

NOTES

1.0 GENERAL

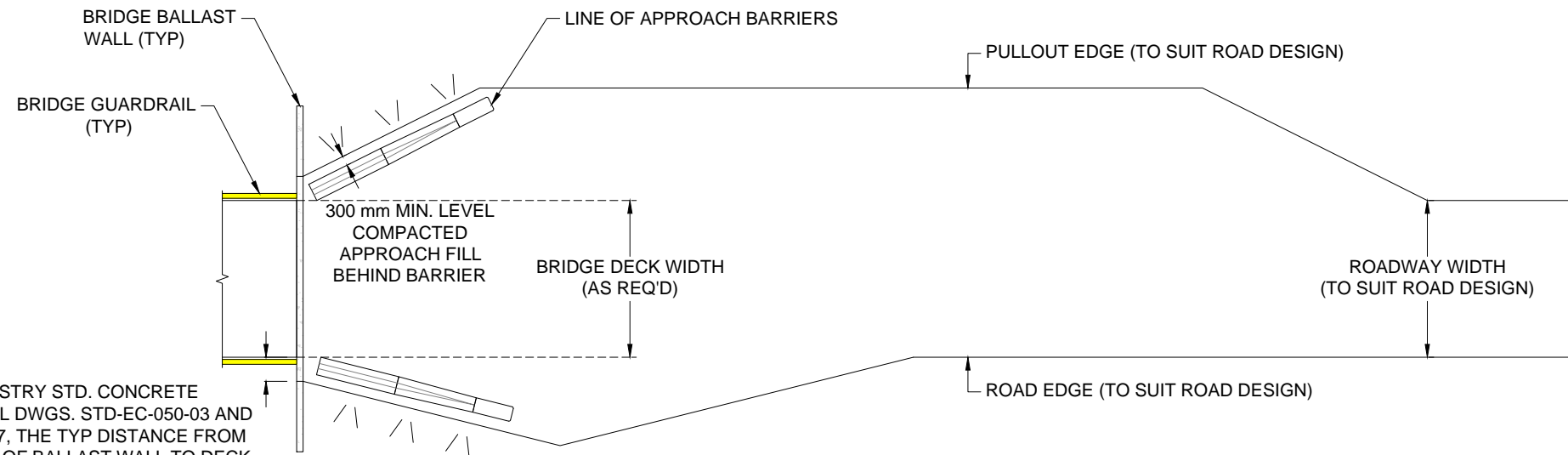
- THIS CONCEPT DWG ILLUSTRATES THE MINIMUM MINISTRY OF FORESTS, LANDS, NATURAL RESOURCE OPERATIONS AND RURAL DEVELOPMENT (MINISTRY) STANDARD FOR APPROACH BARRIERS WHERE APPROACH BARRIERS ARE SPECIFIED FOR A FOREST SERVICE ROAD (FSR) BRIDGE SITE.
- THE TWO BARRIER OPTIONS ON THIS DWG ARE NOT PHYSICALLY ANCHORED INTO THE APPROACH ROADWAY FILL AND ARE NOT PHYSICALLY CONNECTED TO THE BRIDGE GUARDRAILS. THESE OPTIONS REFLECT MINIMUM STANDARDS PROVIDING VISUAL GUIDANCE AND WILL PROVIDE SOME LIMITED RESISTANCE TO VEHICLE IMPACTS. THEY ARE NOT CRASH TESTED AND HAVE NOT BEEN ENGINEERED TO RESIST SPECIFIED VEHICLE IMPACT FORCES.
- ANCHORED AND CONNECTED MINISTRY APPROACH BARRIER CONCEPTS CAN BE FOUND ON MINISTRY STANDARD DWGS STD-EC-010-15 & 16 "ANCHORED/CONNECTED BRIDGE APPROACH BARRIER CONCEPTS."
- THIS DRAWING IS FOR REFERENCE FOR THE BRIDGE GENERAL ARRANGEMENT ENGINEER IN PRODUCING PROJECT SPECIFIC DESIGN DRAWINGS FOR WHICH THEY TAKE FULL RESPONSIBILITY. THIS PROFESSIONAL ENGINEER SHALL BE REGISTERED TO PRACTICE IN BRITISH COLUMBIA.
- THE BRIDGE GENERAL ARRANGEMENT ENGINEER SHALL DETERMINE, AND INCORPORATE INTO THEIR DESIGN, THE APPROPRIATE MINISTRY STANDARD BRIDGE APPROACH BARRIER CONCEPT FOR A SPECIFIC SITE BASED ON AN ASSESSMENT OF THE BRIDGE CHARACTERISTICS, ROAD ALIGNMENT, VEHICLE USAGE, SITE CONDITIONS, AND OTHER FACTORS AS APPROPRIATE. THE GENERAL ARRANGEMENT DESIGN SHOULD INCLUDE THE SITE SPECIFIC APPROACH ROAD GEOMETRY AND DIMENSIONS (INCLUDING PULLOUTS AND FLARES) AS WELL AS THE DETAILED APPROACH BARRIER REQUIREMENTS (INCLUDING TYPES, LENGTHS & POSITIONS).
- THE BRIDGE GENERAL ARRANGEMENT ENGINEER SHALL INCLUDE A NOTE ON THEIR DRAWINGS TO ADDRESS THE REQUIREMENT FOR FIELD REVIEWS CONSISTENT WITH THE GUIDELINES PUBLISHED BY ENGINEERS AND GEOSCIENTISTS BRITISH COLUMBIA CALLED, "DOCUMENTED FIELD REVIEWS DURING IMPLEMENTATION OR CONSTRUCTION."
- ALL DIMENSIONS ARE NOMINAL.
- FURTHER GUIDANCE AND CONSIDERATIONS RELATED TO SELECTION AND USE OF FSR BRIDGE APPROACH BARRIERS ARE PROVIDED IN THE FOLLOWING MINISTRY DOCUMENTS:

"GUIDANCE FOR SELECTING BRIDGE GUARDRAIL CONTAINMENT LEVEL AND DETERMINING NEED FOR BRIDGE APPROACH BARRIERS ON FSRs", AND

"CONSIDERATIONS FOR USE OF MINISTRY STANDARD DRAWINGS STD-EC-010-05 AND STD-EC-010-15 & 16 BRIDGE APPROACH BARRIERS FOR FSR BRIDGES"

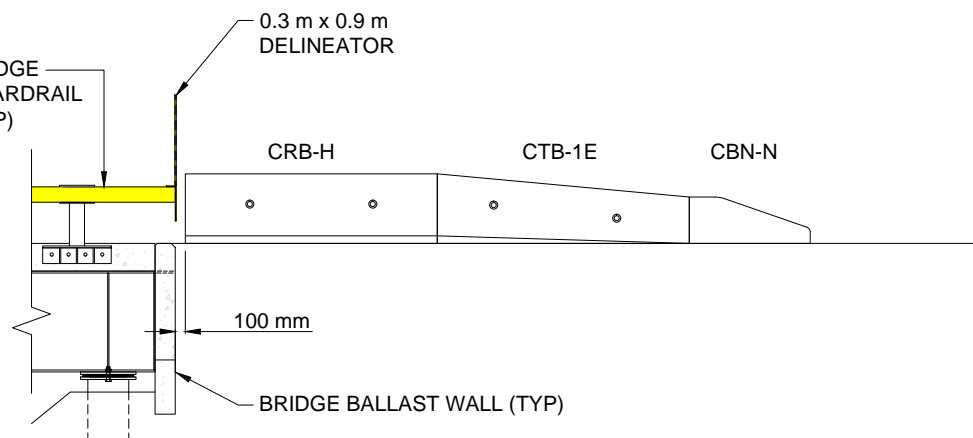
2.0 MATERIALS & INSTALLATION

- BARRIERS SHALL BE PLACED ON A LEVEL AND COMPACT GRANULAR BASE WITH MINIMAL ANTICIPATED SETTLEMENT IN RELATION TO THE BRIDGE ENDS. SPECIFICATIONS FOR THE BASE SHALL BE DETERMINED BY THE BRIDGE GENERAL ARRANGEMENT ENGINEER, INCLUDING REQUIRED COMPACTION OF FILLS, AND FIELD INSPECTIONS DURING CONSTRUCTION.
- MATERIALS AND FABRICATION OF PRECAST REINFORCED CONCRETE BARRIERS (CRB-H, CTB-1E, CBN-N, AND OTHER BARRIER TYPES IF REQ'D) SHALL BE IN ACCORDANCE WITH THE BC MoTI "STANDARD SPECIFICATIONS FOR HIGHWAY CONSTRUCTION" SECTION 941 "PRECAST REINFORCED CONCRETE BARRIERS."
- IF LINES OF CONCRETE BARRIERS LONGER THAN THOSE SHOWN ON THIS DRAWING ARE NECESSARY, CRB-E PIECES (CONNECTING TO CRB-H PIECES) WILL BE REQ'D. IF ROAD SURFACE DRAINAGE IS REQ'D THROUGH A LONGER LINE OF CONCRETE BARRIERS, A CDB-E BARRIER (TOGETHER WITH EROSION CONTROL MEASURES) MAY BE SPECIFIED.
- IF NOT STATED OTHERWISE BY THE MINISTRY, CONCRETE BARRIERS RATHER THAN LOG BARRIERS SHALL BE USED.
- IF SPECIFIED BY THE MINISTRY FOR A PARTICULAR SITE, LOG APPROACH BARRIERS MAY BE USED IN PLACE OF THE CONCRETE BARRIERS SHOWN IN PLAN AND ELEV ON THIS DWG. ANY PROPOSED ALTERNATE EQUIVALENT METHOD OF LOG BUTTRESSING MUST BE SPECIFIED BY A PROFESSIONAL ENGINEER FOR APPROVAL CONSIDERATION BY THE MINISTRY ON A SITE SPECIFIC BASIS.

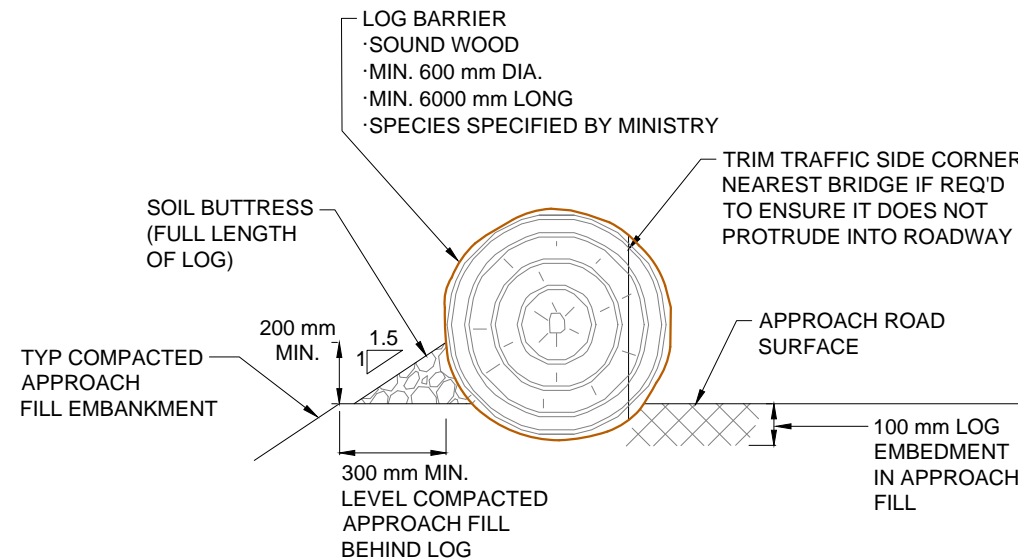


PLAN - CONCRETE BARRIER OPTION (LOG BARRIER OPTION SIMILAR)
N.T.S

NOTE: IN MINISTRY STD. CONCRETE BALLAST WALL DWGS. STD-EC-050-03 AND STD-EC-050-17, THE TYP DISTANCE FROM TOP CORNER OF BALLAST WALL TO DECK EDGE IS 750 mm. BALLAST WALL DESIGN SHALL BE MODIFIED BY P. ENG. WHERE LARGER DISTANCE REQ'D.



ELEV. CONCRETE BARRIER OPTION (LOG BARRIER OPTION SIMILAR)
1:75



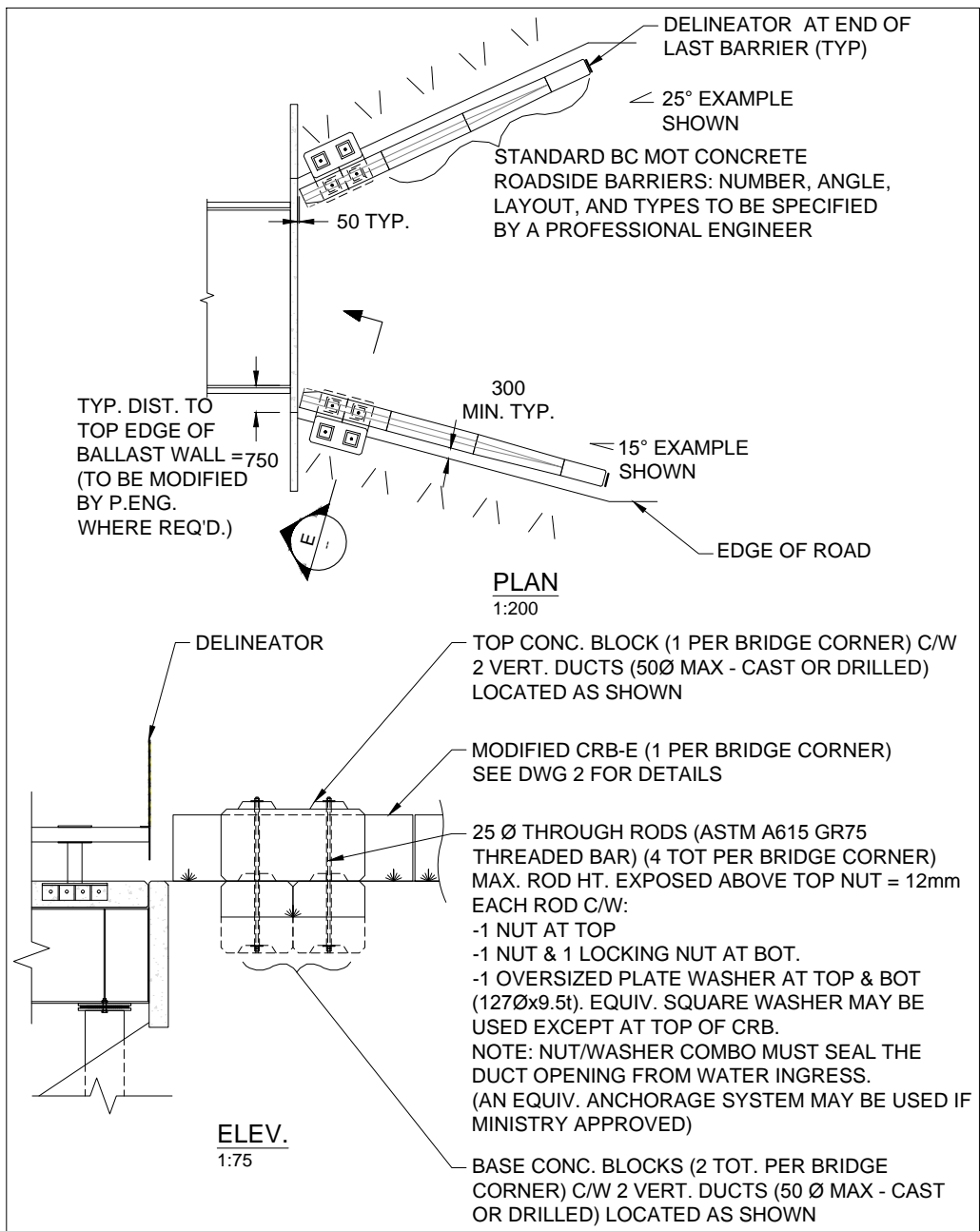
TYP X-SECTION - LOG BARRIER OPTION
1:20
(SITE SPECIFIC MINISTRY APPROVAL REQ'D FOR USE OF THIS OPTION)

**ASSUME NOT TO SCALE
NOT FOR CONSTRUCTION**

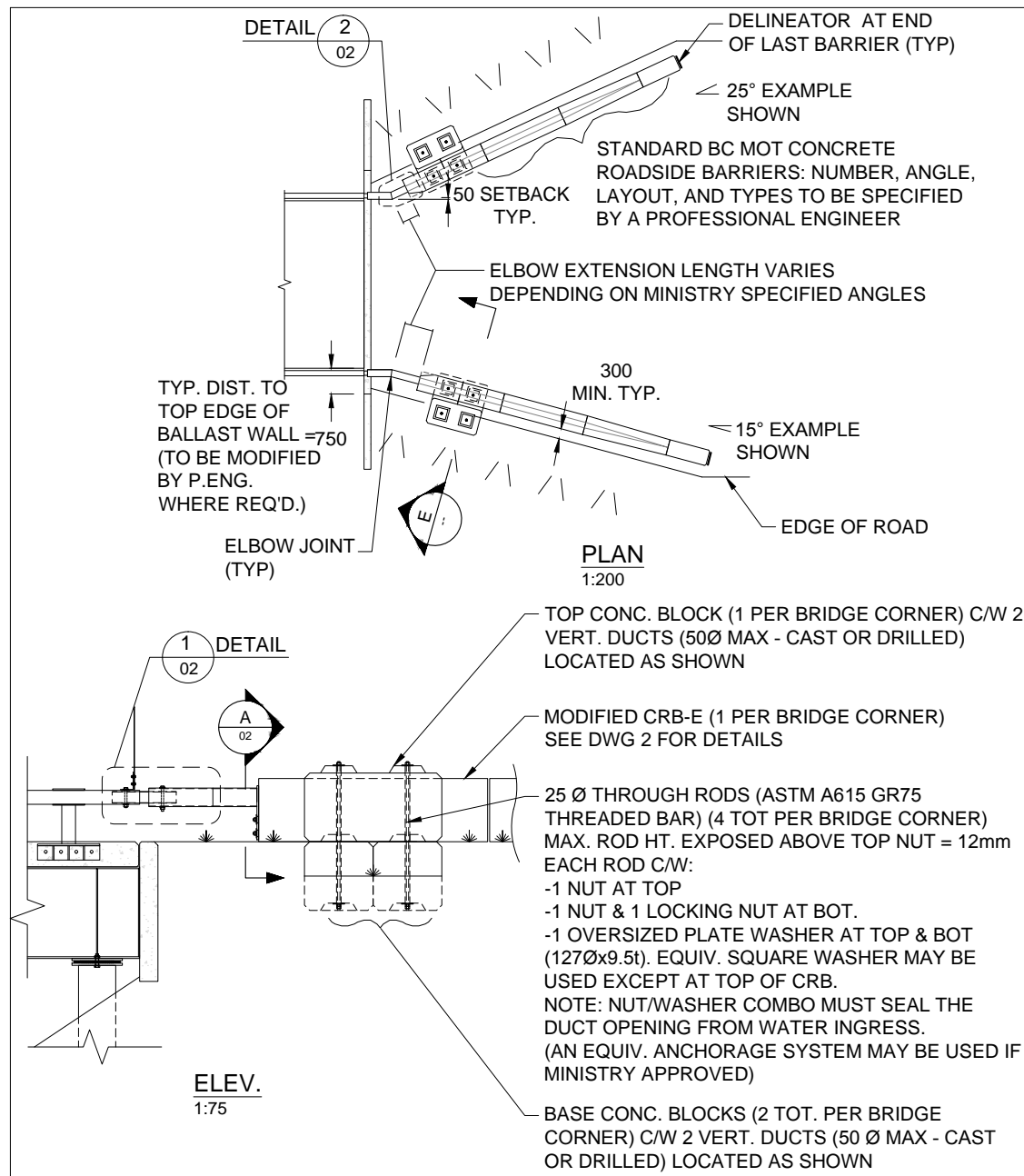
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		Checked	G.M.	Date	Mar. 2019
		Approved	B.C.	Date	Mar. 2019
		Drawn	N.H.	Date	Mar. 2019
REV	DATE	DESCRIPTION	INITIALS		
REVISIONS					



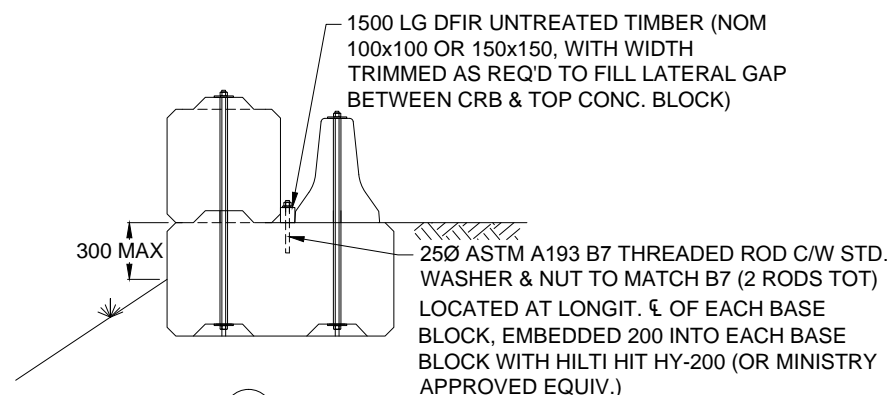
STANDARD BRIDGE DRAWING			
SIMPLE BRIDGE APPROACH BARRIER CONCEPTS			
DRAWN:	NICOLE HARVEY	CHECKED:	GLENN MOORE
ENGINEERED:	MIKE PENNER	APPROVED:	BRIAN CHOW, CHIEF ENGINEER
FILE NUMBER:	FOR-11300-34/APPROACH BAR	DRAWING NUMBER:	STD-EC-010-05
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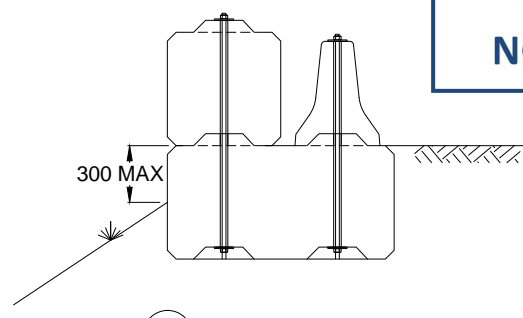
ANCHORED & UNCONNECTED CONCEPT



ANCHORED & CONNECTED CONCEPT



SECTION E-01 : CONC. LAYOUT - OPTION 1
BASE BLOCKS WITH 1/2 KEY & 1/2 FLAT TOP - 1:50
NOTE: ONLY LAYOUT OPTION 1 REQUIRES A GAP FILLING TIMBER



SECTION E-01 : CONC. LAYOUT - OPTION 2
ALL BLOCKS WITH 2 KEYS - 1:50

**ASSUME NOT TO SCALE
NOT FOR CONSTRUCTION**

NOTES

1.0 GENERAL

- THE PROFESSIONAL ENGINEER RESPONSIBLE FOR PRESCRIBING MINISTRY STANDARD BRIDGE APPROACH BARRIERS, AS SHOWN ON THESE DRAWINGS, MUST EVALUATE THE SUITABILITY OF THEIR USE BASED ON AN ASSESSMENT OF THE SPECIFIC BRIDGE CHARACTERISTICS, ROAD ALIGNMENT AND SITE CONDITIONS.
- WHERE THESE DRAWINGS SHOW CONNECTION BETWEEN BRIDGE GUARDRAIL AND APPROACH BARRIER, THEY SHOULD BE READ TOGETHER WITH STD-EC-010-02 "STANDARD BRIDGE GUARDRAIL-HSS RAIL CL-2", OR STD-EC-010-03 "STANDARD BRIDGE GUARDRAIL-HSS RAIL CL-3", OR STD-EC-010-06 "STANDARD HSS GUARDRAIL FOR PRECAST CONCRETE SLAB BRIDGES CL-3".
- PROFESSIONAL ENGINEERS SHALL REFERENCE THE MINISTRY'S APPROACH BARRIER GUIDELINES IN RELATION TO USE OF THESE DRAWINGS.

2.0 MATERIALS

- HSS: Fy MIN. 345MPa, CSA G40.21M OR ASTM A500 GRADE C
- PLATE: Fy MIN. 300W OR 350W, CSA G40.21M
- BOLTS: ASTM A307
- VERTICAL THROUGH RODS: ASTM A615 GR75 THREADED BAR, C/W NUTS TO MATCH STRENGTH AND THREAD TYPE
- UNTHREADED ROUND BAR: ASTM A36
- NUTS: ASTM A563, UNLESS NOTED OTHERWISE (UNO)
- STANDARD WASHERS: ASTM F844, UNO
- OVERSIZED PLATE WASHERS: MILD STEEL (I.D. -2MM > BOLT DIAMETER)
- ALL EXPOSED STEEL MATERIALS, INCLUDING HARDWARE, SHALL BE GALVANIZED TO CSA G164, MIN. 610 g/m², OR ASTM A123, UNLESS OTHER COATING SPECIFICATIONS ARE PROVIDED BY THE MINISTRY.
- ALL STEEL TO BE GALVANIZED SHALL MEET CHEMICAL COMPOSITION RECOMMENDATIONS AS SPECIFIED BY THE AMERICAN GALVANIZERS ASSOCIATION (<https://www.galvanizeit.org/>) TO ENSURE AGAINST EMBRITTLEMENT.
- CONCRETE BLOCKS AND CONCRETE ROADSIDE BARRIERS (CRB) IN ACCORDANCE WITH THE MINISTRY "BRIDGE COMPONENT CONCRETE STANDARD": <http://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/natural-resource-use/resource-roads/bridge-design-construction/brcomconstd.pdf>
- TOP KEYS & BOT. KEY VOIDS OF CONC. BLOCKS, PLUS BOT. KEY VOIDS OF MODIFIED CRB-E, WILL VARY ACCORDING TO SUPPLIER. INTERLOCK PATTERN & GEOMETRY MUST BE APPROVED BY THE MINISTRY.

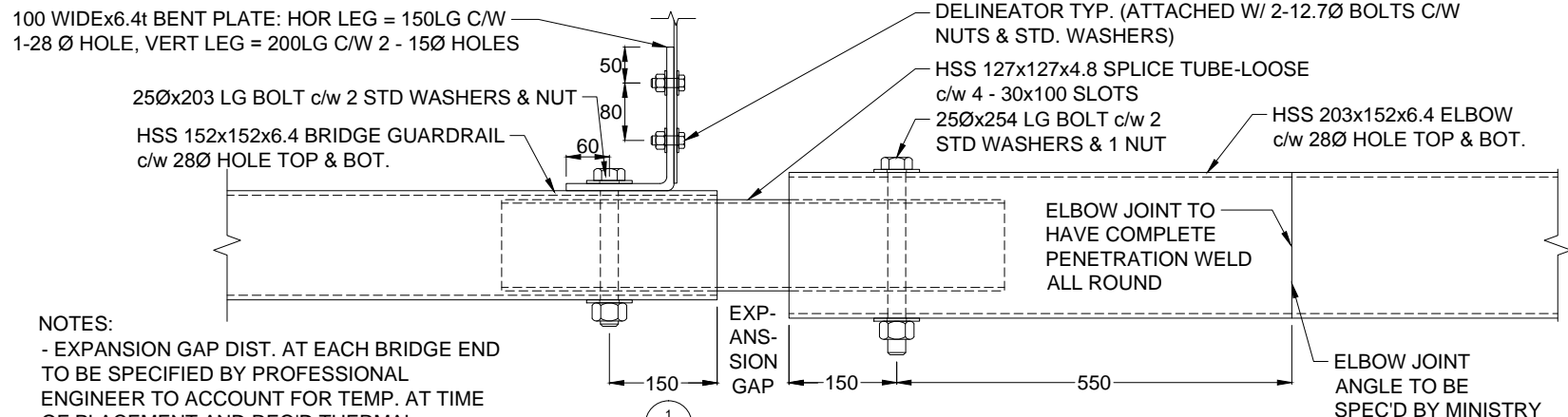
3.0 FABRICATION AND INSTALLATION

- WELDING IN ACCORDANCE WITH CSA W59 BY COMPANY CERTIFIED TO CSA W47.1 FOR DIVISION 1, 2, OR 3
- MIN. FILLET WELD SIZE=6mm UNO
- BOLT HOLE DIAMETERS: 2mm > BOLT DIAMETER, UNO
- NUTS SHALL BE SNUG-TIGHTENED (THE CONDITION THAT BRINGS THE PLIES INTO FIRM CONTACT COMMONLY ATTAINED BY A FEW IMPACTS OF AN IMPACT WRENCH, OR THE FULL EFFORT OF AN IRONWORKER USING AN ORDINARY SPUD WRENCH).
- BASE CONCRETE BLOCKS AND THE BARRIERS CONNECTED TO THEM SHALL BE PLACED ON A COMPETENT, FIRM AND LEVEL GRANULAR BASE WITH MINIMAL ANTICIPATED SETTLEMENT IN RELATION TO THE BRIDGE END. SPECIFICATIONS FOR THE BASE SHALL BE DETERMINED BY THE PROFESSIONAL ENGINEER, INCLUDING REQUIRED COMPACTION OF FILLS, AND FIELD INSPECTIONS DURING CONSTRUCTION.
- THE SUPPLIER OF MATERIALS (CONTRACTOR) SHALL ENSURE THAT ALL COMPONENTS WILL ASSEMBLE ACCURATELY AND EFFICIENTLY.



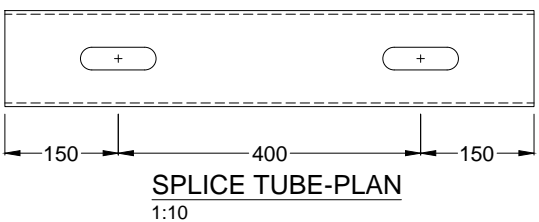
STANDARD BRIDGE DRAWING			
ANCHORED/CONNECTED BRIDGE APPROACH BARRIER CONCEPTS DWG. 1 OF 2			
ORIGINAL SIGNED and SEALED BY: M. PENNER, P.ENG.		APPROVED BY: B. CHOW, P.ENG., CHIEF ENGINEER	
FILE NUMBER:		DRAWING NUMBER: STD-EC-010-15	

SCALE	AS SHOWN	Designed	M.P.	Date	SEPT. 15, 2017
		Checked	G.M.	Date	SEPT. 15, 2017
		Drawn	N.H.	Date	SEPT. 15, 2017
REV	DATE	DESCRIPTION	INITIAL		
REVISIONS					



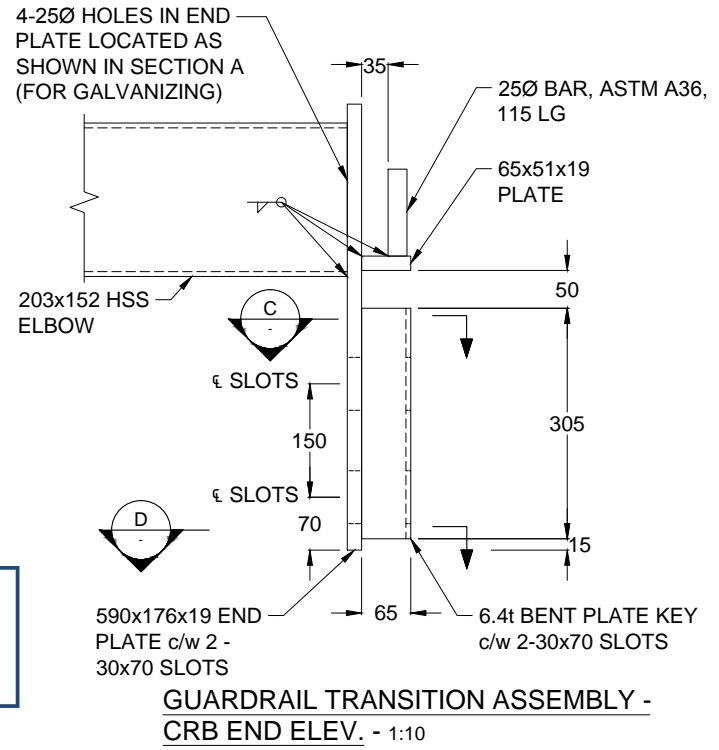
NOTES:
 - EXPANSION GAP DIST. AT EACH BRIDGE END TO BE SPECIFIED BY PROFESSIONAL ENGINEER TO ACCOUNT FOR TEMP. AT TIME OF PLACEMENT AND REQ'D THERMAL MOVEMENT.
 - P. ENG. TO CHECK ADEQUACY OF SLOT LENGTHS IN SPLICE TUBES IF BRIDGE LENGTH >50m, AND MODIFY AS REQ'D.

DETAIL 1/01: GUARDRAIL TRANSITION ASSEMBLY CONNECTION TO BRIDGE GUARDRAIL-ELEV. 1:10

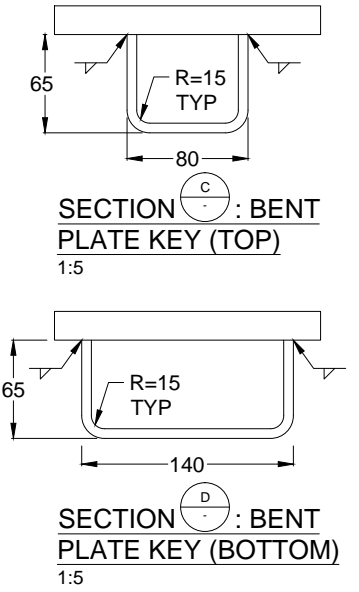


SPLICE TUBE-PLAN 1:10

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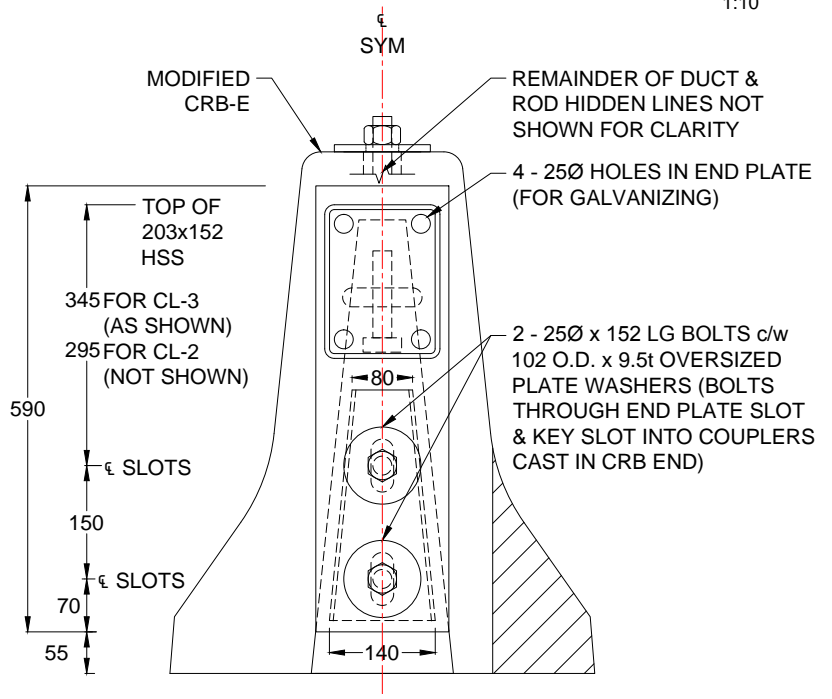


GUARDRAIL TRANSITION ASSEMBLY - CRB END ELEV. - 1:10

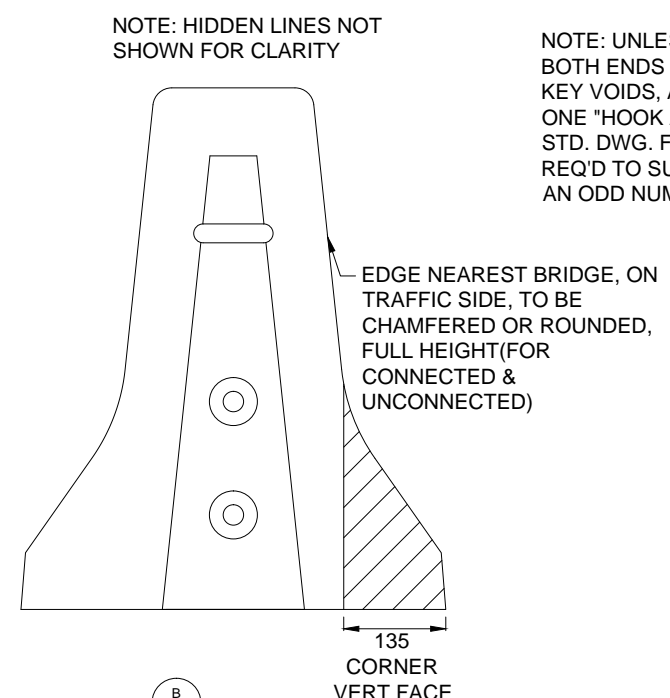


SECTION C: BENT PLATE KEY (TOP) 1:5

SECTION D: BENT PLATE KEY (BOTTOM) 1:5



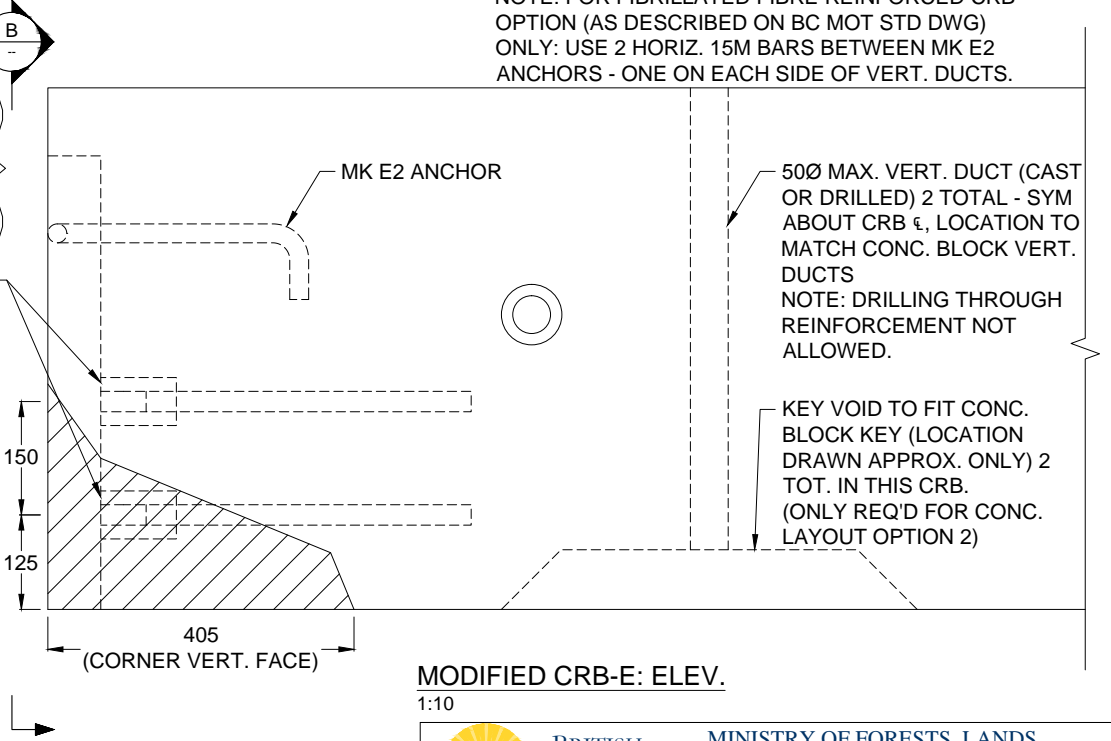
SECTION A/01: GUARDRAIL TRANSITION ASSEMBLY CONNECTION TO MODIFIED CRB-E 1:10



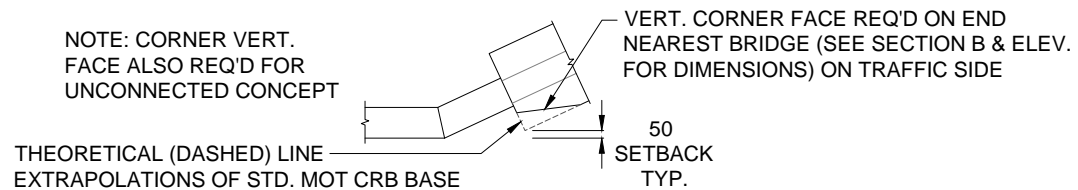
SECTION B: MODIFIED CRB-E FOR "CONNECTED" CONCEPT - END VIEW - 1:10

NOTE: UNLESS OTHERWISE SPECIFIED BY THE MINISTRY, BOTH ENDS SHALL HAVE STANDARD CRB-E EYES AND END KEY VOIDS, AS SHOWN HERE. THE MINISTRY MAY SPECIFY ONE "HOOK AND KEY" END AS PER THE CRB-H BC MOT STD. DWG. FOR THE END FARTHEST FROM THE BRIDGE, IF REQ'D TO SUIT CONNECTION TO OTHER BARRIERS, WHEN AN ODD NUMBER OF BARRIERS IS REQUIRED.

25Ø GALV. COUPLER TYP. MIN. TENSILE STRENGTH = 69KN c/w 25Mx430LG REINF. THREADED ONE END, INSERTED 40 INTO COUPLER, LEAVING 60 OPEN TO ACCEPT 25Ø BOLT. (COUPLERS NOT REQ'D FOR "UNCONNECTED" CONCEPT). AN ACCEPTABLE ALTERNATIVE TO THE EMBEDDED COUPLER/REBAR (AND THE BOLT INSERTED INTO THE COUPLER) IS: 25Ø ASTM A193 B7 THREADED ROD C/W OVERSIZED PLATE WASHER. ROD TO BE INSERTED 200mm INTO DRILLED HOLE IN END OF CRB, USING HILTI HIT HY-200 (OR MINISTRY APPROVED EQUIV.) INSTALLED ACCORDING TO MANUFACTURER'S REQUIREMENTS.



MODIFIED CRB-E: ELEV. 1:10



DETAIL 2/01: MODIFIED CRB-E CORNER VERT. FACE (PLAN) 1:50

SCALE AS SHOWN				Designed M.P. Date SEPT. 15, 2017	
				Checked G.M. Date SEPT. 15, 2017	
				Drawn N.H. Date SEPT. 15, 2017	
STANDARD BRIDGE DRAWING					
ANCHORED/CONNECTED BRIDGE APPROACH BARRIER CONCEPTS DWG. 2 OF 2					
ORIGINAL SIGNED and SEALED BY: M. PENNER, P.ENG.			APPROVED BY: B. CHOW, P.ENG., CHIEF ENGINEER		
FILE NUMBER:			DRAWING NUMBER: STD-EC-010-16		
REVISIONS					