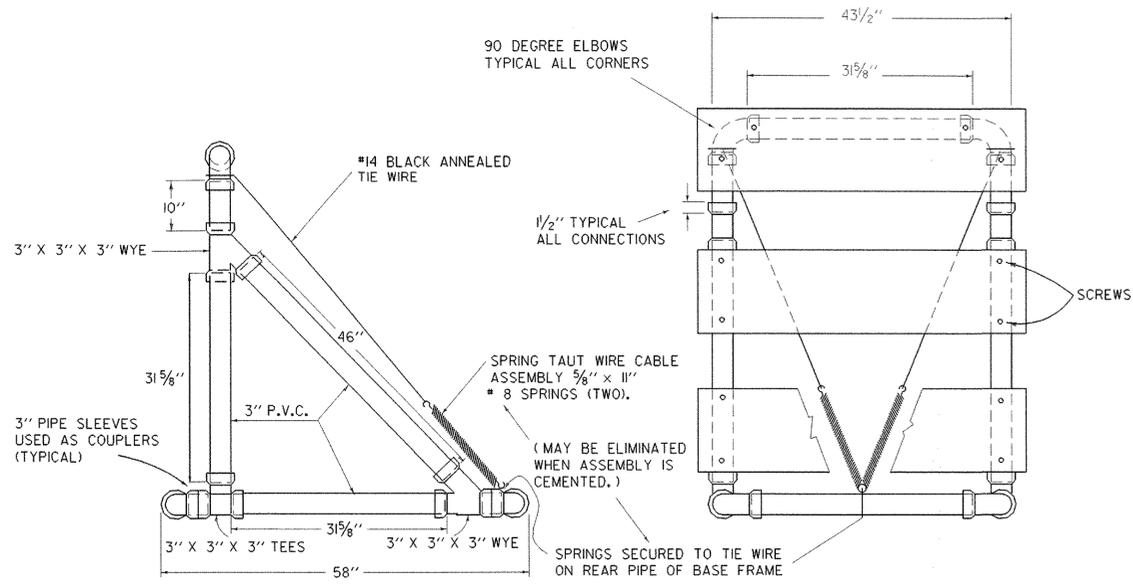
**APPROVED**

DIRECTOR OF PROGRAM DEVELOPMENT  
*[Signature]*  
TRAFFIC OPERATIONS ENGINEER  
*[Signature]*  
FEDERAL HIGHWAY ADMINISTRATION

**DELINEATION, BARRICADES AND DETOURS FOR CONSTRUCTION AREAS**



**STANDARD E-107**

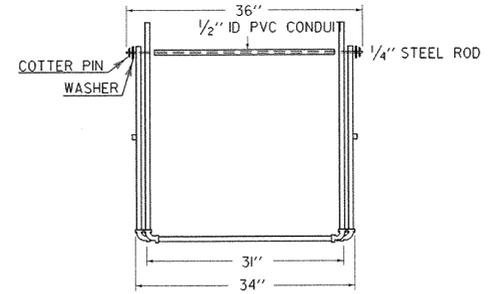
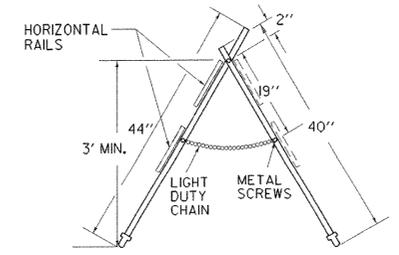


**SIDE VIEW  
TYPE III BARRICADE**

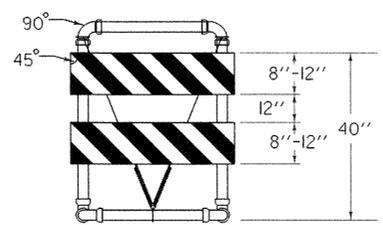
**FRONT VIEW  
TYPE III BARRICADE**

- MATERIALS FOR TYPE I AND II BARRICADES**
- 20' - 1" PVC
  - 4 - 1" PVC 90° ELBOWS
  - 30" - 1/2" ID THINWALL PVC CONDUIT
  - 36" - 1/4" STEEL ROD
  - 4 - 1" WASHERS
  - 24" - LIGHT DUTY CHAIN
  - 1/2" - #14 PAN HEAD METAL SCREWS (AS REQUIRED)
  - 2 - 3/4" COTTER PINS
  - 2 OR 4 - 8" OR 12" X 36" X 0.025" BARRICADE RAILS (AS REQUIRED)

- MATERIALS FOR TYPE III BARRICADES**
- 30 LF - 3" I. D. PVC PIPE
  - 6 - 3" 90° ELBOWS
  - 2 - 3" TEES
  - 4 - 3" WYES
  - 3 - 8" OR 12" X 48" X 0.025" BARRICADE RAILS
  - 2 - 5/8" X 11" #8 SPRING (IF ASSEMBLY IS NOT CEMENTED)
  - 12 - 1" #14 PAN HEAD METAL SCREWS
  - 15 LF - #14 BLACK ANNEALED TIE WIRE (IF ASSEMBLY IS NOT CEMENTED)

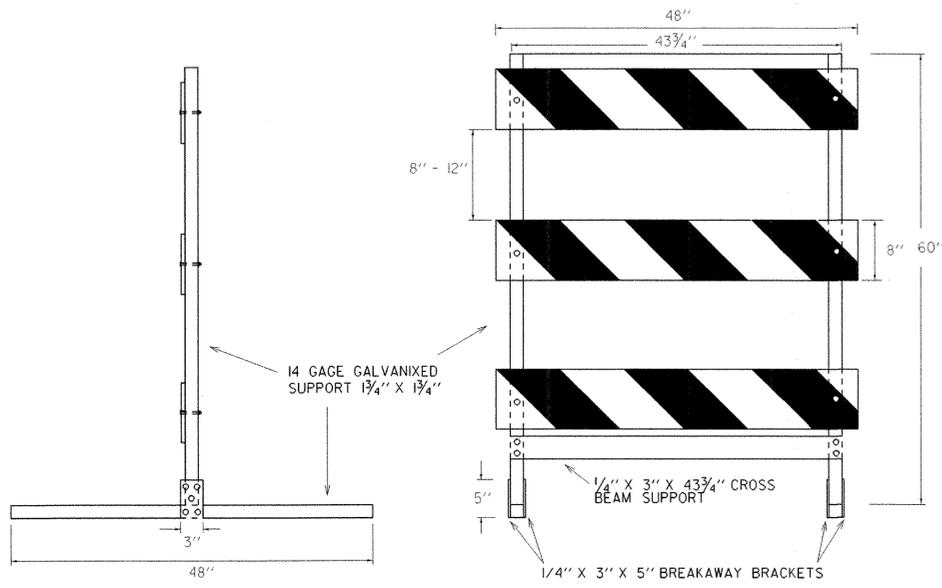


**TYPE I AND TYPE II BARRICADE**



**TYPE III ( MODIFIED ) BARRICADE  
( STRIPING IS SHOWN WITH TRAFFIC PASSING TO THE RIGHT ).**

- MATERIALS FOR METAL TYPE III BARRICADES**
- PANELS (3):**  
8' X 48" GALVANIZED STEEL... COVERED  
1 OR 2 SIDES WITH WHITE/ORANGE, DIAGONALLY STRIPED REFLECTIVE SHEETING
- VERTICAL SUPPORTS (2):** 14 GAGE GALVANIZED TUBING 1 3/4" X 1 3/4" X 60"
- HORIZONTAL SUPPORTS (2):** 14 GAGE GALVANIZED TUBING 1 3/4" X 1 3/4" X 48"
- CROSS BEAM SUPPORT (1):** COLD GALVANIZED STEEL 1/4" X 3" X 43 3/4"
- BREAKAWAY BRACKETS (4):** COLD GALVANIZED STEEL 1/4" X 3" X 5"
- FASTENERS:**  
6 - SHEAR BOLTS WITH LOCK NUTS 1/4" D X 2 3/4"  
4 - FULCRUM BOLTS WITH LOCK NUTS 3/8" D X 2 3/4"  
4 - FASTENER BOLTS WITH LOCK NUTS 3/8" D X 2 3/4"  
6 - PANEL BOLTS WITH LOCK NUTS AND WASHERS 1/4" D X 2"
- ALL FASTENERS GALVANIZED STEEL.  
ALL BOLTS HEX HEAD.



**SIDE AND FRONT VIEW OF TYPE III METAL BARRICADE**

**MATERIALS**

THE PIPE, WYES, TEES AND ELBOWS USED TO CONSTRUCT BARRICADES SHALL CONFORM TO THE REQUIREMENTS OF ASTM DESIGNATION D 2241 FOR P.V.C. I120 OR I220 SDR-21, PRESSURE RATING 200 PSL. THE WYES, TEES AND ELBOWS SHALL CONFORM TO THE REQUIREMENTS OF ASTM DESIGNATION D 2466, TYPE II, GRADE I. ALL JOINTS SHALL BE SLIP-FIT AND MAY BE LIGHTLY CEMENTED. THE BARRICADE RAILS SHALL BE FABRICATED FROM 0.025" ANODIZED ALUMINUM AND SHALL HAVE REFLECTORIZED ALTERNATING ORANGE AND WHITE STRIPES (SLOPING DOWNWARD AT AN ANGLE OF 45 DEGREES IN THE DIRECTION TRAFFIC IS TO PASS).

**MAINTENANCE**

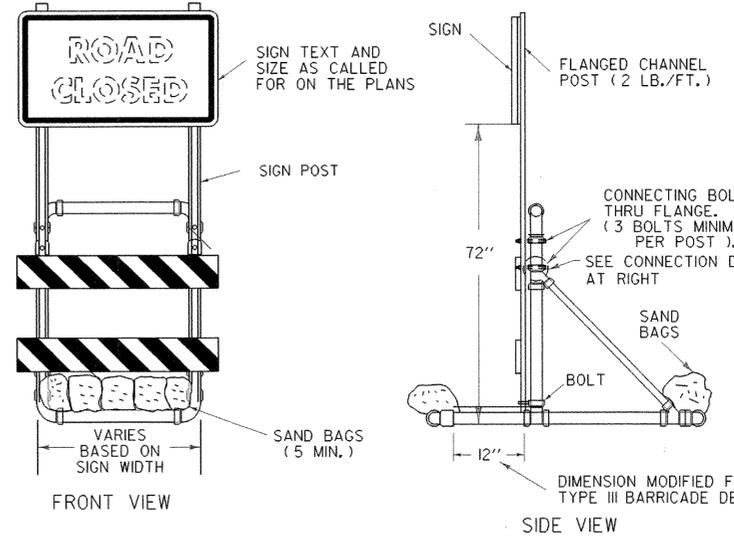
BARRICADES SHALL BE MAINTAINED IN CLEAN AND LEGIBLE CONDITIONS SATISFACTORY TO THE ENGINEER. THEY SHALL BE COMPLETELY VISIBLE TO APPROACHING TRAFFIC AT ALL TIMES. DAMAGED, DEFACED, OR DIRTY BARRICADES SHALL BE REPAIRED, CLEANED OR REPLACED AS ORDERED BY THE ENGINEER. THE P.V.C. PIPE AND FITTINGS SHALL BE WHITE IN COLOR. AT LEAST TWO (2) HOLES SHALL BE DRILLED (3/16" DIAM.) IN EACH SECTION OF PIPE AND FITTINGS IF THE ASSEMBLY IS NOT CEMENTED.

BARRICADES SHALL BE STABILIZED WITH SAND BAGS OF MINIMUM WEIGHT WHICH WILL NOT CONSTITUTE A HAZARD IF THE BARRICADE IS HIT. THESE SHALL BE PLACED ONLY ON THE FRONT AND REAR PIPES OF THE BASE FRAME OF THE BARRICADE. SAND BAG STABILIZERS SHALL BE SO PLACED AS NOT TO BE A HAZARD TO VEHICLES PASSING ON EITHER SIDE. IF BARRICADE REPLACEMENT COSTS CAN BE CONSIDERED NEGLIGIBLE, GLUED JOINTS MAY PROVIDE ADDITIONAL STABILITY TO THE INSTALLATION.

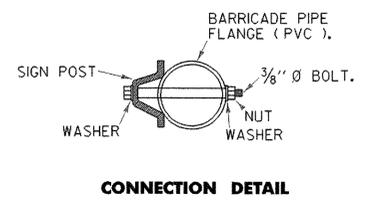
TYPE I BARRICADES SHALL UTILIZE ONE HORIZONTAL RAIL IN EACH DIRECTION.  
TYPE II BARRICADES SHALL BE A TYPE I BARRICADE WITH AN ADDITIONAL HORIZONTAL RAIL MOUNTED BELOW THE OTHER IN EACH DIRECTION.  
TYPE III BARRICADES (MODIFIED) SHALL CONSIST OF THE BREAKAWAY 3" PVC DESIGN SHOWN ON THIS SHEET WITH THE TWO RAIL LAYOUT DETAILED ABOVE LEFT.  
SEE STD E-107 FOR ADDITIONAL INFORMATION.

**NOTES:**

- 1) REFER TO STANDARD TYPE III BARRICADE (ABOVE LEFT)
- 2) ALL BARRICADE JOINTS SHALL BE GLUED.
- 3) FIVE SAND BAGS ARE REQUIRED BOTH FRONT AND BACK, 50 LB. MINIMUM EACH.



**SIGN MOUNTING ON  
TYPE III BARRICADE ( MODIFIED )**



**CONNECTION DETAIL**

**OTHER STDS. REQUIRED:  
E-107**

REVISIONS AND CORRECTIONS  
SEPT. 10, 1987 - ORIGINAL APPROVAL DATE  
SEPT. 20, 1993 - REVISED NOTES AND TYPE III (MOD.) BARRICADE DETAIL  
AUG. 08, 1995 - ADDED METAL TYPE III BARRICADE  
JUN. 08, 2009 - MINOR CORRECTIONS

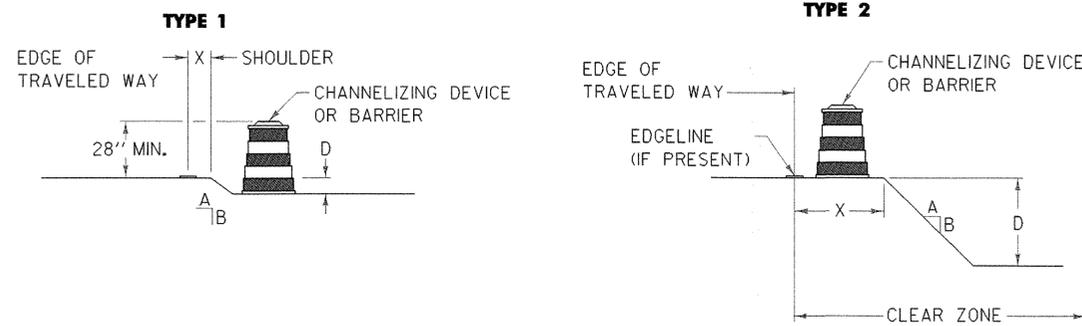
APPROVED  
*Kevin A. Plavick*  
HIGHWAY, SAFETY & DESIGN ENGINEER  
*Richard Stewart*  
DIRECTOR OF PROGRAM DEVELOPMENT  
*Mark D. Richter*  
FEDERAL HIGHWAY ADMINISTRATION

**BREAKAWAY BARRICADE  
DETAILS**



**STANDARD  
E-107 A**

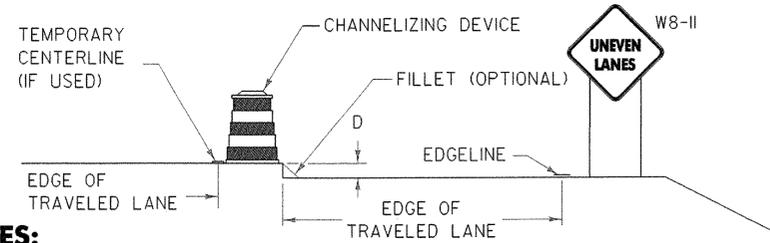
**DROP-OFF ADJACENT TO TRAVELED WAY**



**NOTES:**

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

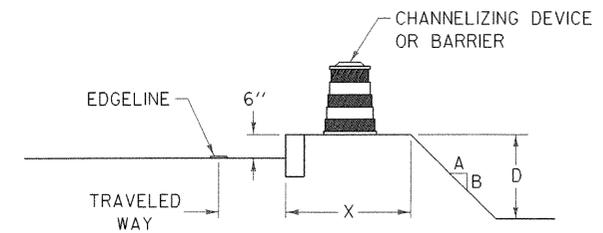
**DROP-OFF BETWEEN ADJACENT TRAVELED LANE**



**NOTES:**

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

**DROP-OFF BEYOND SHOULDER OR CURB**



**NOTES:**

- CHANNELIZING DEVICES OR BARRIER SHOULD BE PLACED TO MAXIMIZE THE WIDTH OF THE TRAVELED WAY.
- FOR SPECIFIC REQUIREMENTS USE CHART "A" OR "B" AS APPLICABLE.

**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"	1.5:1 OR FLATTER	NONE
		STEEPER THAN 1.5:1	CHANNELIZING DEVICE
4' TO 10'	GREATER THAN 6"	3:1 OR FLATTER	NONE
		STEEPER THAN 3:1	BARRIER/CHANNELIZING DEVICE
	LESS THAN 6"	ANY	NONE
4' TO 10'	6" TO 12"	3:1 OR FLATTER	NONE
		STEEPER THAN 3:1	BARRIER/CHANNELIZING DEVICE
	GREATER THAN 12"	3:1 OR FLATTER	NONE
10' TO CZ		STEEPER THAN 3:1	BARRIER/CHANNELIZING DEVICE
	LESS THAN OR EQUAL TO 12"	ANY	NONE
	GREATER THAN 12"	3:1 OR FLATTER	NONE
		STEEPER THAN 3:1	BARRIER

**NOTES:**

- THE MINIMUM CLEAR ZONE FOR FREEWAYS IS TO BE DETERMINED PER THE CURRENT "AMERICAN ASSOCIATION OF STATE HIGHWAY TRANSPORTATION OFFICIALS" (AASHTO) ROADSIDE DESIGN GUIDE. ALL OTHER HIGHWAYS WILL BE DETERMINED PER THE CURRENT "VERMONT STATE STANDARDS" BOOK.
- CHANNELIZING DEVICES MAY BE USED INSTEAD OF BARRIER FOR SHORT TERM (ONE-DAY) OPERATIONS.
- ON BORDERLINE CONDITIONS, THE ENGINEER SHOULD DETERMINE WHICH TREATMENT IS ADEQUATE FOR THE EXISTING CONDITIONS.

**CHART "B"**

**40 MPH OR LESS WITH 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

**NOTES:**

- USE THIS CHART FOR DROP-OFF BEYOND SHOULDER OR CURB.
- USE THIS CHART FOR VERTICAL CURBS OF SIX INCHES OR GREATER. FOR LOWER OR MOUNTABLE CURBS USE CHART "A".
- FOR CURBED SECTIONS WITH POSTED SPEED ABOVE 40 MPH, USE CHART "A".

**GENERAL NOTES:**

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

\* IF CHANNELIZING DEVICES ARE REQUIRED TO REMAIN IN PLACE DURING NIGHTTIME HOURS, CONES SHALL BE A MINIMUM OF 36 INCHES HIGH.
- WHERE BARRIER IS CALLED FOR, EITHER CONCRETE BARRIER (JERSEY SHAPE), STEEL BEAM GUARDRAIL OR OTHER FEDERAL HIGHWAY ADMINISTRATION (FHWA) APPROVED BARRIER MAY BE USED.
 

BARRIER ENDS FACING ONCOMING TRAFFIC SHALL BE TAPERED BEYOND THE CLEAR ZONE OR PROTECTED WITH AN APPROVED END TREATMENT DESIGNED FOR THE POSTED SPEED LIMIT OF THE ROADWAY.
- CHANNELIZING DEVICE SPACING ALONG A LONGITUDINAL DROP-OFF (TANGENT) SHALL BE AS FOLLOWS:
 

TANGENT - CHANNELIZING DEVICES SHALL BE SPACED "2S" ("S" IS THE POSTED SPEED LIMIT IN FEET) APART.
- "LOW SHOULDER" (W8-9), "SHOULDER DROP OFF" (W8-9A) OR "UNEVEN LANES" (W8-II) SIGNS, WHEN USED, SHOULD BEGIN PRIOR TO THE DROP-OFF CONDITION AND SHOULD BE REPEATED EVERY 1500 FEET.
- USE CHART "A" FOR DROP OFFS CREATED BY PROJECT ACTIVITIES.

**OTHER STDS. REQUIRED: E-101, E-106, E-107, E-107A**

REVISIONS AND CORRECTIONS  
 SEPT. 20, 1993- ORIGINAL APPROVAL DATE  
 AUG. 18, 1995 - ADDED SHOULDER WARNING NOTE  
 DEC. 8, 2008 - GENERAL UPDATE  
 JUN. 8, 2009 - MINOR REVISIONS

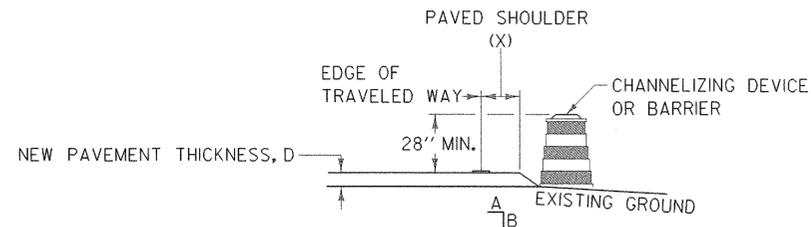
APPROVED  
  
 HIGHWAY, SAFETY & DESIGN ENGINEER  
  
 DIRECTOR OF PROGRAM DEVELOPMENT  
  
 FEDERAL HIGHWAY ADMINISTRATION

**CONSTRUCTION ZONE  
 LONGITUDINAL DROP OFFS**



**STANDARD  
 E-108**

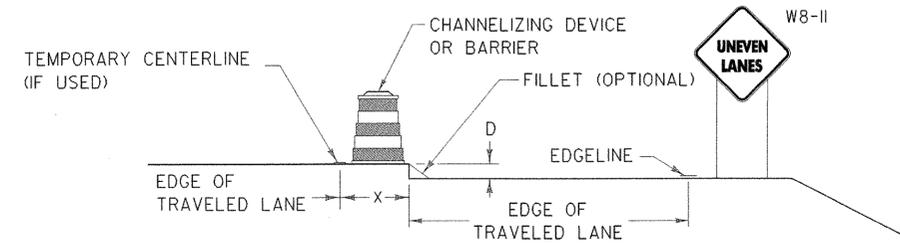
**DROP-OFF ADJACENT TO TRAVELED WAY**



**NOTES:**

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

**DROP-OFF BETWEEN ADJACENT TRAVELED LANE**



**NOTES:**

1. WHENEVER A LONGITUDINAL DROP-OFF BETWEEN ADJACENT TRAVELED LANES IS TO BE LEFT OVERNIGHT THEN "UNEVEN LANES" (W8-II) SIGNS SHOULD BE INSTALLED. CHANNELIZING DEVICES SHOULD BE INSTALLED IF THE REQUIREMENTS OF CHART "A" ARE MET.
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. FOR SPECIFIC REQUIREMENTS USE CHART "A".

**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"	1.5:1 OR FLATTER	NONE
		STEEPER THAN 1.5:1	CHANNELIZING DEVICE
GREATER THAN 6"	3:1 OR FLATTER	3:1 OR FLATTER	NONE
		STEEPER THAN 3:1	BARRIER/CHANNELIZING DEVICE
4' TO 10'	LESS THAN 6"	ANY	NONE
	6" TO 12"	3:1 OR FLATTER	NONE
		STEEPER THAN 3:1	BARRIER/CHANNELIZING DEVICE

**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 ACCEPTABLE CHANNELIZING DEVICES:
  - A. VERTICAL PANEL
  - B. TYPE I OR TYPE II BARRICADE
  - C. PLASTIC DRUM
  - \* D. CONE - WHERE APPLICABLE
  - E. TUBULAR MARKERS (MUTCD)

\* IF CHANNELIZING DEVICES ARE REQUIRED TO REMAIN IN PLACE DURING NIGHTTIME HOURS, CONES SHALL BE A MINIMUM OF 36 INCHES HIGH.
3. WHERE BARRIER IS CALLED FOR, EITHER CONCRETE BARRIER (JERSEY SHAPE), STEEL BEAM GUARDRAIL OR OTHER FEDERAL HIGHWAY ADMINISTRATION (FHWA) APPROVED BARRIER MAY BE USED.
 

BARRIER ENDS FACING ONCOMING TRAFFIC SHALL BE TAPERED BEYOND THE CLEAR ZONE OR PROTECTED WITH AN APPROVED END TREATMENT DESIGNED FOR THE POSTED SPEED LIMIT OF THE ROADWAY.
4. CHANNELIZING DEVICE SPACING ALONG A LONGITUDINAL DROP-OFF (TANGENT) SHALL BE AS FOLLOWS:
 

TANGENT - CHANNELIZING DEVICES SHALL BE SPACED "2S" ("S" IS THE POSTED SPEED LIMIT IN FEET) APART.
5. "LOW SHOULDER" (W8-9), "SHOULDER DROP OFF" (W8-9A) OR "UNEVEN LANES" (W8-II) SIGNS, WHEN USED, SHOULD BEGIN PRIOR TO THE DROP-OFF CONDITION AND SHOULD BE REPEATED EVERY 1500 FEET.
6. USE CHART "A" FOR DROP OFFS CREATED BY PROJECT ACTIVITIES.

**OTHER STDS. REQUIRED: E-101, E-106, E-107, E-107A**

**NOTE:**

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

REVISIONS AND CORRECTIONS  
 DEC. 8, 2008 - ORIGINAL APPROVAL DATE  
 JUN. 8, 2009 - MINOR REVISIONS

APPROVED  
*Kim S. Mauldin*  
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*Richard J. Smith*  
 DIRECTOR OF PROGRAM DEVELOPMENT  
*Mark D. Richter*  
 FEDERAL HIGHWAY ADMINISTRATION

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



**STANDARD**  
**E-108 A**

**NOTES**

**REFLECTORIZAION**

ALL SIGNS USED DURING THE HOURS OF DARKNESS SHALL BE REFLECTORIZED (TYPE II OR III). CONES USED FOR TRAFFIC CONTROL AT NIGHT SHALL COMPLY WITH STANDARD E-106.

**COLORS**

THE WARNING SIGNS SHOWN ON THIS SHEET SHALL HAVE BLACK TEXT, BORDER, AND SYMBOLS ON AN ORANGE BACKGROUND. THE TEXT AND BORDERS MAY BE SCREENED, LETTERING FILM, OR HAND PAINTED. THE ORANGE SHALL CONFORM WITH THE STANDARD COLORS ADOPTED BY THE AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS AND APPROVED BY THE U.S. DEPARTMENT OF TRANSPORTATION, FEDERAL HIGHWAY ADMINISTRATION.

**TEXT DESIGN**

LETTERS, DIGITS, SPACING, AND TEXT DIMENSIONS SHALL CONFORM WITH THE "STANDARD ALPHABETS FOR HIGHWAY SIGNS" AS REFERENCED IN THE "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES".

**SPECIFICATIONS**

WARNING SIGNS SHALL MEET THE STANDARD STATE SPECIFICATIONS FOR TRAFFIC SIGNS.

**SIGN BASE MATERIAL**

THE SIGN BASE MATERIAL USED FOR THE WARNING SIGNS ON THIS SHEET MAY BE OF ANY OF THE FOLLOWING, WITH MINIMUM THICKNESS AS NOTED:

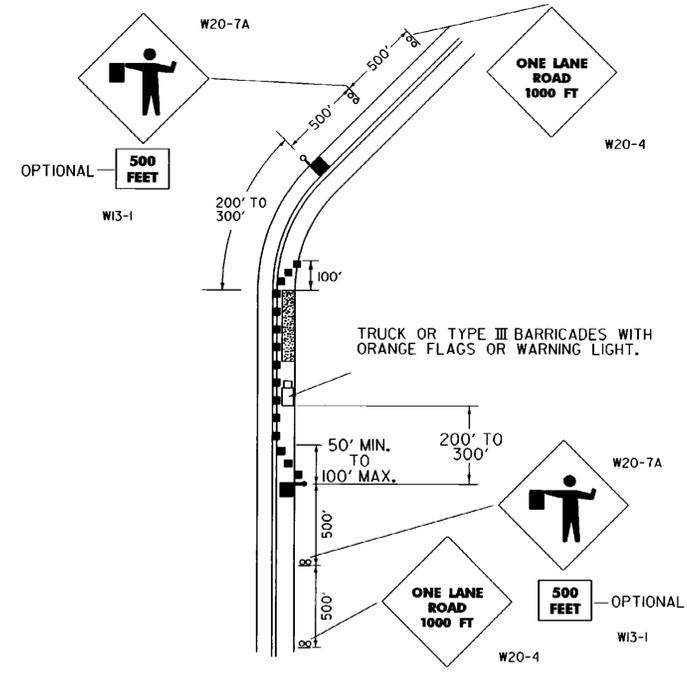
FLAT STEEL OR ALUMINUM	0.125 INCHES
HIGH DENSITY OVERLAPPED PLYWOOD	1/2, 5/8, OR 3/4 INCHES
GALVANIZED SHEET STEEL	12 GAGE

- SIGNS WITH "ROAD WORK 1500 FT. AND "END ROAD WORK" TEXT SHALL BE USED WHEN THE WORK IS NOT COMPLETE AND A HAZARD REMAINS OVERNIGHT.
- THE FLAGPERSON SHALL USE THE SIGN PADDLE DETAILED ON STANDARD SHEET E-102.
- ALL SIGNS SHALL BE COVERED OR REMOVED AT THE END OF THE WORKING DAY UNLESS REQUIRED FOR THE PROTECTION AND SAFETY OF THE TRAVELING PUBLIC.
- INSTALLATION: SIGNS AND BARRICADES SHALL BE IN PLACE PRIOR TO THE START OF THE MAINTENANCE OPERATION TO WHICH THEY APPLY AND SHALL BE REMOVED PROMPTLY WHEN THE NEED NO LONGER EXISTS. EACH SIGN SHALL BE ERECTED IN A NEAT AND WORKMANLIKE MANNER ON YIELDING WOOD OR METAL POSTS SET SECURELY IN THE GROUND (IN ACCORDANCE WITH STD. E-121), OR ON PORTABLE SUPPORTS WHEN APPROPRIATE. THE INSTALLATION OF SIGNS AND BARRICADES SHALL BE SUBJECT TO THE APPROVAL OF THE ENGINEER.
- ALTHOUGH LISTED AS A MAINTENANCE OPERATION STANDARD SIGN SHEET, THE APPROACH SIGNS SHOWN SHALL BE USED BY CONTRACTORS WHEN WORKING WITHIN OR OUTSIDE PROJECT LIMITS.
- ALL DISTANCES ARE DESIRABLE SPECIFICATIONS. FIELD CONDITIONS SHALL CONTROL THE ACTUAL PLACEMENT.
- SIGN DETAILS NOT SHOWN ON THIS SHEET CAN BE FOUND ON STANDARD SHEETS E-100, E-101, AND E-102.
- TAPER FORMULA  
 $L = SXW$  FOR SPEEDS OF 45 OR MORE  
 $L = \frac{WS^2}{60}$  FOR SPEEDS OF 40 OR LESS  
 WHERE  
 L = MINIMUM LENGTH OF TAPER  
 S = NUMERICAL VALUE OF POSTED SPEED LIMIT PRIOR TO WORK OR 85 PERCENTILE SPEED.  
 W = WIDTH OF OFFSET.
- THE MAXIMUM SPACING BETWEEN CHANNELIZING DEVICES IN A TAPER SHOULD BE APPROXIMATELY EQUAL IN FEET TO THE SPEED LIMIT IN M.P.H.. ON TANGENT SECTIONS THE MAXIMUM SPACING SHOULD BE APPROXIMATELY EQUAL TO TWICE THE POSTED SPEED LIMIT.
- FLOOD LIGHTS SHOULD BE PROVIDED TO MARK THE FLAGPERSON STATIONS AT NIGHT AS NEEDED.
- AT SHORT WORK ZONES WHERE ADEQUATE SIGHT DISTANCE IS AVAILABLE FOR THE SAFE HANDLING OF TRAFFIC ONE FLAGGER MAY BE USED WITH THE APPROVAL OF THE ENGINEER.
- CHANNELIZING DEVICES SHALL BE EXTENDED TO A POINT WHERE THEY ARE VISIBLE TO APPROACHING TRAFFIC.
- THE NUMBER OF CHANNELIZING AND OTHER TRAFFIC CONTROL DEVICES SHOWN ON THIS SHEET ARE FOR ILLUSTRATIVE PURPOSES ONLY. THE ACTUAL NUMBER REQUIRED SHALL BE DETERMINED BASED ON INDIVIDUAL DETOUR CONDITIONS (TAPERS, SPEED LIMITS, LENGTH OF DETOUR CURVE, ETC.).

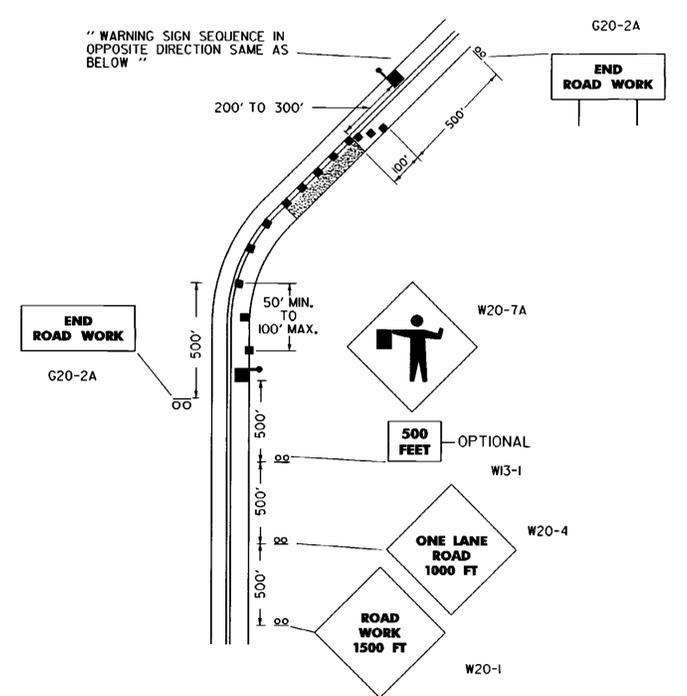
**LEGEND:**

- FLAGPERSON
- CHANNELIZING DEVICES (CONES OR DRUMS)
- FLASHING ARROW PANEL
- WORK AREA
- SIGN & POSTS
- TYPE III BARRICADES

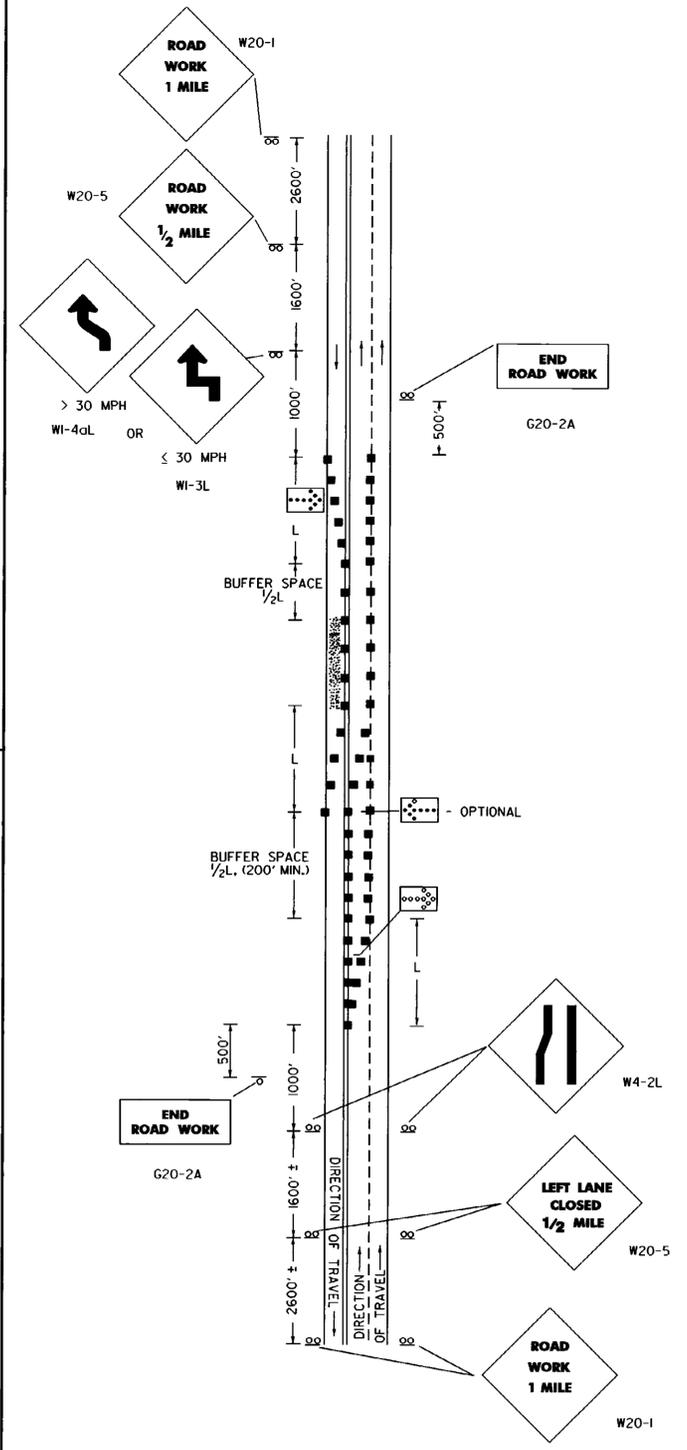
**OTHER STDS. REQUIRED:** E-100 E-101 E-102 E-106



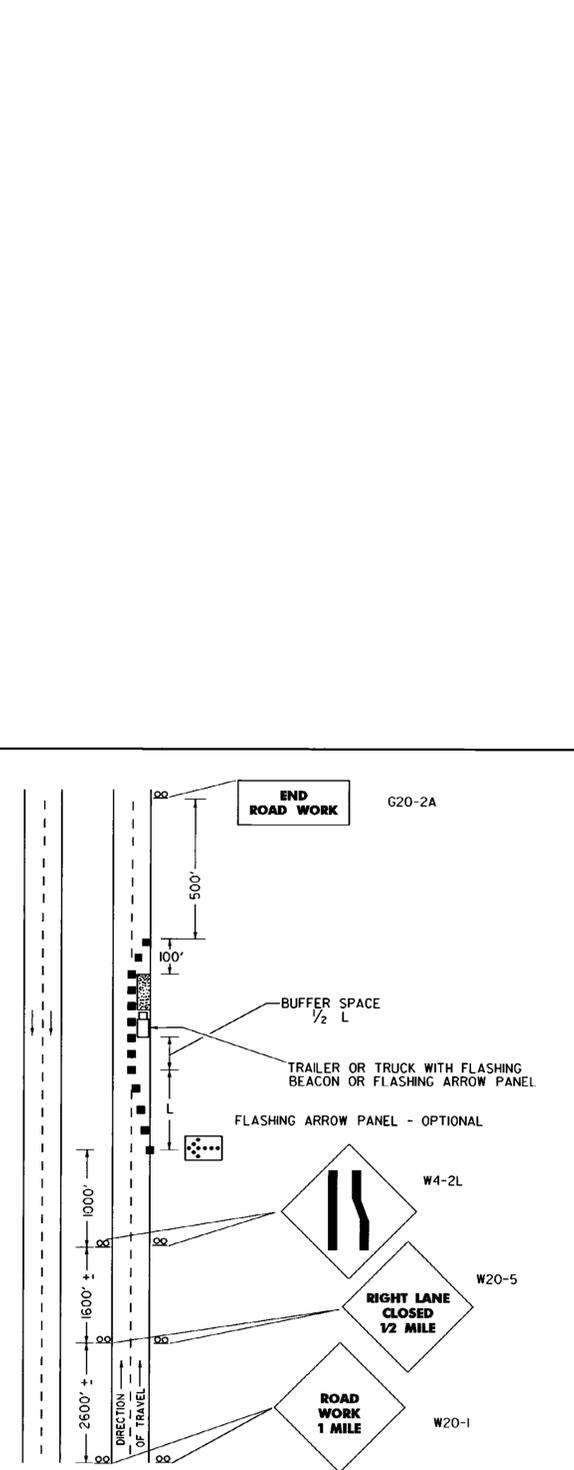
**TYPICAL APPLICATIONS - DAYTIME MAINTENANCE OPERATIONS OF SHORT DURATION ON A 2-LANE ROADWAY WHERE FLAGGING IS PROVIDED**



**TYPICAL APPLICATIONS - TRAFFIC CONTROL DEVICES ON 2-LANE HIGHWAY WHERE ONE LANE IS CLOSED AND FLAGGING IS PROVIDED.**



**TYPICAL APPLICATION - DAYTIME MAINTENANCE OPERATION OF SHORT DURATION ON A 3 LANE ROADWAY WHERE CENTER LANE IS USED FOR OPPOSING TRAFFIC**



**TYPICAL APPLICATION - DAYTIME MAINTENANCE OPERATIONS OF SHORT DURATION ON A 4-LANE DIVIDED ROADWAY WHERE HALF OF ROADWAY IS CLOSED.**

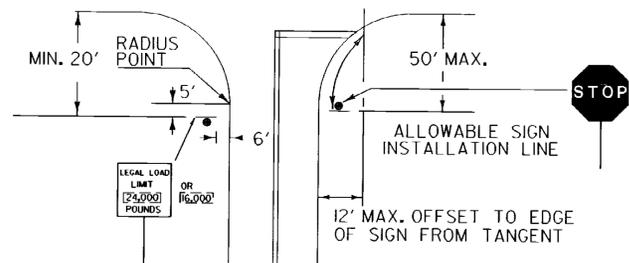
**REVISIONS AND CORRECTIONS**  
 SEPT 10, 1987 - DATE OF ORIGINAL ISSUE  
 MAR 01, 1988 - FHWA REVIEW COMMENTS  
 SEP 20, 1993 - REVISED NOTES & MISC. DETAILS  
 AUG 08, 1995 - DELETED SIGN DETAILS  
 APPROVED FOR THIS PROJECT AND/OR DESIGN IMPLEMENTATION, FHWA FINAL APPROVAL PENDING.

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

# MAJOR MAINTENANCE OPERATION LANE CLOSURE

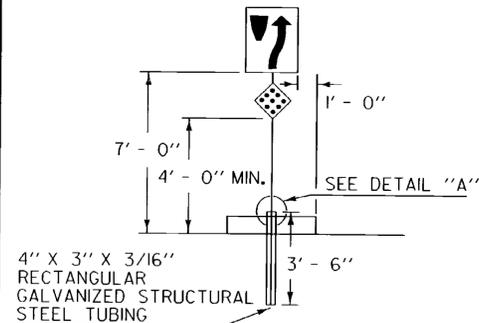


# STANDARD E-110

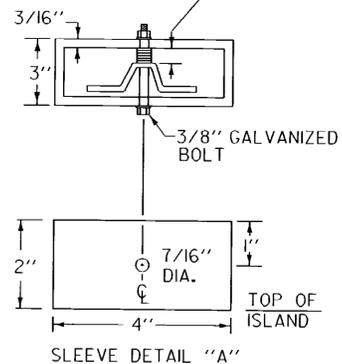


STOP SIGN SHALL BE PLACED ON DRIVERS RIGHT, MAINTAINING MAXIMUM VISIBILITY. CLEARANCE SHALL BE A MINIMUM OF 6' AND A MAXIMUM OF 50' FROM EDGE LINE OF INTERSECTING ROADWAY AND DOES NOT HAVE TO BE ADJACENT TO THE STOP BAR.

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

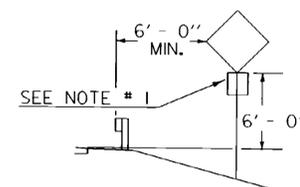
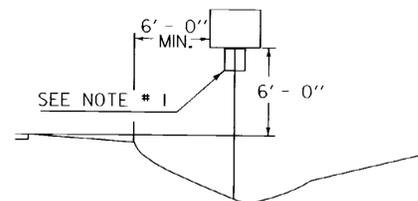
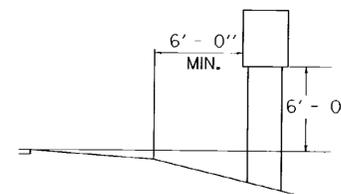


TO INSURE A TIGHT CONNECTION GALVANIZED WASHERS SHALL BE USED AS SPACERS.

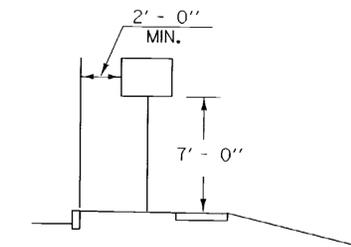
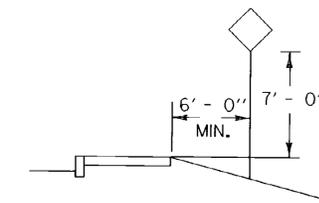


**SIGNS ON MEDIAN ISLANDS IN THE LINE OF TRAFFIC**

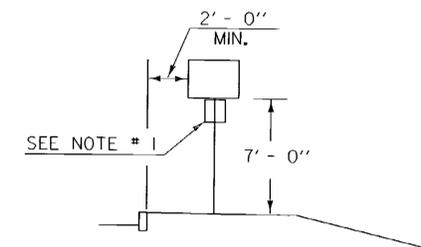
INCREASE VERTICAL CLEARANCE TO 7' IN AREAS OF FREQUENT ROADSIDE PARKING OR PEDESTRIAN ACTIVITY



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

**REVISIONS AND CORRECTIONS**

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

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

**APPROVED**

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*Daniel A. Ross*  
TRAFFIC AND SAFETY ENGINEER

**STANDARD SIGN PLACEMENT  
CONVENTIONAL ROAD**

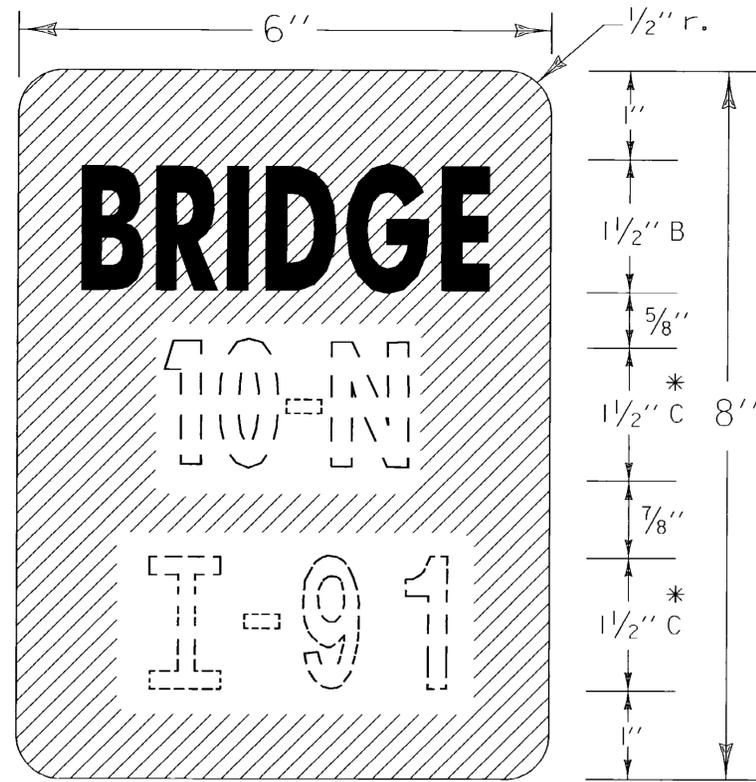
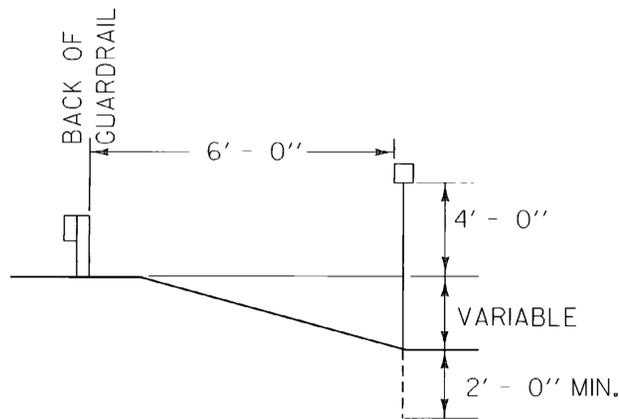
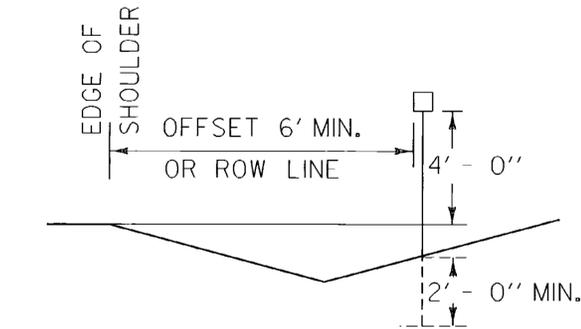


**STANDARD  
E-121**

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:**



STANDARD  
 E-134

**REVISIONS AND CORRECTIONS**

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

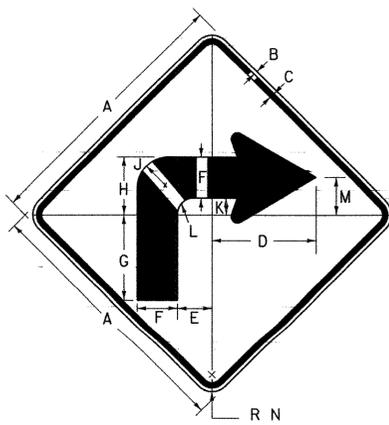
**APPROVED**

*Gordon J. MacArthur*  
 DIRECTOR OF ENGINEERING

*David A. Ross*  
 TRAFFIC AND SAFETY ENGINEER

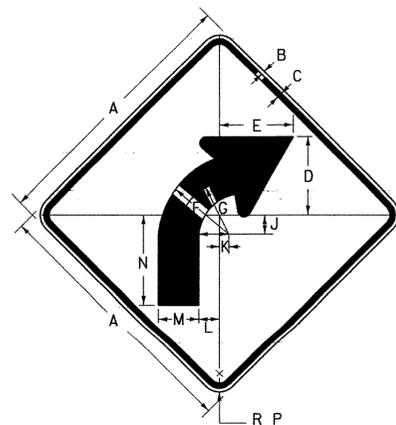
**BRIDGE NUMBER PLAQUE**

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



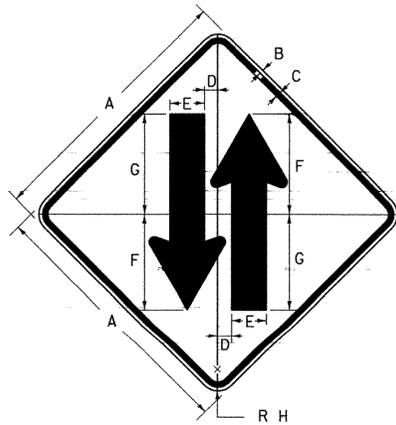
**W1-1R**

SIGN	DIMENSIONS (INCHES)													
	A	B	C	D	E	F	G	H	J	K	L	M	N	
PATH	18	3/8	5/8	7/4	2 1/4	2 5/8	5 7/8	3 3/4	1 7/8	1	5/8	2 1/2	1 1/2	
MIN.	24	3/8	5/8	9 5/8	3	3 1/2	7 3/4	5	2 1/2	1 1/2	1 5/8	3 1/4	1 1/2	
STD.	30	1/2	3/4	12	3 3/4	4 3/8	9 1/16	6 1/4	3	1 7/8	1	4 1/16	1 7/8	
EXPWY.	36	5/8	7/8	14 3/8	4 1/2	5 1/4	11 5/8	7 1/2	3 5/8	2 1/4	1 1/4	4 7/8	2 1/4	
SPECIAL	48	3/4	1 1/4	19 3/16	6	7	15 1/2	10	4 1/8	3	1 5/8	6 1/2	3	



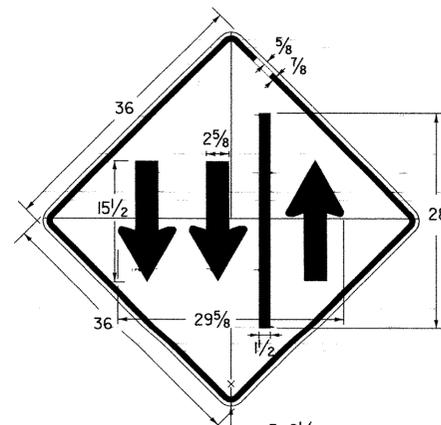
**W1-2R**

SIGN	DIMENSIONS (INCHES)														
	A	B	C	D	E	F	G	H	J	K	L	M	N	P	
PATH	18	3/8	5/8	5 3/8	5 1/2	6	4 3/4	3 3/8	1 3/4	1 1/4	2	2 5/8	6 1/4	1 1/2	
MIN.	24	3/8	5/8	7 1/8	7 1/4	8	6 1/4	4 1/2	2 1/2	1 3/4	2 3/4	3 1/2	8 1/4	1 1/2	
STD.	30	1/2	3/4	8 7/8	9 1/16	10	7 13/16	5 5/8	2 5/16	2 3/16	3 1/16	4 3/8	10 5/16	1 7/8	
EXPWY.	36	5/8	7/8	10 5/8	10 7/8	12	9 3/8	6 3/4	3 1/2	2 5/8	4 1/8	5 1/4	12 3/8	2 1/4	
SPECIAL	48	3/4	1 1/4	14 3/16	14 1/2	16	12 1/2	9	4 11/16	3 1/2	5 1/2	7	16 1/2	3	

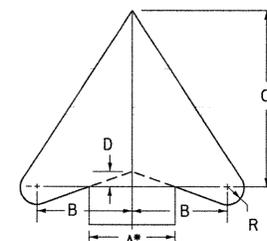


**W6-3**

SIGN	DIMENSIONS (INCHES)							
	A	B	C	D	E	F	G	H
MIN.	30	1/2	3/4	2 1/16	3 3/4	1 1/4	10 5/8	1 7/8
STD.	36	5/8	7/8	2 5/16	4 1/4	1 3/2	12 3/4	2 1/4
SPECIAL	48	3/4	1 1/4	3 7/8	6	18	17	3

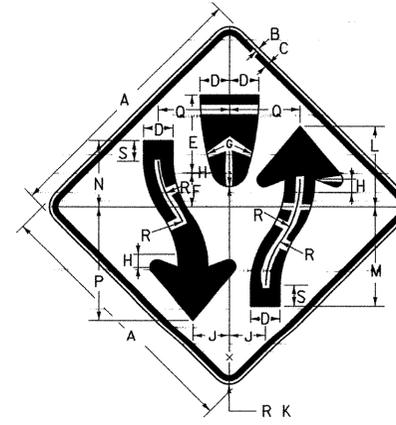


**VW-029**



\* SEE SIGN DETAIL FOR APPROPRIATE WIDTH

DIMENSIONS (INCHES)				
A	B	C	D	E
2	2 5/16	4 1/16	5 1/16	3 3/8
2 1/4	2 5/8	4 1/2	3 3/8	7 1/16
2 1/2	2 7/8	5 1/16	3 3/8	1 1/2
2 5/8	3	5 1/4	3 3/8	1 1/2
2 3/4	3 3/16	5 5/16	7 1/16	9 1/16
3	3 1/2	6 1/8	7 1/16	9 1/16
3 1/8	3 5/8	6 3/8	1 1/2	5 5/8
3 1/4	3 3/4	6 5/8	1 1/2	5 5/8
3 5/16	3 9/16	6 11/16	1 1/2	1 1/16
3 1/2	4	7 1/8	9 1/16	1 1/16
3 3/4	4 5/16	7 5/8	9 1/16	3 1/4
4	4 5/8	8 1/8	5 5/8	1 1/16
4 1/16	4 3/4	8 1/4	5 5/8	1 1/16
4 1/4	4 7/8	8 5/8	5 5/8	1 1/16
4 3/8	5	8 7/8	1 1/16	7 1/8
4 1/2	5 3/16	9 1/8	1 1/16	7 1/8
4 3/4	5 1/16	9 5/8	3 1/4	1
4 7/8	5 5/8	9 7/8	3 1/4	1
5	5 3/4	10 1/8	3 1/4	1
5 1/4	6	10 5/8	1 1/16	1 1/16
5 1/2	6 3/8	11 1/8	7 1/8	1 1/8
5 3/4	6 5/8	11 1/4	7 1/8	1 1/8
6	6 7/8	12 3/16	1 1/16	1 3/16
6 1/2	7 1/2	13 3/16	1	1 5/16
7	8	14 3/16	1 1/16	1 3/8
7 1/2	8 5/8	15 3/16	1 1/8	1 1/2
8	9 3/16	16 1/4	1 1/4	1 5/8



**W6-1**

SIGN	DIMENSIONS (INCHES)																
	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S
MIN.	30	1/2	3/4	3 5/16	8 5/16	4 1/8	25	1 1/16	4 1/8	1 7/8	10	11 5/8	7 5/16	13 1/16	7 7/8	8 5/16	2 1/16
STD. & EXPWY.	36	5/8	7/8	4	10	5	30	2	5	2 1/4	12	14	9 1/2	16 1/2	9 1/2	10	2 1/2
SPECIAL	48	3/4	1 1/4	5 1/4	13 1/8	6 3/16	39 5/16	2 5/8	6 3/16	3	16	18 1/16	12 1/16	22	12 7/16	13 1/8	3 5/16

(ALL DIMENSIONS SHOWN IN INCHES EXCEPT WHERE NOTED)

**NOTES**

**DESIGN**

LETTERS, DIGITS, ARROWS, SYMBOLS, SPACING, AND TEXT DIMENSIONS SHALL CONFORM WITH THE "STANDARD HIGHWAYS SIGNS BOOK" AND DESIGNS PRESCRIBED IN THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD) ADOPTED BY THE U.S. DEPARTMENT OF TRANSPORTATION, FEDERAL HIGHWAY ADMINISTRATION (FHWA).

**MATERIALS**

THE SIGN BASE MATERIALS USED FOR THE WARNING SIGNS SHOWN ON THIS SHEET MAY BE ANY OF THE FOLLOWING, OF THE MINIMUM THICKNESS NOTED.

	24" x 24"	24" x 12"	36" x 18"	48" x 48"
18" x 18"	30" x 30"	36" x 36"	48" x 48"	
FLAT SHEET ALUMINUM	0.060"	0.080"	0.100"	0.125"

**REFLECTORIZATION**

THE BACKGROUND RETROREFLECTIVE MATERIAL SHALL BE ASTM TYPE III, TYPE VIII OR TYPE IX RETROREFLECTIVE SHEETING APPLIED TO THE ENTIRE SIGN. THE TEXT, BORDER AND SYMBOLS SHALL BE LETTERING FILM OR SILK SCREENED.

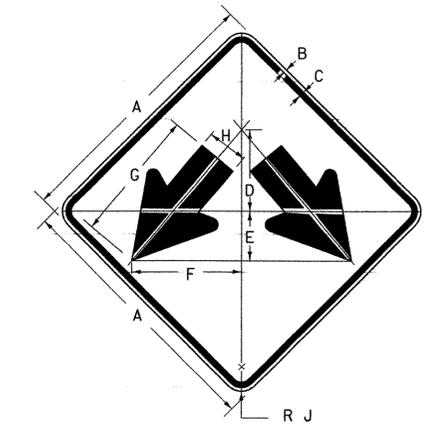
**COLORS**

ALL THE WARNING SIGNS SHOWN ON THIS SHEET SHALL HAVE BLACK TEXT AND SYMBOLS ON RETROREFLECTORIZED YELLOW BACKGROUND UNLESS OTHERWISE NOTED. THE COLORS SHALL CONFORM WITH THE COLORS ADOPTED BY AASHTO AND APPROVED BY THE FHWA.

**SPECIFICATIONS**

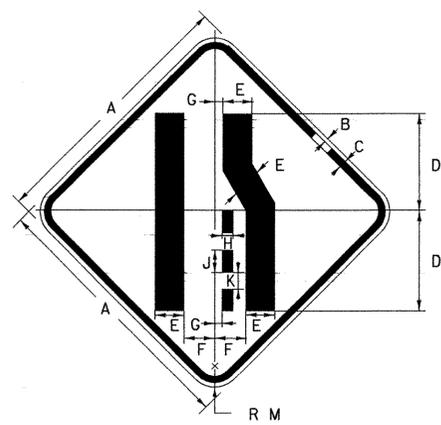
WARNING SIGNS SHALL MEET THE VERMONT STANDARD SPECIFICATIONS FOR CONSTRUCTION "TRAFFIC SIGNS".

**OTHER STDS. REQUIRED:**



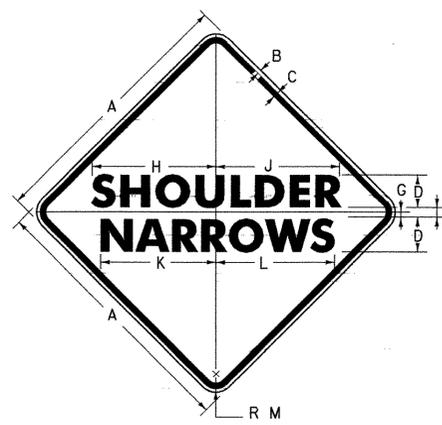
**W12-1**

SIGN	DIMENSIONS (INCHES)									
	A	B	C	D	E	F	G	H	J	
STD. & MIN.	24	3/8	5/8	8	4 1/8	9 3/4	11 5/8	3 1/8	1 1/2	
SPECIAL	30	1/2	3/4	10	5 1/4	12 3/8	14 1/16	4	1 7/8	
SPECIAL	36	5/8	7/8	12	6 1/8	14 5/8	17 1/2	4 3/4	2 1/4	



**W4-2**

SIGN	DIMENSIONS (INCHES)											
	A	B	C	D	E	F	G	H	J	K	L	
MIN.	30	1/2	3/4	10	3 3/8	4 3/8	7 1/8	1 1/2	2 1/2	1 1/4	1 7/8	
STD. & EXPWY.	36	5/8	7/8	12	4	5	1	1 3/4	3	1 1/2	2 1/4	
FWY.	48	3/4	1 1/4	16	5 3/8	6 1/16	1 1/4	2 3/8	4	2	3	



**VW-619**

SIGN	DIMENSIONS (INCHES)												
	A	B	C	D	E	F	G	H	J	K	L	M	
MIN & STD.	36	5/8	7/8	5C	3	6D	1	13 1/16	13 1/16	17 5/8	18 1/4	2 1/4	
EXPWY.	48	3/4	1 1/4	7D	3 1/2	7D	1	23 3/16	23 3/16	21 1/2	21 3/16	3	

**REVISIONS AND CORRECTIONS**

OCT. 31, 1987 - DATE OF ORIGINAL ISSUE  
 AUG. 08, 1995 - MISC. NOTE CHANGES AND ADDED I.D. NUMBERS TO EACH DETAIL.  
 MAY 01, 2004 - CHANGED REFLECTIVE SHEETING TO TYPE III ADDED PATH DIMENSIONS AND VW-029 SIGN

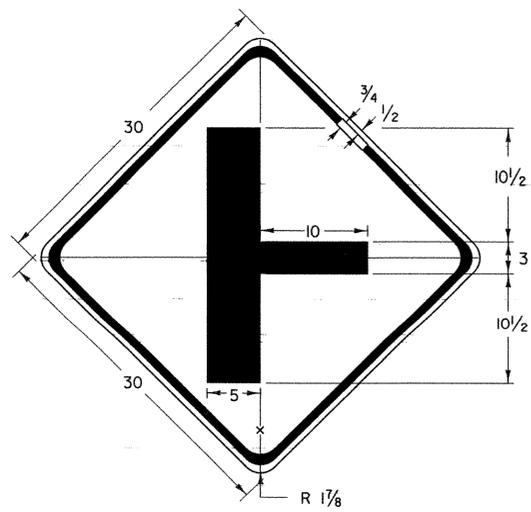
**APPROVED**

*John H. Fell*  
 DIRECTOR OF PROGRAM DEVELOPMENT  
*John H. Fell*  
 TRAFFIC OPERATIONS ENGINEER  
*Michael*  
 FEDERAL HIGHWAY ADMINISTRATION

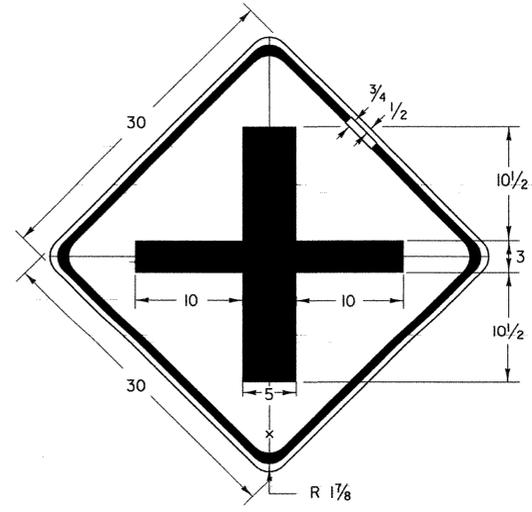
**WARNING SIGNS  
 DETAIL**



**STANDARD  
 E-151**

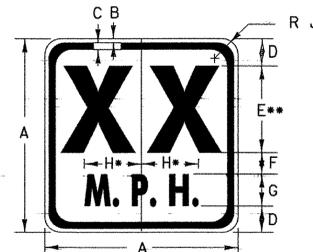


W2-2M



W2-1M

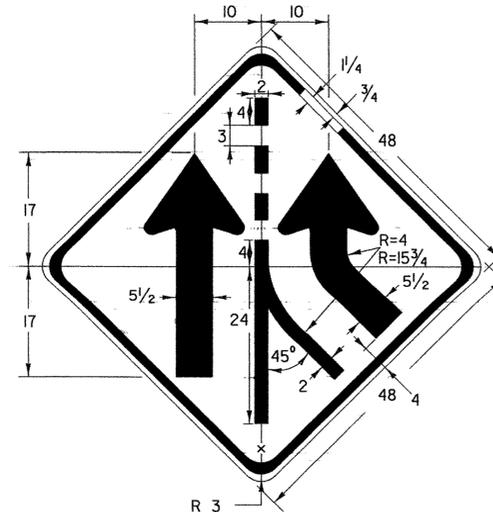
STATE ROUTE /MINOR TOWN HIGHWAY INTERSECTION SIGNS (TYP.)



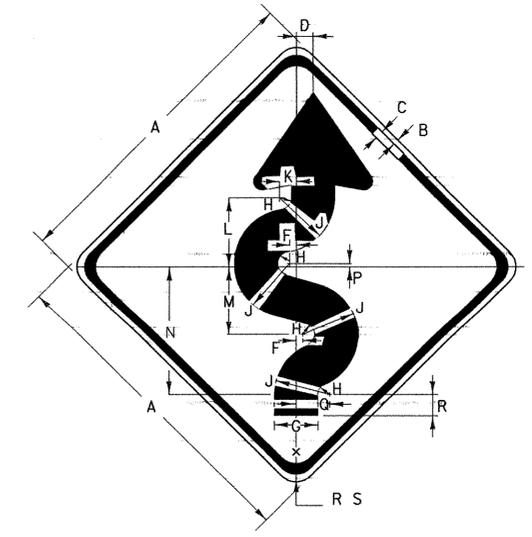
W13-1

- \* INCREASE SPACING 100%
- \*\* OPTICALLY SPACE NUMERALS ABOUT VERTICAL CENTERLINE

SIGN	DIMENSIONS (INCHES)									
	A	B	C	D	E	F	G	H	J	
STD.	18	3/8	5/8	2 1/2	8E	2	3E	5 5/16	1 1/2	
SPECIAL	24	3/8	5/8	3 5/8	10E	2 3/4	4E	7 1/16	1 1/2	



W4-3



W1-5

SIGN	DIMENSIONS (INCHES)																
	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S
PATH	18	3/8	5/8	1	9 5/8	3/8	2 1/2	5/8	3	1	4	4	8 5/8	1/4	2	1 1/4	1 1/2
MIN.	24	3/8	5/8	1 1/4	12 3/4	1/2	3 1/4	7/8	4 1/8	1 1/4	5 3/16	5 1/4	11 3/8	1/4	2 1/2	1 9/32	1 1/2
STD.	30	1/2	3/4	1 9/16	15 5/16	5/8	4 1/16	1 1/32	5 3/32	1 1/16	6 3/16	6 9/16	14 1/32	5/16	3 1/8	2	1 7/8
EXPWY.	36	5/8	7/8	1 7/8	19 1/8	3/4	4 1/8	1 1/16	6 7/16	1 1/8	7 5/16	7 7/16	17 1/16	3/8	3 3/4	2 9/32	2 1/4
SPECIAL	48	3/4	1 1/4	2 1/2	25 1/2	1	6 1/2	1 3/4	8 1/4	2 1/2	10 3/8	10 1/2	22 3/4	1/2	5	3 3/16	3

NOTES

DESIGN

LETTERS, DIGITS, ARROWS, SYMBOLS, SPACINGS, AND TEXT DIMENSIONS SHALL CONFORM WITH THE 'STANDARD HIGHWAY SIGNS BOOK' AND DESIGNS PRESCRIBED IN THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD) ADOPTED BY THE U.S. DEPARTMENT OF TRANSPORTATION, FEDERAL HIGHWAY ADMINISTRATION (FHWA). SEE STANDARD SHEET E-151 FOR ARROWHEAD DETAILS.

MATERIALS

THE SIGN BASE MATERIALS USED FOR THE WARNING SIGNS SHOWN ON THIS SHEET MAY BE ANY OF THE FOLLOWING, OF MINIMUM THICKNESS NOTED.

	24"X24"	30"X30"	36"X36"	48"X48"
FLAT SHEET ALUMINUM	0.060"	0.080"	0.100"	0.125"

REFLECTORIZATION

THE BACKGROUND RETROREFLECTIVE MATERIAL SHALL BE ASTM TYPE III, TYPE VIII OR TYPE IX RETROREFLECTIVE SHEETING APPLIED TO THE ENTIRE SIGN.

THE TEXT, BORDER AND SYMBOLS SHALL BE LETTERING FILM OR SILK SCREENED.

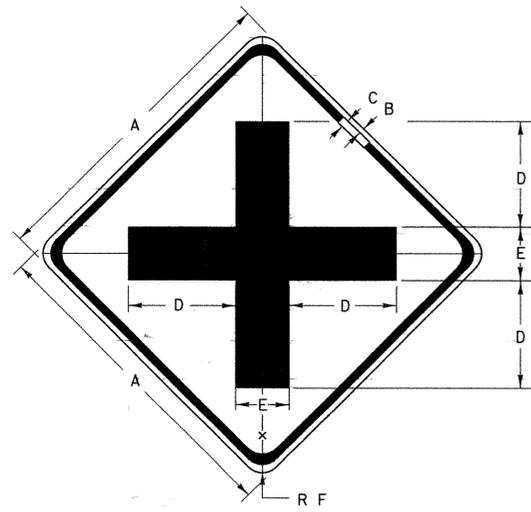
COLORS

ALL THE WARNING SIGNS SHOWN ON THIS SHEET SHALL HAVE BLACK TEXT AND SYMBOLS ON RETROREFLECTORIZED YELLOW BACKGROUND UNLESS OTHERWISE NOTED. THE COLORS SHALL CONFORM WITH THE COLORS ADOPTED BY AASHTO AND APPROVED BY THE FHWA.

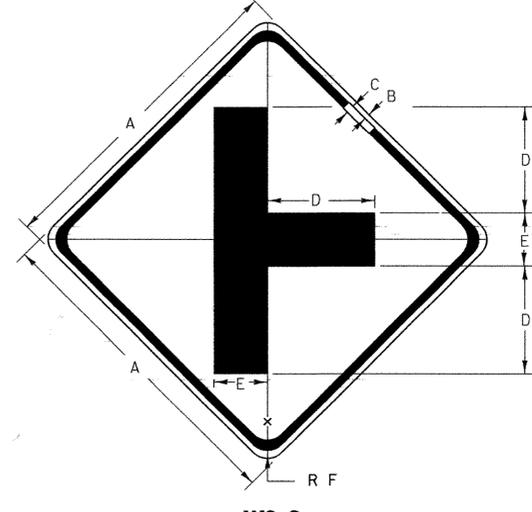
SPECIFICATIONS

WARNING SIGNS SHALL MEET THE VERMONT STANDARD SPECIFICATIONS FOR CONSTRUCTION \*TRAFFIC SIGNS\*.

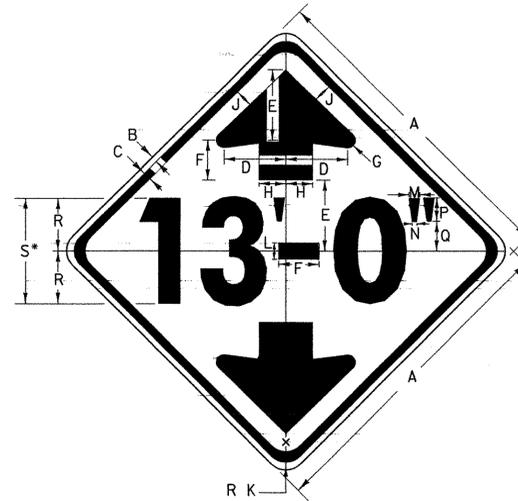
OTHER STDS. E-151 REQUIRED:



W2-1



W2-2



W12-2

- \* OPTICALLY SPACE VERTICAL CLEARANCE ABOUT VERTICAL CENTERLINE (WHERE 10" IS USED IN VERT. CLEARANCE, USE SERIES C NUMERALS)

SIGN	DIMENSIONS (INCHES)					
	A	B	C	D	E	F
PATH	18	3/8	5/8	6	3	1 1/2
MIN.	24	3/8	5/8	8	4	1 1/2
STD.	30	1/2	3/4	10	5	1 7/8
EXPWY.	36	5/8	7/8	12	6	2 1/4
SPECIAL	48	3/4	1 1/4	16	8	3

SIGN	DIMENSIONS (INCHES)					
	A	B	C	D	E	F
PATH	18	3/8	5/8	6	3	1 1/2
MIN.	24	3/8	5/8	8	4	1 1/2
STD.	30	1/2	3/4	10	5	1 7/8
EXPWY.	36	5/8	7/8	12	6	2 1/4
SPECIAL	48	3/4	1 1/4	16	8	3

SIGN	DIMENSIONS (INCHES)																
	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S
MIN.	30	1/2	3/4	5 3/4	6 5/8	3 3/4	3/4	2 1/2	1 1/16	1 7/8	1 9/16	1	7/16	2 1/4	3 5/16	5	10D
STD. & EXPWY.	36	5/8	7/8	6 7/8	8	4 1/2	1	3	2	2 1/4	1 7/8	1 1/4	1/2	2 3/4	4	6	12D
FWY.	48	3/4	1 1/4	9 3/8	10 5/8	5 7/8	1 1/16	4	2 5/8	3	2 7/16	1 5/8	5/8	3 5/8	5 1/2	8	16D

STATE ROUTE /STATE ROUTE OR MAJOR TOWN HIGHWAY INTERSECTION SIGNS (TYP.)

(ALL DIMENSIONS SHOWN IN INCHES EXCEPT WHERE NOTED)

REVISIONS AND CORRECTIONS

AUG. 08, 1995 - DATE OF ORIGINAL ISSUE  
MAY 01, 2004 - CHANGED REFLECTIVE SHEETING TO TYPE III  
MINOR NOTE CHANGES

APPROVED

*[Signature]*  
DIRECTOR OF PROGRAM DEVELOPMENT  
*[Signature]*  
TRAFFIC OPERATIONS ENGINEER  
*[Signature]*  
FEDERAL HIGHWAY ADMINISTRATION

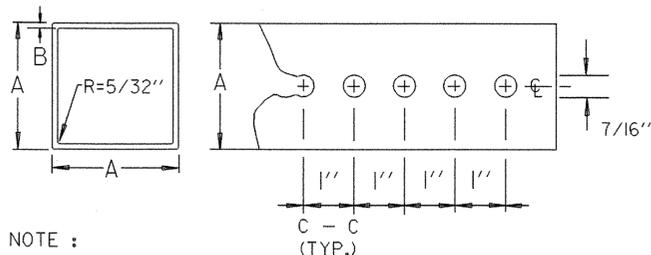
WARNING SIGN  
DETAILS



STANDARD  
E-155

GUARDRAIL DEFLECTION CHART (PER AASHTO - ROADSIDE DESIGN GUIDE - LATEST EDITION)		
TYPE	GR POST SPACING	DEFLECTION
THREE CABLE W/STEEL POSTS	16' - 0"	11" - 6"
W/WOODEN POSTS	12' - 6"	11" - 6"
W-BEAM W/STRONG POST	6' - 3"	3'
BOX BEAM	6' - 0"	5'
THRIE BEAM W/STRONG POST	6' - 3"	2'

THIS CHART LISTS THE THEORETICAL MAXIMUM DEFLECTION DISTANCE, UPON IMPACT, OF DIFFERENT TYPES OF GUARDRAIL AND VARIOUS POST SPACINGS.



NOTE :

THE POSTS SHALL BE CAREFULLY FORMED OF STEEL WITH A MINIMUM YIELD OF 55,000 PSI, INTO A SIZE AND SHAPE WITH CORNERS INDUCTION WELDED IN SUCH A MANNER THAT NEITHER FLASH NOR WELD SHALL INTERFERE WITH THE TELESCOPING PROPERTIES, NOR DAMAGE THE GALVANIZING.

\* THE WALL THICKNESS TOLERANCES SHALL BE +.005" AND -.010" FOR THE 12 GAUGE.

\* THE WALL THICKNESS TOLERANCES SHALL BE +.002" AND -.008" FOR THE 14 GAUGE.

### DIMENSION DETAILS AND POST SELECTION CHART

POST SELECTION CHART								
SIGN AREA ( FT <sup>2</sup> ) X H ( FT ) ≤ SV ( SELECTION VALUE )								
POST SIZE LBS./FT.	DIMENSIONS			SECTION MODULUS IN <sup>3</sup>	ONE POST S <sub>v</sub>	TWO POST S <sub>v</sub>	THREE POST S <sub>v</sub>	NUMBER PERMITTED IN 8' PATH
	A	*B	GAUGE					
1.88	1-3/4"	.083	14	0.230	46	92	138	TWO
2.42	2"	.083	12	0.380	77	154	231	TWO
3.35	2-1/2"	.105	12	0.642	130	260	390	ONE

DESIGN CRITERIA:

WIND SPEED = 70 MPH (10 -YEAR MEAN RECURRENCE INTERVAL)  
WIND PRESSURE = 19 PSF  
STEEL MINIMUM YIELD = 55,000 PSI  
ALLOWABLE STRESS = (1.4) 0.60 FY

REVISIONS AND CORRECTIONS  
APR. 27, 1994 - ORIGINAL APPROVAL DATE  
JUL. 21, 1994 - REVISED POST GAUGES  
AUG. 18, 1995 - ADDED TWO PIECE ANCHOR DETAIL  
MAR. 26, 1996 - REVISED POST SELECTION CHART  
MAY 20, 1999 - REPLACE LOST ORIGINAL  
JUN. 08, 2009 - POST SELECTION REVISIONS

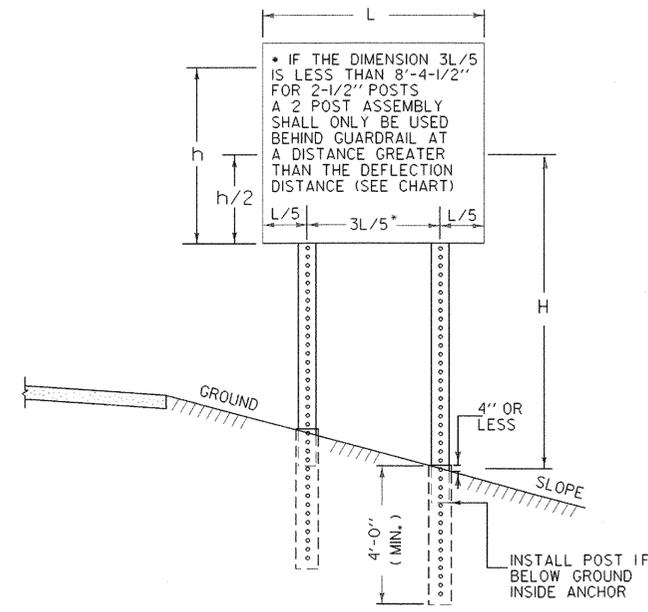
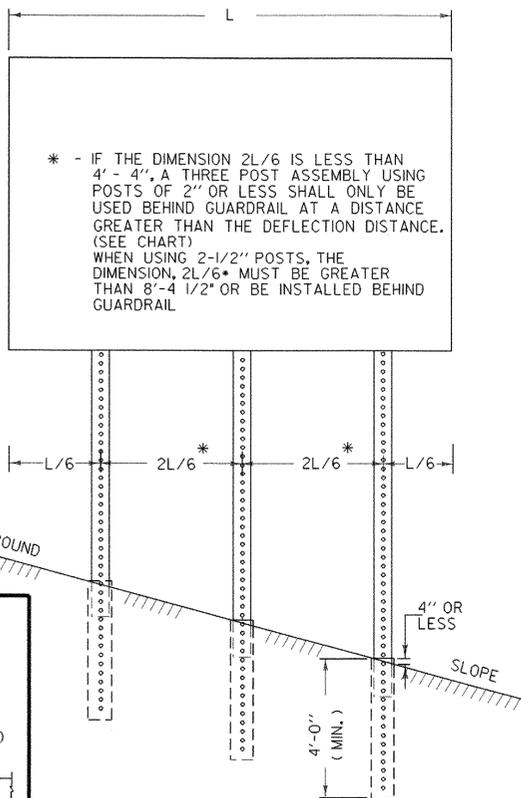
APPROVED

*Kevin S. Maschie*  
HIGHWAY, SAFETY & DESIGN ENGINEER  
*Richard J. Peterson*  
DIRECTOR OF PROGRAM DEVELOPMENT  
*Mark B. Kishner*  
FEDERAL HIGHWAY ADMINISTRATION

# SQUARE STEEL SIGN POST

/traf/english/std/e164.dgn

### MULTI-POST INSTALLATIONS



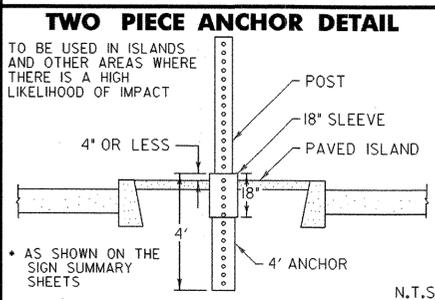
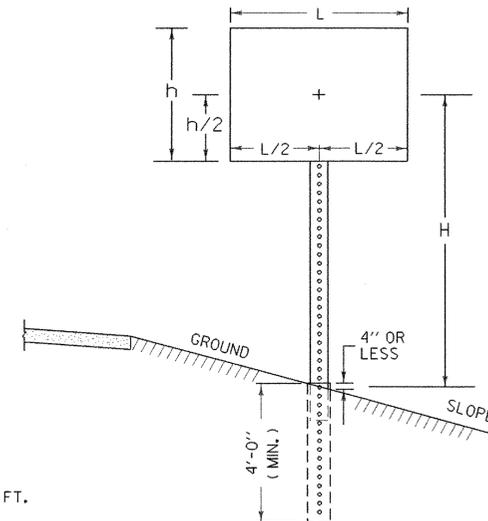
### POST SPACING DETAILS

### GENERAL NOTES

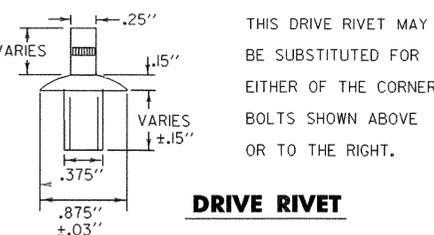
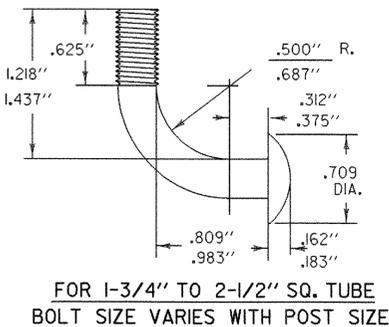
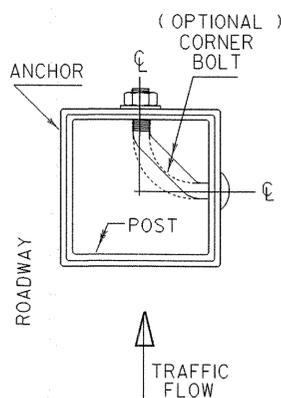
CONSTRUCTION METHODS - POSTS MAY BE DRIVEN OR SET IN A DUG HOLE AND BACKFILLED. IF DRIVEN, A DRIVING CAP SHALL BE USED. THE DUG HOLE INSTALLATION SHALL BE USED IN AREAS OF POOR SOIL CONDITIONS OR AS DIRECTED BY THE RESIDENT ENGINEER. BACKFILL SHALL BE COMPACTED AS DIRECTED BY THE RESIDENT ENGINEER.

SIGN CLEARANCES - HORIZONTAL AND VERTICAL SIGN CLEARANCES SHALL BE SHOWN ON THE PLANS OR THE APPROPRIATE STD. SHEETS.

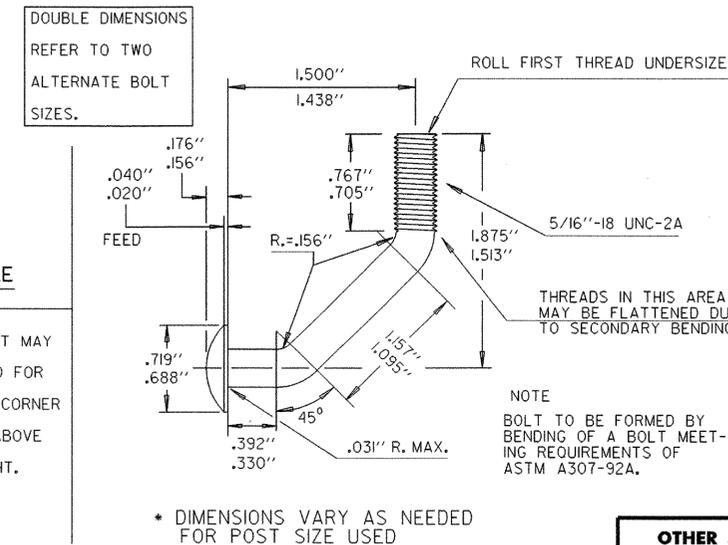
SINGLE POST INSTALLATIONS SHALL BE LIMITED TO A SIGN AREA OF 20 SQ. FT. OR LESS



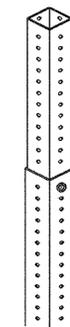
### TOP VIEW OF ANCHOR, POST AND BOLT



### OPTIONAL CORNER BOLT DETAILS



### CONNECTION DETAIL

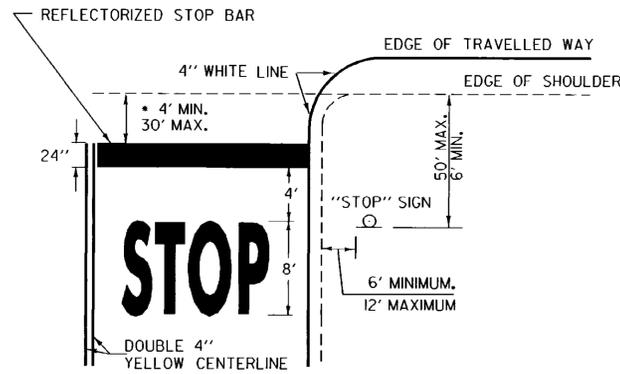


(SEE DETAIL LEFT FOR BOLT PLACEMENT)

OTHER STDS. E-120, E-160  
REQUIRED

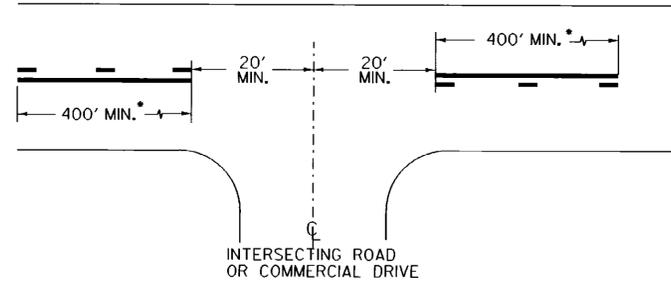


# STANDARD E-164



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

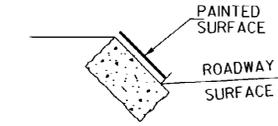
**STOP BAR LAYOUT**



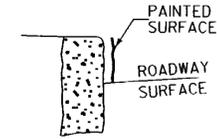
\* THE SOLID LINE SHALL BE PAIRED WITH EITHER A SOLID OR DASHED LINE DEPENDING ON SIGHT DISTANCE AVAILABILITY IN THE OPPOSING DIRECTION. ADJUSTMENTS TO THE 40 FOOT CENTERLINE OPENING MAY BE MADE TO ACCOMMODATE SKEWED INTERSECTIONS.

- 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.

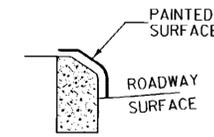
**CENTERLINE LAYOUT**



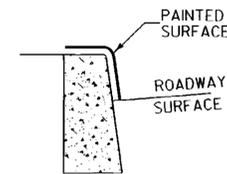
**GRANITE SLOPE EDGING**



**VERTICAL GRANITE CURB**

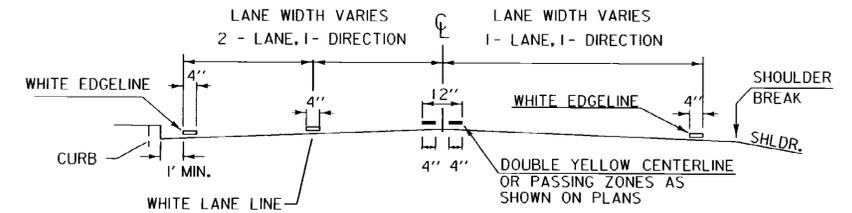


**TYPE A (CONCRETE)**

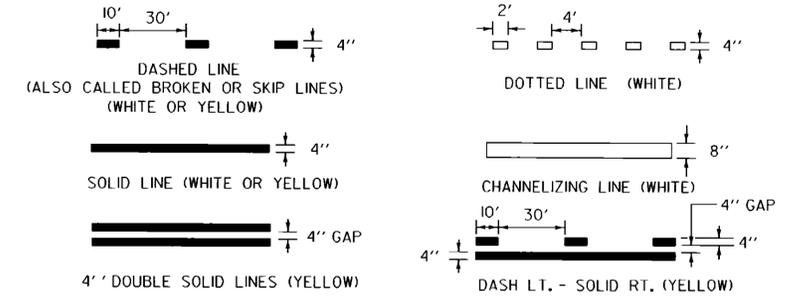


**TYPE B (CONCRETE)**

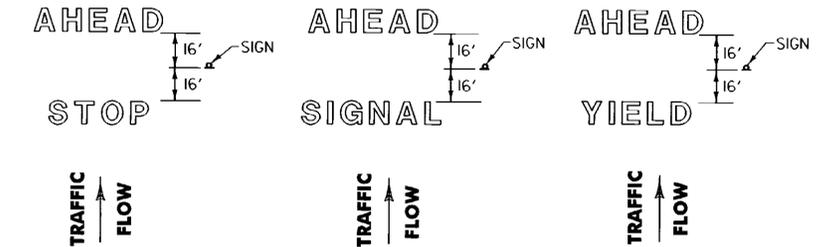
**PAINTED CURB**



**PAVEMENT MARKING PLACEMENT DETAIL**

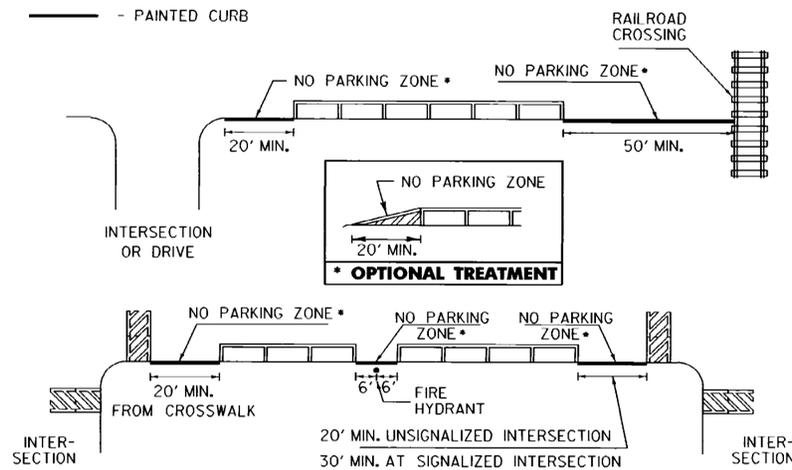


**PAVEMENT MARKING LINE DETAILS**

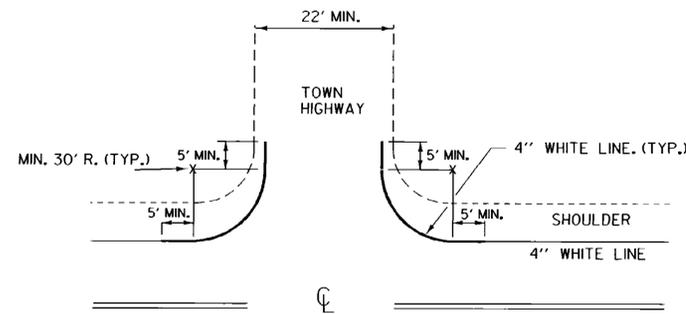


**LETTER IN WORD MARKING SPACING DETAIL**

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



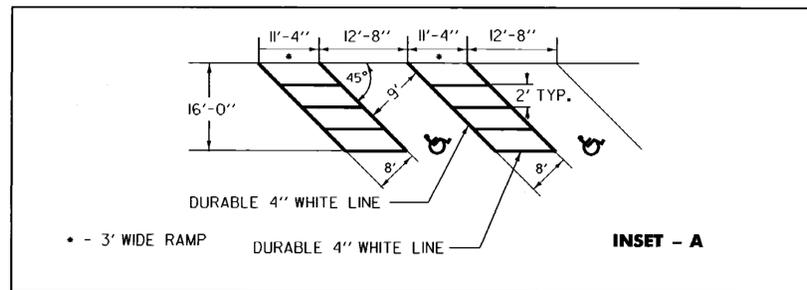
**NO PARKING LAYOUT DETAILS**



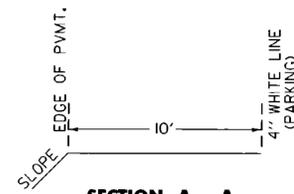
EDGELINES SHALL BE APPLIED TO ALL STATE HIGHWAYS AND SHOULD BE MAINTAINED AT A CONSTANT DISTANCE FROM THE CENTERLINE UNLESS PAVEMENT WIDTH INCREASES TO ALLOW WIDER LANES.

APPLY EDGELINE 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 EDGELINE USING AN 80 FOOT GAP AT INTERSECTION.

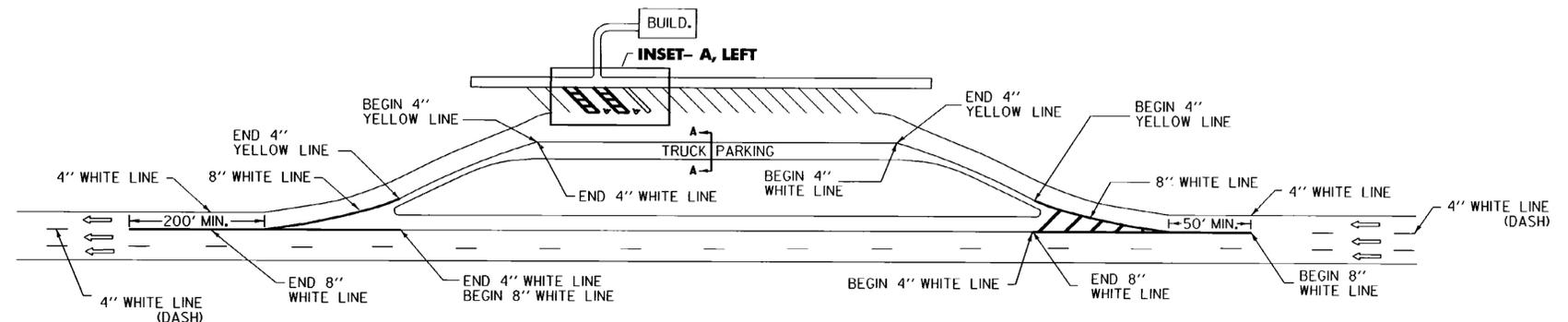
**EDGELINE LAYOUTS**



**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**

*Stephen S. McArthur*  
DIRECTOR OF ENGINEERING

*Daniel A. Ross*  
TRAFFIC AND SAFETY ENGINEER

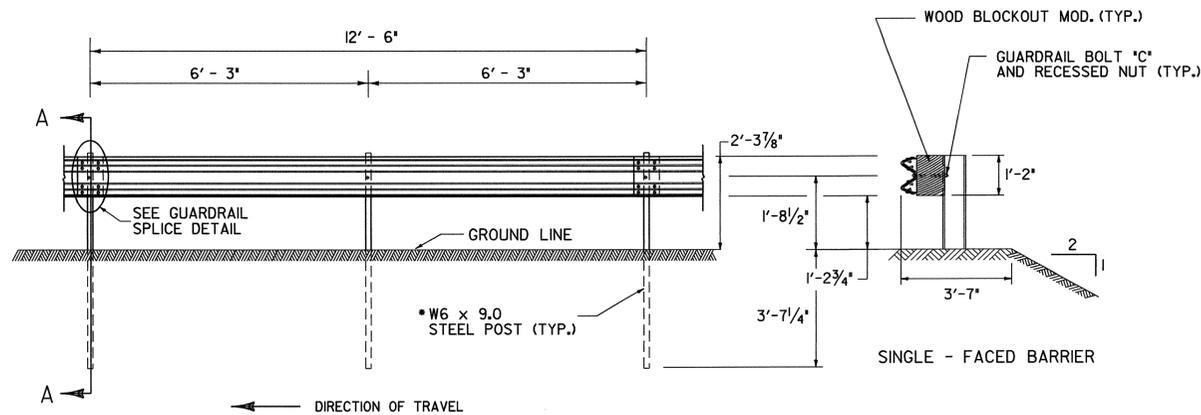
APPROVED FOR THIS PROJECT AND/OR DESIGN IMPLEMENTATION. FHWA FINAL APPROVAL PENDING.

**PAVEMENT MARKING DETAILS**



**STANDARD E-193**

"W" BEAM GUARDRAIL WITH STEEL POSTS



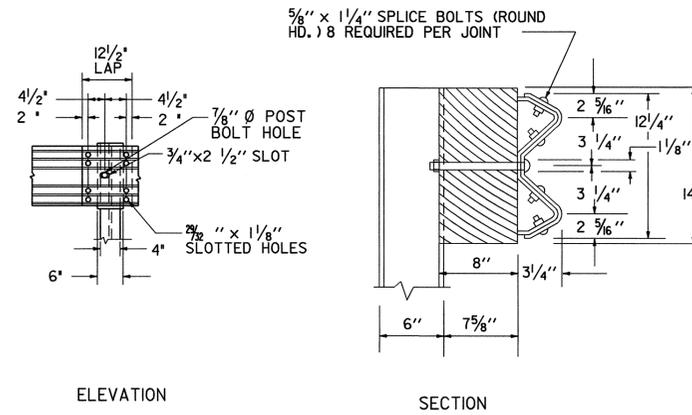
ELEVATION FROM  $\phi$  OF ROAD

SECTION A - A

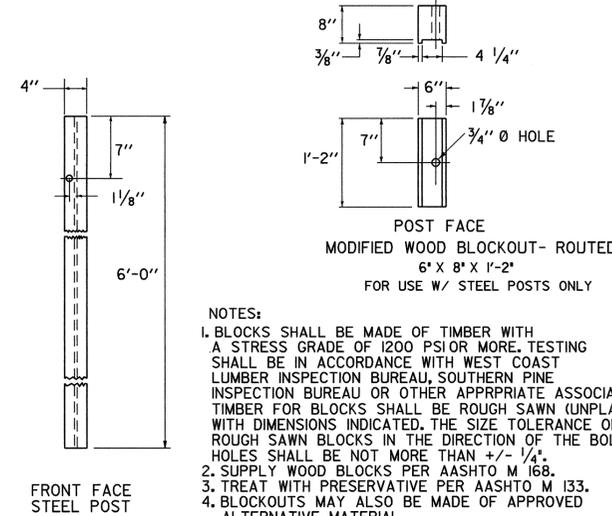
SINGLE - FACED BARRIER

DOUBLE - FACED BARRIER

PLAN

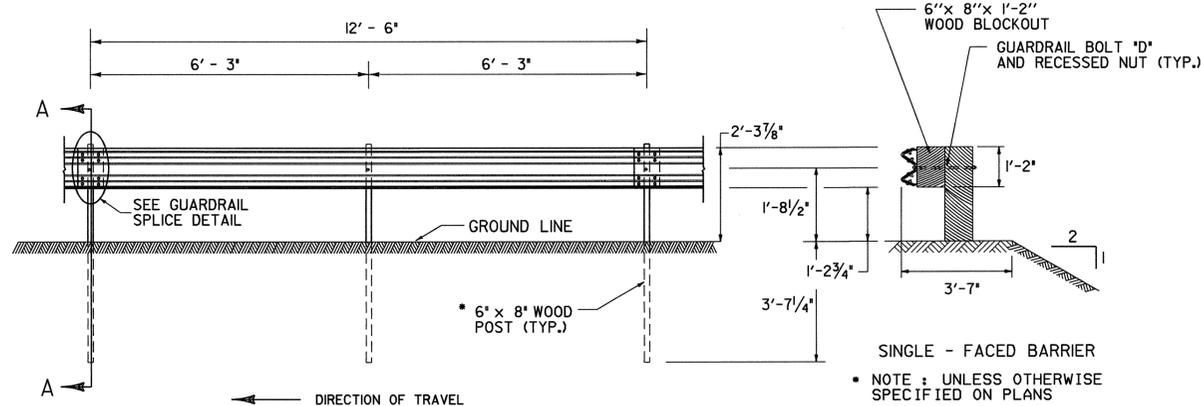


GUARDRAIL SPLICE DETAIL



- POST FACE  
MODIFIED WOOD BLOCKOUT - ROUTED  
6" X 8" X 1'-2"  
FOR USE W/ STEEL POSTS ONLY
- NOTES:  
1. BLOCKS SHALL BE MADE OF TIMBER WITH A STRESS GRADE OF 1200 PSIOR 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 +/- 1/4".  
2. SUPPLY WOOD BLOCKS PER AASHTO M 168.  
3. TREAT WITH PRESERVATIVE PER AASHTO M 133.  
4. BLOCKOUTS MAY ALSO BE MADE OF APPROVED ALTERNATIVE MATERIAL.

"W" BEAM GUARDRAIL WITH WOOD POSTS



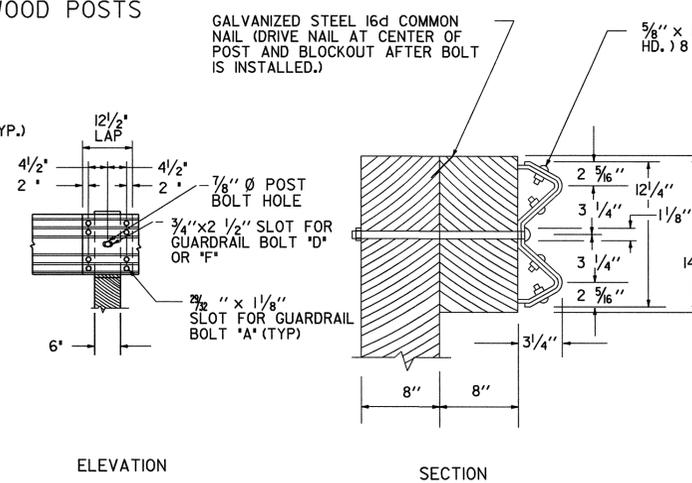
ELEVATION FROM  $\phi$  OF ROAD

SECTION A - A

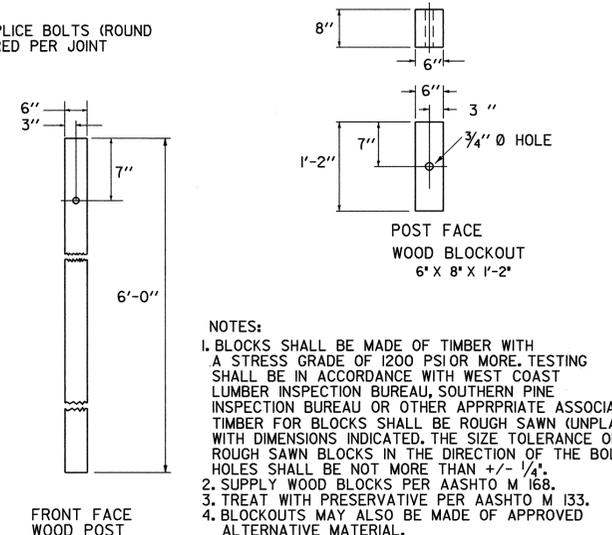
SINGLE - FACED BARRIER

DOUBLE - FACED BARRIER

PLAN

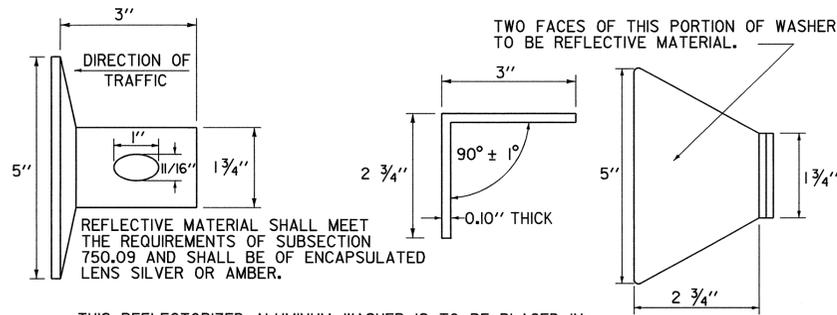


GUARDRAIL SPLICE DETAIL

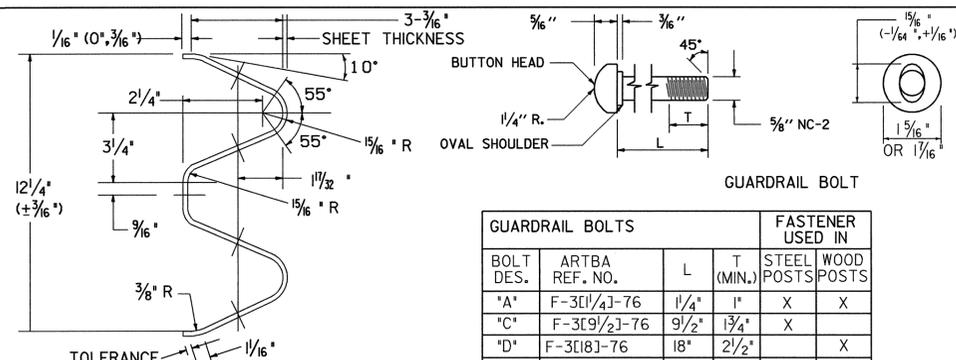


- POST FACE  
WOOD BLOCKOUT  
6" X 8" X 1'-2"
- NOTES:  
1. BLOCKS SHALL BE MADE OF TIMBER WITH A STRESS GRADE OF 1200 PSIOR MORE. TESTING SHALL BE IN ACCORDANCE WITH WEST COAST LUMBER INSPECTION BUREAU, SOUTHERN PINE INSPECTION BUREAU OR OTHER APPROPRIATE ASSOCIATION. TIMBER FOR BLOCKS SHALL BE ROUGH SAWN (UNPLANED) WITH DIMENSIONS INDICATED. THE SIZE TOLERANCE OF ROUGH SAWN BLOCKS IN THE DIRECTION OF THE BOLT HOLES SHALL BE NOT MORE THAN +/- 1/4".  
2. SUPPLY WOOD BLOCKS PER AASHTO M 168.  
3. TREAT WITH PRESERVATIVE PER AASHTO M 133.  
4. BLOCKOUTS MAY ALSO BE MADE OF APPROVED ALTERNATIVE MATERIAL.

GUARDRAIL DELINEATOR

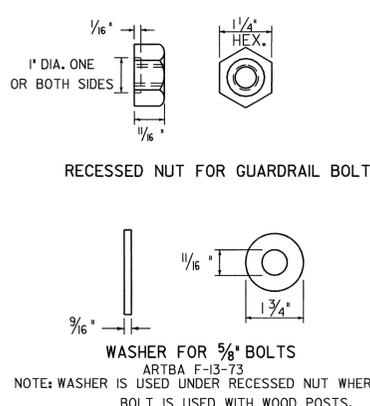


REFLECTIVE MATERIAL SHALL MEET THE REQUIREMENTS OF SUBSECTION 750.09 AND SHALL BE OF ENCAPSULATED LENS SILVER OR AMBER.  
THIS REFLECTORIZED ALUMINUM WASHER IS TO BE PLACED IN VALLEY OF BEAM WHEN MOUNTING BEAM ONTO EACH FIFTH POST. WASHER SHALL MEET SPECIFICATION REQUIREMENTS FOR A.S.T.M. B-209 ALLOY 5052-H32



ARTBA RE-3[286]-3'=12'-6" CLASS A, TYPE IJ-73  
TYPICAL GUARDRAIL SECTION

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



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 I, 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 BOLTS, 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 3/4" 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

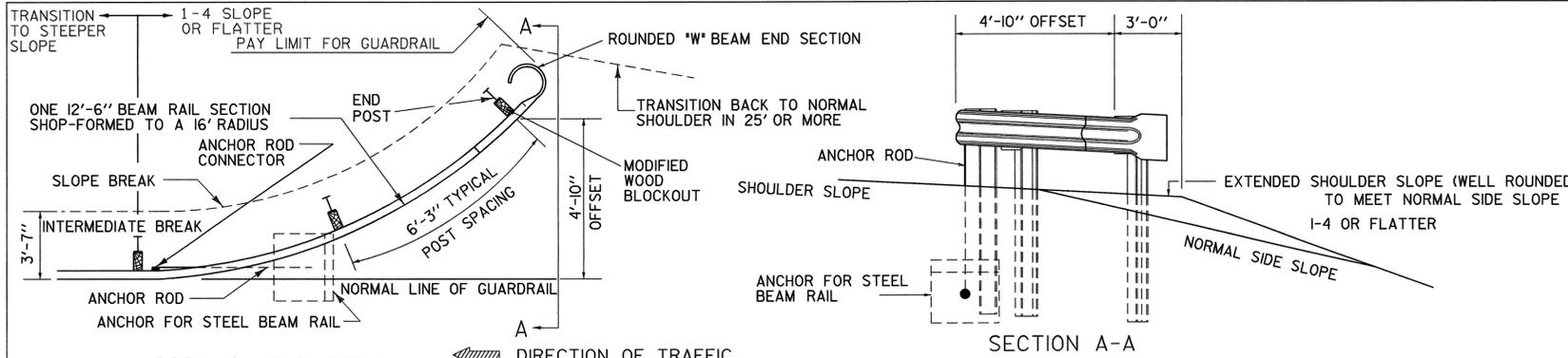
APPROVED

*[Signature]*  
DIRECTOR OF PROJECT DEVELOPMENT  
*[Signature]*  
ROADWAY AND TRAFFIC DESIGN ENGINEER

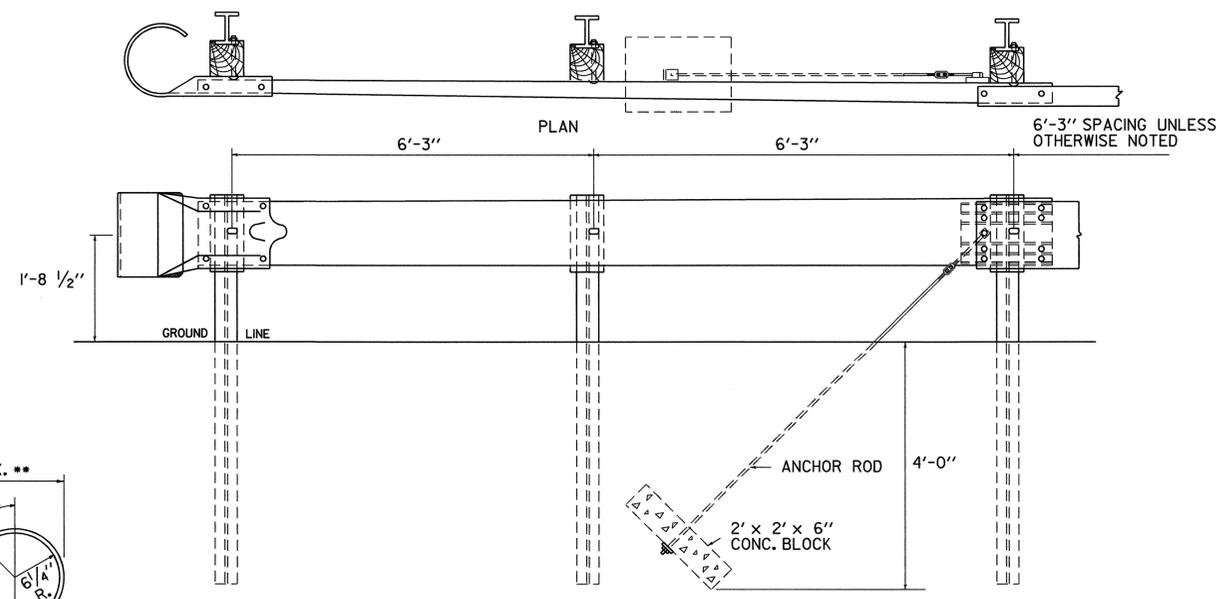
STEEL BEAM GUARDRAIL WITH STEEL POSTS  
STEEL BEAM GUARDRAIL WITH WOOD POSTS



STANDARD  
G-1



APPROACH END DETAIL  
 NHS APPROVED FOR USE WHERE DESIGN SPEED IS 40 OR LESS MPH  
 NON-NHS APPROVED FOR USE WHERE DESIGN SPEED IS 50 OR LESS MPH

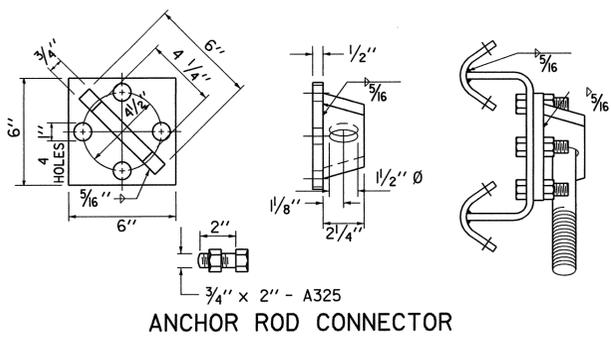


ASSEMBLY ELEVATION

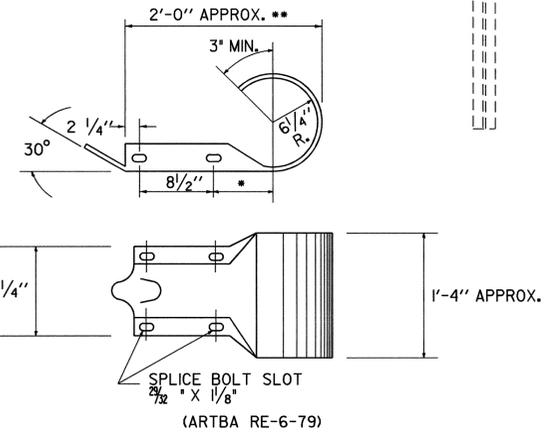
TRAILING END TERMINAL FOR USE ON ONE-WAY HIGHWAYS

GENERAL NOTES:

1. ALL METAL PARTS SHALL BE GALVANIZED.
2. ALL WOOD POSTS SHALL BE GIVEN A PRESERVATIVE TREATMENT.
3. DETAILS PERTINENT TO THE STANDARD INSTALLATION OF "W" BEAM SECTIONS WILL BE FOUND ON STANDARD DRAWING G-1.
4. FOR DESCRIPTION AND SPECIFICATIONS OF PARTS IDENTIFIED BY "ARTBA..." AND OTHER DETAILS OF POSTS, POST ACCESSORIES, FASTENERS AND RAIL ELEMENTS, SEE AASHTO-AGC-ARTBA JOINT TASK FORCE NO. 13, TITLED "A GUIDE TO STANDARDIZED HIGHWAY BARRIER HARDWARE", LATEST EDITION.

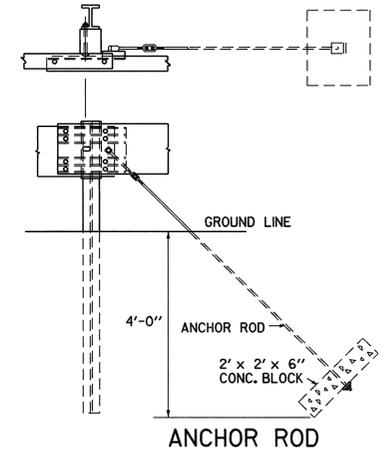


ANCHOR ROD CONNECTOR

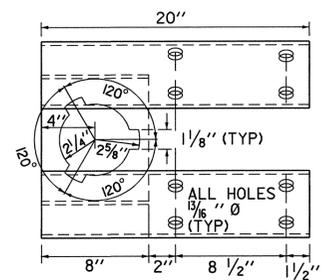


ROUNDED "W" BEAM END SECTION

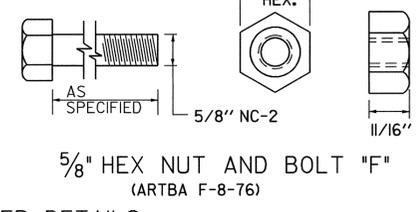
\* THIS DIMENSION IS 7 1/2" INRE-7-79. IF THE DIMENSION IS USED IN THIS PART, IT WILL GIVE AN ACCEPTABLE OVERALL LENGTH (\*\*) OF APPROXIMATELY 2'- 11/2."



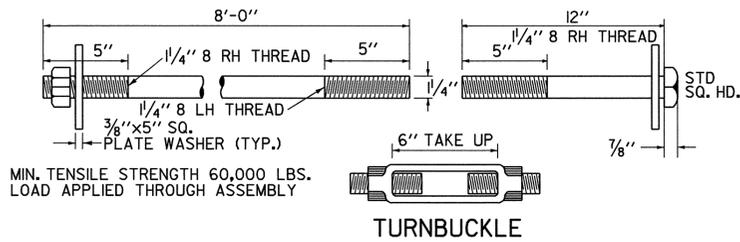
ANCHOR ROD



RECTANGULAR GUARDRAIL PLATE WASHER (ARTBA F-12-73)

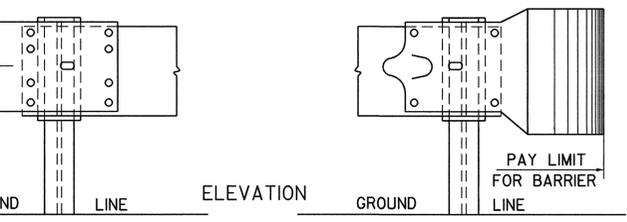


FASTENER DETAILS

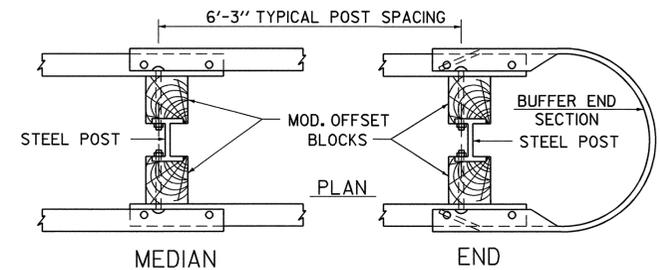


TURNBUCKLE

MIN. TENSILE STRENGTH 60,000 LBS. LOAD APPLIED THROUGH ASSEMBLY



ELEVATION



MEDIAN

END

STEEL BEAM MEDIAN BARRIER  
 NOTE: TO BE USED OUTSIDE CLEAR ZONE ONLY.

OTHER STANDARD REQUIRED G-1

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

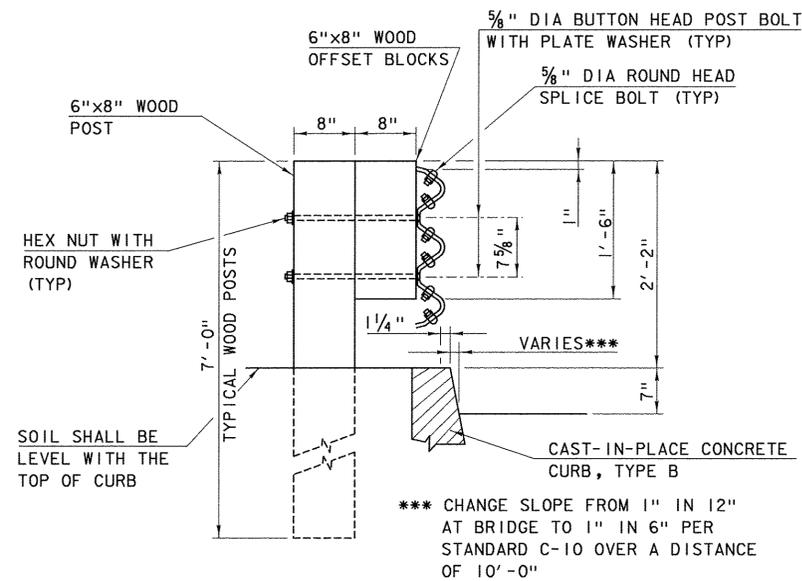
APPROVED  
  
 DIRECTOR OF PROJECT DEVELOPMENT  
  
 ROADWAY AND TRAFFIC DESIGN ENGINEER

STEEL BEAM GUARDRAIL APPROACH END TERMINAL  
 STEEL BEAM GUARDRAIL TRAILING END TERMINAL  
 ANCHOR FOR STEEL BEAM GUARDRAIL  
 STEEL BEAM MEDIAN BARRIER

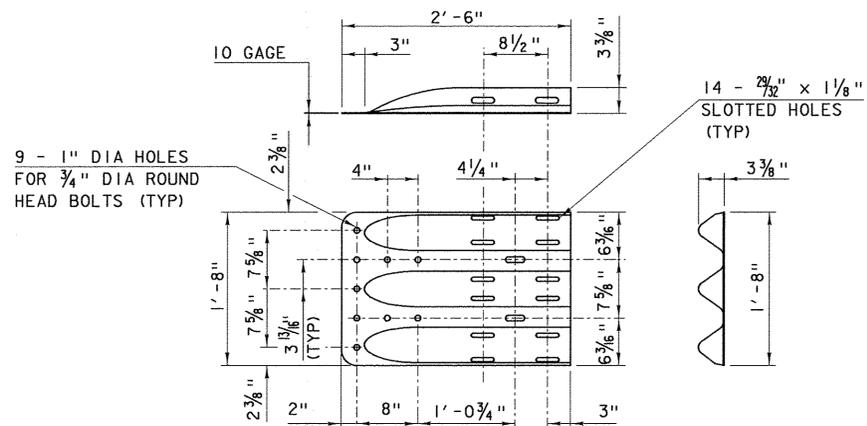


STANDARD  
 G-1d





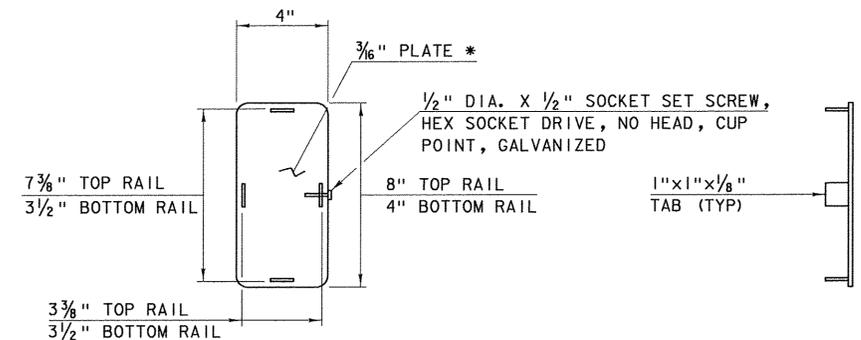
**WOOD POST AND THRIE-BEAM RAIL ASSEMBLY**



**THRIE-BEAM TERMINAL CONNECTOR (HM-TF-13/RE-67)**

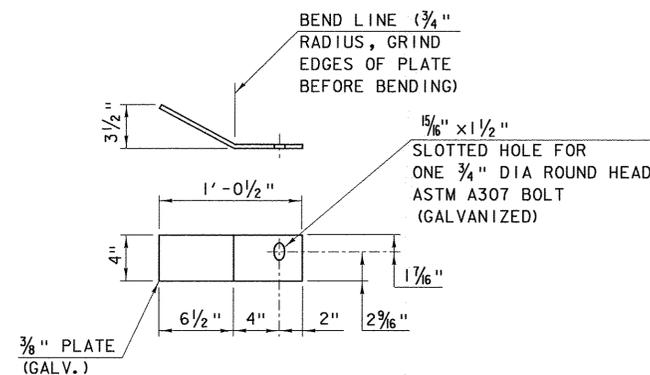
**NOTES**

1. DELINEATOR DEVICES SHALL BE INSTALLED PER BRIDGE RAIL AND OR GUARDRAIL STANDARD REQUIREMENTS.
2. ON BRIDGES WITH A SIDEWALK, DELINEATORS ARE NOT TO BE INSTALLED ON THE SIDEWALK SIDE OF THE BRIDGE.

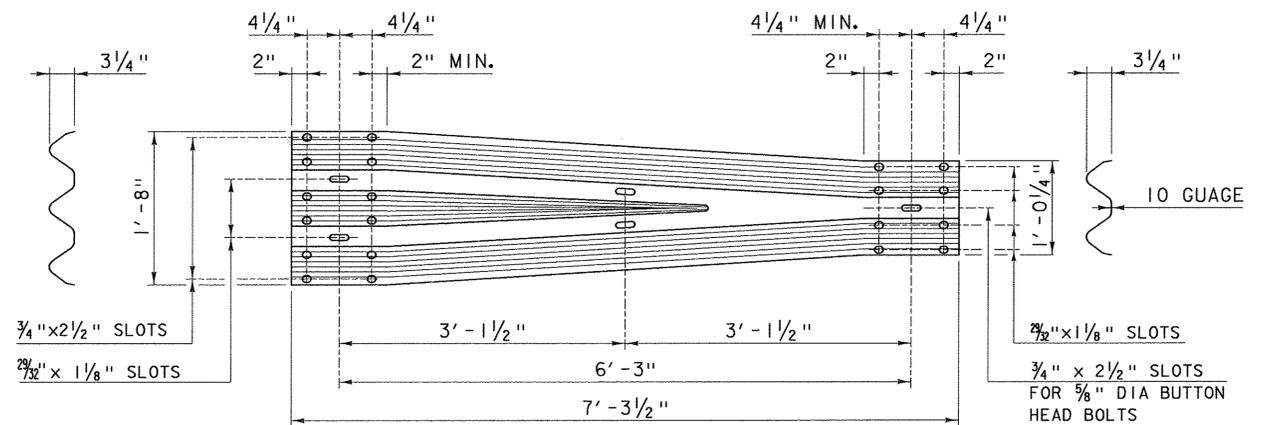


**END CAP DETAIL**

\* ROUND CORNERS 1/2" RADIUS (TYP)



**DEFLECTOR PLATE DETAIL**



**THRIE-BEAM TO STANDARD STEEL BEAM TRANSITION SECTION (HM-TF-13/RE-69)**

**REVISIONS AND CORRECTIONS**

DECEMBER 14, 2009 - ORIGINAL APPROVAL DATE  
APRIL 23, 2012 - GENERAL UPDATE 2012

**APPROVED**

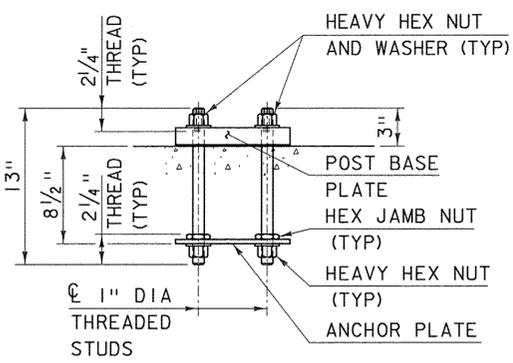
*Dr. Michel Hedys*  
STRUCTURES ENGINEER  
*Rick Schaub*  
DIRECTOR OF PROGRAM DEVELOPMENT  
*Mark D. Kistler*  
FEDERAL HIGHWAY ADMINISTRATION

**THRIE BEAM TO STANDARD STEEL BEAM TRANSITION SECTION**

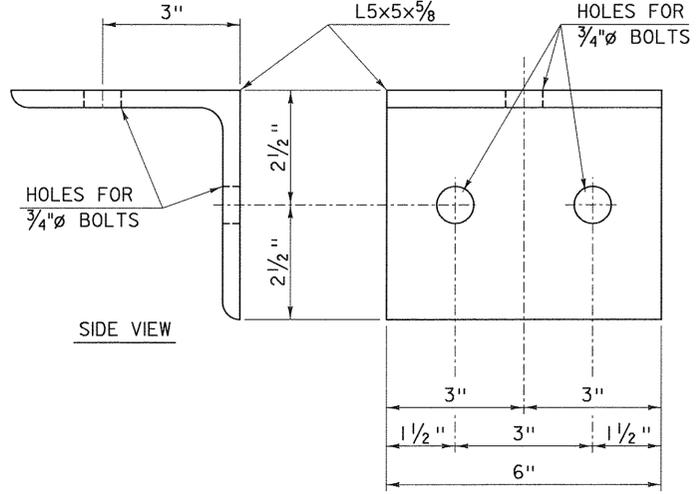
**OTHER STDS. REQUIRED: C-10**



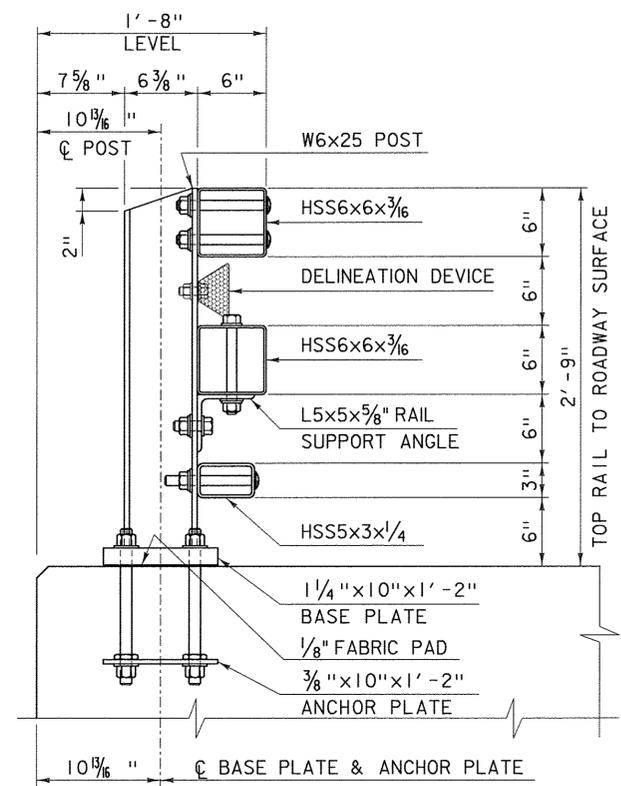
**STANDARD S-363**



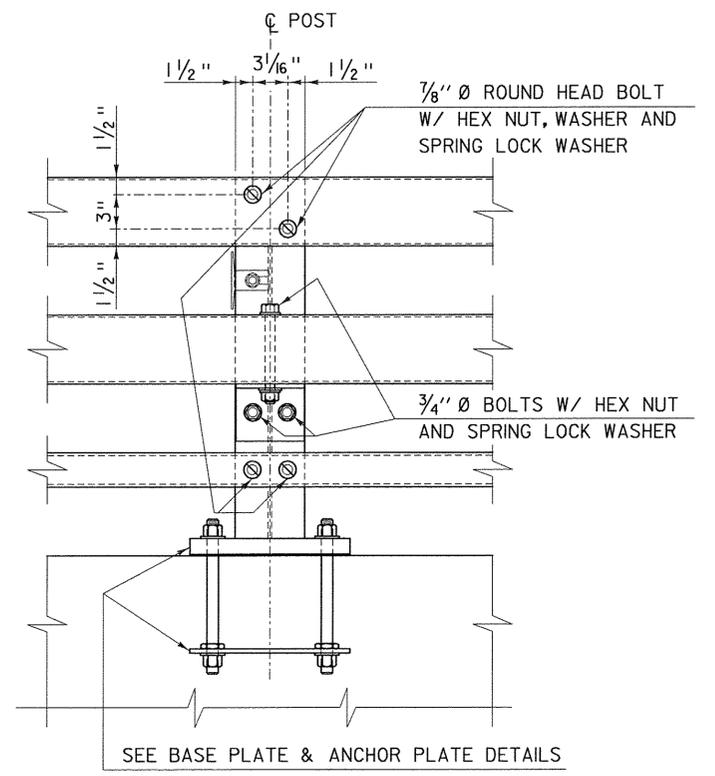
RAILING POST ANCHORAGE



ELEVATION VIEW  
RAILING ANGLE DETAILS

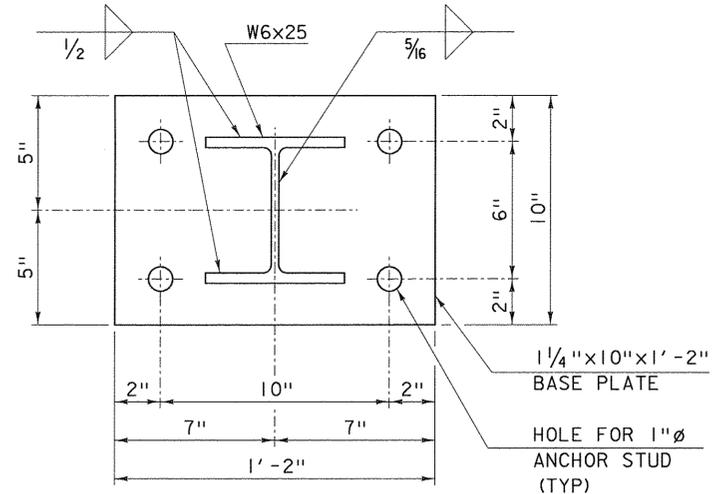


RAILING SECTION

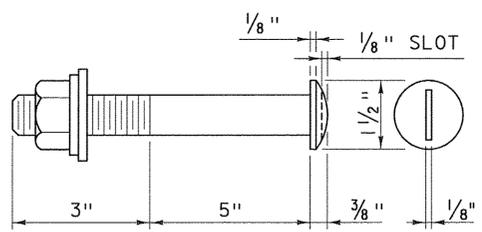


RAILING ELEVATION

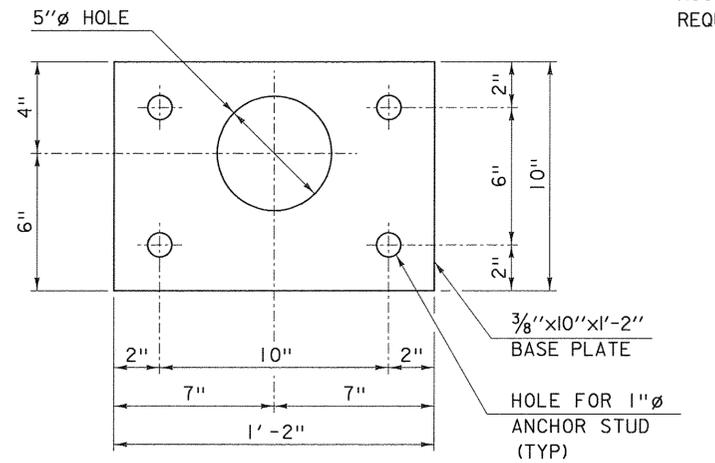
- NOTES:
1. ALL WORK AND MATERIALS SHALL CONFORM TO SECTION 525.
  2. PRIOR TO GALVANIZING THE ASSEMBLED POST, GRIND ALL EDGES TO A MINIMUM RADIUS OF 1/16".
  3. ALL POSTS SHALL BE SET NORMAL TO GRADE. THE MAXIMUM CENTER TO CENTER SPACING OF BRIDGE RAIL POSTS IS 8'-3".
  4. SECTIONS OF RAIL TUBE SHALL 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.



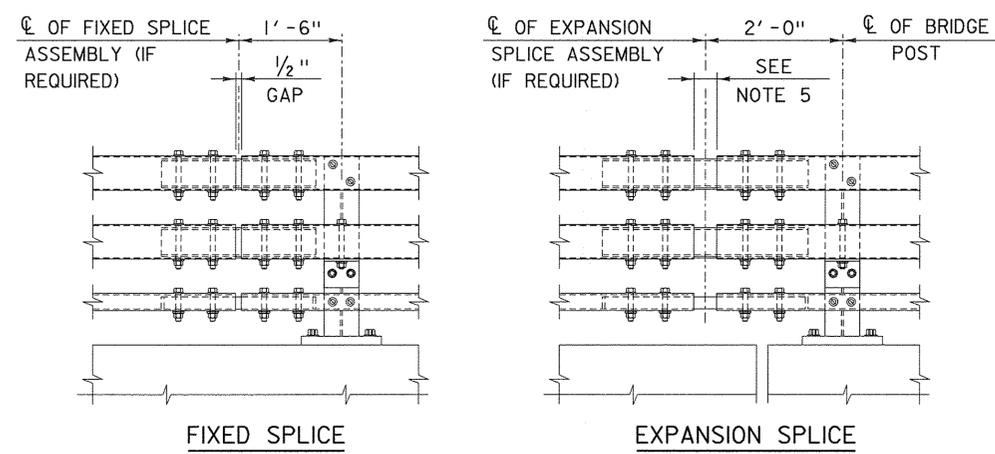
BASE PLATE DETAIL



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

APPROVED  
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# BRIDGE RAILING, GALVANIZED 3 RAIL BOX BEAM

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



# STANDARD S-364A