

△△ GENERAL NOTES

1. THESE BRIDGERAIL UPGRADE DRAWINGS APPLY TO VERTICAL BAR BRIDGERAILS SIMILAR TO THE BRIDGERAIL SHOWN ON DRAWING S-732 AND ALSO TO HORIZONTAL RAIL TYPE BRIDGERAILS SIMILAR TO THE BRIDGERAIL SHOWN ON DRAWING S-687.
2. ALL DIMENSIONS ARE SHOWN IN MILLIMETRES UNLESS NOTED OTHERWISE.
3. THE SQUASHING CAPACITY OF THE 168.3 O.D. x 4.0 mm SQUASH CANS BETWEEN THE NEW RAIL AND EXISTING POSTS SHALL BE BETWEEN 25 KN AND 35 KN FOR THIS BRIDGERAIL UPGRADE DESIGN.
4. TROUGH DRAINS AT THE ENDS OF THE BRIDGE MAY REQUIRE MODIFICATIONS TO ACCOMMODATE THE BRIDGERAIL UPGRADE, MODIFICATIONS SHALL BE CARRIED OUT ON A SITE SPECIFIC BASIS.

APPROACH RAIL

1. FOR UNDIVIDED HIGHWAYS THE THRIE BEAM APPROACH RAIL BEYOND THE FIRST THRIE BEAM POST AT ALL FOUR CORNERS OF THE BRIDGE SHALL BE AS PER DWG S-1643-00 EXCEPT AS MODIFIED ON THESE DRAWINGS.
2. FOR DIVIDED HIGHWAYS THE THRIE BEAM APPROACH RAIL BEYOND THE FIRST THRIE BEAM POST AT THE TWO APPROACH TRAFFIC CORNERS OF THE BRIDGE SHALL BE AS PER DWG S-1643-00 EXCEPT AS MODIFIED ON THESE DRAWINGS.
3. FOR DIVIDED HIGHWAYS, APPROACH RAIL IS NOT REQUIRED AT THE EXIT TRAFFIC CORNERS OF THE BRIDGE PROVIDED THAT THERE ARE NO HAZARDS DOWNSTREAM THAT WOULD WARRANT A BARRIER.
4. FOR DIVIDED HIGHWAYS WHERE APPROACH RAIL IS REQUIRED AT THE TWO EXIT CORNERS OF THE BRIDGE IT SHALL BE AS PER DRAWINGS S-1715-07 EXCEPT AS MODIFIED ON THESE DRAWINGS.

FABRICATION

1. SQUASH CANS SHALL BE SELECTED FROM LINE PIPE MATERIAL CONFORMING TO CSA Z245.1-07 GRADE 359 CATEGORY 1.1 MEETING AN IMPACT ENERGY OF 20J TESTED AT -30°C. THE CONTRACTOR SHALL REVIEW MILL TESTING CERTIFICATES AND SELECT MATERIAL WITH A YIELD STRENGTH RANGING BETWEEN 450 MPa AND 480 MPa. CUT LENGTH OF THE SQUASH CANS SHALL BE DETERMINED FROM LOAD TESTING REQUIREMENTS AND SHALL BE A MAXIMUM OF 500 mm AND A MINIMUM OF 250 mm. CUTTING AND FABRICATION OF THE SQUASH CANS SHALL NOT PROCEED PRIOR TO ESTABLISHING THIS CUT LENGTH. DUE TO VARIATIONS OF EXISTING CURB AND POST DIMENSIONS IN THE FIELD, THE BOLT HOLES FOR ATTACHING THE SQUASH CANS TO THE HSS 152x152 SPACER TUBE SHALL BE LOCATED BASED ON FIELD CONFIRMED DIMENSIONS.
2. EXISTING SITE SPECIFIC BRIDGE RAIL INFORMATION, INCLUDING CURB HEIGHT AND RAIL CONFIGURATION, SHALL BE FIELD VERIFIED BEFORE DETERMINING THE REQUIRED LENGTH OF THE STUB POSTS AND THE BOLT HOLE LOCATIONS IN THE SQUASH CANS. AFTER DETERMINING THE CUT LENGTH OF THE SQUASH CAN, THE HSS RAIL AND SQUASH CAN ELEVATIONS SHALL BE ADJUSTED TO WITHIN THE TOLERANCES SHOWN ON THE STANDARD DRAWINGS TO ENSURE CLEARANCE BETWEEN THE UPGRADE AND EXISTING BRIDGE RAIL MEMBERS. DETERMINE THE LENGTH OF THE STUB POSTS AND USE THE BOLT LOCATIONS ON THE SPACER TUBE, AS SHOWN ON THE STANDARD DRAWINGS, TO LOCATE THE BOLT HOLES IN THE SQUASH CANS.
3. BRIDGERAIL UPGRADE SHALL CONFORM TO THE CURRENT REQUIREMENTS OF THE SPECIFICATIONS FOR BRIDGE CONSTRUCTION SECTIONS 12 - BRIDGERAIL AND SECTION 14 - GUARDRAIL.
4. ALL PLATE STEEL AND STRUCTURAL SHAPES SHALL CONFORM TO CSA G40.21 GRADE 300W EXCEPT AS FOLLOWS:
 - RECTANGULAR AND SQUARE TUBING SHALL CONFORM TO ASTM A500C.
 - STANDARD PIPE MATERIAL SHALL CONFORM TO ASTM A53 GRADE B.
5. ALL BOLTS SHALL CONFORM TO ASTM A325 UNLESS NOTED OTHERWISE.
6. ALL W-BEAM AND THRIE BEAM GUARDRAIL (INCLUDING THRIE BEAM TERMINAL CONNECTOR AND W-THRIE BEAM TRANSITION SECTION) SHALL HAVE A MINIMUM YIELD STRENGTH OF 345 MPa.
7. TIMBER POSTS AND SPACERS SHALL BE COAST DOUGLAS FIR OR PACIFIC COAST HEMLOCK CONFORMING TO THE STRESS GRADE "SELECT STRUCTURAL POSTS AND TIMBERS" (NLGA PARAGRAPH 131 a).
8. GROUT FOR GROUT PADS SHALL MEET THE LATEST REQUIREMENTS OF THE SPECIFICATION FOR SUPPLY OF NON-SHRINK GROUT (B387).
9. ALL WELDING SHALL CONFORM TO CURRENT AWS SPECIFICATION D1.5.
10. ALL MATERIALS SHALL BE HOT-DIP GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH CSA G164 UNLESS NOTED OTHERWISE.

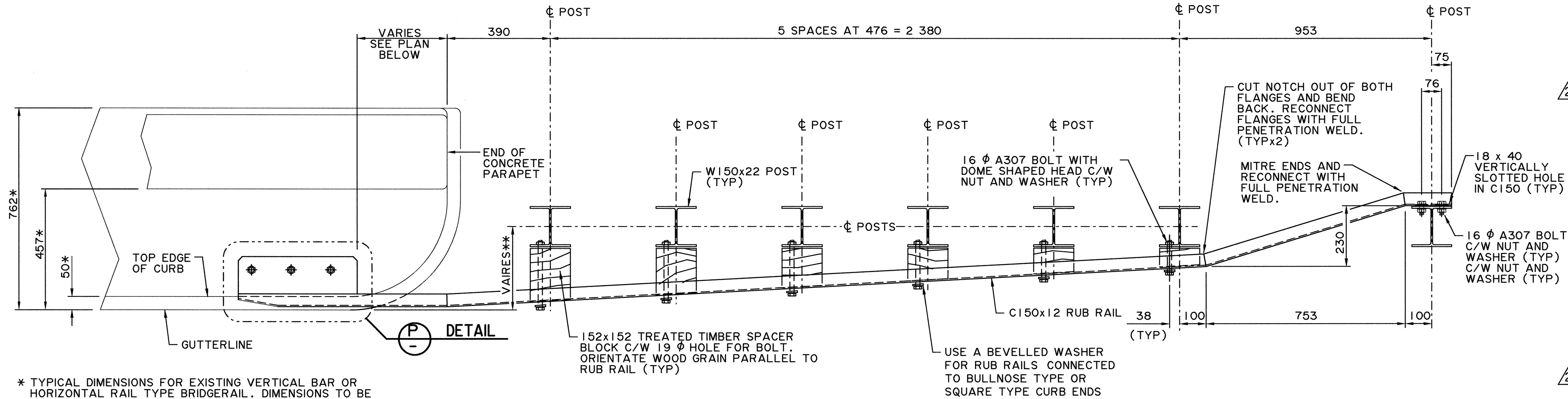
SQUASH CAN LOAD TESTING REQUIREMENTS

THE SQUASHING CAPACITY AND CUT LENGTH SHALL BE DETERMINED BY LOAD TESTING SPECIMENS IN ACCORDANCE WITH THE ASTM A53 FLATTENING TEST AND THE FOLLOWING REQUIREMENTS:

1. A MINIMUM OF TWO SPECIMENS SHALL BE INDIVIDUALLY TESTED. IF THE LOAD DEFLECTION CURVES OF BOTH SPECIMENS COMPARE WITHIN 10% THEN THE TEST RESULTS WILL BE CONSIDERED ACCURATE. OTHERWISE, A THIRD SPECIMEN SHALL BE TESTED TO CONFIRM THE VALIDITY OF THE FIRST TWO TEST RESULTS.
2. TESTING SHALL BE CARRIED OUT ON PIPE SPECIMENS OF THE SAME HEAT NUMBER AS THE PIPE MATERIAL USED IN FABRICATION OF THE RETROFIT BRIDGERAIL.
3. LOAD TESTING SHALL BE CARRIED OUT ON 400 mm LONG SPECIMENS WITH THE LOAD APPLIED UNIFORMLY ALONG THE FULL LENGTH OF EACH SPECIMEN.
4. VISUAL OBSERVATIONS FOR STEPS 1, 2 AND 3 OF THE FLATTENING TEST AS NOTED IN ASTM A53, SHALL BE RECORDED AND LABELLED AS PASS OR FAIL AND SUBMITTED TO THE CONSULTANT FOR REVIEW PRIOR TO FABRICATION.
5. A LOAD-DEFLECTION CURVE SHALL BE RECORDED FOR EACH TEST SPECIMEN AND SUBMITTED TO THE CONSULTANT FOR REVIEW PRIOR TO FABRICATION. THE DEFLECTION SHALL BE PLOTTED FOR EACH 1 kN OF CHANGE IN THE APPLIED LOAD.
6. THE RATE OF LOADING SHALL BE BETWEEN 40 mm/MIN AND 80 mm/MIN.
7. THE ACTUAL RATE OF LOADING AND DATE OF TESTING SHALL BE RECORDED ON EACH LOAD DEFLECTION CURVE.
8. THE ABOVE LOAD TESTING SHALL BE ADMINISTERED BY THE CONTRACTOR AND WITNESSED BY THE CONSULTANT.
9. THE LENGTH OF THE SQUASH CANS SHALL BE DETERMINED BY PROPORTIONING THE 400 mm LENGTH BY THE RATIO OF 35 kN DIVIDED BY THE AVERAGE YIELD STRENGTH OF THE TEST SPECIMENS, EXCEPT THE LENGTH SHALL BE LIMITED TO 500 mm MAXIMUM AND 250 mm MINIMUM.

ERECTION

1. LINE AND ELEVATION OF BARRIER SHALL BE SET BY INSTRUMENT.
2. ALL POSTS SHALL BE VERTICAL.
3. ANY GALVANIZED MATERIAL CUT OR DAMAGED IN THE FIELD SHALL BE TOUCHED UP WITH TWO COATS OF ZINC RICH PAINT.
4. TIGHTENING OF BOLTS SHALL BE BY THE TURN OF NUT METHOD.

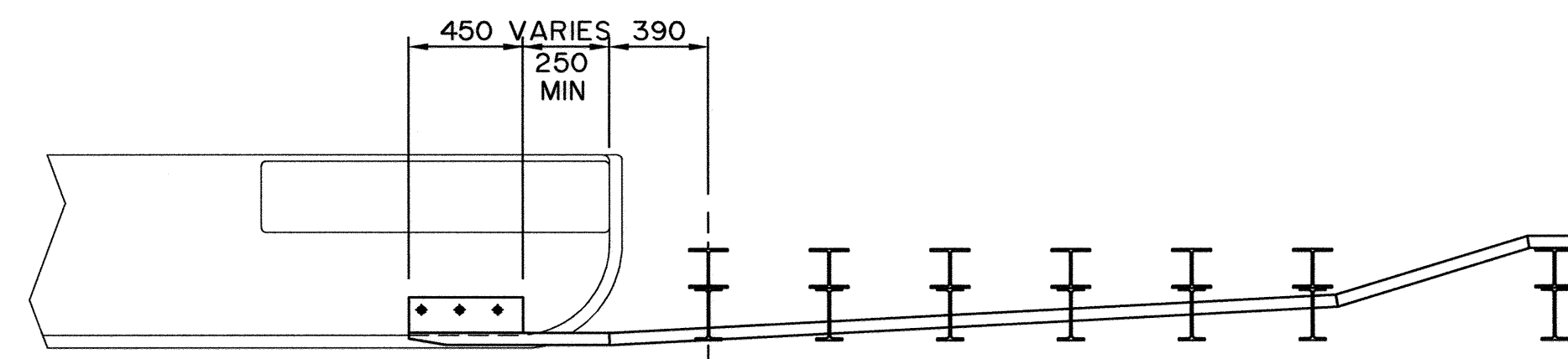


* TYPICAL DIMENSIONS FOR EXISTING VERTICAL BAR OR HORIZONTAL RAIL TYPE BRIDGERAIL. DIMENSIONS TO BE CONFIRMED ON A SITE SPECIFIC BASIS.

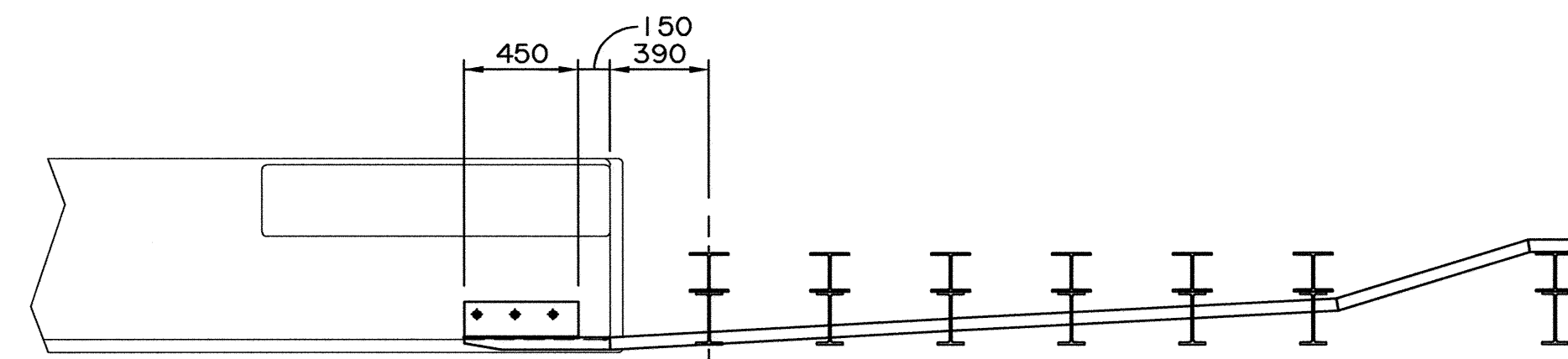
** THIS DIMENSION WILL TYPICALLY VARY FROM 305 mm FOR BRIDGERAILS WITH STEEL POSTS TO 265 mm FOR BRIDGERAILS WITH CONCRETE POSTS.

RUB RAIL PLAN VIEW

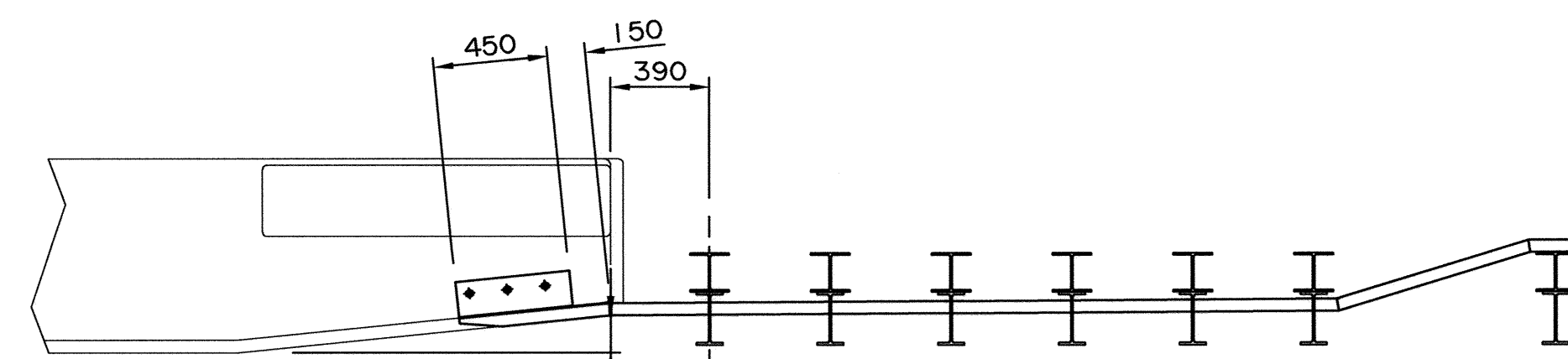
NOTE:
THRIE BEAM AND HORIZONTAL TUBE RAIL NOT SHOWN FOR CLARITY.



FOR BULLNOSE CURB END



FOR SQUARE CURB END

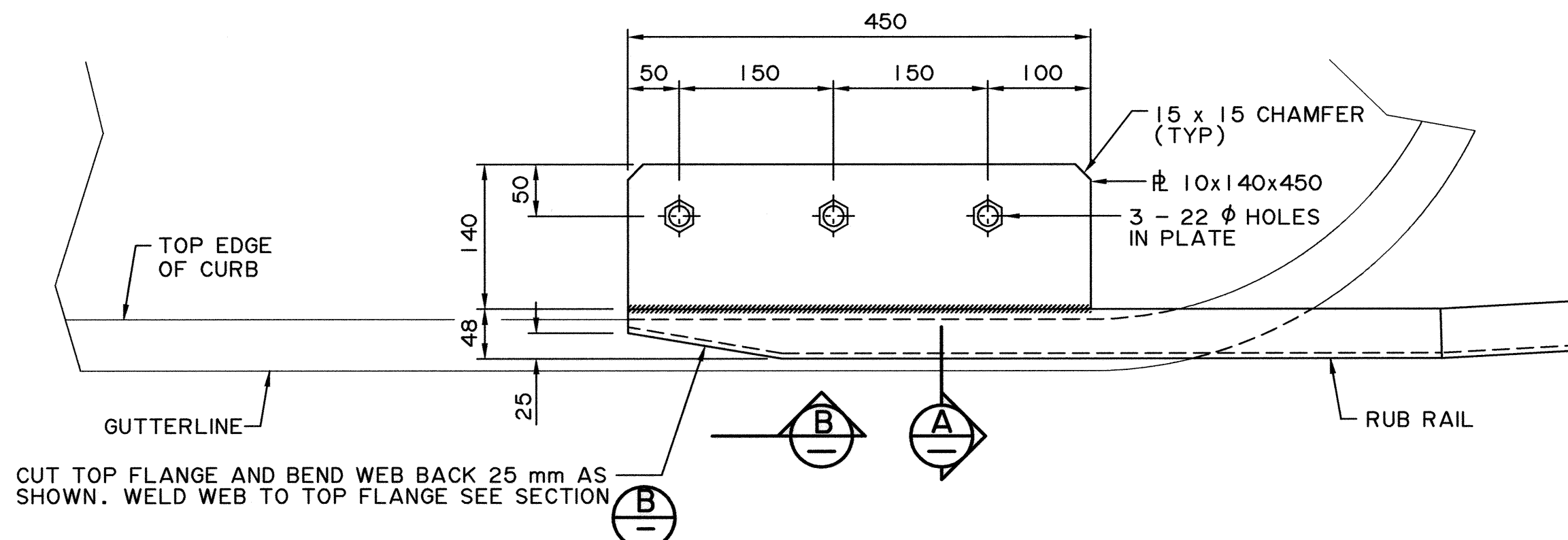


FOR TAPERED CURB END

NOTE:
FOR TAPERED CURB ENDS RUB RAIL SHALL NOT BE REQUIRED IF TAPER IS SUFFICIENT TO MAKE THE ROADWAY FACE OF THE CURB END 200 mm OR MORE BEHIND THE ROADWAY FACE OF THE NEW HORIZONTAL RAIL.

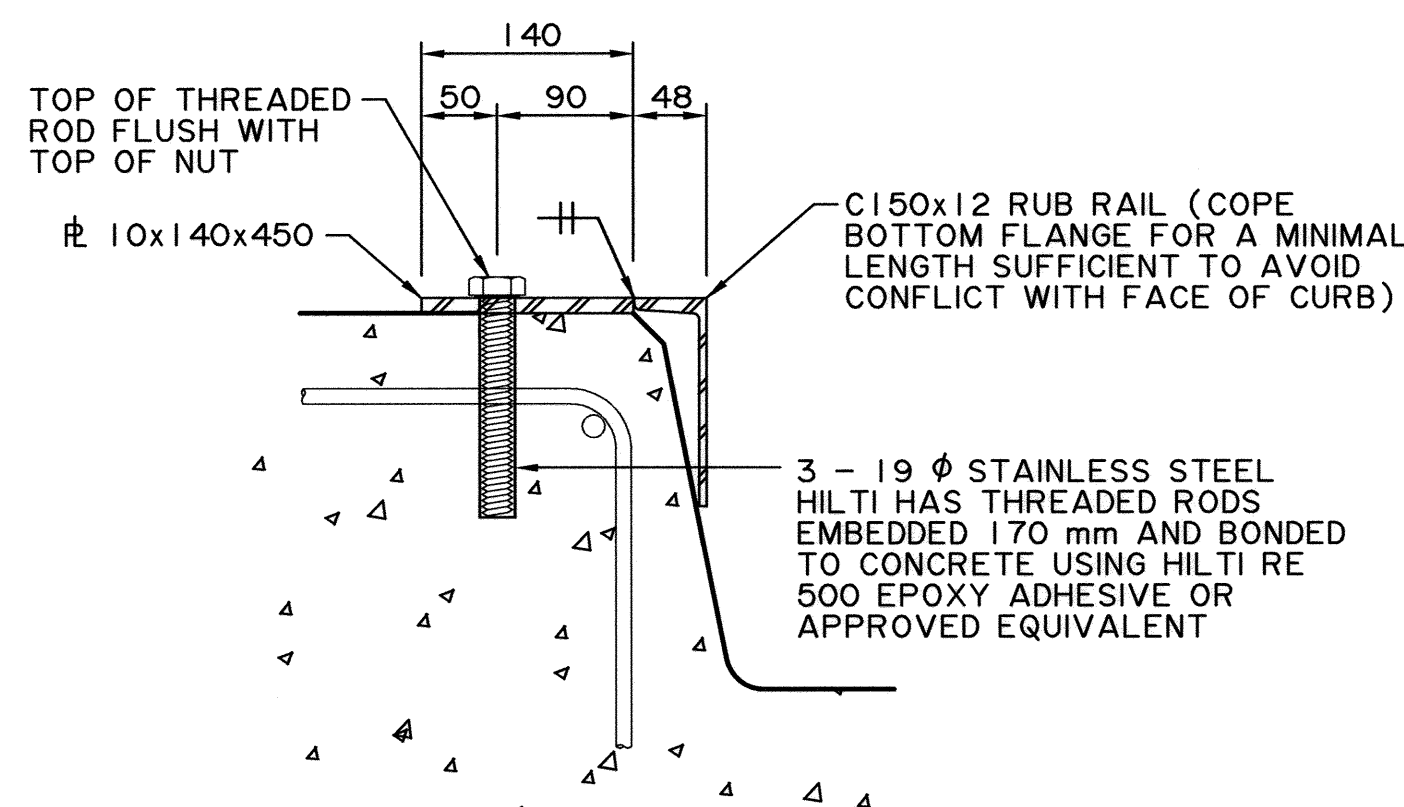
RUB RAIL TO CURB CONNECTION PLAN

NOTE: SEE RUB RAIL PLAN VIEW FOR RUB RAIL GEOMETRY.



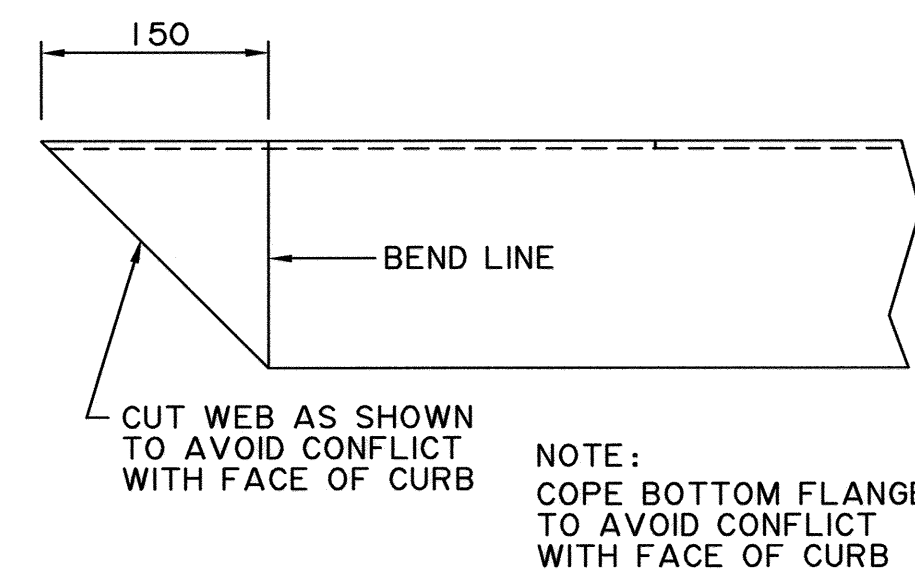
RUB RAIL TO CURB CONNECTION

(TYPICAL) 1:5



SECTION A

1:5



SECTION B

1:5

• WORK THESE DRAWINGS TOGETHER: S-1750-07, S-1751-07 AND S-1752-07

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UMA ENGINEERING LTD.
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BY: **BOB RAMSAY**
ON: **JANUARY 4, 2008**
The Association of Professional Engineers,
Geologists and Geophysicists of Alberta

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REV	DATE	REVISIONS	BY
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△	11-09-22	REVISE GENERAL NOTES	WCM
△	10-06-06	REVISE GENERAL NOTES	CM

RECOMMENDED DIRECTOR BRIDGE ENGINEERING
ORIGINAL SIGNED BY TOM LOO
APPROVED EXECUTIVE DIRECTOR TECHNICAL STANDARDS BRANCH
ORIGINAL SIGNED BY ALLAN KWAN
DATE FEB 7, 2008

Alberta INFRASTRUCTURE AND TRANSPORTATION

BRIDGERAIL UPGRADE
VERT. BAR / HORIZ. RAIL BRIDGERAIL
SHEET 3

AI BAR CODE DATE SHEET DRAWING
2007-04-02 3 of 3 S-1752-07