



Ministry of
Forests, Lands, Natural
Resource Operations
and Rural Development

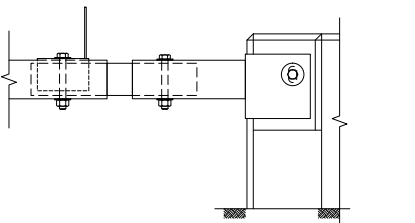
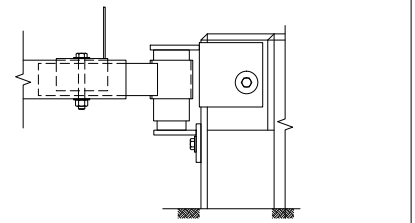
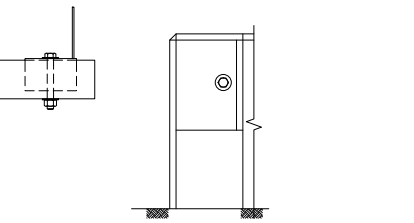
ENGINEERING BRANCH

ANCHORED/CONNECTED BRIDGE APPROACH BARRIERS

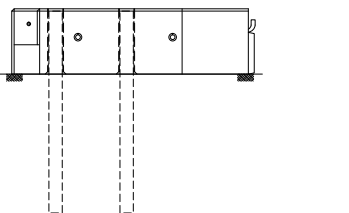
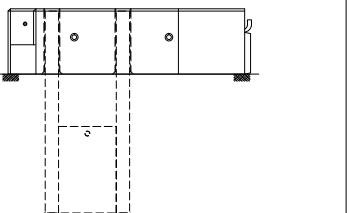
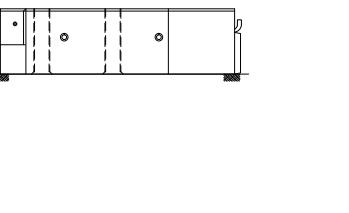
DRAWING SCHEDULE			
DRAWING NUMBER	DESCRIPTION	REV.	DATE
STD-EC-010-17	OPTIONS SUMMARY & GENERAL NOTES	0	DECEMBER 13, 2019
STD-EC-010-18	EXAMPLE APPROACH BARRIER LAYOUT	0	DECEMBER 13, 2019
STD-EC-010-19	ANCHOR CRB DETAILS	0	DECEMBER 13, 2019
STD-EC-010-20	BURIED ANCHORAGE DETAILS & DELINEATOR ATTACHMENT TAB DETAILS	0	DECEMBER 13, 2019
STD-EC-010-21	FIXED ANGLE CONNECTION OPTION DETAILS	0	DECEMBER 13, 2019
STD-EC-010-22	HINGED CONNECTION OPTION DETAILS	0	DECEMBER 13, 2019

OPTIONS SUMMARY

CONNECTION OPTIONS - (CONNECTION BETWEEN BRIDGE RAILING & ANCHOR CRB)

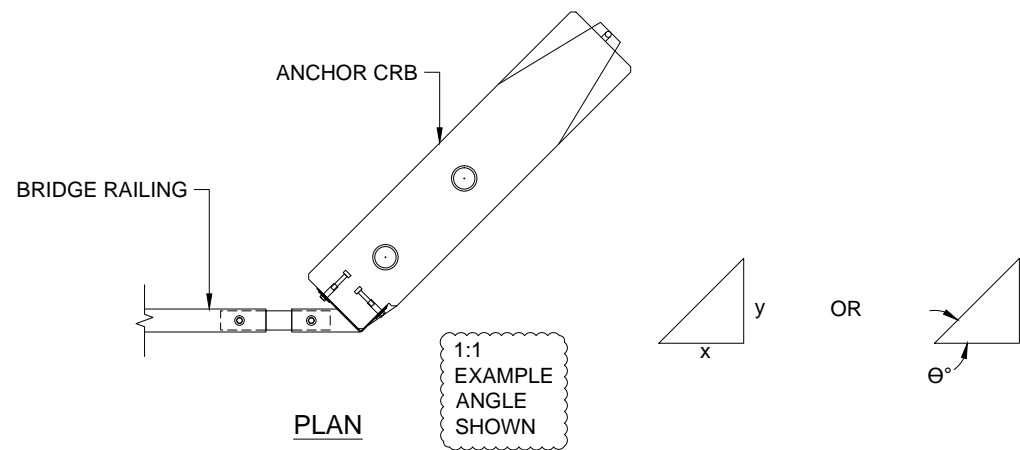
FIXED ANGLE CONNECTION 	OR	HINGED CONNECTION 	OR	NO CONNECTION 
MUST ALSO SPECIFY: <ul style="list-style-type: none"> CL-2 OR CL-3 BRIDGE RAILING HEIGHT CONNECTION ANGLE (IN DEGREES OR X:Y FORMAT) FOR EACH BRIDGE CORNER "TRANSITION SPLICE TUBE" LENGTH FOR EACH BRIDGE CORNER 		MUST ALSO SPECIFY: <ul style="list-style-type: none"> "TRANSITION ARM ASSEMBLY" LENGTH FOR EACH BRIDGE CORNER 		

BURIED ANCHORAGE OPTIONS - (FOR ANCHOR CRB)

"INDEPENDENT PIPES" BURIED ANCHORAGE 	OR	"PIPES & PLATES" BURIED ANCHORAGE 	OR	NO BURIED ANCHORAGE 
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APPROACH BARRIER ANGLE TERMINOLOGY

RATIO/DEGREE CONVERSION TABLE FOR COMMONLY USED ANGLES		
RATIO (X:Y)	DEGREES (θ°)	NOTE
PARALLEL	0°	MIN. ANGLE ALLOWED
20:1	2.862°	--
6:1	9.462°	--
4:1	14.036°	--
2:1	25.565°	--
1:1 (EXAMPLE BELOW)	45.000°	MAX. ANGLE ALLOWED



GENERAL NOTES

1.0 GENERAL

- THESE DRAWINGS DEPICT MINISTRY OF FORESTS, LANDS AND NATURAL RESOURCE OPERATIONS AND RURAL DEVELOPMENT ("THE MINISTRY") STANDARD ANCHORED/CONNECTED BRIDGE APPROACH BARRIER OPTIONS FOR USE ON FOREST SERVICE ROADS (FSRS). THESE OPTIONS MAY BE USED TO PROVIDE MORE ROBUST APPROACH BARRIER SYSTEMS COMPARED TO THE MINISTRY'S STANDARD DRAWING STD-EC-010-05 "SIMPLE BRIDGE APPROACH BARRIER CONCEPTS". NONE OF THESE APPROACH BARRIER SYSTEMS ARE CRASH TESTED.
- MINISTRY STANDARDS REFERENCED HEREIN CAN BE FOUND AT: [HTTPS://WWW2.GOV.BC.CA/GOV/CONTENT/INDUSTRY/NATURAL-RESOURCE-USE/RESOURCE-ROADS/ENGINEERING-STANDARDS-GUIDELINES/BRIDGE-DESIGN-CONSTRUCTION](https://www2.gov.bc.ca/gov/content/industry/natural-resource-use/resource-roads/engineering-standards-guidelines/bridge-design-construction).
- A PROFESSIONAL ENGINEER SHALL SHOW, ON THEIR BRIDGE GENERAL ARRANGEMENT (G.A.) DESIGNS, AN APPROPRIATE MINISTRY STANDARD BRIDGE APPROACH BARRIER SYSTEM FOR A SPECIFIC SITE BASED ON AN ASSESSMENT OF THE BRIDGE CHARACTERISTICS, ROAD ALIGNMENT, VEHICLE USAGE, SITE CONDITIONS, AND OTHER FACTORS AS APPROPRIATE. THE G.A. DESIGN SHOULD INCLUDE THE SITE-SPECIFIC APPROACH ROAD GEOMETRY (INCLUDING PULLOUTS AND FLARES), DETAILED BALLAST WALL GEOMETRY, AND DETAILED APPROACH BARRIER REQUIREMENTS (INCLUDING LENGTHS AND POSITIONS).
- IF LINES OF CONCRETE BARRIERS LONGER THAN THOSE SHOWN ON THESE DRAWINGS ARE NECESSARY, CRB-E AND CRB-H BARRIERS MAY BE SPECIFIED. IF ROAD SURFACE DRAINAGE IS REQUIRED THROUGH A LONGER LINE OF CONCRETE BARRIERS, A CDB-E BARRIER (TOGETHER WITH EROSION CONTROL MEASURES) MAY BE SPECIFIED.
- FURTHER INFORMATION RELATED TO SELECTION AND USE OF FSR BRIDGE APPROACH BARRIERS IS 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-010-17 TO 22 BRIDGE APPROACH BARRIERS FOR FSR BRIDGES".
- THESE DRAWINGS SHOULD BE READ TOGETHER WITH THE FOLLOWING MINISTRY STANDARD DRAWINGS: 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". IT IS ALSO POSSIBLE TO USE THESE DRAWINGS IN RELATION TO G.A. DESIGNS FOR BRIDGES WITH OTHER TYPES OF BRIDGE GUARDRAILS (E.G.; TIMBER GUARDRAILS) IF "BURIED ANCHORAGE" IS USED AND "CONNECTION" TO BRIDGE GUARDRAIL IS NOT USED.
- THE BRIDGE G.A. ENGINEER SHALL PROVIDE 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 WORK TO BE IN ACCORDANCE WITH CSA S6, UNO.
- ALL DIMENSIONS ARE NOMINAL AND ARE SPECIFIED IN MM UNO.

2.0 MATERIALS AND FABRICATION

- FASTENERS**
- BOLTS: ASTM A307 HEX OR HEAVY HEX., GALV.
 - NUTS: ASTM A563 GALV.
 - COUPLERS: ASTM A563 GALV "BURRARD" TYPE (100 LONG, 38 O.D.). I.D. THREADED TO MATCH SPECIFIED 25 DIA. A307 GALV. BOLTS. COUPLER STRENGTH TO MEET OR EXCEED BOLT STRENGTH. ACCURATE FIT AND STRENGTH OF COUPLER ASSEMBLY (EMBEDDED BOLT/ COUPLER/EXTERIOR BOLT) TO BE CONFIRMED BY SUPPLIER PRIOR TO CASTING ANCHOR CRB.
 - WASHERS: ASTM F844 GALV., UNO (WASHER SIZE FOR 25 DIA. BOLTS: 63 O.D., 27 I.D., 4 T).
 - OVERSIZED WASHERS: MILD STEEL (89 O.D., 27 I.D., 9.5 T) GALV.
 - ALL FASTENERS TO BE GALVANIZED TO ASTM A153.
- STEEL**
- HSS: FY 317 MPA, ASTM A500 GRADE C; OR FY 345 MPA, CSA G40.21M.
 - PIPES: FY 240 MPA, ASTM A53 GR. B OR ASTM A106 GR. B.
 - ANGLES: FY 345 MPA, CSA G40.21M OR ASTM A572 GRADE 50.
 - PLATE: FY 345 MPA, 350WT CAT. 4, CSA G40.21M.

WELDING

- WELDING IN ACCORDANCE WITH CSA W59 BY COMPANY CERTIFIED TO CSA W47.1 FOR DIVISION 1 OR 2.
 - MINIMUM FILLET WELD SIZE SHALL BE 6 MM UNO.
- PLATE BENDING AND SUBSEQUENT WELDING AT BEND**
- FOR THE FIXED ANGLE CONNECTION AND HINGED CONNECTION, THE PLATE BENDING AND SUBSEQUENT WELDING AT THE BEND LOCATION SHALL BE UNDERTAKEN WITH SPECIAL BENDING AND WELDING PROCEDURES TO MINIMIZE LOSS OF DUCTILITY AND TO ENSURE AGAINST CRACKING AT WELD LOCATIONS. THE PROCEDURES SHALL BE DOCUMENTED IN THE WELDING PROCEDURE DATA SHEET (WPDS) WHICH SHALL BE SUBMITTED TO THE MINISTRY IN-PLANT QUALITY ASSURANCE (QA) INSPECTOR.
 - THE BEND LINE SHALL BE AT RIGHT ANGLES TO THE DIRECTION OF PLATE ROLLING.
 - CORNERS SHALL BE LIGHTLY CHAMFERED BY GRINDING IN THE REGION OF THE BEND PRIOR TO BENDING.
 - THE SUPPLIER SHALL CAREFULLY INSPECT THE BENT PLATE AND WELDING BEFORE COATING TO CONFIRM NO INDICATIONS OF CRACKING.
- COATING OF STEEL COMPONENTS (OTHER THAN FASTENERS)**
- BURIED ANCHORAGE COMPONENTS: UNCOATED.
 - 168 O.D. ANCHOR SLEEVE PIPE CAST INTO ANCHOR CRB: GALV. (LACQUER FINISH TO BE REMOVED PRIOR TO GALV.).
 - DELINEATOR ATTACHMENT TAB: GALV. OR PAINTED (ALL FACES)
 - FIXED ANGLE WELDED ASSEMBLY & TRANSITION SPLICE TUBE: PAINTED (BENT PLATE TO BE PAINTED ON ALL FACES FRONT AND BACK).
 - UPPER HINGE ASSEMBLY, LOWER HINGE ASSEMBLY & TRANSITION ARM ASSEMBLY: PAINTED (PLATES TO BE PAINTED ON ALL FACES FRONT AND BACK).
 - PAINTING: IN ACCORDANCE WITH THE MINISTRY'S "STEEL GUARDRAIL COMPONENT PAINT STANDARD".
 - PAINTED PIPES AND HSS SHALL HAVE THEIR EXTERIORS, ENDS, SLOTS, AND HOLES PAINTED.
 - END PAINTING OF PIPES AND HSS SHALL EXTEND MIN. 25 MM INSIDE THE COMPONENT, EXCEPT FOR THE OUTER HINGE PIPE OF THE TRANSITION ARM ASSEMBLY WHICH SHALL BE FULLY PAINTED INSIDE.
 - GALVANIZING: IN ACCORDANCE WITH ASTM A123.

CONCRETE

- MATERIALS AND FABRICATION OF PRECAST REINFORCED CONCRETE BARRIERS (ANCHOR CRB, CTB-1E, CBN-H, AND OTHERS IF REQUIRED) SHALL BE IN ACCORDANCE WITH THE BC MINISTRY OF TRANSPORTATION AND INFRASTRUCTURE (BC MOTI) "STANDARD SPECIFICATIONS FOR HIGHWAY CONSTRUCTION" SECTION 941 "PRECAST REINFORCED CONCRETE BARRIERS" UNO.
- ANCHOR CRB MAY BE PRODUCED WITHOUT THE USE OF FIBRILLATED FIBRES AND WITHOUT THE USE OF WELDED WIRE MESH.
- ANCHOR CRB TO BE FABRICATED IN ACCORDANCE WITH CSA A23.4.
- REINFORCING BARS: CSA G30.18 GR. 400W.

DELINEATORS

- STANDARD BC MOTI OBJECT MARKERS: W-54 L AND W-54 R.
- GENERAL**
- THE SUPPLIER OF MATERIALS (CONTRACTOR) SHALL ENSURE THAT ALL COMPONENTS WILL ASSEMBLE ACCURATELY AND EFFICIENTLY PRIOR TO SHIPPING.

3.0 INSTALLATION

- BARRIERS SHALL BE PLACED ON A COMPACT GRANULAR BASE WITH MINIMAL ANTICIPATED SETTLEMENT IN RELATION TO THE BRIDGE END. SPECIFICATIONS FOR THE BASE SHALL BE DETERMINED BY THE G.A. ENGINEER, INCLUDING REQUIRED COMPACTION OF FILLS, AND FIELD INSPECTIONS DURING CONSTRUCTION.
- ALL FASTENERS 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).
- ANY DAMAGE TO MATERIALS SHALL BE REPAIRED, OR THE MATERIALS REPLACED, TO THE MINISTRY'S SATISFACTION.

STANDARD BRIDGE DRAWING

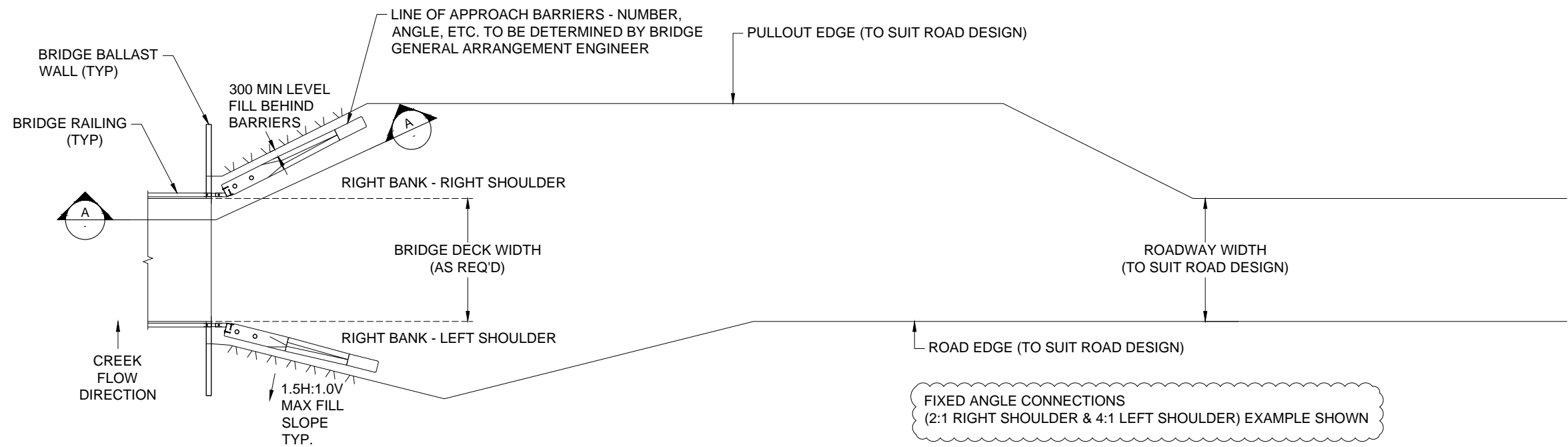
ANCHORED/CONNECTED BRIDGE APPROACH BARRIERS

SHEET 1 OF 6 OPTIONS SUMMARY & GENERAL NOTES

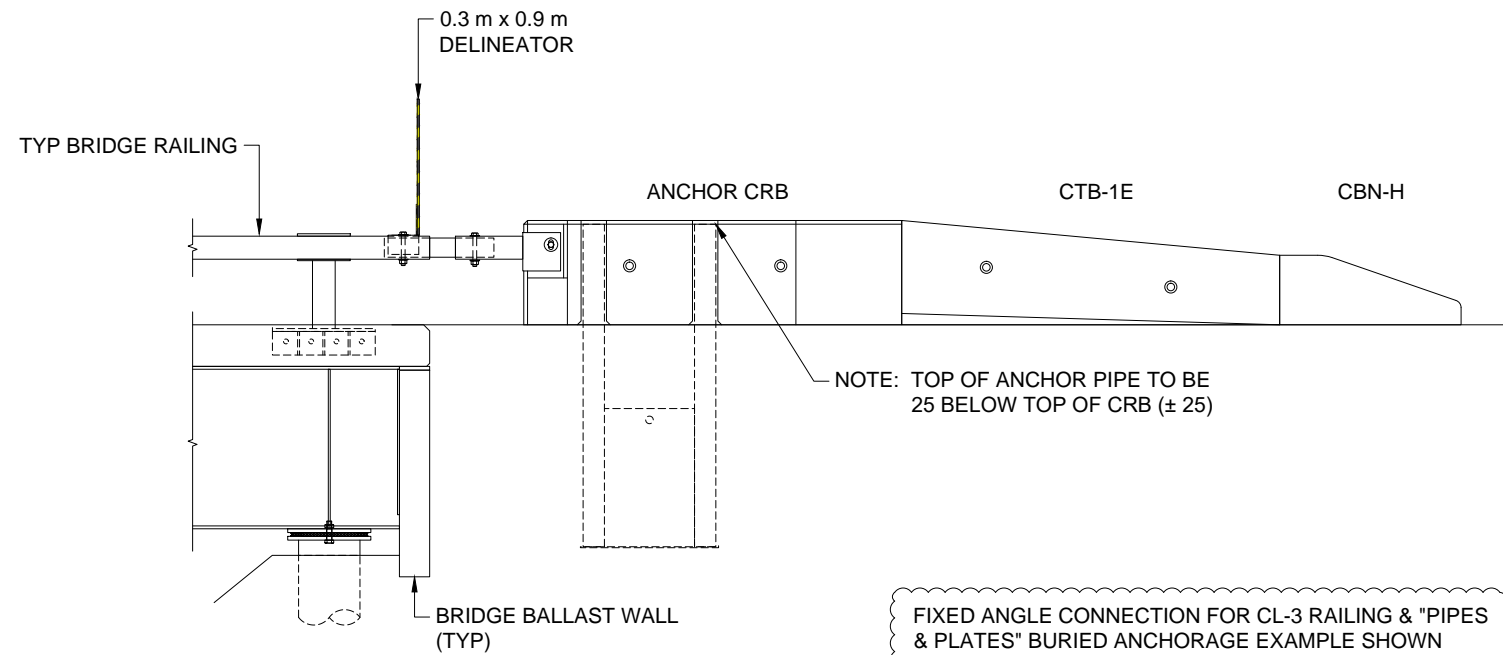
DRAWN: NICOLE HARVEY	CHECKED: GLENN MOORE
ENGINEERED: MIKE PENNER	APPROVED: BRIAN CHOW, CHIEF ENGINEER
FILE NUMBER: FOR-11300-30/1919F	DRAWING NUMBER: STD-EC-010-17 0

SCALE: AS SHOWN	Engineered: M.P. Date: DEC 13 / 2019		
	Checked: G.M. Date: DEC 13 / 2019		
	Approved: B.C. Date: DEC 13 / 2019		
	Drawn: N.H. Date: DEC 13 / 2019		
REV	DATE	DESCRIPTION	INITIALS
REVISIONS			





EXAMPLE RIGHT BANK APPROACH BARRIER LAYOUT PLAN
1:200



SECTION A
1:50

APPROACH BARRIER LAYOUT NOTES:

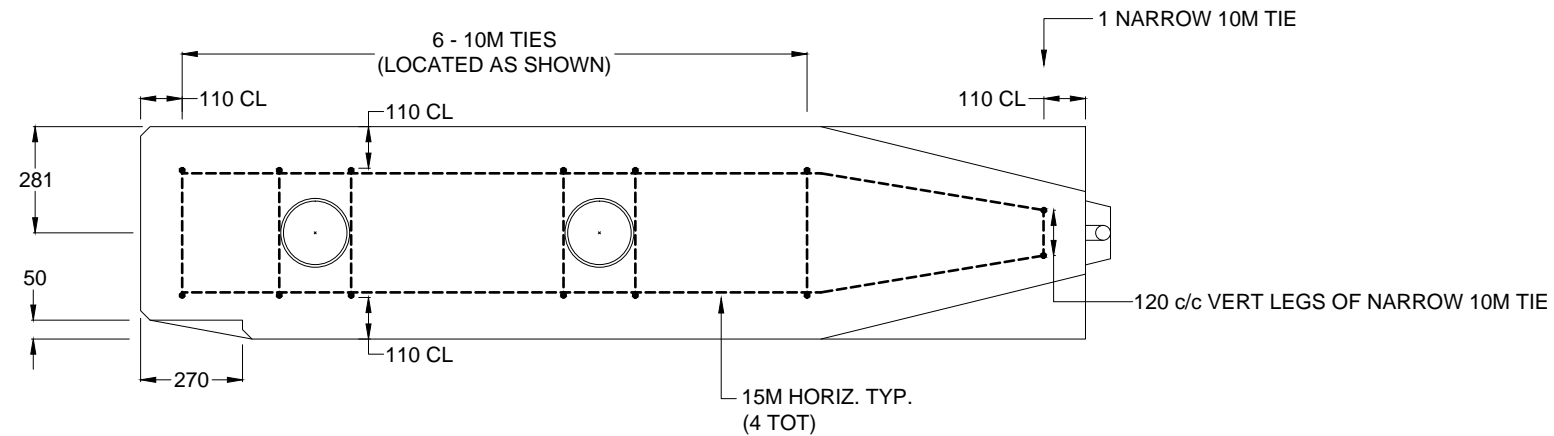
- GENERAL ARRANGEMENT ENGINEER TO DETERMINE REQ'D BALLAST WALL GEOMETRY. MINISTRY STANDARD BALLAST WALL GEOMETRY FREQUENTLY REQUIRES MODIFICATION TO ENSURE ADEQUATE FILL RETENTION & SPACE FOR APPROACH BARRIERS.
- RIGHT/LEFT BANKS ARE DETERMINED WHEN LOOKING DOWNSTREAM AT THE BRIDGE.
- RIGHT/LEFT SHOULDERS ARE DETERMINED WHEN APPROACHING THE BRIDGE BY ROAD.
- SEE SHEET 1 FOR GENERAL NOTES

SCALE	AS SHOWN	Engineered	M.P.	Date	DEC 13 / 2019
		Checked	G.M.	Date	DEC 13 / 2019
		Approved	B.C.	Date	DEC 13 / 2019
		Drawn	N.H.	Date	DEC 13 / 2019

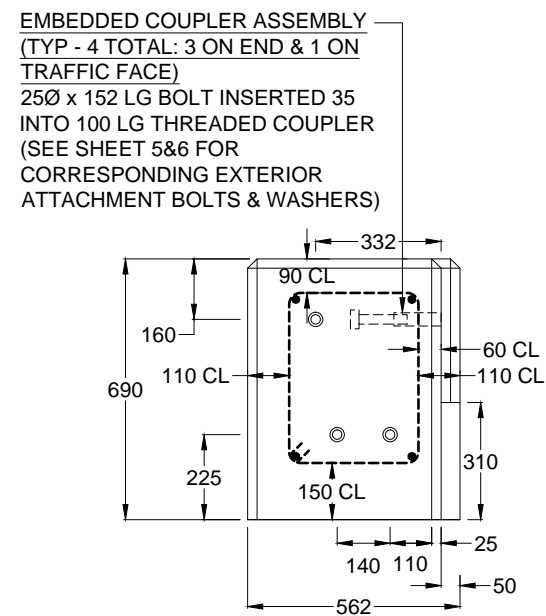
REV	DATE	DESCRIPTION	INITIALS
REVISIONS			



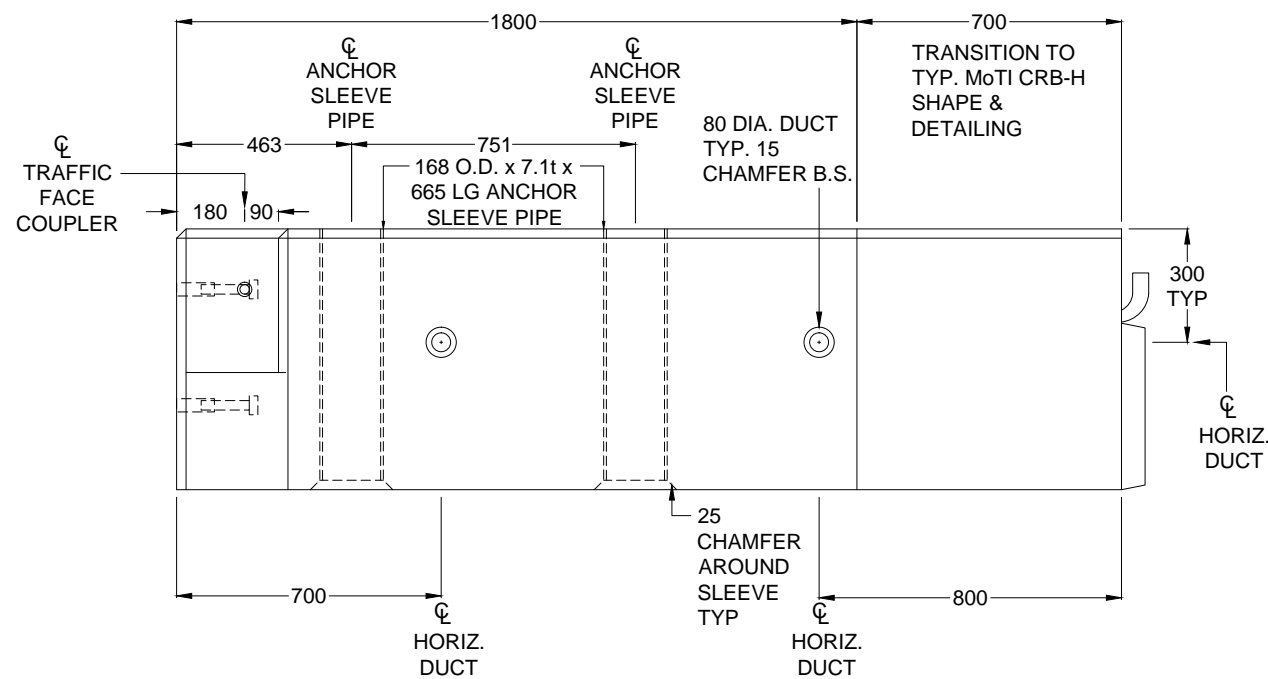
STANDARD BRIDGE DRAWING	
ANCHORED/CONNECTED BRIDGE APPROACH BARRIERS	
SHEET 2 OF 6	EXAMPLE APPROACH BARRIER LAYOUT
DRAWN: NICOLE HARVEY	CHECKED: GLENN MOORE
ENGINEERED: MIKE PENNER	APPROVED: BRIAN CHOW, CHIEF ENGINEER
FILE NUMBER: FOR-11300-30/1919F	DRAWING NUMBER: STD-EC-010-18 0



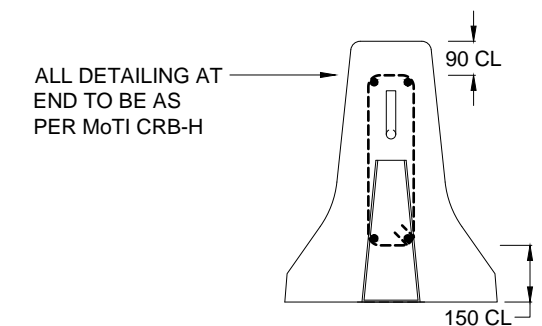
PLAN
1:20
(NOT ALL EMBEDMENTS SHOWN IN THIS VIEW - FOR CLARITY)



BRIDGE END ELEV
1:20



TRAFFIC FACE ELEV
1:20
(REINFORCEMENT NOT SHOWN FOR CLARITY)



HOOK END ELEV
1:20
(NOT SHOWING WIDENING BEYOND THE END)

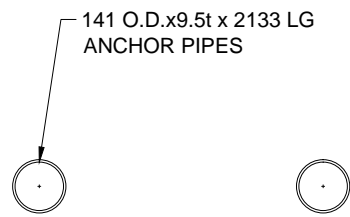
ANCHOR CRB NOTES:

- 2 RIGHT SHOULDER ANCHOR CRBS (AS SHOWN) & 2 LEFT SHOULDER ANCHOR CRBS (NOT SHOWN) TYP. PER BRIDGE.
- 25 CHAMFERS TYP. U.N.O.
- CHAMFERS AT BASE & HOOK END TO BE AS PER MoTI CRB-H
- 700 mm LONG TRANSITION ZONE TO TYP MoTI CRB-H SHAPE & DETAILING TO BE DETAILED ON FABRICATOR PREPARED SHOP DRAWINGS, AND TO BE CONSTRUCTED WITH HIGH QUALITY, SMOOTH ANGLES, TRANSITIONS & FINISHING MEETING TYP. MoTI CRB SPECS.
- SEE SHEET 1 FOR GENERAL NOTES

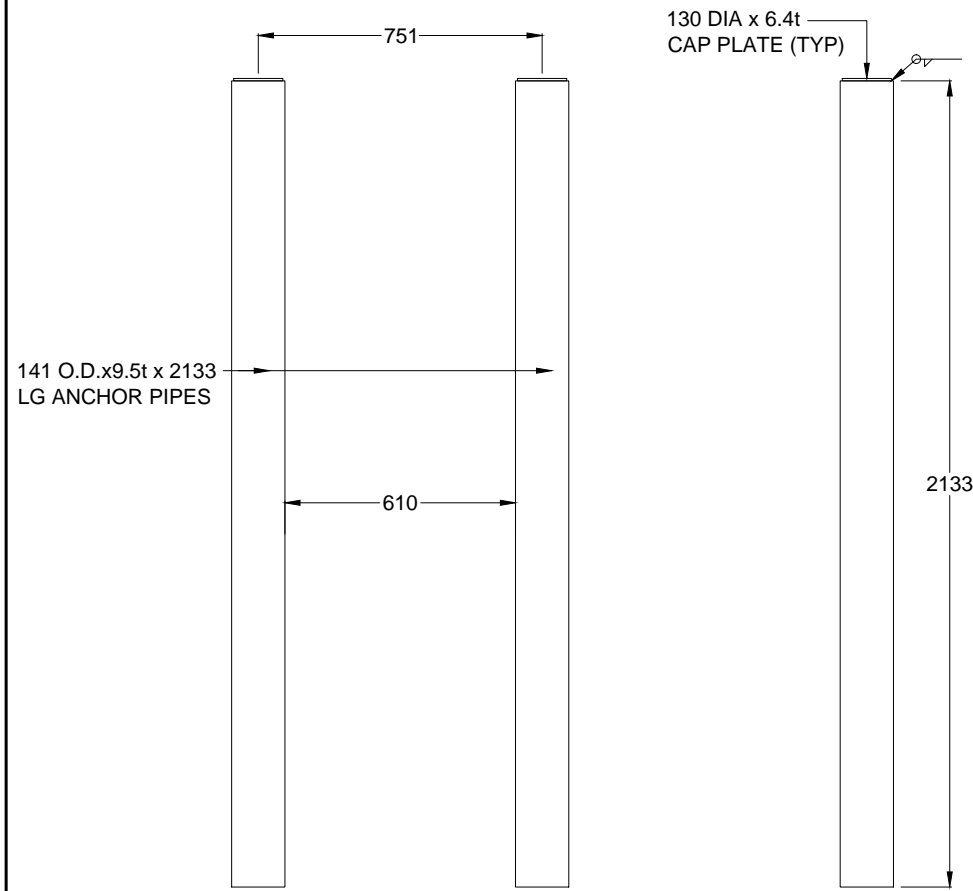
SCALE	AS SHOWN	Engineered	M.P.	Date	DEC 13 / 2019
		Checked	G.M.	Date	DEC 13 / 2019
		Approved	B.C.	Date	DEC 13 / 2019
		Drawn	N.H.	Date	DEC 13 / 2019
REV	DATE	DESCRIPTION	INITIALS		
REVISIONS					



STANDARD BRIDGE DRAWING			
ANCHORED/CONNECTED BRIDGE APPROACH BARRIERS			
SHEET		ANCHOR CRB DETAILS	
3 OF 6			
DRAWN:	NICOLE HARVEY	CHECKED:	GLENN MOORE
ENGINEERED:	MIKE PENNER	APPROVED:	BRIAN CHOW, CHIEF ENGINEER
FILE NUMBER:	FOR-11300-30/1919F	DRAWING NUMBER:	STD-EC-010-19 0



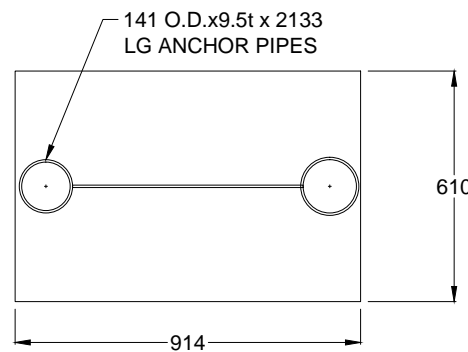
PLAN



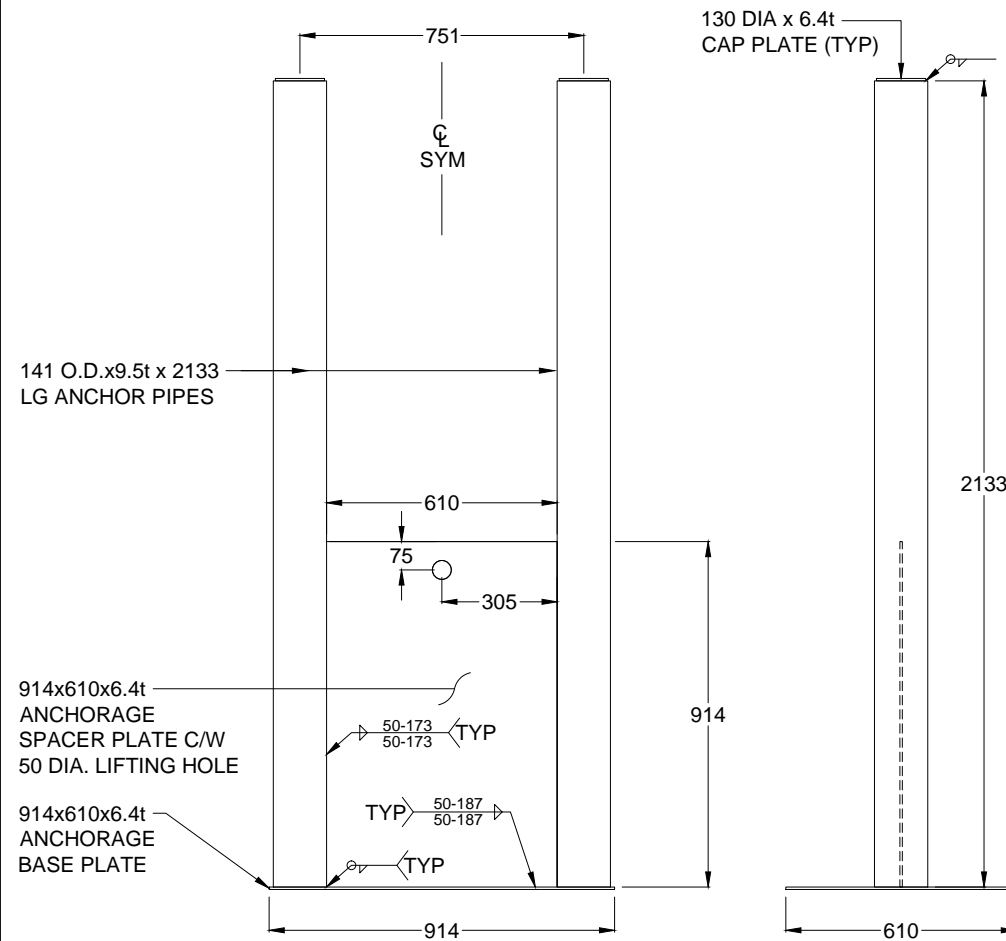
FRONT ELEV.

SIDE ELEV.

"INDEPENDENT PIPES" BURIED ANCHORAGE OPTION
1:20



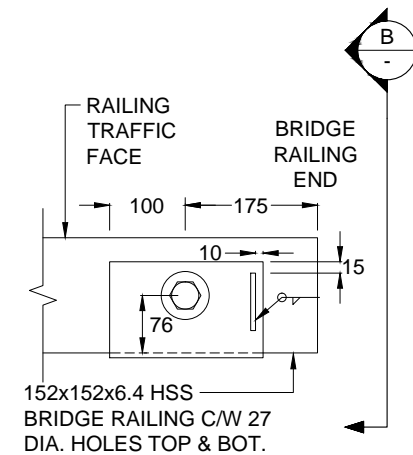
PLAN



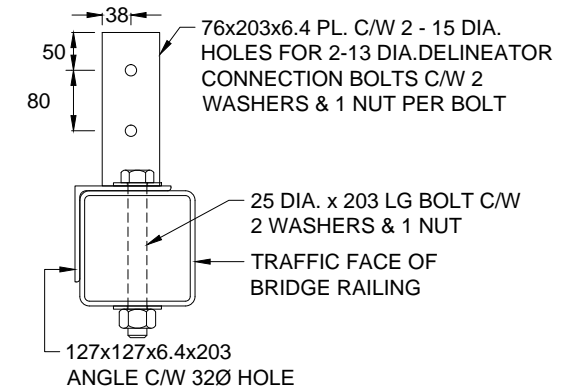
FRONT ELEV.

SIDE ELEV.

"PIPES & PLATES" BURIED ANCHORAGE OPTION
1:20



PLAN



SECTION B

DELINEATOR ATTACHMENT TAB

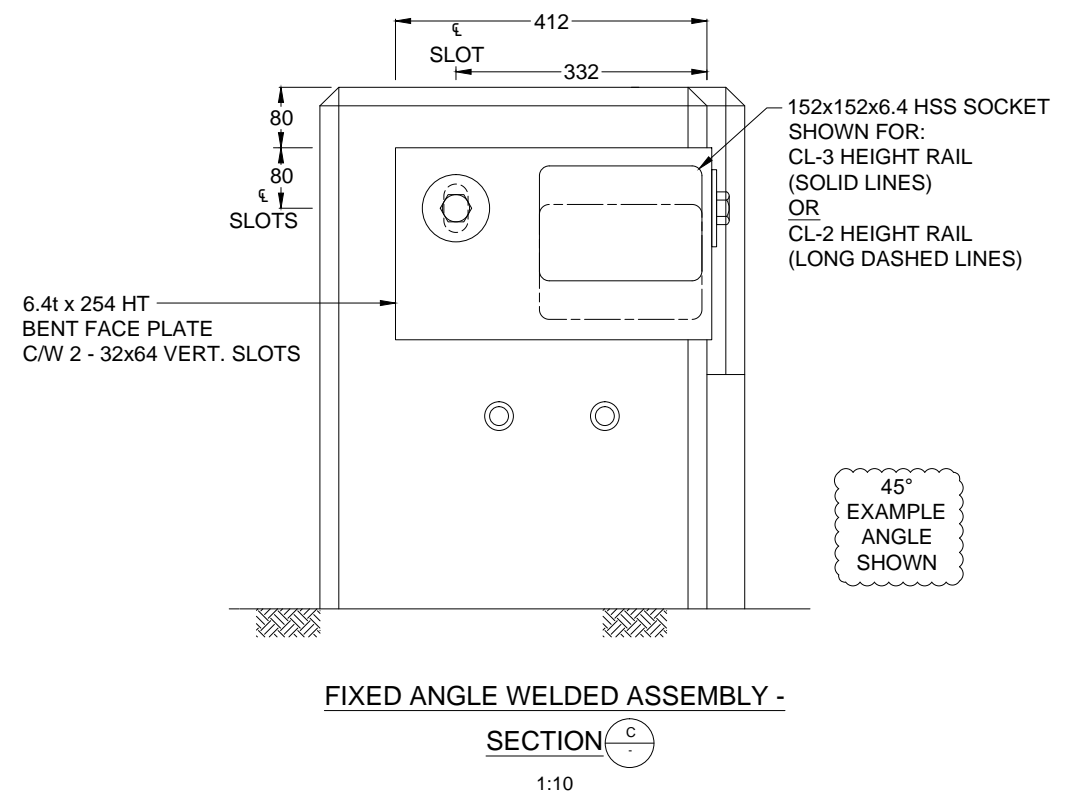
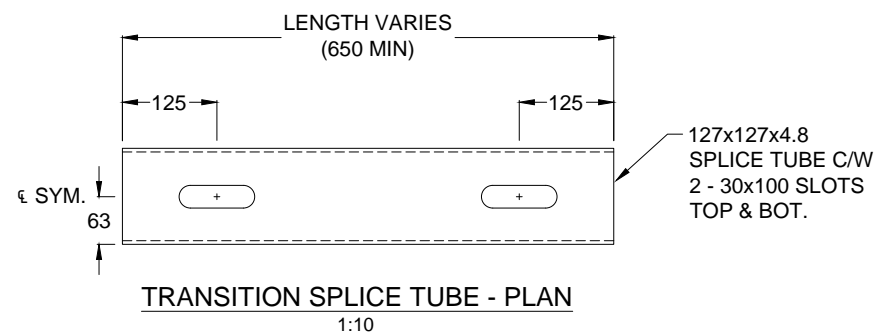
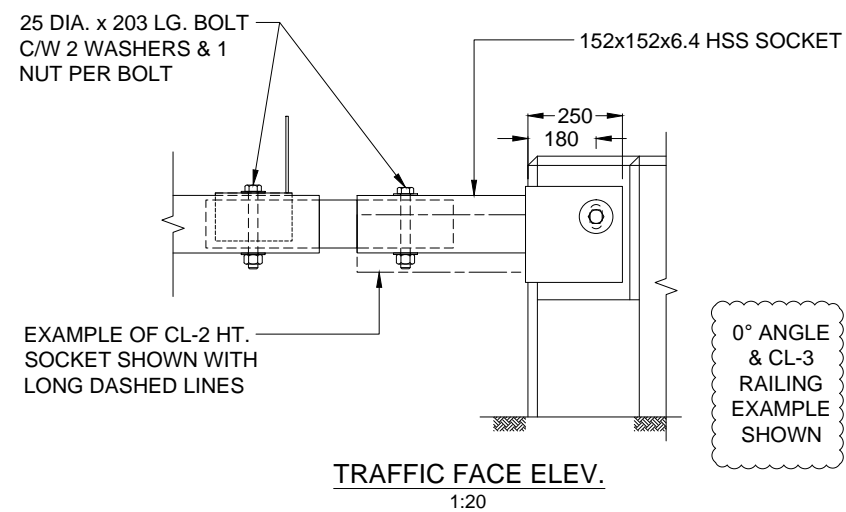
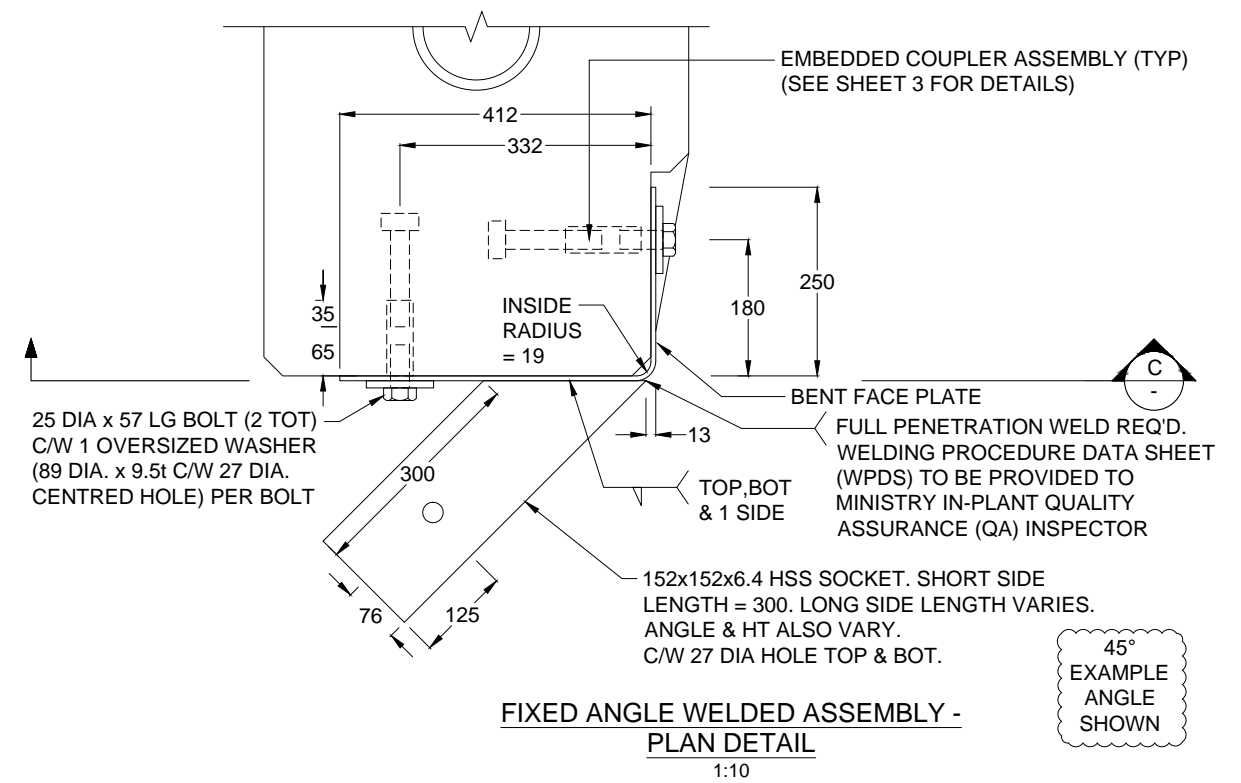
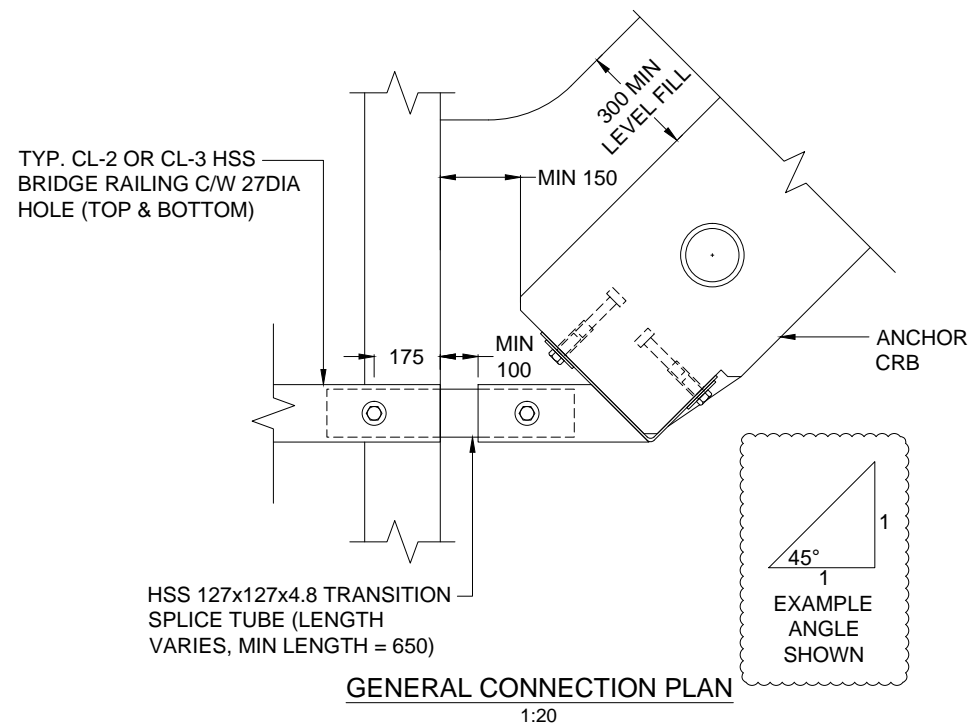
1:10
(LEFT SHOULDER TAB SHOWN - 2R SHOULDER TABS & 2L SHOULDER TABS REQ'D PER BRIDGE. SPLICE TUBE/TRANSITION ARM NOT SHOWN FOR CLARITY)

BURIED ANCHORAGE NOTES:
 - SPACER & BASE PLATES NOT USED IF PIPES ARE DRIVEN AS PILES
 - SPACER & BASE PLATES OPTIONAL AT MINISTRY ENGINEER'S DISCRETION IF PIPES ARE PLACED & BACK FILLED
 - SEE SHEET 1 FOR GENERAL NOTES

SCALE AS SHOWN		Engineered <u>M.P.</u> Date <u>DEC 13 / 2019</u>	
		Checked <u>G.M.</u> Date <u>DEC 13 / 2019</u>	
		Approved <u>B.C.</u> Date <u>DEC 13 / 2019</u>	
		Drawn <u>N.H.</u> Date <u>DEC 13 / 2019</u>	
REV	DATE	DESCRIPTION	INITIALS
REVISIONS			



STANDARD BRIDGE DRAWING	
ANCHORED/CONNECTED BRIDGE APPROACH BARRIERS	
SHEET 4 OF 6	BURIED ANCHORAGE DETAILS & DELINEATOR ATTACHMENT TAB DETAILS
DRAWN: NICOLE HARVEY	CHECKED: GLENN MOORE
ENGINEERED: MIKE PENNER	APPROVED: BRIAN CHOW, CHIEF ENGINEER
FILE NUMBER: FOR-11300-30/1919F	DRAWING NUMBER: STD-EC-010-20 0



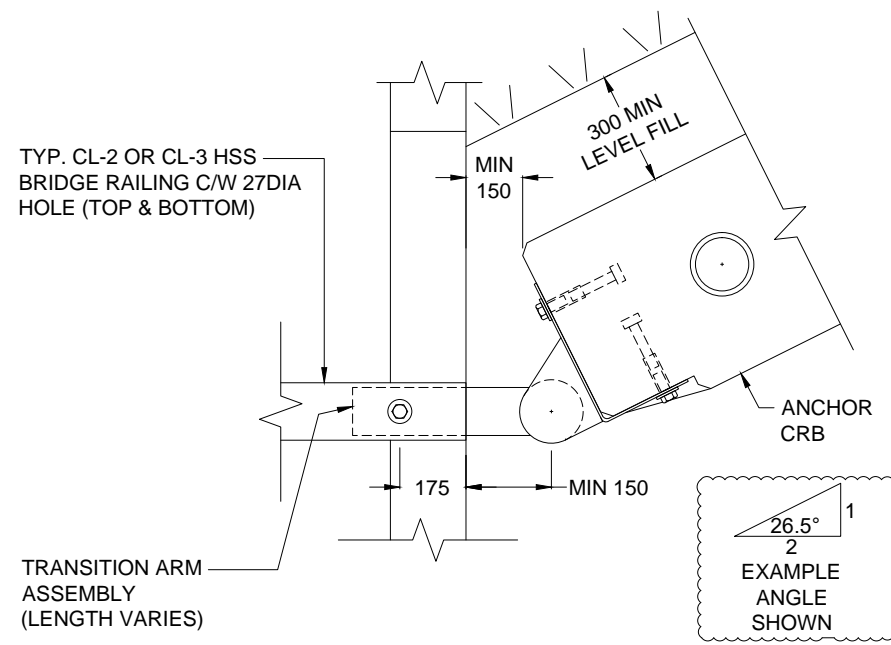
FIXED ANGLE CONNECTION NOTES:

- REQUIRES CUSTOM DETAILING & FABRICATION FOR SPECIFIC ANGLES & FOR CL-2 OR CL-3 RAIL HT.
- NOT EASILY FIELD ADJUSTABLE
- DWGS SHOW RIGHT SHOULDER CONNECTION DETAILING (TYPICALLY 2 RIGHT SHOULDER CONNECTIONS & 2 LEFT SHOULDER CONNECTIONS ARE REQ'D FOR EACH BRIDGE)
- SEE SHEET 1 FOR GENERAL NOTES

SCALE	AS SHOWN	Engineered	M.P.	Date	DEC 13 / 2019
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		Approved	B.C.	Date	DEC 13 / 2019
		Drawn	N.H.	Date	DEC 13 / 2019
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REVISIONS					



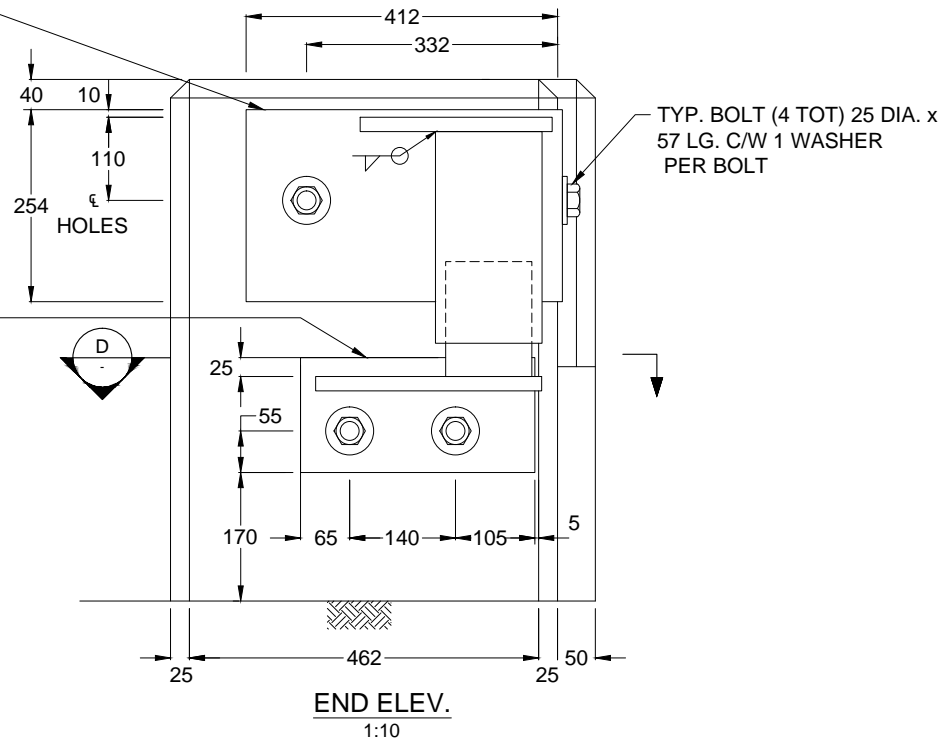
STANDARD BRIDGE DRAWING			
ANCHORED/CONNECTED BRIDGE APPROACH BARRIERS			
SHEET		FIXED ANGLE CONNECTION OPTION DETAILS	
5 OF 6			
DRAWN:	NICOLE HARVEY	CHECKED:	GLENN MOORE
ENGINEERED:	MIKE PENNER	APPROVED:	BRIAN CHOW, CHIEF ENGINEER
FILE NUMBER:	FOR-11300-30/1919F	DRAWING NUMBER:	STD-EC-010-21 0



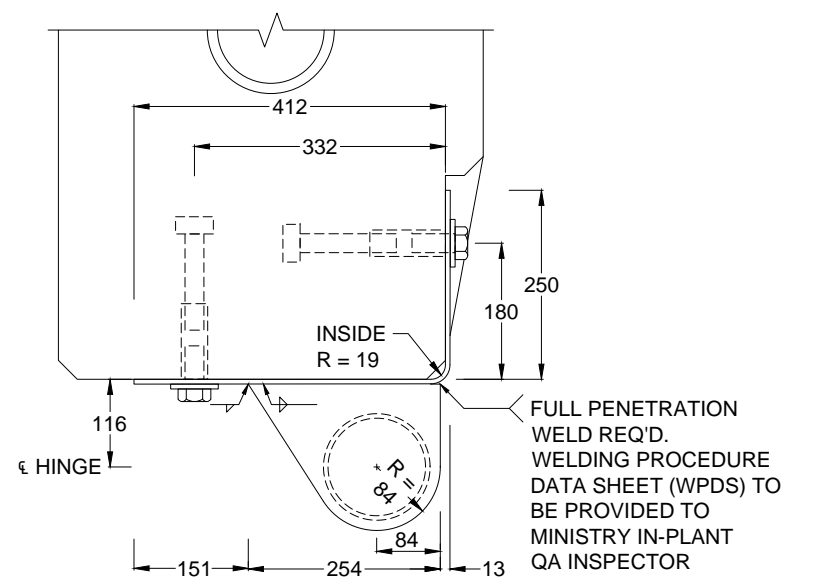
GENERAL CONNECTION PLAN
1:20

UPPER HINGE ASSEMBLY
6.4 t x 254 HT.
BENT FACE PLATE
C/W 2 - 32 DIA. HOLES
PLUS 19t HORIZ. PLATE
PLUS 141 O.D. x 9.5 t x 280 LG.
MIDDLE HINGE PIPE

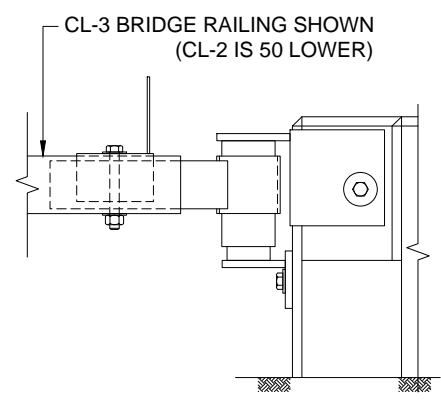
LOWER HINGE ASSEMBLY
310x152x19t
FLAT FACE PLATE
C/W 2 - 32 DIA. HOLES
PLUS 19t HORIZ. PLATE
PLUS 114 O.D. x 6 t x 152 LG.
INNER HINGE PIPE



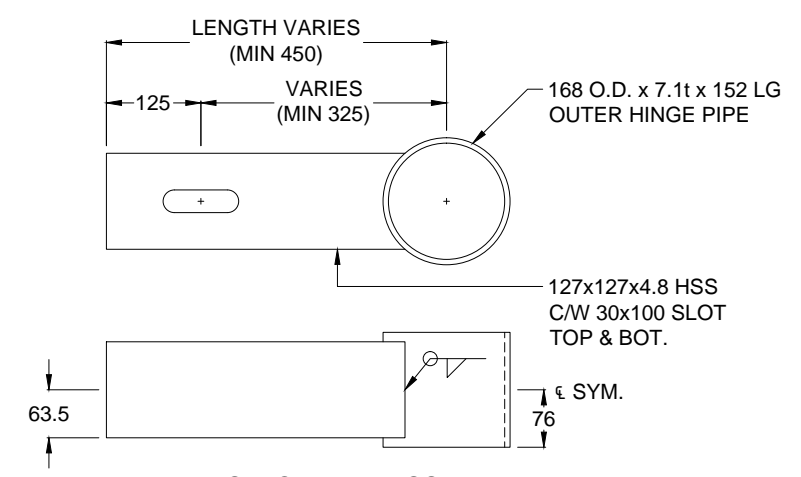
END ELEV.
1:10



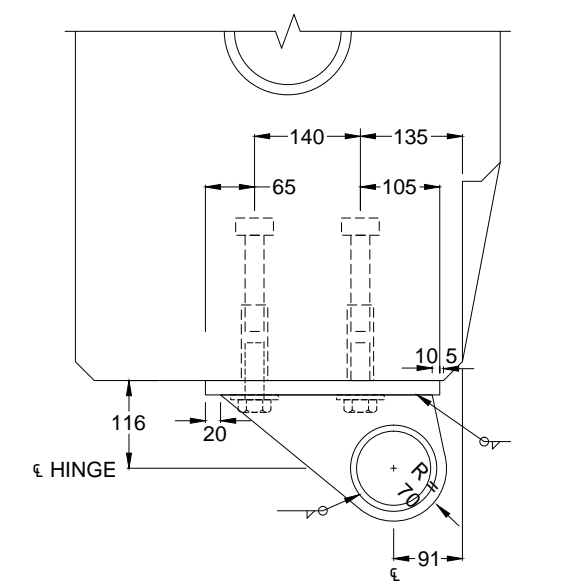
UPPER HINGE ASSEMBLY PLAN
1:10



TRAFFIC FACE ELEV.
1:20



**TRANSITION ARM ASSEMBLY
PLAN & ELEV.**
1:10



SECTION D-D: LOWER HINGE ASSEMBLY
1:10

HINGED CONNECTION NOTES:

- WORKS FOR ANY ANGLE (0-45°)
- WORKS FOR CL-2 OR CL-3 BRIDGE RAILINGS
- FIELD ADJUSTABLE
- DWGS SHOW RIGHT SHOULDER CONNECTION DETAILING (TYPICALLY 2 RIGHT SHOULDER CONNECTIONS & 2 LEFT SHOULDER CONNECTIONS ARE REQ'D FOR EACH BRIDGE)
- SEE SHEET 1 FOR GENERAL NOTES

SCALE	AS SHOWN	Engineered	M.P.	Date	DEC 13 / 2019
		Checked	G.M.	Date	DEC 13 / 2019
		Approved	B.C.	Date	DEC 13 / 2019
		Drawn	N.H.	Date	DEC 13 / 2019
REV	DATE	DESCRIPTION	INITIALS		
REVISIONS					



STANDARD BRIDGE DRAWING	
ANCHORED/CONNECTED BRIDGE APPROACH BARRIERS	
SHEET 6 OF 6	HINGED CONNECTION OPTION DETAILS
DRAWN: NICOLE HARVEY	CHECKED: GLENN MOORE
ENGINEERED: MIKE PENNER	APPROVED: BRIAN CHOW, CHIEF ENGINEER
FILE NUMBER: FOR-11300-30/1919F	DRAWING NUMBER: STD-EC-010-22 0