

**APPENDIX B**

**REFERENCE DRAWINGS**

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# Appendix B

## Reference Drawings

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## **APPENDIX B1**

# **ALBERTA WEAK POST AND STRONG POST W-BEAM GUARDRAIL**

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# Appendix B1

## Alberta Weak Post and Strong Post W-Beam Guardrail

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# Appendix B1

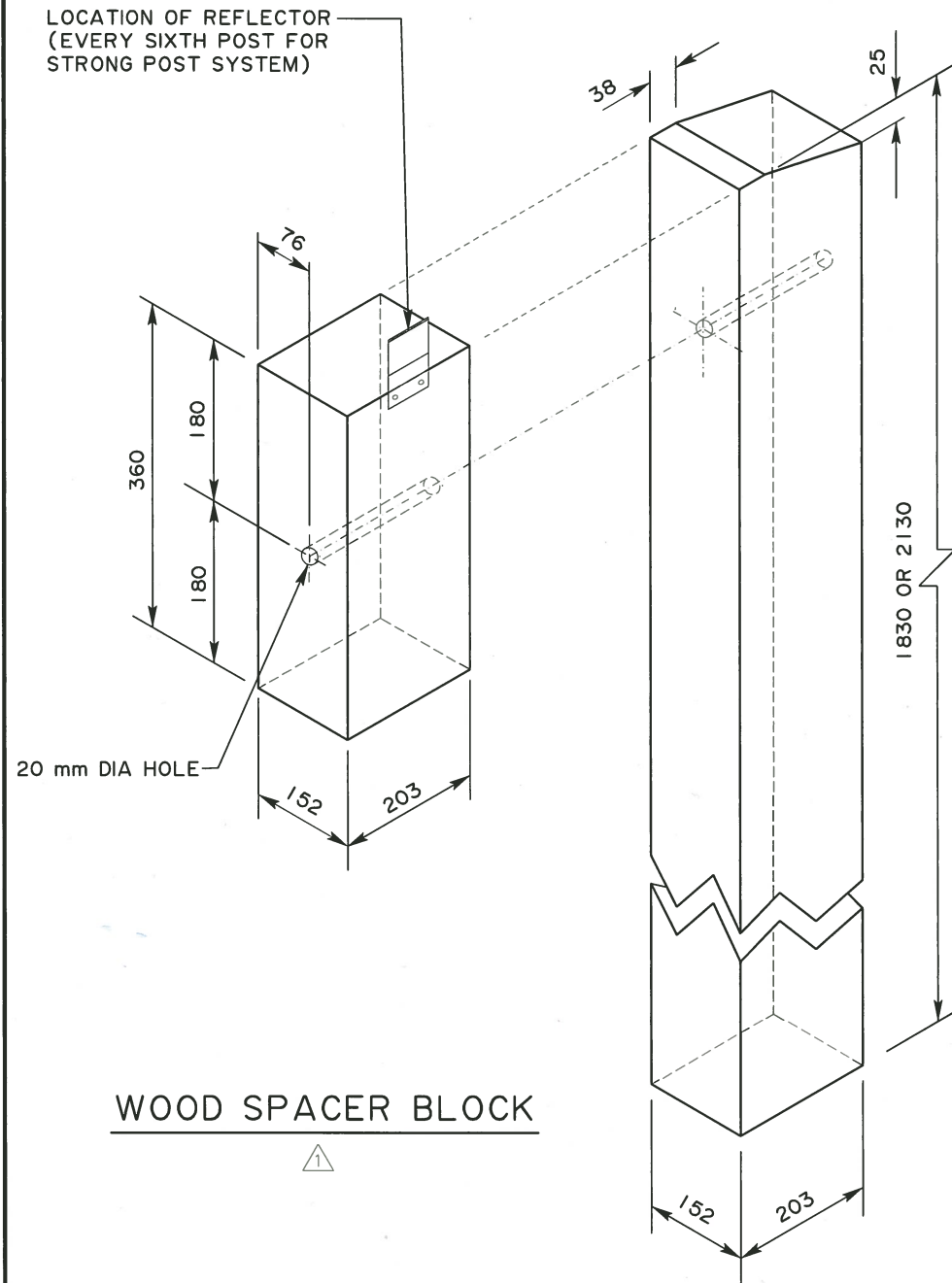
## Alberta Weak Post and Strong Post W-Beam Guardrail

### TABLE OF CONTENTS

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NOTES: 

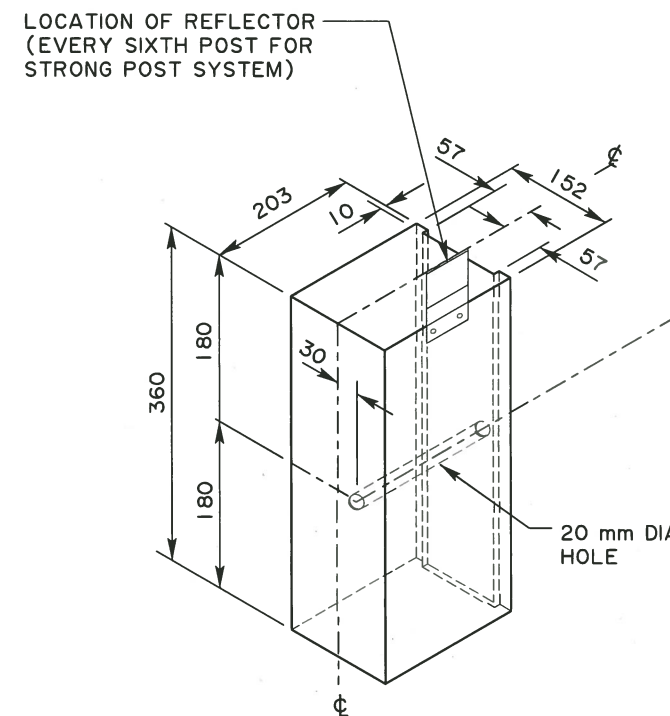
- REFLECTOR COLOUR IS EITHER FLUORESCENT YELLOW OR WHITE SUCH THAT IT COMPLIES WITH THE PRINCIPLES FOR PAVEMENT EDGE LINES WITH RESPECT TO THEIR COLOUR.
- REFLECTOR IS DOUBLE SIDED SHEETING 102mm x 76mm (MINIMUM) WHICH SHALL MEET ASTM D4956, TYPE IX OR XI FOR LUMINANCE LEVEL. THE CONTRACTOR SHALL SELECT THE REFLECTOR FROM THE ALBERTA TRANSPORTATION PRODUCTS LIST.
- PLASTIC POST AND/OR SPACER BLOCK MAY BE USED. FOR PLASTIC POST REFER TO ALBERTA TRANSPORTATION PRODUCT LIST FOR ACCEPTED PROPRIETARY PLASTIC POST. ALSO REFER TO MANUFACTURER FOR THE LATEST DRAWINGS AND SPECIFICATIONS.
- STEEL POST W150x12.6 IS AN ACCEPTABLE ALTERNATIVE THAT IS CONSIDERED EQUIVALENT TO THE W150x13.5
- TOENAIL WITH ONE 89 mm LONG GALVANIZED NAIL TO PREVENT BLOCK ROTATION OF WOODEN SPACER BLOCK.
- THE OPTIONAL HOLES IN THE FLANGE ARE ACCEPTABLE FOR USE ON ROADSIDE AND MEDIAN APPLICATIONS BUT REQUIRED FOR MEDIAN APPLICATIONS WHERE RAILS ARE INSTALLED ON BOTH SIDES.



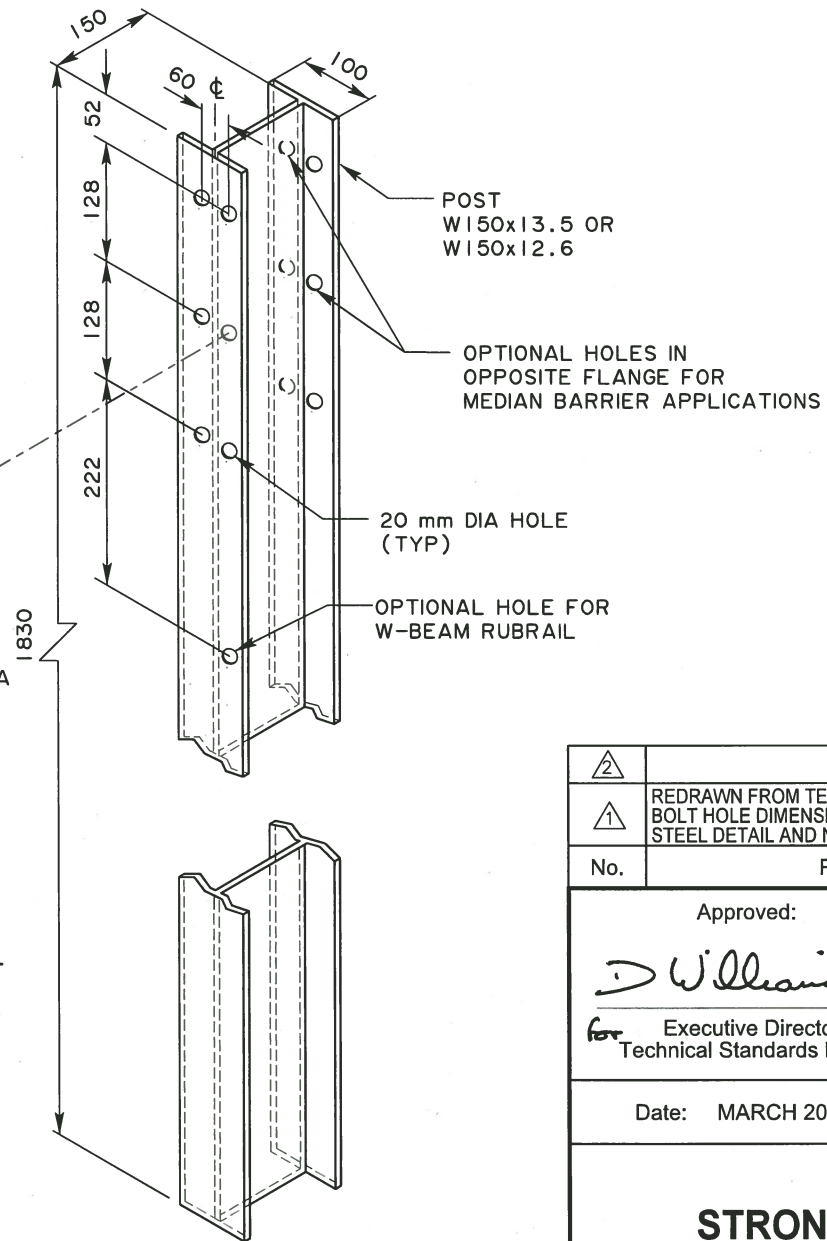
WOOD SPACER BLOCK

WOOD POST DETAIL



1830 (6'0") or 2130 (7'0")

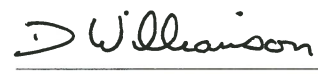



ROUTED WOODEN SPACER BLOCK



STEEL POST DETAIL

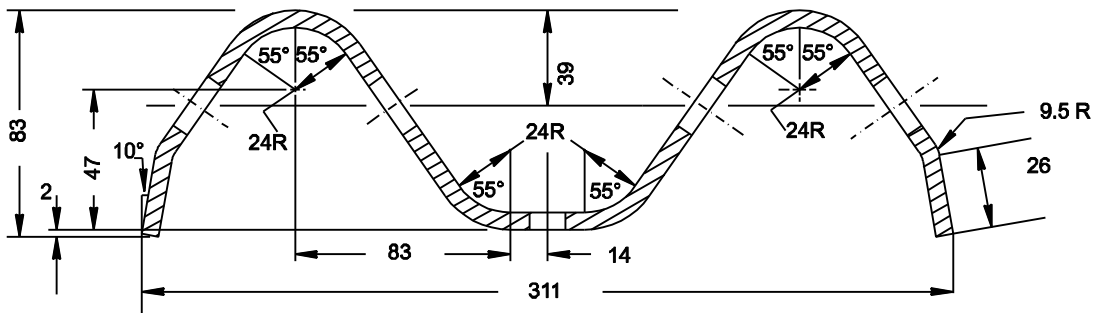
			
	REDRAWN FROM TEB 3.01, JULY 2009, REVISION 3. BOLT HOLE DIMENSION AND NOTE 2 REVISED. STEEL DETAIL AND NOTES 3 - 6 ADDED	PM	11 MAR 2016
No.	REVISIONS	BY	DATE

Approved:  for Executive Director, Technical Standards Branch	
Date: MARCH 2016	

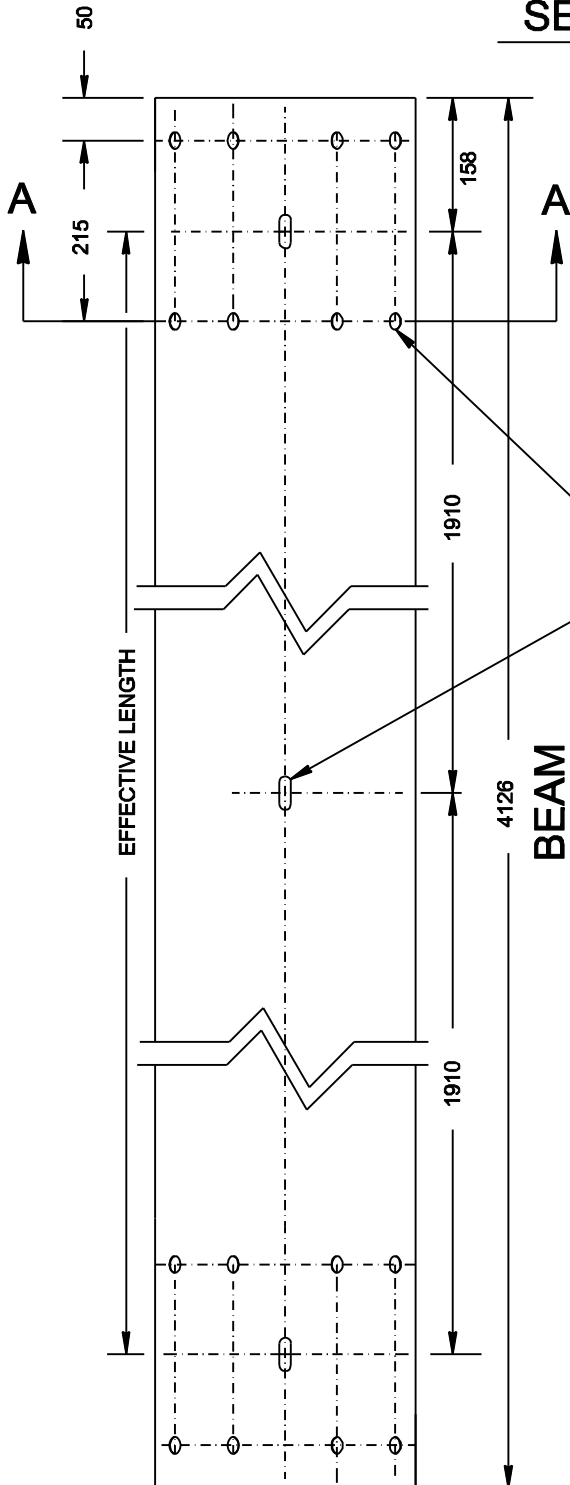
**STRONG POST W - BEAM  
GUARDRAIL HARDWARE  
WOOD SPACER BLOCK AND POST**

Prepared By: GEC	Checked By: PM	Scale: N.T.S.	<b>TEB 3.01</b>
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ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE INDICATED



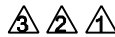
**SECTION A-A**



16 - SLOTTED HOLES  
23 X 29

3 - SLOTTED HOLES  
19 X 63

EFFECTIVE LENGTH = 3820 (12' 6")



A FINISHED THICKNESS OF RAIL TO BE 2.82 mm  
NOMINAL STEEL AND HOT DIPPED GALVANIZED  
AFTER FABRICATION.

FOR 955 POST SPACING, SPECIFY RAIL ELEMENT  
WITH HOLES AT 955 CENTRES.

△	Revised Note	B.K.	08/05/07
△	Steel Thickness	B.K.	01/03/06
△	Steel Thickness	B.K.	12/07/05
No.	REVISIONS	BY	DATE

Approved:  
Original approved by  
Traffic Operations Branch  
Alberta Transportation and Utilities

Executive Director,  
Technical Standards Branch

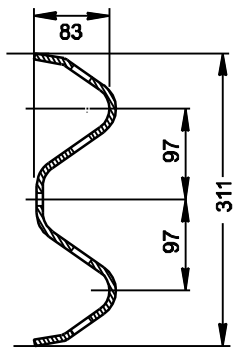


Date: NOVEMBER 11, 1992

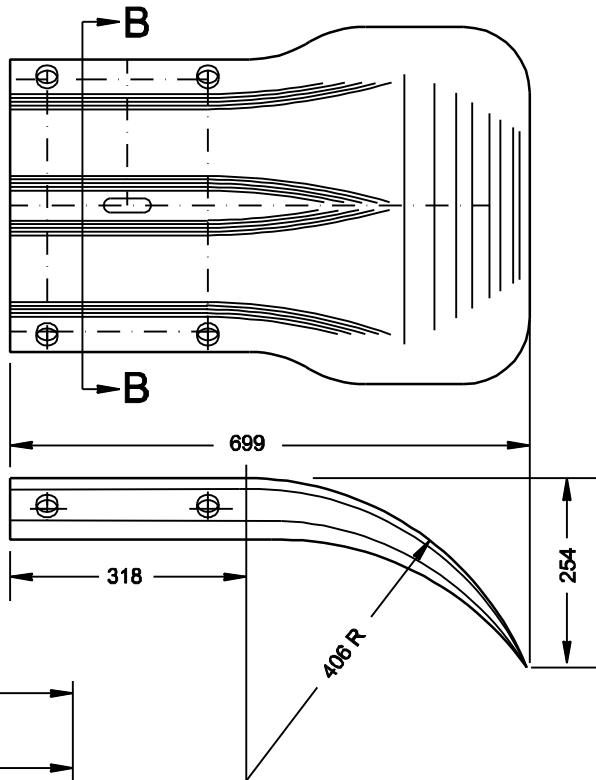
**W - BEAM GUARDRAIL  
HARDWARE  
RAIL DETAIL**

All dimensions are in millimetres unless otherwise indicated.

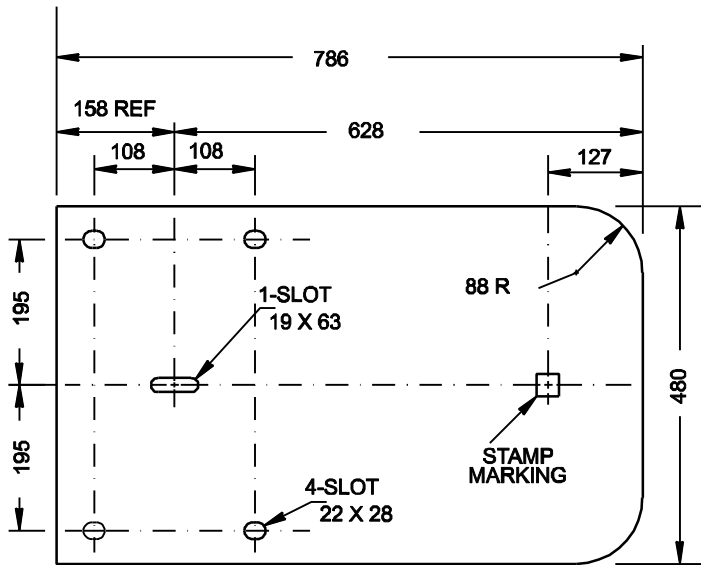
Prepared By: M.T	Checked By: B.K	Scale: N.T.S.	Dwg No.: TEB 3.02
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**SECTION B - B**



**END SECTION**



**BLANK LAYOUT**

THICKNESS OF STEEL=2.82mm AFTER GALVANIZING



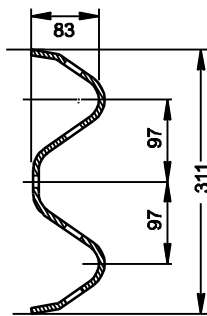
3	Galvanizing added	B.K.	08/05/07
2	Steel Thickness	P.M.	31/01/06
1	Steel Thickness	B.K.	12/07/05
No.	REVISIONS	BY	DATE

<p>Approved:</p> <p>Original approved by Traffic Operations Branch Alberta Transportation and Utilities</p> <p>Executive Director, Technical Standards Branch</p>	
<p>Date: NOVEMBER 11, 1992</p>	

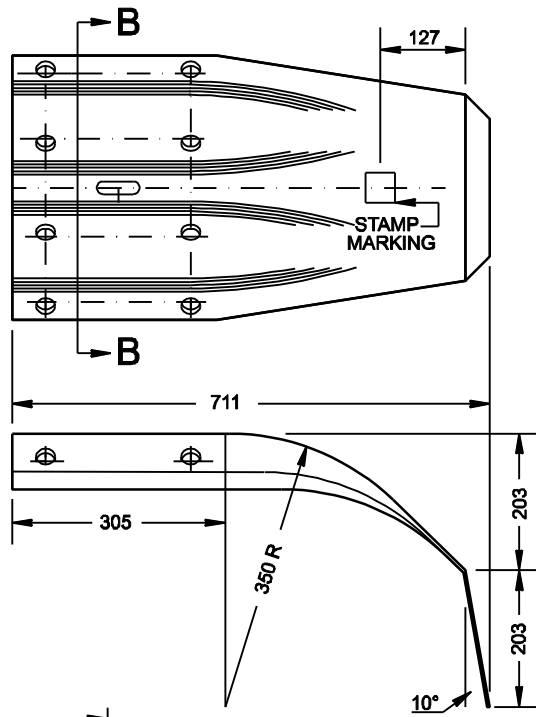
**W - BEAM GUARDRAIL  
HARDWARE  
END SECTION - WING**

Prepared By: M.T	Checked By: B.K	Scale: N.T.S.	Dwg No.: TEB 3.03
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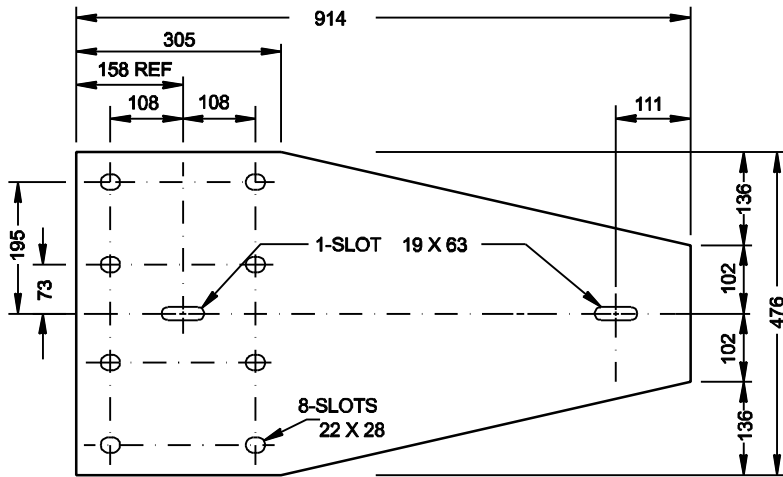
All dimensions are in millimetres unless otherwise indicated.



**SECTION B - B**



**END SECTION**



**BLANK LAYOUT**

**NOTES:**



1. THICKNESS OF STEEL=2.82mm AFTER GALVANIZING
2. THIS END SECTION IS USED IN THE STANDARD W-BEAM WEAK POST TURN DOWN END TREATMENT (SEE DWG TEB 3.12 SECTION D-D).

	Galvanizing added	B.K.	08/05/07
	Steel Thickness	P.M.	31/01/06
	Notes	B.K.	12/07/05
No.	REVISIONS	BY	DATE

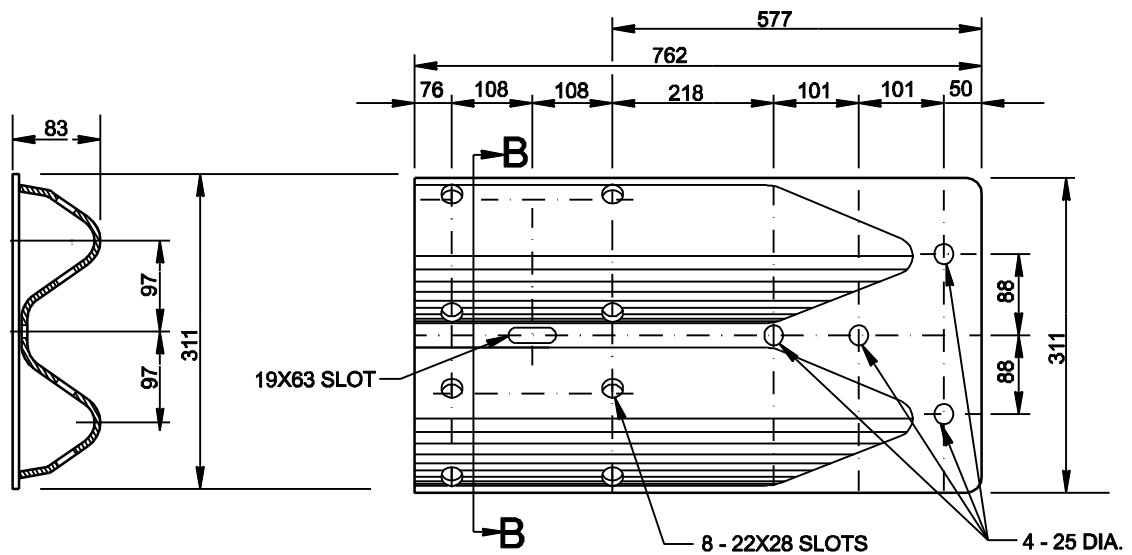
<p>Approved:</p> <p>Original approved by Traffic Operations Branch Alberta Transportation and Utilities</p> <p>Executive Director, Technical Standards Branch</p>	
Date: DECEMBER 11, 1992	

**W - BEAM GUARDRAIL  
HARDWARE  
END SECTION - BURIED**

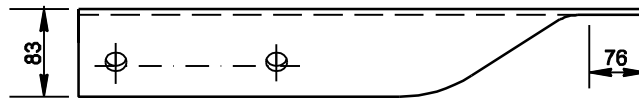
All dimensions are in millimetres unless otherwise indicated.

Prepared By: M.T	Checked By: B.K	Scale: N.T.S.	Dwg No.: TEB 3.04
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**SECTION B - B**



**END SECTION**

THICKNESS OF STEEL=3.43mm



	Steel Thickness	B.K.	12/07/05
No.	REVISIONS	BY	DATE

<p>Approved:</p> <p>Original approved by Traffic Operations Branch Alberta Transportation and Utilities</p> <p>Executive Director, Technical Standards Branch</p>	
<p>Date: DECEMBER 11, 1992</p>	

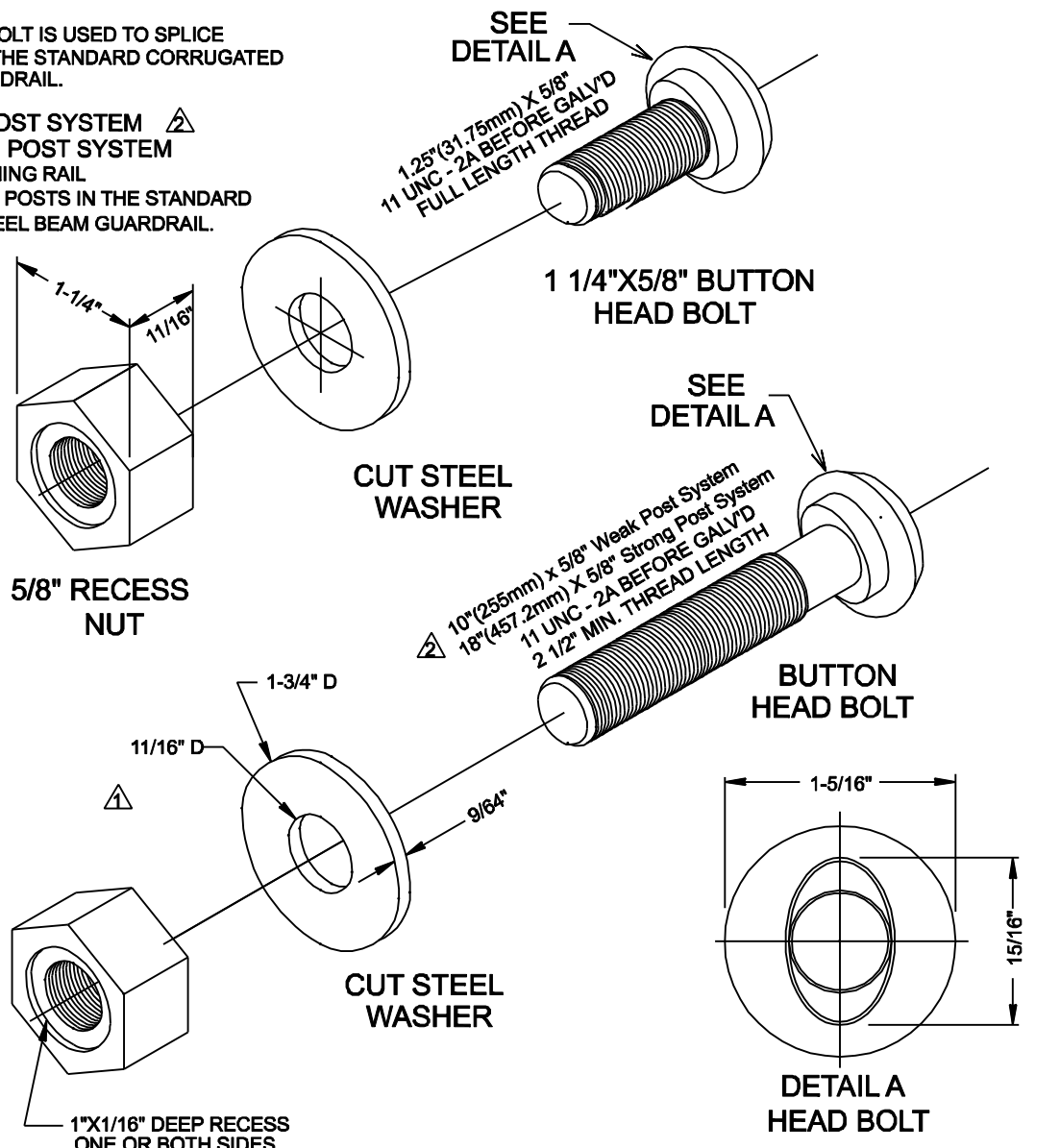
**W - BEAM GUARDRAIL  
HARDWARE  
TERMINAL CONNECTOR**

All dimensions are in millimetres unless otherwise indicated.

Prepared By: M.T	Checked By: B.K	Scale: N.T.S.	Dwg No.: TEB 3.05
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(1-1/4" LENGTH) THIS BOLT IS USED TO SPLICE RAIL ELEMENTS USED IN THE STANDARD CORRUGATED SHEET STEEL BEAM GUARDRAIL.

(10" LENGTH) WEAK POST SYSTEM  $\triangle$   
 (18" LENGTH) STRONG POST SYSTEM  
 THIS BOLT IS FOR FASTENING RAIL TO WOOD OR CONCRETE POSTS IN THE STANDARD CORRUGATED SHEET STEEL BEAM GUARDRAIL.



BOLTS SHALL CONFORM TO THE REQUIREMENTS OF A.S.T.M A307 AND NUTS TO THE REQUIREMENT OF A.S.T.M A563, GRADE A OR BETTER, AND BE GALVANIZED IN ACCORDANCE WITH CSA G 164-M EXCEPT WHEN CORROSION RESISTANT STEEL IS REQUESTED IN WHICH CASE BOLTS AND NUTS SHALL BE MADE OF MATERIAL HAVING AN ATMOSPHERIC CORROSION RESISTANCE, APPROXIMATELY TWO TIMES THAT OF CARBON STRUCTURAL STEEL WITH COPPER AND SHALL NOT BE GALVANIZED.

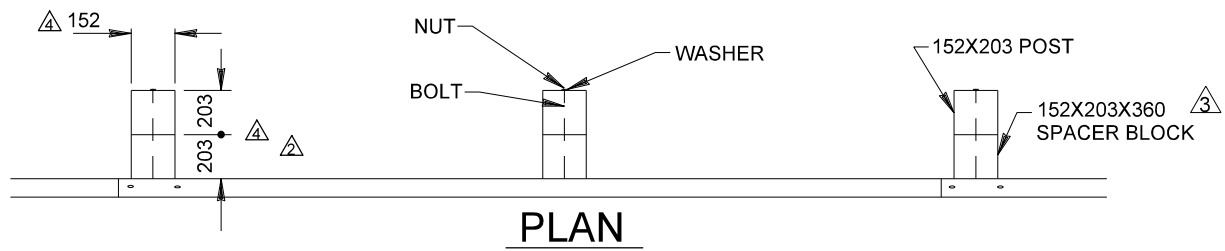
All dimensions are in millimetres unless otherwise indicated.

$\triangle$	Bolt Dimension	P.M.	9/14/05
$\triangle$	Rectangular Washer Removed	B.K.	12/07/05
No.	REVISIONS	BY	DATE

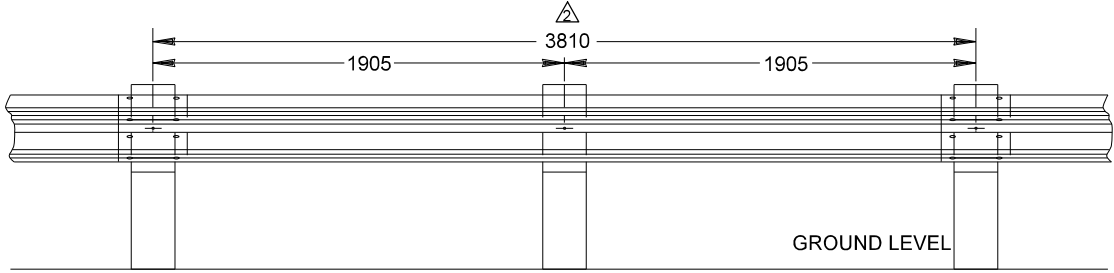
Approved: Original approved by Traffic Operations Branch Alberta Transportation and Utilities <hr/> Executive Director, Technical Standards Branch	
Date: DECEMBER 11, 1992	

## W - BEAM GUARDRAIL HARDWARE BOLT, NUT AND WASHER

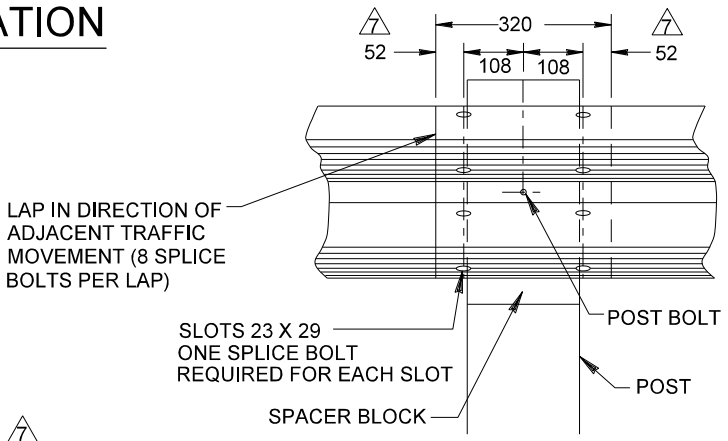
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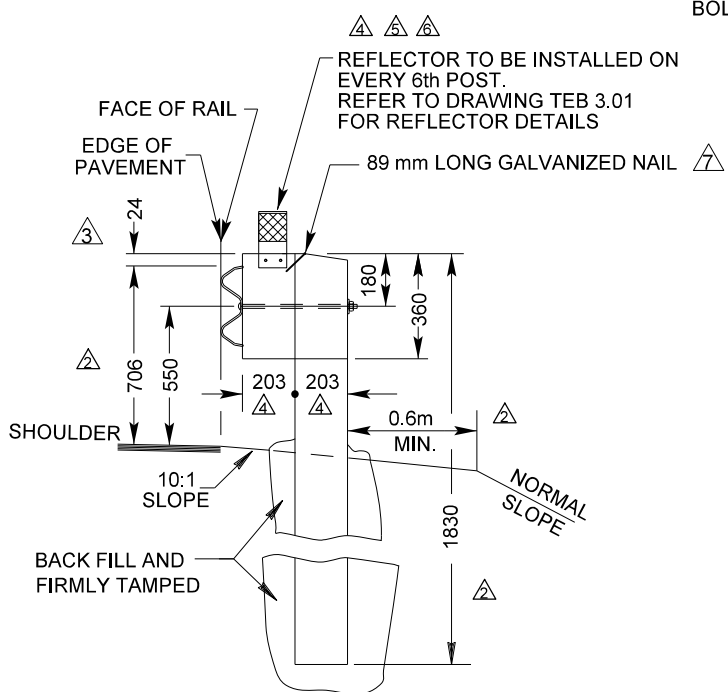
**PLAN**



**ELEVATION**



**RAIL SPLICE DETAIL**



**POST AND SPACER DETAILS**

NOTE:

1. THE STANDARD POST LENGTH FOR STRONG POST SYSTEM IS 1830mm (6'0"). OTHER POST LENGTHS MAY BE USED IF DIRECTED BY THE ENGINEER.
2. REFER TO DRAWING TEB 3.01 FOR SPACER BLOCK AND POST DETAILS
3. 89 mm LONG GALVANIZED NAIL TO PREVENT BLOCK ROTATION

All dimensions are in millimetres unless otherwise indicated.

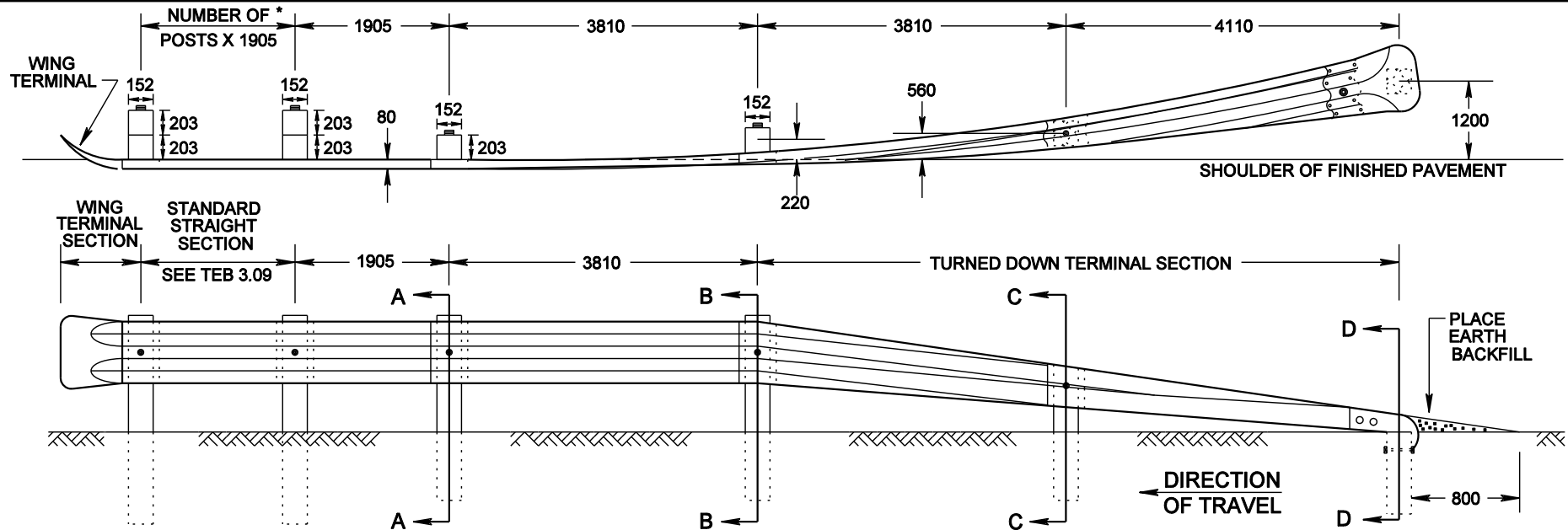
No.	REVISIONS	BY	DATE
7	Dimensions, revised. Galvanized nail and notes 2 and 3 added	HC	11 MAR 2016
6	Reflector Note Revised	PM	8 JUL 09
5	Reflector Note Revised (Include Type IX)	BK	03/23/07
4	Reflector Note and Added Post Dimensions	BK	08/11/06
3	Dimensions and Reflector Detail	BK	12/07/05
2	Notes and Dimensions	BK	12-04
1			06-95

Approved:  
Original signed by  
A.D. Cherwenuk  
-----  
Executive Director,  
Technical Standards Branch  
Date: DECEMBER 11, 1992



**STRONG POST W-BEAM  
BLOCKED-OUT GUARDRAIL**

Prepared By: M.T	Checked By: B.K	Scale: N.T.S.	Dwg No.: <b>TEB 3.09</b>
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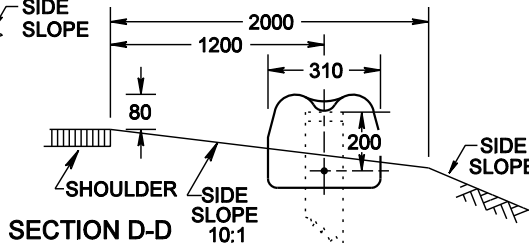
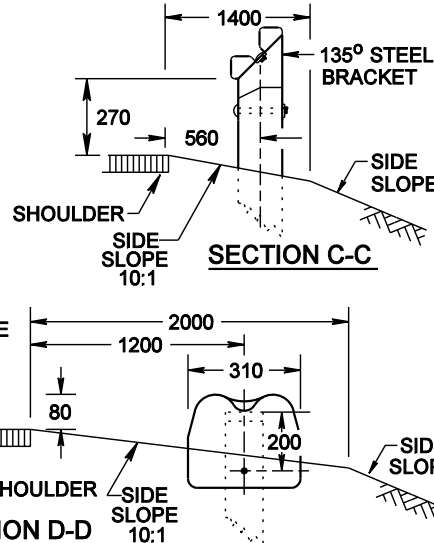
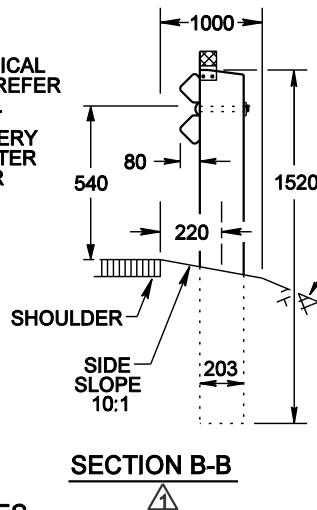
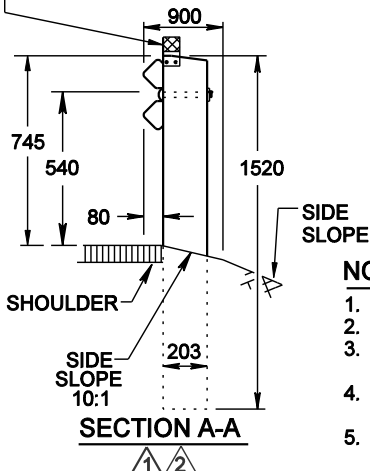


1 SEPT. 2011. TURN DOWN ENDS WILL NO LONGER BE ACCEPTABLE FOR NEW INSTALLATIONS OR REPLACEMENT OF EXISTING ENDS. CRASH WORTHY END TREATMENTS SHALL BE USED.

20 NOV. 2012. WHERE EXISTING TURN DOWN END TREATMENTS NEED TO BE RE-BUILT AND/OR REPLACED DUE TO BEING HIT BY AN ERRANT VEHICLE, THE REPLACEMENT WITH A CRASHWORTHY END TREATMENT IS SUBJECT TO FUNDING AVAILABILITY.

\* LENGTH OF STANDARD STRAIGHT GUARDRAIL IS DETERMINED BY PHYSICAL NEED. STANDARD SPACING IS 1905. REFER TO TEB 3.09 FOR STANDARD DETAILS.

REFLECTOR TO BE INSTALLED ON EVERY 6th POST ON STRAIGHT SECTIONS AFTER SECTION A-A. REFER TO TEB 3.01 FOR REFLECTOR DETAILS.



**NOTES**

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SPECIFIED.
2. ALL JOINTS TO BE LAPPED IN THE DIRECTION OF TRAFFIC.
3. TURNED DOWN TERMINALS ARE TO BE USED AT BOTH ENDS OF GUARDRAIL INSTALLATIONS ON 2 LANE UNDIVIDED HIGHWAYS.
4. THE ACCEPTABLE DESIGN RANGE FOR HEIGHT OF GUARDRAIL IS +/- 75mm (TO BE SET BY THE CONSULTANT).
5. THE ACCEPTABLE TOLERANCE FOR HEIGHT OF GUARDRAIL AT TIME OF CONSTRUCTION OR MAINTENANCE IS SHOWN IN THE APPLICABLE SPECIFICATIONS.

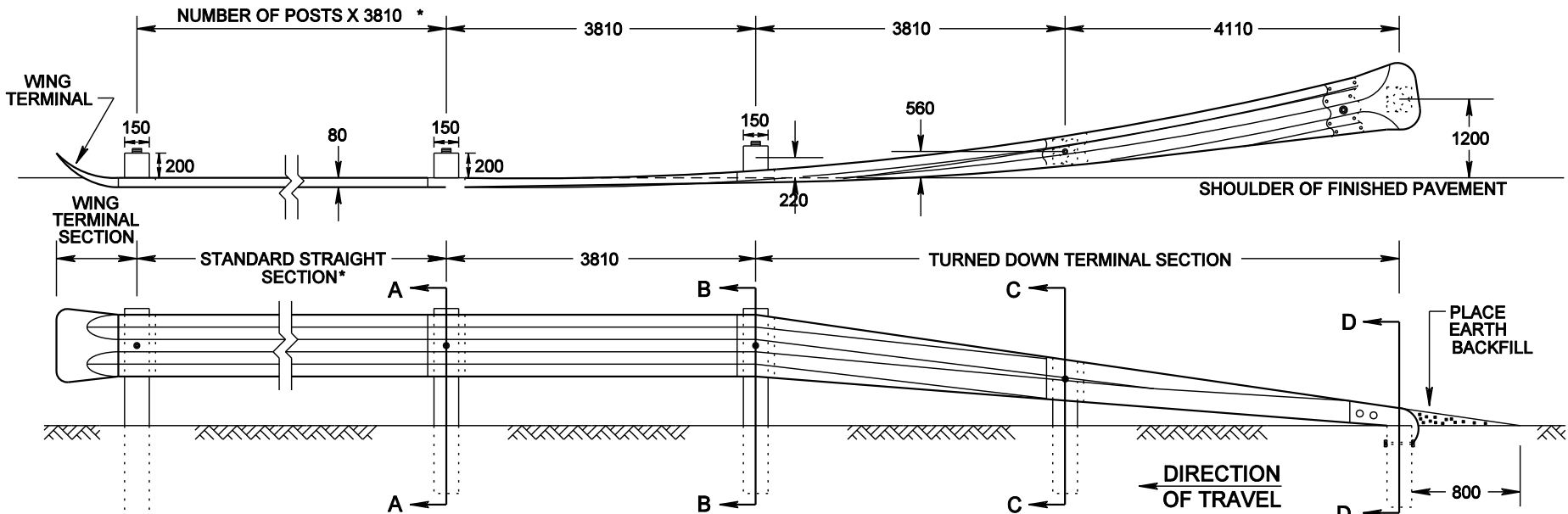
3			
2	REFLECTOR NOTE REVISED	PM	8 JUL 09
1	REFLECTOR NOTE REVISED	BK	5 JUN 07
No.	REVISIONS	BY	DATE

Approved:	
Executive Director, Technical Standards Branch	
Date:	July, 2006

**W-BEAM GUARDRAIL  
STRONG POST END TREATMENT  
TURN DOWN  
(1.9m SPACING - WITH BLOCKS)**

**OBSELETE**  
20 SEPTEMBER 2011  
20 NOVEMBER 2012

Prepared By: G.E.C.	Checked By: B.K	Scale: N.T.S.	Dwg No.: TEB 3.10
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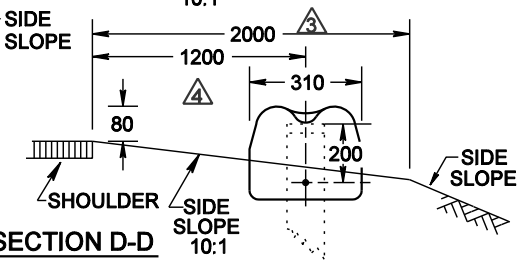
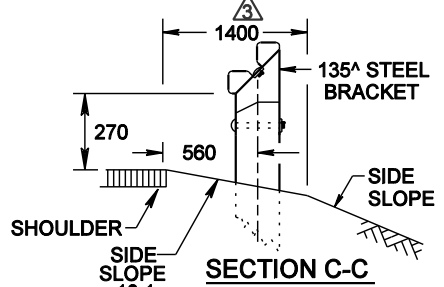
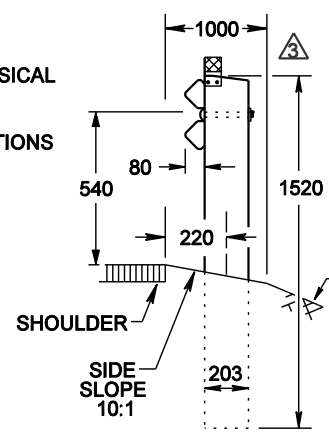
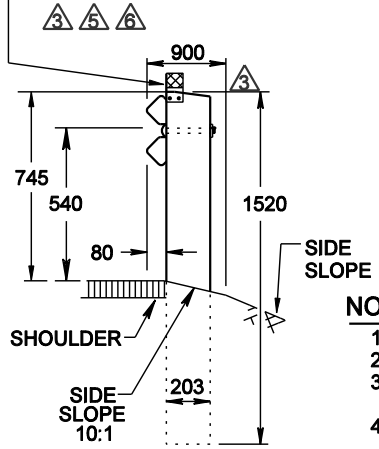


1 SEPT. 2011. TURN DOWN ENDS WILL NO LONGER BE ACCEPTABLE FOR NEW INSTALLATIONS OR REPLACEMENT OF EXISTING ENDS. CRASH WORTHY END TREATMENTS SHALL BE USED.

20 NOV. 2012. WHERE EXISTING TURN DOWN END TREATMENTS NEED TO BE RE-BUILT AND/OR REPLACED DUE TO BEING HIT BY AN ERRANT VEHICLE, THE REPLACEMENT WITH A CRASHWORTHY END TREATMENT IS SUBJECT TO FUNDING AVAILABILITY.

6	REFLECTOR NOTE REVISED	PM	8 JUL 09
5	REFLECTOR NOTE REVISED	BK	5 JUN 07
4	DIMENSION	BK	12/07/05
3	NOTES AND DIMENSIONS	BK	12/04
2	REVISED NOTE	RD	8/03
1	ADDED NOTE No. 4	TDN	10/98
No.	REVISIONS	BY	DATE

\* LENGTH OF STANDARD STRAIGHT GUARDRAIL IS DETERMINED BY PHYSICAL NEED. STANDARD SPACING IS 3810. REFLECTOR TO BE INSTALLED ON EVERY 3rd POST ON STRAIGHT SECTIONS AFTER SECTION A-A. REFER TO DRAWING TEB 3.01 FOR REFLECTOR DETAILS



- NOTES**
1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SPECIFIED.
  2. ALL JOINTS TO BE LAPPED IN THE DIRECTION OF TRAFFIC.
  3. TURNED DOWN TERMINALS ARE TO BE USED AT BOTH ENDS OF GUARDRAIL INSTALLATIONS ON 2 LANE UNDIVIDED HIGHWAYS.
  4. THE ACCEPTABLE DESIGN RANGE FOR HEIGHT OF GUARDRAIL IS +/- 75mm (TO BE SET BY THE CONSULTANT).
  5. THE ACCEPTABLE TOLERANCE FOR HEIGHT OF GUARDRAIL AT TIME OF CONSTRUCTION OR MAINTENANCE IS SHOWN IN THE APPLICABLE SPECIFICATIONS.

Approved: \_\_\_\_\_

Executive Director,  
Technical Standards Branch

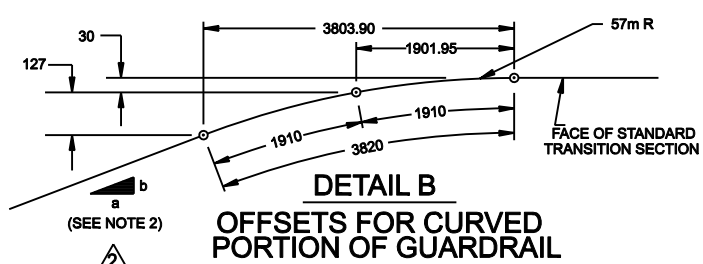
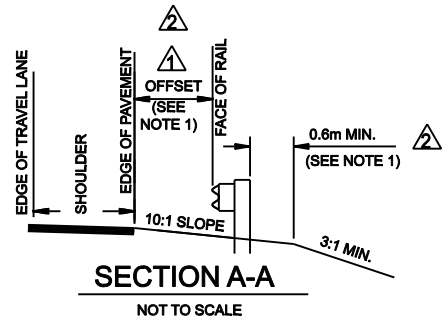
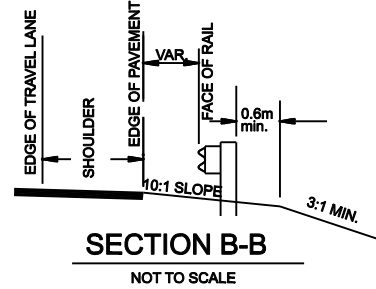
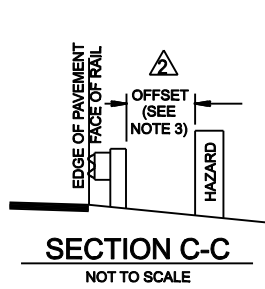
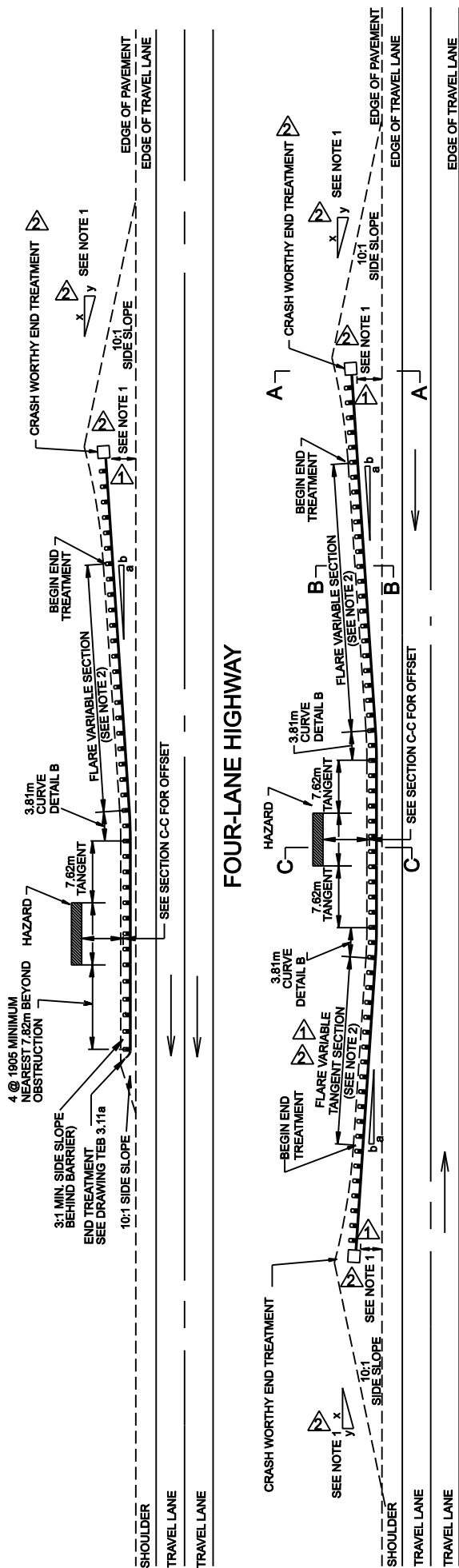
Date: December, 1992

**Alberta**  
Transportation

**W-BEAM GUARDRAIL  
WEAK POST END TREATMENT  
TURN DOWN  
(3.8m SPACING - NO BLOCK)**

**OBSOLETE**  
13 SEPTEMBER 2011  
20 NOVEMBER 2012

Prepared By: T.S.	Checked By: B.K.	Scale: N.T.S.	Dwg No.: TEB 3.12
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- NOTES**
- REFER TO CRASH WORTHY END TREATMENT STANDARD DRAWINGS OR MANUFACTURER'S SPECIFICATIONS FOR DISTANCES
  - FLARE RATES SHALL BE AS PER STANDARD FOR DESIGN SPEED AND SYSTEM TYPE
  - OFFSET FROM BACK OF BARRIER TO FACE OF OBSTRUCTION SHALL BE AT LEAST THE DESIGN DEFLECTION OF THE BARRIER SYSTEM AS FOLLOWS:  

HTCB	VARIABLE UP TO 3.7m
STRONG POST W-BEAM	0.9m
STRONG POST (PLASTIC)	1.5m
MODIFIED THRIE BEAM	0.9m

END TREATMENT NOTES AND SECTIONS	P.M.	02 JUL 13
END TREATMENT NOTES	B.K.	12/01/05
No.	REVISIONS	BY DATE

Approved:  
Original signed by  
Allan Kwan

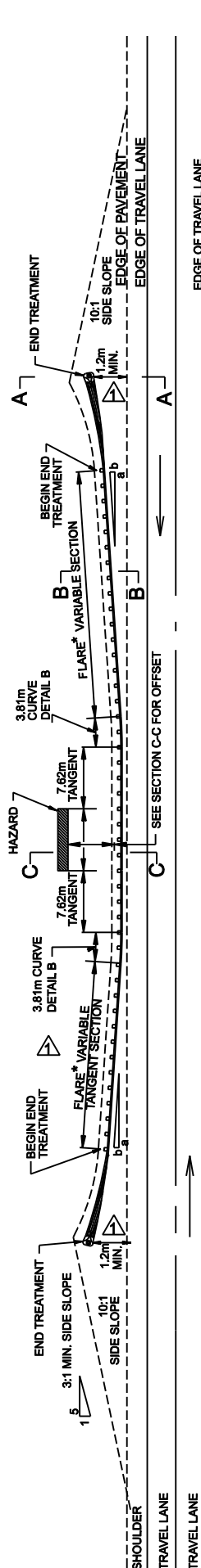
Executive Director,  
Technical Standards Branch  
Date: JUNE 24, 2005

Date: JULY 12, 2005



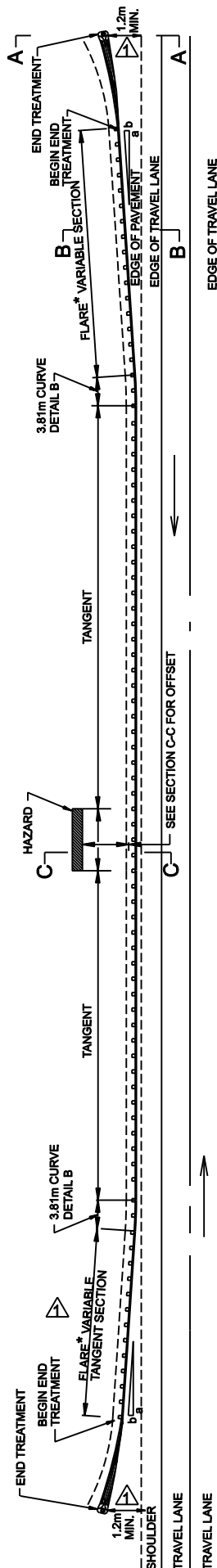
**TYPICAL W-BEAM STRONG POST OR MODIFIED THRIE BEAM GUARDRAIL PLACEMENT ROADSIDE HAZARDS (TWO AND FOUR LANE HIGHWAYS)**

Prepared By: M.T	Checked By: B.K	Scale: N.T.S.	Dwg No.: TEB 3.15a
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**TWO-LANE HIGHWAY  
(BARRIER FLARED)**

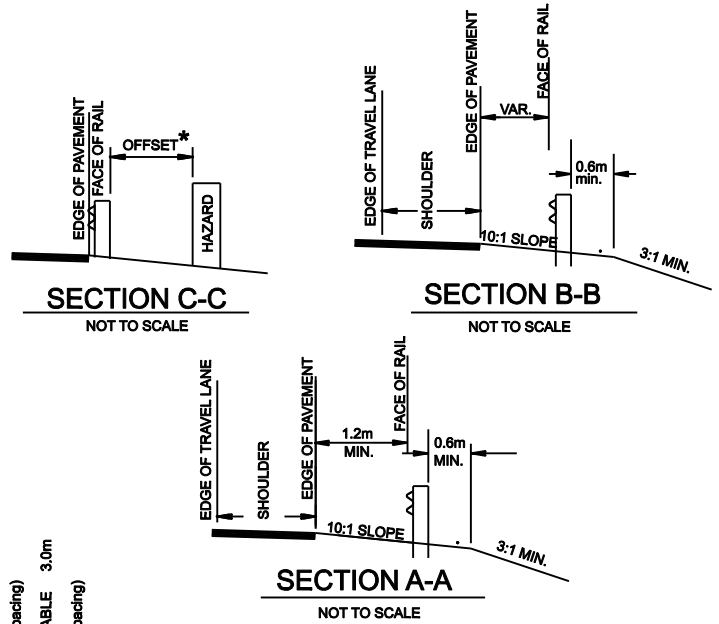
\* FLARE RATES SHALL BE AS PER STANDARD FOR DESIGN SPEED AND SYSTEM TYPE



**TWO-LANE HIGHWAY  
(BARRIER ON TANGENT)**

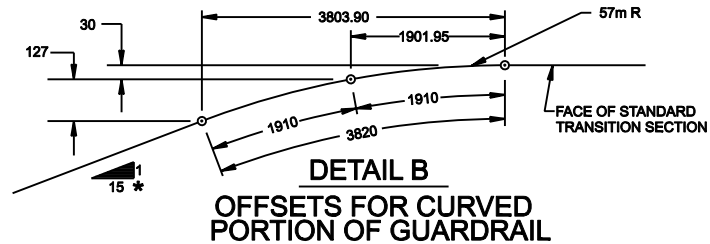
\* OFFSET FROM BACK OF BARRIER TO FACE OF OBSTRUCTION SHALL BE AT LEAST THE DESIGN DEFLECTION OF THE BARRIER SYSTEM AS FOLLOWS:

- WEAK POST W-BEAM 2.5m (3.81m post spacing)
- 3-STRAND CABLE 3.0m (3.81m post spacing)



1 SEPT. 2011. TURN DOWN ENDS WILL NO LONGER BE ACCEPTABLE FOR NEW INSTALLATIONS OR REPLACEMENT OF EXISTING ENDS. CRASH WORTHY END TREATMENTS SHALL BE USED.

20 NOV. 2012. WHERE EXISTING TURN DOWN END TREATMENTS NEED TO BE RE-BUILT AND/OR REPLACED DUE TO BEING HIT BY AN ERRANT VEHICLE, THE REPLACEMENT WITH A CRASHWORTHY END TREATMENT IS SUBJECT TO FUNDING AVAILABILITY.



BARRIER MAY BE INSTALLED ON TANGENT OR WITH FLARING AT ONE OR BOTH ENDS. GUARDRAIL LENGTH MAY BE REDUCED BY FLARING. LENGTH IS TO BE DETERMINED BY PROTECTION ENVELOPE METHOD.

END TREATMENT BARRIER MAY BE TERMINATED WITH A TURN-DOWN NEAR SHOULDER (TEB 3.12), OR OTHER TREATMENT AS DETERMINED BY PROJECT ENGINEER IN EACH GIVEN SITUATION

ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE INDICATED.

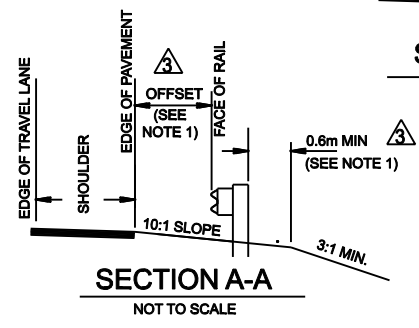
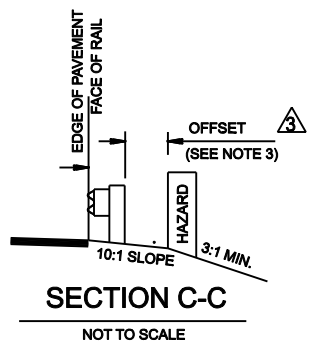
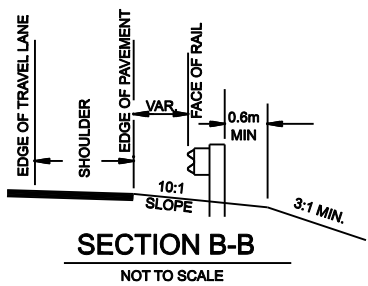
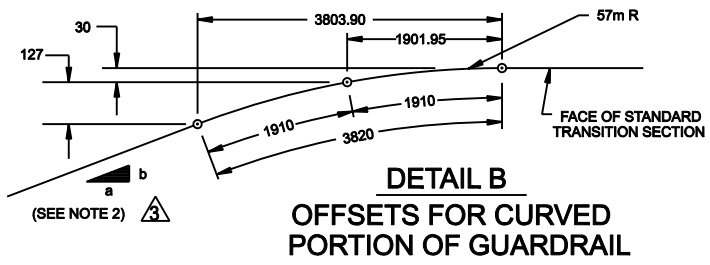
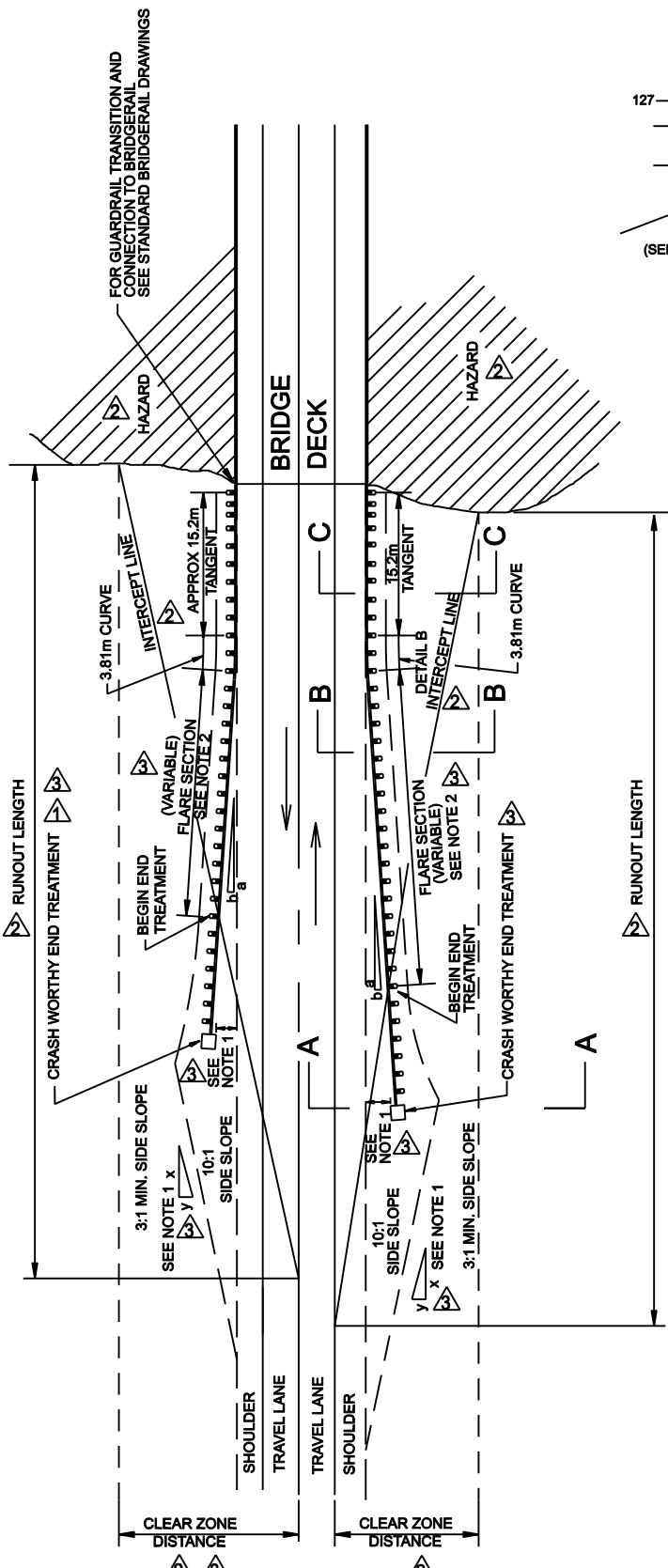
2			
1	END TREATMENT NOTES	B.K.	12/01/05
No.	REVISIONS	BY	DATE

Approved:  
Original signed by Allan Kwan  
Executive Director, Technical Standards Branch  
Date: JUNE 24, 2005  
Date: JULY 12, 2005

**OBSOLETE**  
30 SEPTEMBER 2011  
30 NOVEMBER 2012  
TYPICAL W-BEAM WEAK POST GUARDRAIL PLACEMENT ROADSIDE HAZARDS

Prepared By: M.T	Checked By: B.K	Scale: N.T.S.	Dwg No.: TEB 3.15b
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- NOTES
- REFER TO CRASH WORTHY END TREATMENT STANDARD DRAWINGS OR MANUFACTURER'S SPECIFICATIONS FOR DISTANCES
  - FLARE RATES SHALL BE AS PER STANDARD FOR DESIGN SPEED AND SYSTEM TYPE
  - OFFSET FROM BACK OF BARRIER TO FACE OF OBSTRUCTION SHALL BE AT LEAST THE DESIGN DEFLECTION OF THE BARRIER SYSTEM AS FOLLOWS:  
HTCB VARIES UP TO 3.7m  
STRONG POST W-BEAM 0.9m  
STRONG POST (PLASTIC) 1.5m  
MODIFIED THRIE BEAM 0.9m
  - END TREATMENT TO BE DETERMINED BY PROJECT MANAGER IN EACH GIVEN SITUATION
  - RUNOUT LENGTH IS TO BE MEASURED FROM BEGINNING OF HAZARD ON ROADSIDE
  - LENGTH OF GUARDRAIL TO BE DETERMINED BY PROTECTION ENVELOPE METHOD
  - ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED

3	END TREATMENT NOTES, SECTIONS AND CLEAR ZONE	P.M.	02 JUL 13
2	"LENGTH OF NEED" SHOWN	B.K.	12 SEP 07
1	END TREATMENT NOTES	B.K.	12/01/05
No.	REVISIONS	BY	DATE

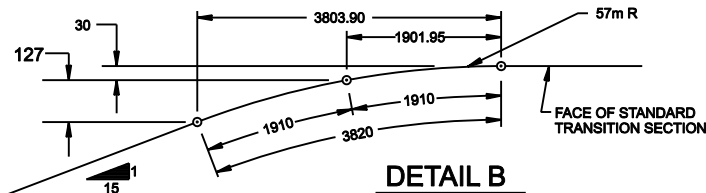
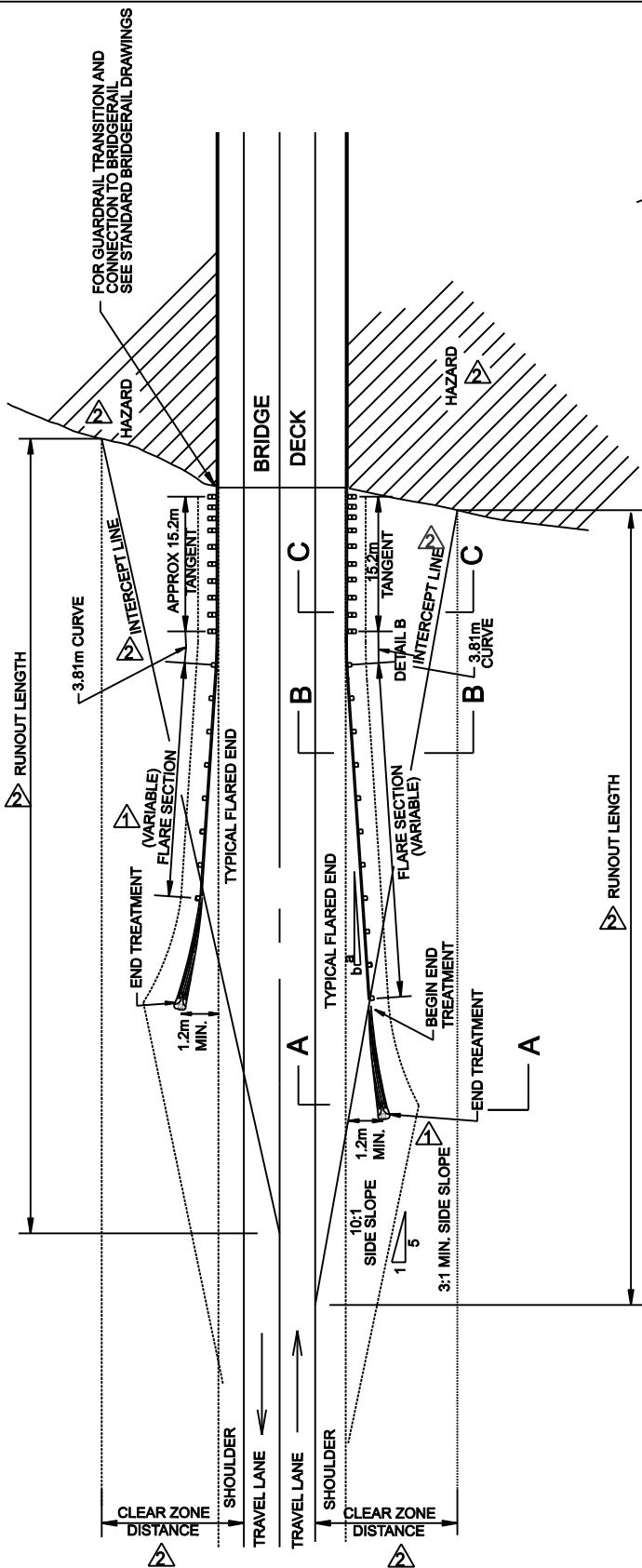
Approved:  
Original signed by  
Allan Kwan  
Executive Director,  
Technical Standards Branch  
Date: JUNE 24, 2005  
Date: JULY 12, 2005



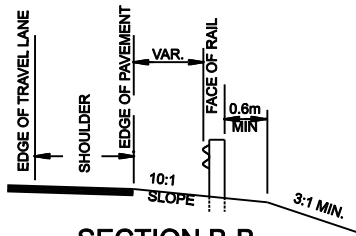
## TYPICAL STRONG POST W-BEAM OR MODIFIED THRIE BEAM GUARDRAIL PLACEMENT AT BRIDGE APPROACHES (TWO-LANE HIGHWAY)

Prepared By: M.T	Checked By: B.K	Scale: N.T.S.	Dwg No.: TEB 3.16a
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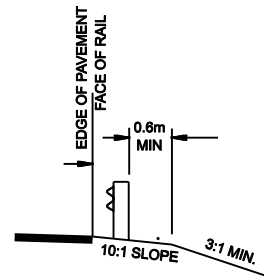




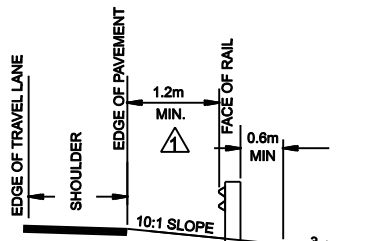
**DETAIL B**  
OFFSETS FOR CURVED PORTION OF GUARDRAIL



**SECTION B-B**  
NOT TO SCALE



**SECTION C-C**  
NOT TO SCALE



**SECTION A-A**  
NOT TO SCALE

1 SEPT. 2011. TURN DOWN ENDS WILL NO LONGER BE ACCEPTABLE FOR NEW INSTALLATIONS OR REPLACEMENT OF EXISTING ENDS. CRASH WORTHY END TREATMENTS SHALL BE USED.

20 NOV. 2012. WHERE EXISTING TURN DOWN END TREATMENTS NEED TO BE RE-BUILT AND/OR REPLACED DUE TO BEING HIT BY AN ERRANT VEHICLE, THE REPLACEMENT WITH A CRASHWORTHY END TREATMENT IS SUBJECT TO FUNDING AVAILABILITY.

△	"LENGTH OF NEED" SHOWN	B.K.	12 SEP 07
△	END TREATMENT NOTES	B.K.	12/01/05
No.	REVISIONS	BY	DATE

Approved:			
Original signed by Allan Kwan			
Executive Director, Technical Standards Branch		INFRASTRUCTURE AND TRANSPORTATION	
Date: JUNE 24, 2005			
Date: JULY 12, 2005			

**TYPICAL W-BEAM WEAK POST GUARDRAIL PLACEMENT AT BRIDGE APPROACHES (TWO-LANE HIGHWAY)**

**OBSOLETE**  
1 SEPTEMBER 2011  
30 NOVEMBER 2012

END TREATMENT IS TO BE DETERMINED BY PROJECT MANAGER IN EACH GIVEN SITUATION

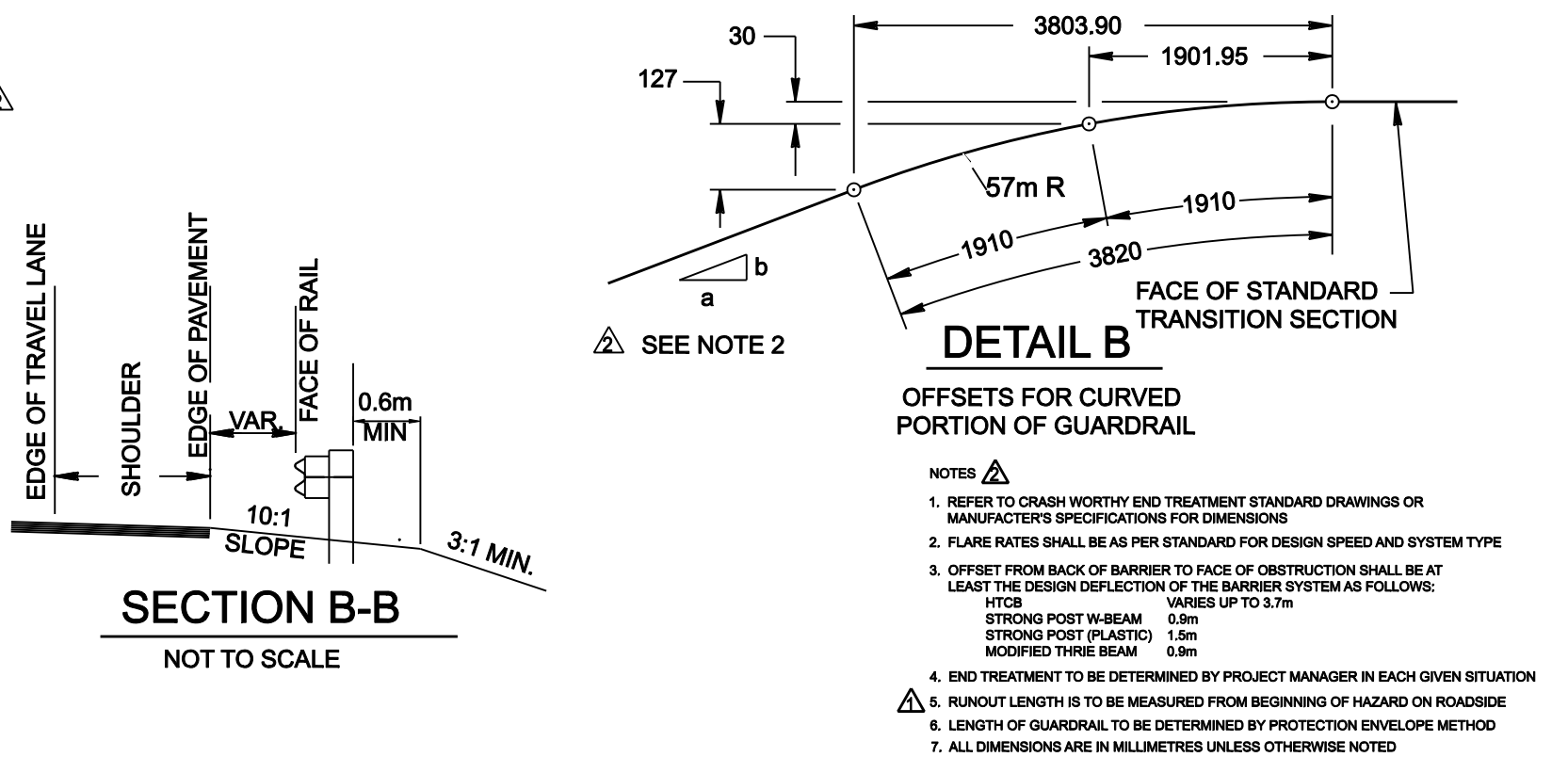
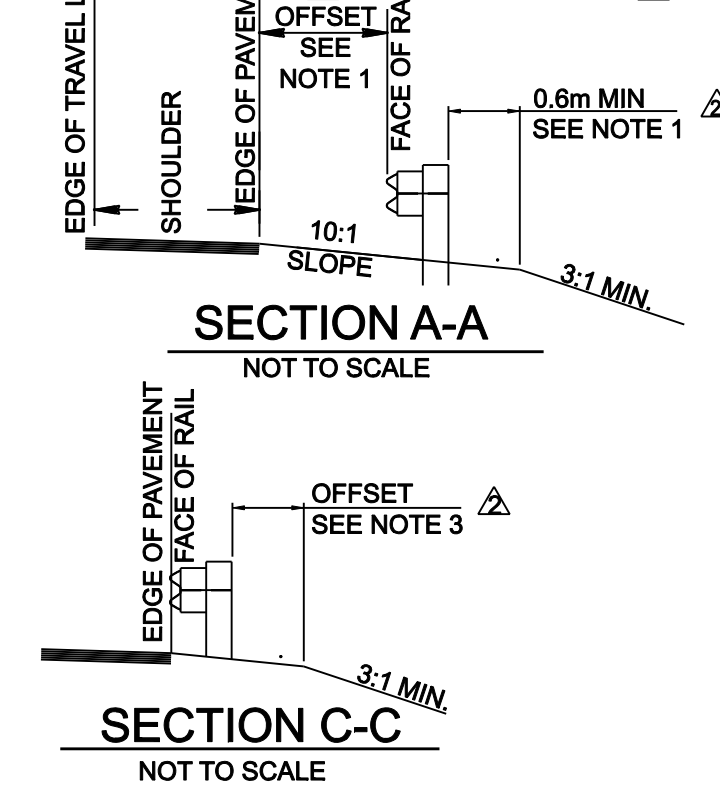
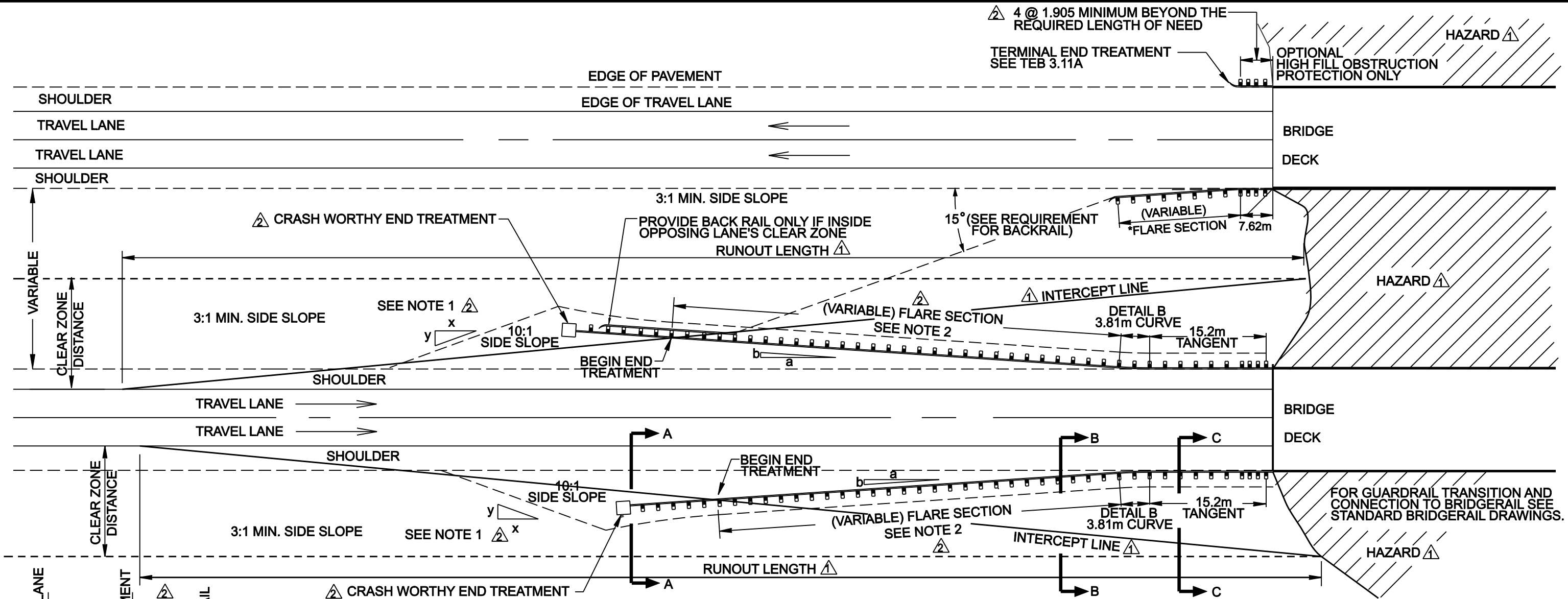
BARRIER MAY BE INSTALLED ON TANGENT OR WITH FLARING AT ONE OR BOTH ENDS. GUARDRAIL LENGTH MAY BE REDUCED BY FLARING. LENGTH IS TO BE DETERMINED BY PROTECTION ENVELOPE METHOD.

△ RUNOUT LENGTH IS TO BE MEASURED FROM BEGINNING OF HAZARD ON ROADSIDE.

all dimensions are in millimetres unless otherwise indicated.

Prepared By: M.T	Checked By: B.K	Scale: N.T.S.	Dwg No.: TEB 3.16b
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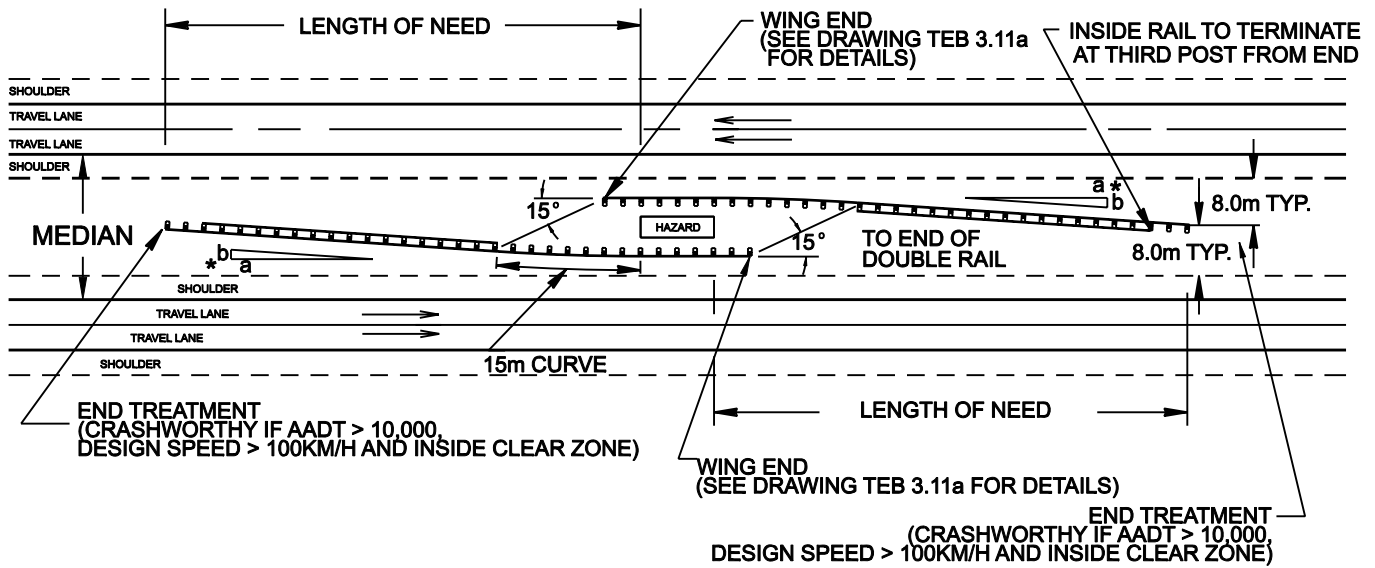
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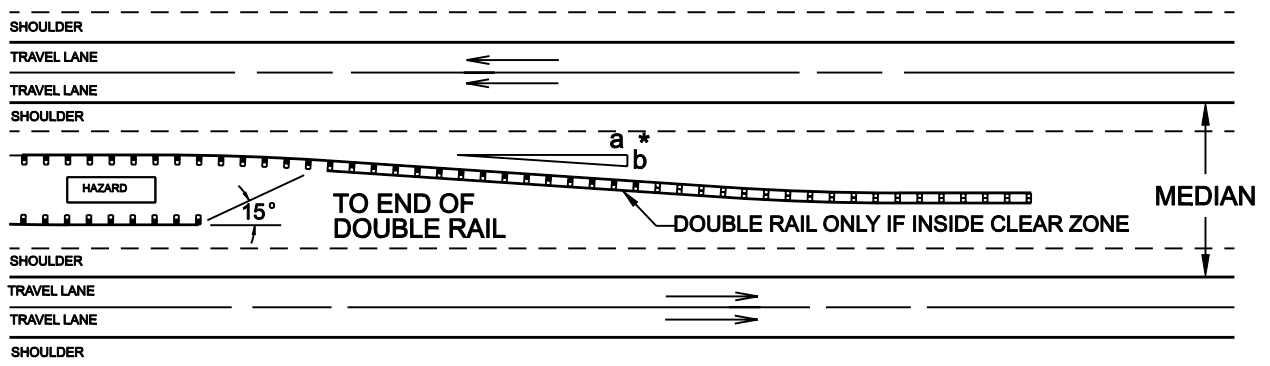
△	END TREATMENT NOTES AND SECTIONS	P.M.	02 JUL 13
△	"LENGTH OF NEED" CORRECTED	B.K.	12 SEP 07
No.	REVISIONS	BY	DATE
Approved:			
Original signed by Allan Kwan			
Executive Director, Technical Standards Branch			
Date: JUNE 24, 2005			
Effective Date: JULY 12, 2005			
<b>TYPICAL STRONG POST W-BEAM OR MODIFIED THRIE BEAM GUARDRAIL PLACEMENT AT BRIDGE APPROACHES (FOUR-LANE DIVIDED HIGHWAY)</b>			
Prepared By: M.T	Checked By: B.K	Scale: N.T.S.	Dwg No.: TEB 3.17a

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# INTRODUCED MEDIAN BARRIER



# CONTINUOUS MEDIAN BARRIER



\* FLARE RATE AS PER STANDARD FOR DESIGN SPEED.

CONSIDER ONLY WHERE MEDIAN WIDTH SUFFICIENT TO PROVIDE 8m MINIMUM FROM OPPOSING TRAVEL LANE TO BACK SIDE OF TERMINAL.

FOR NARROW MEDIAN, IMPACT SYSTEMS ARE REQUIRED.

THE LENGTH OF NEED SHALL BE BASED ON THE PROTECTION ENVELOPE.

CLEARANCE BETWEEN GUARDRAIL AND OBSTRUCTION:  
 STRONG POST (WOOD AND STEEL POSTS) 0.9m  
 THRIE BEAM 0.9m  
 STRONG POST (PLASTIC POSTS) 1.5m

DATA FOR 15m CURVE  
 D=383.0' R=225.0m  
 SR=7.508m CL=15.0m

END TREATMENT IS TO BE DETERMINED BY PROJECT MANAGER TO EACH GIVEN SITUATION.

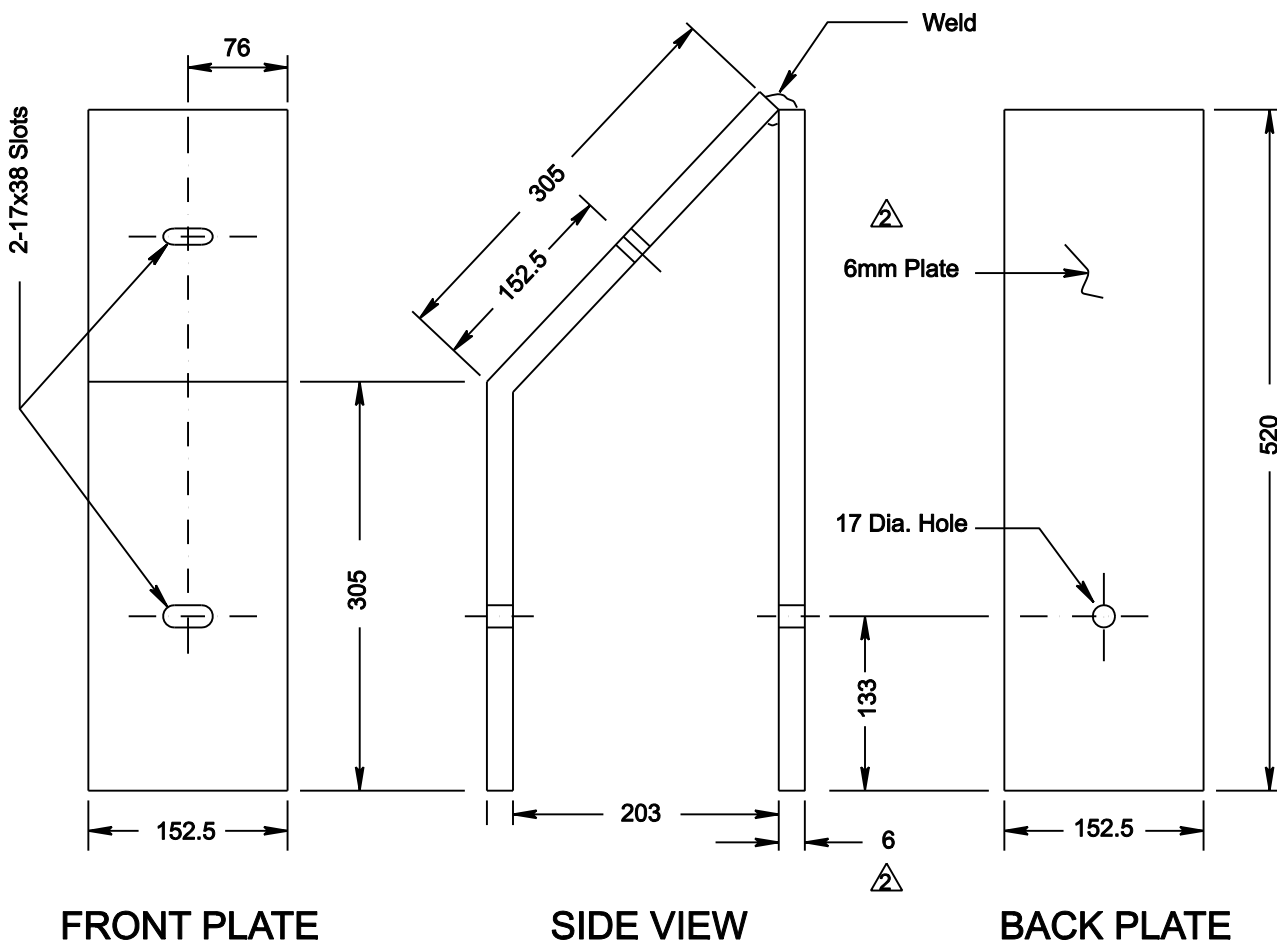
All dimensions are in millimetres unless otherwise indicated.

△			
△			
No.	REVISIONS	BY	DATE

Approved: Original signed by Allan Kwan  Executive Director, Technical Standards Branch Date: JUNE 24, 2005  Effective Date: JULY 12, 2005	
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## TYPICAL STRONG POST W-BEAM OR MODIFIED THRIE BEAM GUARDRAIL PLACEMENT FOR MEDIAN HAZARDS

Prepared By: M.T	Checked By: B.K	Scale: N.T.S.	Dwg No.: TEB 3.18a
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**NOTES:**  
 THIS BRACKET IS REQUIRED FOR THE STANDARD W-BEAM  
 GUARDRAIL WEAKPOST TURN DOWN END TREATMENT -  
 SEE DRAWING TEB 3.12 SECTION C-C ①

1 SEPT. 2011. TURN DOWN ENDS WILL NO LONGER BE  
 ACCEPTABLE FOR NEW INSTALLATIONS OR  
 REPLACEMENT OF EXISTING ENDS. CRASH WORTHY  
 END TREATMENTS SHALL BE USED.

20 NOV. 2012. WHERE EXISTING TURN DOWN END TREATMENTS  
 NEED TO BE RE-BUILT AND/OR REPLACED DUE TO BEING HIT BY  
 AN ERRANT VEHICLE, THE REPLACEMENT WITH A CRASHWORTHY  
 END TREATMENT IS SUBJECT TO FUNDING AVAILABILITY.

All dimensions are in millimetres unless otherwise indicated.

②	Plate Thickness and Notes	B.K.	12/07/05
①	N/A	.	06/95
No.	REVISIONS	BY	DATE

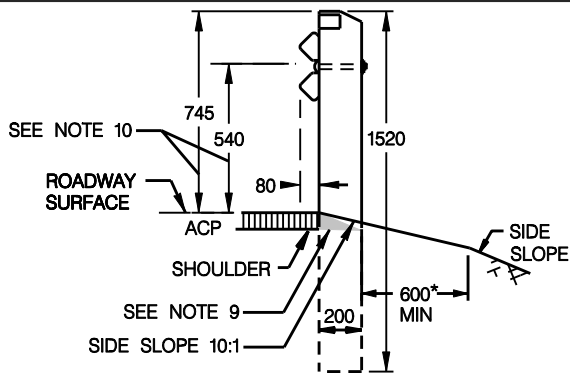
Approved:  
 Original Approved by  
 Alberta Transportation and Utilities  
 Traffic Engineering Section  
 Roadway Engineering Branch  
 Executive Director,  
 Technical Standards Branch

Date: NOVEMBER 25, 1992

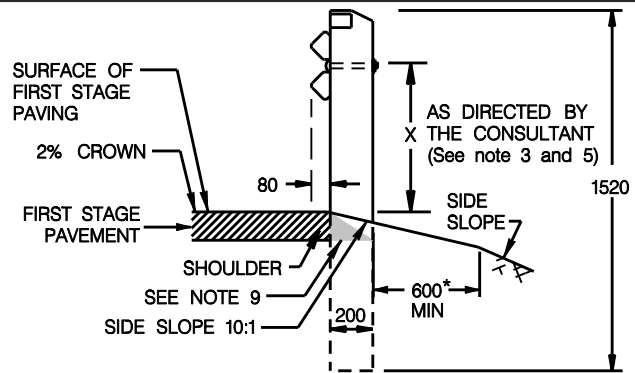
**W-BEAM GUARDRAIL  
 TURN DOWN END HARDWARE**

OBSOLETE  
 1 SEPTEMBER 2011  
 20 NOVEMBER 2012

Prepared By: M.T	Checked By: B.K	Scale: N.T.S.	Dwg No.: TEB 3.53
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**SECTION A-A**   
 STANDARD GUARDRAIL INSTALLATION

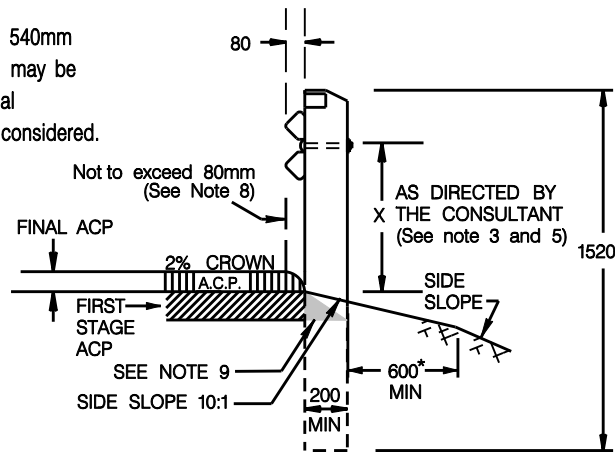


**SECTION B-B**   
 STAGE 1: FIRST STAGE PAVING

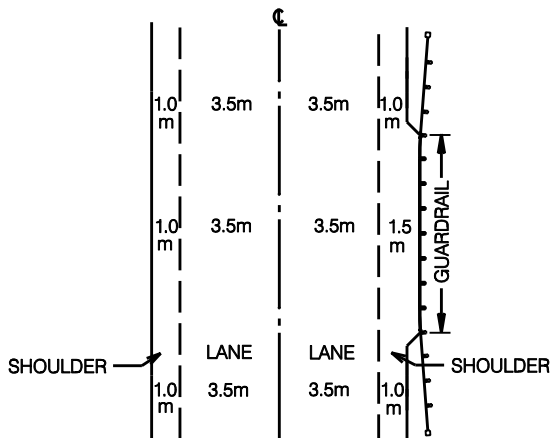
NOTES:

- Sections B-B and C-C show the special installation of guardrail that is suggested on projects where final paving is anticipated within 10 years.
- The standard height of guardrail from the road surface to the centre bolt is 540mm (Section A-A). The acceptable design range for height of guardrail installation is from 465mm to 615mm i.e.  $6 \pm 75$ mm
- The guardrail elevation 'x' is to be set by the consultant. An elevation between 540mm and 615mm is normally chosen for First Stage Paving projects. The elevation may be selected based on an estimate of the Final Pavement thickness. Where the final pavement thickness is not known, the highest permissible elevation should be considered.
- The acceptable tolerance for height of guardrail at time of construction or maintenance is shown in the applicable specification.
- By installing guardrail at the highest permissible elevation (Section B-B), the final pavement can be placed without the guardrail being removed or adjusted (Section C-C).
- All dimensions are in millimetres unless otherwise noted.
- Drawing is not to scale.
- Pavement drop-off line must not be more than 80mm from the guardrail post line. This is to prevent snagging.
- Installation of guardrail system normally requires post to be installed through ACP and GBC layers.
- This Installation method will also apply to other barrier systems. The height tolerances will vary depending in the barrier system.

\* The 600mm dimension may be exceeded if required by the consultant based on barrier type, hazard severity, embankment characteristics, etc.



**SECTION C-C**   
 STAGE 2: FINAL PAVING ON FIRST STAGE PAVING JOB



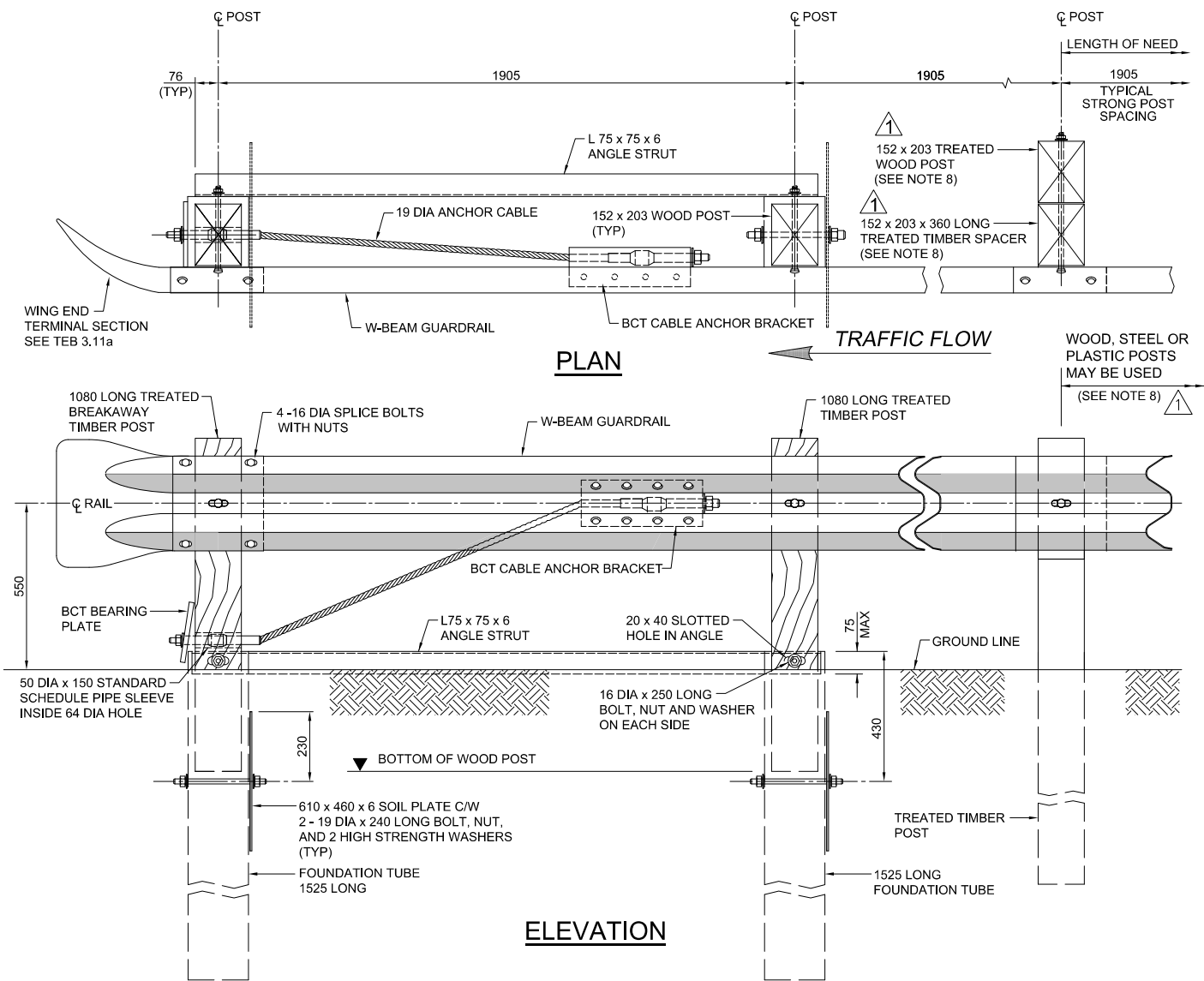
**PLAN VIEW**   
 EXAMPLE SHOWING GUARDRAIL INSTALLATION ON A TYPICAL RAU-209 ROADWAY AT STAGE 2

	Notes and Plan View revised	P.M.	02 JUL 13
	Notes and Sections	P.M.	8 JUL 09
No.	REVISIONS	BY	DATE

<p>Approved: Original approved by Alberta Transportation and Utilities Traffic Operations Branch</p> <p>Executive Director, Technical Standards Branch Date: JUNE 24, 2005</p> <p>Effective Date: JULY 12, 2005</p>	
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**WEAK POST W-BEAM  
INSTALLATION ON  
FIRST STAGE PAVING PROJECTS**

Prepared By: M.T	Checked By: B.K	Scale: N.T.S.	Dwg No.: TEB 3.56a
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**NOTES:**

1. THIS END TREATMENT IS ACCEPTABLE FOR USE ON THE LEAVING END OF DIVIDED ROADWAYS ONLY. USE IN MEDIAN APPLICATIONS ARE LIMITED TO INSTALLATIONS OUTSIDE THE CLEAR ZONE OF OPPOSING TRAFFIC.
2. POSTS ARE TO BE SET BY INSTRUMENT FOR ALIGNMENT AND GRADE.
3. BCT CABLE ANCHOR HARDWARE SHALL CONFORM TO AASHTO TASK FORCE 13 REPORT "A GUIDE TO STANDARDIZED HIGHWAY BARRIER HARDWARE."
4. LAP ALL GUARDRAIL SECTIONS IN THE DIRECTION OF TRAFFIC FLOW.
5. ALL REQUIRED FITTINGS AND HARDWARE SHALL BE GALVANIZED.
6. CABLE ANCHOR SHALL BE TIGHTENED DURING INSTALLATION TO TAKE OUT ANY SLACK.
7. REFER TO RGD-B1.2 AND RDG-B1.3 FOR STANDARD HARDWARE DETAILS.
8. TYPICAL STRONG POST SYSTEM CAN BE WOOD, STEEL OR PLASTIC POST WITH WOOD SPACER BLOCK. REFER TO STANDARD DRAWING TEB 3.01 FOR POST DETAILS.

	NOTE 8 ADDED	HC	11 MAR 2016
No.	REVISIONS	BY	DATE

Approved:

Moh Lali

For Executive Director,  
Technical Standards Branch

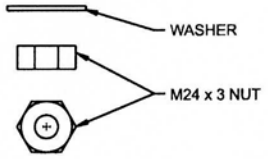
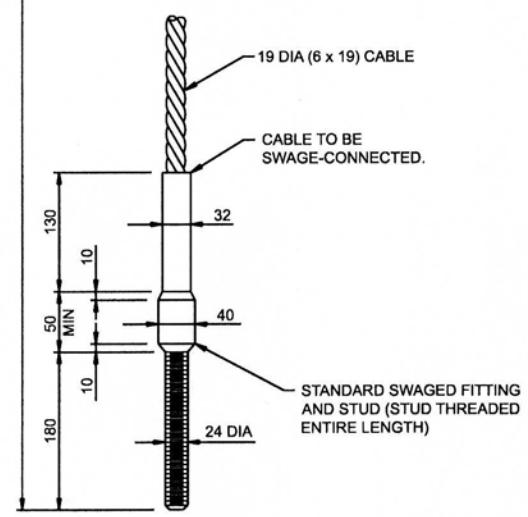
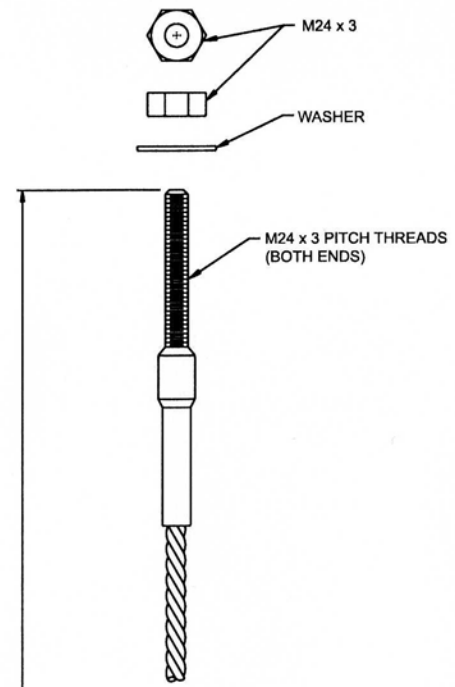
Date: NOVEMBER, 2007

**W-BEAM  
CABLE ANCHOR TERMINAL  
(EXIT END TREATMENT  
FOR DIVIDED HIGHWAYS)**

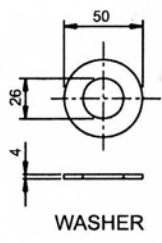
Prepared By: MO	Checked By: WS	Scale: N.T.S.	Dwg No.: RDG-B1.1
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ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE INDICATED.

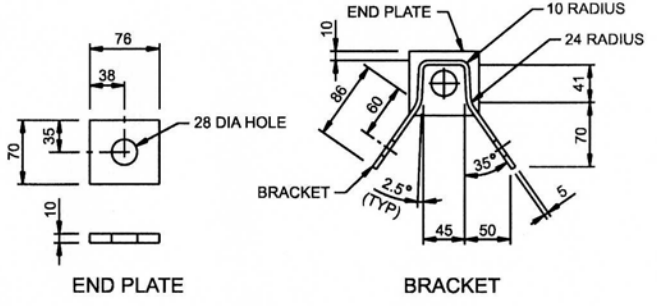
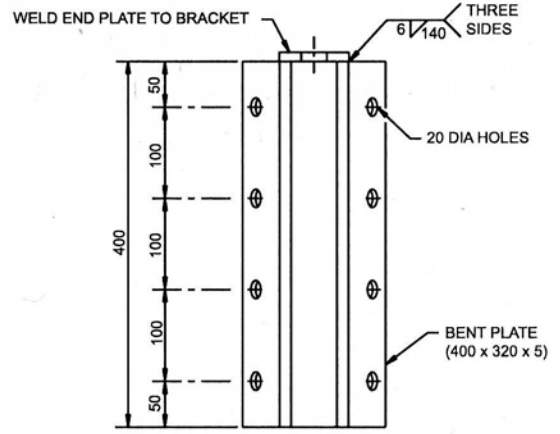




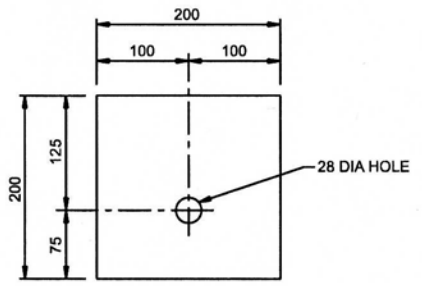
**BCT CABLE ANCHOR ASSEMBLY**



ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE INDICATED.



**BCT CABLE ANCHOR BRACKET**



**200 x 200 x 16 BCT BEARING PLATE**

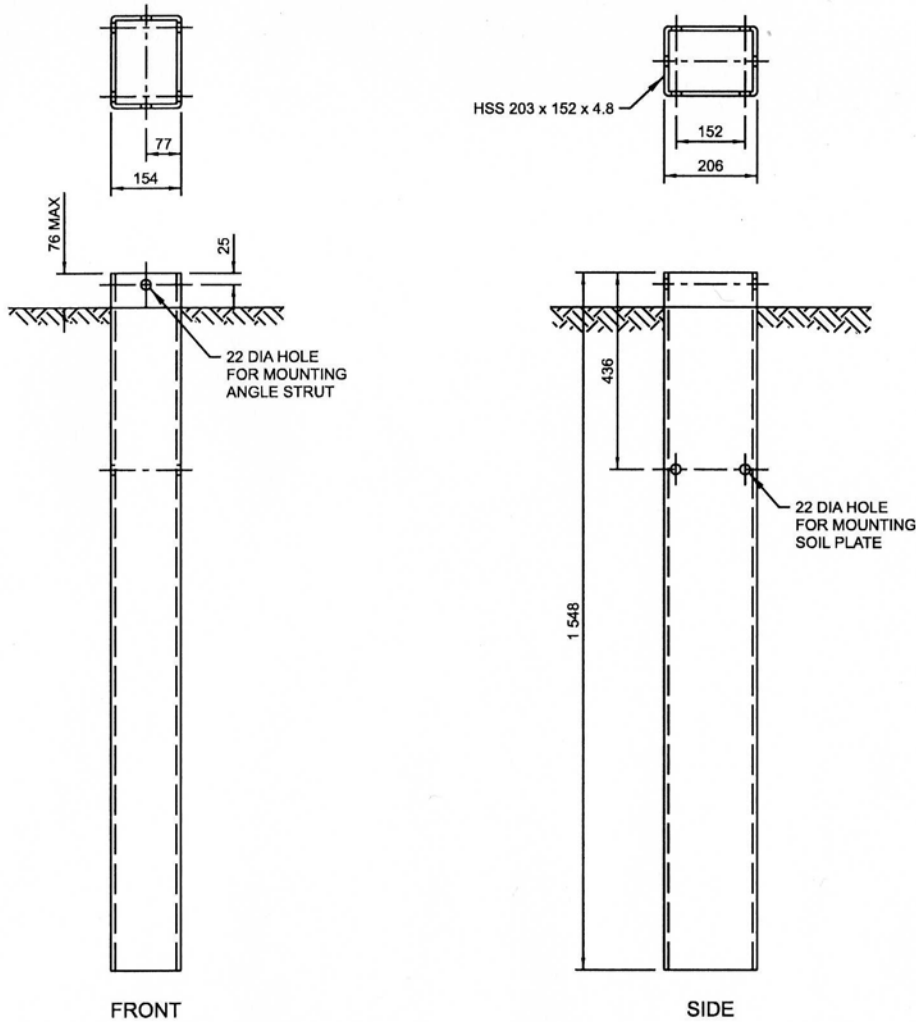
▲			
▲			
No.	REVISIONS	BY	DATE

Approved:  
*Allan Swan*  
Executive Director,  
Technical Standards Branch  
Date: NOVEMBER, 2007



**HARDWARE DETAILS  
FOR W-BEAM AND  
THREE BEAM GUARDRAIL  
CABLE ANCHOR TERMINAL**

Prepared By: MO	Checked By: WS	Scale: NTS	Dwg No.: RDG-B1.2
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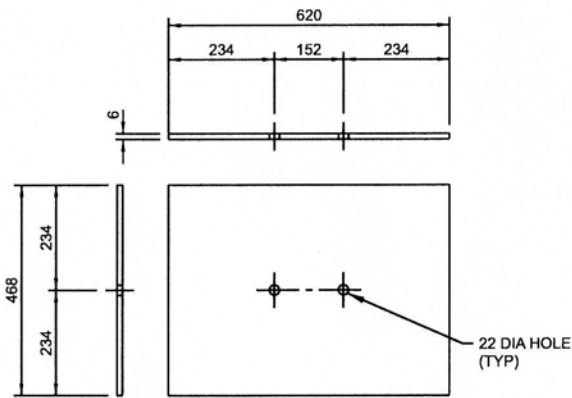
FRONT

SIDE

**FOUNDATION TUBE**

**NOTE:**

WOOD POST SHOULD BE ABLE TO SLIDE INTO THE TOP OF FOUNDATION TUBE SO THE ACTUAL INSIDE DIMENSIONS OF FOUNDATION TUBE CAN NOT BE LESS THAN 190x140.



**FOUNDATION TUBE SOIL PLATE**

△			
△			
No.	REVISIONS	BY	DATE

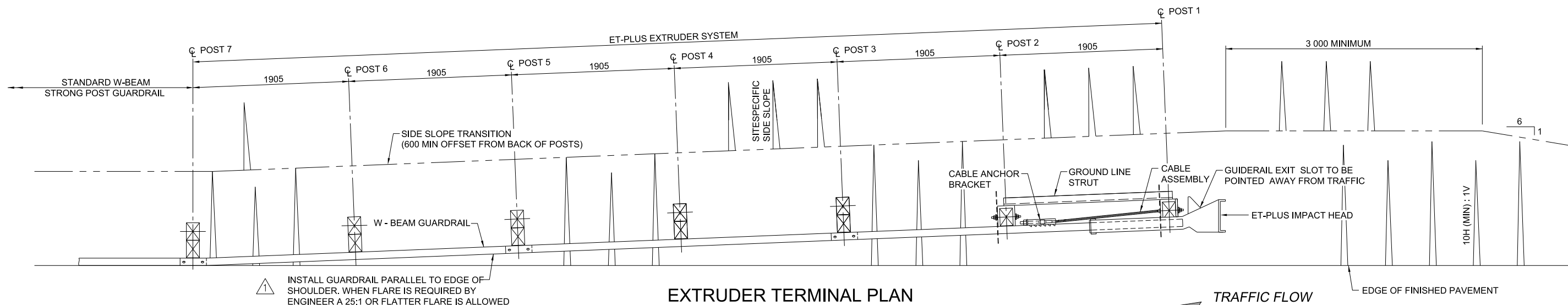
Approved:  
  
 Executive Director,  
 Technical Standards Branch  
 Date: NOVEMBER, 2007



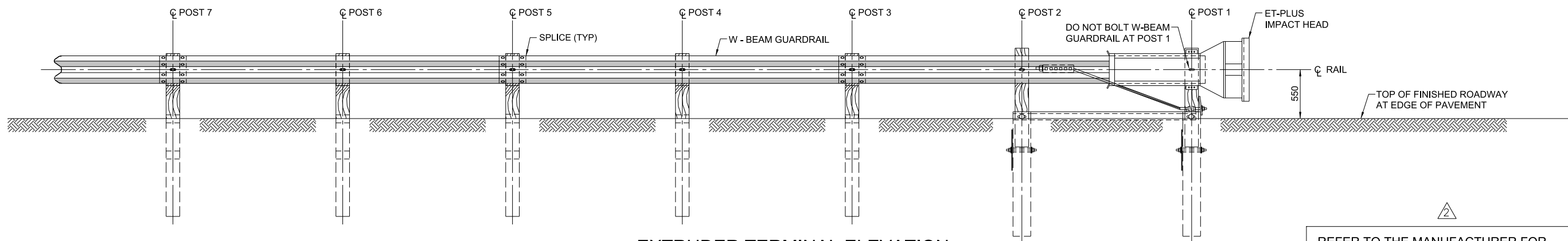
**FOUNDATION TUBE AND  
 FOUNDATION TUBE SOIL PLATE  
 DETAILS FOR W-BEAM AND THRIE  
 BEAM CABLE ANCHOR TERMINAL**

ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE INDICATED.

Prepared By: MO	Checked By: WS	Scale: NTS	Dwg No.: <b>RDG-B1.3</b>
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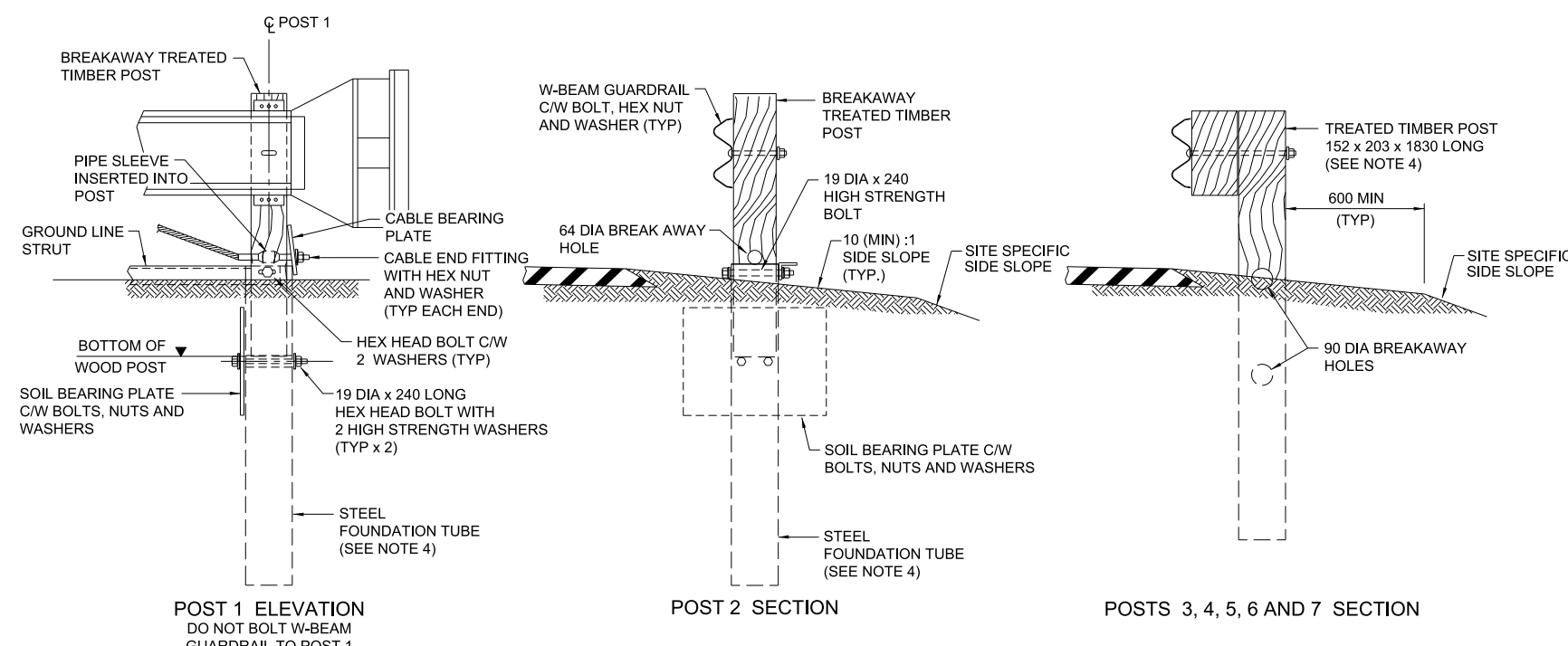


**EXTRUDER TERMINAL PLAN**



**EXTRUDER TERMINAL ELEVATION**

REFER TO THE MANUFACTURER FOR THE LATEST DRAWINGS AND SPECIFICATIONS



**POST DETAILS**

**NOTES:**

1. THE ET PLUS EXTRUDER SYSTEM DEPICTED ON THIS DRAWING IS PROPRIETARY TO TRINITY INDUSTRIES, INC. AND MEETS THE REQUIREMENTS OF NCHRP REPORT 350 FOR TEST LEVEL 3 (TL-3). THE INSTALLATION OF THIS SYSTEM SHALL BE AS PER THE TRINITY INSTALLATION INSTRUCTIONS MANUAL.
2. THIS DRAWING SHOWS THE INSTALLATION OF THE RIGHT SHOULDER EXTRUDER TERMINAL. INSTALLATION OF THE LEFT SHOULDER EXTRUDER TERMINAL IS INVERTED FOR UNIDIRECTIONAL TRAFFIC.
3. RAIL SECTIONS ARE TO BE LAPPED IN THE DIRECTION OF TRAFFIC FLOW.
4. ALTERNATE POST SIZES AND TYPES FOR POSTS 1 TO 7 INCLUSIVE MAY BE USED AS SPECIFIED IN THE TRINITY INSTALLATION INSTRUCTIONS MANUAL.
5. FOR INSTALLATION ON A CURVE, THE ET PLUS EXTRUDER SYSTEM MUST BE MAINTAINED STRAIGHT OVER THE LENGTH OF THE SYSTEM. REFER TO THE TRINITY INSTALLATION INSTRUCTIONS MANUAL FOR LIMITATIONS, INCLUDING MAXIMUM TERMINAL OFFSETS.
6. TO ENSURE PROPER DELINEATION, REFLECTIVE SHEETING ON THE FRONT FACE OF THE EXTRUDER HEAD SHALL BE PROVIDED AS PART OF THE INSTALLED SYSTEM.
7. ALL FITTINGS AND HARDWARE SHALL BE GALVANIZED.
8. POST 3 MARKS THE BEGINNING OF THE CALCULATED LENGTH OF NEED.
9. A MAXIMUM FLARE RATE OF 25 TO 1 IS ACCEPTABLE TO OFFSET THE IMPACT HEAD AWAY FROM EDGE OF SHOULDER.
10. POSTS SHALL BE SET BY INSTRUMENT FOR ALIGNMENT AND GRADE.
11. TOP OF FOUNDATION TUBES SHALL BE SET BETWEEN 64 AND 76 ABOVE THE TOP OF PAVED SHOULDER EDGE AND SHALL NOT PROJECT MORE THAN 100 ABOVE THE FINISHED SIDE SLOPE GRADE AT POST.

ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE INDICATED.

△	REFER TO MANUFACTURER NOTE ADDED	HC	11 MAR 2016
△	REVISED FLARE NOTE	PM	2 JUL 13
No.	REVISIONS	BY	DATE

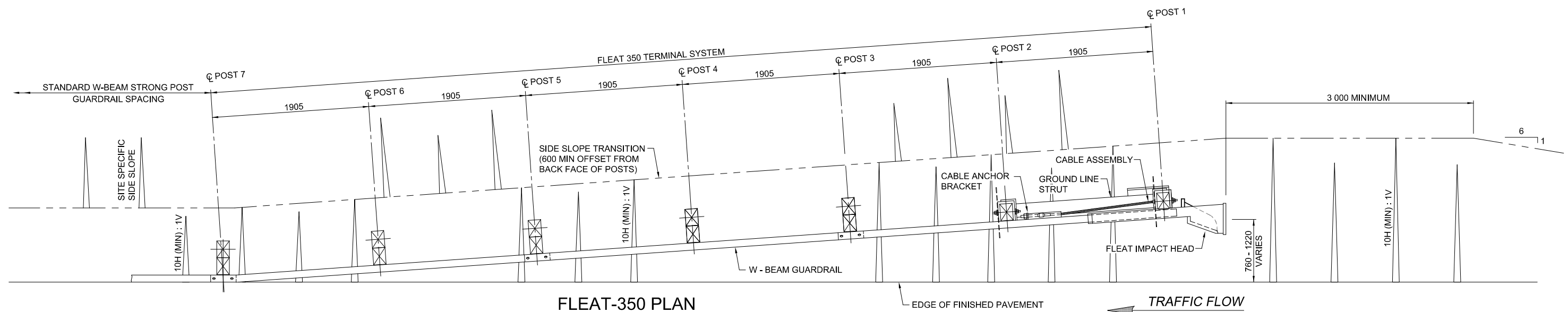
Approved:  
Allan Kwan  
Executive Director,  
Technical Standards Branch

Date: NOVEMBER, 2007

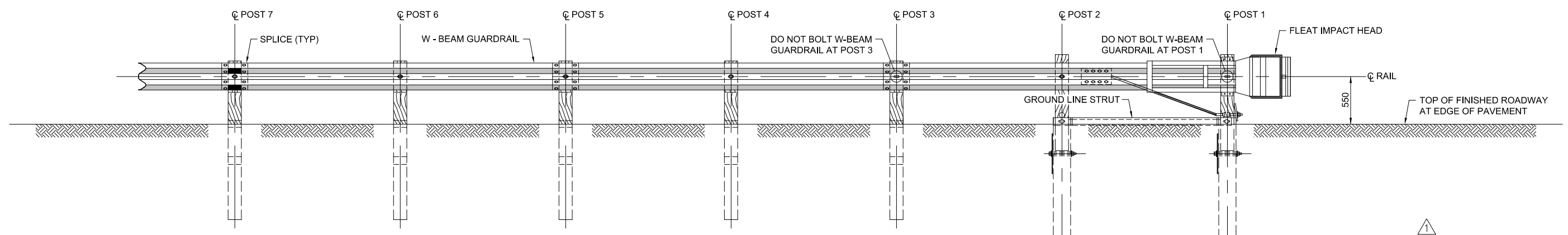
**W-BEAM STRONG POST  
ET-PLUS EXTRUDER  
ENERGY ABSORBING TERMINAL**

Prepared By: MO    Checked By: WS    Scale: N.T.S.    Dwg No.: **RDG-B1.4**

**TEMPORARILY SUSPENDED**

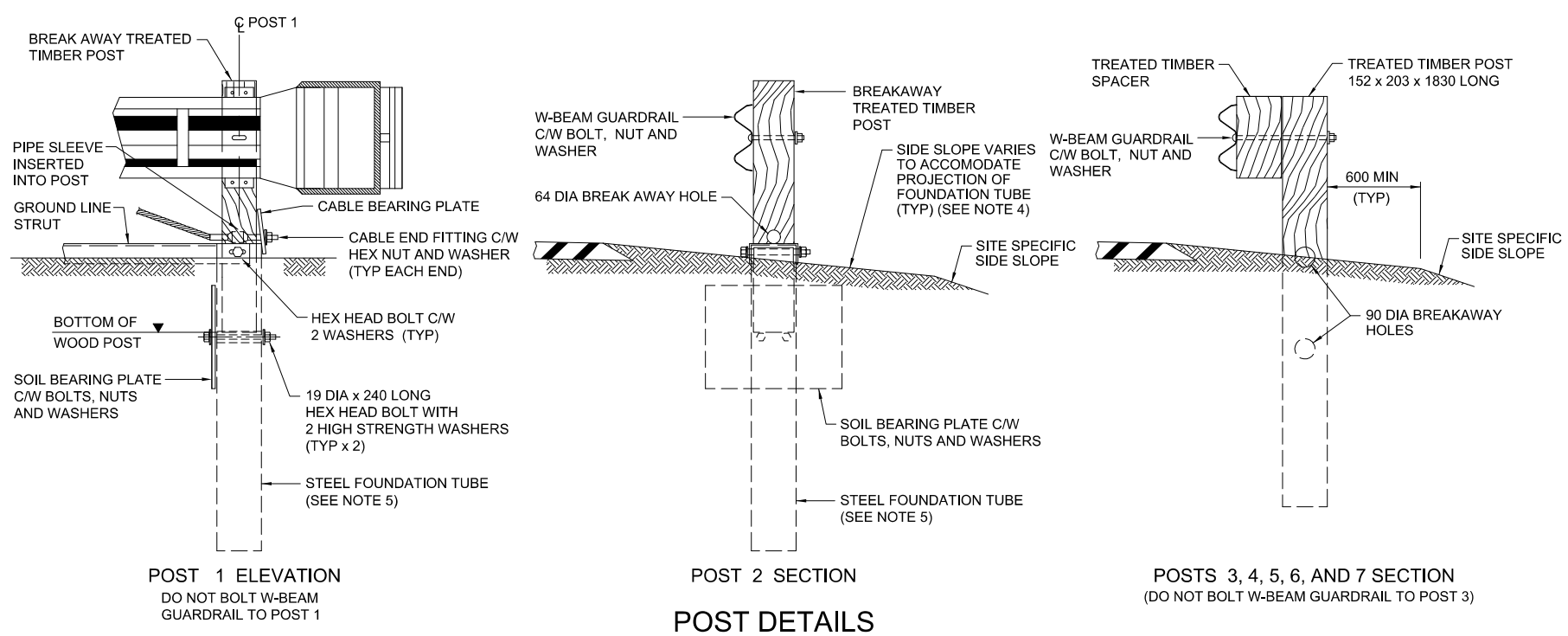


**FLEAT-350 PLAN**



**FLEAT-350 ELEVATION**

REFER TO THE MANUFACTURER FOR THE LATEST DRAWINGS AND SPECIFICATIONS



**NOTES:**

1. THE FLEAT 350 SYSTEM DEPICTED ON THIS DRAWING IS PROPRIETARY TO ROAD SYSTEMS INC (RSI) AND MEETS THE REQUIREMENTS OF NCHRP REPORT 350 FOR TEST LEVEL 3 (TL-3). THE INSTALLATION OF THIS SYSTEM SHALL BE AS PER THE RSI INSTALLATION MANUAL.
2. THIS DRAWING SHOWS THE INSTALLATION OF THE RIGHT SHOULDER EXTRUDER TERMINAL. FOR LEFT SHOULDER INSTALLATIONS, SUCH AS FOR UNIDIRECTIONAL TRAFFIC OR DIVIDED HIGHWAYS WITH WIDE MEDIANS, THE EXTRUDER TERMINAL SHOWN IS INVERTED.
3. RAIL SECTIONS ARE TO BE LAPPED IN THE DIRECTION OF TRAFFIC FLOW.
4. TOP OF FOUNDATION TUBES SHALL BE SET BETWEEN 64 AND 76 ABOVE THE TOP OF PAVED SHOULDER EDGE AND SHALL NOT PROJECT MORE THAN 100 ABOVE THE FINISHED SIDE SLOPE GRADE AT POST.
5. FOR POSTS 1 AND 2, THE FOLLOWING FOUNDATION TUBES MAY BE USED:
  - a. 1830 LONG SPLIT OR SOLID FOUNDATION TUBES WITHOUT SOIL BEARING PLATES.
  - b. 1524 LONG SOLID OR 1370 LONG SOLID FOUNDATION TUBES WITH SOIL BEARING PLATES.
6. TO ENSURE PROPER DELINEATION, REFLECTIVE SHEETING ON THE FRONT FACE OF THE FLEAT 350 HEAD SHALL BE PROVIDED AS PART OF THE INSTALLED SYSTEM.
7. POST 3 MARKS THE BEGINNING OF THE CALCULATED LENGTH OF NEED.
8. ALL FITTINGS AND HARDWARE SHALL BE GALVANIZED.
9. POSTS SHALL BE SET BY INSTRUMENT FOR ALIGNMENT AND GRADE.

2			
1	REFER TO MANUFACTURER NOTE ADDED	HC	11 MAR 2016
No.	REVISIONS	BY	DATE

Approved:  
Allan Kwan  
Executive Director,  
Technical Standards Branch

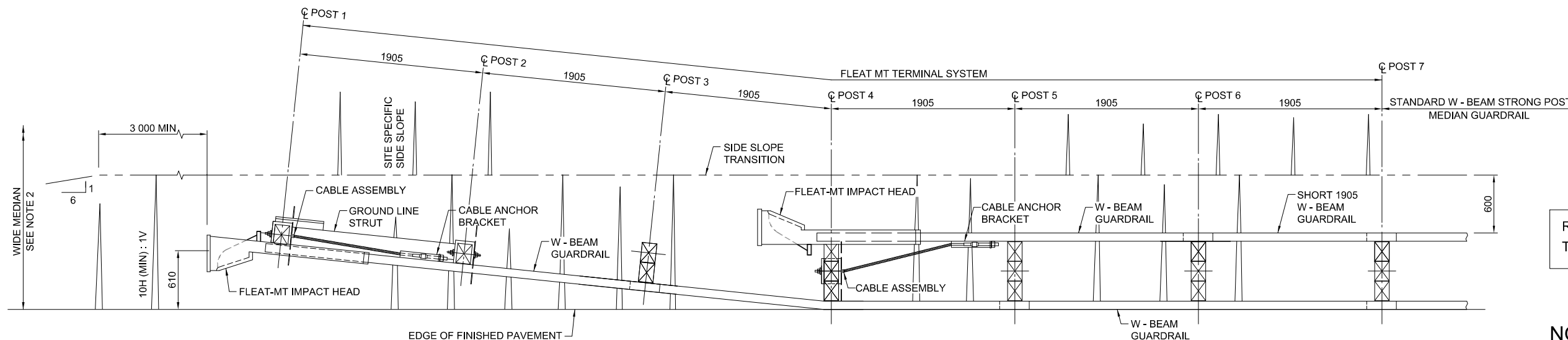
Date: NOVEMBER, 2007

**Alberta**  
INFRASTRUCTURE AND  
TRANSPORTATION

**W-BEAM STRONG POST  
TL-3 FLEAT 350  
ENERGY ABSORBING TERMINAL**

Prepared By: MO	Checked By: WS	Scale: N.T.S.	Dwg No.: RDG-B1.5
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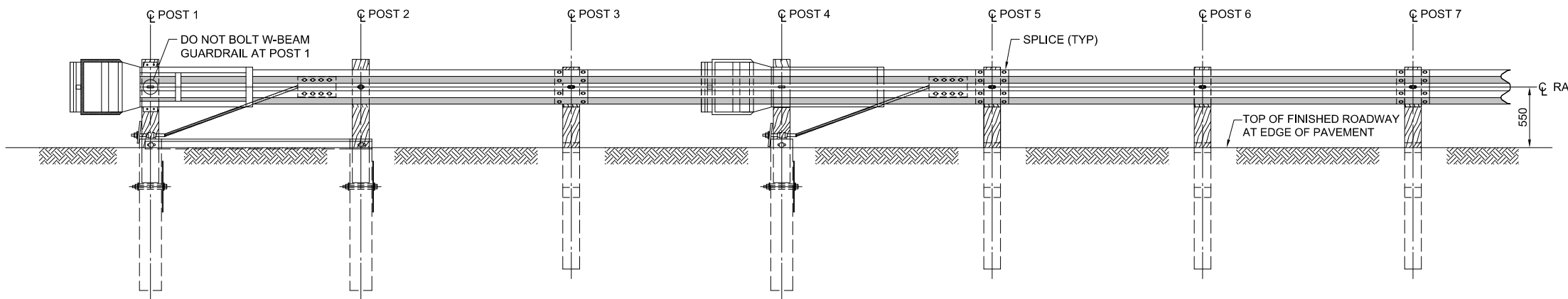
ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE INDICATED.



REFER TO THE MANUFACTURER FOR THE LATEST DRAWINGS AND SPECIFICATIONS

TRAFFIC FLOW →

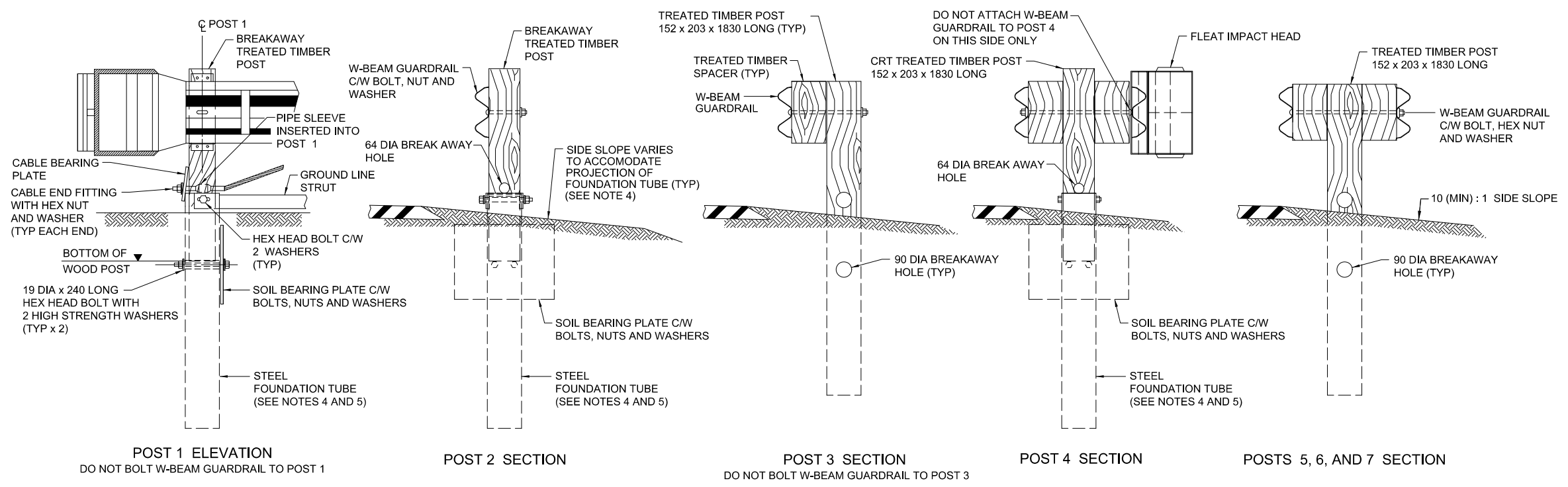
**FLEAT-MT TERMINAL PLAN**  
FOR WIDE MEDIANS ONLY



**FLEAT-MT TERMINAL ELEVATION**

**NOTES:**

1. THE FLEAT MT SYSTEM DEPICTED ON THIS DRAWING IS PROPRIETARY TO ROAD SYSTEMS, INC. (RSI) AND MEETS THE REQUIREMENTS OF NCHRP REPORT 350 FOR TEST LEVEL 3 (TL-3). THE INSTALLATION OF THIS SYSTEM SHALL BE AS PER THE RSI INSTALLATION MANUAL.
2. APPLICATION OF THIS SYSTEM SHALL ONLY BE USED FOR WIDE MEDIANS SUCH THAT THE INSTALLED SYSTEM CAN BE PHYSICALLY LOCATED OUTSIDE THE CLEAR ZONE FOR THE OPPOSING TRAFFIC.
3. RAIL SECTIONS ARE TO BE LAPPED IN THE DIRECTION OF TRAFFIC FLOW.
4. TOP OF FOUNDATION TUBES SHALL BE SET BETWEEN 64 AND 76 ABOVE TOP OF PAVED SHOULDER EDGE AND SHALL NOT PROJECT MORE THAN 100 ABOVE THE FINISHED SIDE SLOPE GRADE AT POST.
5. FOR POSTS 1, 2 AND 4 THE FOLLOWING FOUNDATION TUBES MAY BE USED:
  - a. 1830 LONG SPLIT OR SOLID FOUNDATION TUBES WITHOUT SOIL BEARING PLATES.
  - b. 1524 LONG SOLID OR 1370 LONG SOLID FOUNDATION TUBES WITH SOIL BEARING PLATES.
6. FOR POSTS 3, 5, 6 AND 7, PLUG WELDED STEEL BREAKAWAY POSTS MAY BE USED IN LIEU OF TREATED TIMBER POSTS AS PER RSI GUIDELINES, PROVIDED THAT THE APPROPRIATE INSTALLATION HARDWARE IS USED TO MAINTAIN COMPLIANCE WITH TL-3.
7. TO ENSURE PROPER DELINEATION, REFLECTIVE SHEETING OBJECT MARKER ON THE FRONT FACE OF THE FLEAT MT HEAD SHALL BE PROVIDED AS PART OF THE INSTALLED SYSTEM.
8. POST 3 MARKS THE BEGINNING OF THE CALCULATED LENGTH OF NEED.
9. ALL FITTINGS AND HARDWARE SHALL BE GALVANIZED.
10. POSTS SHALL BE SET BY INSTRUMENT FOR ALIGNMENT AND GRADE.



**POST DETAILS**

△			
△	REFER TO MANUFACTURER NOTE ADDED	HC	11 MAR 2016
No.	REVISIONS	BY	DATE

Approved:  
Allan Kwan  
Executive Director,  
Technical Standards Branch

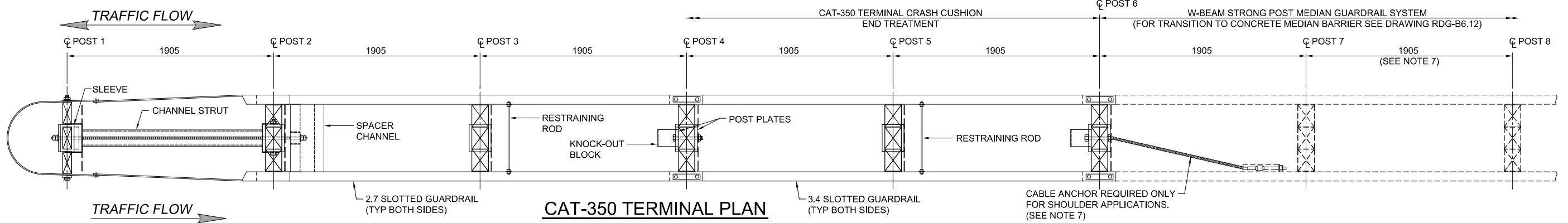
Date: NOVEMBER, 2007

**Alberta**  
INFRASTRUCTURE AND  
TRANSPORTATION

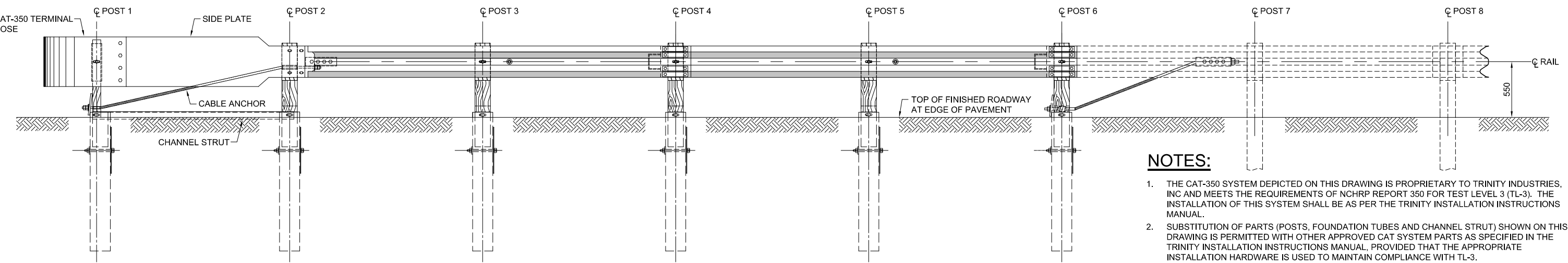
**W-BEAM STRONG POST  
TL-3 FLEAT MT  
ENERGY ABSORBING TERMINAL  
FOR MEDIAN APPLICATIONS**

Prepared By: MO	Checked By: WS	Scale: N.T.S.	Dwg No.: RDG-B1.6
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ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE INDICATED.



**CAT-350 TERMINAL PLAN**

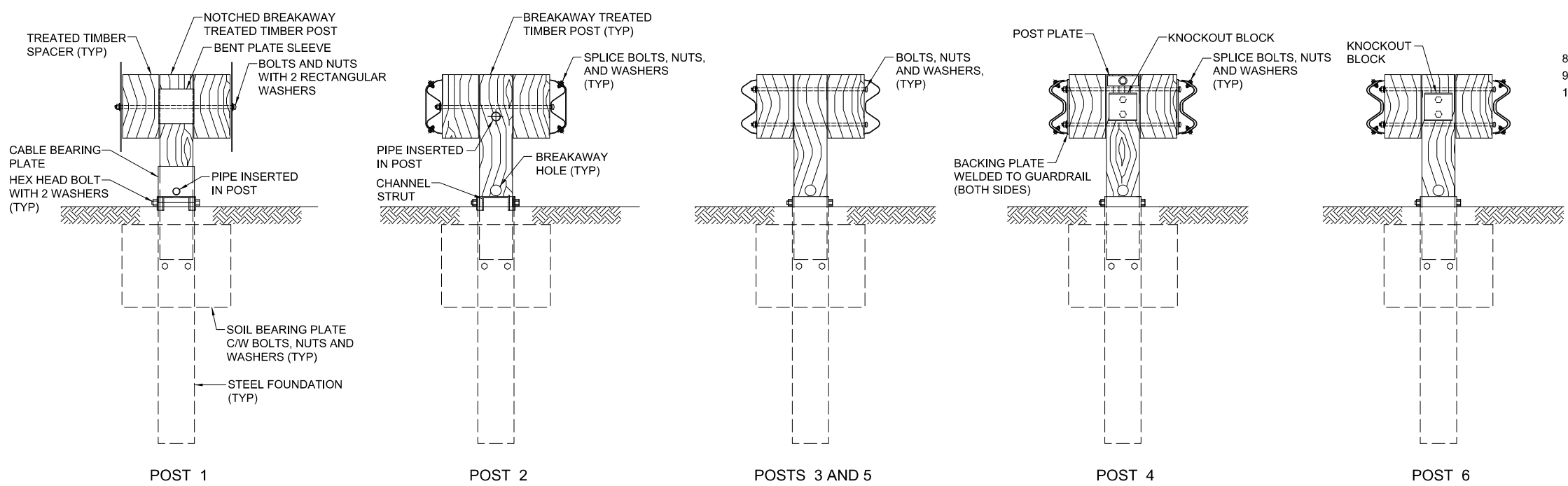


**CAT-350 TERMINAL ELEVATION**

REFER TO THE MANUFACTURER FOR THE LATEST DRAWINGS AND SPECIFICATIONS

**NOTES:**

1. THE CAT-350 SYSTEM DEPICTED ON THIS DRAWING IS PROPRIETARY TO TRINITY INDUSTRIES, INC AND MEETS THE REQUIREMENTS OF NCHRP REPORT 350 FOR TEST LEVEL 3 (TL-3). THE INSTALLATION OF THIS SYSTEM SHALL BE AS PER THE TRINITY INSTALLATION INSTRUCTIONS MANUAL.
2. SUBSTITUTION OF PARTS (POSTS, FOUNDATION TUBES AND CHANNEL STRUT) SHOWN ON THIS DRAWING IS PERMITTED WITH OTHER APPROVED CAT SYSTEM PARTS AS SPECIFIED IN THE TRINITY INSTALLATION INSTRUCTIONS MANUAL, PROVIDED THAT THE APPROPRIATE INSTALLATION HARDWARE IS USED TO MAINTAIN COMPLIANCE WITH TL-3.
3. MAXIMUM PROJECTION OF FOUNDATION TUBE ABOVE FINISHED GRADE SHALL NOT EXCEED 100.
4. CAT RAIL SPLICE BOLTS SHALL BE USED AT POSTS 4 AND 6 TO ENSURE PROPER PERFORMANCE OF THE SYSTEM DURING IMPACT. THESE BOLTS ARE DESIGNED TO ALLOW TELESCOPING ACTION OF RAIL SLIDING ON RAIL.
5. RAIL SECTIONS ARE TO BE LAPPED IN THE DIRECTION OF TRAFFIC FLOW.
6. DO NOT ATTACH RAIL ELEMENTS TO POSTS 3, 5 AND 6.
7. A 3810 LONG CAT-350 TAIL-END SECTION SHALL BE PROVIDED FROM POST 6 TO POST 8 WHEN LESS THAN 11 430 OF W-BEAM MEDIAN GUARDRAIL IS INSTALLED BEYOND POST 6. FOR SHOULDER APPLICATIONS WHEN TRANSITIONING THE CAT-350 TERMINAL TO A SINGLE SIDED W-BEAM GUARDRAIL, A CABLE ATTACHMENT AND ANCHORAGE ASSEMBLY IS REQUIRED BETWEEN POSTS 6 AND 7. DETAILS FOR BOTH TYPES OF TRANSITIONS MAY BE OBTAINED FROM TRINITY.
8. ALL FITTINGS AND HARDWARE SHALL BE GALVANIZED.
9. POST 4 MARKS THE BEGINNING OF THE CALCULATED LENGTH OF NEED.
10. TO ENSURE PROPER DELINEATION, REFLECTIVE SHEETING SHALL BE PLACE ON THE NOSE AND SHALL BE PROVIDED AS PART OF THE INSTALLED SYSTEM.



**POST DETAILS**

2			
1	REFER TO MANUFACTURER NOTE ADDED	HC	11 MAR 2016
No.	REVISIONS	BY	DATE

Approved:  
Allan Kwan  
Executive Director,  
Technical Standards Branch

Date: NOVEMBER, 2007

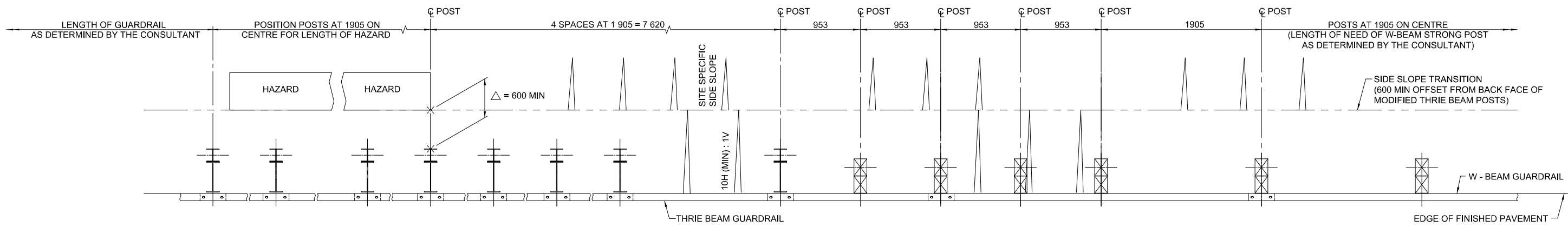


**W-BEAM STRONG POST  
MEDIAN OR GORE AREA  
TERMINATION  
TL-3 CAT 350 TERMINAL**

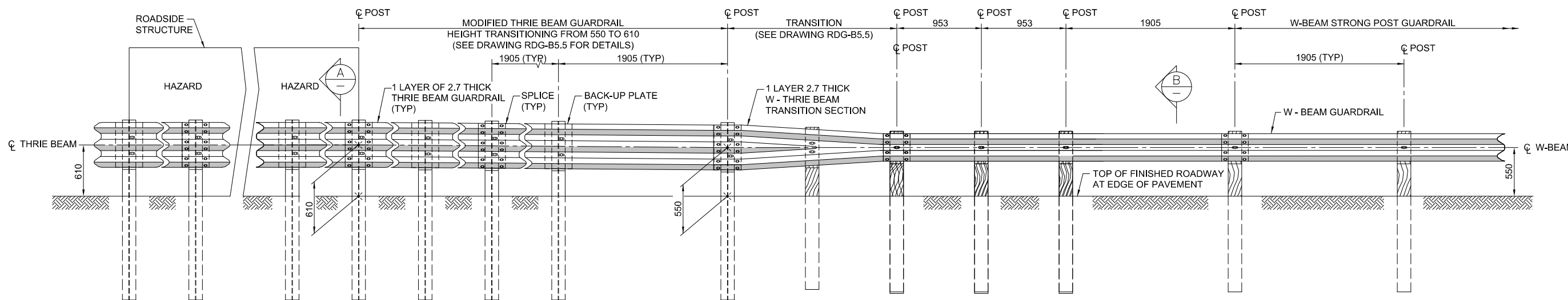
Prepared By: MO	Checked By: WS	Scale: N.T.S.	Dwg No.: RDG-B1.7
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ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE INDICATED.

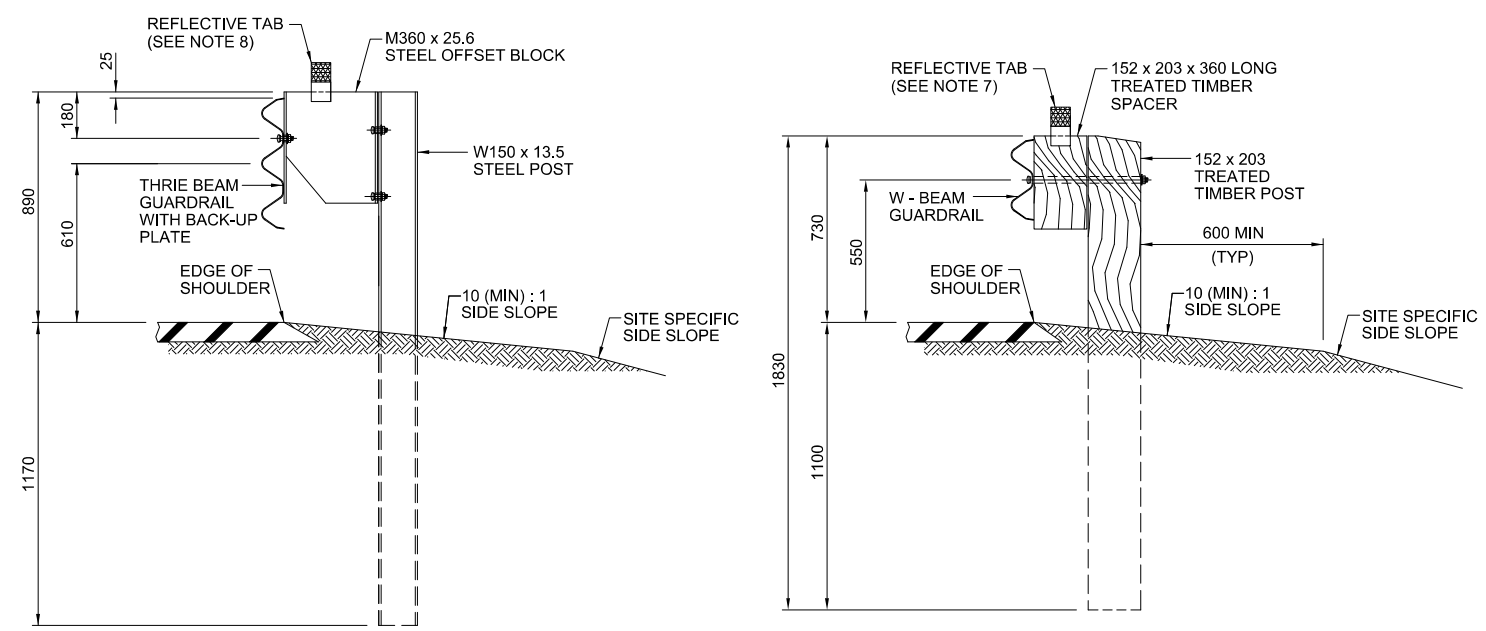




PLAN



ELEVATION



POST DETAILS

NOTES:

1. FOR GENERAL LAYOUT REFER TO TEB DRAWINGS 3.15a AND 3.18.
2. WHERE GUARDRAIL IS ADJACENT TO CURB, HEIGHT OF RAIL SHALL BE MEASURED AS FOLLOWS:
  - a. VERTICALLY AT FACE OF GUARDRAIL WHEN FACE OF GUARDRAIL IS MORE THAN 300 BEYOND GUTTER LINE.
  - b. VERTICALLY AT GUTTER LINE WHEN FACE OF GUARDRAIL IS 300 OR LESS BEYOND GUTTER LINE.
3. POSTS SHALL BE SET BY INSTRUMENT FOR ALIGNMENT AND GRADE, WITH TOP PARALLEL TO PAVEMENT GRADE.
4. THE ACCEPTABLE TOLERANCE FOR HEIGHT OF GUARDRAIL AT TIME OF CONSTRUCTION OR MAINTENANCE SHALL BE IN ACCORDANCE WITH THE MOST RECENT SPECIFICATIONS.
5. LAP ALL JOINTS IN THE DIRECTION OF TRAFFIC FLOW.
6. ALL FITTINGS AND HARDWARE REQUIRED SHALL BE GALVANIZED.
7. FASTEN REFLECTOR TO TOP OF EVERY SIXTH GUARDRAIL STRONG POST SPACER BY MECHANICAL MEANS SUCH AS NAILING OR STAPLING. ADHESIVES ALONE WILL NOT BE ACCEPTED. REFER TO DRAWING TEB 3.01 FOR REFLECTOR DETAILS.
8. FASTEN REFLECTOR TO TOP OF EVERY SIXTH GUARDRAIL STEEL OFFSET BLOCK WITH APPROVED ADHESIVE. REFER TO DRAWING TEB 3.01 FOR REFLECTOR DETAILS.
9. THIS TRANSITION SATISFIES NCHRP REPORT 350 REQUIREMENTS FOR TEST LEVEL 3 (TL3).

2			
1	NOTES 7 AND 8 REVISED	PM	8 JUL 09
No.	REVISIONS	BY	DATE

Approved:

Allan Kwan  
Executive Director,  
Technical Standards Branch

Date: NOVEMBER, 2007

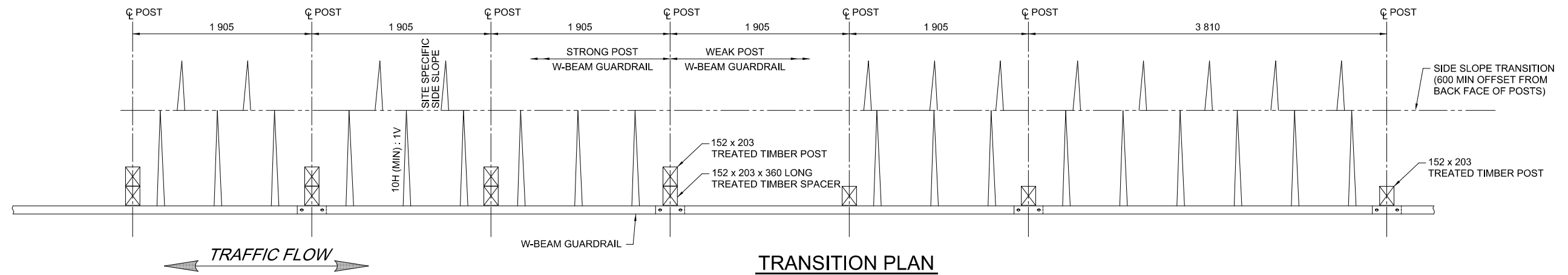
**Alberta**  
Transportation

**W-BEAM STRONG POST TO MODIFIED THRIE BEAM GUARDRAIL TRANSITION AT ROADSIDE STRUCTURE**

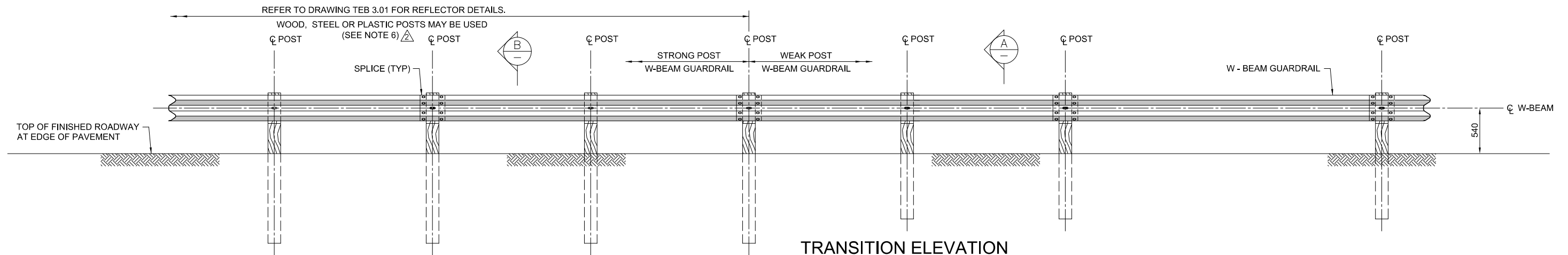
**SUPERSEDED**  
11 MARCH 2016  
Refer to RDG-B5.10

Prepared By: MO	Checked By: WS	Scale: N.T.S.	Dwg No.: RDG-B1.8
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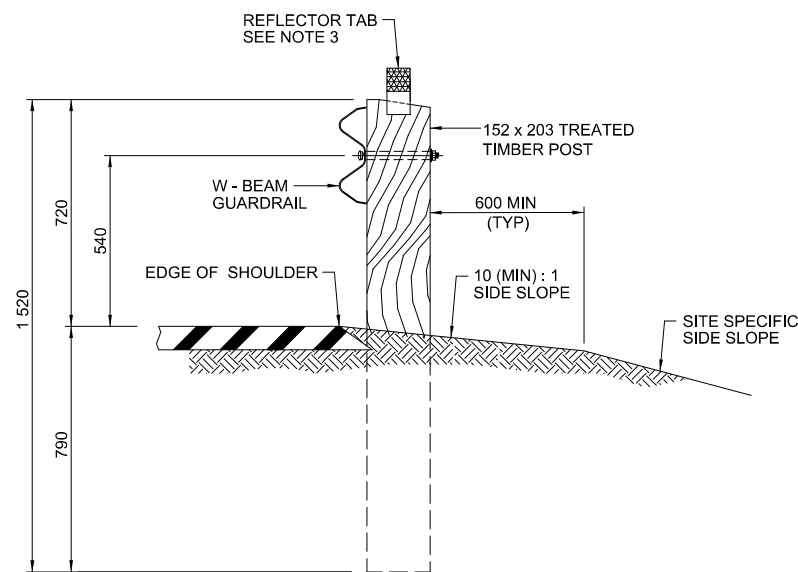
ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE INDICATED.



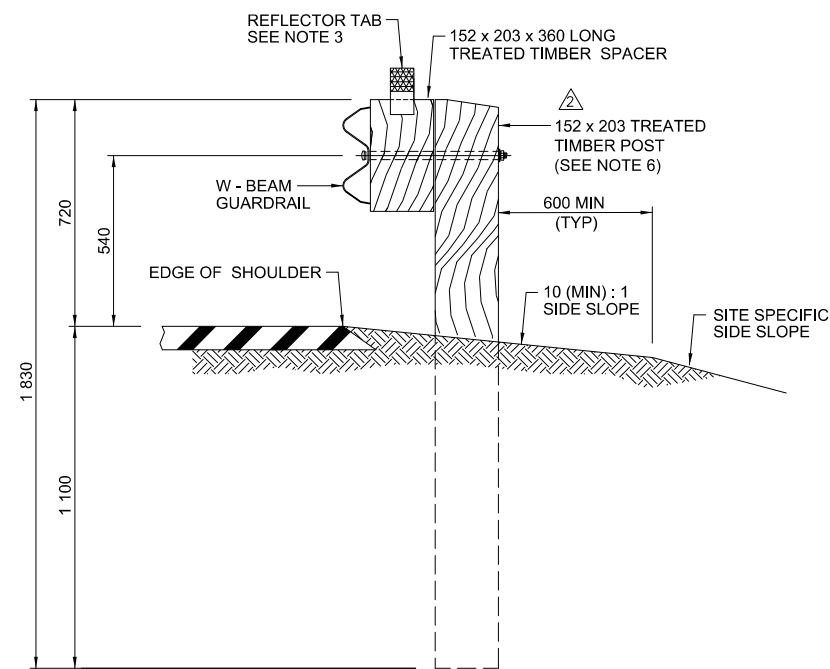
**TRANSITION PLAN**



**TRANSITION ELEVATION**



**SECTION A**



**SECTION B**

**GENERAL NOTES:** ⚠ ⚠

1. LAP ALL JOINTS IN THE DIRECTION OF TRAFFIC.
2. THE ACCEPTABLE TOLERANCE FOR HEIGHT OF GUARDRAIL AT TIME OF CONSTRUCTION OR MAINTENANCE SHALL BE IN ACCORDANCE WITH THE MOST RECENT SPECIFICATIONS.
3. REFLECTOR TO BE INSTALLED ON EVERY 3RD POST AND 6TH POST FOR WEAK POST AND STRONG POST RESPECTIVELY REFER TO DRAWING TEB 3.01 FOR REFLECTOR DETAILS.
4. POSTS SHALL BE SET BY INSTRUMENT FOR ALIGNMENT AND GRADE.
5. ALL FITTINGS AND HARDWARE REQUIRED SHALL BE GALVANIZED.
6. TYPICAL STRONG POST SYSTEM CAN BE WOOD, STEEL OR PLASTIC POST WITH WOOD SPACER BLOCK. REFER TO STANDARD DRAWING TEB 3.01 FOR POST DETAILS.

⚠	NOTE 3 REVISED NOTE 6 ADDED	HC	11 MAR 2016
⚠	NOTE 3 REVISED	PM	8 JUL 09
No.	REVISIONS	BY	DATE

Approved:  
 Allan Kwan  
 Executive Director,  
 Technical Standards Branch

Date: NOVEMBER, 2007

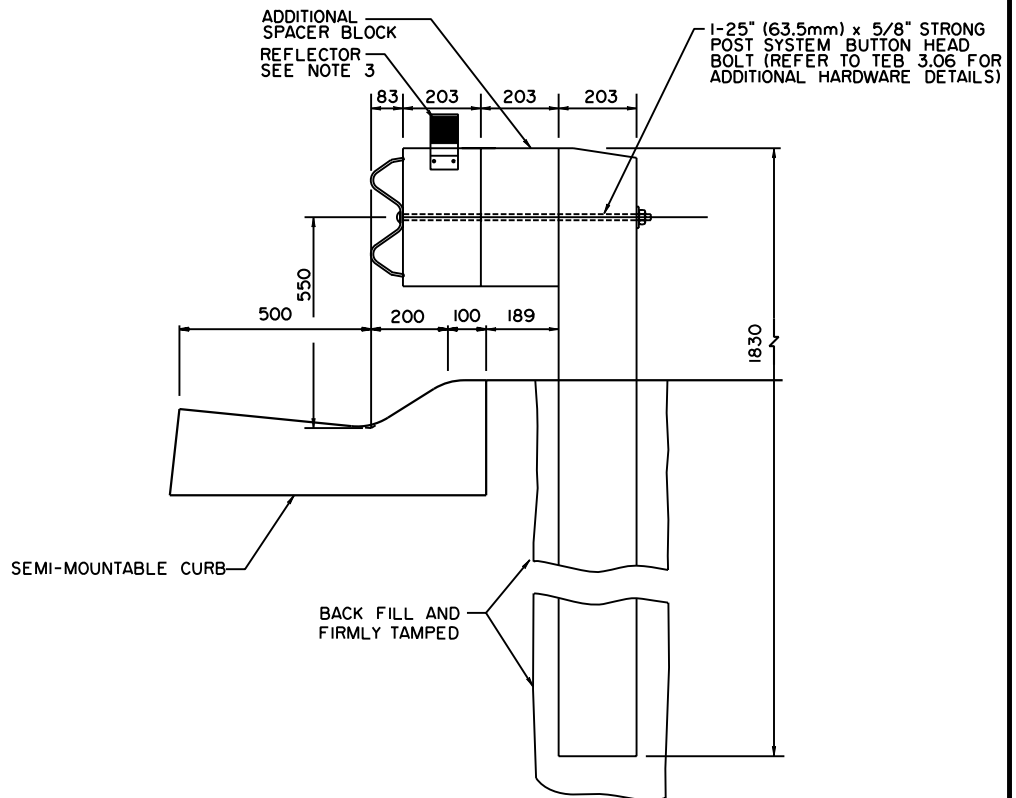


**TRANSITION OF WEAK POST  
 W-BEAM GUARDRAIL  
 TO STRONG POST  
 W-BEAM GUARDRAIL**

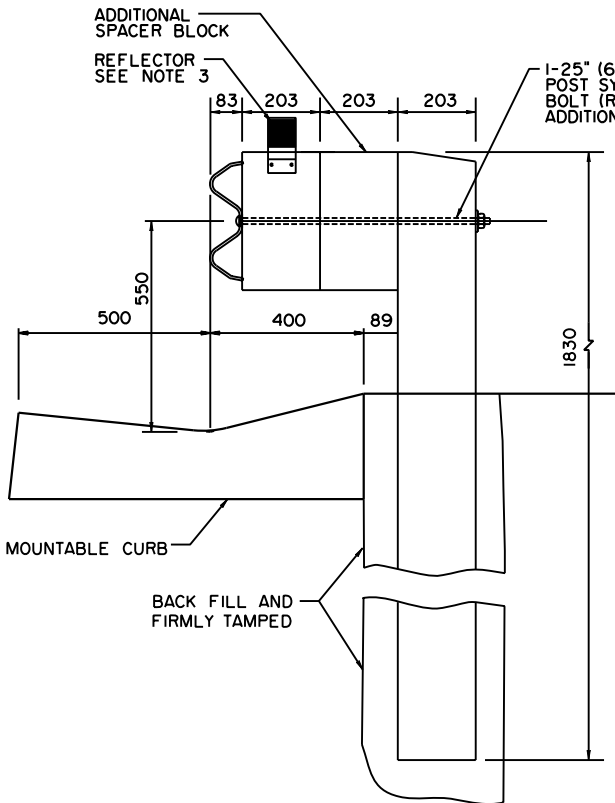
Prepared By: NSP	Checked By: WS	Scale:	Dwg No.: <b>RDG-B1.9</b>
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ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE INDICATED.





**STRONG POST W-BEAM BLOCKED-OUT  
(2 SPACER BLOCKS) GUARDRAIL  
WITH SEMI-MOUNTABLE CURB**



**STRONG POST W-BEAM BLOCKED-OUT  
(2 SPACER BLOCKS) GUARDRAIL  
WITH MOUNTABLE CURB**

**NOTES**

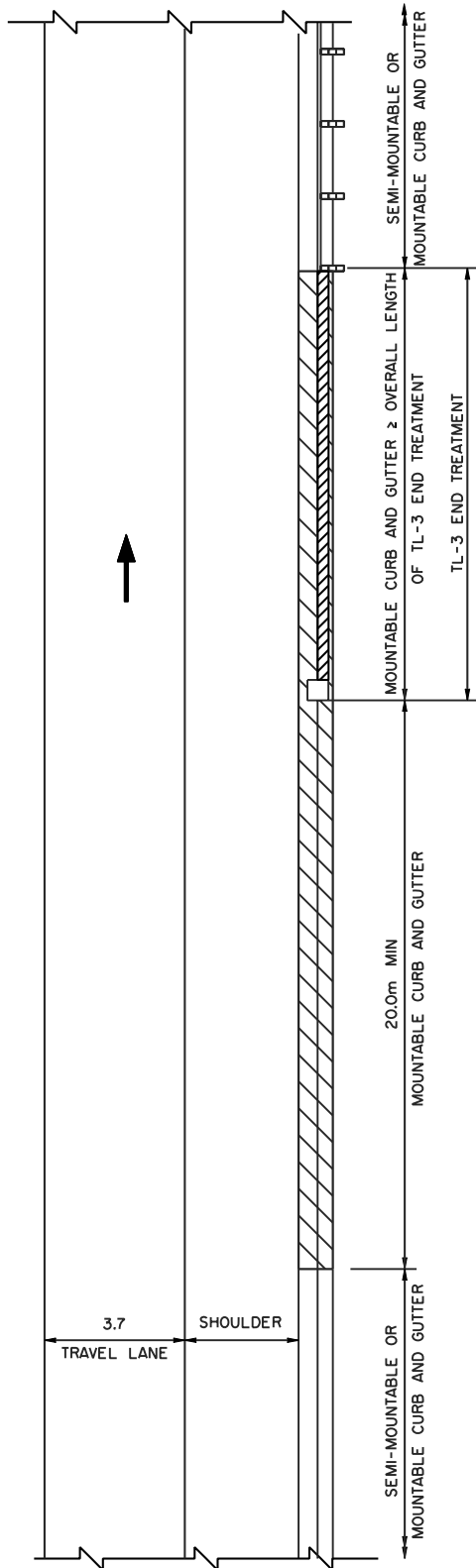
1. REFER TO CB6 STANDARD DRAWINGS FOR SEMI-MOUNTABLE AND MOUNTABLE CURB AND GUTTER DETAILS
2. REFER TO DRAWING TEB 3.09 STRONG POST W-BEAM BLOCKED-OUT GUARDRAIL FOR FURTHER DETAILS
3. REFLECTOR TO BE INSTALLED ON EVERY 6TH POST. REFER TO DRAWING TEB 3.01 FOR REFLECTOR DETAILS.
4. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE INDICATED.

▲			
▲			
No.	REVISIONS	BY	DATE

<b>Approved:</b>  <b>Moh Lali</b> Executive Director, Technical Standards Branch	<b>Government of Alberta</b> ■ <b>Transportation</b>
Date: JULY, 2009	

**STRONG POST  
W-BEAM GUARDRAIL  
FOR MOUNTABLE AND  
SEMI-MOUNTABLE CURB**

Prepared By: GEC	Checked By: PM	Scale: NTS	Dwg No.: <b>RDG-B1.10</b>
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No.	REVISIONS	BY	DATE

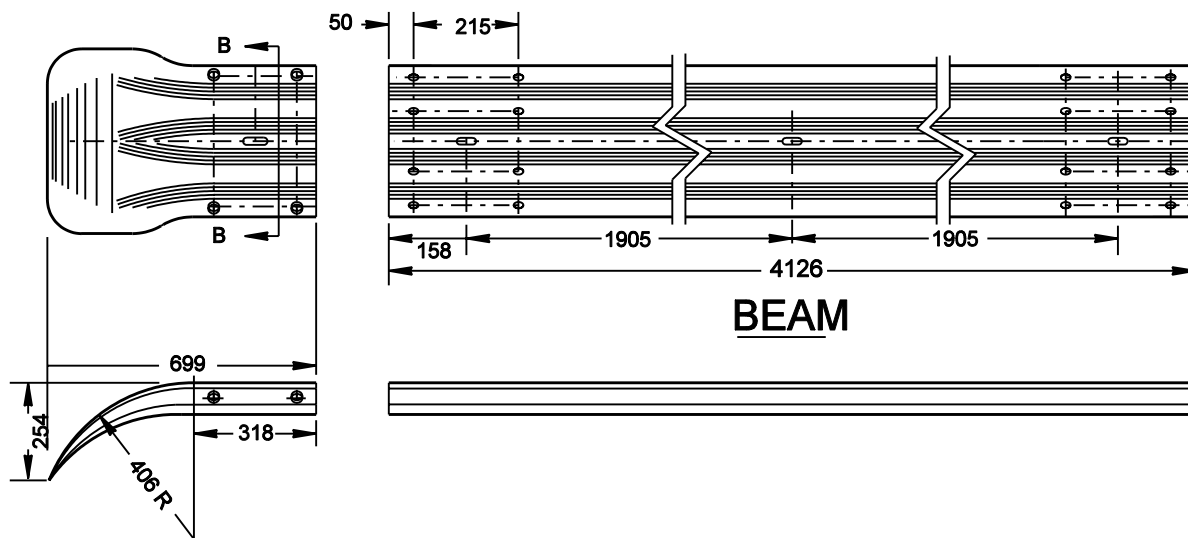
Approved:  
 Moh Lali  
 Executive Director,  
 Technical Standards Branch

Date: JULY, 2009

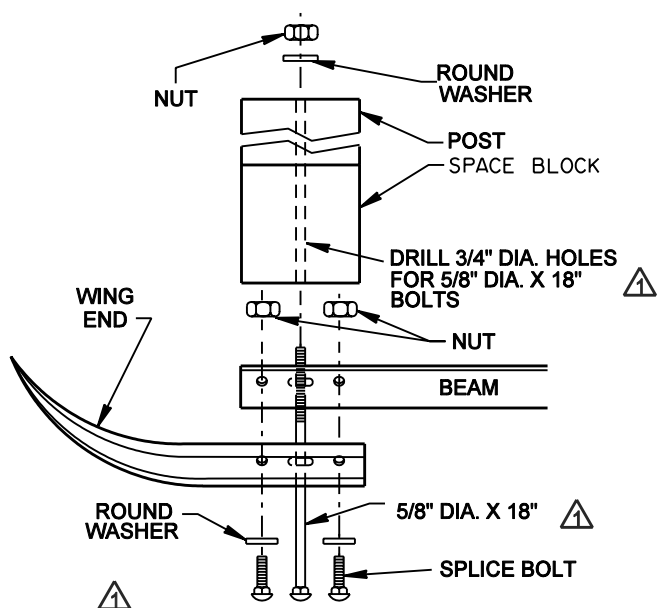
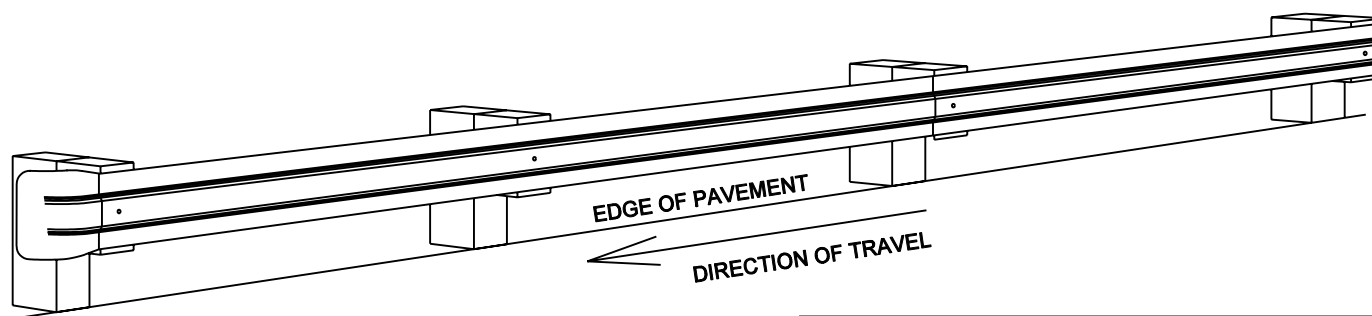
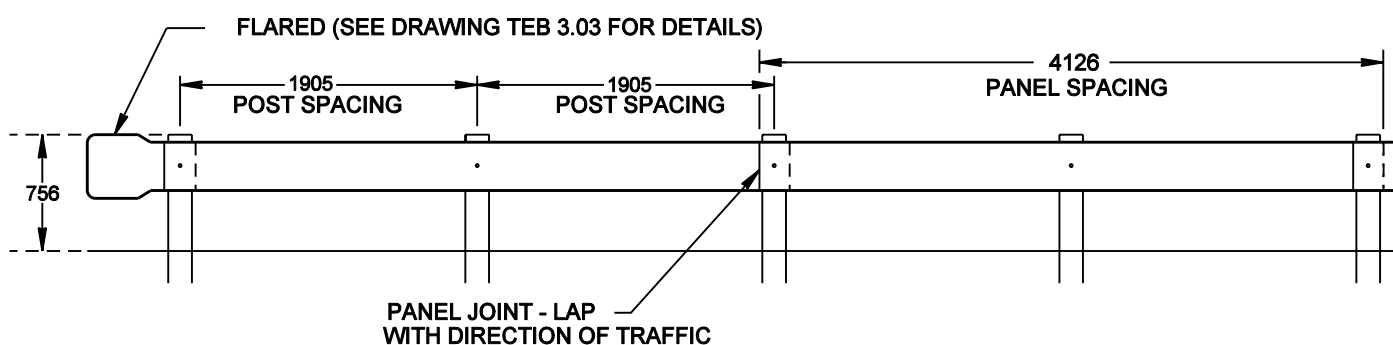
**Government of Alberta** ■  
**Transportation**

**TYPICAL STRONG POST  
 W-BEAM GUARDRAIL TL-3 END  
 TREATMENT WITH CURB AND  
 GUTTER TRANSITION**

Prepared By: GEC    Checked By: PM    Scale: NTS    Dwg No.: **RDG-B1.11**



### END SECTION



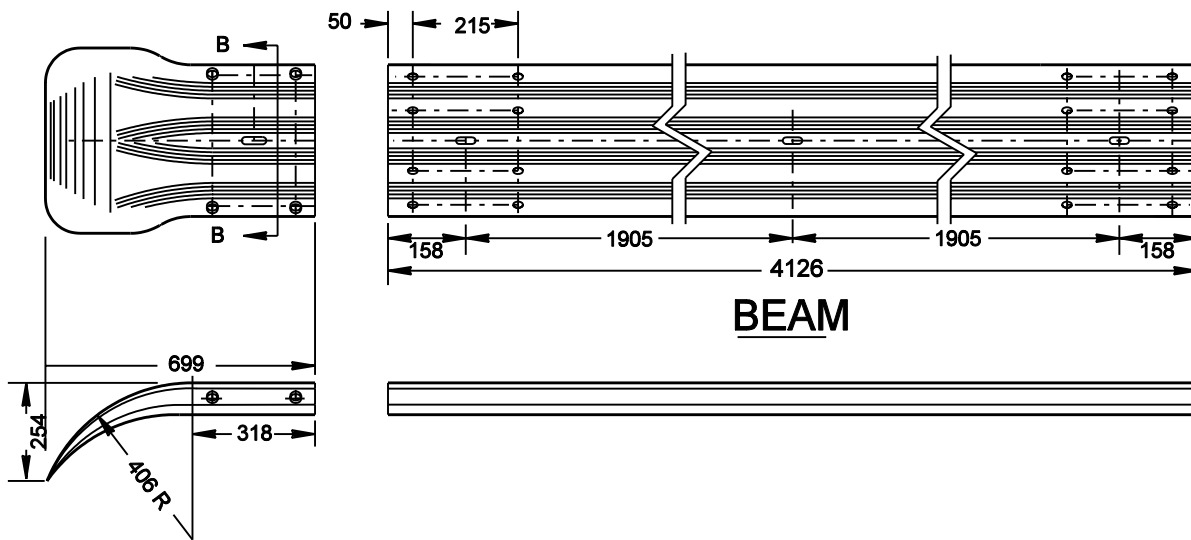
All dimensions are in millimetres unless otherwise indicated.

⚠			
⚠	Bolt and hole dimension, rectangular washer removed.	P.M.	9/14/05
No.	REVISIONS	BY	DATE

Approved: Original signed by Allan Kwan Executive Director, Technical Standards Branch Date: JUNE 24, 2005 JULY 12, 2005			
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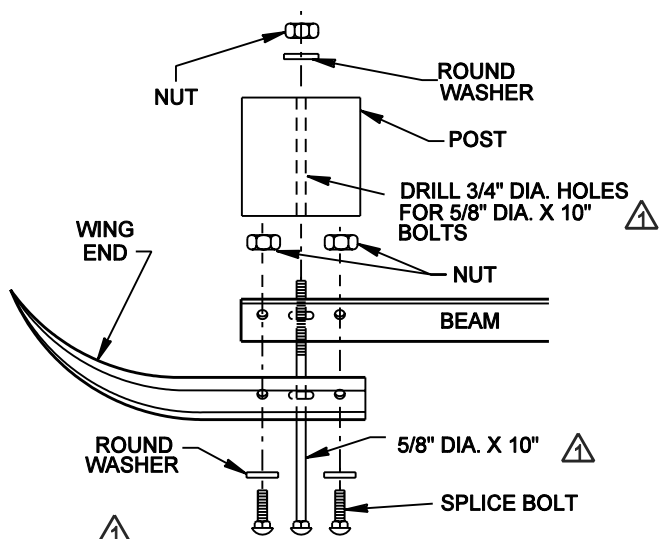
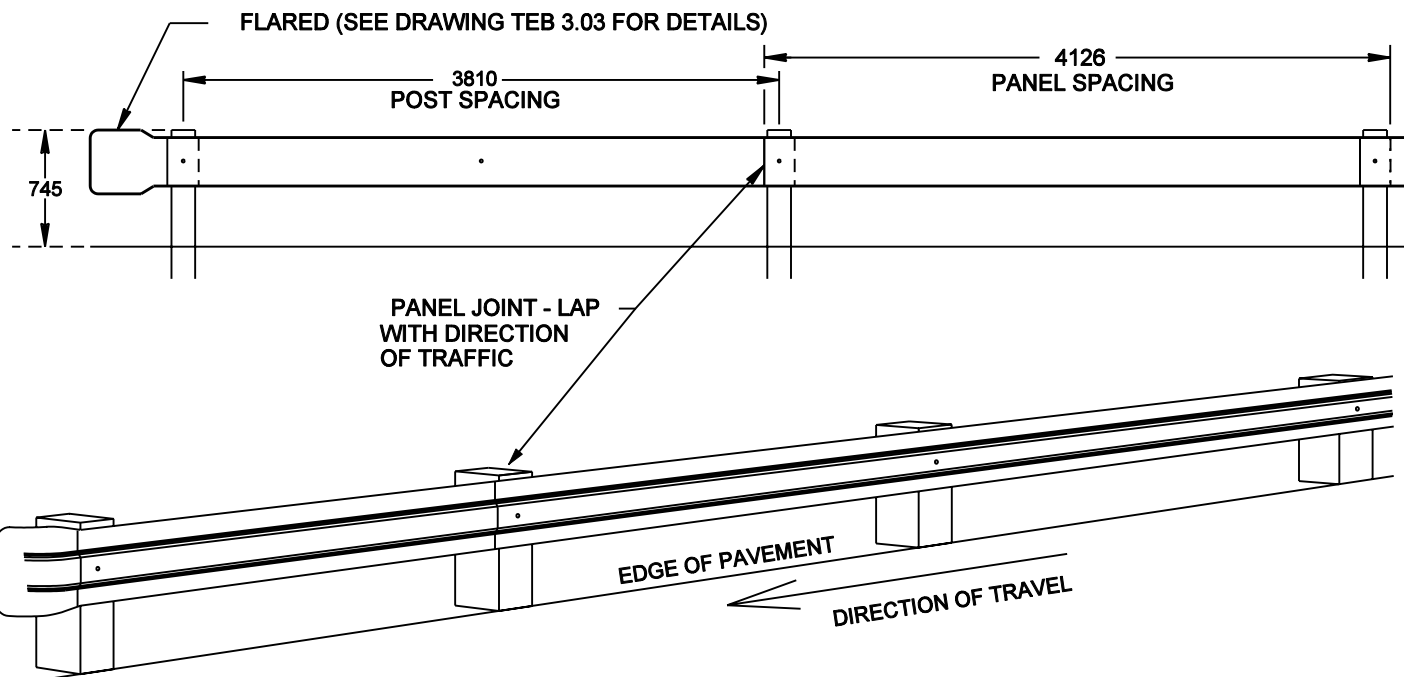
## STRONG POST W-BEAM BLOCKED OUT TERMINAL END TREATMENT WING END

Prepared By: M.T	Checked By: B.K	Scale: N.T.S.	Dwg No.: TEB 3.11a
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**BEAM**

**END SECTION**



All dimensions are in millimetres unless otherwise indicated.

⚠			
⚠	Bolt and hole dimension, rectangular washer removed.	P.M.	9/14/05
No.	REVISIONS	BY	DATE

Approved:  
Original signed by  
Allan Kwan  
.....  
Executive Director,  
Technical Standards Branch  
Date: JUNE 24, 2005  
JULY 12, 2005

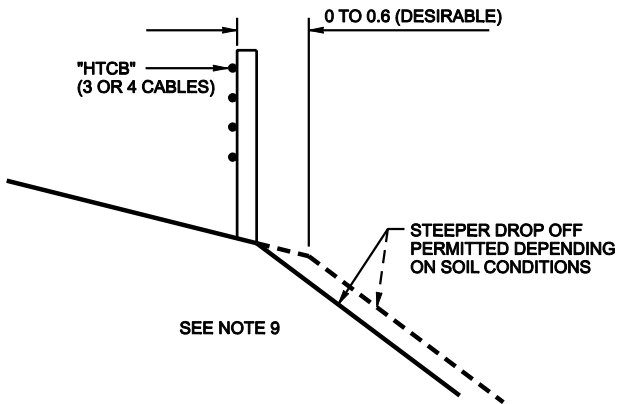
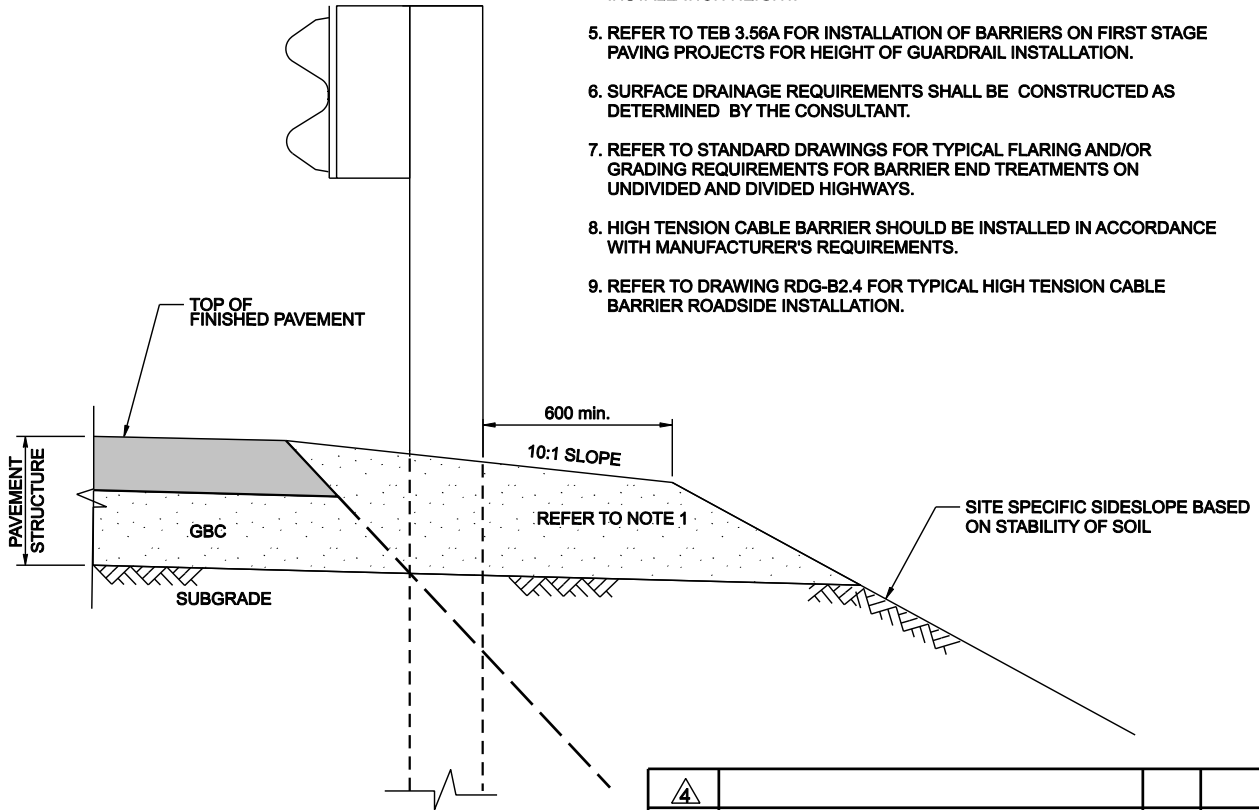


**WEAK POST W-BEAM  
TERMINAL END TREATMENT  
WING END**

Prepared By: M.T	Checked By: B.K	Scale: N.T.S.	Dwg No.: TEB 3.11b
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NOTES:

1. 10:1 SLOPE SHALL BE CONSTRUCTED IN THE PAVEMENT SIDESLOPE ZONE WITH ACP, AND/OR GRANULAR FILL AS DETERMINED BY THE CONSULTANT. GRANULAR FILL DEPTHS TO MATCH PAVEMENT STRUCTURE TO ENSURE POSITIVE SUB-SURFACE DRAINAGE
2. TYPICAL MATERIAL TREATMENT IS ALSO APPLIED AT BARRIER, OFFSET FLARE AND /OR END TREATMENT INSTALLATION. REFER TO APPROPRIATE TYPICAL BARRIER INSTALLATION DRAWING FOR OFFSET DIMENSION OF GUARDRAIL FACE FROM EDGE OF PAVEMENT.
3. DENUDED SIDESLOPES SHOULD BE SCARIFIED OR BENCHED TO OBTAIN BONDING AS DETERMINED BY THE CONSULTANT
4. REFER TO A.T. ROADWAY DESIGN GUIDE FOR DESIGN TOLERANCE OF INSTALLATION HEIGHT.
5. REFER TO TEB 3.56A FOR INSTALLATION OF BARRIERS ON FIRST STAGE PAVING PROJECTS FOR HEIGHT OF GUARDRAIL INSTALLATION.
6. SURFACE DRAINAGE REQUIREMENTS SHALL BE CONSTRUCTED AS DETERMINED BY THE CONSULTANT.
7. REFER TO STANDARD DRAWINGS FOR TYPICAL FLARING AND/OR GRADING REQUIREMENTS FOR BARRIER END TREATMENTS ON UNDIVIDED AND DIVIDED HIGHWAYS.
8. HIGH TENSION CABLE BARRIER SHOULD BE INSTALLED IN ACCORDANCE WITH MANUFACTURER'S REQUIREMENTS.
9. REFER TO DRAWING RDG-B2.4 FOR TYPICAL HIGH TENSION CABLE BARRIER ROADSIDE INSTALLATION.

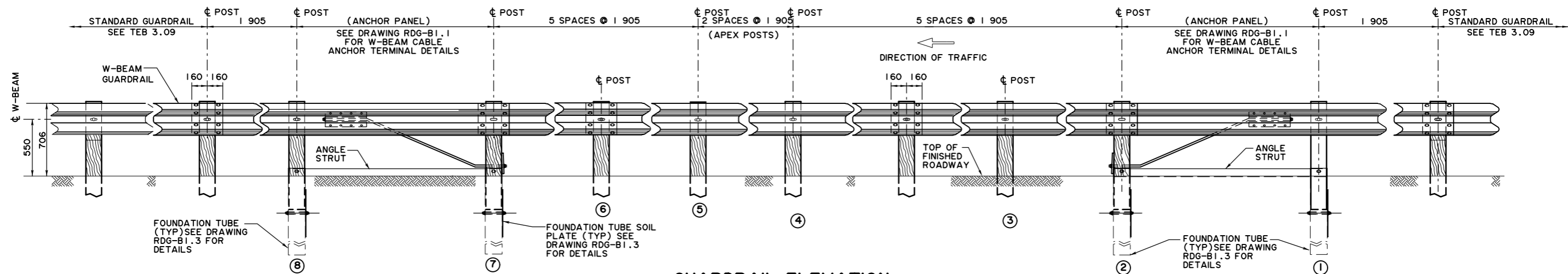


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No.	REVISIONS	BY	DATE

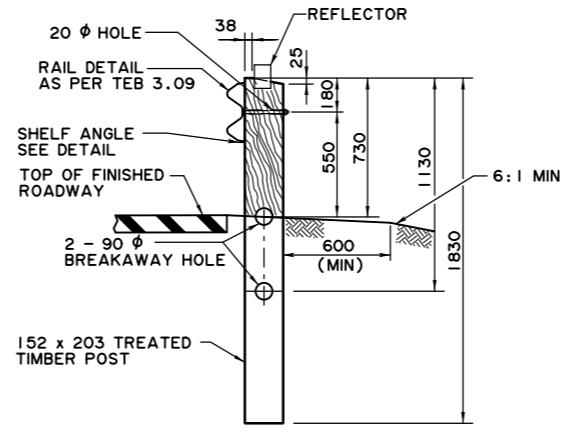
Approved:	<b>Government of Alberta</b> Transportation
Moh Lai Executive Director, Technical Standards Branch	
Date: 5 April, 2012	

**TYPICAL MATERIAL WIDENING FOR BARRIER INSTALLATIONS**

Prepared By: GEC	Checked By: PM	Scale: NTS	Dwg No.: RDG-B1.12
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**GUARDRAIL ELEVATION**  
1:20

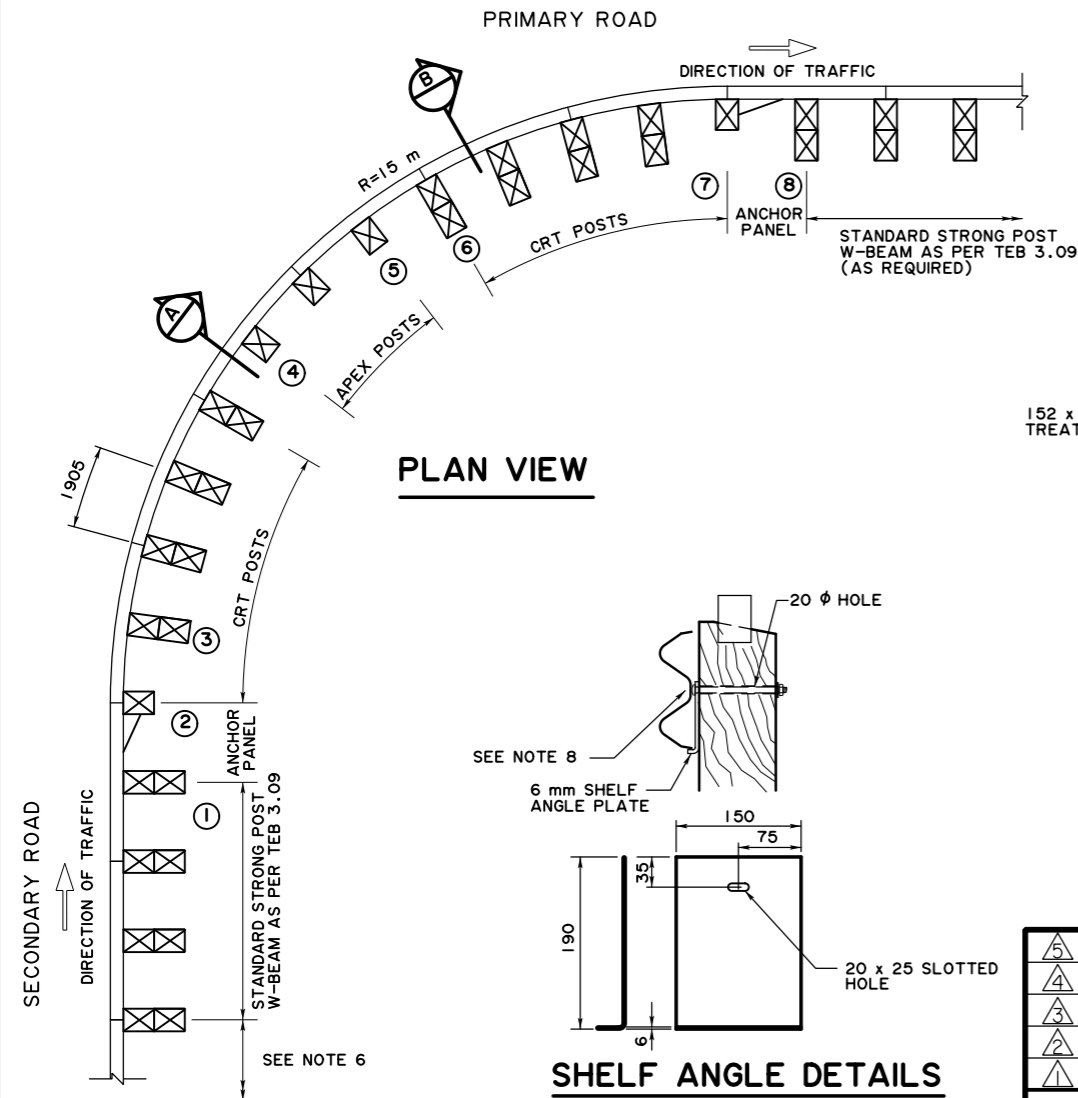


**A SECTION**

EDGE OF ROADWAY RADIUS (m)	RADIUS OF CURVED GUARDRAIL (m) - BASED ON 3.81m RAILS	NUMBER OF RAILS FOR CURVED SECTION (3.81m)	TOTAL NUMBER OF POSTS FOR CURVED SECTION	NUMBER OF APEX POSTS (POST WITH NO BLOCKOUT)
5	4.85	2	5	3
10	9.70	4	9	3
15	14.55	6	13	3
20	19.40	8	17	3
25	24.25	10	21	3

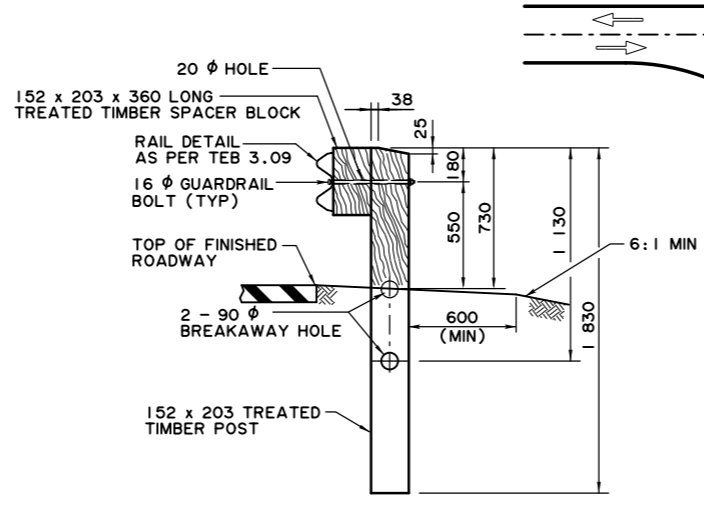
- NOTES:**
- DESIGN IS BASED ON CONCEPTS DEVELOPED BY WASHINGTON STATE DOT, FHWA, AND NZ TRANSPORT AGENCY. THIS SYSTEM HAS NOT BEEN CRASH TESTED TO NCHRP 350 OR MASH 2009 TL-3; THEREFORE, IT SHOULD ONLY BE USED WHERE OTHER SOLUTIONS ARE NOT PRACTICAL. DESIGNERS SHALL FIRST INVESTIGATE OTHER OPTIONS.
  - THIS DRAWING IS BASED ON A 15 m EDGE OF ROADWAY RADIUS, REFER TO TABLE FOR ADJUSTMENTS BASED ON OTHER RADII.
  - ALL RADII TO PROVIDE A MINIMUM CLEAR AREA OF 22 x 6 m FREE OF HAZARDS BEHIND THE GUARDRAIL.
  - CLEAR AREA BEHIND GUARDRAIL SHALL BE 6H:1V OR FLATTER AND MAINTAINED FREE OF NON-CRASHWORTHY OBSTRUCTIONS.
  - RAILS SHALL BE SHOP BENT TO THE SPECIFIED RADIUS FOR ALL CURVED GUARDRAIL ELEMENTS.
  - APPROACH GRADING SHALL BE 10H:1V OR FLATTER AND MAINTAINED FREE OF OBSTRUCTIONS.
  - A CRASHWORTHY END TREATMENT IN ACCORDANCE WITH NCHRP 350 OR MASH 2009 SHALL BE PROVIDED AT THE END OF THE GUARDRAIL ON THE MINOR ROAD AND MAY BE REQUIRED ON THE MAJOR ROAD.
  - CONTROLLED RELEASE TERMINAL (CRT) POST SHALL BE WOODEN POSTS.
  - NO BLOCKOUTS ON APEX POSTS. RAIL ON SHELF ANGLE AT CURVED APEX ONLY. NO BOLT THROUGH RAIL.
  - LAP ALL GUARDRAIL SECTIONS IN THE DIRECTION OF THE TRAFFIC FLOW.
  - REFLECTORS TO BE PLACED ON TOP OF APEX POSTS AND EVERY SIXTH POST UPSTREAM AND DOWNSTREAM FROM APEX.

ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE

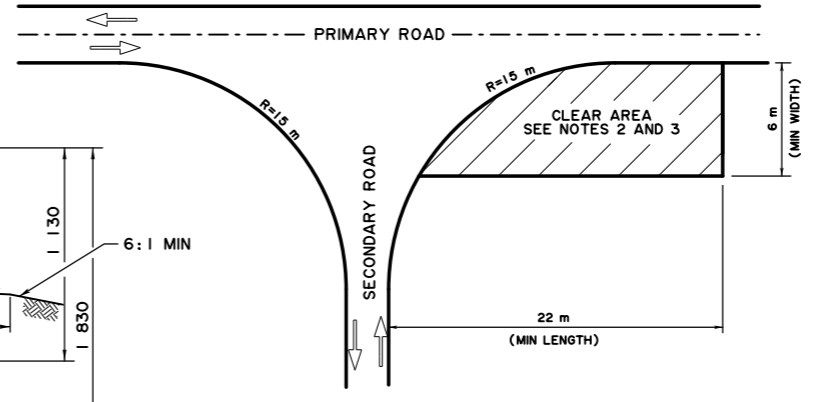


**PLAN VIEW**

**SHELF ANGLE DETAILS**



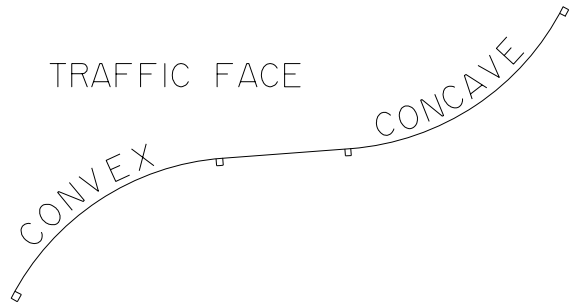
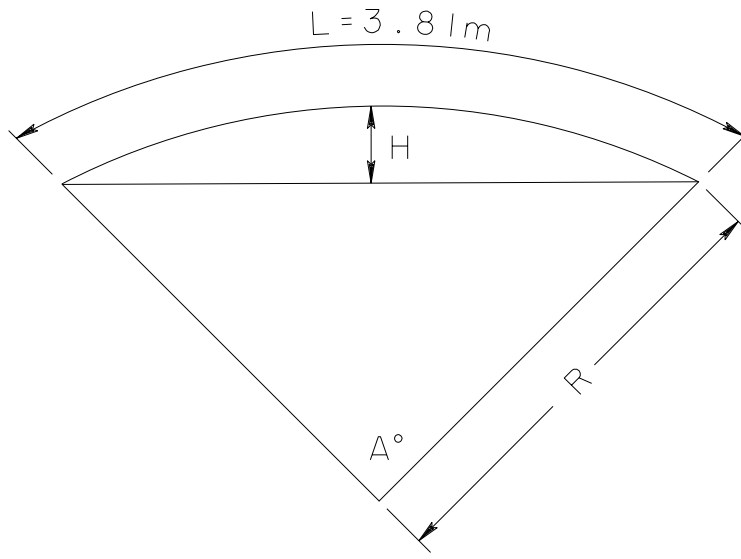
**B SECTION**



**PLAN AREA DETAIL**

REV	DATE	REVISION	BY
5			
4			
3			
2	2018-02-01	TITLE CHANGED, NOTES RENUMBERED	HT

		<b>90 DEGREE SHORT RADIUS GUARDRAIL</b>		DRAWING NO. RDG-B1.13	
PREPARED BY GEC	CHECKED BY BK	SCALE NTS	DATE 2018-01-08	APPENDIX B1 H-APP-B1-34	



Typical Radii R(m)	Approximate	
	A(deg.)	H(mm)
1.5 (min. convex)	144	1055
3.0 (min. concave)	73	585
5.0	43	360
7.5	29	240
10.0	21	180
12.5	17	145
15.0	14	120
18.0	12	100
21.0	10	85
25.0	8	70
30.0	7	60
35.0	6	50
40.0	5	45
45.0	4.5	40

 Alberta TRANSPORTATION AND UTILITIES Traffic Operations Branch	DWG. No.	TEB 3.54
	Date	NOV. 21/92
	Revision	TABLE 2018-01-15
	Revision	

W - BEAM GUARDRAIL  
SPECIFICATIONS FOR  
CURVED RAILS

A.D. Cherwenuk, Director

**APPENDIX B2**

**HIGH TENSION CABLE SYSTEM**



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# Appendix B2

## High Tension Cable Barrier

### TABLE OF CONTENTS

Dwg. No.	Drawing Title	Page Number
RDG-B2.1	Typical HTCB Median Installation, Slopes 6H:1V or Flatter	H-APP-B2-3
RDG-B2.2	Typical HTCB Median Installation, 6H:1V > Slopes $\geq$ 4H:1V	H-APP-B2-4
RDG-B2.3	Typical HTCB Median Installation, Slopes Steeper Than 4H:1V	H-APP-B2-5
RDG-B2.4	Typical HTCB Roadside Installation	H-APP-B2-6

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## High Tension Cable Barrier System

### Product Development and Acceptance Testing

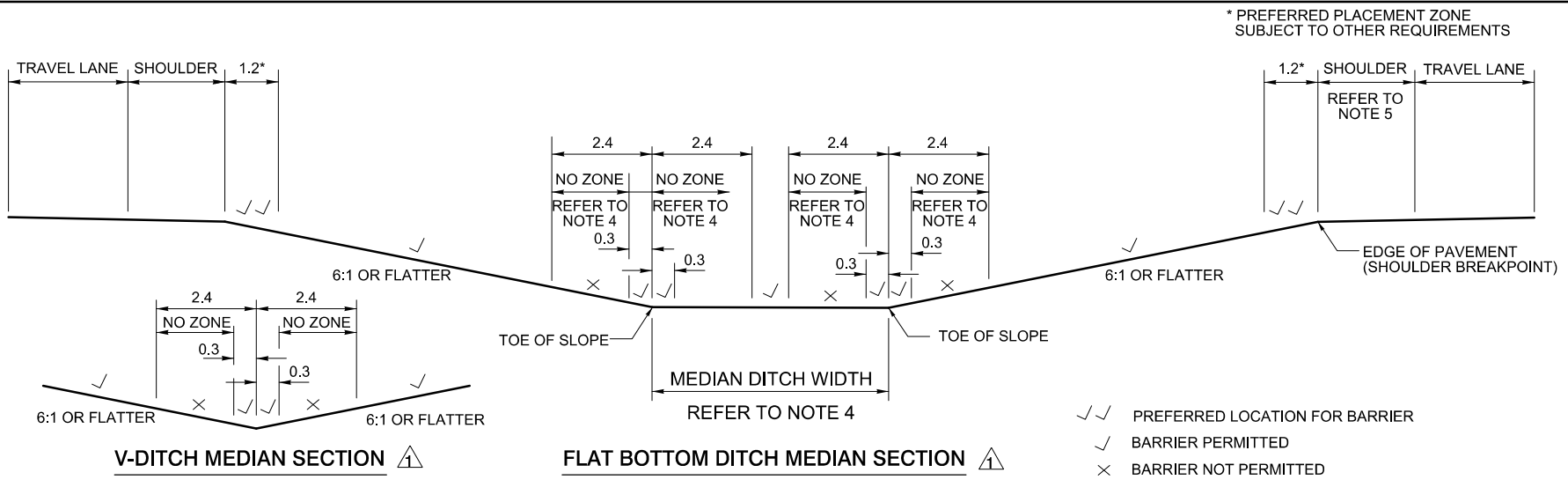
The Alberta Transportation Products List of proven, trial and potential products for HTCB (including vendor information) is available at the link indicated below.

<http://www.transportation.alberta.ca/689.htm>

As of September 8, 2016 there are five proprietary HTCB systems in North America that have passed NCHRP 350 and/or MASH 2009. They are listed below in alphabetical order. Not all of the tested systems are on the Alberta Transportation Products List.

- Brifen Canada  
15521 Marine Drive  
White Rock, BC V4B 1C9, Canada  
<http://www.brifen.ca>
- Gibraltar  
4303 Innovation Loop  
Marble Falls, TX 78654, USA  
<http://gibraltarus.com>
- Nucor Steel Marion, Inc.  
912 Cheney Avenue  
Marion, Ohio 43302, USA  
<http://www.nucorhighway.com>  
(Note: Not on Alberta Transportation's Products List dated September 8, 2016)
- SAFENCE (Gregory Industries, Inc.)  
4100 13th Street, SW  
Canton, Ohio 44710, USA  
<http://www.gregorycorp.com>
- Trinity Highway Safety Products  
2525 North Stemmons Freeway  
Dallas, Texas 75207, USA  
<http://www.highwayguardrail.com>

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NOTES <sup>1</sup>

- HIGH TENSION CABLE BARRIERS (HTCB) ARE PROPRIETARY PRODUCTS AND THEREFORE MUST BE INSTALLED AND MAINTAINED IN ACCORDANCE WITH THE MANUFACTURER'S AND/OR VENDOR'S SPECIFICATIONS. CABLE BARRIER PRODUCTS VARY SUBSTANTIALLY IN DETAILS, SPECIFICATION AND METHOD OF INSTALLATION, ETC. DESIGNERS SHOULD REVIEW THE FHWA (UNITED STATES FEDERAL HIGHWAY ADMINISTRATION) ELIGIBILITY LETTERS IN CONJUNCTION WITH THE MANUFACTURER AND/OR VENDOR'S PRODUCT DETAILS AND SPECIFICATIONS.
- DESIGNERS SHALL REVIEW THE FHWA ELIGIBILITY LETTERS AND THE TEST DOCUMENTATION UPON WHICH THE LETTERS ARE BASED IN DETAIL. THIS INCLUDES THE SUMMARY RESULTS (E.G. TEST DEFLECTION), TEST SITE CONDITIONS (E.G. POST SPACING, SOIL DATA, ETC.), PRODUCT DETAILS, PROVISIONS, ETC., UNDER WHICH THE PRODUCT WAS TESTED AND ACCEPTED.
- FHWA ELIGIBILITY LETTERS ARE NORMALLY BASED ON THE HTCB SYSTEM BEING TESTED ON TANGENT IN A CONTROLLED ENVIRONMENT. THE SLOPE PLACEMENT, POST SPACING AND SPECIFIED MAXIMUM DEFLECTION, ETC., MAY NEED TO BE ADJUSTED DUE TO SITE-SPECIFIC CONDITIONS.
- ACCORDING TO NCHRP REPORT 711, THE HTCB MAY BE PLACED AS FOLLOWS:
  - ON THE MEDIAN SIDESLOPE, BUT NOT IN THE AREA BETWEEN 0.3 AND 2.4 METRES FROM THE TOE OF THE SLOPE
  - IN THE MEDIAN DITCH WITHIN 0.3 OF THE TOE OF SLOPE, IF THE MEDIAN DITCH IS 2.4 METRES OR WIDER
  - IF THE MEDIAN DITCH IS LESS THAN 2.4 METRES WIDE, THE HTCB MAY NOT BE PLACED IN ANY PORTION OF THE DITCH BOTTOM
- HTCB LONGITUDINAL RUNS ARE NORMALLY INSTALLED TO PROTECT BOTH DIRECTIONS OF TRAFFIC. HTCB PLACEMENT AND/OR DESIGN MUST PREVENT INTRUSION OF OPPOSING VEHICLES INTO THE TRAVEL LANE CAUSED BY THE IMPACT TO THE CABLE SYSTEM ON THE BACK-SIDE AFTER CROSSING THE MEDIAN.
- NO ZONE AREA IN THE MEDIAN WHERE HTCB TYPICALLY MAY NOT BE INSTALLED.
- POSTS CAN BE PLACED IN SOCKETS IN CONCRETE FOUNDATIONS OR SOCKETS DRIVEN INTO THE GROUND DEPENDING ON THE SOIL CONDITION, MANUFACTURER'S SPECIFICATION AND FHWA APPROVALS. POSTS DRIVEN DIRECTLY INTO THE GROUND ARE NOT PERMITTED.
- THE DITCH MAY BE SUBJECT TO WEAK SOILS (OFTEN UNCOMPACTED), PERIODIC FLOODING AND/OR WET SOIL CONDITIONS. THE SOIL STRENGTH MUST BE TAKEN INTO ACCOUNT WHEN DESIGNING THE POST FOUNDATIONS AND END ANCHOR FOUNDATIONS.
- ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE NOTED.

<sup>4</sup>			
<sup>3</sup>			
<sup>2</sup>			
<sup>1</sup>	NOTES 1 - 6 AND CROSS SECTIONS	HC	28 OCT 16
No.	REVISIONS	BY	DATE

Approved:

Steve Otto

For Executive Director,  
Technical Standards Branch

Date: 17 February, 2012

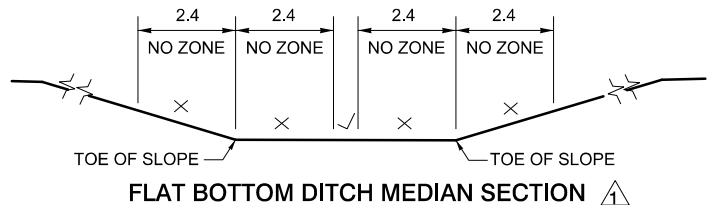
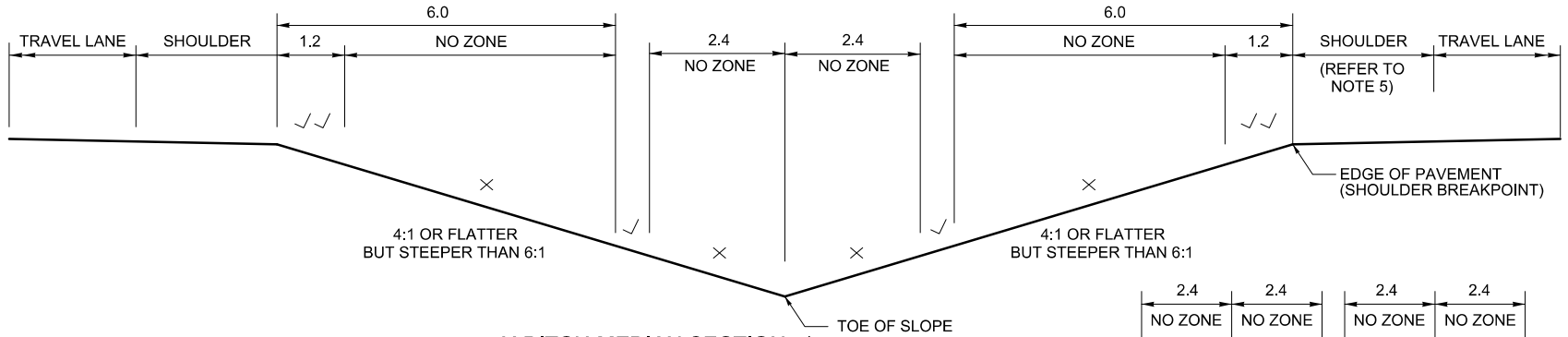
**Government of Alberta** ■  
Transportation

**TYPICAL HIGH TENSION CABLE BARRIER MEDIAN INSTALLATION**

**SLOPES 6(H):1(V) OR FLATTER**

Prepared By: GEC.	Checked By: PM	Scale: N.T.S.	Dwg No.: RDG-B2.1
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HTCB MAY BE INSTALLED WITHIN 1.2m OF THE EDGE OF THE SHOULDER BREAKPOINT OR GREATER THAN 6.0 METRES FROM THE SHOULDER BREAKPOINT BUT CANNOT BE INSTALLED IN THE NO ZONE AREAS. SEE NOTES 4 AND 5.



NOTES

1. HIGH TENSION CABLE BARRIERS (HTCB) ARE PROPRIETARY PRODUCTS AND THEREFORE MUST BE INSTALLED AND MAINTAINED IN ACCORDANCE WITH THE MANUFACTURER'S AND/OR VENDOR'S SPECIFICATIONS. CABLE BARRIER PRODUCTS VARY SUBSTANTIALLY IN DETAILS, SPECIFICATION AND METHOD OF INSTALLATION, ETC. DESIGNERS SHOULD REVIEW THE FHWA (UNITED STATES FEDERAL HIGHWAY ADMINISTRATION) ELIGIBILITY LETTERS IN CONJUNCTION WITH THE MANUFACTURER AND/OR VENDOR'S PRODUCT DETAILS AND SPECIFICATIONS.
2. DESIGNERS SHALL REVIEW THE FHWA ELIGIBILITY LETTERS AND THE TEST DOCUMENTATION UPON WHICH THE LETTERS ARE BASED IN DETAIL. THIS INCLUDES THE SUMMARY RESULTS (E.G. TEST DEFLECTION), TEST SITE CONDITIONS (E.G. POST SPACING, SOIL DATA, ETC.), PRODUCT DETAILS, PROVISIONS, ETC., UNDER WHICH THE PRODUCT WAS TESTED AND ACCEPTED.
3. FHWA ELIGIBILITY LETTERS ARE NORMALLY BASED ON THE HTCB SYSTEM BEING TESTED ON TANGENT IN A CONTROLLED ENVIRONMENT. THE SLOPE PLACEMENT, POST SPACING AND SPECIFIED MAXIMUM DEFLECTION, ETC., MAY NEED TO BE ADJUSTED DUE TO SITE-SPECIFIC CONDITIONS.
4. ACCORDING TO NCHRP REPORT 711, THE HTCB MAY BE PLACED AS FOLLOWS:
  - ON THE SIDESLOPE WITHIN 1.2 METRES OF THE SHOULDER BREAKPOINT (EDGE OF PAVEMENT)
  - DOWN THE SIDESLOPE AT AN OFFSET GREATER THAN 6.0 METRES FROM THE SHOULDER BREAKPOINT AND GREATER THAN 2.4 METRES FROM THE TOE OF THE SIDESLOPE
  - IN THE MEDIAN DITCH BOTTOM AT AN OFFSET GREATER THAN 2.4 METRES FROM THE TOE OF THE SIDESLOPE
  - THE OPTION OF TWO SEPARATE LONGITUDINAL RUNS OF HTCB WITHIN 1.2 METRES OF THE EDGE OF BOTH SHOULDER BREAKPOINTS MAY ALSO BE CONSIDERED WHERE SECTIONS OF THE ROADWAY HAVE SLOPES THAT ARE SHARPER THAN 4:1, THE DITCH IS VERY NARROW (NOT ALLOWING THE SPECIFIED OFFSETS AND DEFLECTIONS) OR THERE ARE FIXED HAZARDS IN THE MEDIAN.
5. HTCB LONGITUDINAL RUNS ARE NORMALLY INSTALLED TO PROTECT BOTH DIRECTIONS OF TRAFFIC. HTCB PLACEMENT AND/OR DESIGN MUST PREVENT INTRUSION OF OPPOSING VEHICLES INTO THE TRAVEL LANE CAUSED BY THE IMPACT TO THE CABLE SYSTEM ON THE BACK-SIDE AFTER CROSSING THE MEDIAN.
6. NO ZONE AREA IN THE MEDIAN WHERE HTCB TYPICALLY MAY NOT BE INSTALLED.
7. POSTS CAN BE PLACED IN SOCKETS IN CONCRETE FOUNDATIONS OR SOCKETS DRIVEN INTO THE GROUND DEPENDING ON THE SOIL CONDITION, MANUFACTURER'S SPECIFICATION AND FHWA APPROVALS. POSTS DRIVEN DIRECTLY INTO THE GROUND ARE NOT PERMITTED.
8. THE DITCH MAY BE SUBJECT TO WEAK SOILS (OFTEN UNCOMPACTED), PERIODIC FLOODING AND/OR WET SOIL CONDITIONS. THE SOIL STRENGTH MUST BE TAKEN INTO ACCOUNT WHEN DESIGNING THE POST FOUNDATIONS AND END ANCHOR FOUNDATIONS.
9. ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE NOTED.

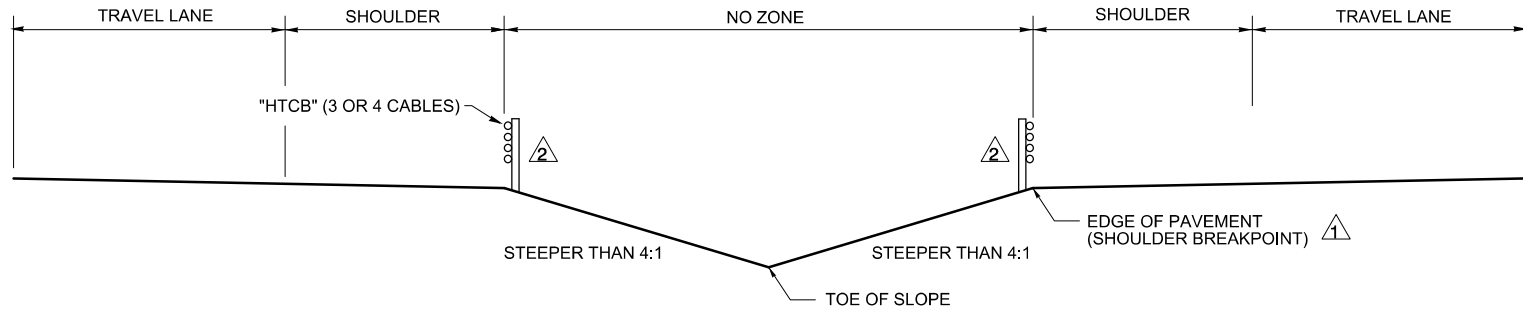
	NOTES 1 - 6 AND CROSS SECTIONS	HC	28 OCT 16
No.	REVISIONS	BY	DATE

Approved:  Steve Otto For Executive Director, Technical Standards Branch	<b>Government of Alberta</b> Transportation
Date: 17 February, 2012	

## TYPICAL HIGH TENSION CABLE BARRIER MEDIAN INSTALLATION

### 6(H):1(V) > SLOPES ≥ 4(H):1(V)

Prepared By: GEC.	Checked By: PM	Scale: N.T.S.	Dwg No.: RDG-B2.2
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NOTES <sup>1</sup>

1. HIGH TENSION CABLE BARRIERS (HTCB) ARE PROPRIETARY PRODUCTS AND THEREFORE MUST BE INSTALLED AND MAINTAINED IN ACCORDANCE WITH THE MANUFACTURER'S AND/OR VENDOR'S SPECIFICATIONS. CABLE BARRIER PRODUCTS VARY SUBSTANTIALLY IN DETAILS, SPECIFICATION AND METHOD OF INSTALLATION, ETC. DESIGNERS SHOULD REVIEW THE FHWA (UNITED STATES FEDERAL HIGHWAY ADMINISTRATION) ELIGIBILITY LETTERS IN CONJUNCTION WITH THE MANUFACTURER AND/OR VENDOR'S PRODUCT DETAILS AND SPECIFICATIONS.
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4. HTCB TYPICALLY SHOULD BE PLACED UNDER THE FOLLOWING CONDITIONS:
  - AT THE SHOULDER BREAKPOINT (0.0 m LATERAL OFFSET FROM THE EDGE OF PAVEMENT).
  - THE OPTION OF TWO SEPARATE LONGITUDINAL RUNS OF HTCB SHOULD ALSO BE CONSIDERED WHERE THE MEDIAN WIDTH IS NARROW, DESIRABLE DEFLECTION SPACE IS GREATER THAN THE SHOULDER WIDTH, AND/OR GENERAL RE-GRADING IS NOT AN OPTION, ETC.
5. NO ZONE AREA IN THE MEDIAN WHERE HTCB TYPICALLY MAY NOT BE INSTALLED.
6. POSTS CAN BE PLACED IN SOCKETS IN CONCRETE FOUNDATIONS OR SOCKETS DRIVEN INTO THE GROUND DEPENDING ON THE SOIL CONDITION, MANUFACTURER'S SPECIFICATION AND FHWA APPROVALS. POSTS DRIVEN DIRECTLY INTO THE GROUND ARE NOT PERMITTED.
7. THE DITCH MAY BE SUBJECT TO WEAK SOILS (OFTEN UNCOMPACTED), PERIODIC FLOODING AND/OR WET SOIL CONDITIONS. THE SOIL STRENGTH MUST BE TAKEN INTO ACCOUNT WHEN DESIGNING THE POST FOUNDATIONS AND END ANCHOR FOUNDATIONS.
8. ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE NOTED.

<sup>4</sup>			
<sup>3</sup>			
<sup>2</sup>	CABLES ON MEDIAN SIDE REMOVED	BK	24 AUG 17
<sup>1</sup>	NOTES 1 - 5 AND CROSS SECTION	HC	28 OCT 16
No.	REVISIONS	BY	DATE



Approved:  Steve Otto For Executive Director, Technical Standards Branch	<b>Government of Alberta</b> ■ Transportation
Date: 17 February, 2012	

## TYPICAL HIGH TENSION CABLE BARRIER MEDIAN INSTALLATION

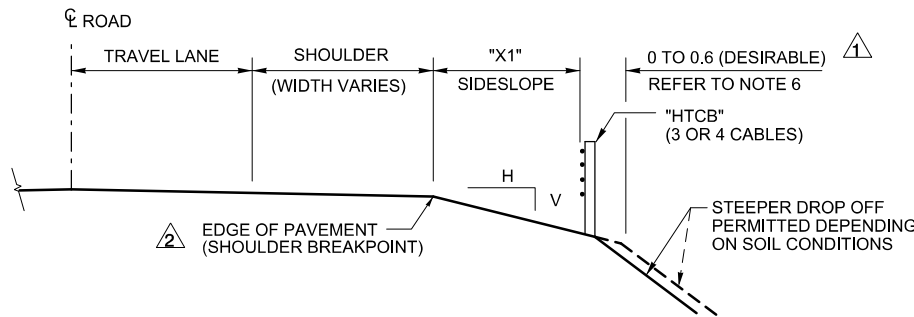
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



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


NOTES  

1. HIGH TENSION CABLE BARRIERS (HTCB) ARE PROPRIETARY PRODUCTS AND THEREFORE MUST BE INSTALLED AND MAINTAINED IN ACCORDANCE WITH THE MANUFACTURER'S AND/OR VENDOR'S SPECIFICATIONS. CABLE BARRIER PRODUCTS VARY SUBSTANTIALLY IN DETAILS, SPECIFICATION AND METHOD OF INSTALLATION, ETC. DESIGNERS SHOULD REVIEW THE FHWA (UNITED STATES FEDERAL HIGHWAY ADMINISTRATION) ELIGIBILITY LETTERS IN CONJUNCTION WITH THE MANUFACTURER AND/OR VENDOR'S PRODUCT DETAILS AND SPECIFICATIONS.
2. DESIGNERS SHALL REVIEW THE FHWA ELIGIBILITY LETTERS AND THE TEST DOCUMENTATION UPON WHICH THE LETTERS ARE BASED IN DETAIL. THIS INCLUDES THE SUMMARY RESULTS (E.G. TEST DEFLECTION), TEST SITE CONDITIONS (E.G. POST SPACING, SOIL DATA, ETC.), PRODUCT DETAILS PROVISIONS, ETC., UNDER WHICH THE PRODUCT WAS TESTED AND ACCEPTED.
3. FHWA ELIGIBILITY LETTERS ARE NORMALLY BASED ON THE HTCB SYSTEM BEING TESTED ON TANGENT IN A CONTROLLED ENVIRONMENT. THE SLOPE PLACEMENT, POST SPACING AND SPECIFIED MAXIMUM DEFLECTION, ETC., MAY NEED TO BE ADJUSTED DUE TO SITE-SPECIFIC CONDITIONS.
4. HTCB SYSTEMS CAN TYPICALLY BE PLACED DOWN THE SIDESLOPES IF THE SLOPES ARE 4H:1V OR FLATTER. THIS SLOPE REFERS TO THE SLOPE ON THE ROADSIDE BETWEEN THE SHOULDER BREAK POINT AND THE BARRIER SYSTEM (DIMENSION "X1"). THE AREA IMMEDIATELY BEHIND THE BARRIER SYSTEM MAY BE CONSTRUCTED AT STEEPER SLOPES DEPENDING ON THE STABILITY OF THE SOIL.
5. HTCB SYSTEMS MAY NOT BE PLACED DOWN THE SLOPE ON SIDESLOPES STEEPER THAN 4H:1V UNLESS THE SYSTEM HAS BEEN SUCCESSFULLY CRASH TESTED UNDER THESE CONDITIONS (WITH AN FHWA ELIGIBILITY LETTER). HTCB MAY BE PLACED AT THE EDGE OF PAVEMENT (EDGE OF SHOULDER ON UNPAVED ROADS) AS SHOWN IN THE TABLE.
6. A CONTINUATION OF THE FLATTER SLOPE BEHIND THE BARRIER, FOR A DISTANCE OF 0.0 METRES TO 0.6 METRES (DESIRABLE SHOULD BE CONSIDERED. THE DISTANCE BEHIND THE BARRIER SYSTEM MAY VARY DEPENDING ON THE EMBANKMENT SLOPE, POST FOUNDATION/DEPTH, SOIL/GEOTECHNICAL CONDITION, POST SPACING, EXPECTED IMPACT CONDITION, ETC.
7. ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE NOTED.



			
			
	NOTES 1 - 6, CROSS SECTION AND TABLE	HC	28 OCT 16
	NOTE 6 AND CROSS SECTION	PM	4 APR 12
No.	REVISIONS	BY	DATE

ROADSIDE SIDESLOPE*	MAXIMUM DIMENSION (X1) FROM THE OUTSIDE EDGE OF SHOULDER (m) *
6H:1V OR FLATTER	INFINITY
6H:1V > SIDESLOPES ≥ 4H: 1V	0.0 TO 1.2 OR GREATER THAN 6.0 
STEEPER THAN 4H:1V	0.0

\*SUBJECT TO GEOTECHNICAL/SOIL CONDITIONS

Approved:  
 Steve Otto  
 For Executive Director,  
 Technical Standards Branch

Date: 17 February, 2012

**Government of Alberta**  
 Transportation

**TYPICAL HIGH TENSION CABLE BARRIER ROADSIDE INSTALLATION**

Prepared By: GEC.	Checked By: PM	Scale: N.T.S.	Dwg No.: RDG-B2.4
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## **APPENDIX B3**

# **WEAK POST BOX BEAM GUARDRAIL**

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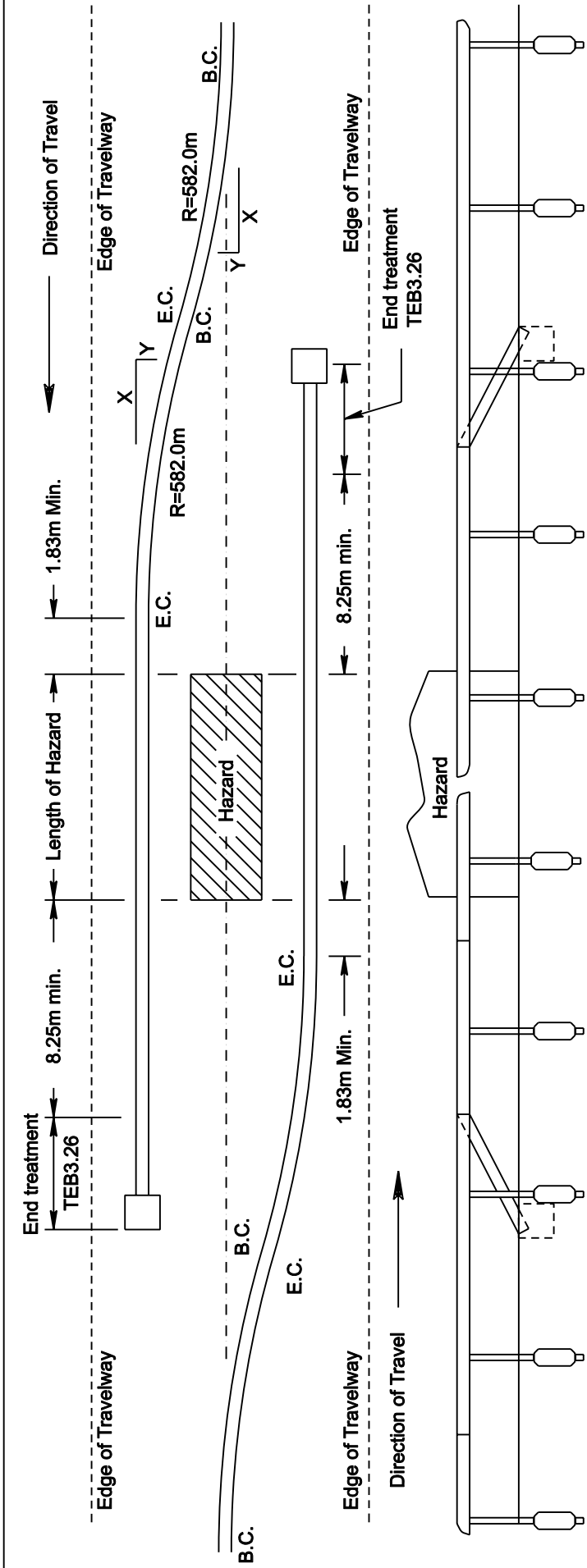
## Appendix B3

### Weak Post Beam Guardrail

#### TABLE OF CONTENTS

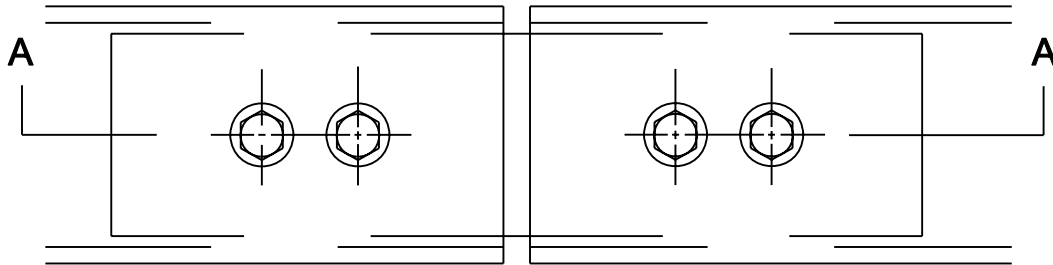
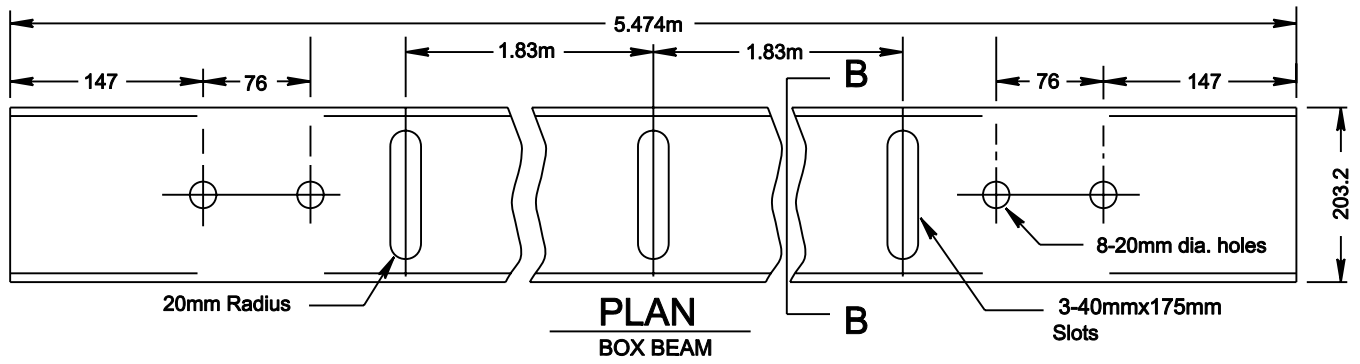
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TEB 3.22	Median Box Beam Barrier Installation Detail Treatment of Median Hazard	H-APP-B3-1
TEB 3.23	Median Box Beam Guardrail Rail and Splice Plate Detail	H-APP-B3-2
TEB 3.24	Median Box Beam Guardrail Post Detail	H-APP-B3-3
TEB 3.26	Median Box Beam Guardrail Installation Detail for End Treatment	H-APP-B3-4
TEB 3.27	Standard Box Beam Guardrail Detail of Splice Plate Used at End Treatment	H-APP-B3-5
TEB 3.27A	Median Box Beam Guardrail Detail of Splice Plate Used at End Treatment	H-APP-B3-6
TEB 3.28	Standard Box Beam Guardrail Retainer Assembly and Track Welding Details	H-APP-B3-7
TEB 3.28A	Median Box Beam Guardrail Retainer Assembly and Track Welding Details	H-APP-B3-8
TEB 3.30	Median Box Beam Guardrail Expansion Joint Splice Detail	H-APP-B3-9
TEB 3.33	Standard Box Beam Guardrail Post Detail	H-APP-B3-10
TEB 3.34	Standard Box Beam Guardrail Bracket Assembly Detail	H-APP-B3-11
TEB 3.35	Standard Box Beam Guardrail Rail and Splice Plate Detail	H-APP-B3-12
TEB 3.36	Standard Box Beam Guardrail Bent Splice Plate Detail	H-APP-B3-13
TEB 3.37	Standard Box Beam Guardrail Installation Detail for End Treatment	H-APP-B3-14
TEB 3.39	Standard Box Beam Guardrail Assembly for 0.915m and 1.83m Post Spacing	H-APP-B3-15
TEB 3.40	Standard Box Beam Guardrail Expansion Joint Splice Detail	H-APP-B3-16
TEB 3.46	Standard Box Beam Guardrail Bend Detail for Approach Road Radii	H-APP-B3-17

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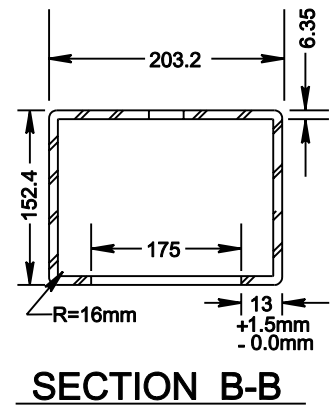
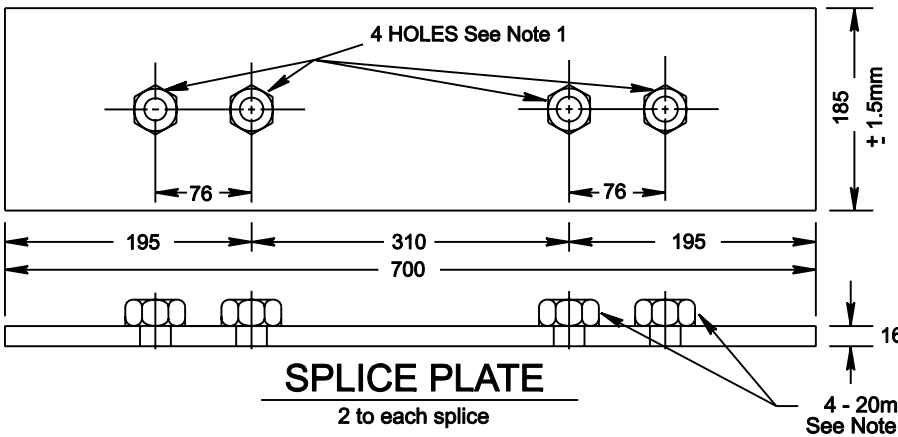
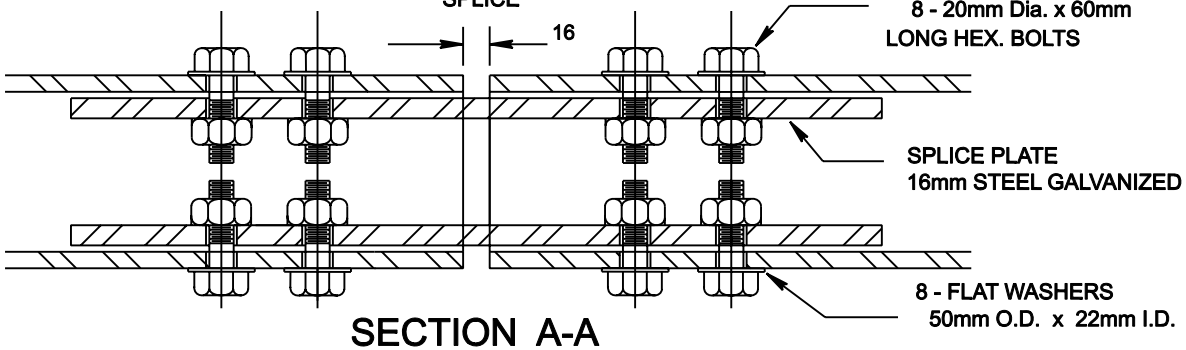
<b>Alberta</b> TRANSPORTATION AND UTILITIES Traffic Operations Branch	DWG. No.	TEB 3.22
	Date	DEC.15/92
	Revision	
	Revision	

**MEDIAN BOX BEAM BARRIER  
 INSTALLATION DETAIL  
 TREATMENT OF MEDIAN HAZARD**



PLAN

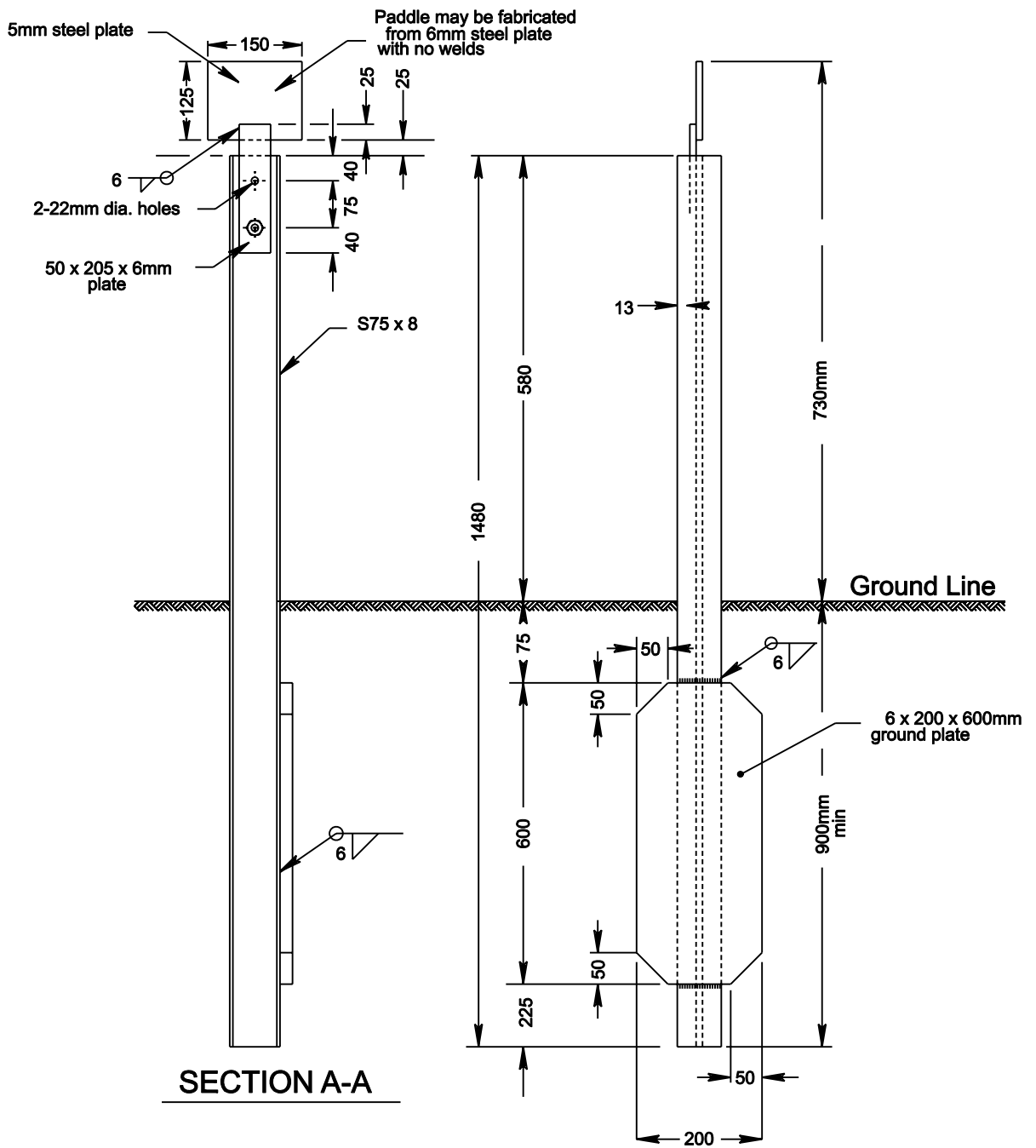
SPLICE



	DWG. No.	TEB 3.23
	Date	DEC. 21/92
	Revision	
	Revision	

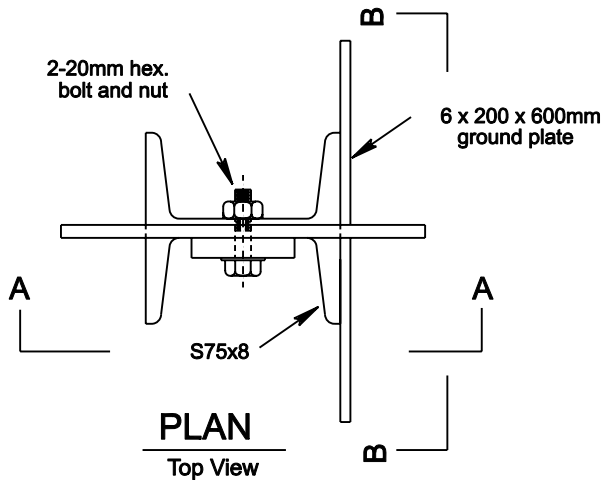
MEDIAN BOX BEAM GUARDRAIL RAIL AND SPLICE PLATE DETAIL

Note 1: For details of nut attachment see TEB 3.28A  
All dimensions are in millimetres unless otherwise indicated.



**SECTION A-A**

**SECTION B-B**



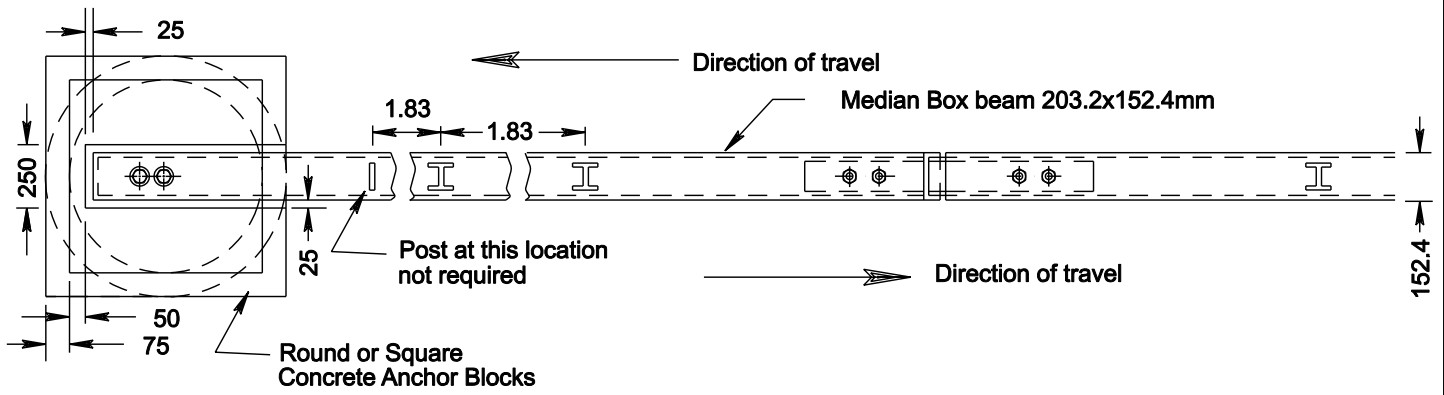
**PLAN**  
Top View

All dimensions are in millimetres unless otherwise indicated.

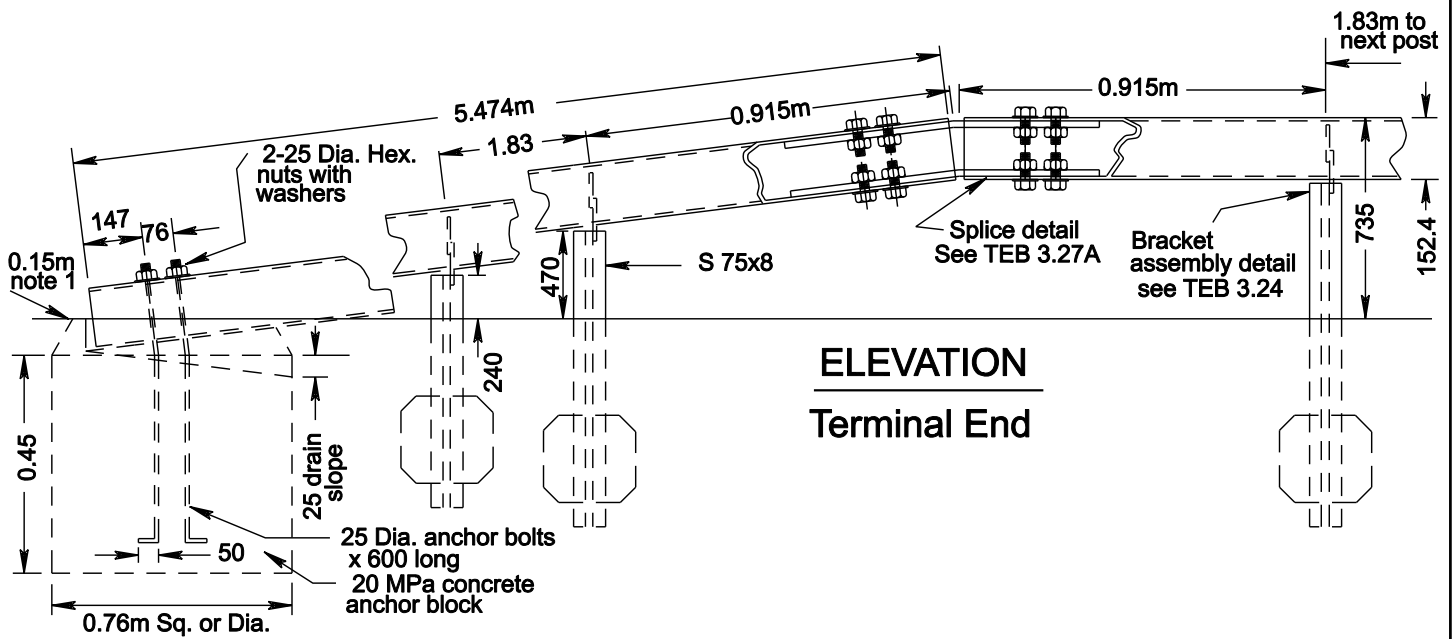
<p><b>Alberta</b> TRANSPORTATION AND UTILITIES Traffic Engineering Section Roadway Engineering Branch</p>	DWG. No.	TEB 3.24
	Date	DEC. 21/92
	Revision	June 95
	Revision	

**MEDIAN BOX BEAM GUARDRAIL  
POST DETAIL**





**PLAN**



**ELEVATION**  
**Terminal End**

<b>Alberta</b> TRANSPORTATION AND UTILITIES Traffic Operations Branch	DWG. No.	TEB 3.26
	Date	DEC. 13/92
	Revision	
	Revision	

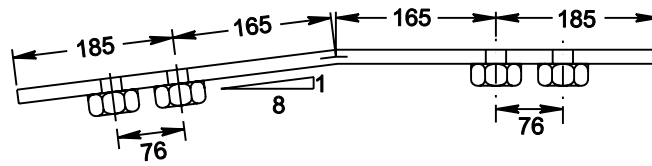
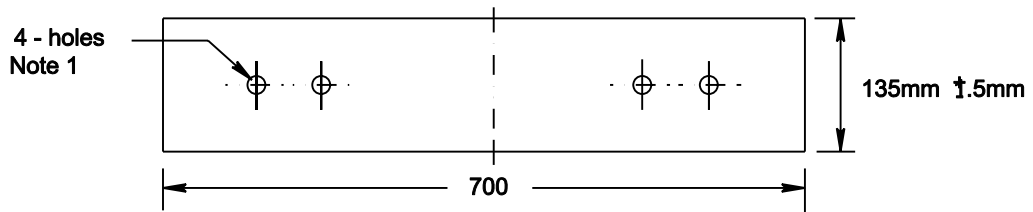
1 SEPT. 2011. TURN DOWN ENDS WILL NO LONGER BE ACCEPTABLE FOR NEW INSTALLATIONS OR REPLACEMENT OF EXISTING ENDS. CRASH WORTHY END TREATMENTS SHALL BE USED.

20 NOV. 2012. WHERE EXISTING TURN DOWN END TREATMENTS NEED TO BE RE-BUILT AND/OR REPLACED DUE TO BEING HIT BY AN ERRANT VEHICLE, THE REPLACEMENT WITH A CRASHWORTHY END TREATMENT IS SUBJECT TO FUNDING AVAILABILITY.

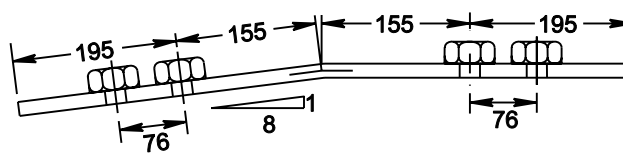
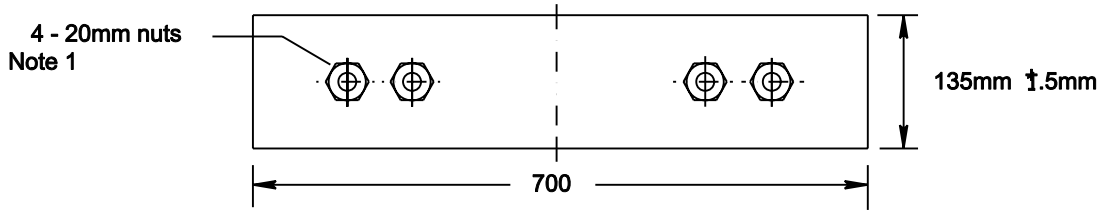
MEDIAN BOX BEAM GUARDRAIL  
INSTALLATION DETAIL FOR  
END TREATMENT

OBSOLETE

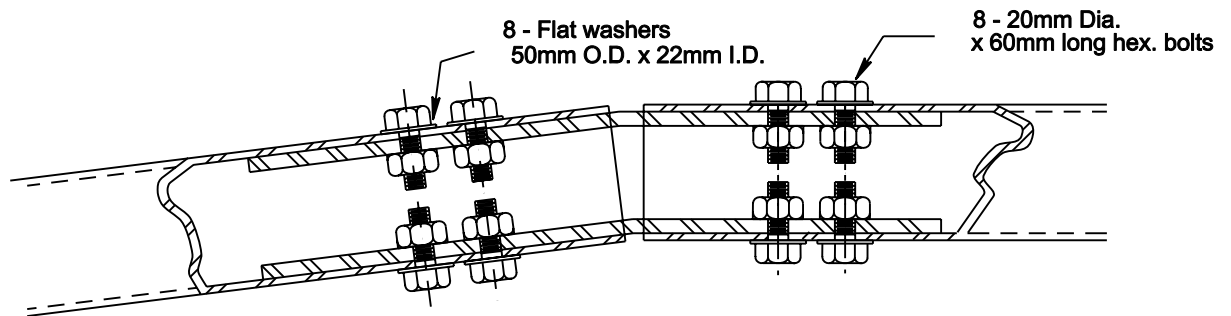
1 SEPT 2011  
20 NOVEMBER 2012



**UPPER SPLICE PLATE**  
16mm galvanized steel plate



**LOWER SPLICE PLATE**  
16mm galvanized steel plate



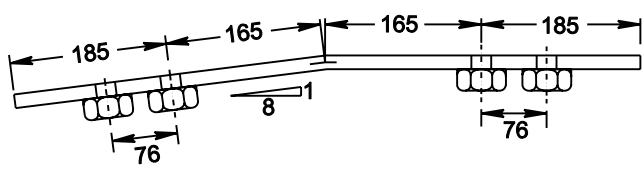
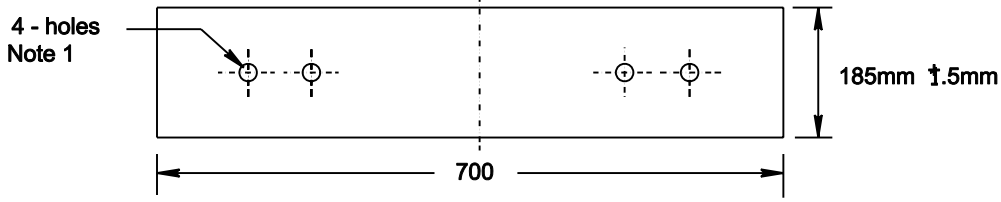
**ASSEMBLY DETAIL**

Note 1: For details of nut attachment see TEB 3.28.  
All dimensions are in millimetres unless otherwise shown.

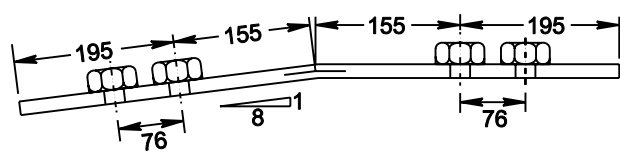
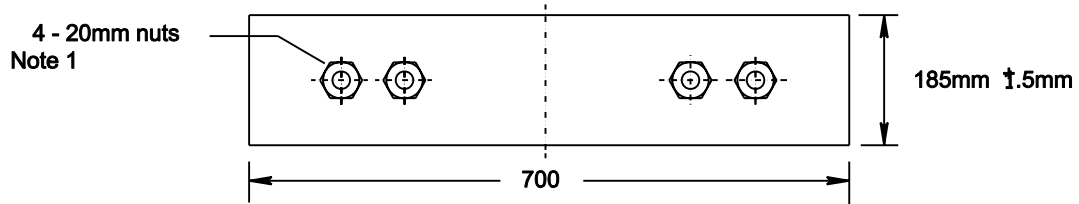
 <b>Alberta</b> TRANSPORTATION AND UTILITIES Traffic Operations Branch	DWG. No.	TEB 3.27
	Date	DEC 13/92
	Revision	_____
	Revision	_____

**STANDARD BOX BEAM GUARDRAIL  
DETAIL OF SPLICE PLATE  
USED AT END TREATMENT**

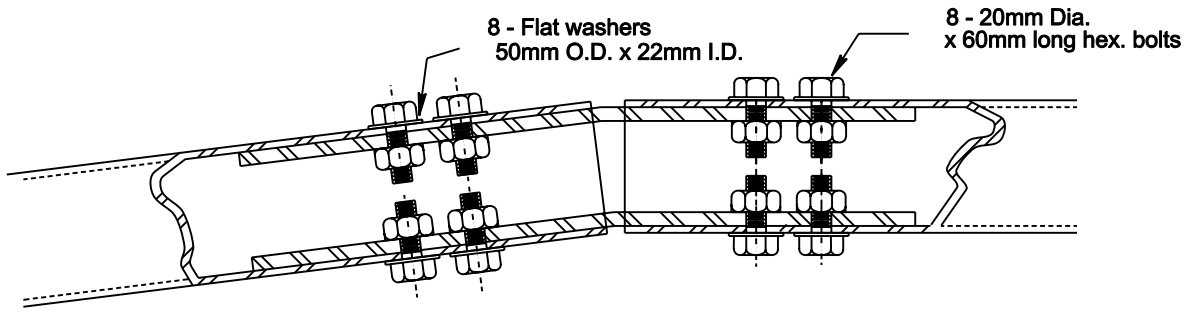
Original signed by:  
A.D. Cherwenuk, Director



**UPPER SPLICE PLATE**  
16mm galvanized steel plate



**LOWER SPLICE PLATE**  
16mm galvanized steel plate

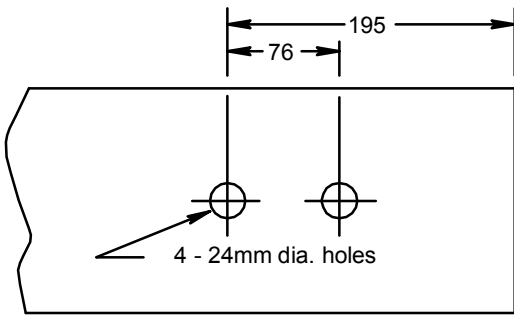


**ASSEMBLY DETAIL**

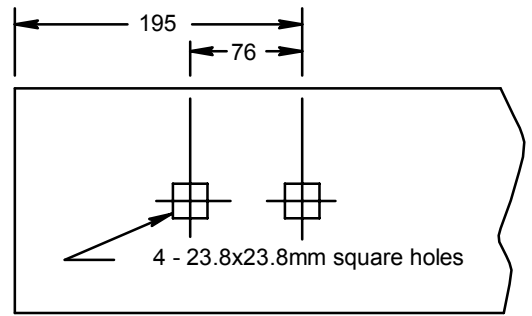
Note 1: For details of nut attachment see TEB 3.28A.  
All dimensions are in millimetres unless otherwise shown.

<p>Alberta TRANSPORTATION AND UTILITIES Traffic Operations Branch</p>	DWG. No.	TEB 3.27A
	Date	DEC 13/92
	Revision	
	Revision	

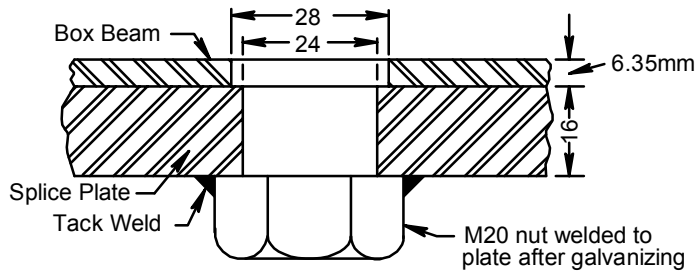
**MEDIAN BOX BEAM GUARDRAIL  
DETAIL OF SPLICE PLATE  
USED AT END TREATMENT**



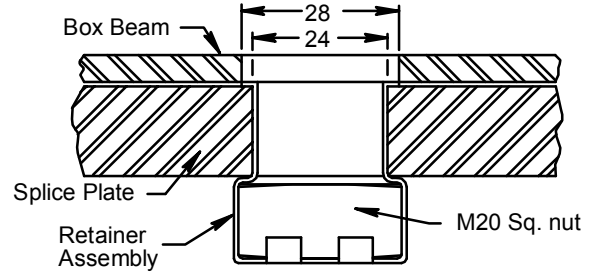
**SPLICE PLATE  
FOR TACK WELDING**



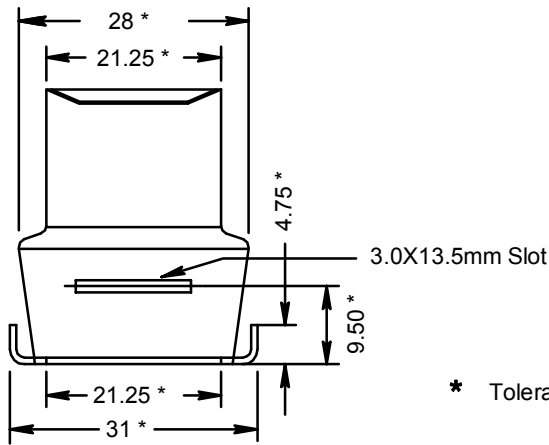
**SPLICE PLATE  
FOR RETAINER ASSEMBLY**



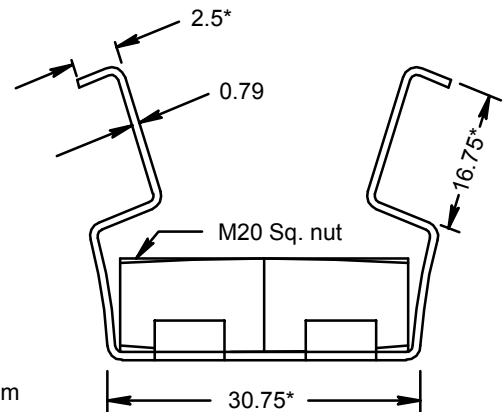
**NUT TACK WELDED  
TO SPLICE PLATE**



**NUT CLIPPED  
TO SPLICE PLATE**



**FRONT VIEW**



**SIDE VIEW**

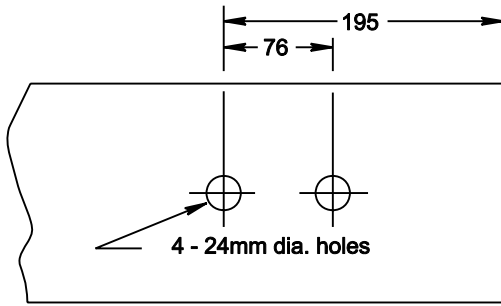
\* Tolerance  $\pm 0.24\text{mm}$

**RETAINER ASSEMBLY DETAIL**

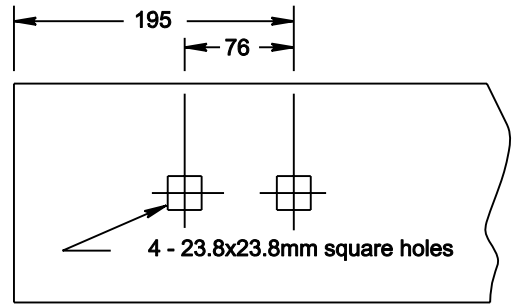
 <b>Alberta</b> TRANSPORTATION AND UTILITIES Traffic Operations Branch	DWG. No.	TEB 3.28
	Date	DEC 20/92
	Revision	_____
	Revision	_____

**STANDARD BOX BEAM GUARDRAIL  
RETAINER ASSEMBLY AND  
TRACK WELDING DETAILS**

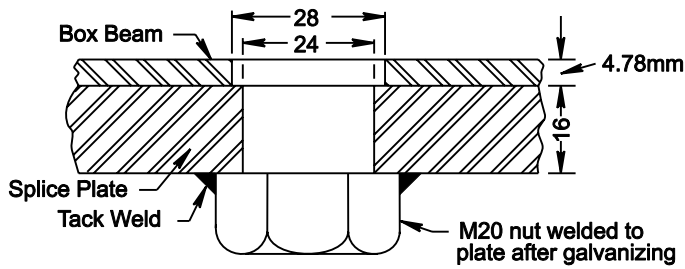
A.D. Cherwenuk, Director



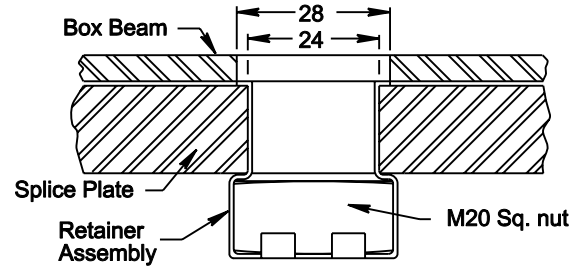
**SPLICE PLATE  
FOR TACK WELDING**



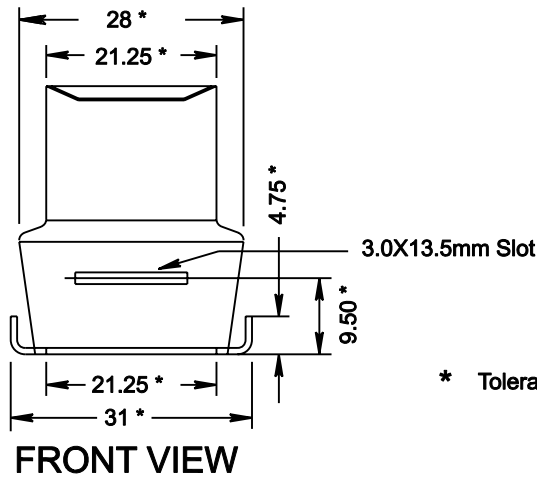
**SPLICE PLATE  
FOR RETAINER ASSEMBLY**



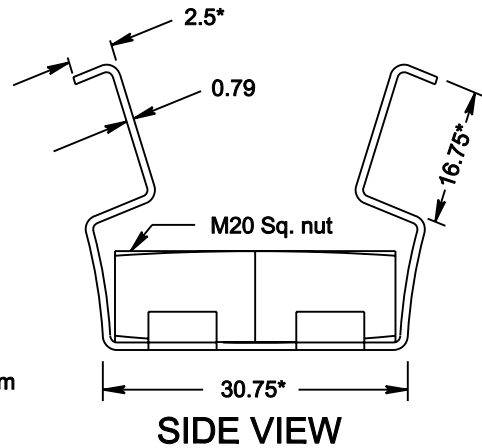
**NUT TACK WELDED  
TO SPLICE PLATE**



**NUT CLIPPED  
TO SPLICE PLATE**



**FRONT VIEW**



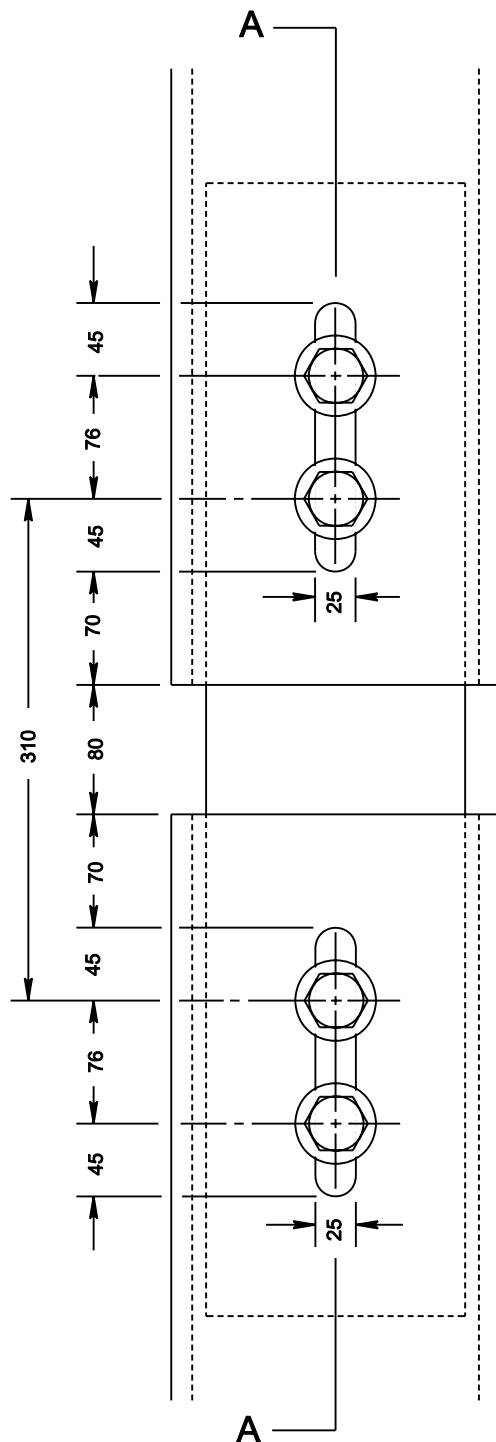
**SIDE VIEW**

\* Tolerance  $\pm 0.24\text{mm}$

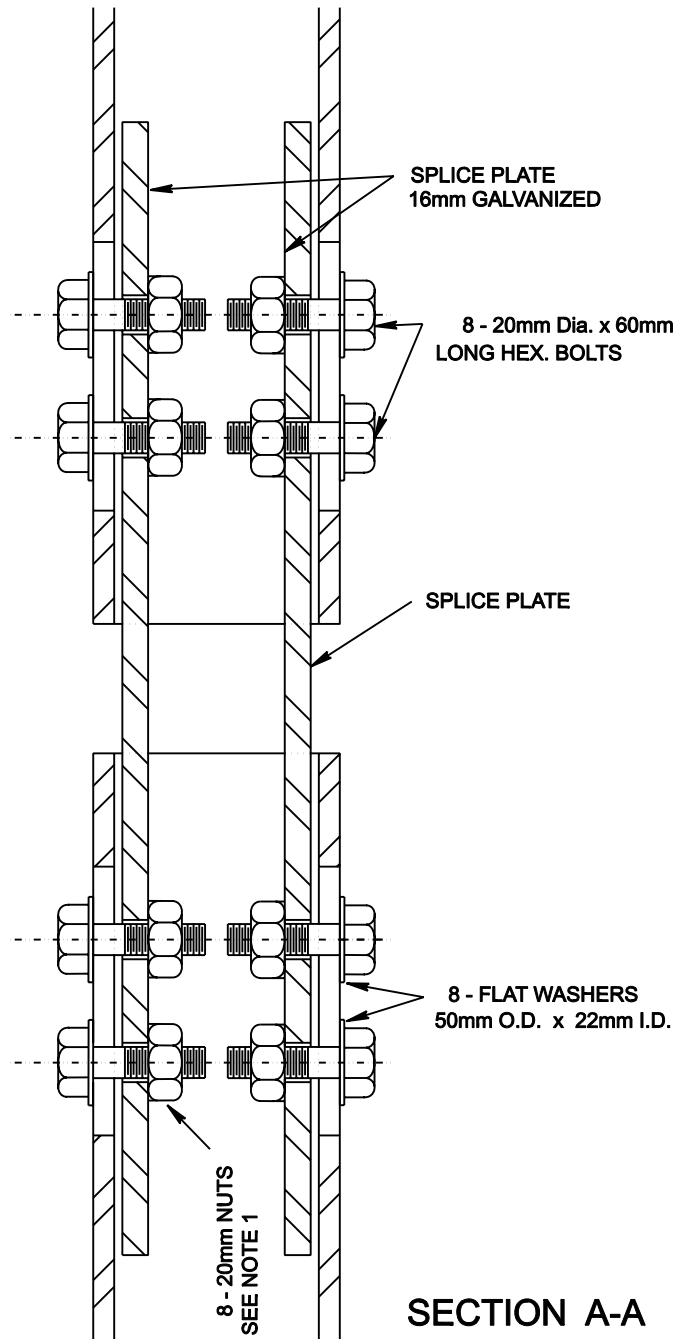
**RETAINER ASSEMBLY DETAIL**

	DWG. No.	TEB 3.28A
	Date	DEC 20/92
	Revision	
	Revision	

**MEDIAN BOX BEAM GUARDRAIL  
RETAINER ASSEMBLY AND  
TRACK WELDING DETAILS**



**PLAN**

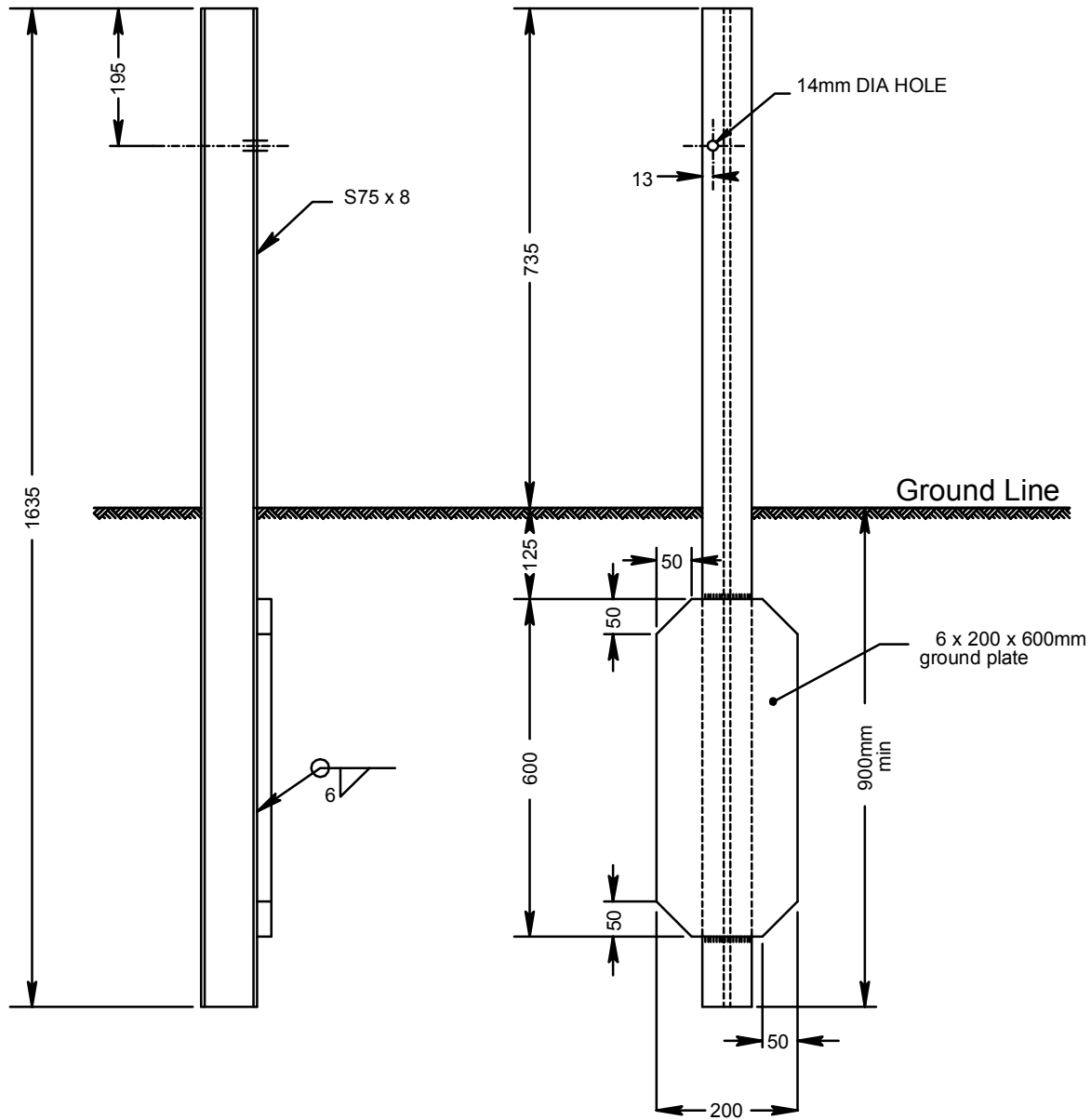


**SECTION A-A**

Note 1: For details of nut attachment see TEB 3.28A  
 Field cut slots 25mm x 166mm  
 Expansion joint shall be used at every tenth beam splice.  
 Post spacing at expansion joint shall be 1.90m.  
 All dimensions are in millimetres unless otherwise indicated.

	DWG. No.	TEB 3.30
	Date	DEC.11/92
	Revision	
	Revision	

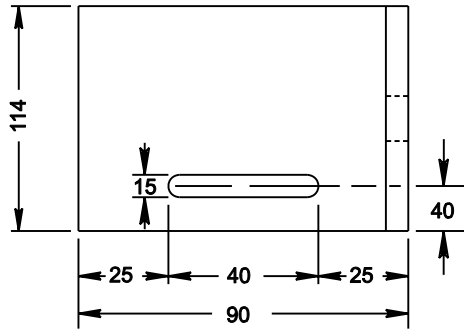
**MEDIAN BOX BEAM GUARDRAIL  
 EXPANSION JOINT SPLICE DETAIL**



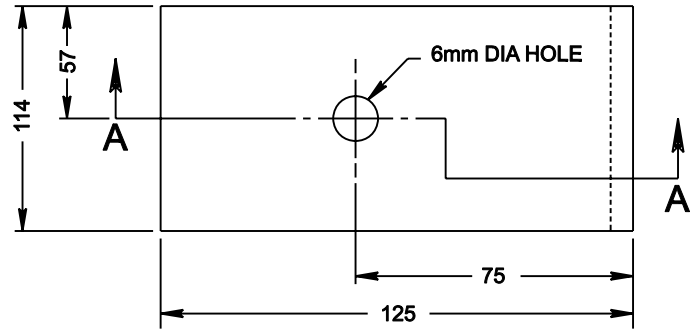
All dimensions are in millimetres unless otherwise indicated.

<b>Alberta</b> TRANSPORTATION AND UTILITIES Traffic Engineering Section Roadway Engineering Branch	DWG. No.	TEB 3.33
	Date	DEC.17/92
	Revision	June 95
	Revision	

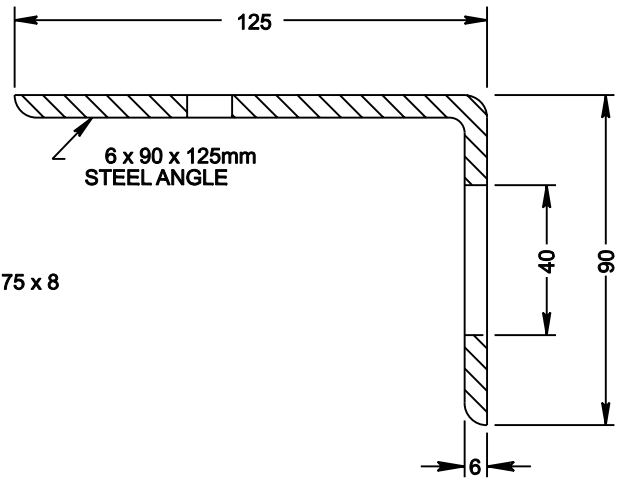
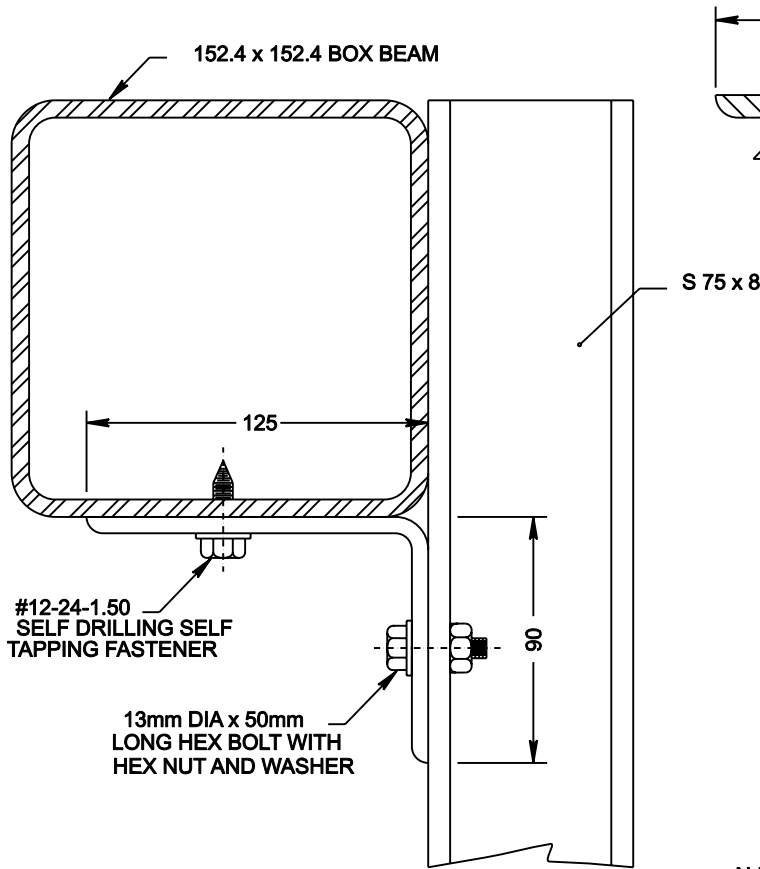
## STANDARD BOX BEAM GUARDRAIL POST DETAIL



**ELEVATION**



**PLAN**



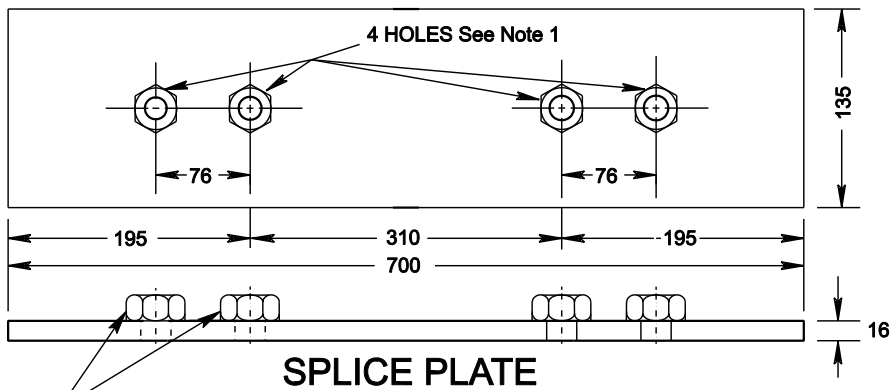
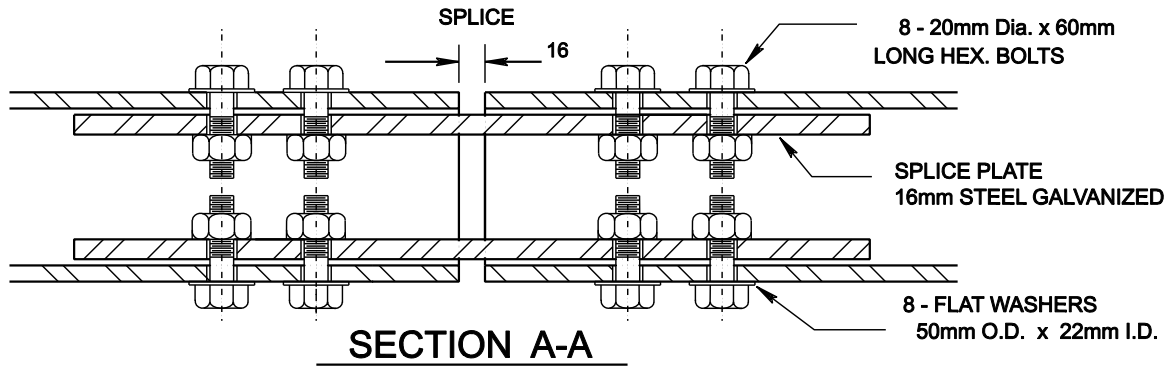
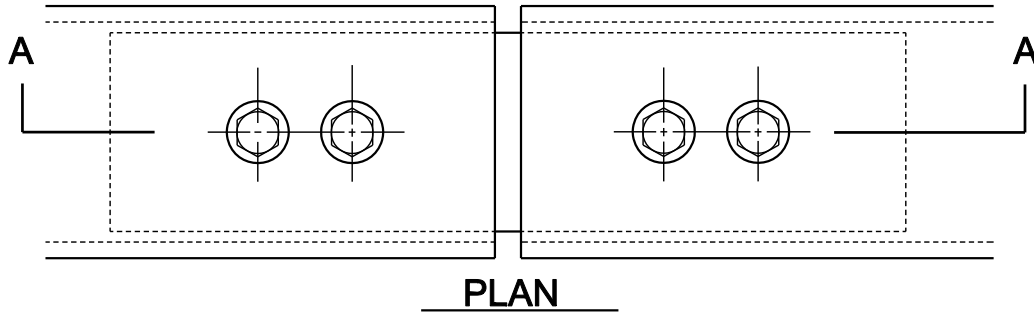
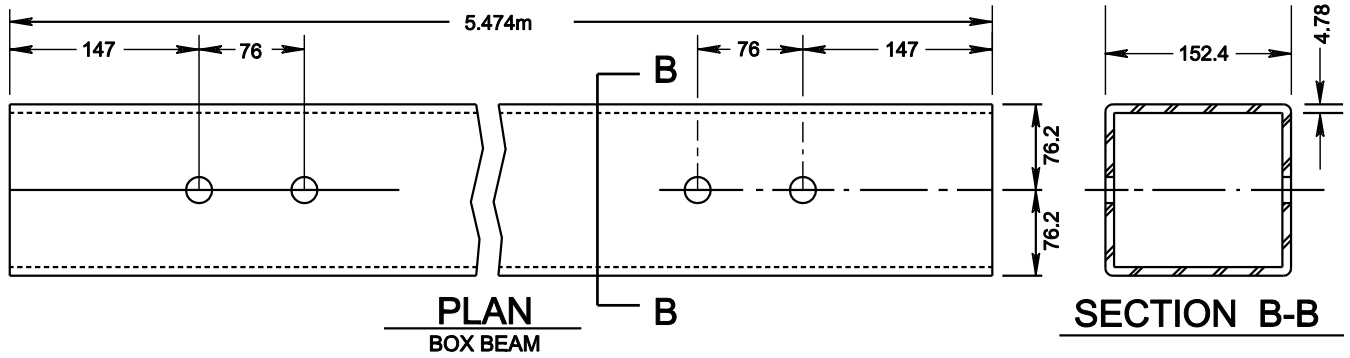
**SECTION A-A**

ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE INDICATED.

<b>Alberta</b> TRANSPORTATION AND UTILITIES Traffic Operations Branch	DWG. No.	TEB 3.34
	Date	DEC. 29/92
	Revision	
	Revision	

**STANDARD BOX BEAM GUARDRAIL  
BRACKET ASSEMBLY DETAIL**





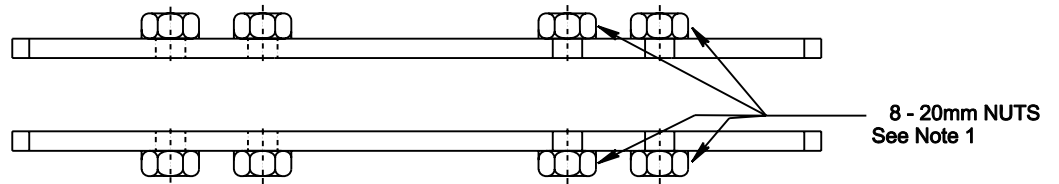
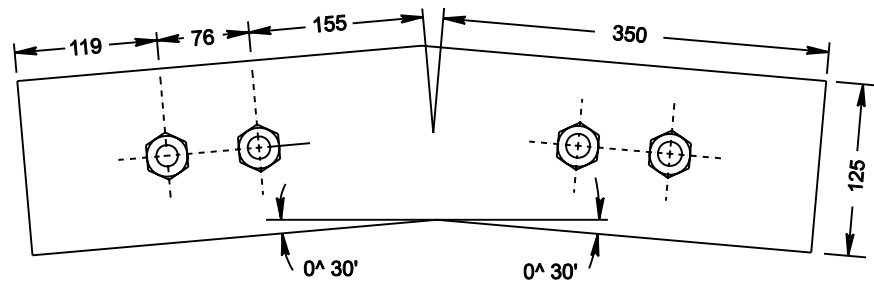
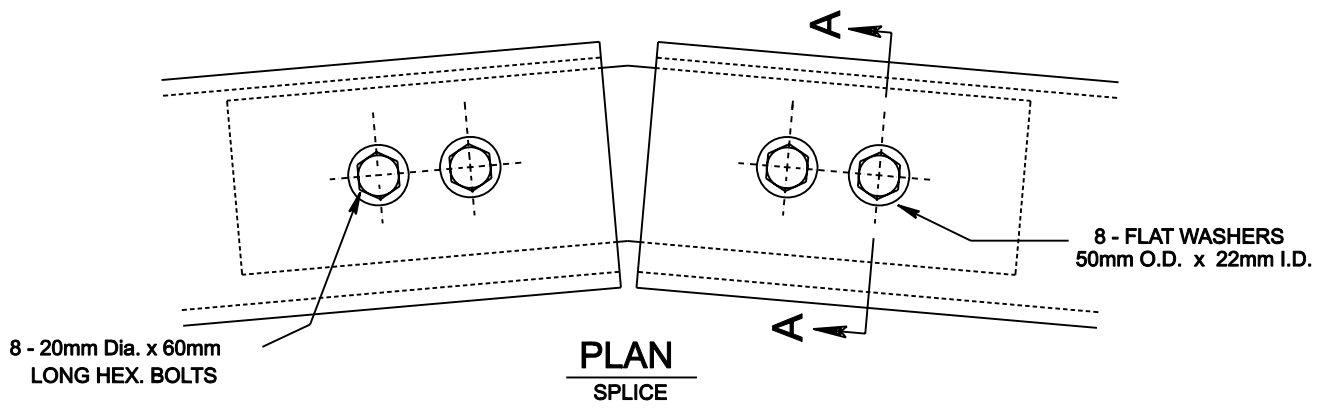
4 - 20mm NUTS  
See Note 1

⚠ 2 to each splice

⚠	REVISED BOLT PLACEMENT	B.G.	20Jan2012
No.	REVISIONS	BY	DATE
 Traffic Operations Branch		DWG. No.	TEB 3.35
		Date	DEC.11/92
		Revision	
Revision			

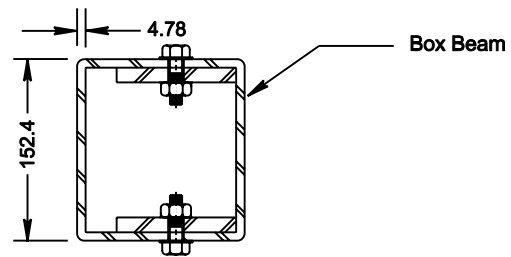
Note 1: For details of nut attachment see TEB 3.28  
All dimensions are in millimetres unless otherwise indicated.

**STANDARD BOX BEAM GUARDRAIL  
RAIL AND SPLICE PLATE DETAIL**



**SPLICE PLATE**

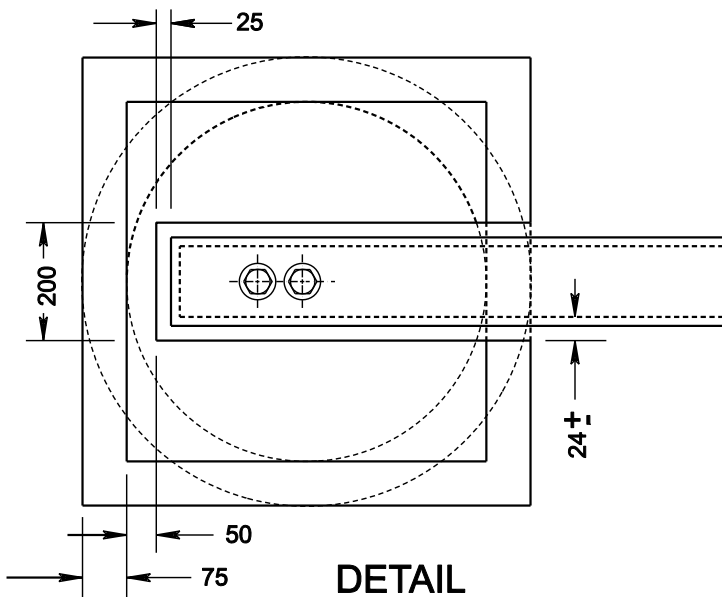
2 to each splice



**SECTION A-A**

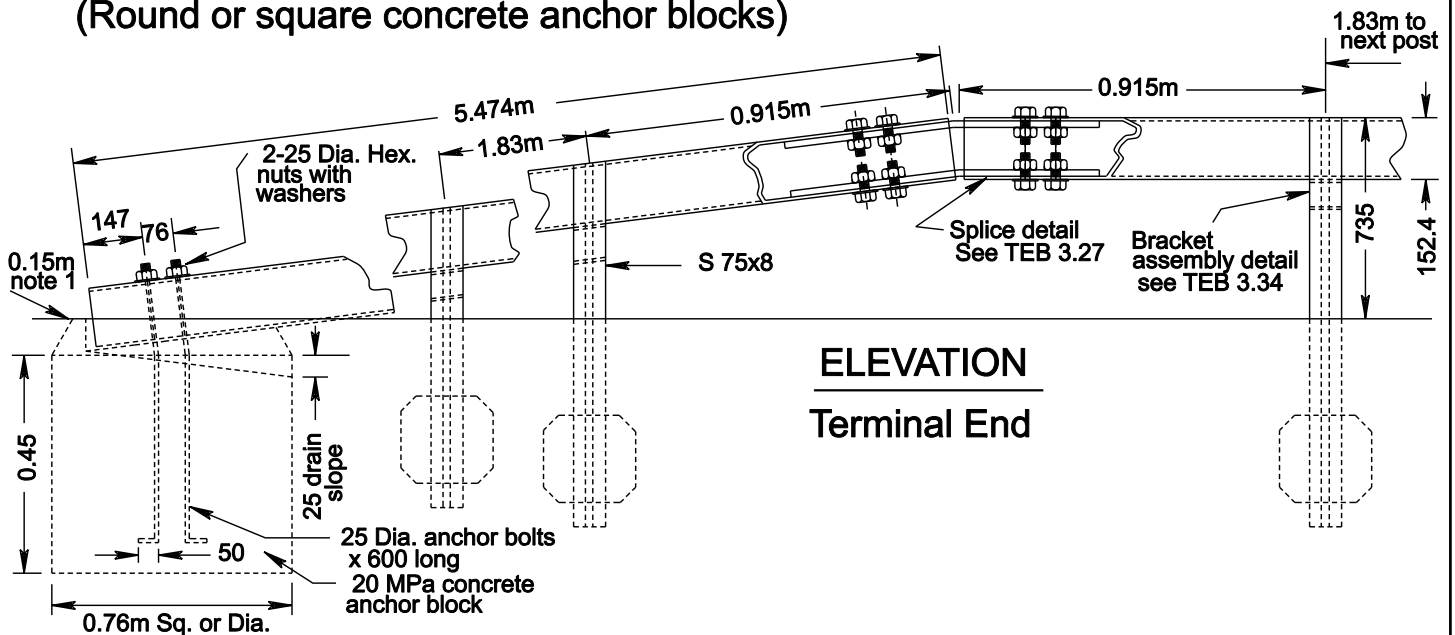
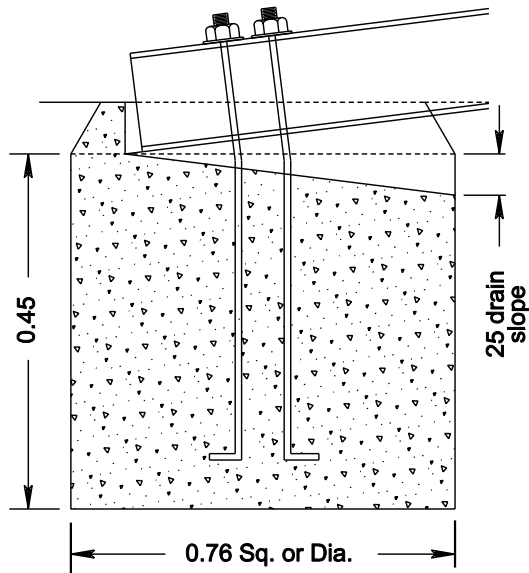
	DWG. No.	TEB 3.36
	Date	DEC.20/92
	Revision	
	Revision	

**STANDARD BOX BEAM GUARDRAIL  
BENT SPLICE PLATE DETAIL**

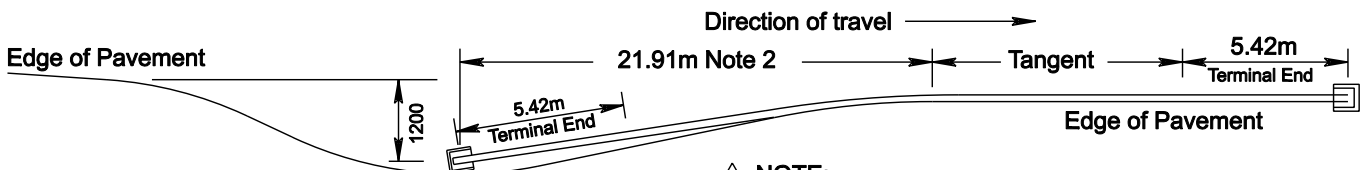


**DETAIL**

(Round or square concrete anchor blocks)



**ELEVATION**  
Terminal End



**PLAN**

NOTE: ALL DIMENSIONS SHOWN ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.

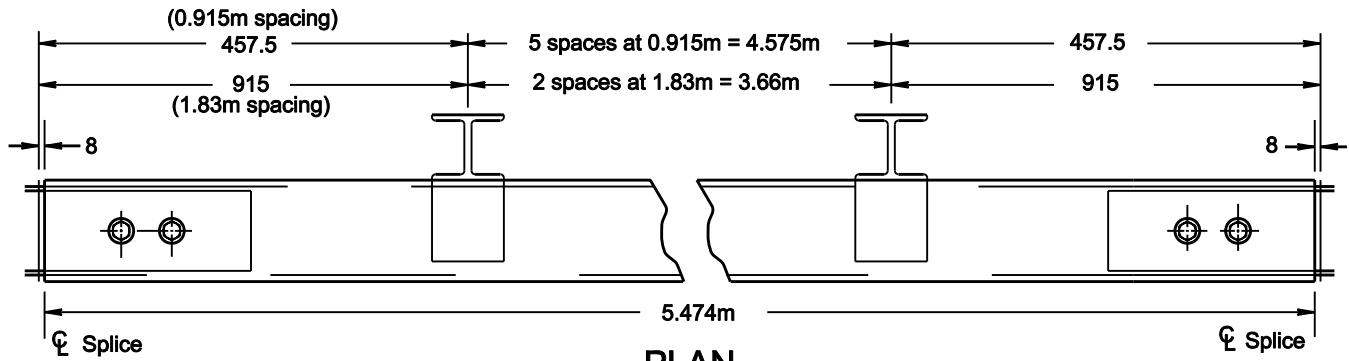
<b>Alberta</b> TRANSPORTATION AND UTILITIES Traffic Engineering Section Roadway Engineering Branch	DWG. No.	TEB 3.37
	Date	DEC. 13/92
	Revision	June 95
	Revision	April 07

**STANDARD BOX BEAM GUARDRAIL  
INSTALLATION DETAIL FOR  
END TREATMENT**

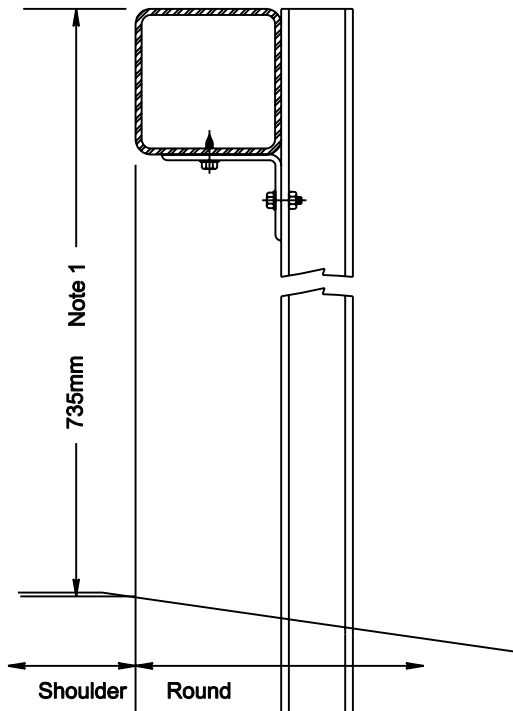
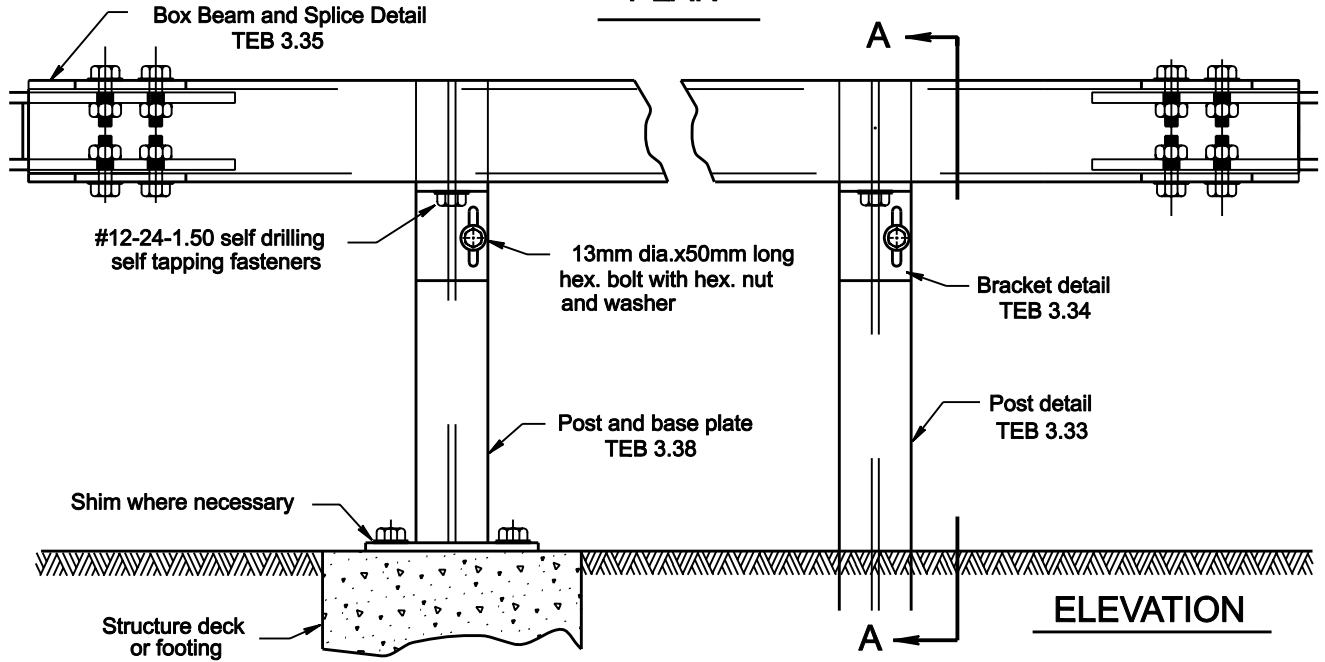
**OBSOLETE**  
 1 SEPTEMBER 2011  
 20 NOVEMBER 2012

1 SEPT. 2011. TURN DOWN ENDS WILL NO LONGER BE ACCEPTABLE FOR NEW INSTALLATIONS OR REPLACEMENT OF EXISTING ENDS. CRASH WORTHY END TREATMENTS SHALL BE USED.

20 NOV. 2012. WHERE EXISTING TURN DOWN END TREATMENTS NEED TO BE RE-BUILT AND/OR REPLACED DUE TO BEING HIT BY AN ERRANT VEHICLE, THE REPLACEMENT WITH A CRASHWORTHY END TREATMENT IS SUBJECT TO FUNDING AVAILABILITY.



PLAN

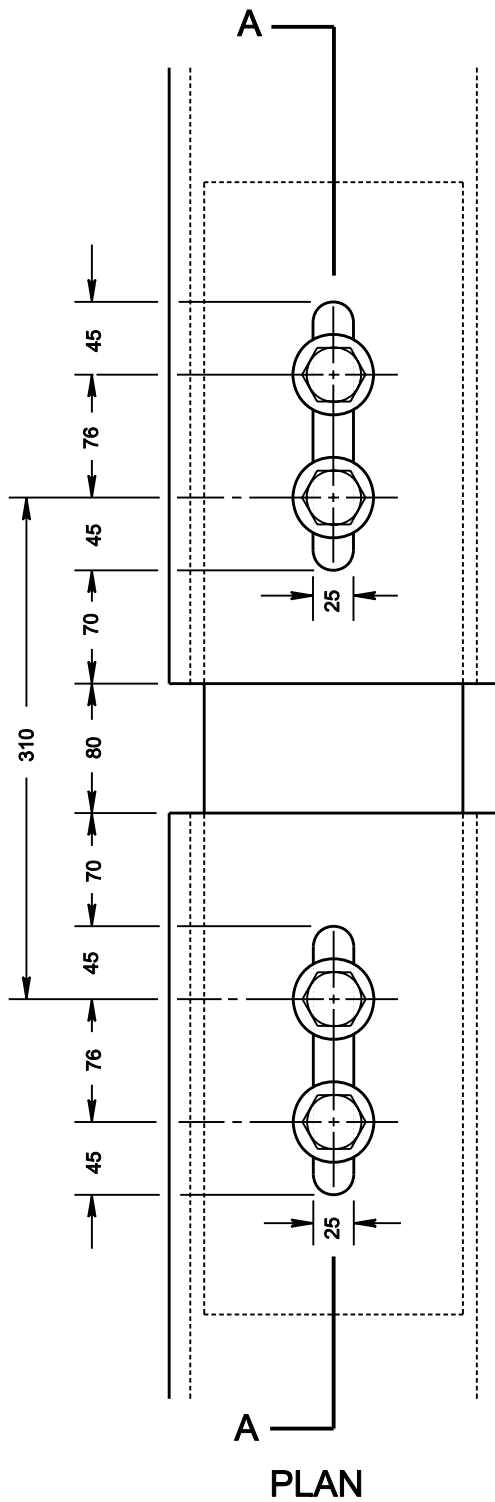


SECTION A - A

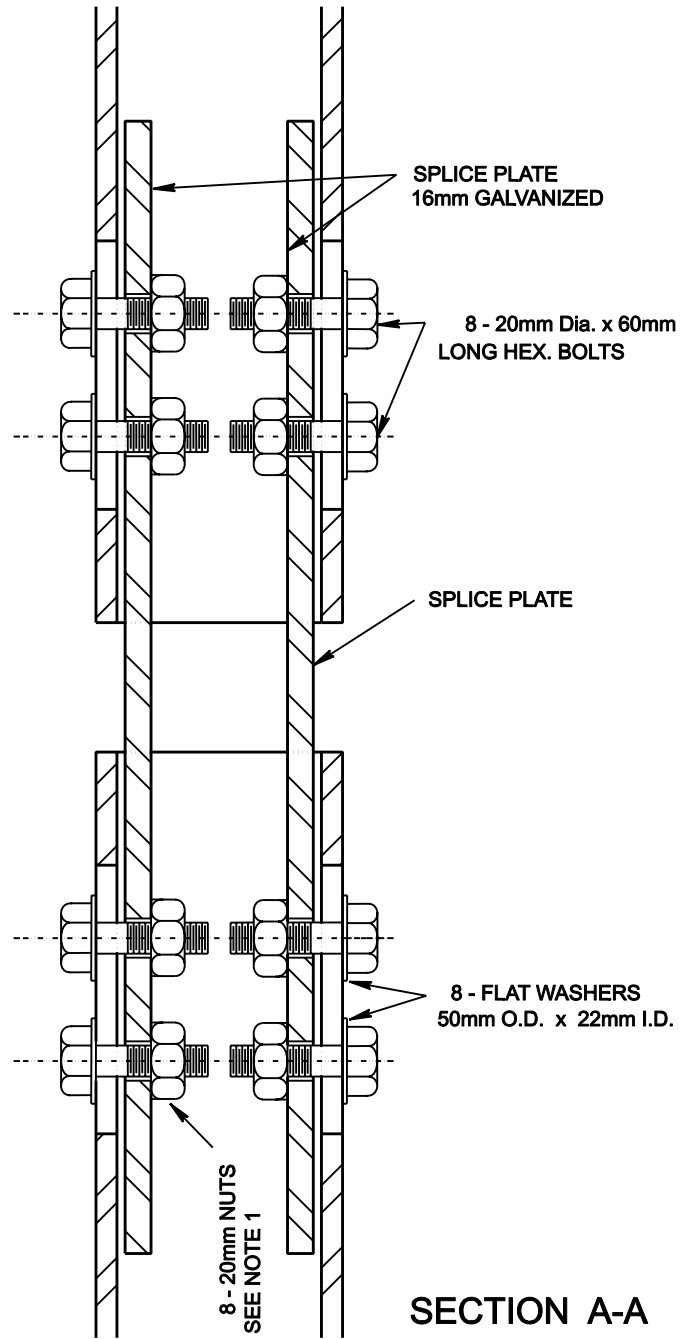
NOTE:  
ALL DIMENSIONS SHOWN ARE IN MILLIMETRES  
UNLESS OTHERWISE NOTED.

<b>Alberta</b> TRANSPORTATION AND UTILITIES Traffic Operations Branch	DWG. No.	TEB 3.39
	Date	DEC. 20/92
	Revision	
	Revision	

STANDARD BOX BEAM GUARDRAIL  
 ASSEMBLY DETAIL FOR  
 0.915m AND 1.83m POST SPACING



PLAN

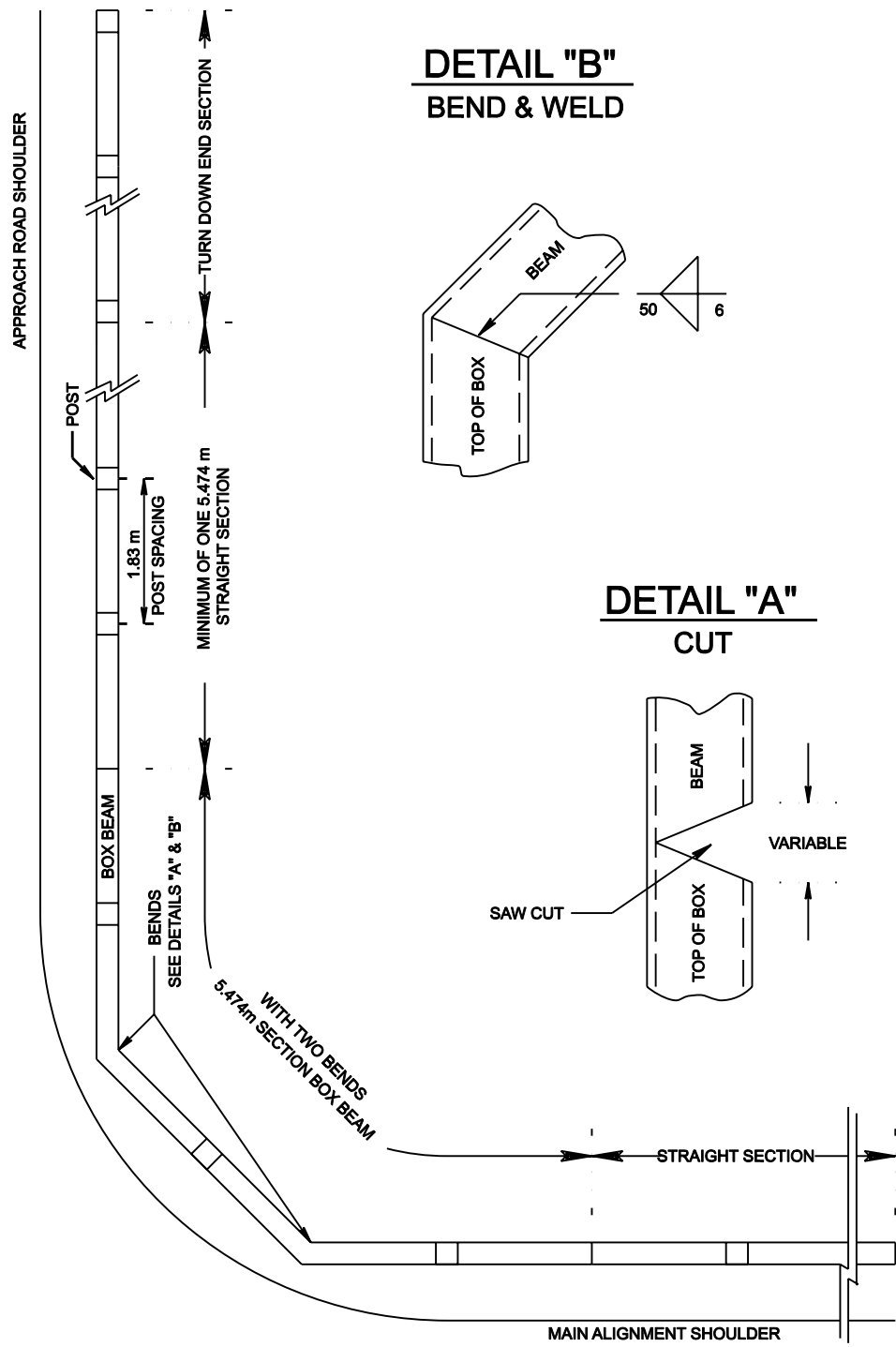


SECTION A-A

Note 1: For details of nut attachment see TEB 3.28.  
 Field cut slots 25mm x 166mm.  
 Expansion joint shall be used at every tenth beam splice.  
 Post spacing at expansion joint shall be 1.90m.  
 All dimensions are in millimetres unless otherwise indicated.

	DWG. No.	TEB 3.40
	Date	DEC.11/92
	Revision	
	Revision	

**STANDARD BOX BEAM GUARDRAIL  
 EXPANSION JOINT SPLICE DETAIL**



**PLAN VIEW**  
TOP VIEW

All dimensions are in millimetres unless otherwise indicated.

<b>Alberta</b> TRANSPORTATION AND UTILITIES Traffic Operations Branch	DWG. No.	TEB 3.46
	Date	DEC.11/92
	Revision	
	Revision	

**STANDARD BOX BEAM GUARDRAIL  
BEND DETAIL  
FOR APPROACH ROAD RADII**

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**APPENDIX B4**

**PRECAST F-SHAPE AND “NJ” SHAPE  
CONCRETE BARRIERS**



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## Appendix B4

# Precast F-Shape and "NJ" Shape Concrete Barriers

### TABLE OF CONTENTS

Table Number	Title	Page Number
CB6-4.2M16	Precast F-Shape Barrier NCHRP 350 Test Level 3	H-APP-B4-1
CB6-4.3M1A	Reinforced Concrete Median Barrier NJ Shape	H-APP-B4-2
CB6-4.3M12	Precast Concrete Barrier NJ Shape	H-APP-B4-3

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**General Notes:**

- The barrier is based on a design that has been crash tested and meets the requirements of NCHRP Test Level 3. The following deflection information is provided for guidance on the use of this barrier:  
2000 kg pick-up truck test @ 100kph @ 25° Approx. deflection 1800 mm

Unanchored	1800 mm
Four 25 mm diameter by 1m long deformed rebar dowels to be driven through holes provided to be flush with the face of the concrete barrier to prevent snagging	75 mm
Three 19 diameter anchor bolts c/w drop-in anchors in concrete slab on traffic side	900 mm (anchor failure is expected)
Three 28 diameter A307 fully developed tension anchor bolts on traffic side	300 mm (deflection on top edge only)

When using this barrier, it is the responsibility of the user to ensure appropriate deflection room or anchoring commensurate with the risks based on traffic and site conditions.

**Materials:**

- Reinforcing bars – Grade 400W.
- 19 mm diameter loop bars – Minimum yield 420 MPa, minimum tensile strength 550 MPa, minimum 14% elongation in 203 mm, pass a 180 degree bend test using a 3.5D bend diameter.
- 32 mm diameter pin – ASTM A36.
- All reinforcing bars and steel hardware to be hot-dip galvanized after fabrication to the requirements of CSA G164.
- Concrete strength shall be 40 MPa @ 28 days, and all requirements of Section 7 – Precast Concrete Units of the Specifications for Bridge Construction shall be met.

**Handling and Installation:**

- At no time shall the barriers be lifted, moved, etc. by the use of the loop bars at the ends.
- For barriers placed on a paved surface, all loose dirt and sand shall be removed from the roadway just prior to placement of the barriers. Barriers can also be placed on a compacted base material with a minimum thickness of 150 mm and a maximum width of 1.2 m.
- Calculated mass of one segment = 1.8 tonnes

Mark	Size	Shape	No.	Length	Mass
A1001G	10	U	18	1820	26.0
A2001G	20	U	6	898	13.0
A1501G	15	—	1	2900	5.0
A1002G	10	—	4	2900	9.1
A1003G	10	—	4	780	2.0
A1004G	10	—	2	510	1.0

TOTAL Kg 55.0

**BAR LIST: 3000 SEGMENT**

General Note #1	RY 10 Aug 2011
Notes and Details	BK Sept/06
REVISIONS	BY DATE

Approved:  
Original signed by  
Allan Kwan

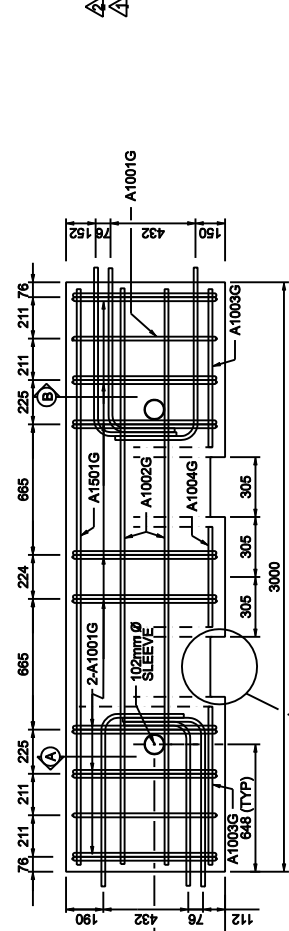
Executive Director,  
Technical Standards Branch

Date: NOVEMBER 23, 2004



**PRECAST 'F' SHAPE BARRIER  
NCHRP 350 TEST LEVEL 3**

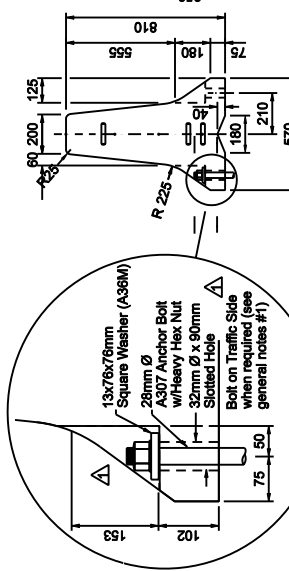
Prepared By: M.T	Checked By: R.Y	Scale: N.T.S.	Dwg No.: CB6 4.2 M 16
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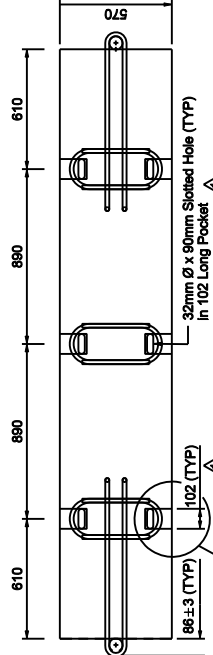
**ELEVATION VIEW**

See DETAIL "P"

**OPTIONAL ANCHOR BOLTS**  
(Traffic Side Only)

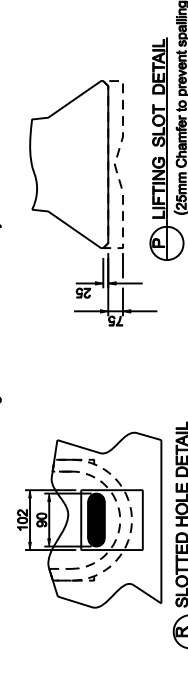


**END VIEW**



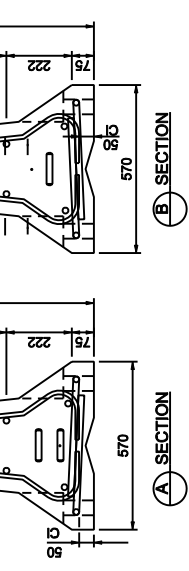
**PLAN VIEW**

NOTE: Remaining rebars are omitted for clarity



**LIFTING SLOT DETAIL**  
(25mm Chamfer to prevent spalling)

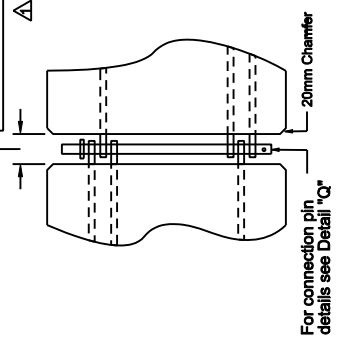
**SLOTTED HOLE DETAIL**



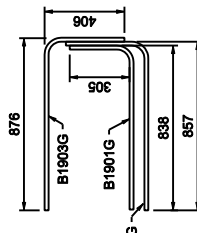
**SECTION A**

**SECTION B**

SET WITH 92mm WOODEN BLOCK



**DETAILS OF BARRIER CONNECTION**



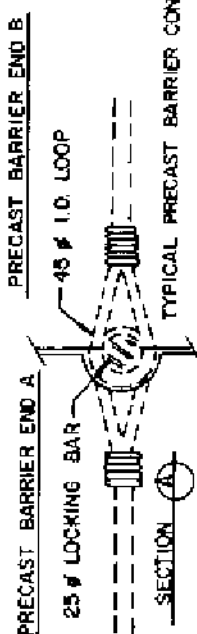
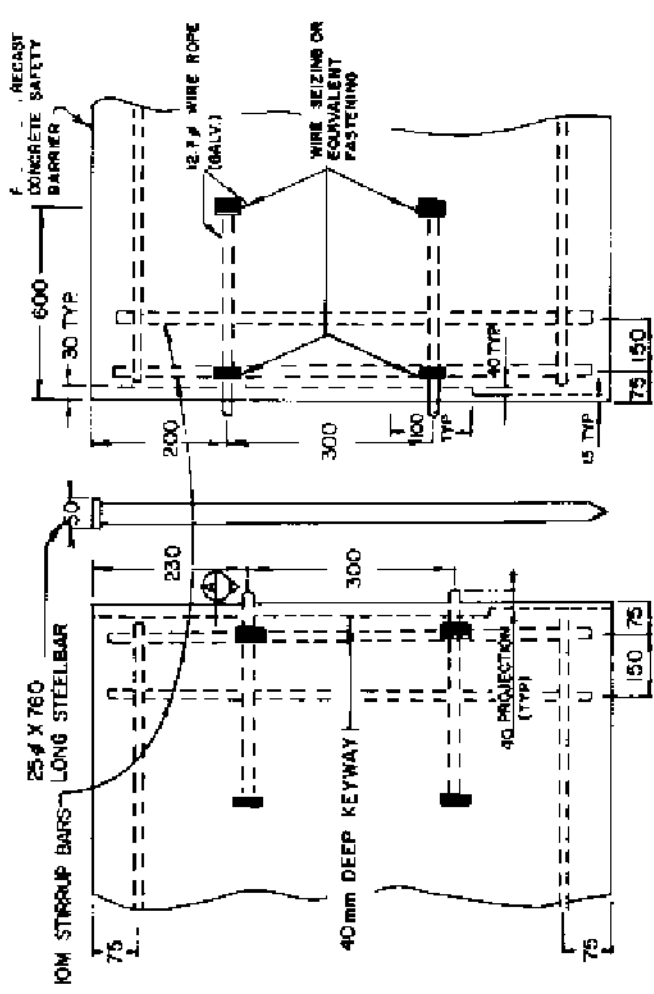
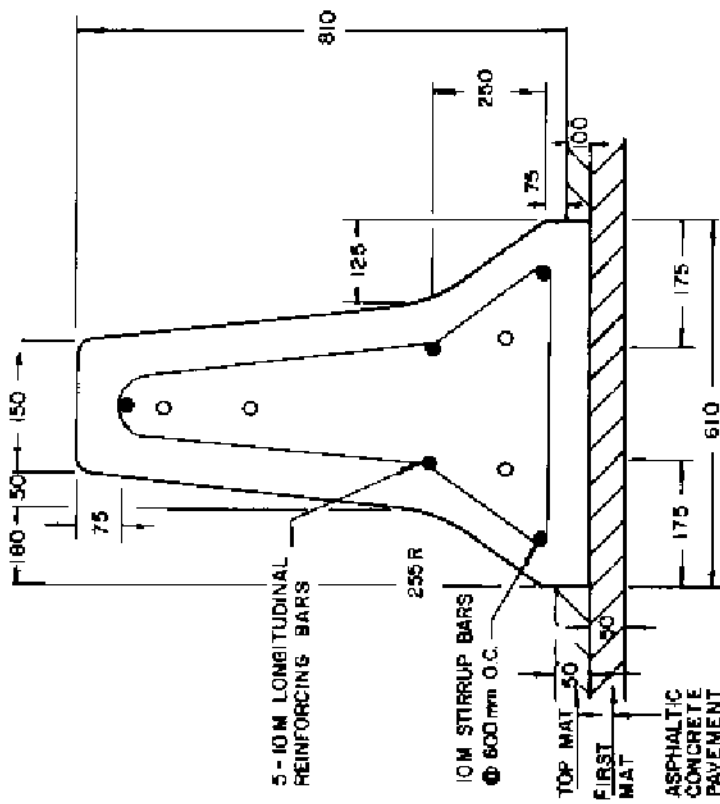
**ELEVATION**

**PLAN**

**13mm TOP PLATE DETAIL**  
10mm & Retainer Hole Retainer Bolt Optional

**LOOP BAR ASSEMBLY**  
Material as stated in General Notes

**CONNECTION PIN DETAIL**



1. ALL CONCRETE SHALL BE 40 MPa AT 28 DAYS.
2. ALL REINFORCEMENT SHALL BE EPOXY COATED REINFORCING BARS.
3. ALL EXPOSED CONCRETE SHALL HAVE A SMOOTH SURFACE.
4. EXPOSED SURFACES SHALL HAVE 20mm CHAMFER OR FILLET OR AS OTHERWISE SPECIFIED.
5. ALL SURFACES SHALL BE FORMED WITH OILED PLYWOOD OR STEEL FORMED FINISH
6. ALL VOIDS ARE TO BE CAPPED AND WATERPROOFED
7. EXPOSED SURFACES SHALL HAVE AN APPROVED SEALING SOLUTION APPLIED

ALL DIMENSIONS ARE IN MILLEMETRES  
UNLESS OTHERWISE NOTED

FOR RETROFIT ONLY

A		BK.	04-17-07
Δ	CURB REMOVED FROM TITLE	BY	DATE
No.	REVISIONS		

**Alberta**  
Infrastructure and  
Transportation

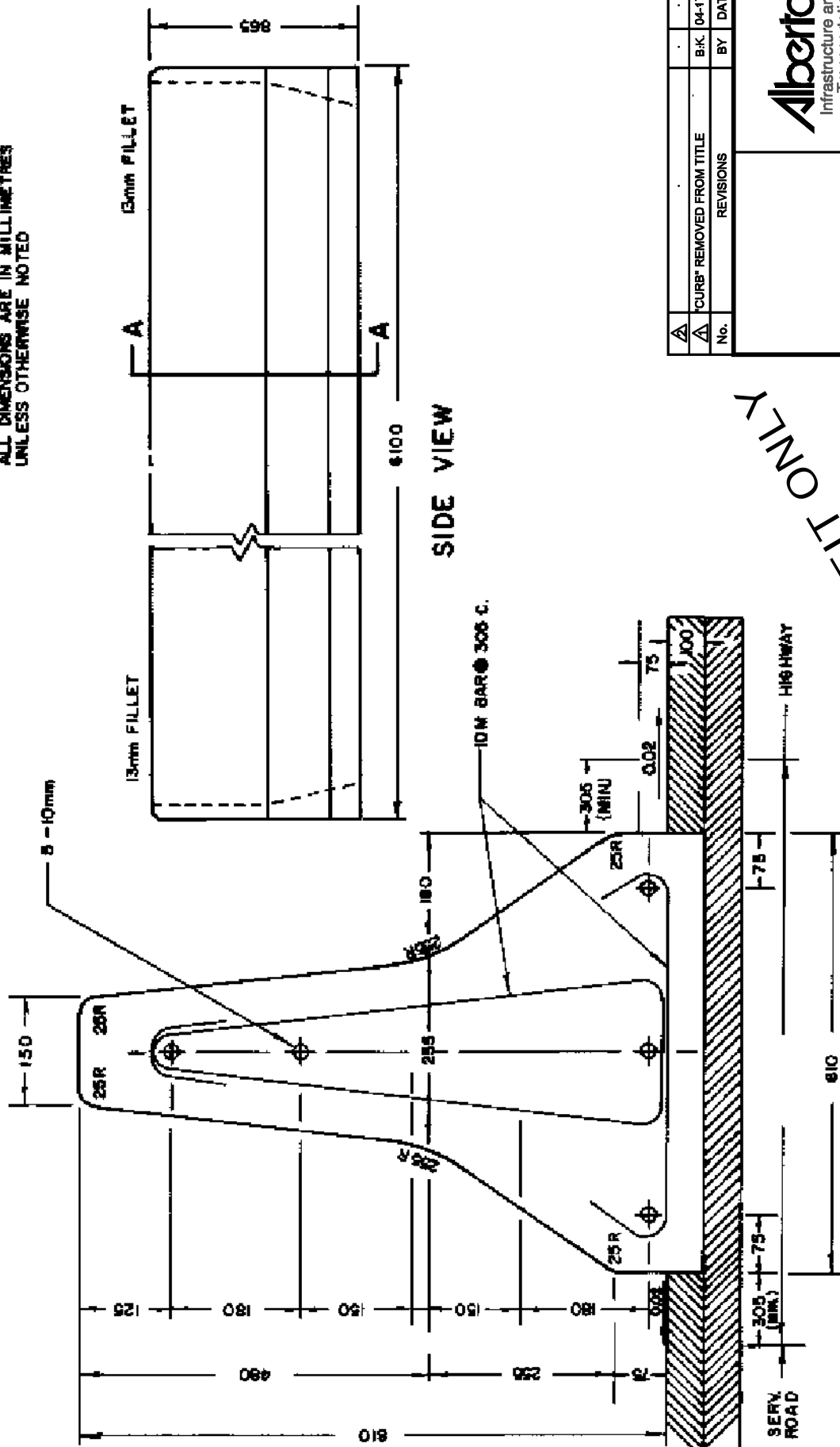
Effective Date: 1997

**REINFORCED CONCRETE  
MEDIAN BARRIER Δ**

**NJ SHAPE**

Prepared By: N.N.	Checked By: B.K.	Scale: N.T.S.	Dwg No.: CB6-4.3M1A
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ALL DIMENSIONS ARE IN MILLIMETRES  
UNLESS OTHERWISE NOTED



FOR RETROFIT ONLY

SECTION A-A VIEW

SIDE VIEW

REVISIONS	BY	DATE
△	B.K.	04-17-07

Alberta  
Infrastructure and  
Transportation

Date: MAY, 1985

PRECAST CONCRETE  
BARRIER △  
NJ SHAPE

Prepared By: N.I.N.	Checked By: B.K.	Scale: N.T.S.	Dwg No.: CB6-4.3M12
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**APPENDIX B5**

**THREE BEAM GUARDRAIL**



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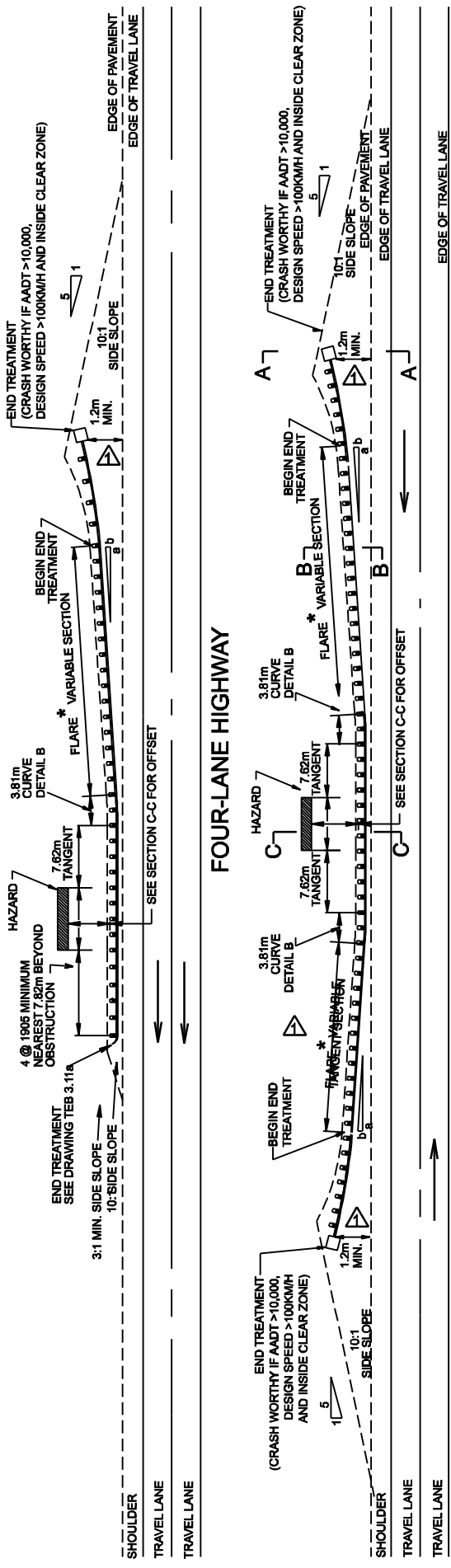
## Appendix B5

### Thrie Beam Guardrail

#### TABLE OF CONTENTS

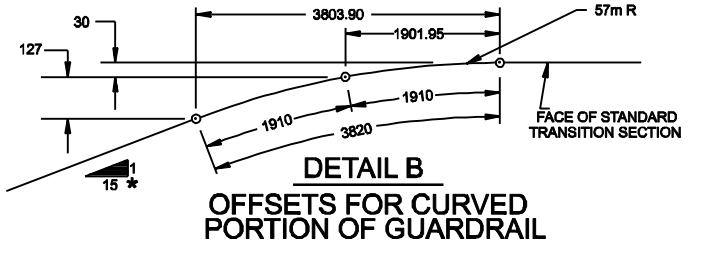
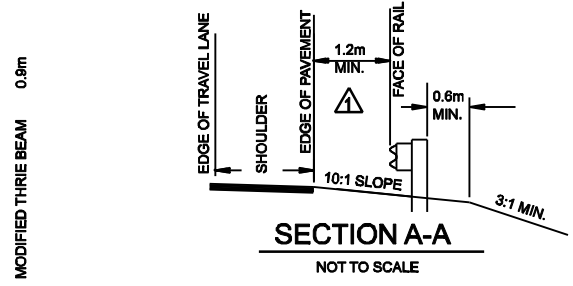
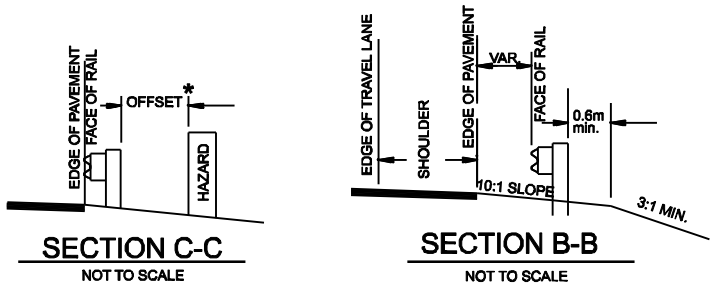
Dwg. No.	Title	Page Number
TEB 3.15a	Typical W-Beam Strong Post or Modified Thrie Beam Guardrail Placement Roadside Hazards (Two and Four Lane Highways)	H-APP-B5-1
TEB 3.16a	Typical Strong Post W-Beam or Modified Thrie Beam Guardrail Placement at Bridge Approaches (Two-Lane Highway)	H-APP-B5-2
TEB 3.17a	Typical Strong Post W-Beam or Modified Thrie Beam Guardrail Placement at Bridge Approaches (Four-Lane Divided Highway)	H-APP-B5-3
TEB 3.18a	Typical Strong Post W-Beam or Modified Thrie Beam Guardrail Placement for Median Hazards	H-APP-B5-5
TEB 3.60-1	Bullnose Guardrail System Protection of Piers in Medians	H-APP-B5-7
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TEB 3.60-4	Bullnose Guardrail System Posts & Blocks	H-APP-B5-10
TEB 3.60-5	Bullnose Guardrail System Rail Section 1	H-APP-B5-11
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TEB 3.60-9	Bullnose Guardrail System Thrie Beam and Cable Length	H-APP-B5-15
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RDG-B5.2	Bullnose Guardrail System Standard Thrie Beam Cable Anchor Terminal with Wing End (Exit End Treatment for Divided Highways)	H-APP-B5-19
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RDG-B5.10	W-Beam Strong Post to Modified Thrie Beam Guardrail Transition at Roadside Structure	H-APP-B5-28

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**FOUR-LANE HIGHWAY**

**TWO-LANE HIGHWAY**



\* OFFSET FROM BACK OF BARRIER TO FACE OF OBSTRUCTION SHALL BE AT LEAST THE DESIGN DEFLECTION OF THE BARRIER SYSTEM AS FOLLOWS:

STRONG POST (W-BEAM) 0.9m  
 STRONG POST (PLASTIC) 1.5m  
 MODIFIED THRIE BEAM 0.8m

\* FLARE RATES SHALL BE AS PER STANDARD FOR DESIGN SPEED AND SYSTEM TYPE

△			
△	END TREATMENT NOTES	B.K.	12/01/05
No.	REVISIONS	BY	DATE

Approved:  
 Original signed by  
 Allan Kwan

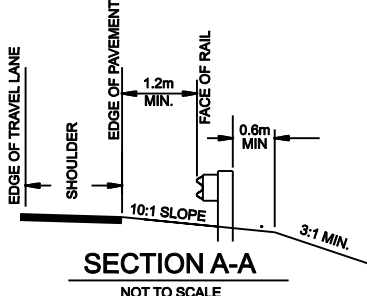
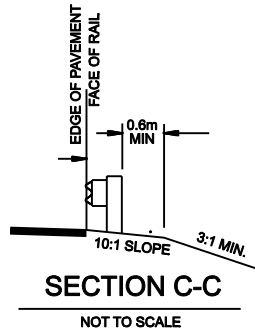
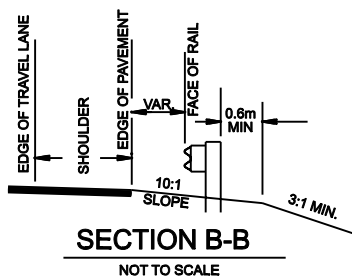
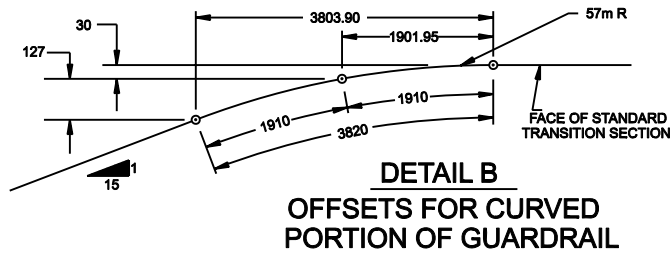
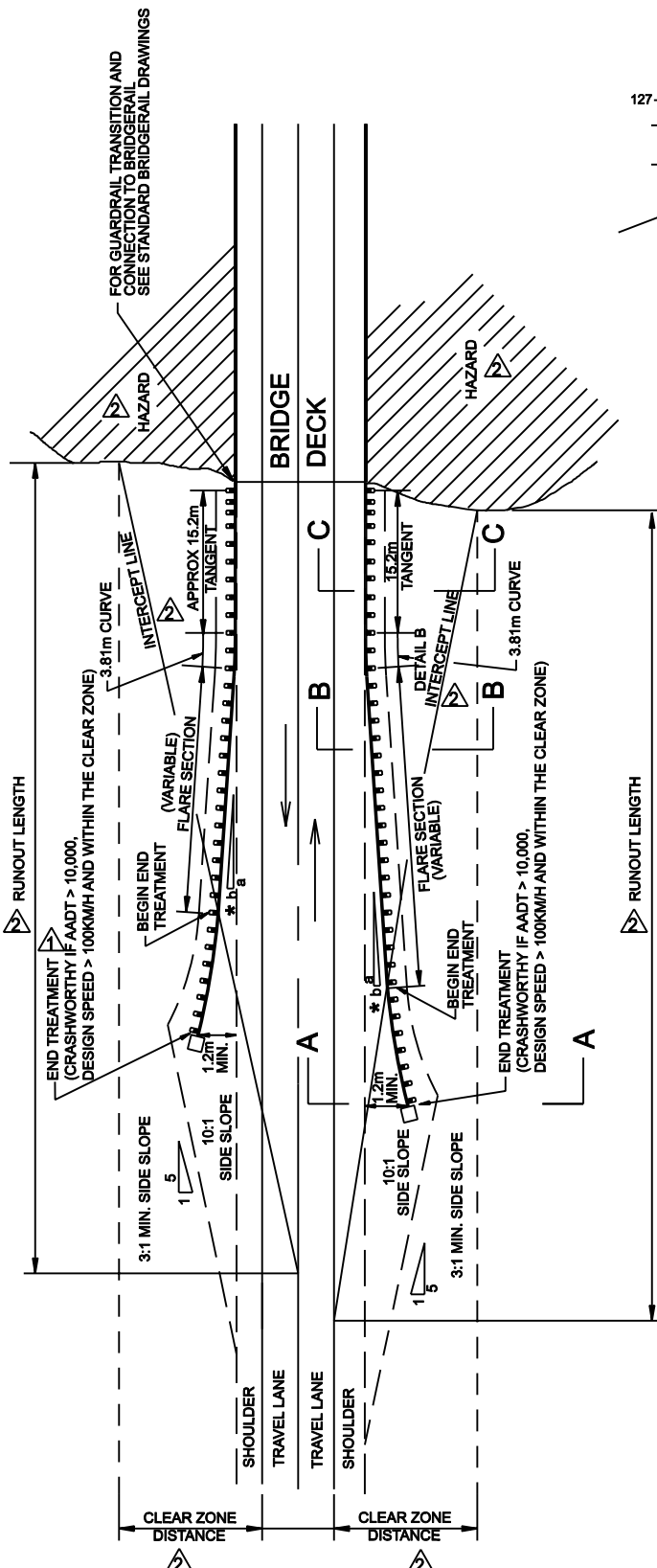
Executive Director,  
 Technical Standards Branch  
 Date: JUNE 24, 2005

Date: JULY 12, 2005



**TYPICAL W-BEAM STRONG POST OR MODIFIED THRIE BEAM GUARDRAIL PLACEMENT ROADSIDE HAZARDS (TWO AND FOUR LANE HIGHWAYS)**

Prepared By: M.T	Checked By: B.K	Scale: N.T.S.	Dwg No.: TEB 3.15a
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⚠	"LENGTH OF NEED" SHOWN	B.K.	12 SEP 07
⚠	END TREATMENT NOTES	B.K.	12/01/05
No.	REVISIONS	BY	DATE

Approved:

Original signed by  
Allan Kwan

Executive Director,  
Technical Standards Branch  
Date: JUNE 24, 2005

Date: JULY 12, 2005

**TYPICAL STRONG POST W-BEAM  
OR MODIFIED THREE BEAM GUARDRAIL  
PLACEMENT AT BRIDGE APPROACHES  
(TWO-LANE HIGHWAY)**

Prepared By: M.T	Checked By: B.K	Scale: N.T.S.	Dwg No.: TEB 3.16a
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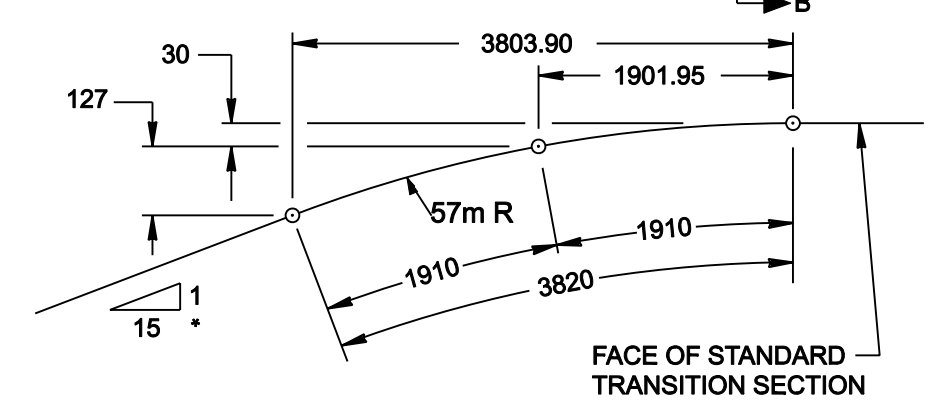
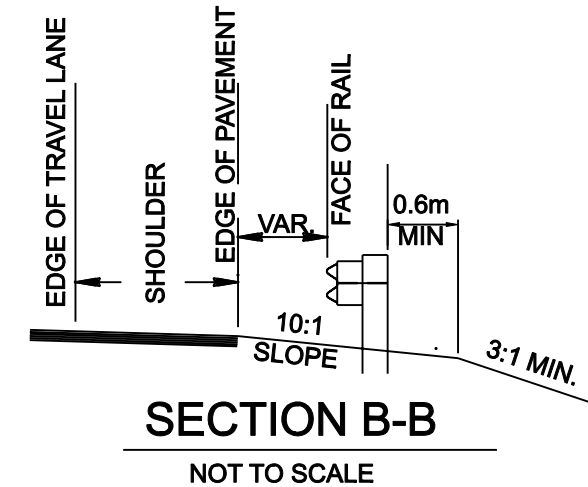
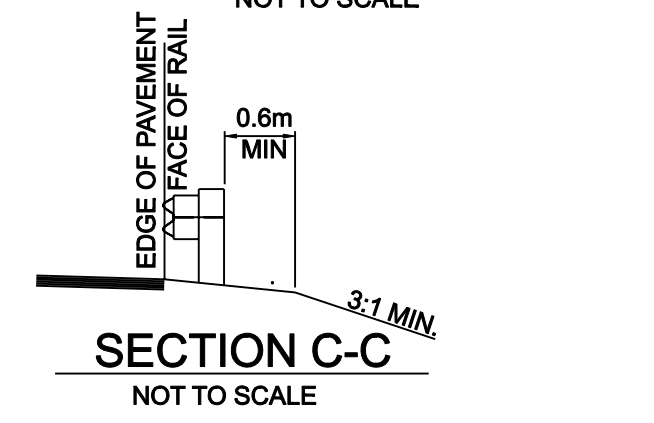
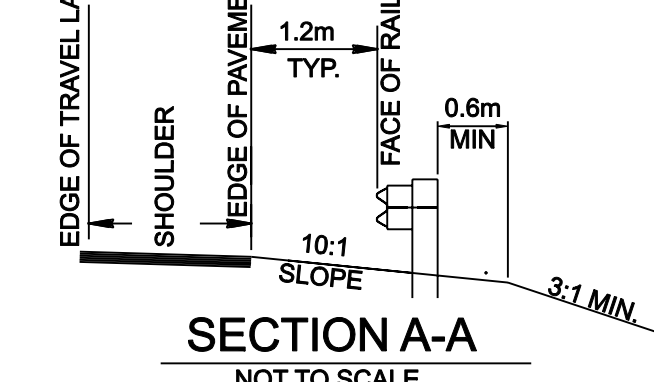
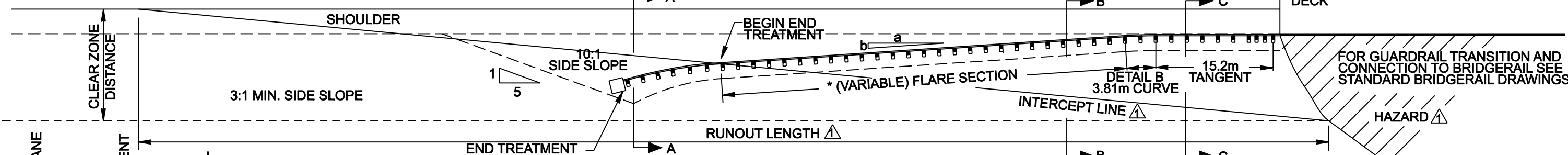
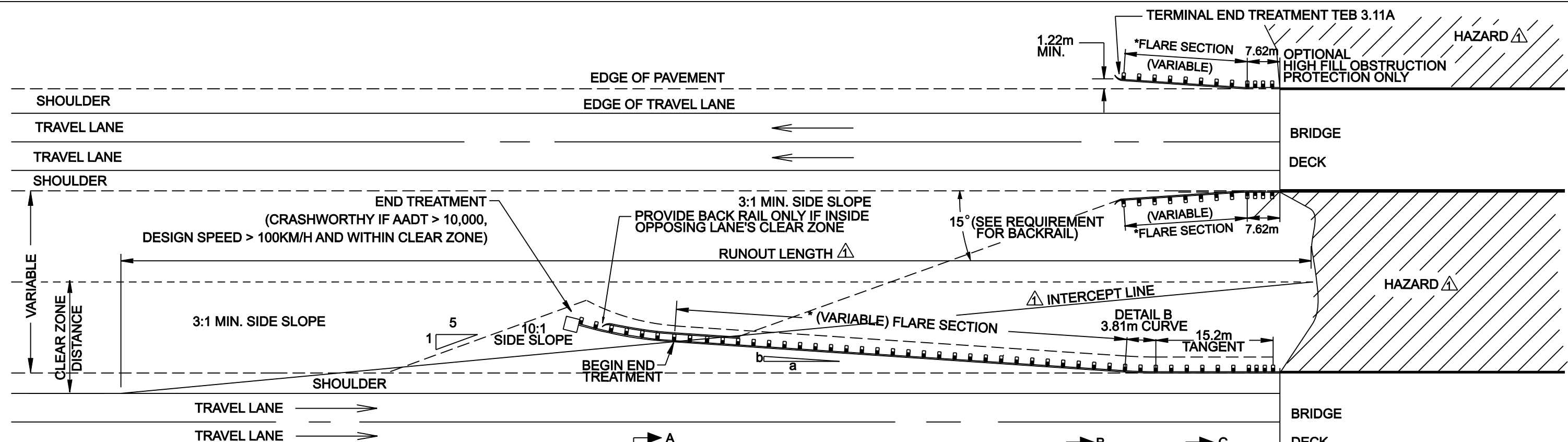
END TREATMENT IS TO BE DETERMINED BY PROJECT MANAGER IN EACH GIVEN SITUATION

\* FLARE RATES AS PER STANDARD

⚠ RUNOUT LENGTH IS TO BE MEASURED FROM BEGINNING OF HAZARD ON ROADSIDE

LENGTH OF GUARDRAIL TO BE DETERMINED BY PROTECTION ENVELOPE METHOD

All dimensions are in millimetres unless otherwise indicated.



END TREATMENT IS TO BE DETERMINED BY PROJECT MANAGER IN EACH GIVEN SITUATION  
 LENGTH OF GUARDRAIL TO BE DETERMINED BY PROTECTION ENVELOPE METHOD  
 RUNOUT LENGTH IS TO BE MEASURED FROM BEGINNING OF HAZARD ON ROADSIDE  
 \* FLARE RATES AS PER STANDARD  
 ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE INDICATED.

△			
△	"LENGTH OF NEED" CORRECTED	B.K.	12 SEP 07
No.	REVISIONS	BY	DATE

Approved:  
 Original signed by  
 Allan Kwan  
 Executive Director,  
 Technical Standards Branch  
 Date: JUNE 24, 2005  
 Effective Date: JULY 12, 2005

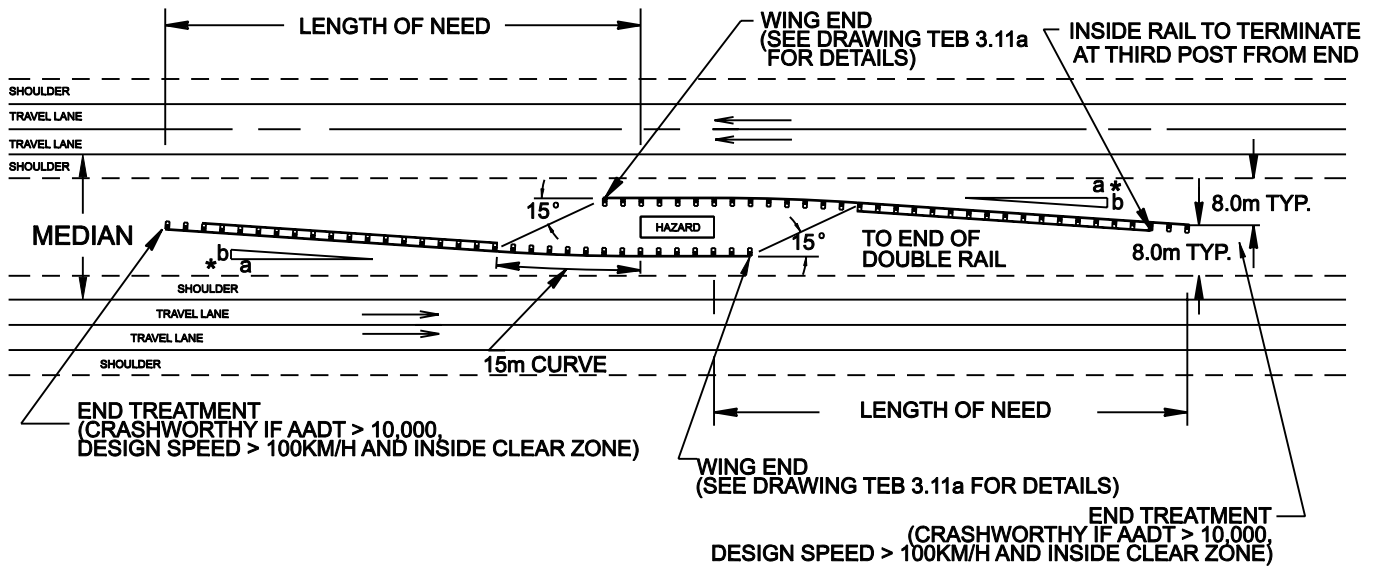


**TYPICAL STRONG POST W-BEAM OR MODIFIED THRIE BEAM GUARDRAIL PLACEMENT AT BRIDGE APPROACHES (FOUR-LANE DIVIDED HIGHWAY)**

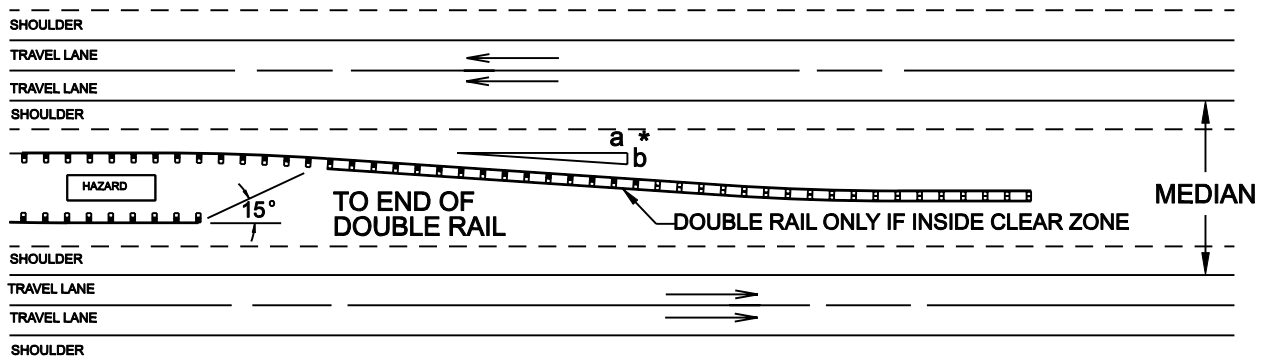
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# INTRODUCED MEDIAN BARRIER



# CONTINUOUS MEDIAN BARRIER



\* FLARE RATE AS PER STANDARD FOR DESIGN SPEED.

CONSIDER ONLY WHERE MEDIAN WIDTH SUFFICIENT TO PROVIDE 8m MINIMUM FROM OPPOSING TRAVEL LANE TO BACK SIDE OF TERMINAL.

FOR NARROW MEDIAN, IMPACT SYSTEMS ARE REQUIRED.

THE LENGTH OF NEED SHALL BE BASED ON THE PROTECTION ENVELOPE.

CLEARANCE BETWEEN GUARDRAIL AND OBSTRUCTION:  
 STRONG POST (WOOD AND STEEL POSTS) 0.9m  
 THRIE BEAM 0.9m  
 STRONG POST (PLASTIC POSTS) 1.5m

DATA FOR 15m CURVE  
 D=383.0' R=225.0m  
 SR=7.508m CL=15.0m

END TREATMENT IS TO BE DETERMINED BY PROJECT MANAGER TO EACH GIVEN SITUATION.

All dimensions are in millimetres unless otherwise indicated.

⚠			
⚠			
No.	REVISIONS	BY	DATE

Approved:  
 Original signed by  
 Allan Kwan

Executive Director,  
 Technical Standards Branch  
 Date: JUNE 24, 2005

Effective Date: JULY 12, 2005

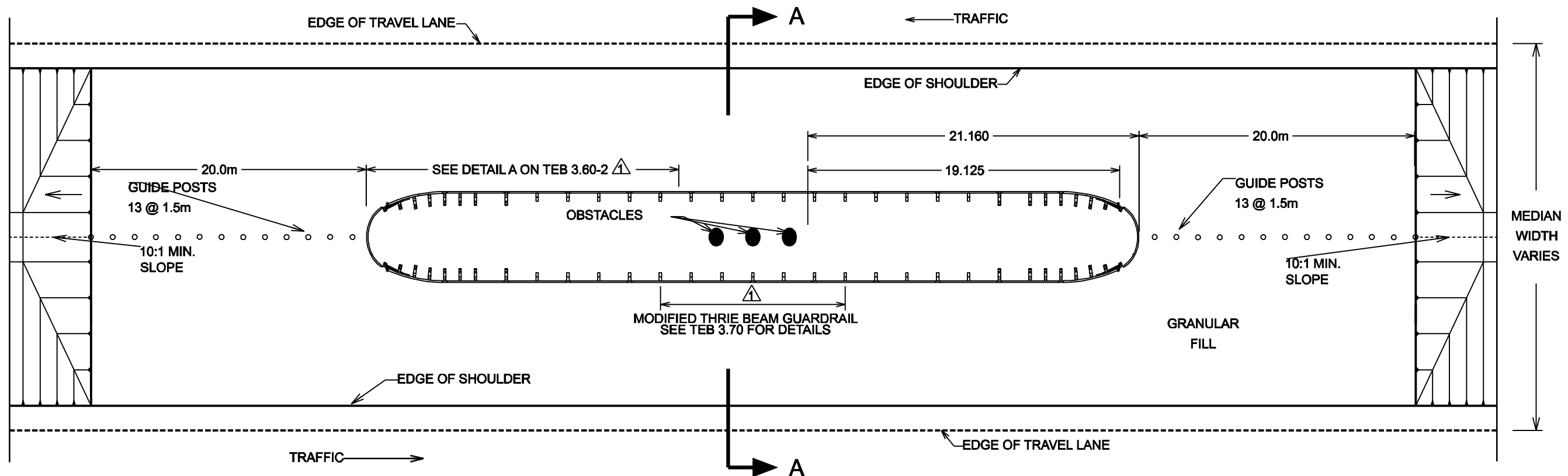


## TYPICAL STRONG POST W-BEAM OR MODIFIED THRIE BEAM GUARDRAIL PLACEMENT FOR MEDIAN HAZARDS

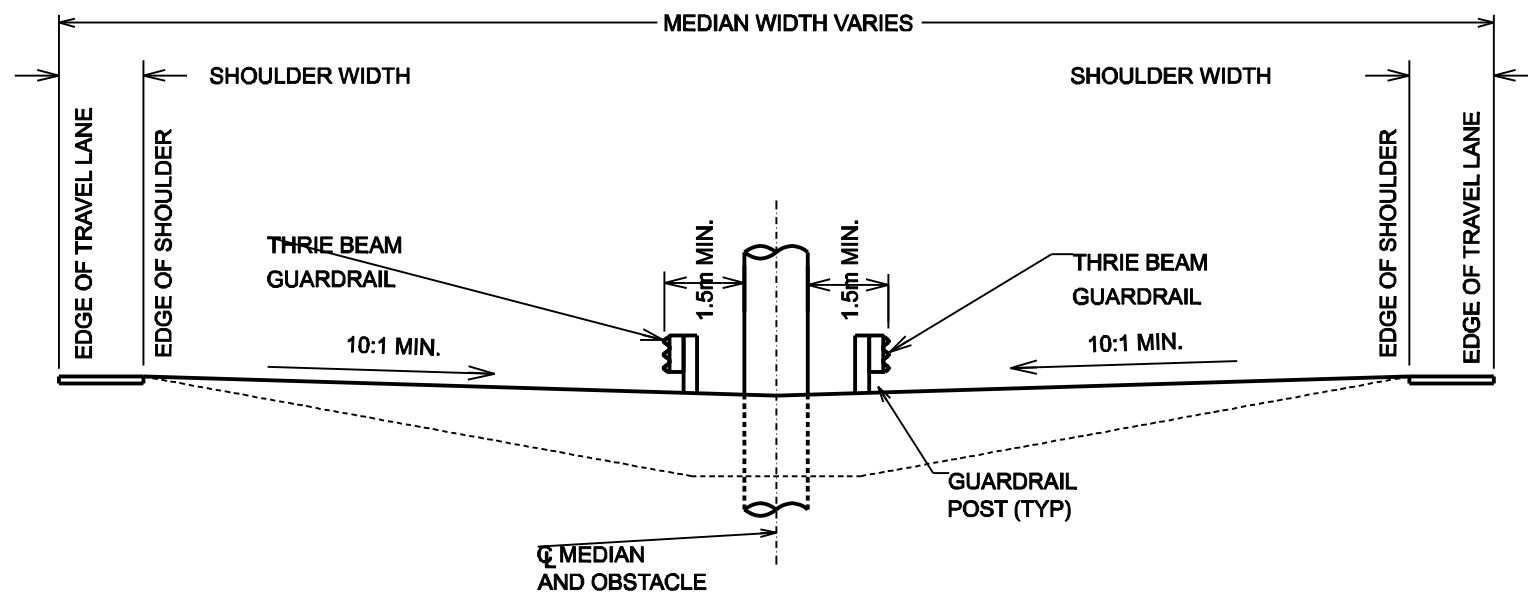
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**PIER AT C OF MEDIAN  
PLAN VIEW**



**SECTION A-A**

**NOTES:**

SUITABLE DRAINAGE MUST BE PROVIDED WHEN MEDIAN GRADING IMPEDES NORMAL FLOW.

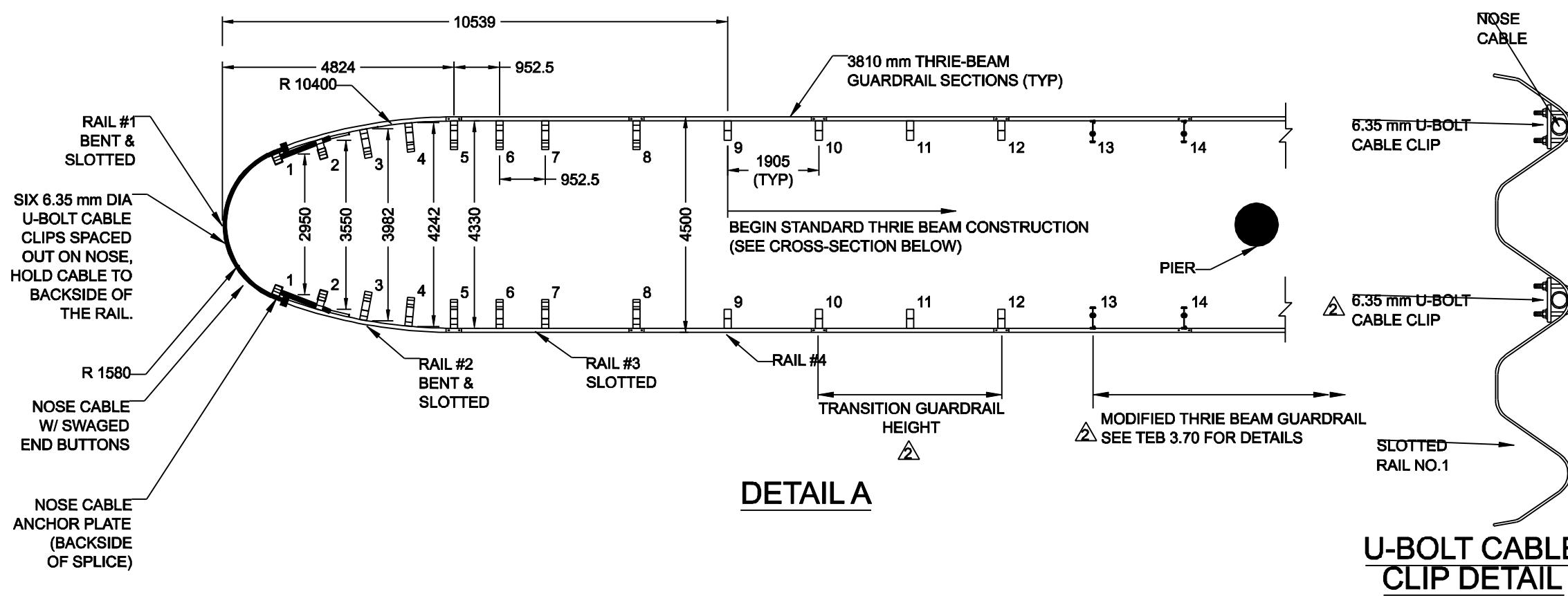
ALL DIMENSIONS SHOWN ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.

△	THRIE BEAM ADDED AND TITLE REVISED	B.K.	18 JUN 07
△	DWG. REFERENCE	B.K.	06/15/06
No.	REVISIONS	BY	DATE

<p>Approved:</p> <p>Original signed by Allan Kwan</p> <p>Executive Director, Technical Standards Branch Date: JUNE 24, 2005</p> <p>Effective Date: JULY 12, 2005</p>	
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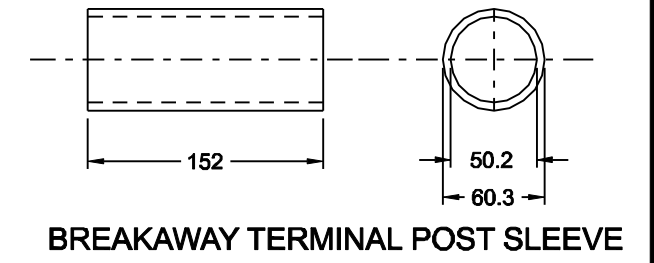
**BULLNOSE GUARDRAIL SYSTEM  
PROTECTION OF PIERS  
IN MEDIANS  
SHEET 1 of 9 △**

Prepared By: M.T	Checked By: B.K	Scale: N.T.S.	Dwg No.: TEB 3.60-1
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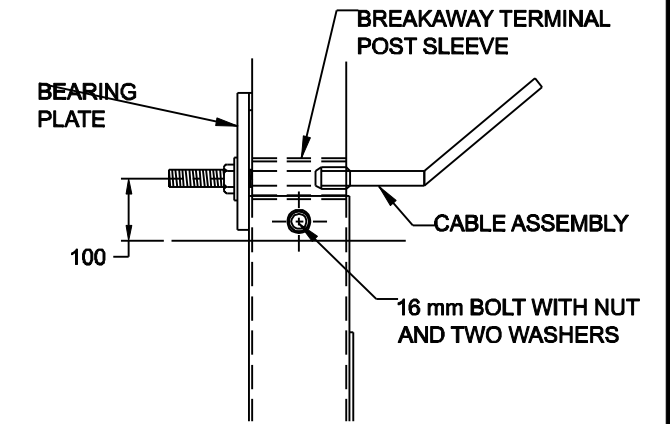


**DETAIL A**

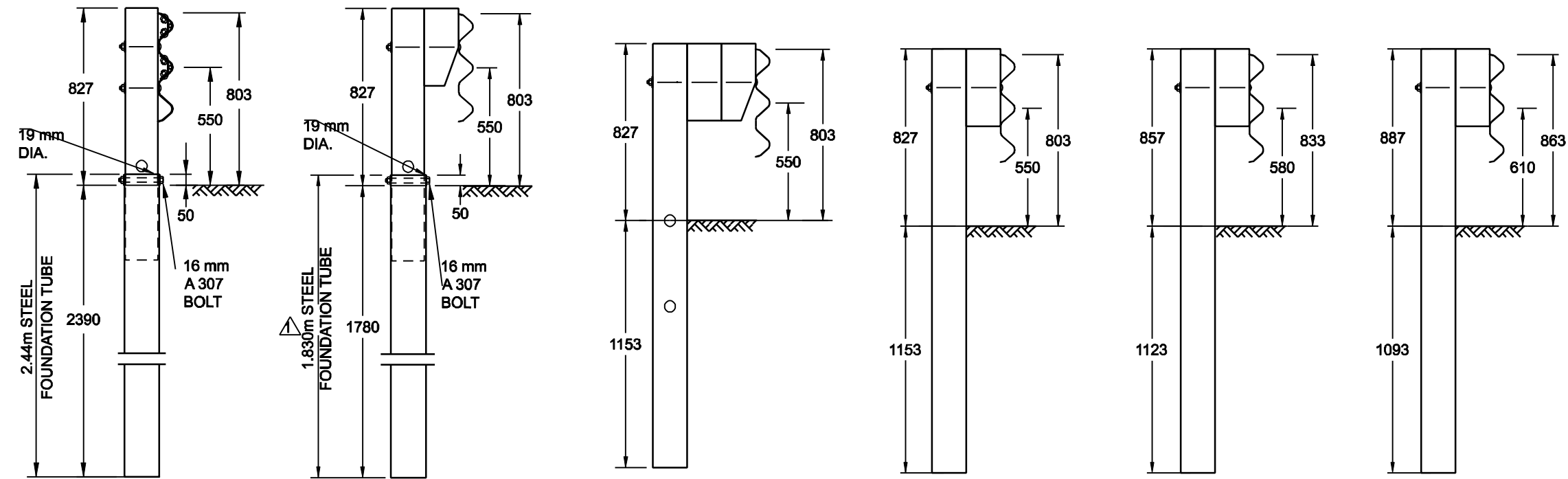
**U-BOLT CABLE CLIP DETAIL**



**BREAKAWAY TERMINAL POST SLEEVE**



**POST 1 DETAIL**



**POST DETAILS**

\* CRT DENOTES CONTROLLED RELEASE TERMINAL

**NOTES:**  
 THRIE BEAM BASE METAL THICKNESS = 2.7mm  
 ALL DIMENSIONS SHOWN ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.

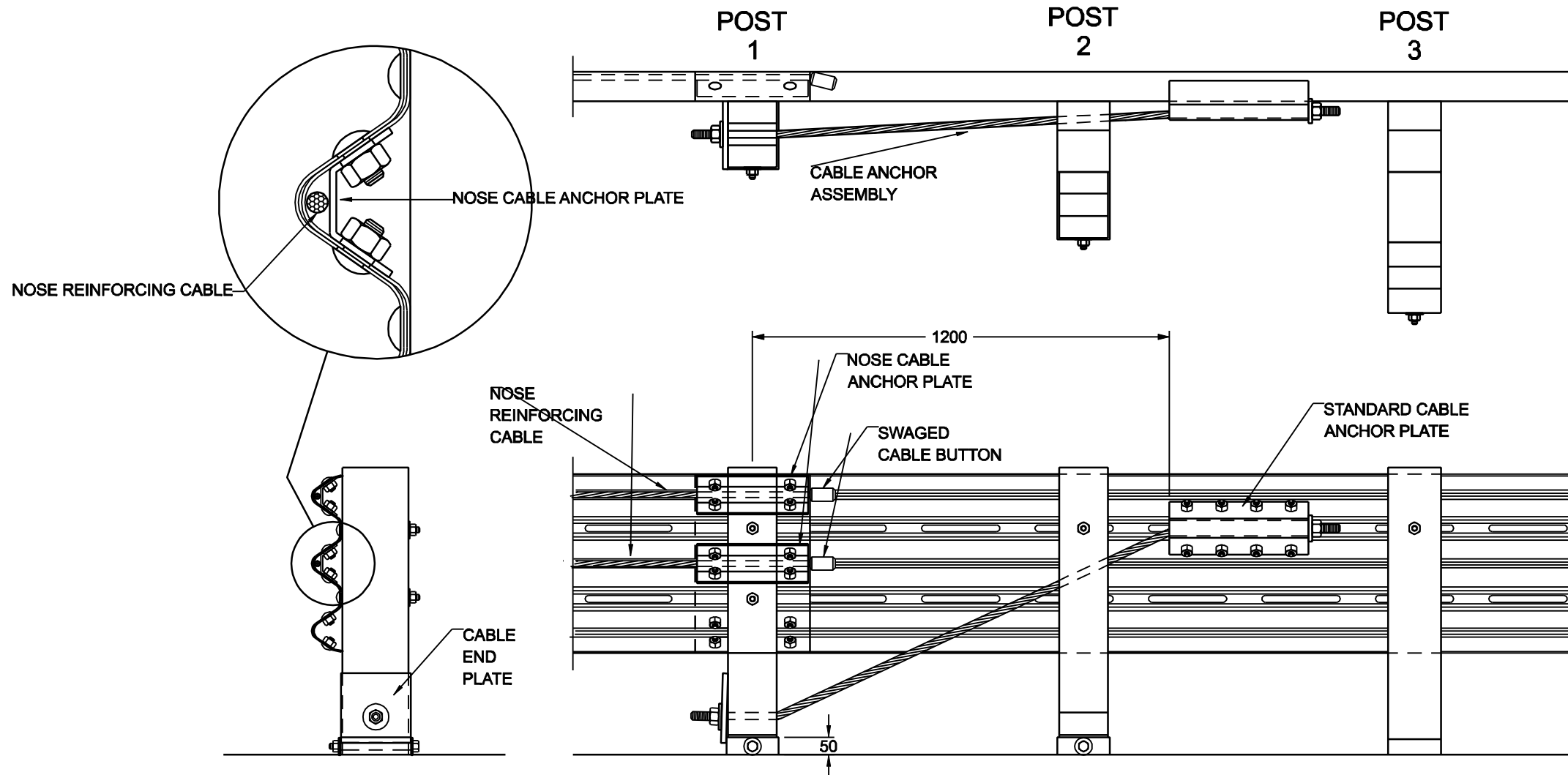
3			
2	POST DETAILS AND TITLE REVISED AND CRT NOTE ADDED	B.K.	18 JUN 07
1	FOUNDATION TUBE LENGTH	B.K.	11/04/05
No.	REVISIONS	BY	DATE

Approved:  
 Original signed by  
 Allan Kwan  
 Executive Director,  
 Technical Standards Branch  
 Date: JUNE 24, 2005  
 JULY 12, 2005

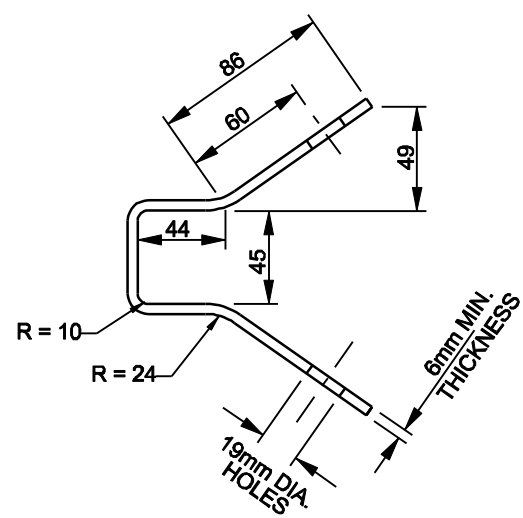


**BULLNOSE GUARDRAIL SYSTEM  
 PROTECTION OF PIERS  
 IN MEDIANS  
 SHEET 2 of 9**

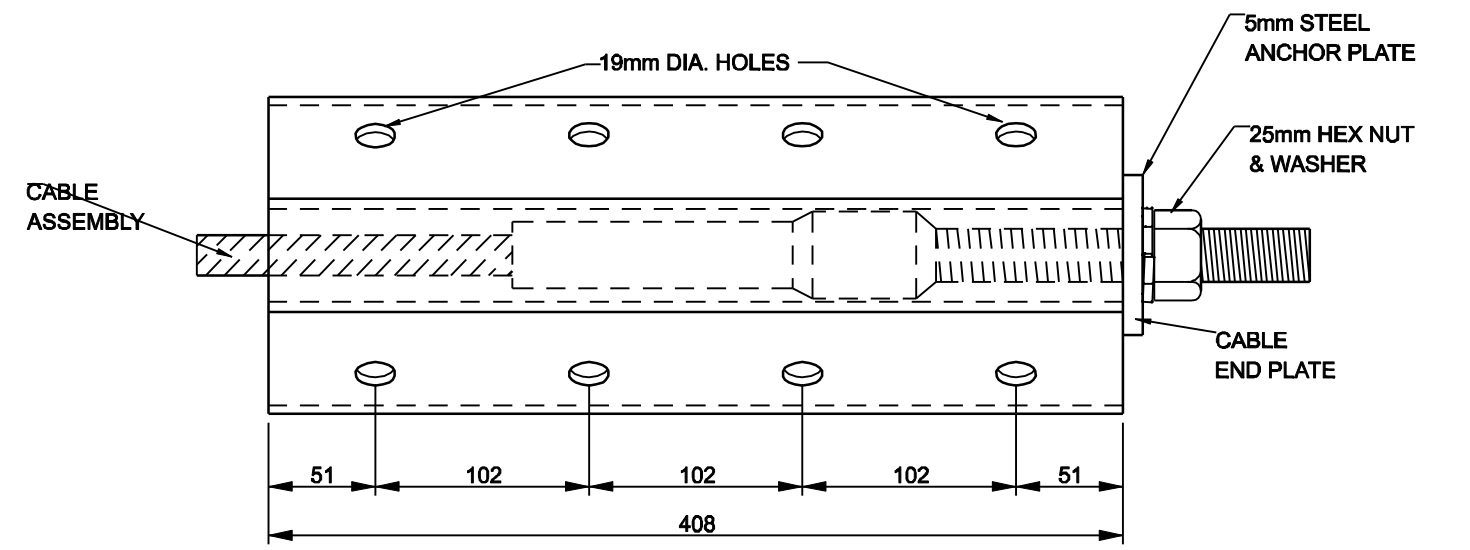
Prepared By: M.T	Checked By: B.K	Scale: N.T.S.	Dwg No.: TEB 3.60-2
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**DETAIL 'B'**



**END VIEW**



**DETAILS OF STANDARD CABLE ANCHOR PLATE**

**NOTE:**  
ALL DIMENSIONS SHOWN ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.

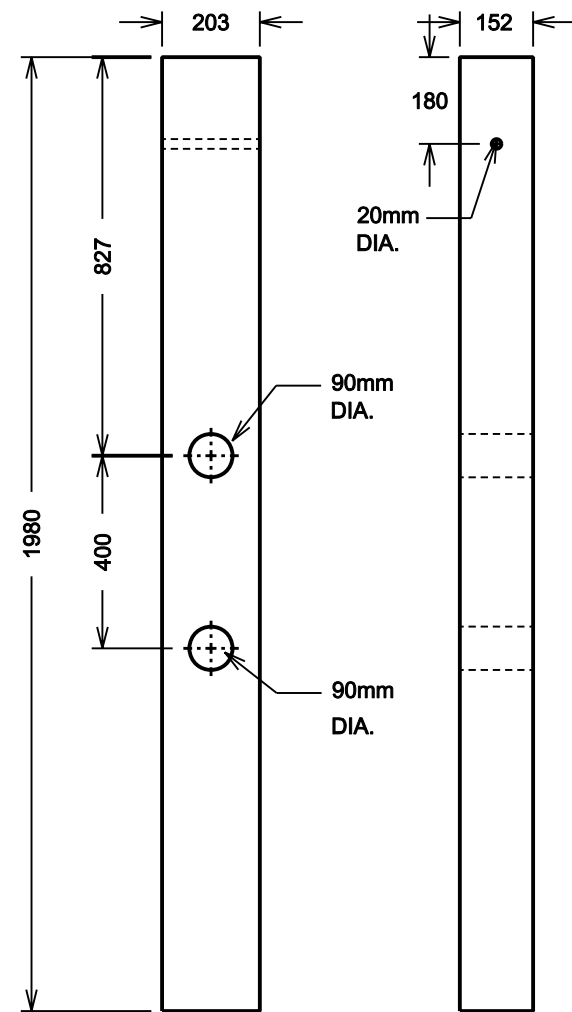
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△	TITLE REVISED	B.K	18 JUN 07
No.	REVISIONS	BY	DATE

Approved:  
Original signed by  
Allan Kwan  
Executive Director,  
Technical Standards Branch  
Date: JUNE 24, 2005  
Effective Date: JULY 12, 2005



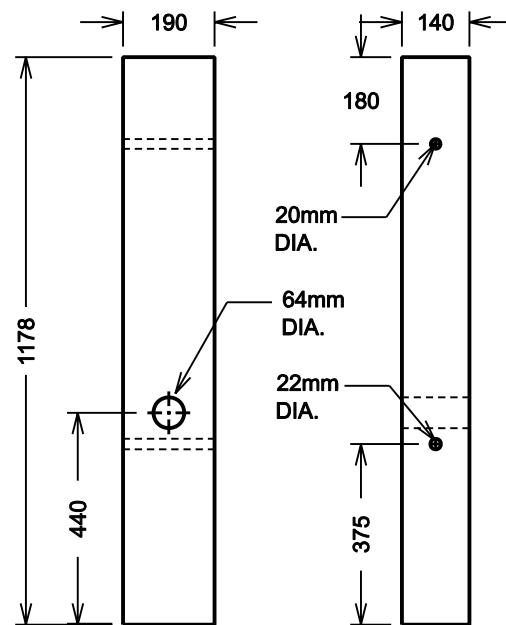
**BULLNOSE GUARDRAIL SYSTEM  
CABLE ANCHOR  
SHEET 3 of 9** △

Prepared By: M.T	Checked By: B.K	Scale: N.T.S.	Dwg No.: TEB 3.60-3
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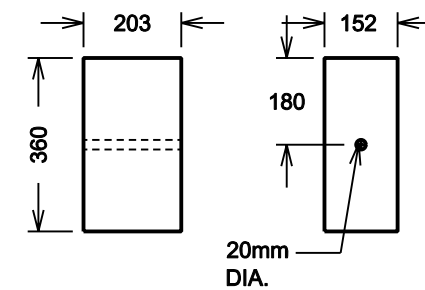


**THRIE BEAM CRT\* POSTS**

\* CRT DENOTES CONTROLLED RELEASE TERMINAL  $\triangle$



**THRIE BEAM ANCHOR POSTS**



**POSTS 3 THROUGH 12  
STANDARD BLOCKS**



**NOTES:**

CRT, ANCHOR AND BLOCK POSTS ARE WOOD.

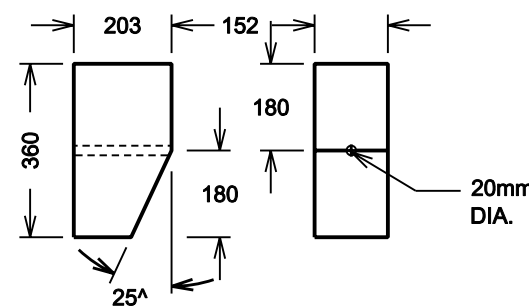
ALL DIMENSIONS SHOWN ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.

$\triangle$			
$\triangle$	BLOCK DETAILS AND TITLE REVISED AND CRT NOTE ADDED	B.K.	18 JUN 07
No.	REVISIONS	BY	DATE

Approved: Original signed by Allan Kwan  Executive Director, Technical Standards Branch Date: JUNE 24, 2005 Effective Date: JULY 12, 2005	
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**BULLNOSE GUARDRAIL SYSTEM  
POSTS & BLOCKS  
SHEET 4 of 9  $\triangle$**

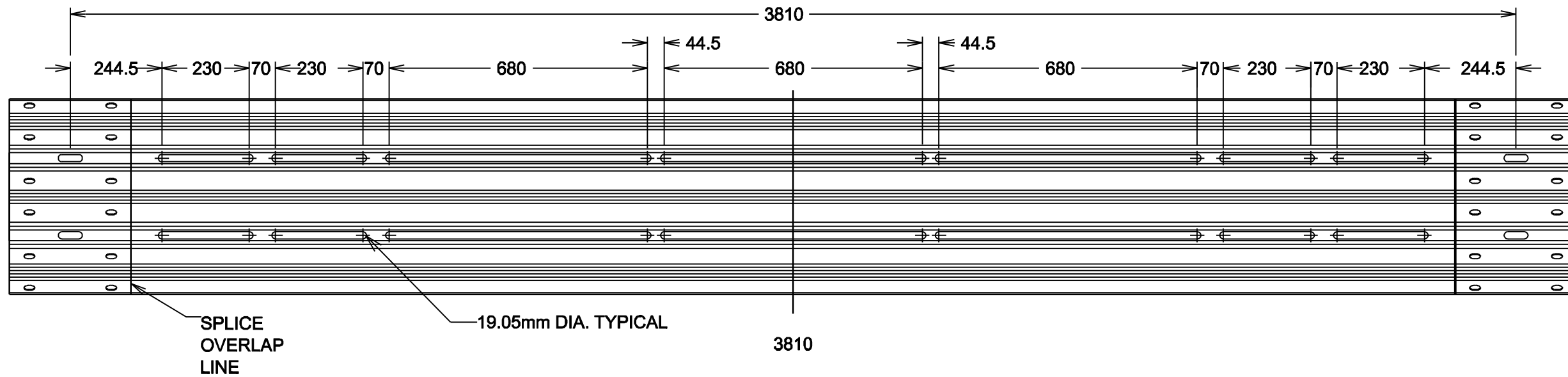
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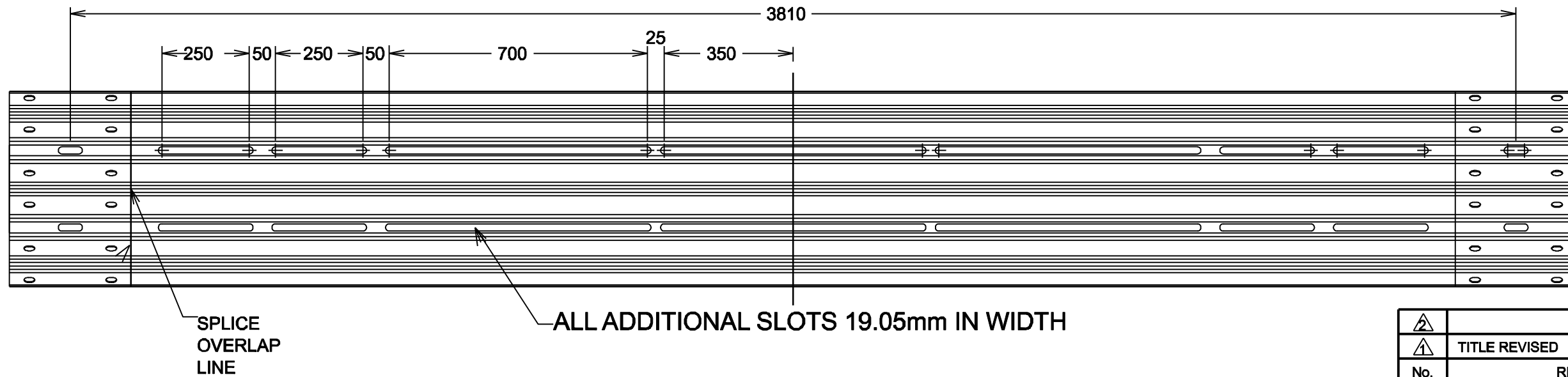
**TAPERED BLOCKS FOR POSTS**

**2 - 8**





**RAIL SECTION 1 ("NOSE" SECTION)**



**RAIL SECTION 1 ("NOSE" SECTION)**

**NOTE:**

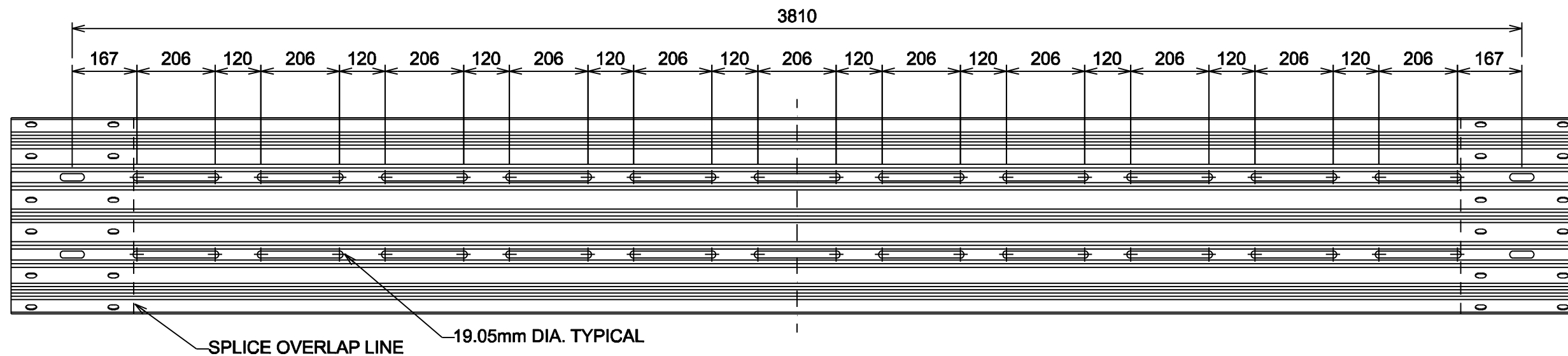
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△	TITLE REVISED	B.K.	18 JUN 07
No.	REVISIONS	BY	DATE

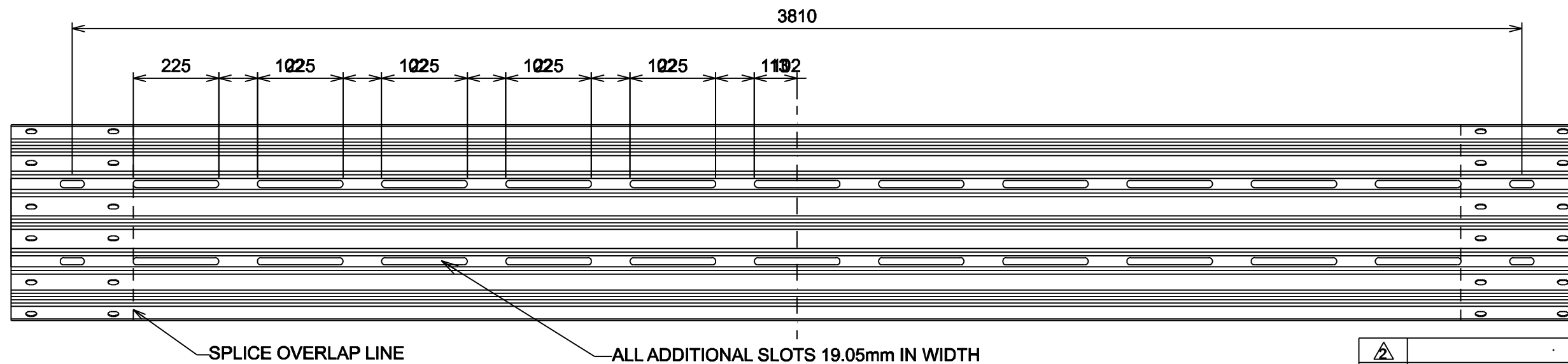
Approved: Original signed by Allan Kwan Executive Director, Technical Standards Branch Date: JUNE 24, 2005 Effective Date: JULY 12, 2005	
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**BULLNOSE GUARDRAIL SYSTEM  
RAIL SECTION 1  
SHEET 5 of 9 △**

Prepared By: M.T	Checked By: B.K	Scale: N.T.S.	Dwg No.: TEB 3.60-5
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**RAIL SECTION 2**



**RAIL SECTION 2**

**NOTE:**  
ALL DIMENSIONS SHOWN ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.

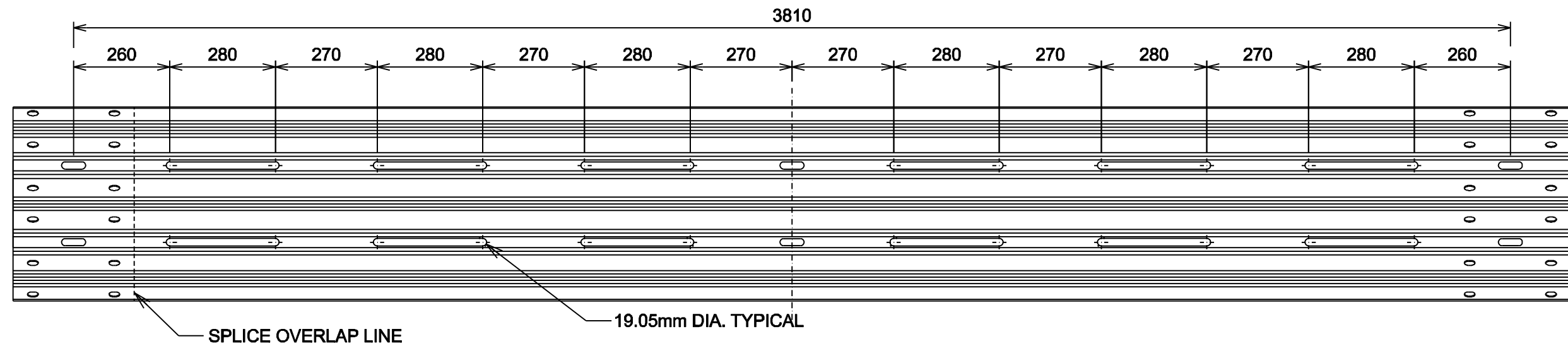
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△	TITLE REVISED	B.K.	18 JUN 07
No.	REVISIONS	BY	DATE

Approved:  
Original signed by  
Allan Kwan  
Executive Director,  
Technical Standards Branch  
Date: JUNE 24, 2005  
Effective Date: JULY 12, 2005

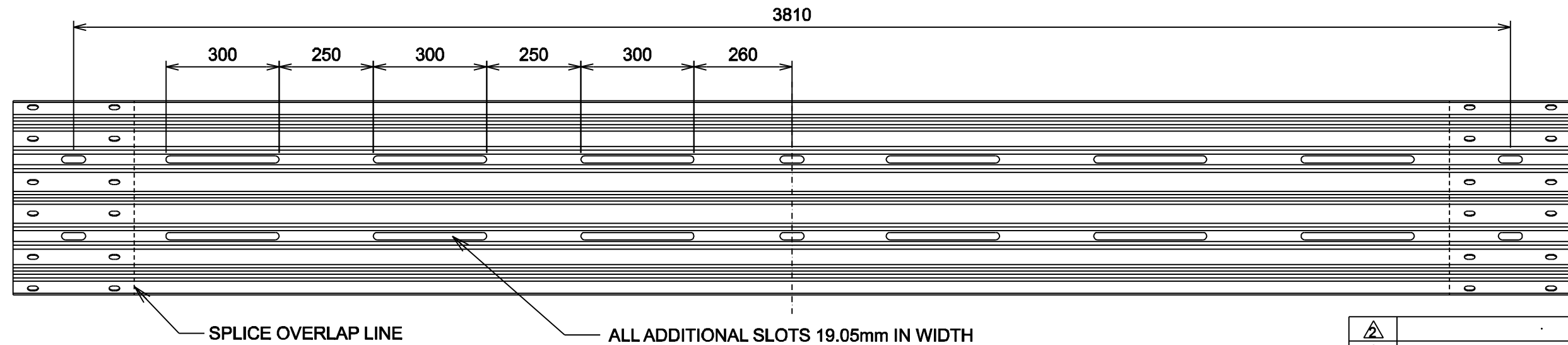


**BULLNOSE GUARDRAIL SYSTEM  
RAIL SECTION 2  
SHEET 6 of 9**

Prepared By: M.T	Checked By: B.K	Scale: N.T.S.	Dwg No.: TEB 3.60-6
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**RAIL SECTION 3**



**RAIL SECTION 3**

**NOTE:**

ALL DIMENSIONS SHOWN ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.

△	TITLE REVISED	B.K.	18 JUN 07
No.	REVISIONS	BY	DATE

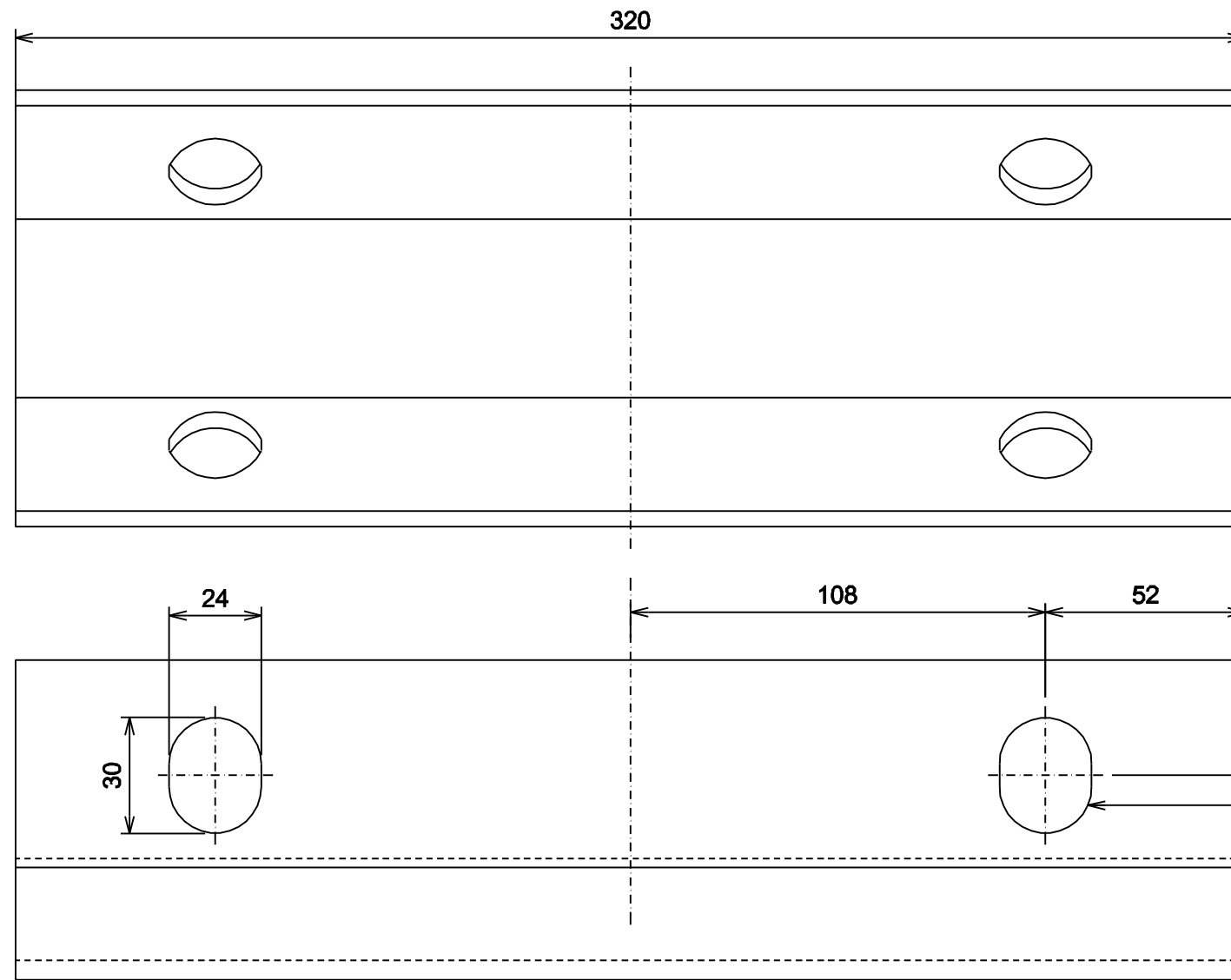
Approved:  
Original signed by  
Allan Kwan  
Executive Director,  
Technical Standards Branch  
Date: JUNE 24, 2005  
Effective Date: JULY 12, 2005



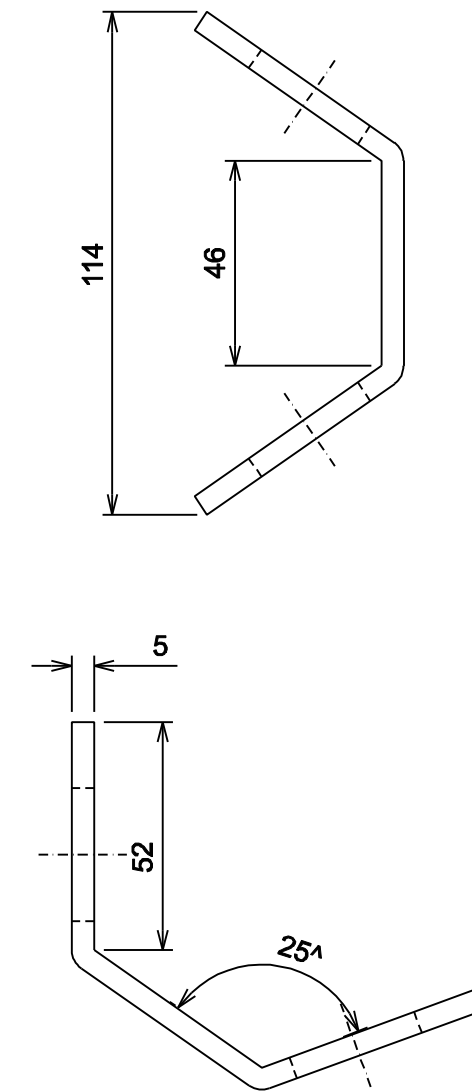
**BULLNOSE GUARDRAIL SYSTEM  
RAIL SECTION 3  
SHEET 7 of 9 △**

Prepared By: M.T	Checked By: B.K	Scale: N.T.S.	Dwg No.: TEB 3.60-7
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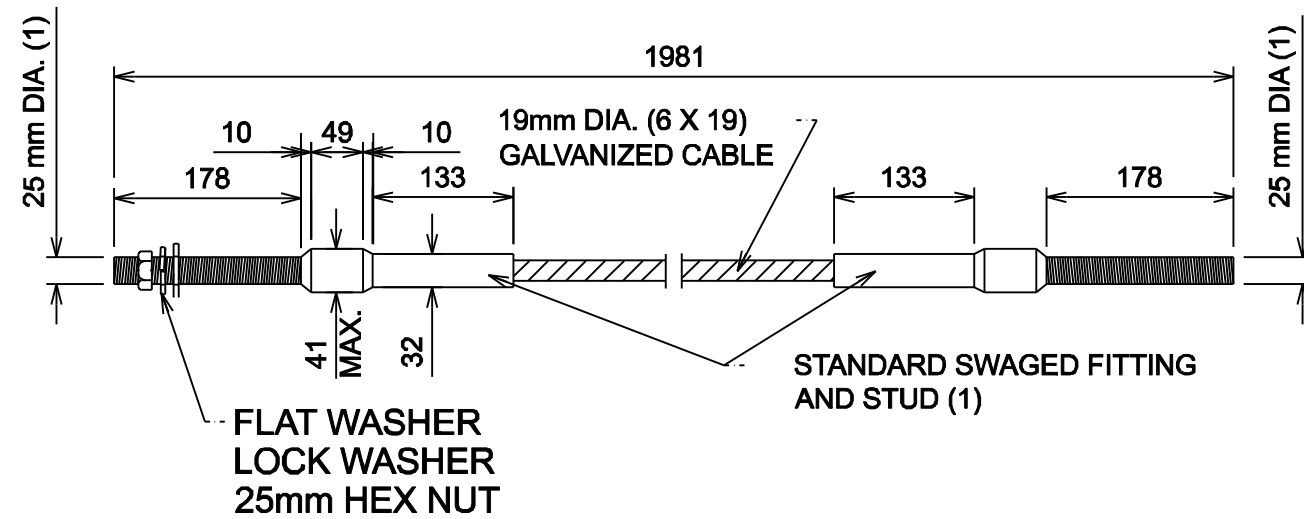
**STEEL PLATE, A306**  
**320 mm x 150 mm x 5 mm**



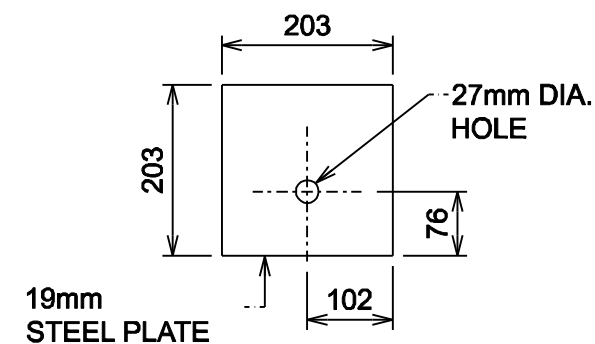
NOTE:

ALL DIMENSIONS SHOWN ARE IN MILLIMETRES  
 UNLESS OTHERWISE NOTED.

(1) STUD, THREADED ENTIRE LENGTH.



**DETAIL OF CABLE ASSEMBLY**



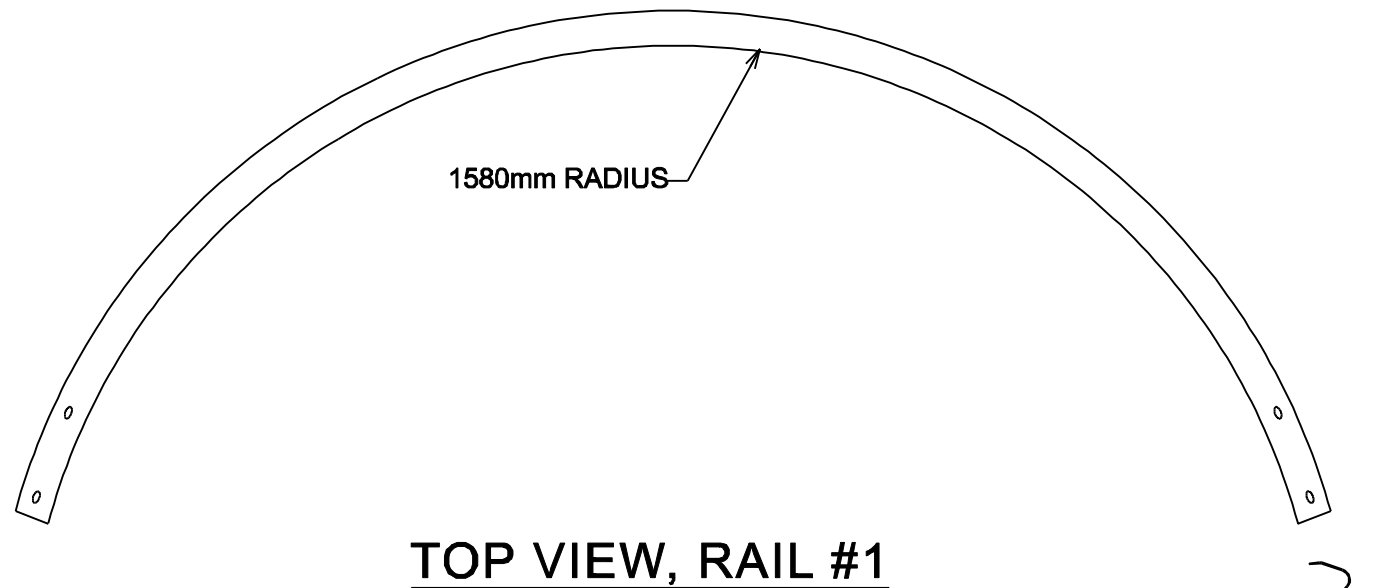
**DETAIL OF**  
**STEEL BEARING PLATE**

No.	REVISIONS	BY	DATE
	TITLE REVISED	B.K.	18 JUN 07

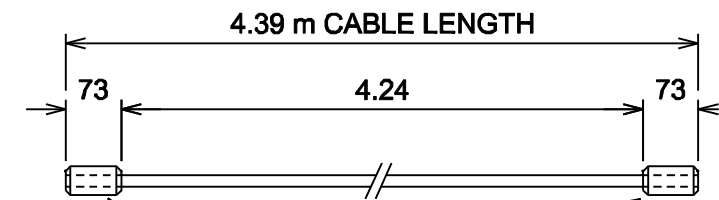
Approved: Original signed by Allan Kwan  Executive Director, Technical Standards Branch Date: JUNE 24, 2005 Effective Date: JULY 12, 2005	
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**BULLNOSE GUARDRAIL SYSTEM**  
**PLATES AND CABLE ASSEMBLY**  
 SHEET 8 of 9

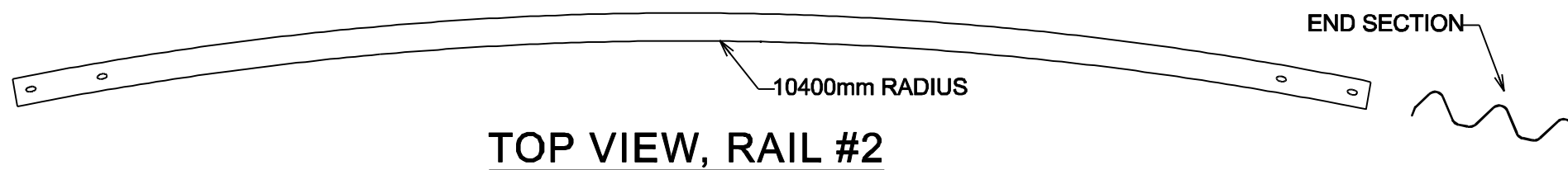
Prepared By: M.T	Checked By: B.K	Scale: N.T.S.	Dwg No.: TEB 3.60-8
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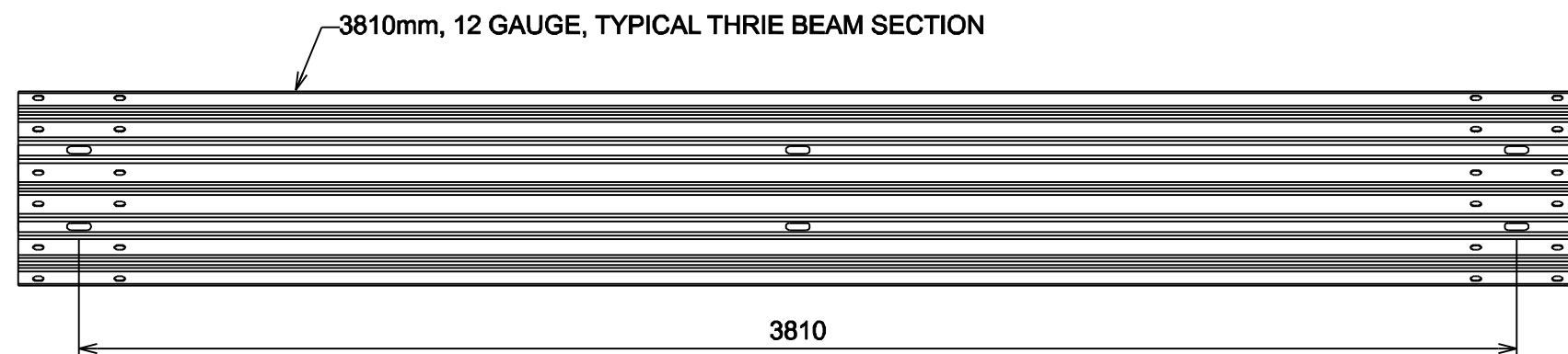
END SECTION



"COLD TUFF" BUTTON, S-409 SIZE NO. 12  
SB 73mm STOCK NO. 1040395 FOR 15.9mm  
DIA (7 x 19) WIRE ROPE  
(OR ANY SIMILARLY SIZED SWAGE-GRIP  
BUTTON FERRULES)



END SECTION



END SECTION

**FRONT VIEW RAIL (UNBENT)**

**NOTE:**

ALL DIMENSIONS SHOWN ARE IN MILLIMETRES  
UNLESS OTHERWISE NOTED.

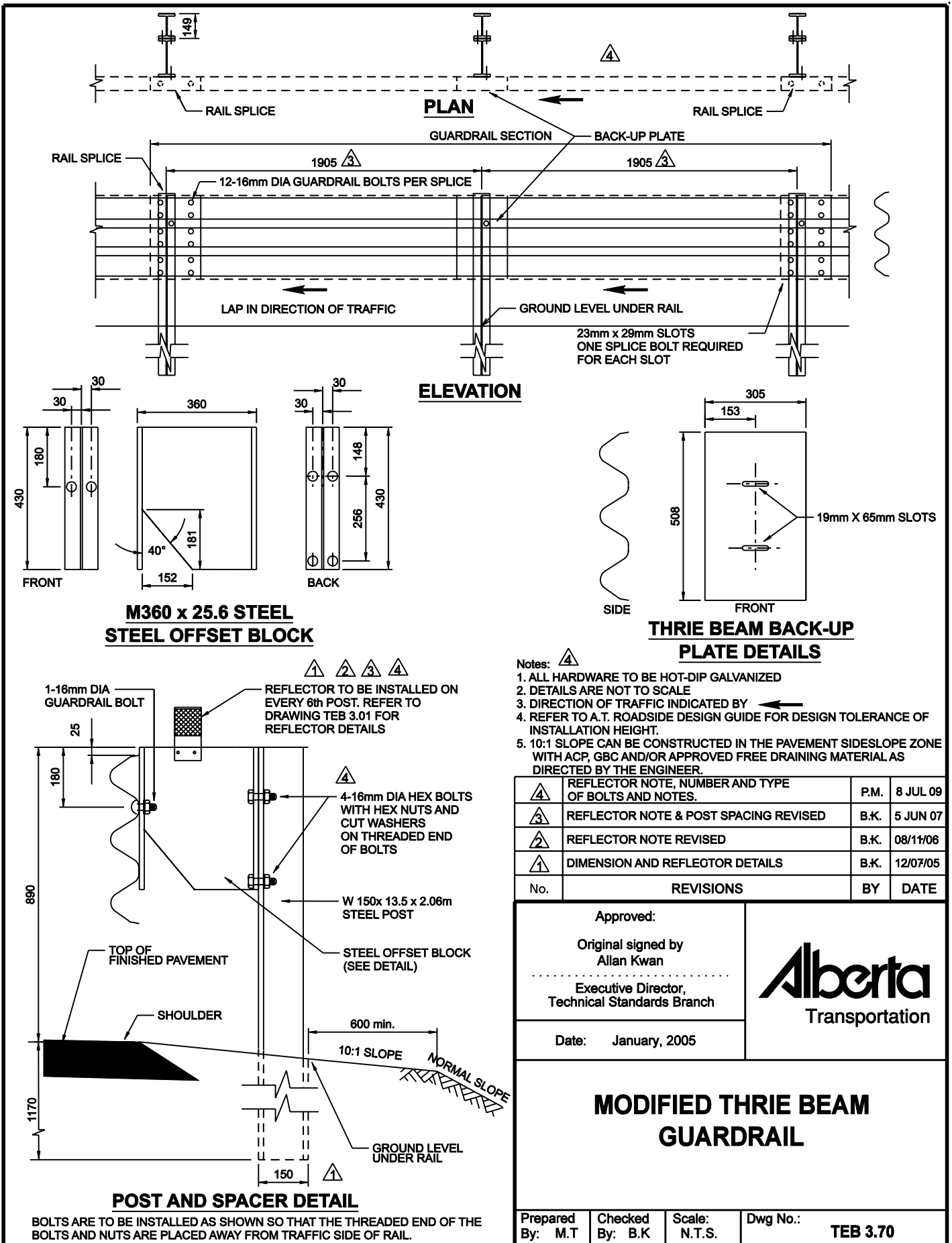
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△	TITLE REVISED	B.K.	18 JUN 07
No.	REVISIONS	BY	DATE

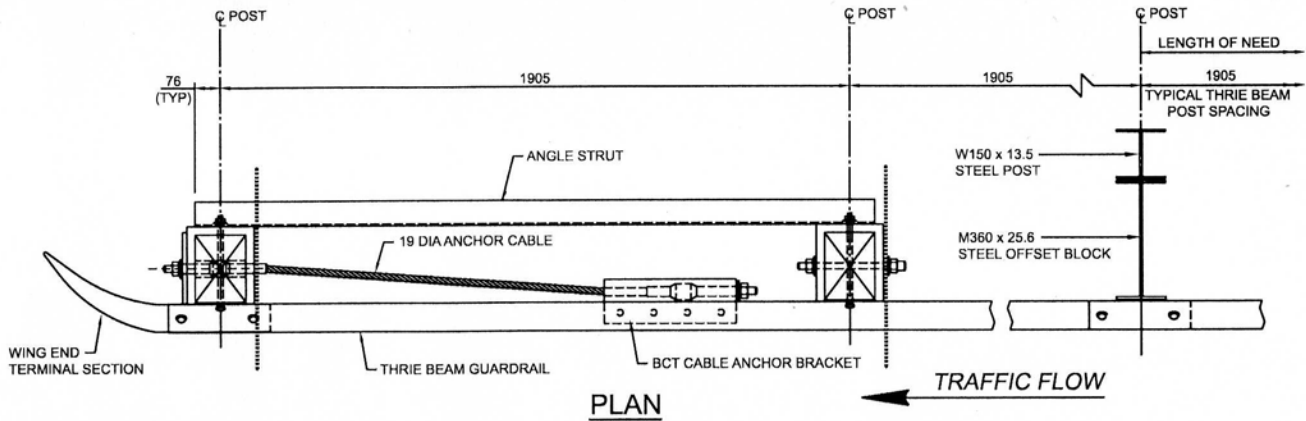
<p>Approved:</p> <p>Original signed by Allan Kwan</p> <p>Executive Director, Technical Standards Branch Date: JUNE 24, 2005</p> <p>Effective Date: JULY 12, 2005</p>	
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**BULLNOSE GUARDRAIL SYSTEM  
THRIE BEAM AND CABLE LENGTH  
SHEET 9 of 9 △**

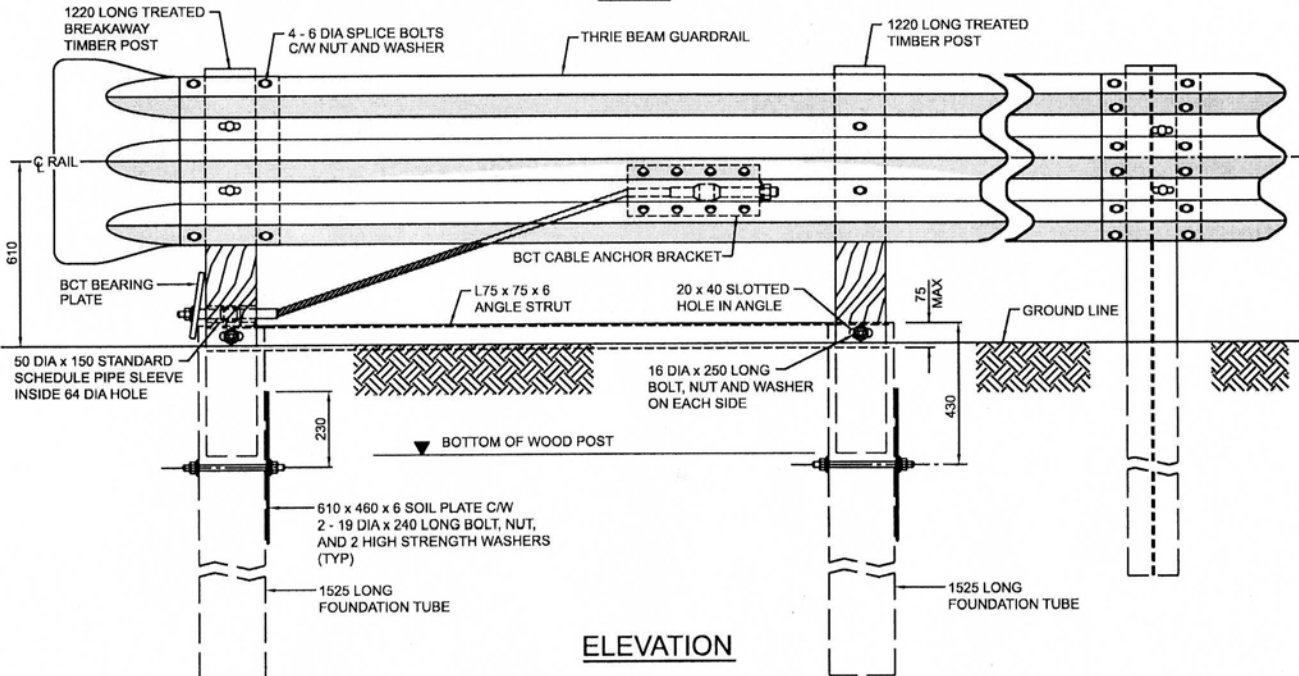
Prepared By: M.T	Checked By: B.K	Scale: N.T.S.	Dwg No.: TEB 3.60-9
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PLAN

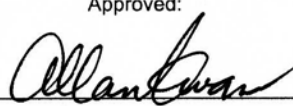



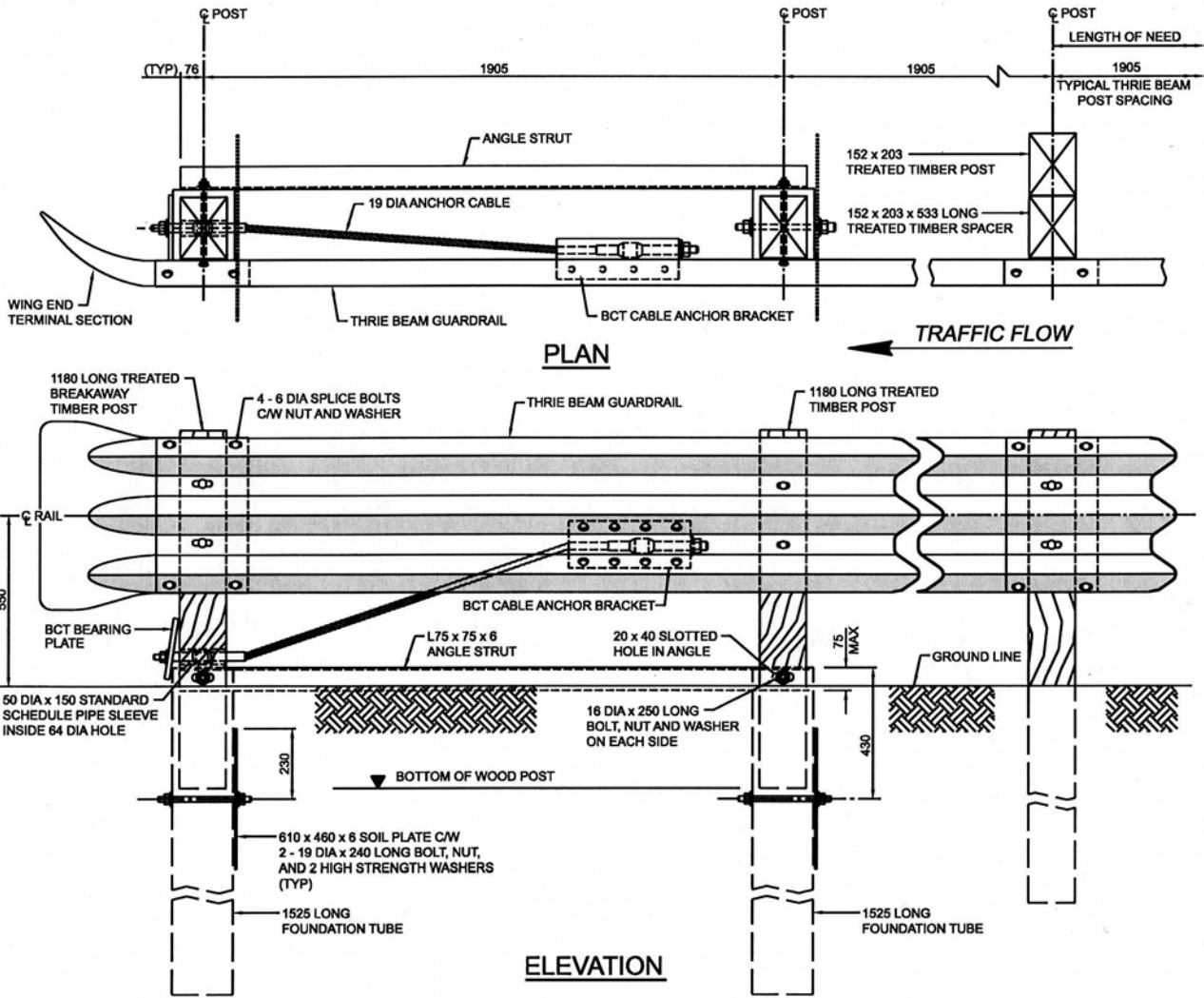
ELEVATION

**NOTES:**

1. THIS END TREATMENT IS ACCEPTABLE FOR USE ON THE LEAVING END OF DIVIDED ROADWAYS ONLY. USE IN MEDIAN APPLICATIONS ARE LIMITED TO INSTALLATIONS OUTSIDE THE CLEAR ZONE OF OPPOSING TRAFFIC.
2. POSTS ARE TO BE SET BY INSTRUMENT FOR ALIGNMENT AND GRADE.
3. BCT CABLE ANCHOR HARDWARE SHALL CONFORM TO AASHTO TASK FORCE 13 REPORT "A GUIDE TO STANDARDIZED HIGHWAY BARRIER HARDWARE."
4. LAP ALL GUARDRAIL SECTIONS IN THE DIRECTION OF TRAFFIC FLOW.
5. ALL REQUIRED FITTINGS AND HARDWARE SHALL BE GALVANIZED.
6. CABLE ANCHOR SHALL BE TIGHTENED DURING INSTALLATION TO TAKE OUT ANY SLACK.
7. REFER TO RDG-B5.3 AND RDG-B5.4 FOR STANDARD HARDWARE DETAILS.

ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE INDICATED.

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⚠			
No.	REVISIONS	BY	DATE
Approved:  Executive Director, Technical Standards Branch			
Date: NOVEMBER, 2007			
<b>MODIFIED THRIE BEAM          CABLE ANCHOR TERMINAL          WITH WING END          (EXIT END TREATMENT          FOR DIVIDED HIGHWAYS)</b>			
Prepared By: MO	Checked By: WS	Scale: N.T.S.	Dwg No.: <b>RDG-B5.1</b>




**NOTES:**

1. THIS END TREATMENT IS ACCEPTABLE FOR USE ON THE LEAVING END OF DIVIDED ROADWAYS ONLY. USE IN MEDIAN APPLICATIONS ARE LIMITED TO INSTALLATIONS OUTSIDE THE CLEAR ZONE OF OPPOSING TRAFFIC.
2. POSTS ARE TO BE SET BY INSTRUMENT FOR ALIGNMENT AND GRADE.
3. BCT CABLE ANCHOR HARDWARE SHALL CONFORM TO AASHTO TASK FORCE 13 REPORT "A GUIDE TO STANDARDIZED HIGHWAY BARRIER HARDWARE."
4. LAP ALL GUARDRAIL SECTIONS IN THE DIRECTION OF TRAFFIC FLOW.
5. ALL REQUIRED FITTINGS AND HARDWARE SHALL BE GALVANIZED.
6. CABLE ANCHOR SHALL BE TIGHTENED DURING INSTALLATION TO TAKE OUT ANY SLACK.
7. REFER TO RDG-B1.2 AND RDG-B1.3 FOR STANDARD HARDWARE DETAILS.

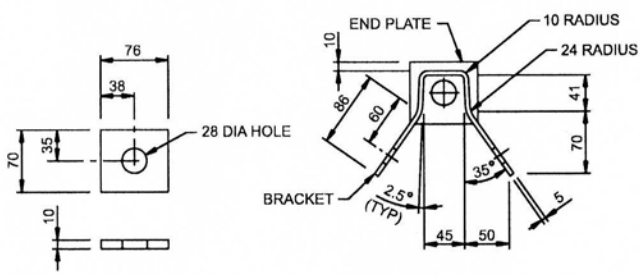
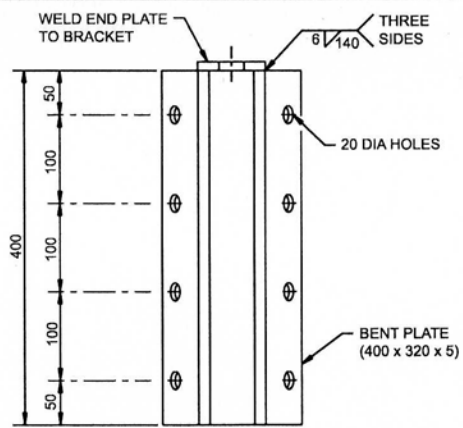
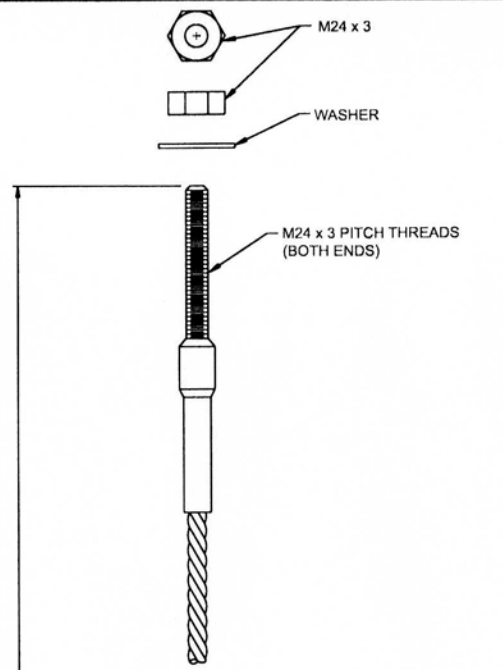
ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE INDICATED.

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No.	REVISIONS	BY	DATE

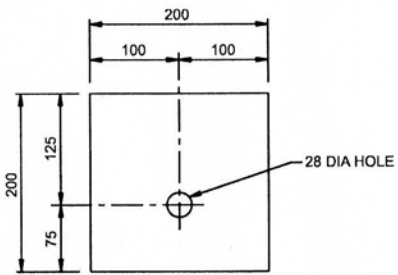
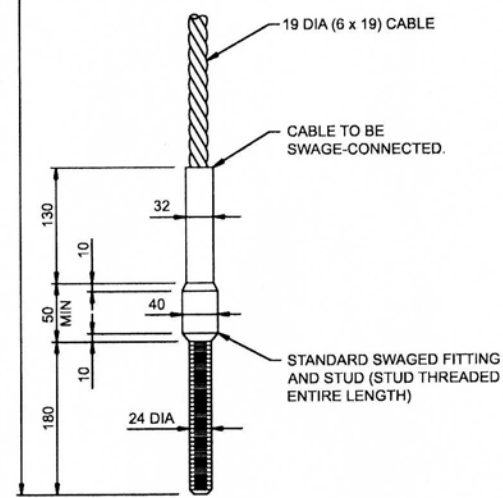
<p style="text-align: center;">Approved:</p> <p style="text-align: center;"><i>Allan Kwan</i> Executive Director, Technical Standards Branch</p> <p style="text-align: center;">Date: NOVEMBER, 2007</p>	
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**STANDARD THRIE BEAM CABLE ANCHOR TERMINAL WITH WING END (EXIT END TREATMENT FOR DIVIDED HIGHWAYS)**

Prepared By: MO	Checked By: WS	Scale: N.T.S.	Dwg No.: <b>RDG-B5.2</b>
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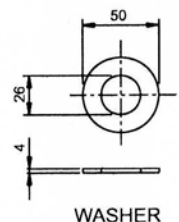


END PLATE BRACKET  
**BCT CABLE ANCHOR BRACKET**



**200 x 200 x 16 BCT BEARING PLATE**

**BCT CABLE ANCHOR ASSEMBLY**



ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE INDICATED.

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△			
No.	REVISIONS	BY	DATE

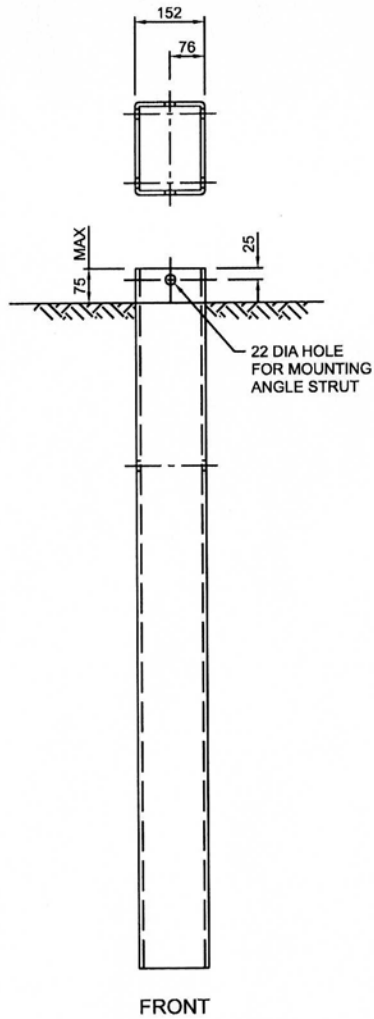
Approved:  
*Allan Swan*  
 Executive Director,  
 Technical Standards Branch



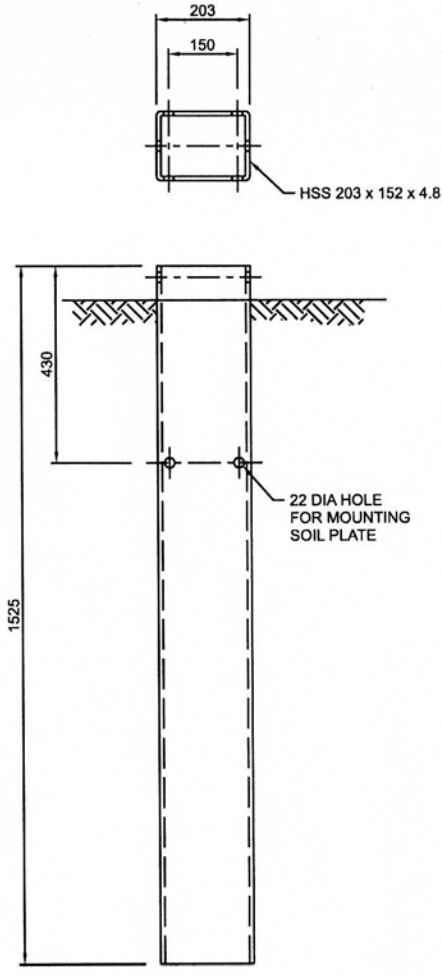
Date: NOVEMBER, 2007

**HARDWARE DETAILS  
 FOR W-BEAM AND  
 THRIE BEAM GUARDRAIL  
 CABLE ANCHOR TERMINAL**

Prepared By: MO	Checked By: WS	Scale: NTS	Dwg No.: <b>RDG-B5.3</b>
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FRONT

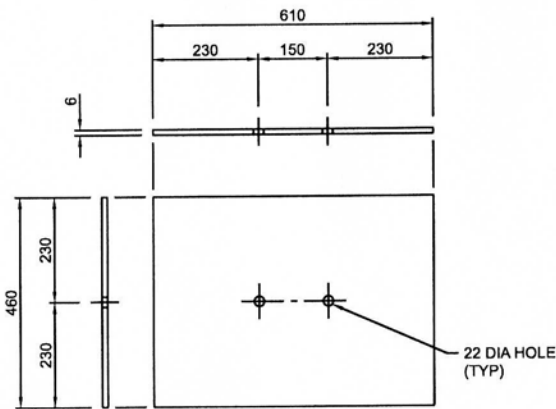


SIDE

**FOUNDATION TUBE**

**NOTE:**



WOOD POST SHOULD BE ABLE TO SLIDE INTO THE TOP OF FOUNDATION TUBE SO THE ACTUAL INSIDE DIMENSIONS OF FOUNDATION TUBE CAN NOT BE LESS THAN 190x140.



**FOUNDATION TUBE SOIL PLATE**

ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE INDICATED.

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No.	REVISIONS	BY	DATE

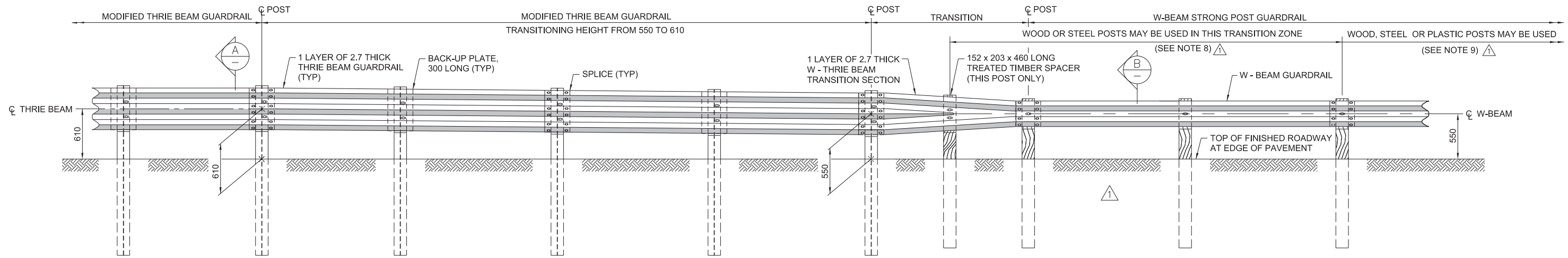
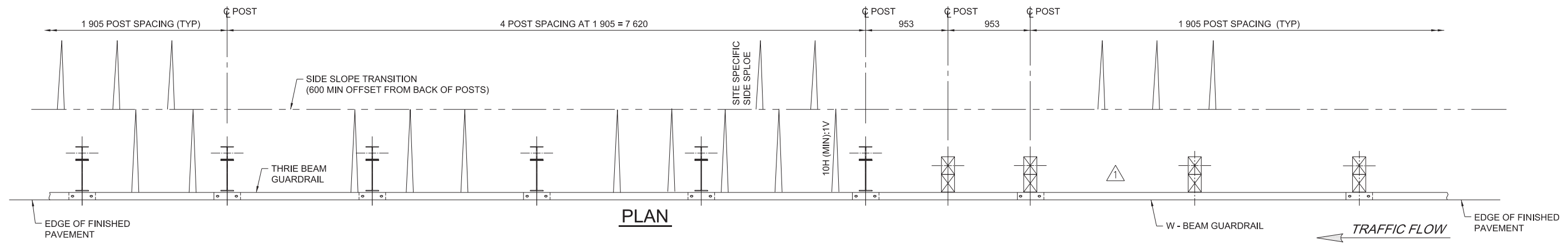
<p>Approved:</p>  <p>Executive Director, Technical Standards Branch</p>	
<p>Date: NOVEMBER, 2007</p>	

**FOUNDATION TUBE AND FOUNDATION TUBE SOIL PLATE DETAILS FOR W-BEAM AND THRIE BEAM CABLE ANCHOR TERMINAL**

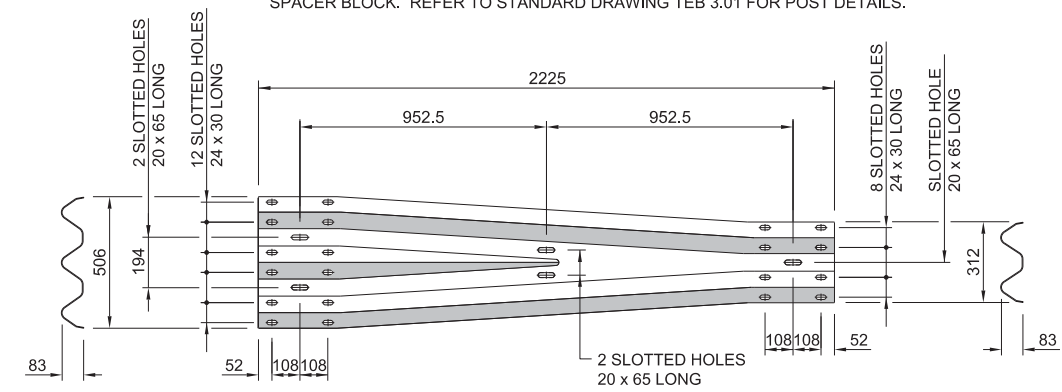
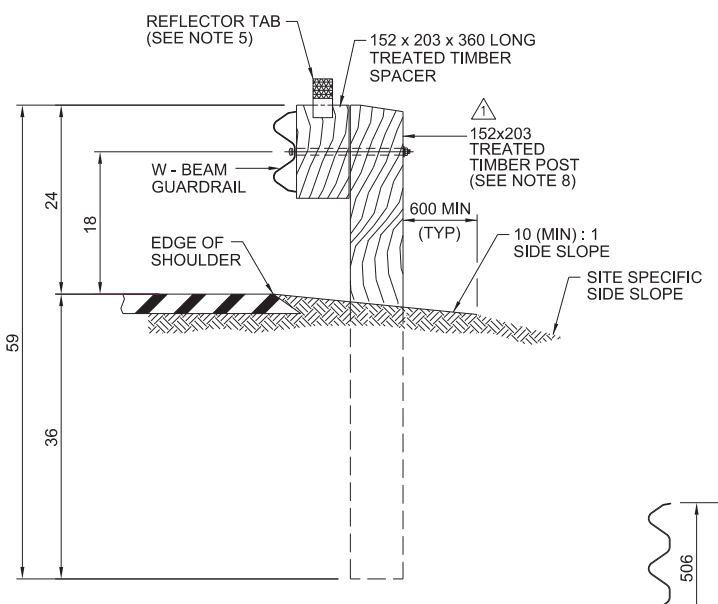
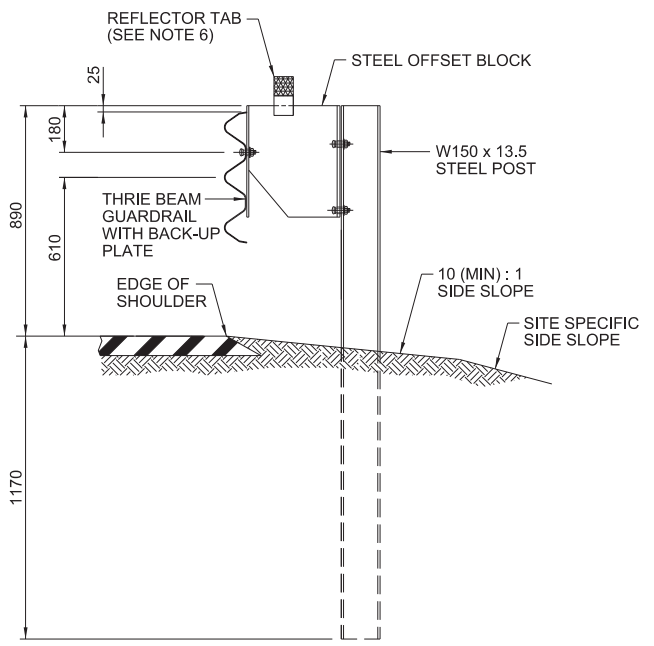
Prepared By: MO	Checked By: WS	Scale: NTS	Dwg No.: <b>RDG-B5.4</b>
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- NOTES:**
- POSTS SHALL TO SET BY INSTRUMENT FOR ALIGNMENT AND GRADE.
  - THE ACCEPTABLE TOLERANCE FOR HEIGHT OF GUARDRAIL AT TIME OF CONSTRUCTION OR MAINTENANCE SHALL BE IN ACCORDANCE WITH THE MOST RECENT SPECIFICATIONS.
  - LAP ALL JOINTS IN THE DIRECTION OF TRAFFIC FLOW.
  - ALL FITTINGS AND HARDWARE REQUIRED SHALL BE GALVANIZED.
  - STRAIGHT WHITE DOUBLE SIDED DIAMOND GRADE 127 x 76 REFLECTOR FROM DAVIDSON TRAFFIC CONTROL PRODUCTS OR APPROVED EQUIVALENT. FASTEN TO TOP OF EVERY SIXTH GUARDRAIL STRONG POST BY MECHANICAL MEANS SUCH AS NAILING OR STAPLING. ADHESIVES ALONE WILL NOT BE ACCEPTED.
  - STRAIGHT WHITE DOUBLE SIDED DIAMOND GRADE 127 x 76 REFLECTOR FROM DAVIDSON TRAFFIC CONTROL PRODUCTS OR APPROVED EQUIVALENT. FASTEN TO TOP OF EVERY SIXTH GUARDRAIL STEEL OFFSET BLOCK WITH APPROVED ADHESIVE.
  - THIS DESIGN MAY BE CONSIDERED TO MEET NCHRP REPORT 350 TL-3 EVALUATION CRITERIA.
  - TRANSITION ZONE CAN BE WOOD OR STEEL POST WITH WOOD SPACER BLOCK. REFER TO STANDARD DRAWING TEB 3.01 FOR POST DETAILS.
  - TYPICAL STRONG POST SYSTEM CAN BE WOOD, STEEL, OR PLASTIC POST WITH WOOD SPACER BLOCK. REFER TO STANDARD DRAWING TEB 3.01 FOR POST DETAILS.



No.	REVISIONS	BY	DATE
	NOTE 8 AND 9 ADDED AND CORRECTION TO W-THRIE BEAM TRANSITION SECTION DIMENSIONS POST REMOVED FROM PLAN AND ELEVATION	HC	11 MAR 2016

Approved:

Allan Kwan  
Executive Director,  
Technical Standards Branch

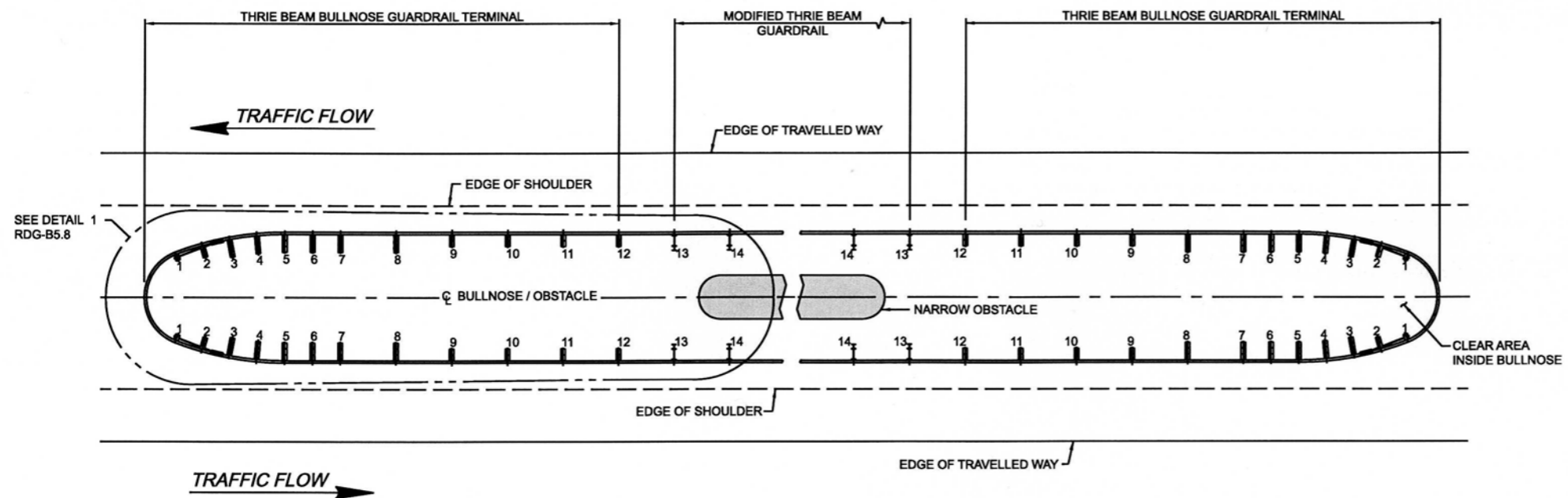
Date: NOVEMBER, 2007



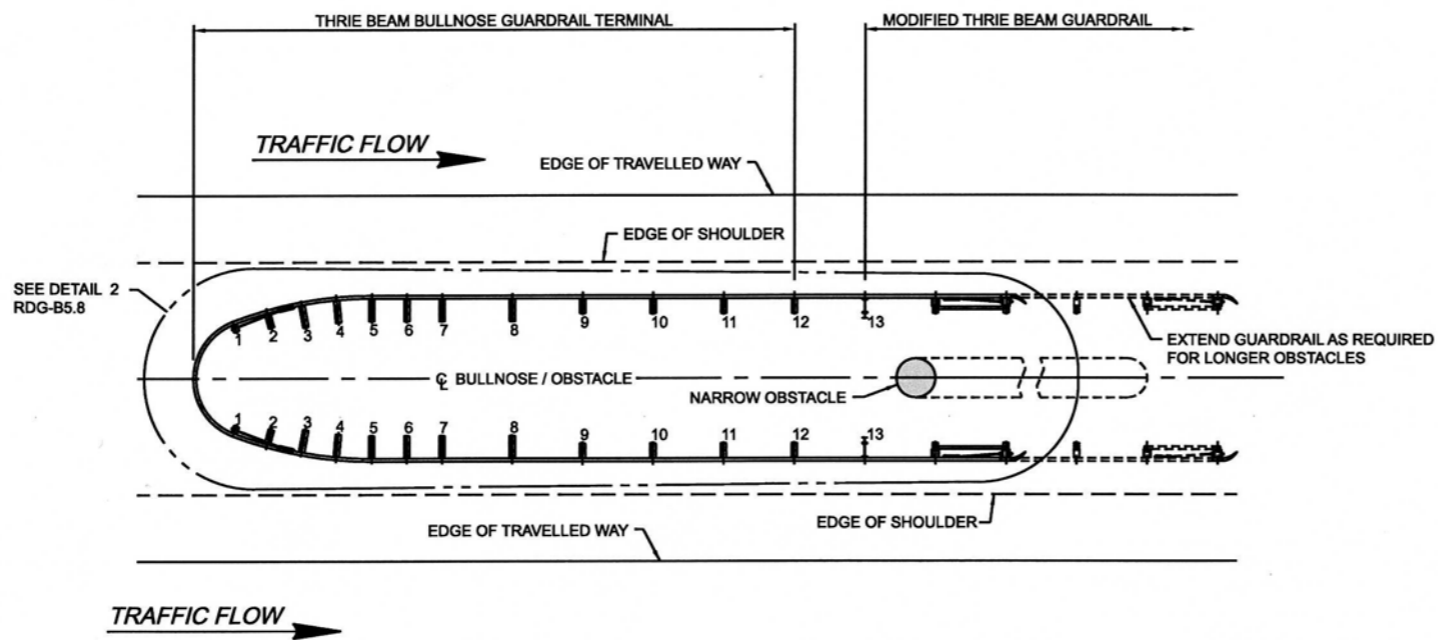
**TL-3 TRANSITION FROM MODIFIED THRIE-BEAM GUARDRAIL TO W-BEAM STRONG POST GUARDRAIL**

Prepared By: MO    Checked By: WS    Scale: N.T.S.    Dwg No.: **RDG-B5.5**

ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE INDICATED.



LAYOUT A - NARROW OBSTACLE - BIDIRECTIONAL TRAFFIC

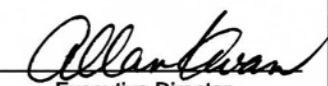



LAYOUT B - NARROW OBSTACLE - UNIDIRECTIONAL TRAFFIC

**NOTES:**

1. LAP ALL JOINTS IN THE DIRECTION OF TRAFFIC FLOW.
2. POSTS SHALL BE SET BY INSTRUMENT FOR ALIGNMENT AND GRADE.
3. THE ACCEPTABLE TOLERANCE FOR HEIGHT OF GUARDRAIL AT TIME OF CONSTRUCTION OR MAINTENANCE SHALL BE IN ACCORDANCE WITH THE MOST RECENT SPECIFICATIONS.
4. ALL FITTINGS AND HARDWARE SHALL BE GALVANIZED.
5. FLARE RATE SHALL BE SPECIFIED WITHIN THE LIMITS SET BY THE MANUFACTURER OF THE CHOSEN CRASH WORTHY END TERMINAL TO MEET THE REQUIREMENTS OF NCHRP REPORT 350 FOR TEST LEVEL 3 (TL-3).
6. THE BULLNOSE GUARDRAIL SYSTEM SATISFIES THE REQUIREMENTS OF NCHRP REPORT 350 FOR TEST LEVEL 3 (TL-3) AND IS THEREFORE APPLICABLE FOR USE ON HIGH SPEED ROAD FACILITIES.

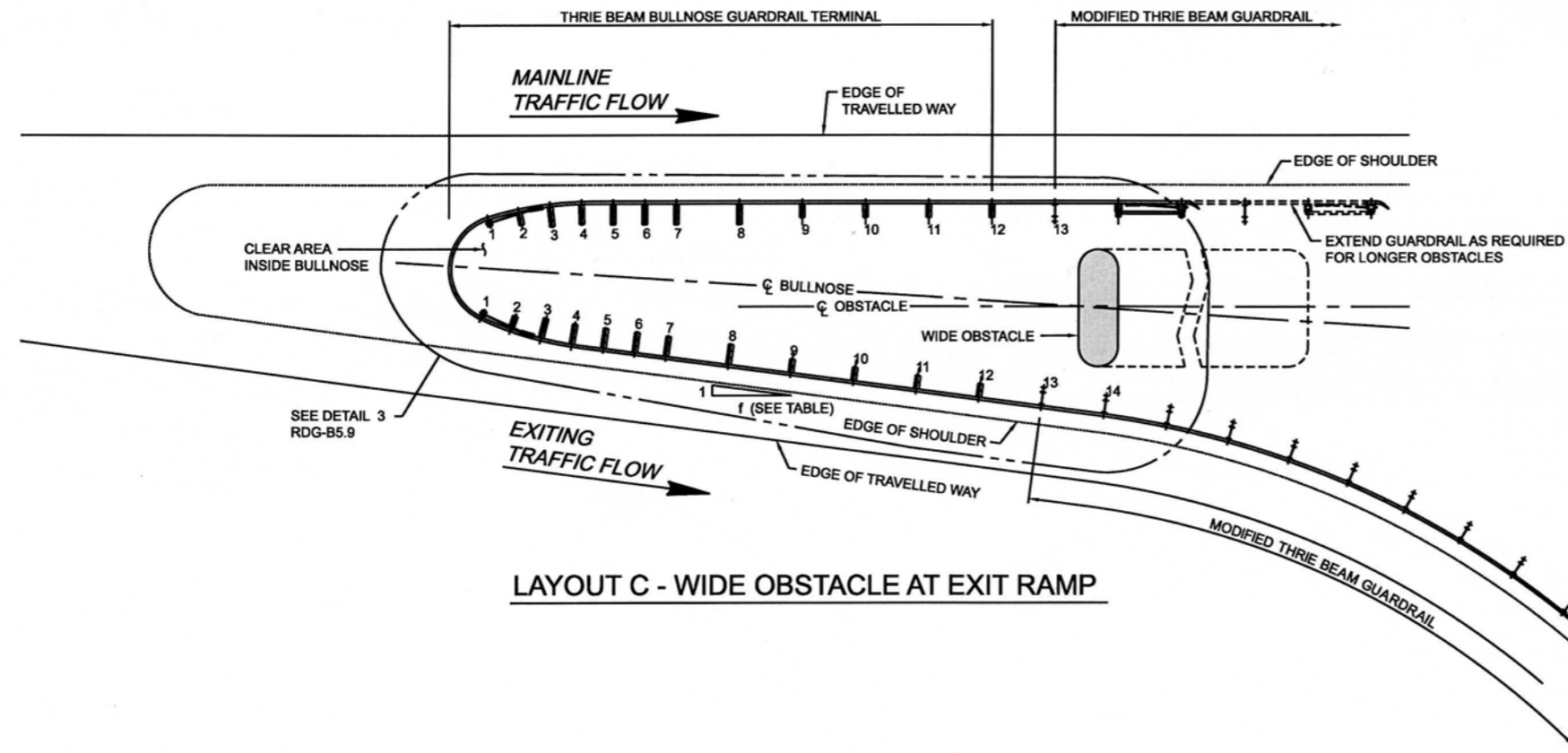
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No.	REVISIONS	BY	DATE

Approved:  Executive Director, Technical Standards Branch	
Date: NOVEMBER, 2007	

**THRIE BEAM BULLNOSE  
GUARDRAIL  
GENERAL LAYOUTS**

Prepared By: MO	Checked By: WS	Scale: N.T.S.	Dwg No.: RDG-B5.6
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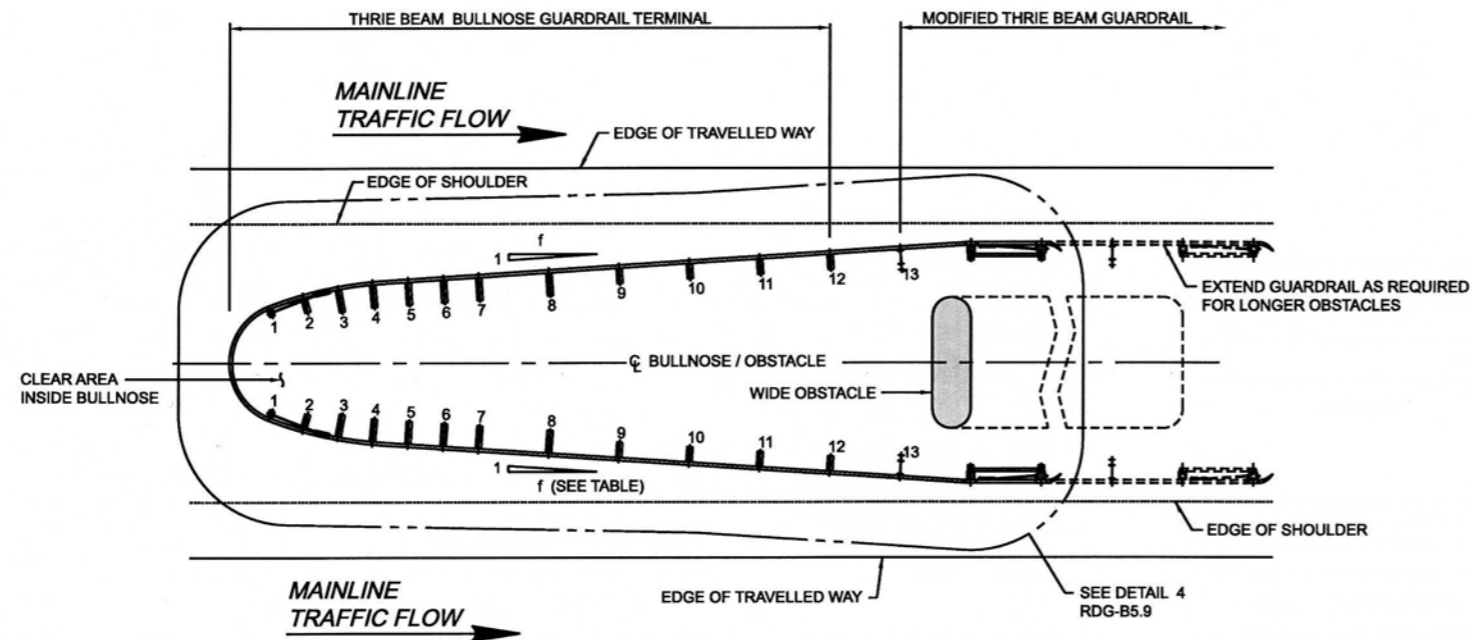
ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE INDICATED.



LAYOUT C - WIDE OBSTACLE AT EXIT RAMP

**NOTES:**

1. LAP ALL JOINTS IN THE DIRECTION OF TRAFFIC FLOW.
2. POSTS SHALL BE SET BY INSTRUMENT FOR ALIGNMENT AND GRADE.
3. THE ACCEPTABLE TOLERANCE FOR HEIGHT OF GUARDRAIL AT TIME OF CONSTRUCTION OR MAINTENANCE SHALL BE IN ACCORDANCE WITH THE MOST RECENT SPECIFICATIONS.
4. ALL FITTINGS AND HARDWARE SHALL BE GALVANIZED.
5. FLARE RATE SHALL BE SPECIFIED WITHIN THE LIMITS SET BY THE MANUFACTURER OF THE CHOSEN CRASH WORTHY END TERMINAL TO MEET THE REQUIREMENTS OF NCHRP REPORT 350 FOR TEST LEVEL 3 (TL-3).
6. THE BULLNOSE GUARDRAIL SYSTEM SATISFIES THE REQUIREMENTS OF NCHRP REPORT 350 FOR TEST LEVEL 3 (TL-3) AND IS THEREFORE APPLICABLE FOR USE ON HIGH SPEED ROAD FACILITIES.
7. FLARE RATES SHOWN ARE RELATIVE TO OBSTACLE CENTRELINE WHICH IS ALIGNED PARALLEL TO MAINLINE TRAFFIC FLOW. FLARING OF GUARDRAIL BEGINS AT POST 5.



LAYOUT D - WIDE OBSTACLE - UNIDIRECTIONAL TRAFFIC

FLARE RATE	
DESIGN SPEED (Km/h)	f
130	15:1
120	15:1
110	15:1
100	14:1
90	12:1
80	11:1
70	10:1
60	8:1
50	7:1

FLARE RATES ADOPTED FROM AASHTO 2002 ROADSIDE DESIGN GUIDE

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⚠			
No.	REVISIONS	BY	DATE

Approved:  
  
 Executive Director,  
 Technical Standards Branch

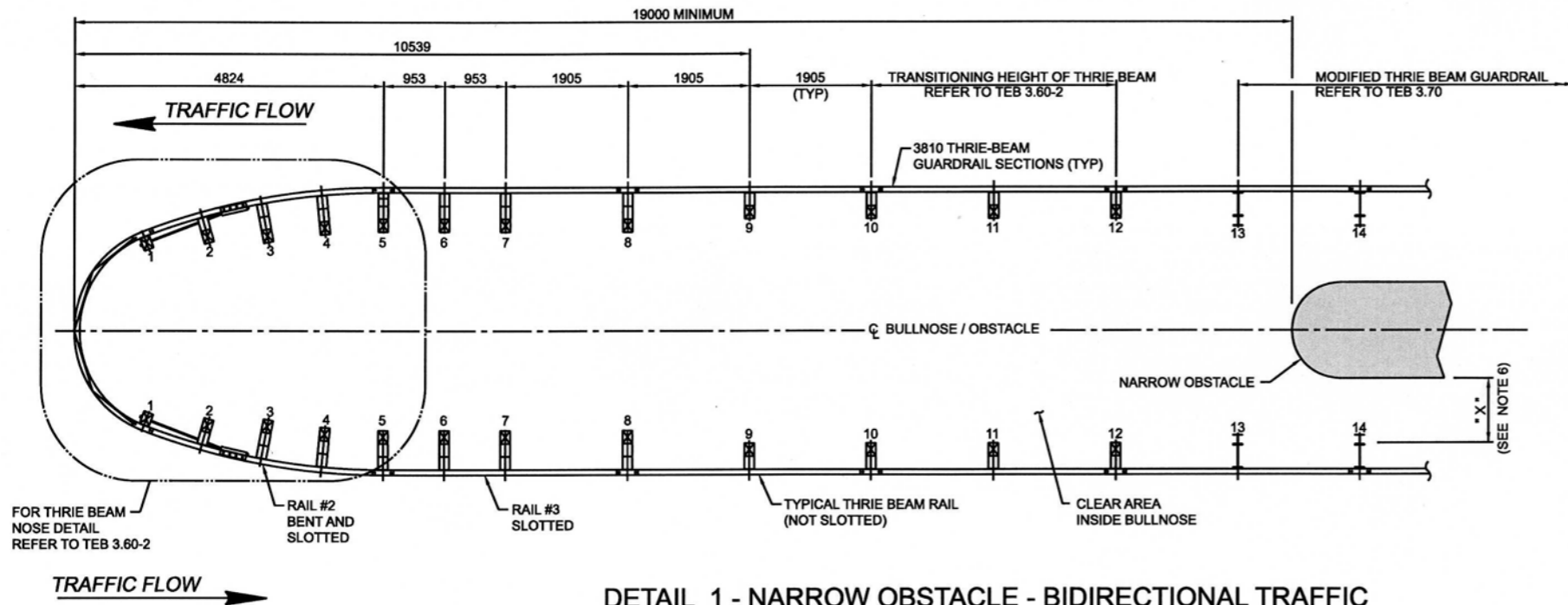


Date: NOVEMBER, 2007

**THRIE BEAM BULLNOSE  
 GUARDRAIL  
 GENERAL LAYOUTS**

Prepared By: MO	Checked By: WS	Scale: N.T.S.	Dwg No.: <b>RDG-B5.7</b>
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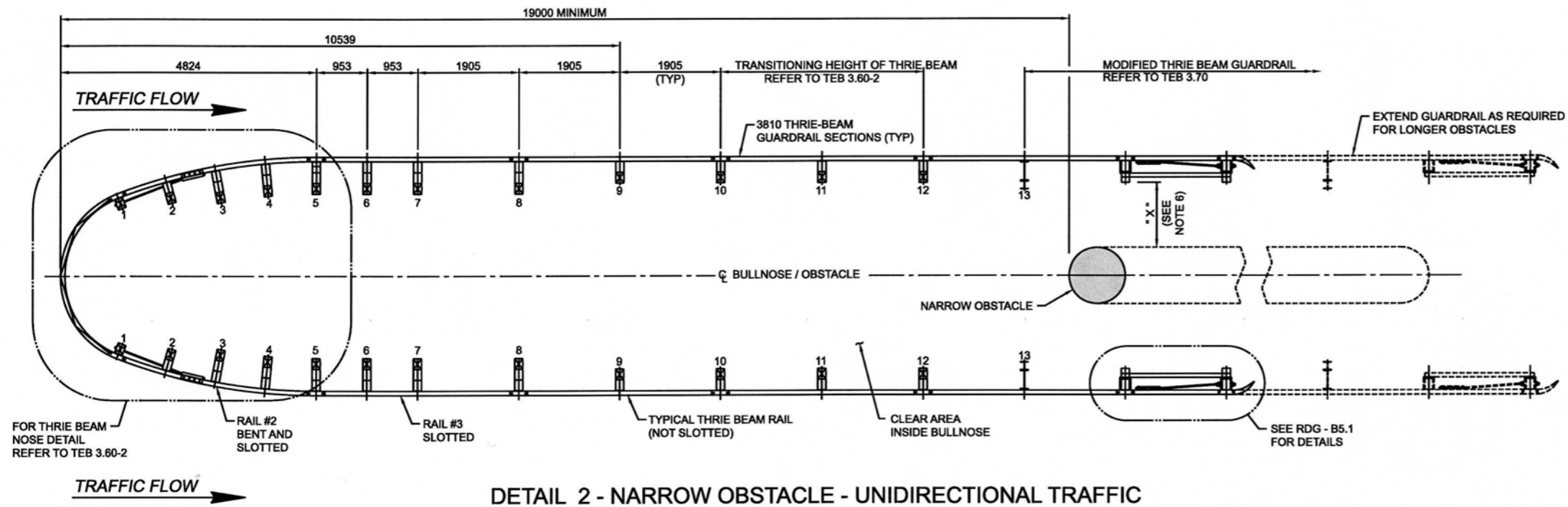
ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE INDICATED.



**DETAIL 1 - NARROW OBSTACLE - BIDIRECTIONAL TRAFFIC**

**NOTES:**

1. LAP ALL JOINTS IN THE DIRECTION OF TRAFFIC FLOW.
2. HORIZONTAL DISTANCE BETWEEN CROSSWISE POSTS ARE MEASURED PERPENDICULAR FROM THE CENTRELINE OF BULLNOSE.
3. POSTS SHALL BE SET BY INSTRUMENT FOR ALIGNMENT AND GRADE.
4. THE ACCEPTABLE TOLERANCE FOR HEIGHT OF GUARDRAIL AT TIME OF CONSTRUCTION OR MAINTENANCE SHALL BE IN ACCORDANCE WITH THE MOST RECENT SPECIFICATIONS.
5. ALL FITTINGS AND HARDWARE SHALL BE GALVANIZED.
6. OFFSET DISTANCE "X" MEASURED FROM BACK FACE OF THRIE BEAM GUARDRAIL POST TO FACE OF OBSTACLE SHALL NOT BE LESS THAN 760 HOWEVER 1000 IS PREFERRED.
7. THIS GUARDRAIL SYSTEM SATISFIES THE REQUIREMENTS OF NCHRP REPORT 350 FOR TEST LEVEL 3 (TL-3) AND IS THEREFORE APPLICABLE FOR USE ON HIGH SPEED ROAD FACILITIES.



**DETAIL 2 - NARROW OBSTACLE - UNIDIRECTIONAL TRAFFIC**

▲			
▲			
No.	REVISIONS	BY	DATE

Approved:  
  
 Executive Director,  
 Technical Standards Branch

Date: NOVEMBER, 2007

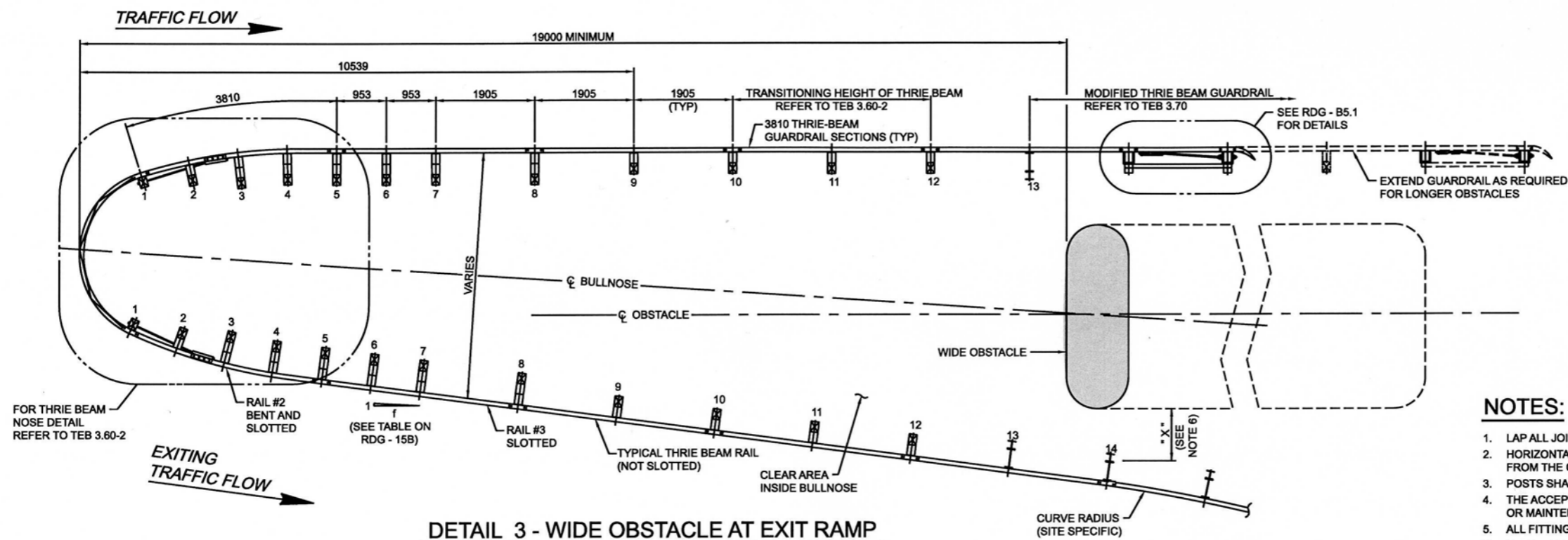


**THRIE BEAM BULLNOSE  
 GUARDRAIL  
 DETAILED PLANS**

Prepared By: MO	Checked By: WS	Scale: N.T.S.	Dwg No.: <b>RDG-B5.8</b>
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ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE INDICATED.

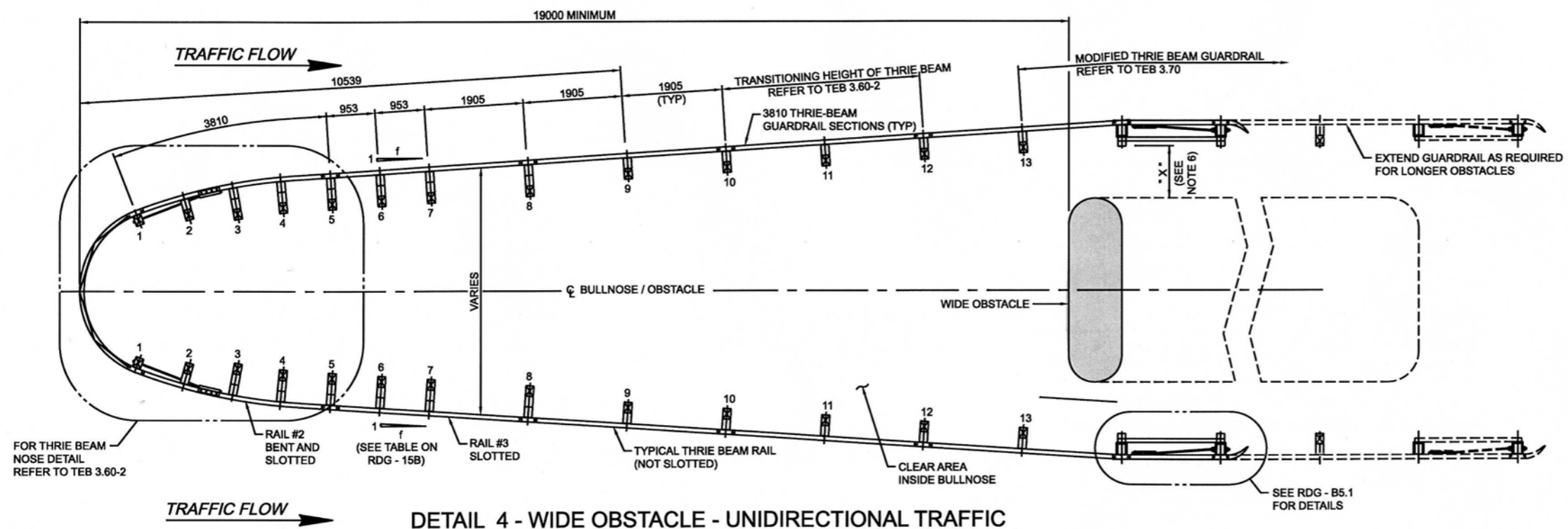




**DETAIL 3 - WIDE OBSTACLE AT EXIT RAMP**

**NOTES:**

1. LAP ALL JOINTS IN THE DIRECTION OF TRAFFIC FLOW.
2. HORIZONTAL DISTANCE BETWEEN CROSSWISE POSTS ARE MEASURED PERPENDICULAR FROM THE CENTRELINE OF BULLNOSE.
3. POSTS SHALL BE SET BY INSTRUMENT FOR ALIGNMENT AND GRADE.
4. THE ACCEPTABLE TOLERANCE FOR HEIGHT OF GUARDRAIL AT TIME OF CONSTRUCTION OR MAINTENANCE SHALL BE IN ACCORDANCE WITH THE MOST RECENT SPECIFICATIONS.
5. ALL FITTINGS AND HARDWARE SHALL BE GALVANIZED.
6. OFFSET DISTANCE "X" MEASURED FROM BACK FACE OF THRIE BEAM GUARDRAIL POST TO FACE OF OBSTACLE SHALL NOT BE LESS THAN 760 HOWEVER 1000 IS PREFERRED.
7. THIS GUARDRAIL SYSTEM SATISFIES THE REQUIREMENTS OF NCHRP REPORT 350 FOR TEST LEVEL 3 (TL-3) AND IS THEREFORE APPLICABLE FOR USE ON HIGH SPEED ROAD FACILITIES.
8. FLARE RATES SHOWN ARE RELATIVE TO OBSTACLE CENTRELINE WHICH IS ALIGNED PARALLEL TO MAINLINE TRAFFIC FLOW. FLARING OF GUARDRAIL BEGINS AT POST 5.



**DETAIL 4 - WIDE OBSTACLE - UNIDIRECTIONAL TRAFFIC**

▲			
▲			
No.	REVISIONS	BY	DATE

Approved:

*Allan Curran*  
Executive Director,  
Technical Standards Branch

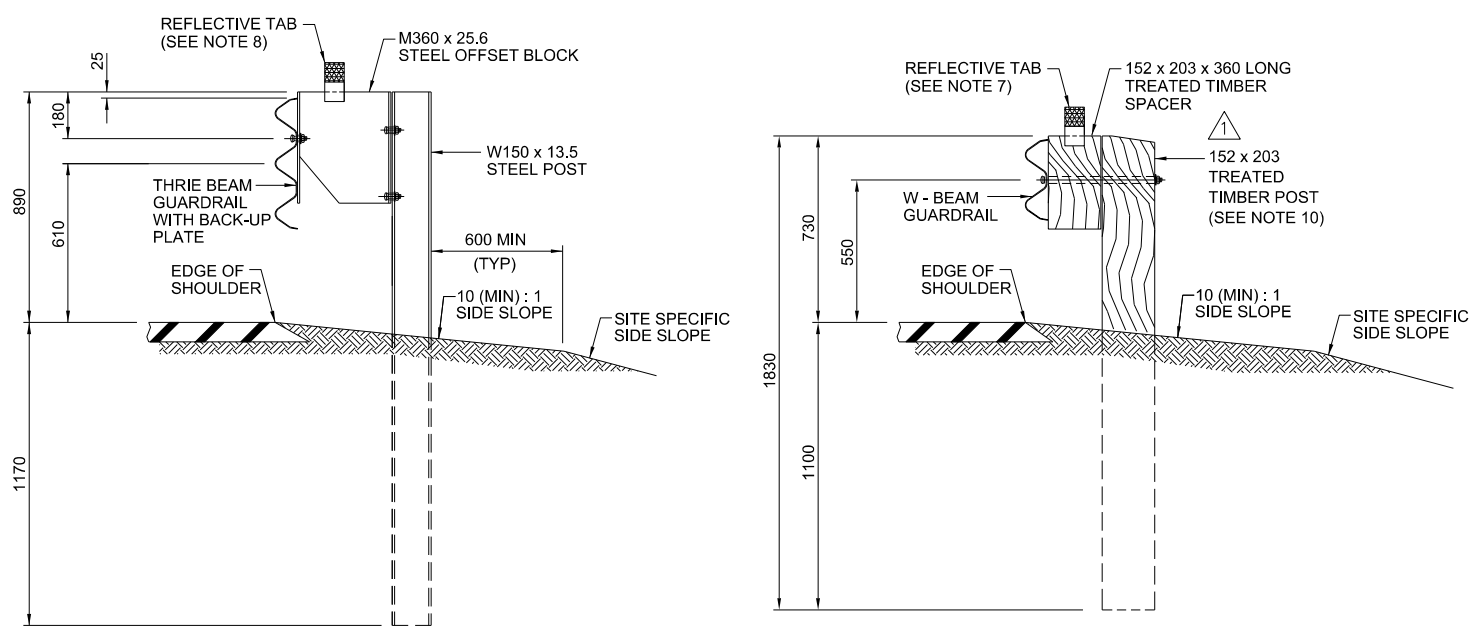
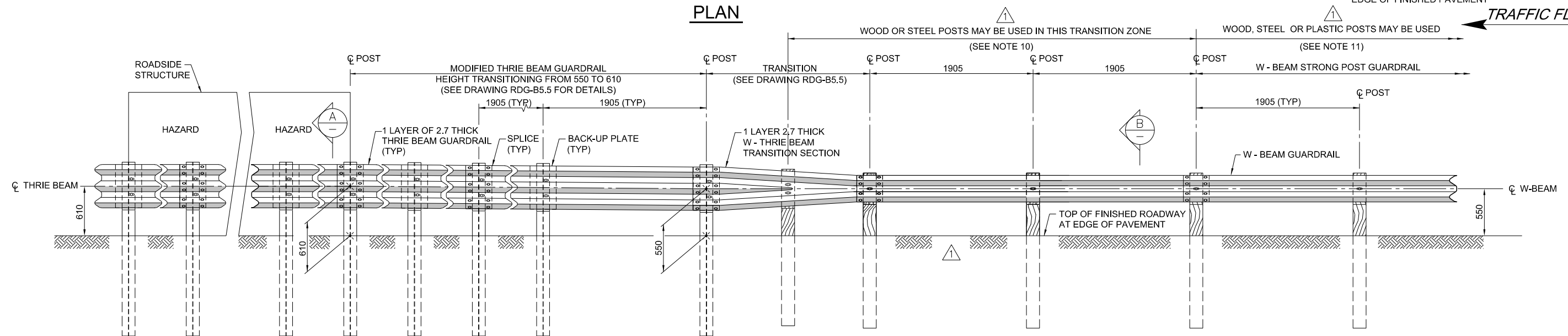
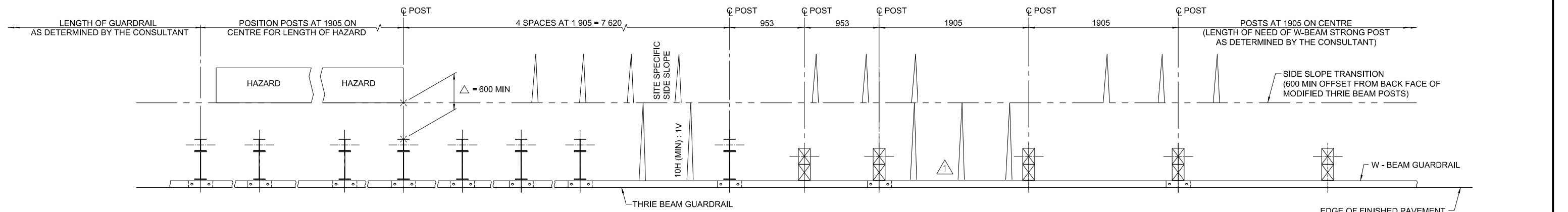
**Alberta**  
INFRASTRUCTURE AND  
TRANSPORTATION

Date: NOVEMBER, 2007

**THRIE BEAM BULLNOSE  
GUARDRAIL  
DETAILED PLANS**

Prepared By: MO	Checked By: WS	Scale: N.T.S.	Dwg No.: <b>RDG-B5.9</b>
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ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE INDICATED.



- NOTES:**
- FOR GENERAL LAYOUT REFER TO TEB DRAWINGS 3.15a AND 3.18.
  - WHERE GUARDRAIL IS ADJACENT TO CURB, HEIGHT OF RAIL SHALL BE MEASURED AS FOLLOWS:
    - VERTICALLY AT FACE OF GUARDRAIL WHEN FACE OF GUARDRAIL IS MORE THAN 300 BEYOND GUTTER LINE.
    - VERTICALLY AT GUTTER LINE WHEN FACE OF GUARDRAIL IS 300 OR LESS BEYOND GUTTER LINE.
  - POSTS SHALL BE SET BY INSTRUMENT FOR ALIGNMENT AND GRADE, WITH TOP PARALLEL TO PAVEMENT GRADE.
  - THE ACCEPTABLE TOLERANCE FOR HEIGHT OF GUARDRAIL AT TIME OF CONSTRUCTION OR MAINTENANCE SHALL BE IN ACCORDANCE WITH THE MOST RECENT SPECIFICATIONS.
  - LAP ALL JOINTS IN THE DIRECTION OF TRAFFIC FLOW.
  - ALL FITTINGS AND HARDWARE REQUIRED SHALL BE GALVANIZED.
  - FASTEN TO TOP OF EVERY SIXTH GUARDRAIL STRONG POST SPACER BY MECHANICAL MEANS SUCH AS NAILING OR STAPLING. ADHESIVES ALONE WILL NOT BE ACCEPTED.
  - FASTEN TO TOP OF EVERY SIXTH GUARDRAIL STEEL OFFSET BLOCK WITH APPROVED ADHESIVE.
  - THIS TRANSITION SATISFIES NCHRP REPORT 350 REQUIREMENTS FOR TEST LEVEL 3 (TL3).
  - TRANSITION ZONE CAN BE WOOD OR STEEL POST WITH WOOD SPACER BLOCK. REFER TO STANDARD DRAWING TEB 3.01 FOR POST DETAILS.
  - TYPICAL STRONG POST SYSTEM CAN BE WOOD, STEEL, OR PLASTIC POST WITH WOOD SPACER BLOCK. REFER TO STANDARD DRAWING TEB 3.01 FOR POST DETAILS.

2			
1	NOTES 7 AND 8 REVISED. NOTES 10 AND 11 ADDED. POST REMOVED FROM PLAN AND ELEVATION	PM	11 MAR 2016
No.	REVISIONS	BY	DATE

Approved:

Allan Kwan

Executive Director,  
Technical Standards Branch

Date: NOVEMBER, 2007

## W-BEAM STRONG POST TO MODIFIED THRIE BEAM GUARDRAIL TRANSITION AT ROADSIDE STRUCTURE

Prepared By: MO	Checked By: WS	Scale: N.T.S.	Dwg No.: RDG-B5.10
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ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE INDICATED.

## APPENDIX B6

# CAST-IN-PLACE OR EXTRUDED F-SHAPE CONCRETE BARRIER AND SINGLE SLOPE CONCRETE BARRIER



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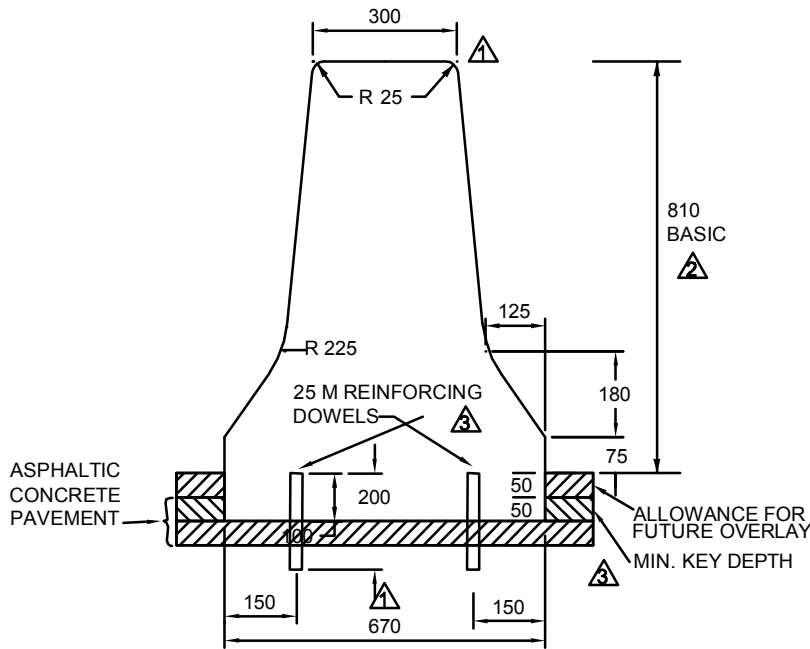
## Appendix B6

# Cast-In Place Or Extruded F-Shape Concrete Barrier and Single Slope Concrete Barrier

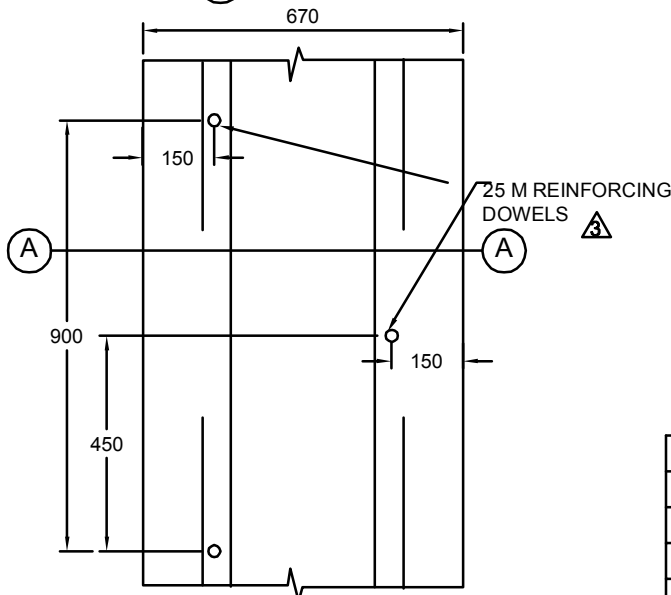
### TABLE OF CONTENTS

Drw. No.	Drawing Title	Page Number
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4.3 M5	Isometric View of Transition End Section for Reinforced Concrete Median Barrier Curb	H-APP-B6-4
RDG-B6.1	TL-4 Standard Single Slope Concrete Barrier Details	H-APP-B6-5
RDG-B6.3	TL-4 Single Slope Concrete Median Barrier Transition Around Existing/New Bridge Pier – Sheet 1 of 2	H-APP-B6-7
RDG-B6.4	TL-4 Single Slope Concrete Median Barrier Transition Around Existing Bridge Pier – Sheet 2 of 2	H-APP-B6-8
RDG-B6.5	TL-4 Single Slope Concrete Median Barrier Transition Around New Bridge Pier – Sheet 1 of 3	H-APP-B6-9
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RDG-B6.11	Quadguard and TRACC Crash Cushion Systems Concrete Pad Foundation	H-APP-B6-15
RDG-B6.12	Transition of TL-4 Single Slope Concrete Barrier to W-Beam Median Guardrail – Sheet 1 of 2	H-APP-B6-16
RDG-B6.13	Transition of TL-4 Single Slope Concrete Barrier to W-Beam Median Guardrail – Sheet 2 of 2	H-APP-B6-17
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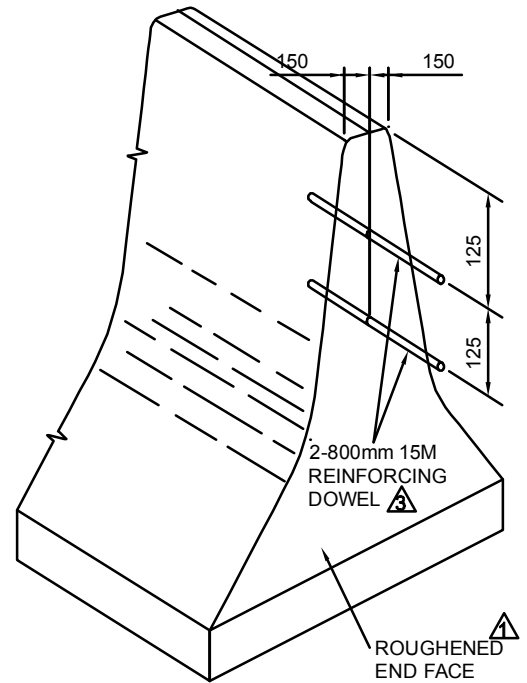
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(A) SECTION



PLAN VIEW



CONSTRUCTION JOINT DETAIL

GENERAL NOTES

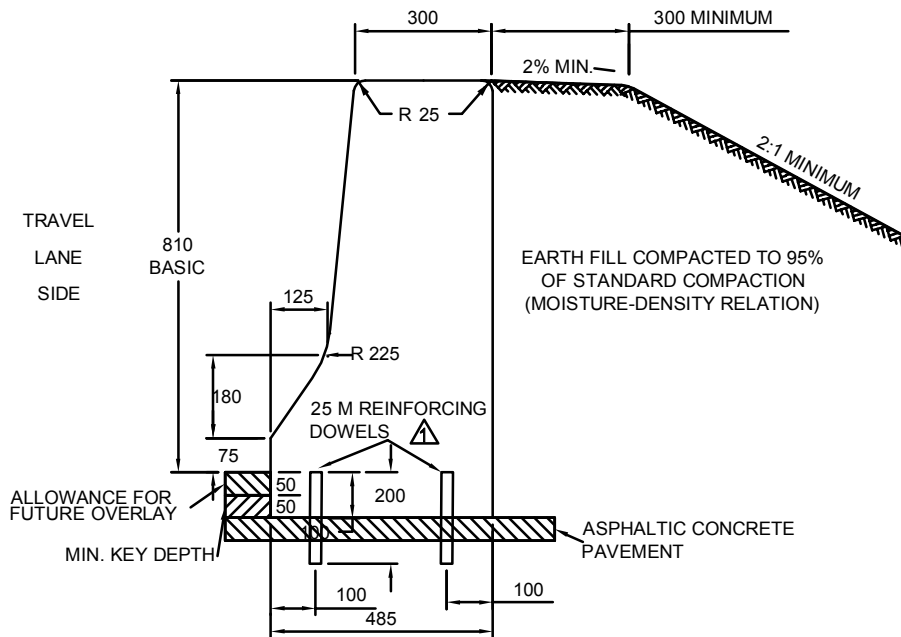
1. All concrete shall meet the requirements of the Specifications for Bridge Construction Section 4 Modified, Class C, except that slump shall be  $\pm 1^* \text{mm}$  and minimum cement content shall be  $335 \text{ kg/m}^3$ .
2. All reinforcement dowels shall be epoxy coated.
3. All exposed concrete shall be finished to a smooth, uniform and closed texture.
4. Exposed surfaces shall have an approved sealer applied in accordance with manufacturer's recommendations.
5. No longitudinal reinforcement required.
6. Tooled or saw cut all around every 3m (min. 50mm deep x 3-6mm wide).
7. No joint sealer required.

⚠	REVISIONS TO NOTES 1 AND 3	BK	16/06/05
⚠	BASE DETAILS AND NOTES	BK	08/04
⚠	HEIGHT DIMENSION	BK	12/03
⚠	TOP WIDTH AND JOINT SPACING	BK	10/03
No.	REVISIONS	BY	DATE

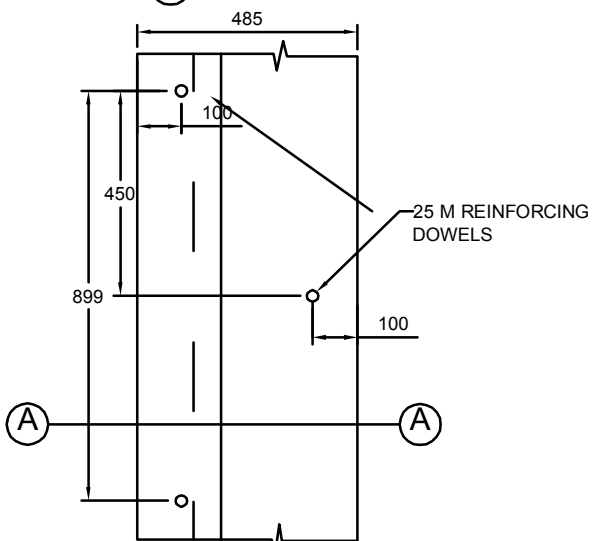
Approved: Original signed by Allan Kwan  Executive Director, Technical Standards Branch	
Date: APRIL, 1986	

**SLIP-FORMED MEDIAN BARRIER  
F-SHAPE**

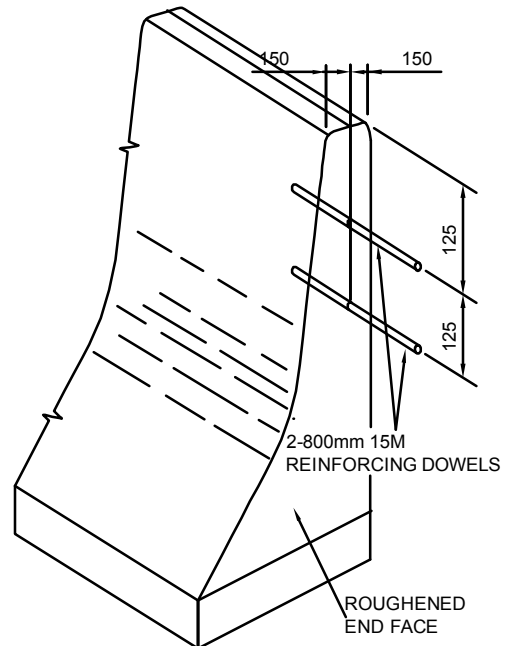
Prepared By: M.T	Checked By: B.K	Scale: N.T.S.	Dwg No.: CB6-4.3M3
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(A) SECTION



PLAN VIEW



CONSTRUCTION JOINT DETAIL

All dimensions in millimetres unless otherwise noted.

GENERAL NOTES

1. All concrete shall meet the requirements of the Specifications for Bridge Construction Section 4, Modified Class C, except that slump shall be 20± 10mm and minimum cement content shall be 335 kg/m<sup>3</sup>.
2. All reinforcement dowels shall be epoxy coated.
3. All exposed concrete shall be finished to a smooth, uniform and closed texture.
4. Exposed surfaces shall have an approved sealer applied in accordance with manufacturer's recommendations.
5. Half F barrier is for use with earth fill as shown.
6. No longitudinal reinforcement required.
7. Tooled or saw cut all around every 3m (min. 50mm deep x 3-6mm wide).
8. No joint sealer required.
9. Earth fill shall be suitable material as indicated under 2.3.2 of the Standard Specification for Highway Construction.

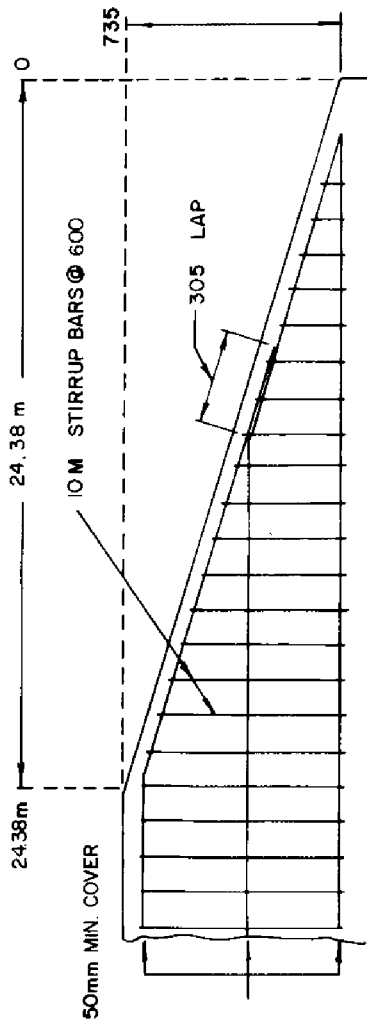
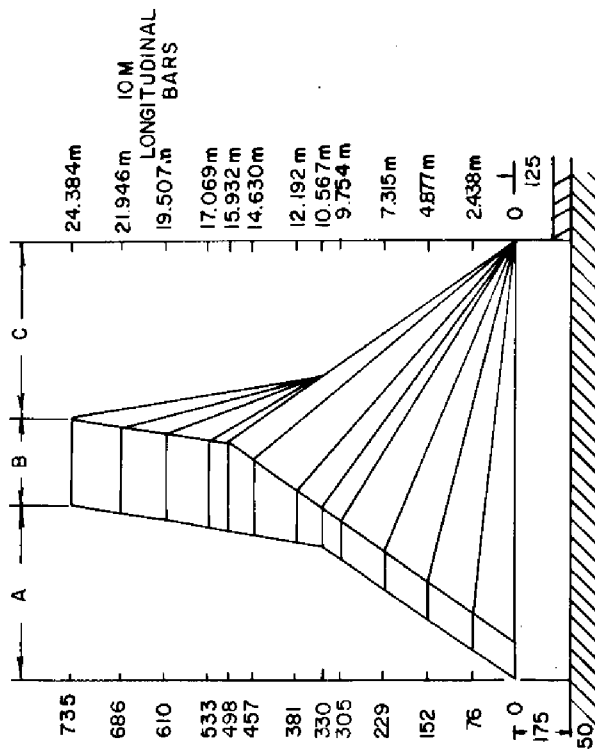
△			
△	REVISIONS TO NOTES 1 AND 3	BK	06/16/05
No.	REVISIONS	BY	DATE

Approved: Original signed by Allan Kwan  Executive Director, Technical Standards Branch	
Date: SEPTEMBER, 2004	

SLIP-FORMED CONCRETE BARRIER  
HALF F-SHAPE

Prepared By: M.T	Checked By: B.K	Scale: N.T.S.	Dwg No.: CB6-4.3M3A
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JP WIDTH OF MEDIAN  
 B-OFFSET FROM REFERENCE LINE ON  
 SIDE OF TRAFFIC GOING AWAY.  
 C-OFFSET FROM REFERENCE LINE ON  
 SIDE OF APPROACHING TRAFFIC.



1. ALL CONCRETE SHALL BE 40MPa AT 28 DAYS.
2. ALL REINFORCEMENT SHALL BE EPOXY COATED REINFORCING BARS.
3. ALL EXPOSED CONCRETE SHALL HAVE A SMOOTH SURFACE.
4. EXPOSED SURFACES SHALL HAVE 20mm CHAMFER OR FILLET OR AS OTHERWISE SPECIFIED.
5. ALL SURFACES SHALL BE FORMED WITH OILED PLYWOOD OR STEEL FORMED FINISH.
6. ALL VOIDS ARE TO BE CAPPED AND WATERPROOFED.
7. EXPOSED SURFACES SHALL HAVE AN APPROVED SEALING SOLUTION APPLIED.

LENGTH FROM END m	RISE mm	A mm	B mm	C mm
24.384	735	200	280	280
21.946	686	200	268	292
19.507	610	200	257	303
17.069	533	200	244	316
15.932	498	200	239	321
14.630	457	172	233	348
12.192	381	118	221	398
10.567	330	82	209	431
9.754	305	82	193	447
7.315	229	82	141	497
4.877	152	82	97	546
2.438	76	82	49	595
0	0	82	0	645

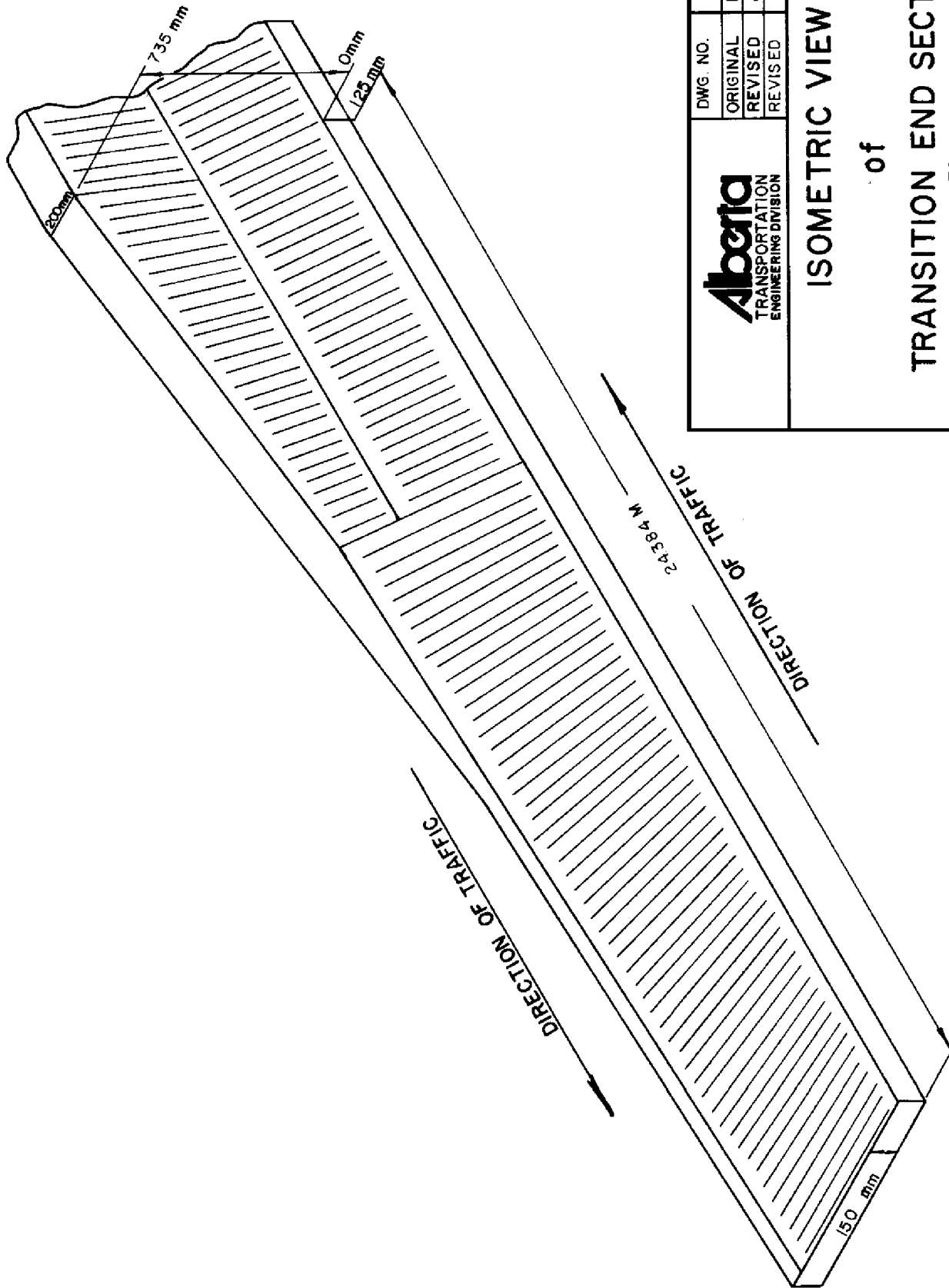
ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.



CB-6	4.3 M4
PLAN NO.	DATE
WORK	MAY 1985
CHART REV.	JUNE 1986
	OCT. 1986

### TRANSITION END SECTION FOR

REINFORCED CONCRETE MEDIAN BARRIER CURB  
 F SHAPE



<b>Alberta</b> TRANSPORTATION ENGINEERING DIVISION	DWG. NO.	4.3 M 5
	ORIGINAL	NOV. 1977
	REVISED	JUNE 1983
	REVISED	OCT. 1986

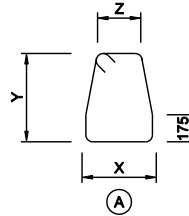
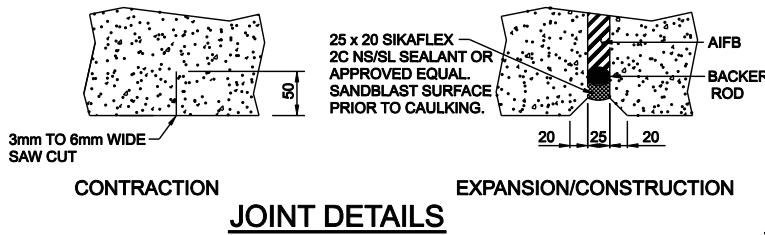
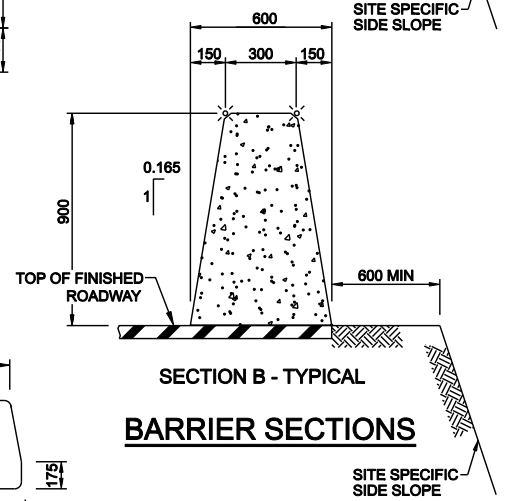
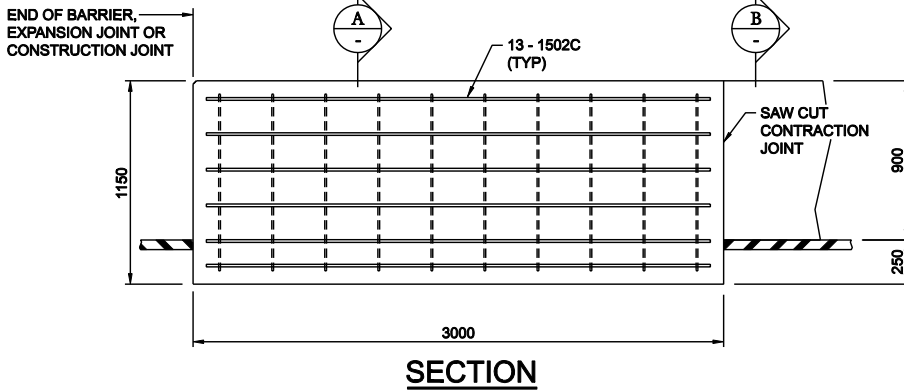
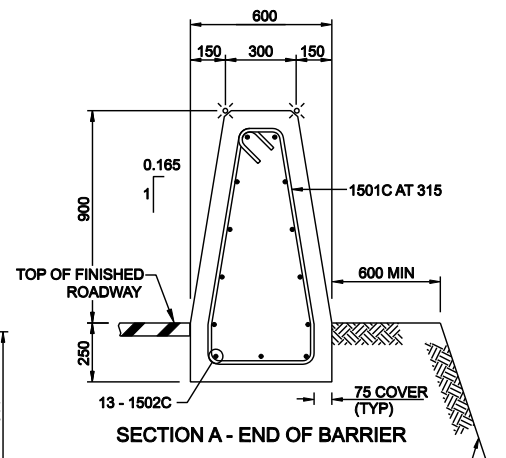
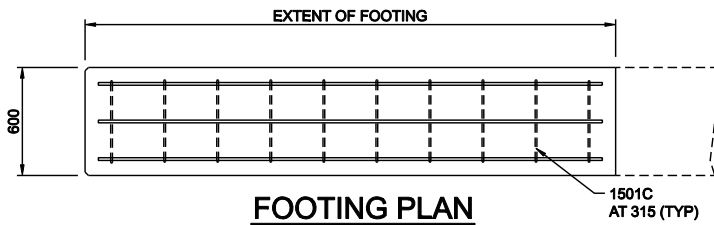
**ISOMETRIC VIEW**

of

**TRANSITION END SECTION**

FOR

REINFORCED CONCRETE MEDIAN BARRIER CURB



**BAR LIST NOTES:**

- DIAMETERS OF ALL BENDS AND DETAILS OF ALL HOOKS, UNLESS NOTED OTHERWISE, SHALL CONFORM TO THE RECOMMENDED SIZES DETAILED IN THE REINFORCING STEEL MANUAL OF STANDARD PRACTICE, FIRST CANADIAN EDITION 1992, PUBLISHED BY THE REINFORCING INSTITUTE OF CANADA.
- REINFORCING STEEL SHALL BE IN ACCORDANCE WITH CAN/CSA-G30.18M92 "BILLET STEEL BARS FOR CONCRETE REINFORCEMENT".
- ALL REINFORCING STEEL SHALL BE GRADE 400 UNLESS NOTED OTHERWISE.
- "C" DENOTES EPOXY COATED REINFORCEMENT.

**BAR LIST: BARRIER**

MARK	SIZE	NO.	TYPE	X	Y	Z	LENGTH	MASS
1501C	15	10	A	450	1 000	125	2 840	45
1502C	15	13	STR	-	-	-	2 850	58

EPOXY COATED TOTAL kg = 103

**NOTES:**

- ALL BARRIERS SHALL BE CAST IN PLACE BY STATIONARY FORMING OR SLIPFORMING.
- PROVIDE 20 mm CHAMFER AT TOP EDGES OF BARRIER AND AROUND ALL EXPOSED EDGES OF EXPANSION AND CONSTRUCTION JOINTS.
- CONCRETE SHALL BE MODIFIED CLASS C UNLESS OTHERWISE SPECIFIED (MINIMUM 28 DAY COMPRESSIVE STRENGTH OF 35 MPa).
- BARRIERS ARE NON-REINFORCED EXCEPT AT FOOTING LOCATIONS.
- BARRIER FOOTINGS SHALL BE PLACED ON EITHER SIDE OF ALL EXPANSION AND CONSTRUCTION JOINTS, AS WELL AS AT BARRIER ENDS.
- PLACE BARRIER AND FOOTING MONOLITHICALLY. COLD JOINTS BETWEEN FOOTING AND BARRIER ARE NOT PERMITTED.
- PLACEMENT OF FUTURE OVERLAYS ARE PERMITTED PROVIDED THAT THE HEIGHT OF BARRIER IS MAINTAINED AT LEAST 800 ABOVE FINISHED PAVEMENT.
- CONTRACTION JOINTS SHALL BE FORMED EVERY 3 METRES EXCEPT WHERE SHORTER SPACING IS NECESSARY FOR CLOSURES.
- BARRIER SHALL BE PLACED BY INSTRUMENT FOR ALIGNMENT AND GRADE.
- THIS BARRIER MEETS THE CRASH TEST REQUIREMENTS OF NCHRP REPORT 350 FOR TEST LEVEL 4 (TL-4) AND IS THEREFORE ACCEPTABLE FOR USE ON HIGH SPEED ROAD FACILITIES.
- TERMINATING THE SINGLE SLOPE CONCRETE BARRIER WITH A BLUNT END, AS SHOWN IN THIS DRAWING, IS RESTRICTED TO THE FOLLOWING APPLICATIONS:
  - ON THE LEAVING END OF BARRIERS INSTALLED ON THE ROADSIDE.
  - ON THE APPROACH END OF BARRIERS INSTALLED ON THE ROADSIDE, PROVIDED THAT THE BARRIER IS TERMINATED AT OR BEYOND THE CLEAR ZONE.
  - ON THE LEAVING END OF BARRIERS INSTALLED IN THE MEDIAN, PROVIDED THAT THE BARRIER IS TERMINATED AT OR BEYOND THE CLEAR ZONE FOR THE FLOW OF TRAFFIC IN THE OPPOSING DIRECTION.
- WHEN THE CONDITIONS STATED IN NOTE 11 CANNOT BE MET, THE BLUNT END OF THE BARRIER SHALL BE SHIELDED USING AN APPROVED ENERGY ABSORBING END TERMINAL.
- TAPERED END TREATMENTS ARE NOT CONSIDERED TO MEET THE REQUIREMENTS OF NCHRP REPORT 350 TL-3 AND SHOULD THEREFORE NOT BE USED WITHIN THE CLEAR ZONE.

ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE INDICATED.

2			
1	NOTE 10 REVISED	PM	28 FEB 12
No.	REVISIONS	BY	DATE

Approved:

\_\_\_\_\_  
Allan Kwan  
Executive Director,  
Technical Standards Branch

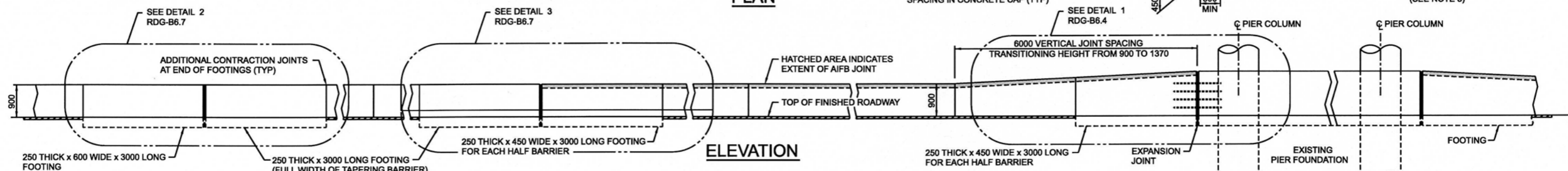
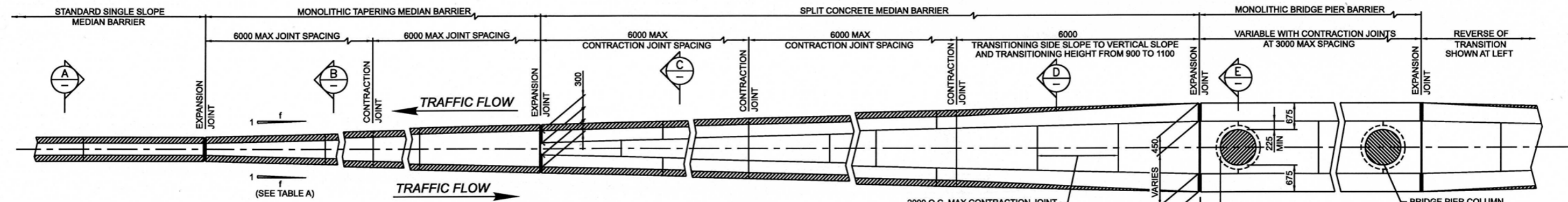
Date: NOVEMBER, 2007

**TL-4 STANDARD  
SINGLE SLOPE  
CONCRETE BARRIER  
DETAILS**

Prepared By: MO	Checked By: WS	Scale: N.T.S.	Dwg No.: RDG-B6.1
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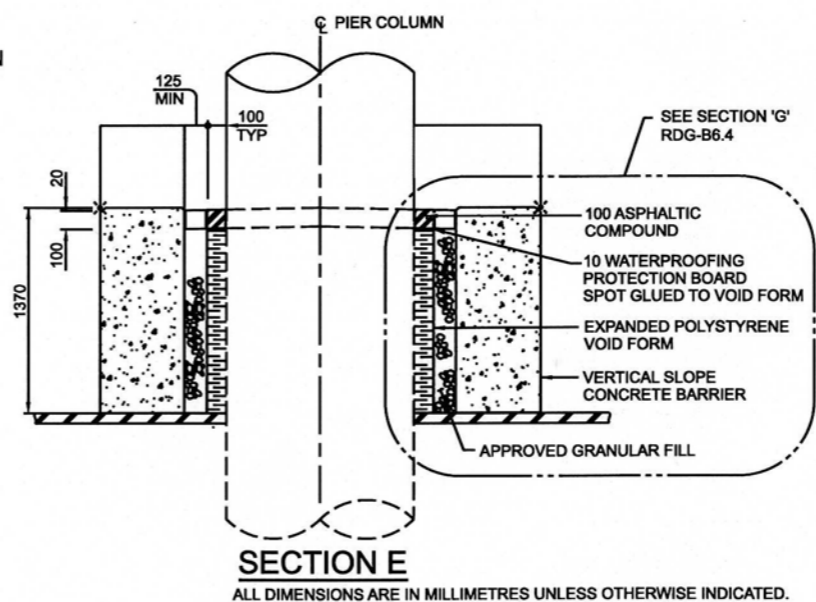
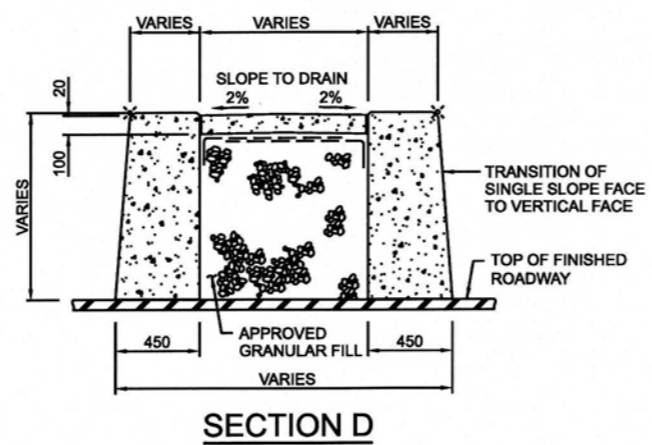
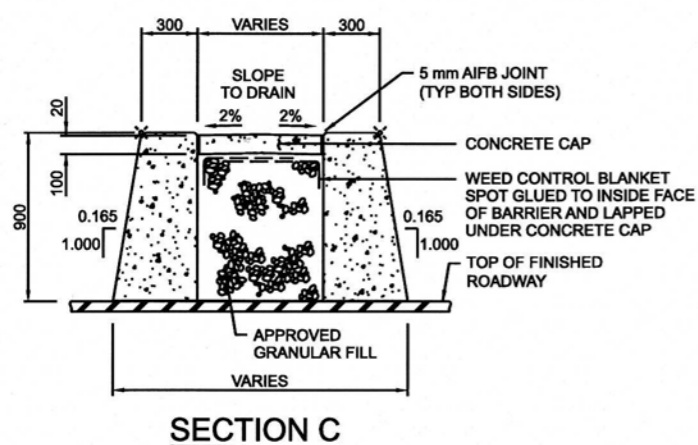
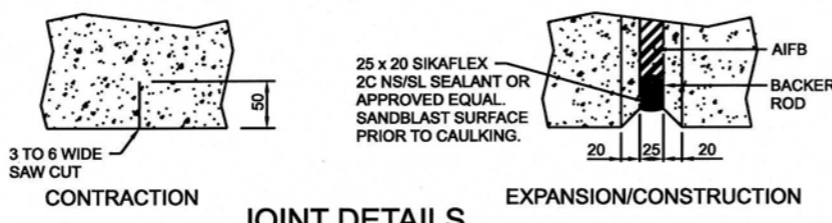
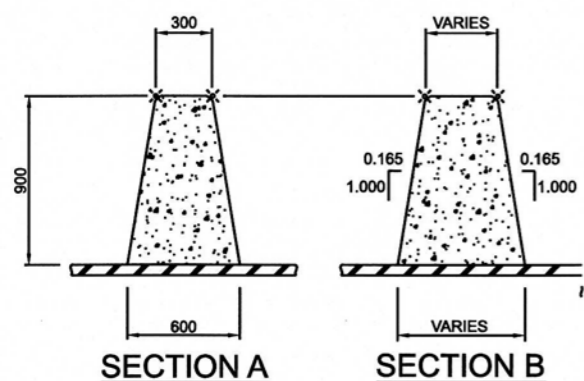


DESIGN SPEED (Km/h)	f
130	50:1
120	40:1
110	30:1
100	26:1
90	24:1
80	21:1
70	18:1
60	16:1
50	13:1

NUMBER OF LANES IN EACH DIRECTION	ROADWAY CROSS SECTION REFERENCE	NORMAL INSIDE SHOULDER WIDTH	MINIMUM INSIDE SHOULDER WIDTH
2	UFD-411.9-100/80	2500	1900 *
3	UFD/UAD-616.6-110/100/80	2500	2500 **
4	UFD/UAD-820.8-120/110/100	3000	2500 ***

\* ACCOMMODATES A MAXIMUM PIER COLUMN WIDTH OF 1000.  
 \*\* ACCOMMODATES A MAXIMUM PIER COLUMN WIDTH OF 1800 (NO REDUCTION IN SHOULDER WIDTH REQUIRED).  
 \*\*\* ACCOMMODATES A MAXIMUM PIER COLUMN WIDTH OF 1600.

- NOTES:**
- ALL BARRIERS SHALL BE CAST IN PLACE BY STATIONARY FORMING OR SLIPFORMING.
  - PROVIDE 20 CHAMFER AT TOP EDGES OF BARRIER AND AROUND ALL EXPOSED EDGES OF EXPANSION AND CONSTRUCTION JOINTS.
  - CONCRETE SHALL BE MODIFIED CLASS C (MINIMUM 28-DAY COMPRESSIVE STRENGTH OF 35 MPa), UNLESS OTHERWISE SPECIFIED.
  - BARRIERS ARE NON-REINFORCED EXCEPT AT FOOTING LOCATIONS.
  - BARRIER FOOTINGS SHALL BE PLACED ON EITHER SIDE OF ALL EXPANSION AND CONSTRUCTION JOINTS, AS WELL AS AT BARRIER ENDS. REFER TO RDG-B6.4 AND RDG-B6.7 FOR DETAILS ON GEOMETRY AND REINFORCING AT THESE LOCATIONS.
  - PLACE BARRIER AND FOOTING MONOLITHICALLY. COLD JOINTS BETWEEN FOOTING AND BARRIER ARE NOT PERMITTED.
  - EXPANSION JOINTS SHALL CONSIST OF A SINGLE LAYER OF 25 ASPHALT IMPREGNATED FIBREBOARD (AIFB) APPLIED TO FULL CROSS SECTION OF BARRIER AND SHALL EXTEND TO BASE OF FOOTING.
  - ACTUAL SHAPE OF PIER COLUMNS MAY VARY AS PER SITE SPECIFIC DRAWINGS.
  - PROVIDE ADDITIONAL CONTROL JOINTS AS DETERMINED BY THE CONSULTANT TO ACCOMMODATE PIER COLUMN GEOMETRY.
  - ADJUST HEIGHT OF CONCRETE BARRIER ON LOW SIDE OF OFFSET OR SUPERELEVATED ROADWAYS TO PROVIDE LEVEL GRADE ACROSS TOP OF BARRIER.
  - THIS TRANSITION DRAWING PROVIDES ALLOWANCE FOR A 100 FUTURE OVERLAY.
  - REDUCED INSIDE SHOULDER WIDTHS AT PIER COLUMNS ARE PERMITTED BUT SHOULD BE AVOIDED WHERE POSSIBLE. SEE TABLE B FOR MAXIMUM SHOULDER WIDTH REDUCTIONS.



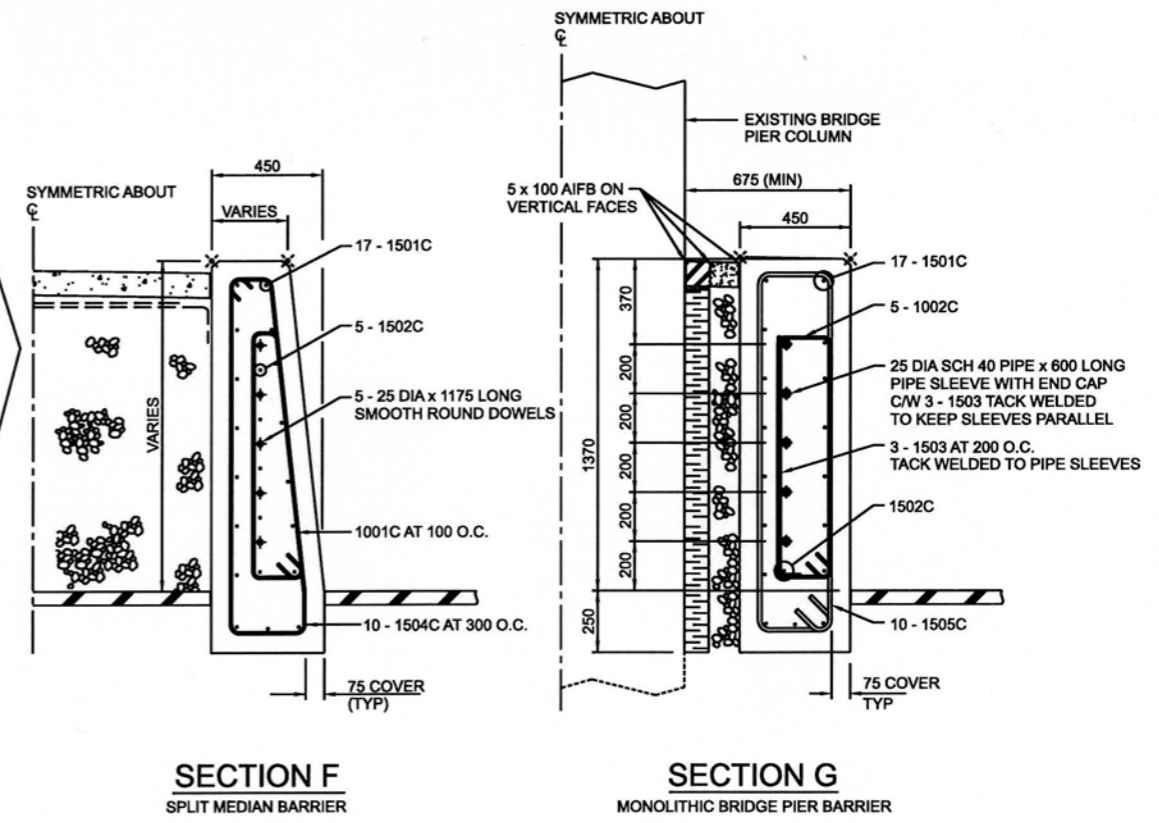
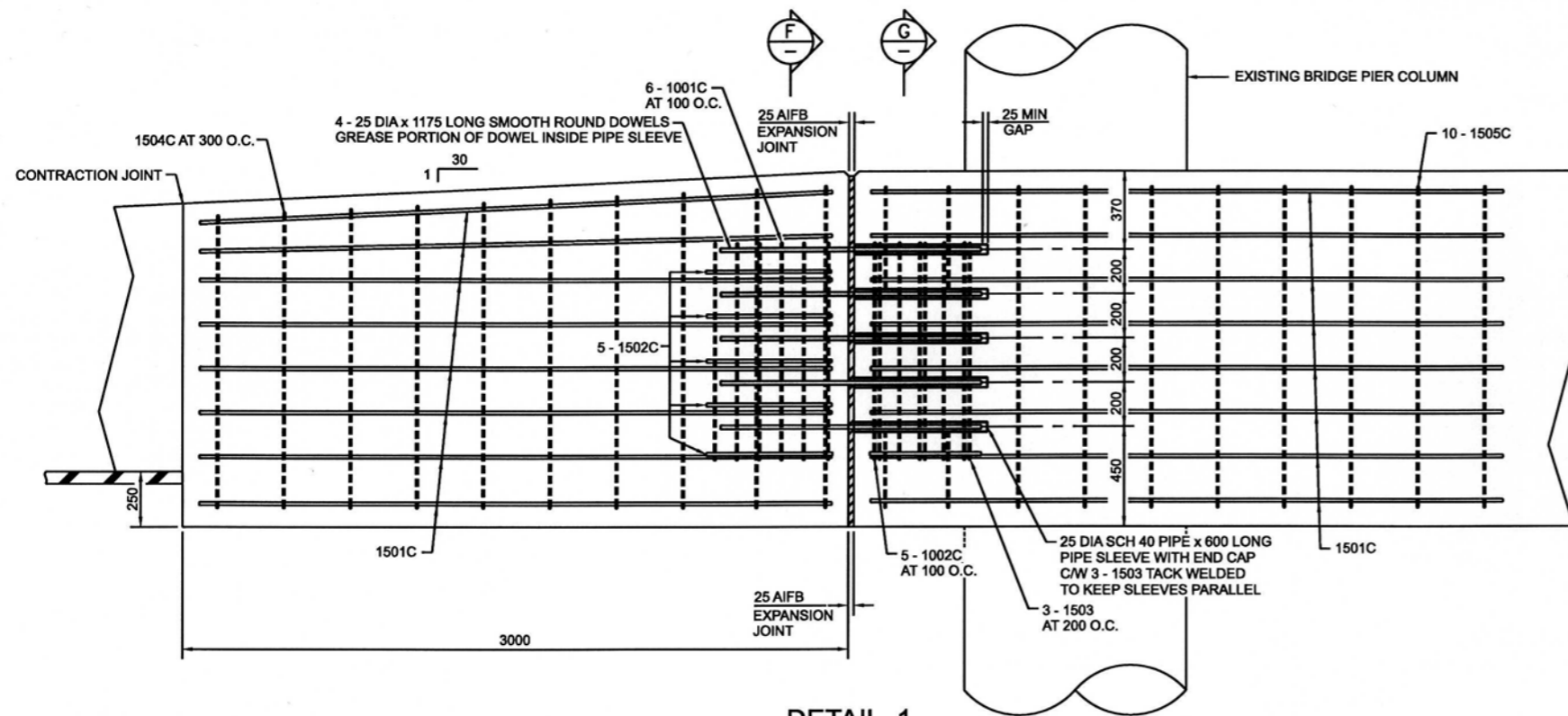
No.	REVISIONS	BY	DATE

Approved: *Allan Swan*  
 Executive Director,  
 Technical Standards Branch  
 Alberta  
 INFRASTRUCTURE AND  
 TRANSPORTATION  
 Date: NOVEMBER, 2007

**TL-4 SINGLE SLOPE  
 CONCRETE MEDIAN BARRIER  
 TRANSITION AROUND EXISTING  
 BRIDGE PIER - SHEET 1 OF 2**

Prepared By: MO    Checked By: WS    Scale: N.T.S.    Dwg No.: **RDG-B6.3**

ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE INDICATED.



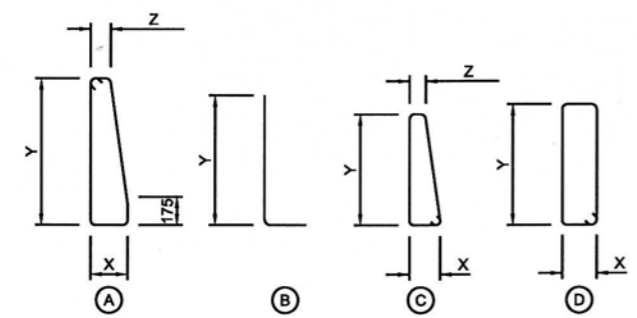
DETAIL 1

SECTION F  
SPLIT MEDIAN BARRIER

SECTION G  
MONOLITHIC BRIDGE PIER BARRIER

BAR LIST: BARRIER								
MARK	SIZE	NO.	TYPE	X	Y	Z	LENGTH	MASS
1001C	10	6	C	220	750	95	2 025	10
1002C	10	5	D	220	750		2 140	8
1501C	15	34	STR				2 850	152
1502C	15	6	STR				550	5
1503	15	3	B		750		930	4
1504C	15	10	A	LENGTH: X = 300 Y = VARIES FROM 1100 TO 1190 IN INCREMENTS OF 10 Z = VARIES FROM 175 TO 287 IN INCREMENTS OF 14			3105 (AVG)	49
1505C	15	10	D	300	1 200		2 780	44

PLAIN TOTAL kg = 4  
EPOXY COATED TOTAL kg = 268



BAR LIST NOTES:

- DIAMETERS OF ALL BENDS AND DETAILS OF ALL HOOKS, UNLESS NOTED OTHERWISE, SHALL CONFORM TO THE RECOMMENDED SIZES DETAILED IN THE REINFORCING STEEL MANUAL OF STANDARD PRACTICE, FIRST CANADIAN EDITION 1992, PUBLISHED BY THE REINFORCING INSTITUTE OF CANADA.
- REINFORCING STEEL SHALL BE IN ACCORDANCE WITH CAN/CSA-G30.18M92 "BILLET STEEL BARS FOR CONCRETE REINFORCEMENT".
- ALL REINFORCING STEEL SHALL BE GRADE 400 UNLESS NOTED OTHERWISE.
- \* C \* DENOTES EPOXY COATED REINFORCEMENT.
- SMOOTH ROUND DOWELS SHALL BE ASTM GRADE A36, OR APPROVED EQUAL, WITH A MINIMUM YIELD STRENGTH OF 250 MPa.
- ALL CONCRETE SHALL BE MODIFIED CLASS C (MINIMUM 28 DAY COMPRESSIVE STRENGTH OF 35 MPa) UNLESS OTHERWISE SPECIFIED.
- ALL CONCRETE CORNERS SHALL HAVE A 20 CHAMFER OR FILLET UNLESS NOTED OTHERWISE.
- ALL REINFORCING STEEL SHALL HAVE 75 CLEAR COVER UNLESS NOTED OTHERWISE.

CONSTRUCTION NOTES:

1. THE 3 - 1503 L-SHAPED DOWELS SHALL BE SHOP WELDED TO THE 25 DIA X 40 SCHEDULE PIPE SLEEVES, COMPLETE WITH END CAP, TO ENSURE THE SLEEVES ARE MAINTAINED PARALLEL.
2. A 25 DIA X 25 LONG COMPRESSIBLE PLUG, SUCH AS POLYSTYRENE, SHALL BE INSERTED INTO EACH PIPE SLEEVE PRIOR TO SLIDING THE 25 DIA SMOOTH ROUND DOWELS INSIDE THE SLEEVES.
3. DURING PLACEMENT OF THE BARRIER CONCRETE SHOWN IN SECTION G, THE 25 DIA SMOOTH ROUND DOWELS SHALL BE SET 575 FROM FACE OF THE 25 THICK AIFB EXPANSION JOINT. THE DOWELS SHALL BE TIED SECURELY TO THE 1001C STIRRUPS TO PREVENT THE DOWELS FROM SLIDING OUT DURING CONCRETE PLACING AND VIBRATING.

ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE INDICATED.

No.	REVISIONS	BY	DATE

Approved: *Allan Swan*  
Executive Director,  
Technical Standards Branch

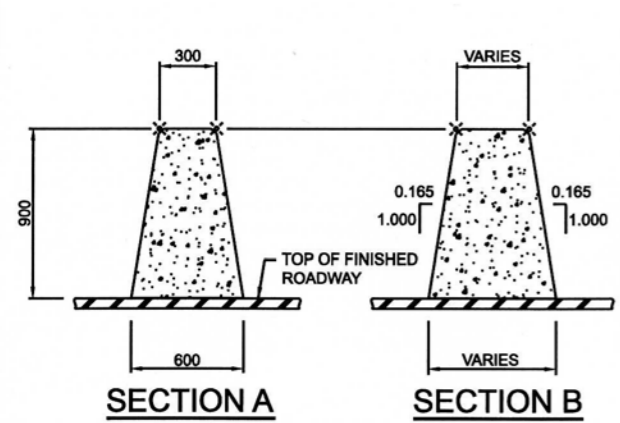
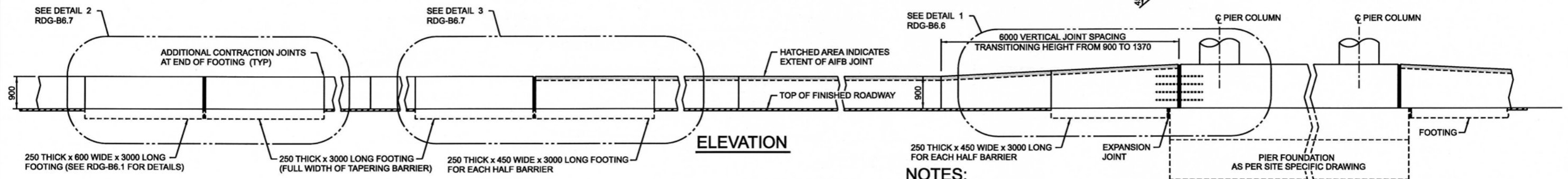
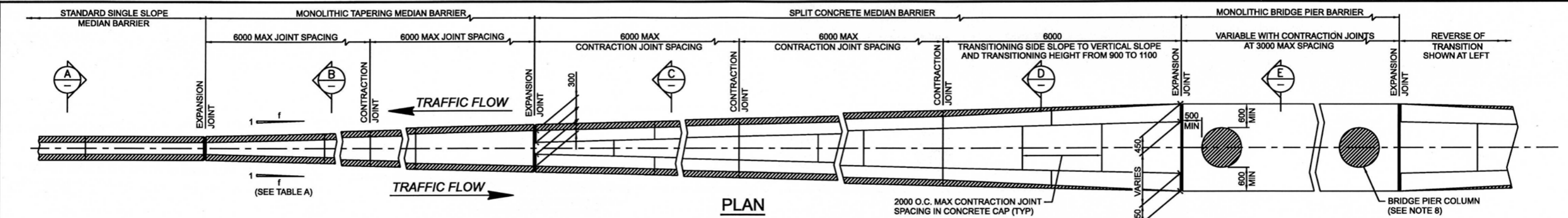
Date: NOVEMBER, 2007

**Alberta**  
INFRASTRUCTURE AND  
TRANSPORTATION

TL-4 SINGLE SLOPE  
CONCRETE MEDIAN BARRIER  
TRANSITION AROUND EXISTING  
BRIDGE PIER - SHEET 2 OF 2

Prepared By: NS/MO	Checked By: WS	Scale: N.T.S.	Dwg No.: RDG-B6.4
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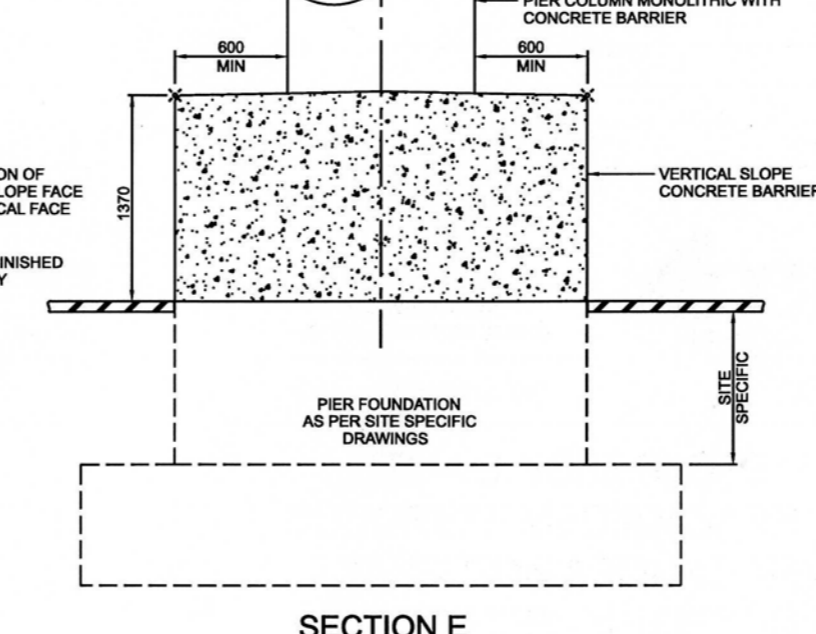
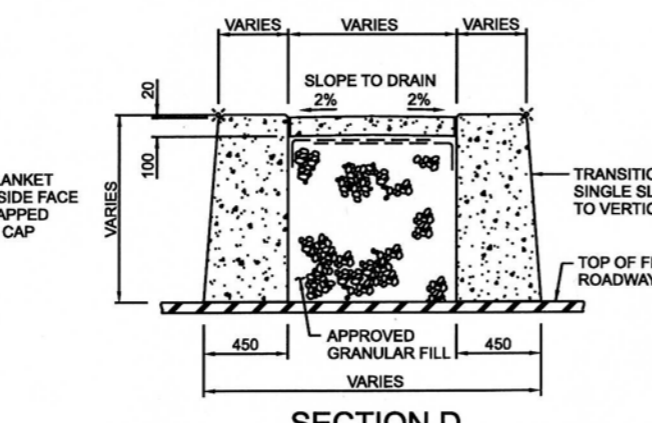
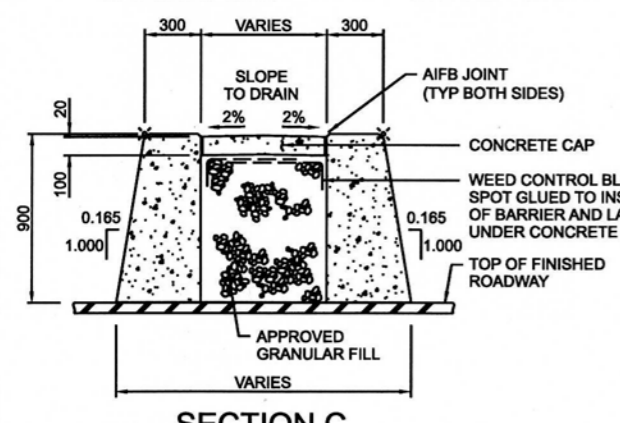
DESIGN SPEED (km/h)	f
130	50:1
120	40:1
110	30:1
100	26:1
90	24:1
80	21:1
70	18:1
60	16:1
50	13:1

FLARE RATES ADOPTED FROM AASHTO 2002 ROADSIDE DESIGN GUIDE

NUMBER OF LANES IN EACH DIRECTION	ROADWAY CROSS SECTION REFERENCE	NORMAL INSIDE SHOULDER WIDTH	MINIMUM INSIDE SHOULDER WIDTH
2	UFD-411.9-100/80	2500	1900 *
3	UFD/UAD-616.6-110/100/80	2500	2500 **
4	UFD/UAD-820.8-120/110/100	3000	2500 ***

\* ACCOMMODATES A MAXIMUM PIER COLUMN WIDTH OF 1000.  
 \*\* ACCOMMODATES A MAXIMUM PIER COLUMN WIDTH OF 1800 (NO REDUCTION IN SHOULDER WIDTH REQUIRED).  
 \*\*\* ACCOMMODATES A MAXIMUM PIER COLUMN WIDTH OF 1600.

- NOTES:**
- ALL BARRIERS SHALL BE CAST IN PLACE BY STATIONARY FORMING OR SLIPFORMING.
  - PROVIDE 20 CHAMFER AT TOP EDGES OF BARRIER AND AROUND ALL EXPOSED EDGES OF EXPANSION AND CONSTRUCTION JOINTS.
  - CONCRETE SHALL BE MODIFIED CLASS C (MINIMUM 28-DAY COMPRESSIVE STRENGTH OF 35 MPa), UNLESS OTHERWISE SPECIFIED.
  - BARRIERS ARE NON-REINFORCED EXCEPT AT FOOTING LOCATIONS.
  - BARRIER FOOTINGS SHALL BE PLACED ON EITHER SIDE OF ALL EXPANSION AND CONSTRUCTION JOINTS, AS WELL AS AT BARRIER ENDS. REFER TO RDG-B6.6 AND RDG-B6.7 FOR DETAILS ON GEOMETRY AND REINFORCING AT THESE LOCATIONS.
  - PLACE BARRIER AND FOOTING MONOLITHICALLY. COLD JOINTS BETWEEN FOOTING AND BARRIER ARE NOT PERMITTED.
  - EXPANSION JOINTS SHALL CONSIST OF A SINGLE LAYER OF 25 ASPHALT IMPREGNATED FIBREBOARD (AIFB) APPLIED TO FULL CROSS SECTION OF BARRIER AND SHALL EXTEND TO BASE OF FOOTING.
  - ENDS OF PIER COLUMNS SHALL BE SEMI-CIRCULAR IN SHAPE. ACTUAL SHAPE OF PIER COLUMNS MAY VARY AS PER SITE SPECIFIC DRAWINGS.
  - PROVIDE ADDITIONAL CONTROL JOINTS AS DETERMINED BY THE CONSULTANT TO ACCOMMODATE PIER COLUMN GEOMETRY.
  - EXTEND PIER COLUMN CONCRETE REINFORCING THROUGH BARRIER AND INTO CONCRETE PIER FOUNDATION AS PER SITE SPECIFIC DRAWINGS.
  - ADJUST HEIGHT OF CONCRETE BARRIER ON LOW SIDE OF OFFSET OR SUPERELEVATED ROADWAYS TO PROVIDE LEVEL GRADE ACROSS TOP OF BARRIER.
  - THIS TRANSITION DRAWING PROVIDES ALLOWANCE FOR A 100 FUTURE OVERLAY.
  - REDUCED INSIDE SHOULDER WIDTHS AT PIER COLUMNS ARE PERMITTED BUT SHOULD BE AVOIDED WHERE POSSIBLE. SEE TABLE B FOR MAXIMUM SHOULDER WIDTH REDUCTIONS.



No.	REVISIONS	BY	DATE

Approved: *Alan Curran*  
 Executive Director,  
 Technical Standards Branch

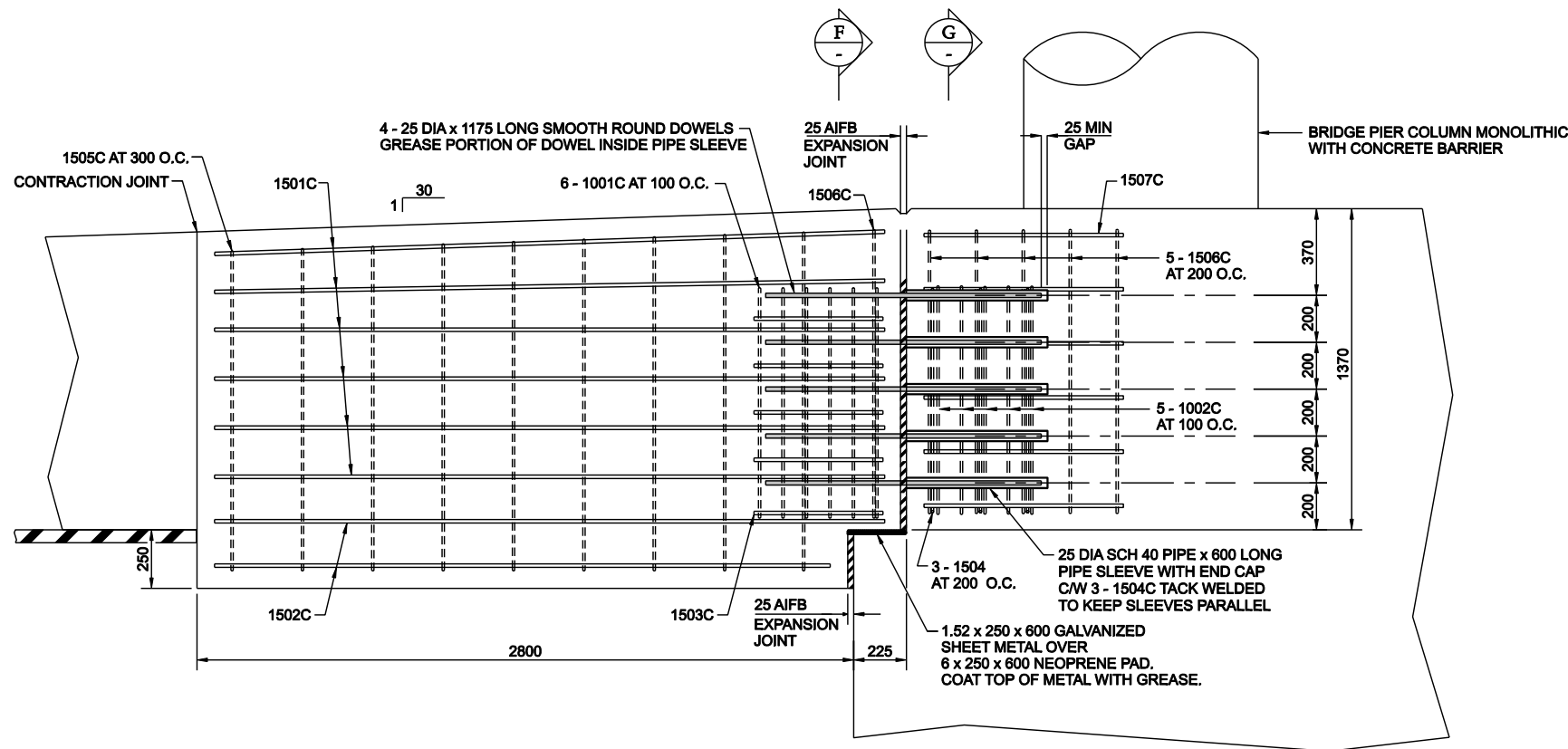
Date: NOVEMBER, 2007

**Alberta**  
 INFRASTRUCTURE AND  
 TRANSPORTATION

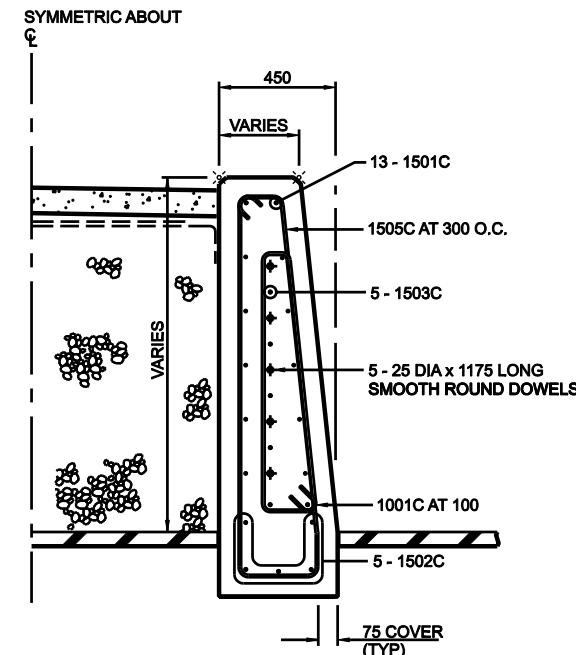
**TL-4 SINGLE SLOPE  
 CONCRETE MEDIAN BARRIER  
 TRANSITION AROUND NEW  
 BRIDGE PIER - SHEET 1 OF 3**

Prepared By: MO    Checked By: WS    Scale: N.T.S.    Dwg No.: **RDG-B6.5**

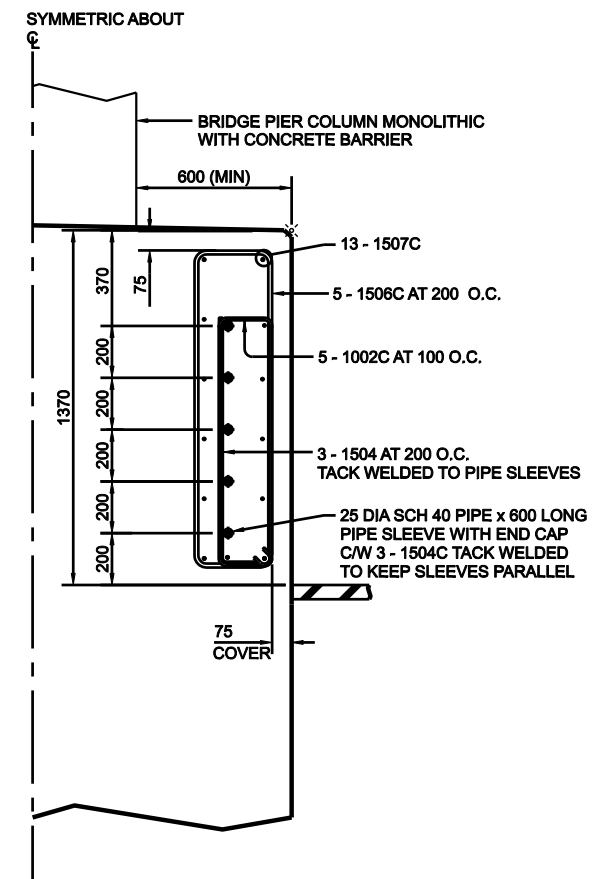
ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE INDICATED.



DETAIL 1



SECTION F  
SPLIT MEDIAN BARRIER



SECTION G  
MONOLITHIC BRIDGE PIER BARRIER

BAR LIST: BARRIER $\Delta$								
MARK	SIZE	NO.	TYPE	X	Y	Z	LENGTH	MASS
1001C	10	6	C	220	950	95	2 425	12
1002C	10	5	D	220	950		2 540	10
1501C	15	13	STR				2 850	58
1502C	15	5	STR				2 625	21
1503C	15	5	STR				550	4
1504	15	3	B		950		1130	5
1505C	15	9	A	LENGTH: X = 300 Y = VARIES FROM 1100 TO 1180 IN INCREMENTS OF 10 Z = VARIES FROM 175 TO 287 IN INCREMENTS OF 14			3105 (AVG)	44
1506C	15	6	D	300	1220		3 320	31
1507C	15	13	STR				850	17

PLAIN  
EPOXY COATED

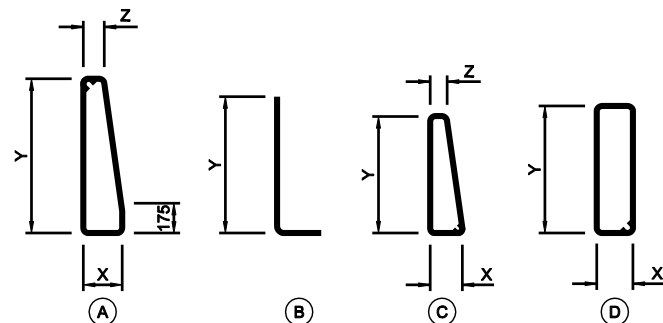
TOTAL kg = 5  
TOTAL kg = 197

BAR LIST NOTES:

- DIAMETERS OF ALL BENDS AND DETAILS OF ALL HOOKS, UNLESS NOTED OTHERWISE, SHALL CONFORM TO THE RECOMMENDED SIZES DETAILED IN THE REINFORCING STEEL MANUAL OF STANDARD PRACTICE, FIRST CANADIAN EDITION 1992, PUBLISHED BY THE REINFORCING INSTITUTE OF CANADA.
- REINFORCING STEEL SHALL BE IN ACCORDANCE WITH CAN/CSA-G30.18M92 "BILLET STEEL BARS FOR CONCRETE REINFORCEMENT".
- ALL REINFORCING STEEL SHALL BE GRADE 400 UNLESS NOTED OTHERWISE.
- "C" DENOTES EPOXY COATED REINFORCEMENT.
- SMOOTH ROUND DOWELS SHALL BE ASTM GRADE A36, OR APPROVED EQUAL, WITH A MINIMUM YIELD STRENGTH OF 250 MPa.
- CONCRETE SHALL BE CLASS C (MINIMUM 28-DAY COMPRESSIVE STRENGTH OF 35 MPa), UNLESS OTHERWISE SPECIFIED.
- ALL CONCRETE CORNERS SHALL HAVE A 20 CHAMFER OR FILLET UNLESS NOTED OTHERWISE.
- ALL REINFORCING STEEL SHALL HAVE 75 CLEAR COVER UNLESS NOTED OTHERWISE.

CONSTRUCTION NOTES:

- THE 3 - 1504 L-SHAPED DOWELS SHALL BE SHOP WELDED TO THE 25 DIA X 40 SCHEDULE PIPE SLEEVES, COMPLETE WITH END CAP, TO ENSURE THE SLEEVES ARE MAINTAINED PARALLEL.
- A 25 DIA X 25 LONG COMPRESSIBLE PLUG, SUCH AS POLYSTYRENE, SHALL BE INSERTED INTO EACH PIPE SLEEVE PRIOR TO SLIDING THE 25 DIA SMOOTH ROUND DOWELS INSIDE THE SLEEVES.
- DURING PLACEMENT OF THE BARRIER CONCRETE SHOWN IN SECTION G, THE 25 DIA SMOOTH ROUND DOWELS SHALL BE SET 575 FROM FACE OF THE 25 THICK AIFB EXPANSION JOINT. THE DOWELS SHALL BE TIED SECURELY TO THE 1001C STIRRUPS TO PREVENT THE DOWELS FROM SLIDING OUT DURING CONCRETE PLACING AND VIBRATING.



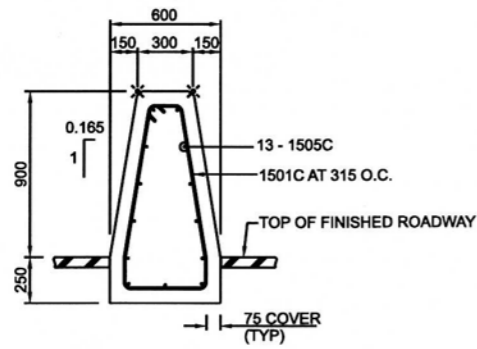
ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE INDICATED.

$\Delta$			
$\Delta$	BAR LIST AND NOTE REVISED	C.M.	16/OCT/12
No.	REVISIONS	BY	DATE

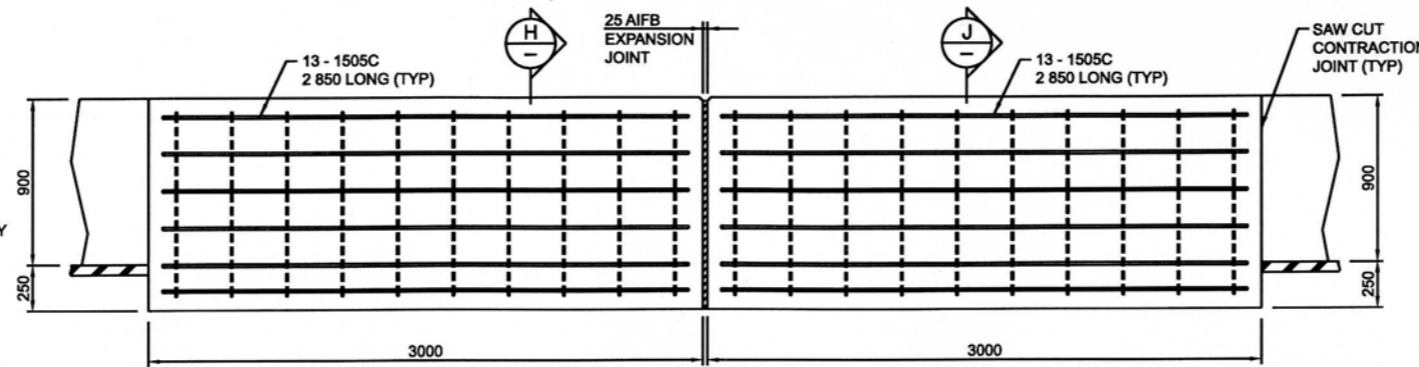
Approved:	
Allan Kwan Executive Director, Technical Standards Branch	
Date: NOVEMBER, 2007	

TL-4 SINGLE SLOPE  
CONCRETE MEDIAN BARRIER  
TRANSITION AROUND NEW  
BRIDGE PIER - SHEET 2 OF 3

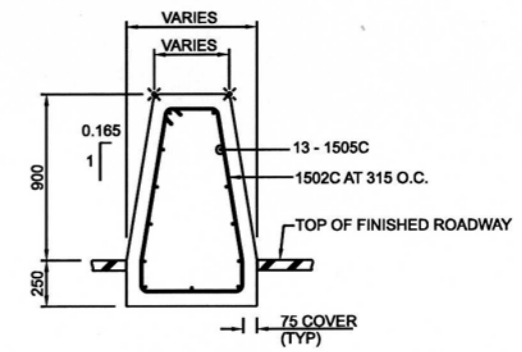
Prepared By: MO	Checked By: WS	Scale: N.T.S.	Dwg No.: RDG-B6.6
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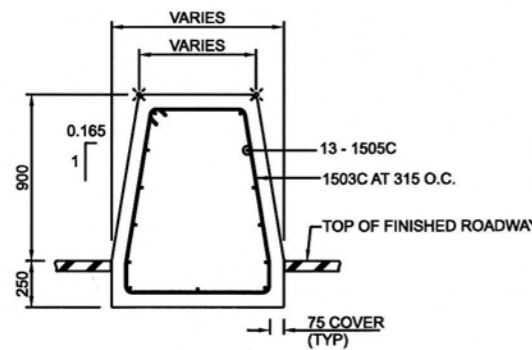
SECTION H



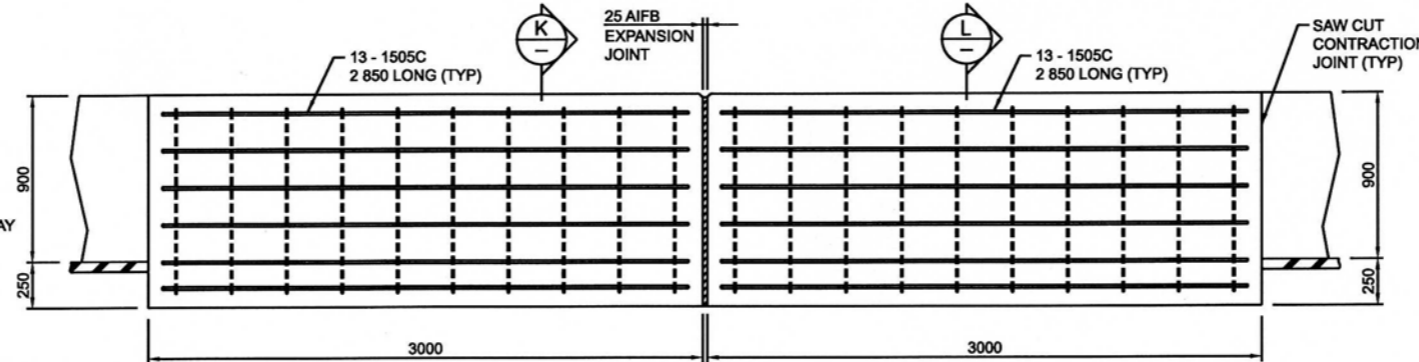
DETAIL 2



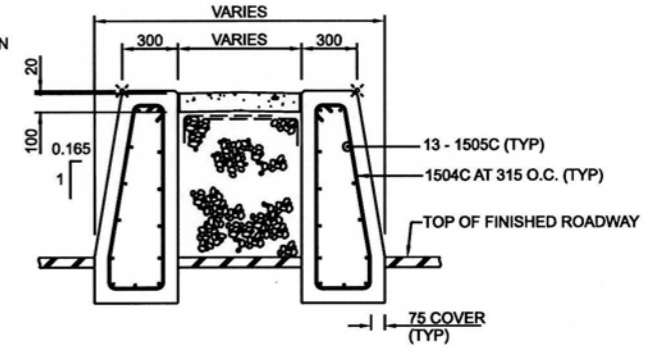
SECTION J



SECTION K



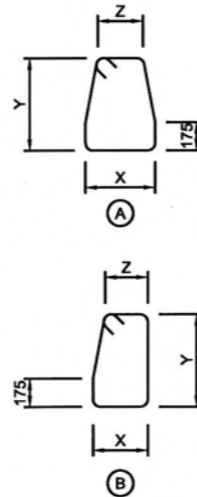
DETAIL 3



SECTION L

BAR LIST: BARRIER								
MARK	SIZE	NO.	TYPE	X	Y	Z	LENGTH	MASS
1501C	15	10	A	450	1 000	178	2 930	46
1502C	15	10	A	LENGTH: X = VARIES FROM 450 TO (450 + 5700/f) IN INCREMENTS OF 633/f Y = 1 000 Z = VARIES FROM 178 TO (178 + 5700/f) IN INCREMENTS OF 633/f			2 930 + 5 700/f	46.00 + 89.49/f
1503C	15	10	A	LENGTH: X = VARIES FROM (1188 - 5700/f) TO 1188 IN INCREMENTS OF 633/f Y = 1 000 Z = VARIES FROM (763 - 5700/f) TO 763 IN INCREMENTS OF 633/f			4 253 - 5 700/f	66.77 - 89.49/f
1504C	15	20	B	LENGTH: X = VARIES FROM 164 TO (164 + 2850/f) IN INCREMENTS OF 633/f Y = 1 000 Z = VARIES FROM 314 TO (314 + 2850/f) IN INCREMENTS OF 633/f			2 489 + 2 850/f	39.10 + 44.75/f
1505C	15	65	STR				2 850	291

EPOXY COATED TOTAL kg = 443 + 44.8/f



BAR LIST NOTES:

- DIAMETERS OF ALL BENDS AND DETAILS OF ALL HOOKS, UNLESS NOTED OTHERWISE, SHALL CONFORM TO THE RECOMMENDED SIZES DETAILED IN THE REINFORCING STEEL MANUAL OF STANDARD PRACTICE, FIRST CANADIAN EDITION 1992, PUBLISHED BY THE REINFORCING INSTITUTE OF CANADA.
- REINFORCING STEEL SHALL BE IN ACCORDANCE WITH CAN/CSA-G30.18M92 "BILLET STEEL BARS FOR CONCRETE REINFORCEMENT".
- ALL REINFORCING STEEL SHALL BE GRADE 400 UNLESS NOTED OTHERWISE.
- "C" DENOTES EPOXY COATED REINFORCEMENT.
- THE FLARE RATE VALUE "f" IS DEFINED IN TABLE A ON RDG-B6.3 AND RDG-B6.5.

No.	REVISIONS	BY	DATE

Approved:

*Allan Swan*  
Executive Director,  
Technical Standards Branch

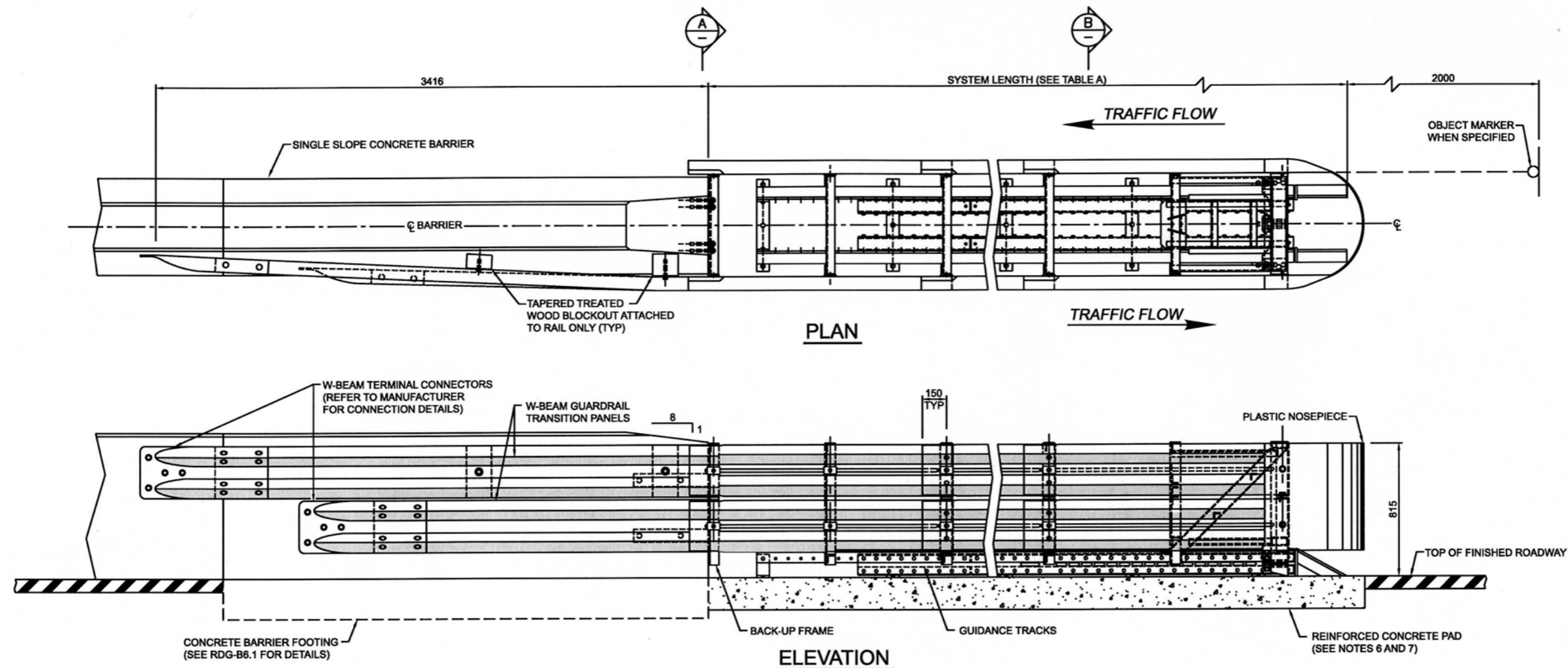
Date: NOVEMBER, 2007

**Alberta**  
INFRASTRUCTURE AND  
TRANSPORTATION

TL-4 SINGLE SLOPE CONCRETE  
BARRIER TRANSITION AROUND  
EXISTING/NEW BRIDGE PIER -  
SHEET 3 OF 3

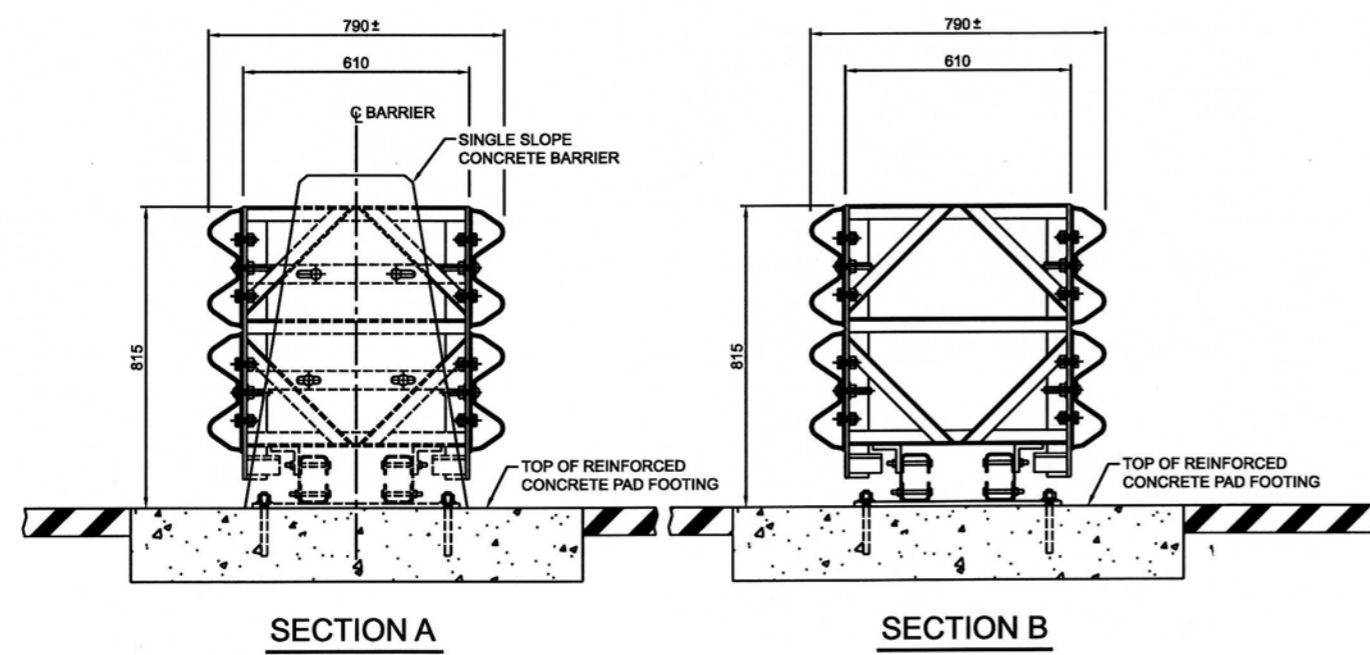
Prepared By: AK/MO	Checked By: WS	Scale: N.T.S.	Dwg No.: RDG-B6.7
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ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE INDICATED.



PLAN

ELEVATION



SECTION A

SECTION B

NOTES:

1. THE TRINITY ATTENUATING CRASH CUSHION (TRACC) SYSTEM DEPICTED ON THIS DRAWING IS PROPRIETARY TO TRINITY INDUSTRIES, INC.
2. THE TRACC SYSTEM SHALL NOT BE PLACED DIRECTLY BEHIND A RAISED CURB.
3. THE APPROACH AREA IN FRONT OF THE INSTALLED UNIT SHALL BE GRADED TO A SLOPE NOT EXCEEDING 10:1 IN THE DIRECTION OF TRAFFIC FLOW. THE CROSS SLOPE SHALL NOT EXCEED 12:1.
4. THE ENTIRE LENGTH OF THE TRACC SYSTEM CAN BE USED IN LENGTH OF NEED CALCULATIONS AS IT IS FULLY REDIRECTING.
5. SIGNS AND OTHER APPURTENANCES SHALL NOT BE INSTALLED WITHIN 1500 OF THE END OF THE ADJOINING CONCRETE MEDIAN BARRIER. THIS IS TO ALLOW THE SIDE PANELS OF THE TRACC TO RETRACT DURING AN END-ON IMPACT.
6. THE TRACC SYSTEM SHALL BE ANCHORED TO A CONCRETE PAD FOUNDATION AS PER THE INSTALLATION INSTRUCTIONS PROVIDED BY THE MANUFACTURER. SEE DRAWING RDG-B6.11 FOR DETAILS.
7. FOR TEMPORARY APPLICATIONS, THE TRACC SYSTEM MAY BE ANCHORED INTO 150 OF ASPHALT UNDERLAIN WITH AT LEAST 150 OF COMPACTED SUBBASE USING 16 DIA X 460 LONG ANCHOR STUDS AS PER THE MANUFACTURER'S INSTRUCTIONS.

TABLE A

POSTED SPEED km/h	< 70	≥ 70
NCHRP REPORT 350 TEST LEVEL	TL-2	TL-3
SYSTEM LENGTH	4750	6857

ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE INDICATED.

No.	REVISIONS	BY	DATE

Approved:

*Allan Ewan*  
Executive Director,  
Technical Standards Branch

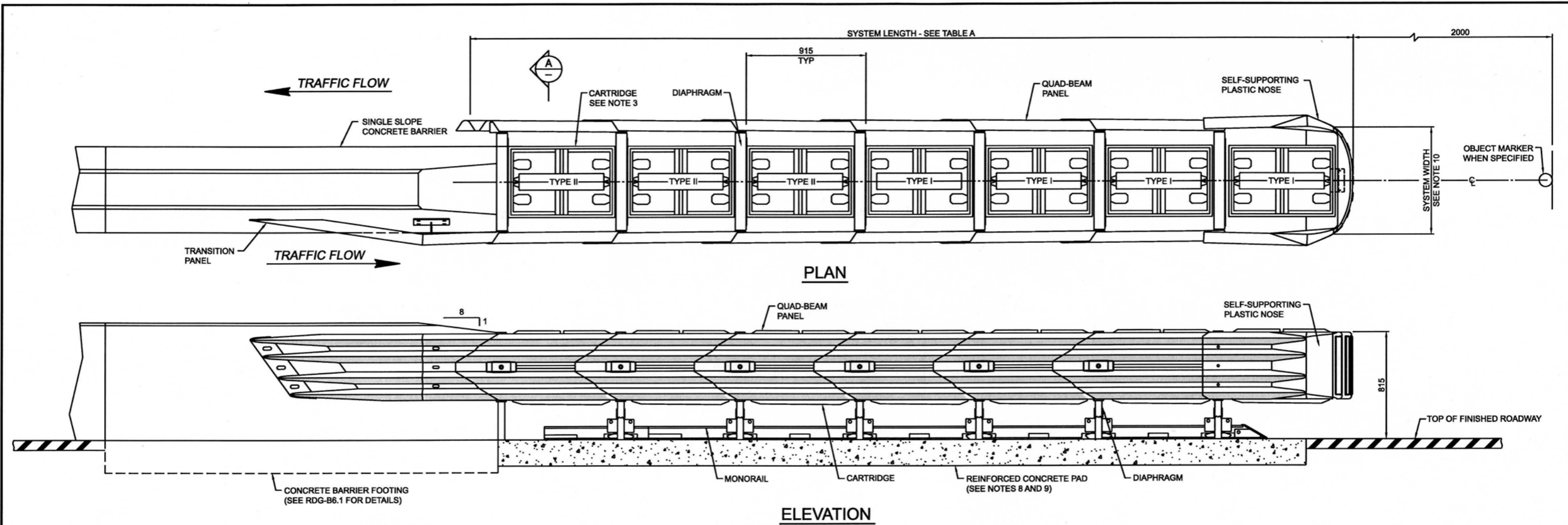
Date: NOVEMBER, 2007

**Alberta**  
INFRASTRUCTURE AND  
TRANSPORTATION

TL-2 AND TL-3 CONCRETE  
MEDIAN BARRIER TERMINATION  
TRACC CRASH CUSHION  
SYSTEM (BIDIRECTIONAL)

Prepared By: MO	Checked By: WS	Scale: N.T.S.	Dwg No.: RDG-B6.8
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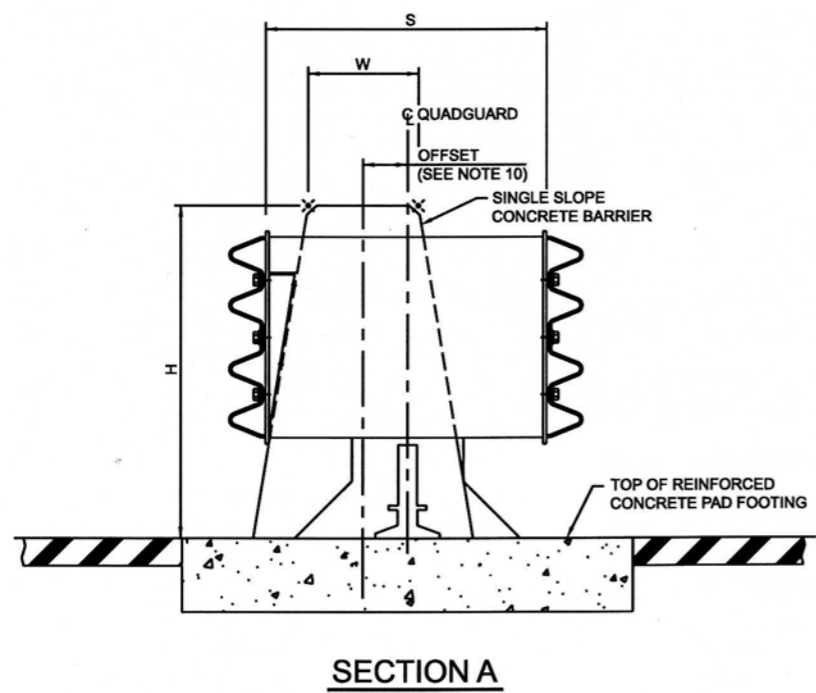




**NOTES:**

1. THE QUADGUARD SYSTEM DEPICTED ON THIS DRAWING IS PROPRIETARY TO ENERGY ABSORPTION SYSTEMS, INC. THE SYSTEM SHOWN IS FOR A PERMANENT APPLICATION WITH THE SINGLE SLOPE CONCRETE BARRIER PROVIDING BACK-UP.
2. A TENSION STRUT BACKUP MAY BE USED AS PER THE MANUFACTURER'S INSTRUCTIONS WHEN A CONCRETE BACK-UP IS NOT PROVIDED DIRECTLY BEHIND THE QUADGUARD SYSTEM. FOR EXAMPLE, WHEN THE END OF THE CONCRETE BARRIER IS TRANSITIONED USING THREE BEAM AND/OR W-BEAM BEFORE TERMINATING WITH THE QUADGUARD SYSTEM.
3. SEE TABLE A FOR NUMBER OF CARTRIDGE TYPES REQUIRED BASED ON POSTED SPEED.
4. THE QUADGUARD SYSTEM SHALL NOT BE PLACED DIRECTLY BEHIND A RAISED CURB.
5. THE APPROACH AREA IN FRONT OF THE INSTALLED SYSTEM SHALL BE GRADED TO A SLOPE NOT EXCEEDING 10:1 IN THE DIRECTION OF TRAFFIC FLOW. THE CROSS SLOPE SHALL NOT EXCEED 12:1.
6. THE ENTIRE LENGTH OF THE QUADGUARD SYSTEM LESS 500 CAN BE USED IN LENGTH OF NEED CALCULATIONS AS IT IS FULLY REDIRECTING.
7. SIGNS AND OTHER APPURTENANCES SHALL NOT BE INSTALLED WITHIN 1500 OF THE END OF THE ADJOINING CONCRETE BARRIER. THIS IS TO ALLOW THE FENDER PANELS OF THE QUADGUARD TO RETRACT DURING END-ON IMPACT.
8. THE QUADGUARD SYSTEM SHALL BE ANCHORED TO A CONCRETE PAD FOUNDATION AS PER THE INSTALLATION INSTRUCTIONS PROVIDED BY THE MANUFACTURER. SEE DRAWING RDG-B6.11 FOR DETAILS.
9. FOR TEMPORARY APPLICATIONS, THE QUADGUARD SYSTEM IS AVAILABLE IN A CZ CONFIGURATION AND MAY BE ANCHORED INTO 150 OF ASPHALT UNDERLAIN WITH AT LEAST 150 OF COMPACTED SUBBASE USING 16 DIA x 460 LONG ANCHOR STUDS AS PER THE MANUFACTURER'S INSTRUCTIONS.
10. FOR MEDIAN INSTALLATIONS IN BIDIRECTIONAL TRAFFIC FLOW AND WHEN CONNECTING DIRECTLY TO A SINGLE SLOPE CONCRETE BARRIER, A TRANSITION PANEL SHALL BE INSTALLED TO FACE OF BARRIER. THE OFFSET BETWEEN CENTERLINE OF THE QUADGUARD SYSTEM WIDTH "S" AND CENTERLINE OF THE BARRIER SHALL BE DETERMINED USING THE FOLLOWING FORMULA:  

$$W + (0.38)H - S - 10 = \text{OFFSET (mm)}$$



POSTED SPEED KM/H	< 70	≥ 70
NCHRP REPORT 350 TEST LEVEL	TL - 2	TL - 3
BAYS	3	6
TYPE I CARTRIDGES FRONT	3	4
TYPE II CARTRIDGES REAR	1	3
SYSTEM LENGTH	4000	6740

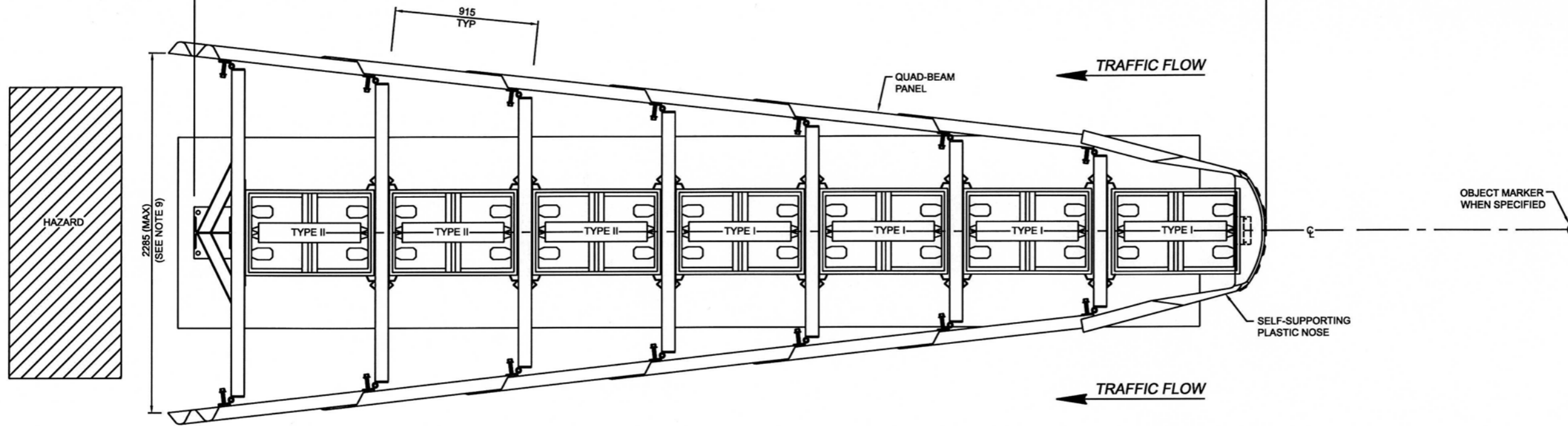
ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE INDICATED.

No.	REVISIONS	BY	DATE
Approved:  Executive Director, Technical Standards Branch			
Date: NOVEMBER, 2007			
<b>TL-2 AND TL-3 CONCRETE          MEDIAN BARRIER TERMINATION          QUADGUARD CRASH CUSHION          SYSTEM (BIDIRECTIONAL)</b>			
Prepared By: MO	Checked By: WS	Scale: N.T.S.	Dwg No.: <b>RDG-B6.9</b>

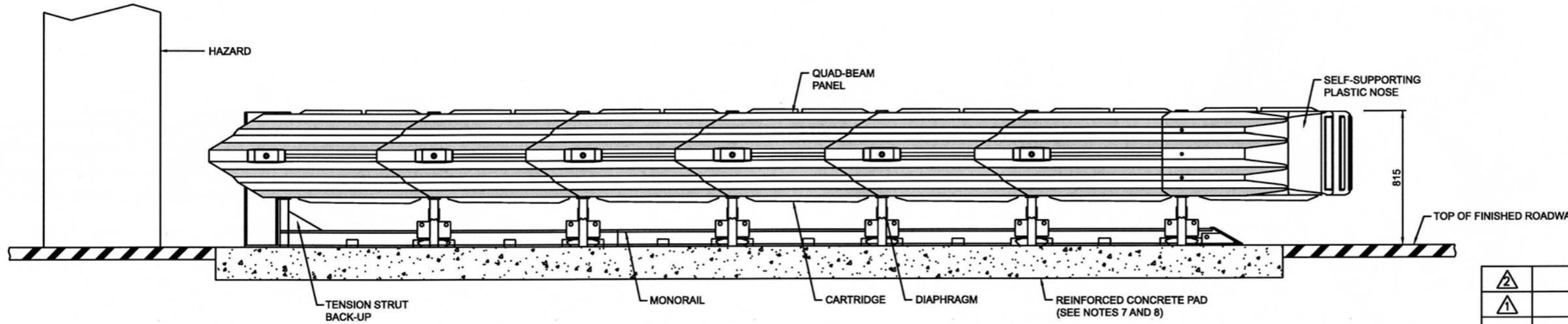


SYSTEM LENGTH - SEE TABLE A

2000



PLAN



ELEVATION

**NOTES:**

1. THE QUADGUARD SYSTEM DEPICTED ON THIS DRAWING IS PROPRIETARY TO ENERGY ABSORPTION SYSTEMS, INC. THE SYSTEM SHOWN IS FOR A PERMANENT APPLICATION WITH A TENSION STRUT PROVIDING BACK-UP.
2. SEE TABLE A FOR NUMBER OF CARTRIDGE TYPES REQUIRED BASED ON POSTED SPEED.
3. THE QUADGUARD SYSTEM SHALL NOT BE PLACED DIRECTLY BEHIND A RAISED CURB.
4. THE APPROACH AREA IN FRONT OF THE INSTALLED SYSTEM SHALL BE GRADED TO A SLOPE NOT EXCEEDING 10:1 IN THE DIRECTION OF TRAFFIC FLOW. THE CROSS SLOPE SHALL NOT EXCEED 12:1.
5. THE ENTIRE LENGTH OF THE QUADGUARD SYSTEM LESS 500 CAN BE USED IN LENGTH OF NEED CALCULATIONS AS IT IS FULLY REDIRECTING.
6. SIGNS AND OTHER APPURTENANCES SHALL NOT BE INSTALLED WITHIN 1500 DIRECTLY BEHIND THE END OF THE FENDER PANELS. THIS IS TO ALLOW THE FENDER PANELS OF THE QUADGUARD TO RETRACT DURING END-ON IMPACT.
7. THE QUADGUARD SYSTEM SHALL BE ANCHORED TO A CONCRETE PAD FOUNDATION AS PER THE INSTALLATION INSTRUCTIONS PROVIDED BY THE MANUFACTURER. SEE DRAWING RDG-B6.11 FOR DETAILS.
8. FOR TEMPORARY APPLICATIONS, THE QUADGUARD SYSTEM IS AVAILABLE IN A CZ CONFIGURATION AND MAY BE ANCHORED INTO 150 OF ASPHALT UNDERLAIN WITH AT LEAST 150 OF COMPACTED SUBBASE USING 16 DIA X 460 LONG ANCHOR STUDS AS PER THE MANUFACTURER'S INSTRUCTIONS.
9. THE QUADGUARD SYSTEM IS AVAILABLE IN 5 NOMINAL WIDTHS: 610, 760, 915, 1755 AND 2285. UNLESS OTHERWISE WARRANTED BY SITE SPECIFIC REQUIREMENTS, SELECTION OF THE NARROWEST WIDTH THAT ADEQUATELY SHIELDS THE HAZARD IS RECOMMENDED.

POSTED SPEED KM/H	< 70	≥ 70
NCHRP REPORT 350 TEST LEVEL	TL - 2	TL - 3
BAYS	3	6
TYPE I CARTRIDGES FRONT	3	4
TYPE II CARTRIDGES REAR	1	3
SYSTEM LENGTH	4000	6740

ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE INDICATED.

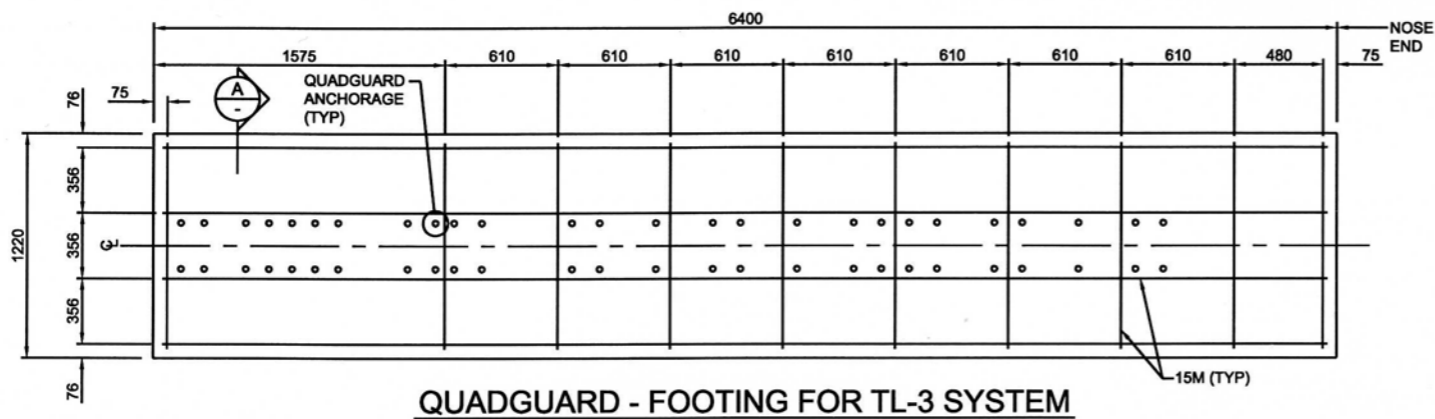
No.	REVISIONS	BY	DATE

Approved:  
*Alan Swan*  
Executive Director,  
Technical Standards Branch  
Date: NOVEMBER, 2007

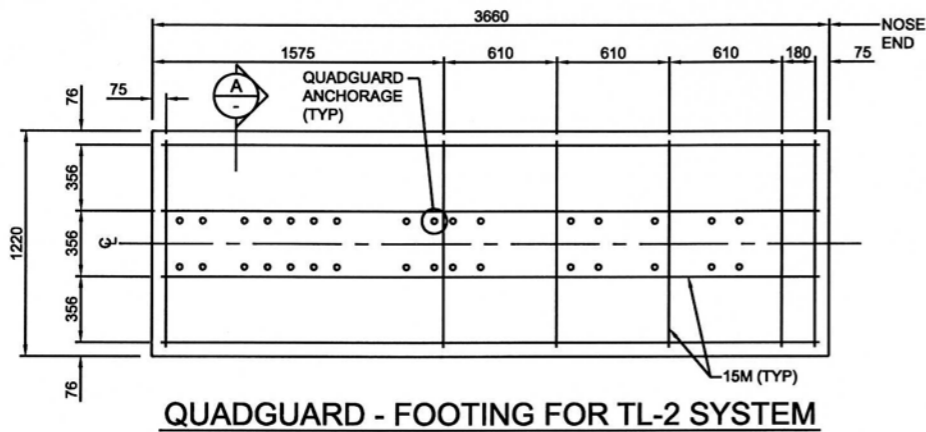


**TL-2 AND TL-3  
UNIDIRECTIONAL QUADGUARD  
CRASH CUSHION SYSTEM  
FOR WIDE MEDIAN HAZARDS**

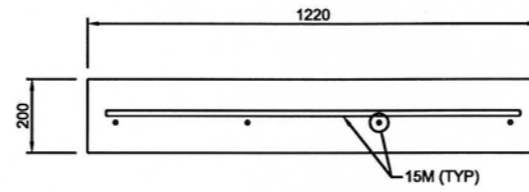
Prepared By: MO    Checked By: WS    Scale: N.T.S.    Dwg No.: **RDG-B6.10**



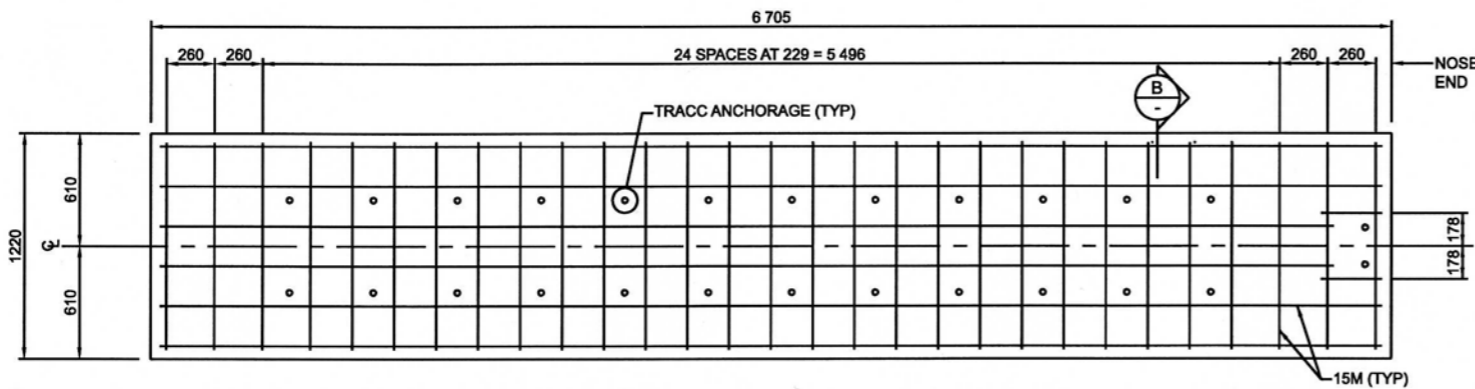
**QUADGUARD - FOOTING FOR TL-3 SYSTEM**



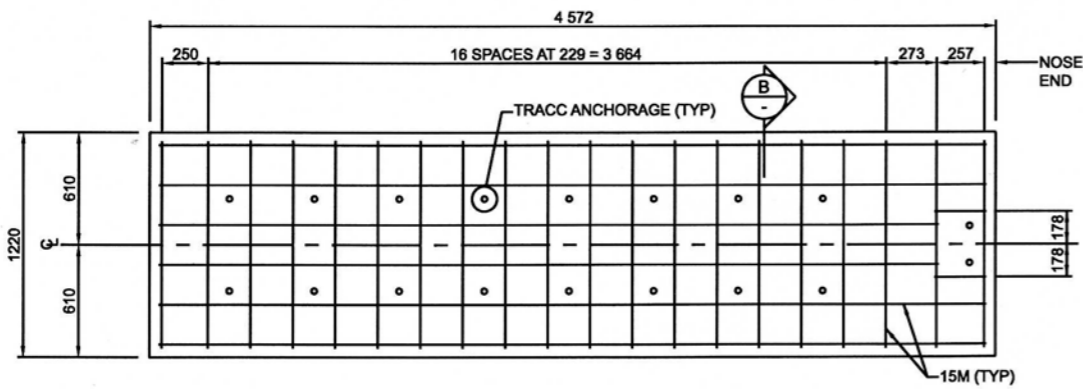
**QUADGUARD - FOOTING FOR TL-2 SYSTEM**



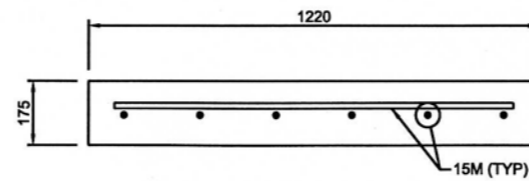
**SECTION A**



**TRACC - FOOTING FOR TL-3 SYSTEM**



**TRACC - FOOTING FOR TL-2 SYSTEM**



**SECTION B**

**NOTES:**

1. THIS DRAWING IS APPLICABLE FOR PERMANENT APPLICATIONS OF QUADGUARD AND TRACC SYSTEMS. FOR TEMPORARY APPLICATIONS, ALTERNATE FOUNDATIONS MAY BE USED AS RECOMMENDED BY THE MANUFACTURER, PROVIDED THAT THE INSTALLED SYSTEM MAINTAINS COMPLIANCE WITH NCHRP REPORT 350 FOR TEST LEVEL 3 (TL-3).
2. CONCRETE FOOTINGS SHALL BE PLACED ON WELL COMPACTED GRANULAR BASE TO 95% STANDARD PROCTOR MAXIMUM DRY DENSITY.
3. CONCRETE SHALL BE MODIFIED CLASS C (MINIMUM 28-DAY COMPRESSIVE STRENGTH OF 35 MPa).
4. SUPPLY AND INSTALLATION OF CONCRETE AND REINFORCING STEEL AS PER THE CONTRACT SPECIFICATIONS.
5. CONCRETE REINFORCING STEEL SHALL BE EPOXY COATED.
6. PROVIDE 75 END COVER AND 75 BOTTOM COVER FOR ALL CONCRETE REINFORCEMENT.
7. REFER TO THE MANUFACTURER'S INSTALLATION INSTRUCTIONS FOR ANCHORAGE DETAILS.

ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE INDICATED.

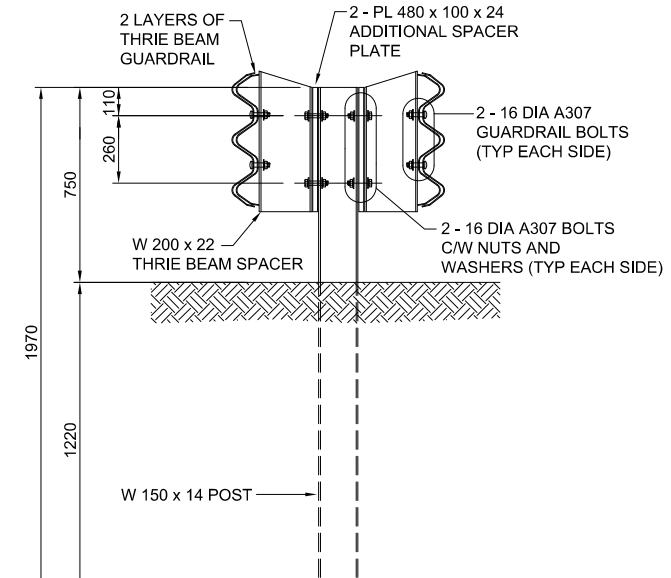
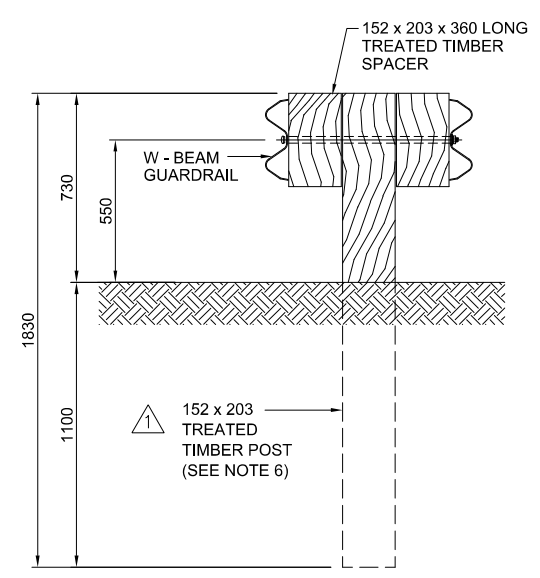
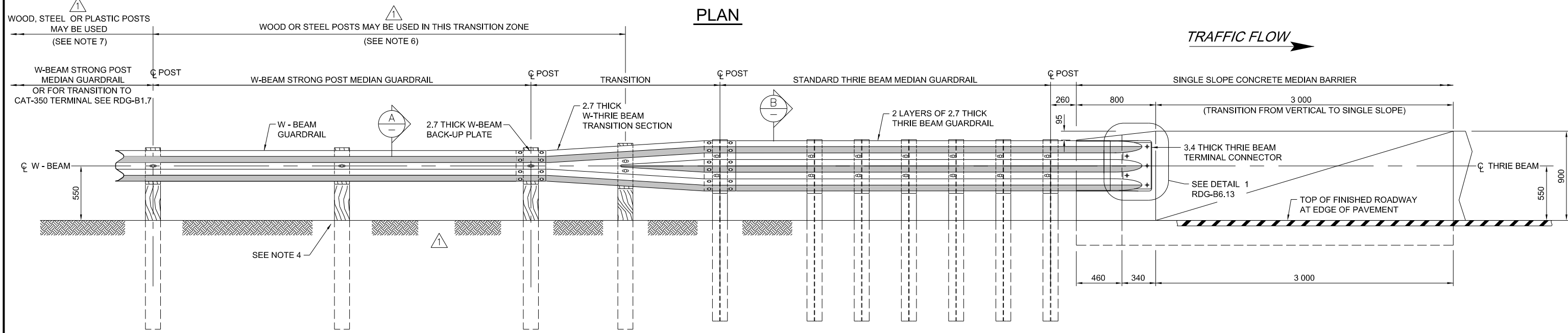
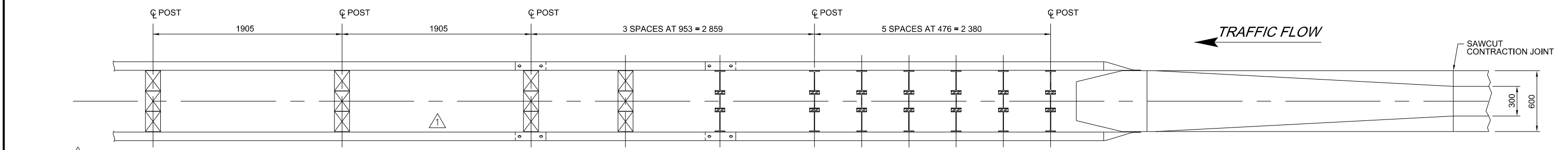
△			
△			
No.	REVISIONS	BY	DATE

Approved:  
  
 Executive Director,  
 Technical Standards Branch  
 Date: NOVEMBER, 2007

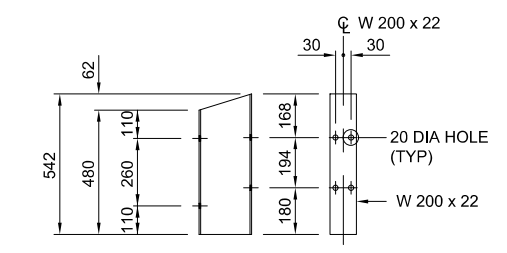


**QUADGUARD AND TRACC  
 CRASH CUSHION SYSTEMS  
 CONCRETE PAD FOUNDATION**

Prepared By: AK	Checked By: WS	Scale: N.T.S.	Dwg No.: RDG-B6.11
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- NOTES:**
- LAP GUARDRAIL SECTIONS IN THE DIRECTION OF TRAFFIC FLOW.
  - ALL FITTINGS AND HARDWARE SHALL BE GALVANIZED.
  - LINE AND ELEVATION OF BARRIER SHALL BE SET BY INSTRUMENT.
  - ACP OR GRANULAR BASE COURSE MAY BE PROVIDED AROUND GUARDRAIL POSTS AS PER SITE SPECIFIC REQUIREMENTS.
  - THIS TRANSITION MAY BE CONSIDERED TO SATISFY NCHRP REPORT 350 REQUIREMENTS FOR TEST LEVEL 4 (TL4)
  - TRANSITION ZONE CAN BE WOOD OR STEEL POST WITH WOOD SPACER BLOCK. REFER TO STANDARD DRAWING TEB 3.01 FOR POST DETAILS.
  - TYPICAL STRONG POST SYSTEM CAN BE WOOD, STEEL, OR PLASTIC POST WITH WOOD SPACER BLOCK. REFER TO STANDARD DRAWING TEB 3.01 FOR POST DETAILS.



2			
1	NOTE 6 AND 7 ADDED. POST REMOVED FROM PLAN AND ELEVATION	HC	11 MAR 2016
No.	REVISIONS	BY	DATE

Approved:  
Allan Kwan  
Executive Director,  
Technical Standards Branch

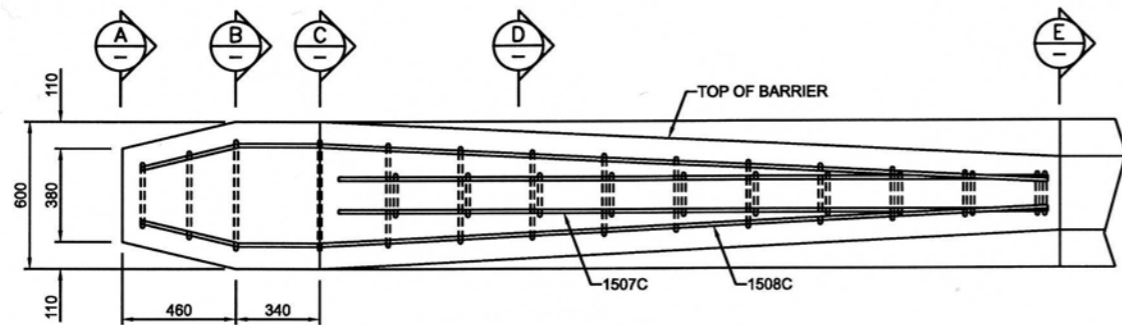
Date: NOVEMBER, 2007

**Alberta**  
INFRASTRUCTURE AND  
TRANSPORTATION

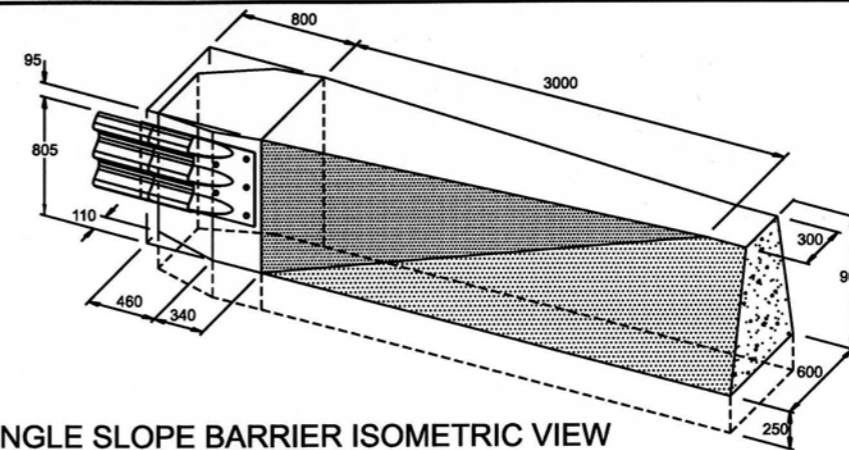
**TRANSITION OF TL-4  
SINGLE SLOPE CONCRETE BARRIER  
TO W-BEAM MEDIAN GUARDRAIL  
SHEET 1 OF 2**

Prepared By: MO Checked By: WS Scale: N.T.S. Dwg No.: RDG-B6.12

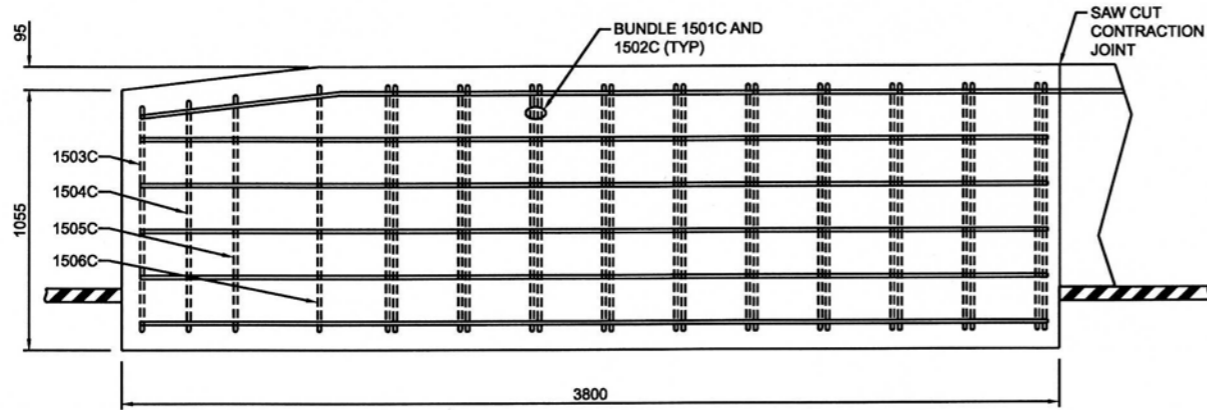
ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE INDICATED.



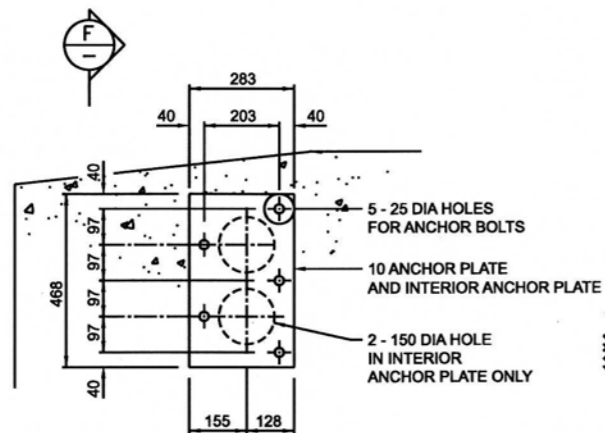
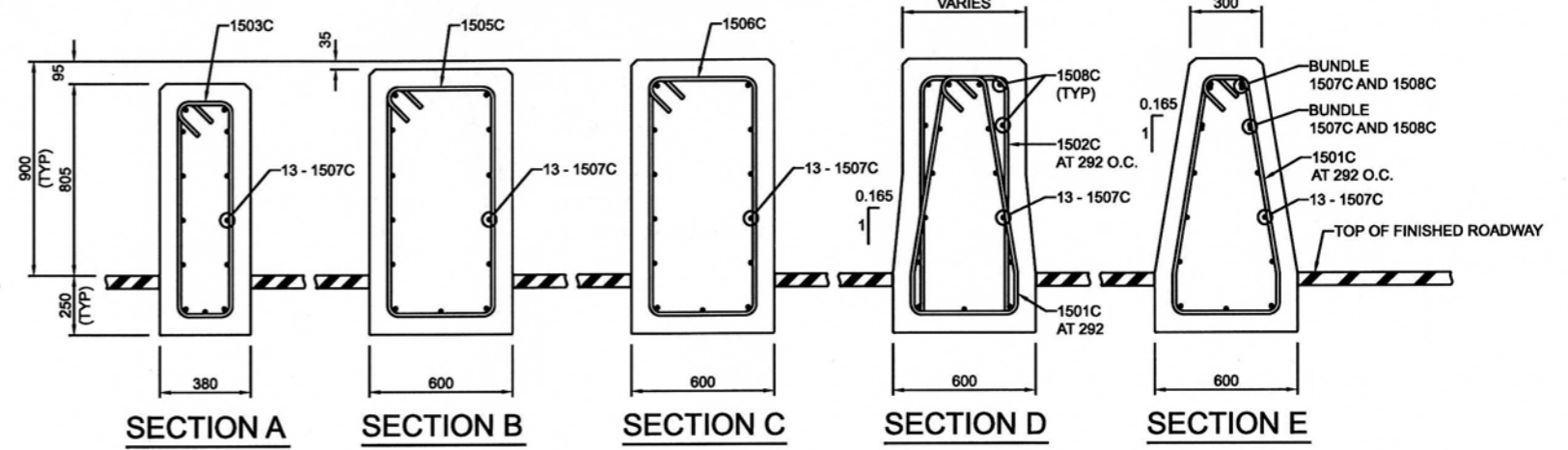
**BARRIER REINFORCEMENT PLAN**



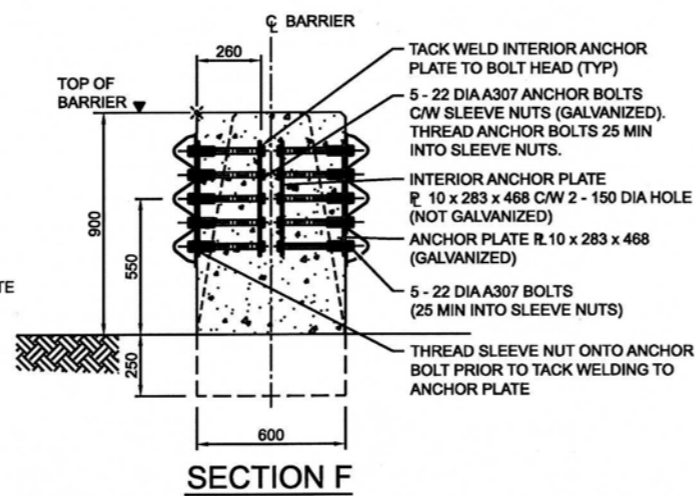
**SINGLE SLOPE BARRIER ISOMETRIC VIEW**



**BARRIER REINFORCEMENT ELEVATION**



**DETAIL 1**  
APPROACH RAIL TRANSITION ANCHORAGE  
(THREE BEAM TERMINAL CONNECTOR  
NOT SHOWN FOR CLARITY)



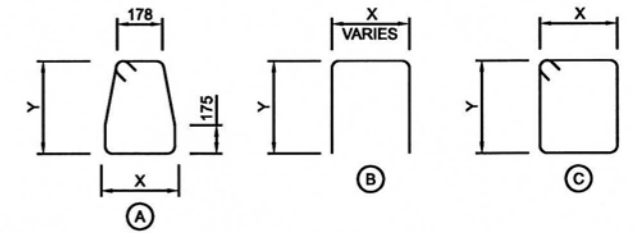
**SECTION F**

BAR LIST: BARRIER							
MARK	SIZE	NO.	TYPE	X	Y	LENGTH	MASS
1501C	15	10	A	450	1 000	2 930	46
1502C	15	10	B	X VARIES FROM 422 TO 190 IN INCREMENTS OF 29, ONE BAR AT 178	1 000	2 295 (AVG)	36
1503C	15	1	C	265	900	2 550	4
1504C	15	1	C	380	930	2 620	4
1505C	15	1	C	450	955	2 810	4
1506C	15	1	C	450	1 000	2 900	5
1507C	15	13	STR	-	-	2 850	53
1508C	15	4	STR	-	-	3 650	23

EPOXY COATED TOTAL kg = 175

**BAR LIST NOTES:**

- DIAMETERS OF ALL BENDS AND DETAILS OF ALL HOOKS, UNLESS NOTED OTHERWISE, SHALL CONFORM TO THE RECOMMENDED SIZES DETAILED IN THE REINFORCING STEEL MANUAL OF STANDARD PRACTICE, FIRST CANADIAN EDITION 1992, PUBLISHED BY THE REINFORCING INSTITUTE OF CANADA.
- REINFORCING STEEL SHALL BE IN ACCORDANCE WITH CAN/CSA-G30.18M92 "BILLET STEEL BARS FOR CONCRETE REINFORCEMENT".
- ALL REINFORCING STEEL SHALL BE GRADE 400 UNLESS NOTED OTHERWISE.
- "C" DENOTES EPOXY COATED REINFORCEMENT.
- ALL CONCRETE SHALL BE MODIFIED CLASS C UNLESS OTHERWISE SPECIFIED (MINIMUM 28 DAY COMPRESSIVE STRENGTH OF 35 MPa).
- ALL CONCRETE CORNERS SHALL HAVE A 20 CHAMFER OR FILLET UNLESS NOTED OTHERWISE.
- ALL REINFORCING STEEL SHALL HAVE 75 CLEAR COVER UNLESS NOTED OTHERWISE.



No.	REVISIONS	BY	DATE

Approved: *Alan Swan*  
Executive Director,  
Technical Standards Branch

Date: NOVEMBER, 2007

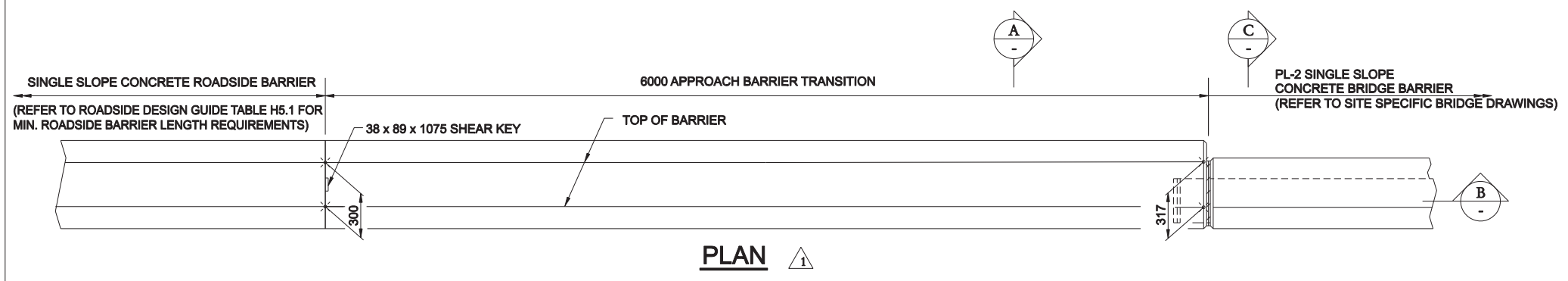
**Alberta**  
INFRASTRUCTURE AND  
TRANSPORTATION

**TRANSITION OF TL-4  
SINGLE SLOPE CONCRETE BARRIER  
TO W-BEAM MEDIAN GUARDRAIL  
SHEET 2 OF 2**

Prepared By: MO	Checked By: WS	Scale: N.T.S.	Dwg No.: RDG-B6.13
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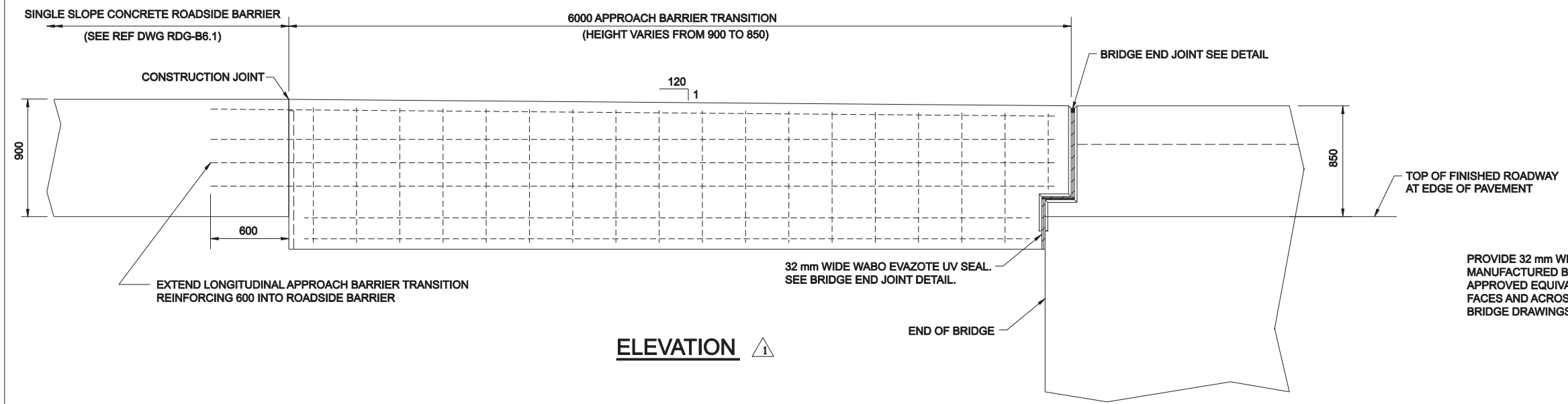
ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE INDICATED.



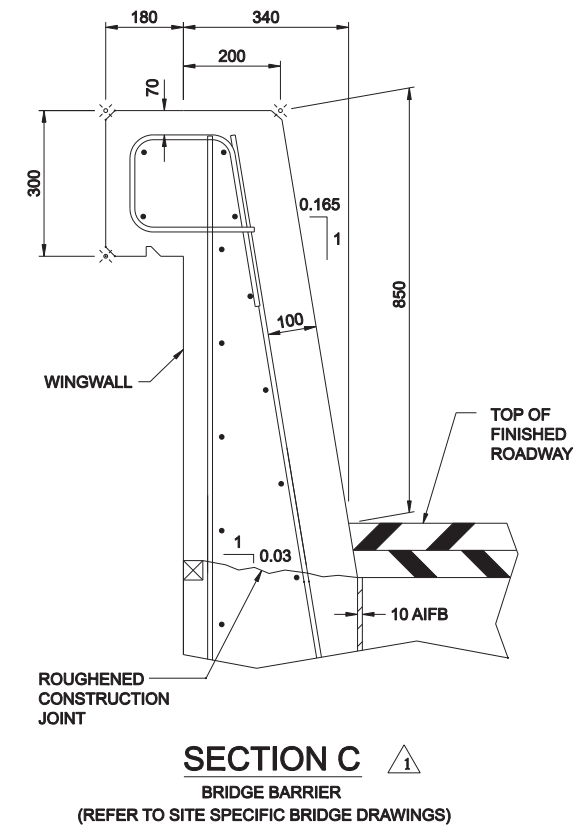
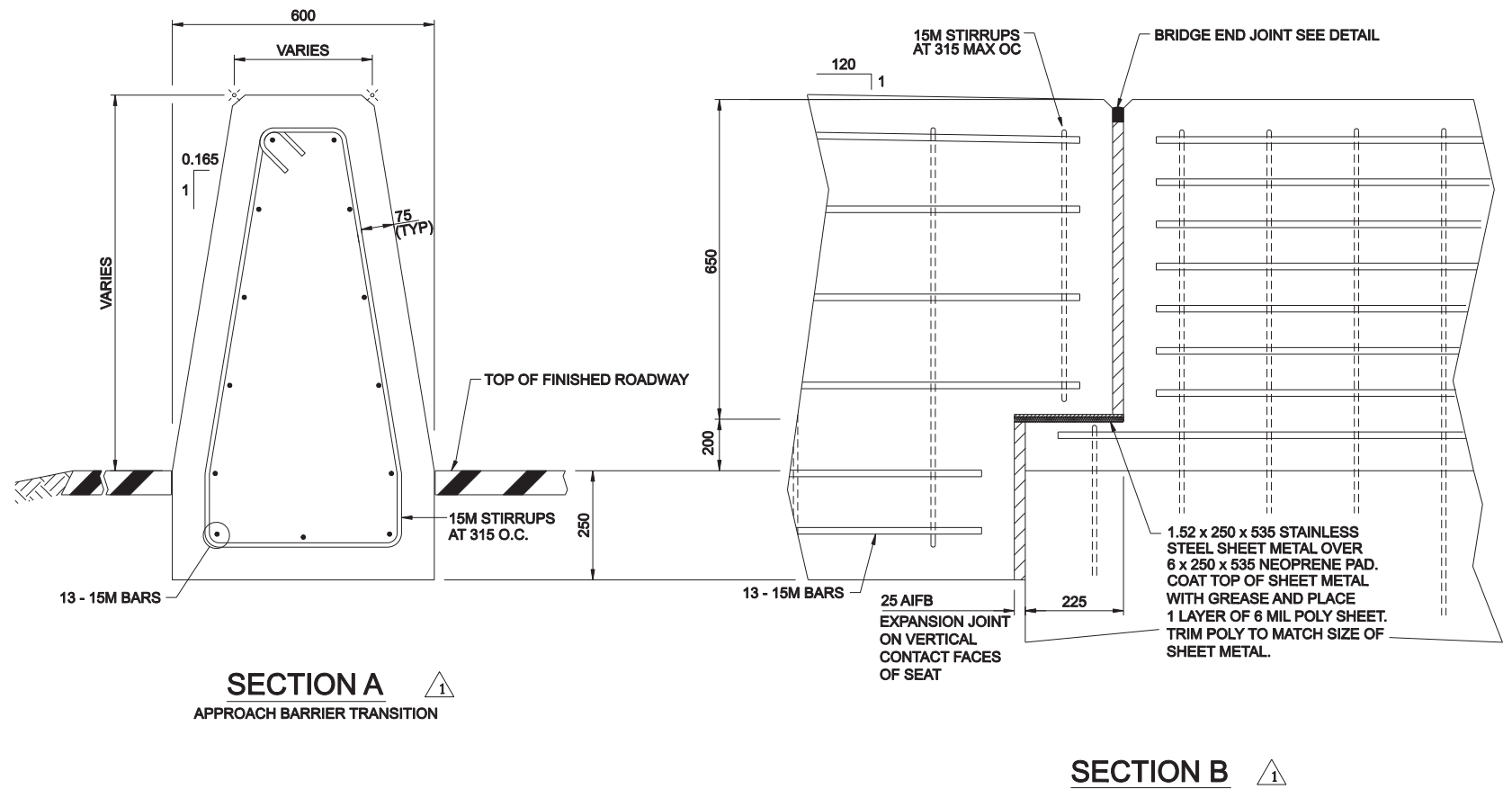
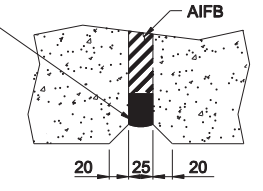


**NOTES:** <sup>1</sup>

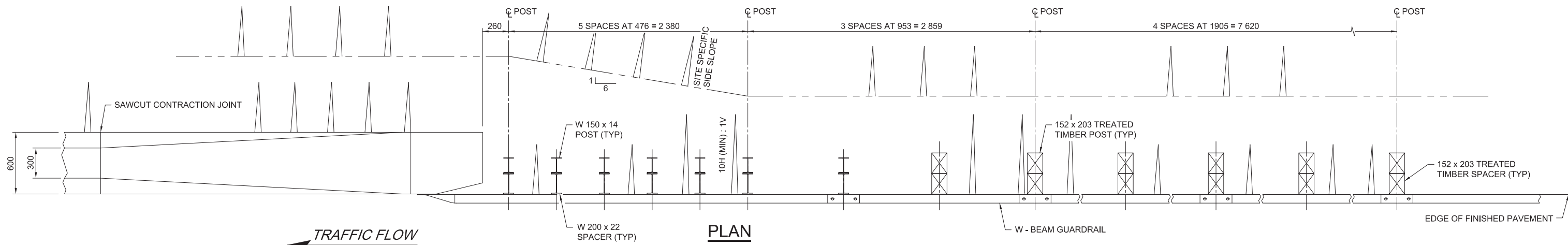
- ALL REINFORCEMENT SHALL BE IN ACCORDANCE WITH SECTION 5 OF THE SPECIFICATIONS FOR BRIDGE CONSTRUCTION.
- APPROACH BARRIER TRANSITION SHALL BE HPC CONCRETE.
- ALL CONCRETE CORNERS SHALL HAVE A 20 CHAMFER OR FILLET UNLESS NOTED OTHERWISE.
- ALL REINFORCING STEEL SHALL HAVE 50 CLEAR COVER UNLESS NOTED OTHERWISE.
- THE DETAILS ON THIS DRAWING ARE DEVELOPED FOR USE ON BRIDGES WITH STATIONARY FIXED WINGWALLS.
- ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE INDICATED.



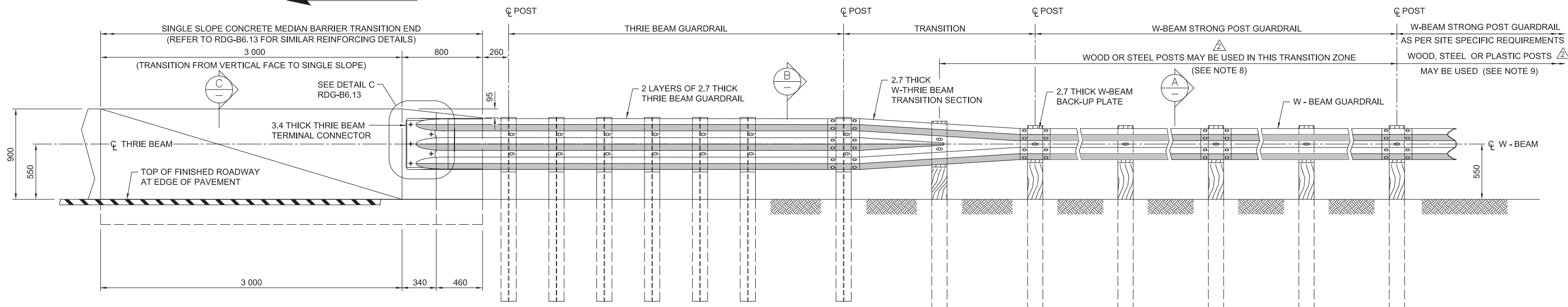
PROVIDE 32 mm WIDE WABO EVAZOTE UV SEAL AS MANUFACTURED BY WATSON BOWMAN ACME OR APPROVED EQUIVALENT, ALONG TRAFFIC VERTICAL FACES AND ACROSS TOP. REFER TO SITE SPECIFIC BRIDGE DRAWINGS FOR SEAL DETAILS.



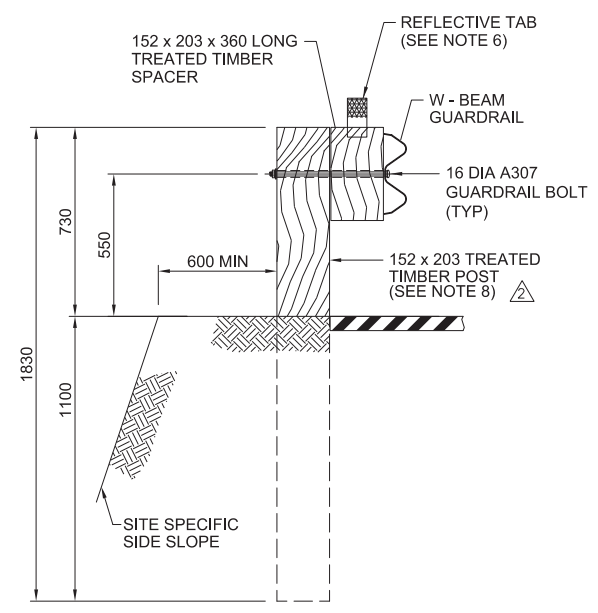
<sup>2</sup>			
<sup>1</sup>	General revisions	C.M.	15/JUL/11
No.	REVISIONS	BY	DATE
Approved:			
Allan Kwan Executive Director, Technical Standards Branch			
Date: NOVEMBER, 2007			
<b>TL-4 SINGLE SLOPE CONCRETE BARRIER TRANSITION TO PL-2 STANDARD BRIDGE CONCRETE BARRIER</b>			
Prepared By: MO	Checked By: WS	Scale: N.T.S.	Dwg No.: <b>RDG-B6.14</b>



**PLAN**

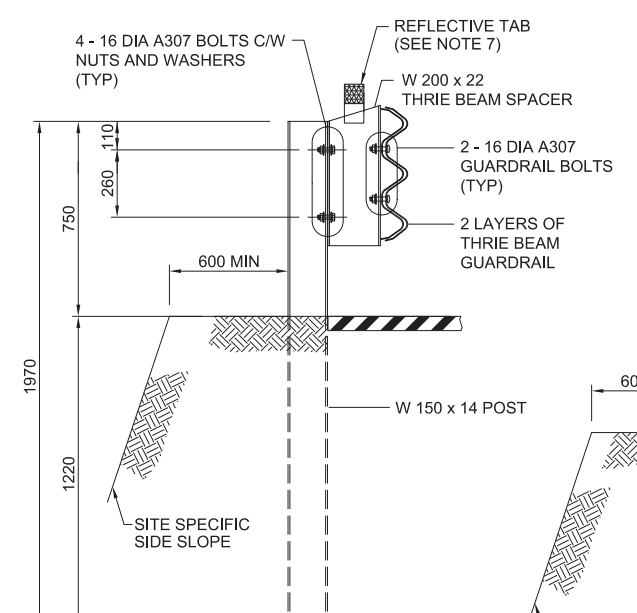


**ELEVATION**

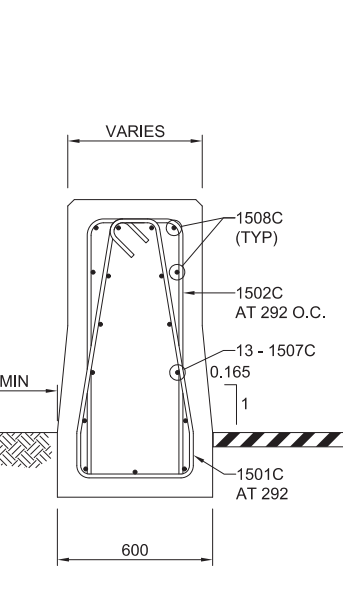


**SECTION A**

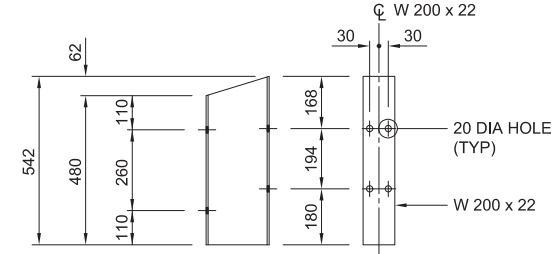
(SEE TEB DRAWING 3.09 FOR DETAILS)



**SECTION B**



**SECTION C**



**THRIE BEAM SPACER DETAIL**

- NOTES:** ⚠ ⚠
- LAP GUARDRAIL SECTION IN THE DIRECTION OF TRAFFIC FLOW.
  - ALL FITTINGS AND HARDWARE SHALL BE GALVANIZED.
  - LINE AND ELEVATION OF BARRIER SHALL BE SET BY INSTRUMENT.
  - ACP OR GRANULAR BASE COURSE MAY BE PROVIDED AROUND GUARDRAIL POSTS AS PER SITE SPECIFIC REQUIREMENTS.
  - THIS TRANSITION MAY BE CONSIDERED TO SATISFY NCHRP REPORT 350 REQUIREMENTS FOR TEST LEVEL 4 (TL4)
  - FASTEN REFLECTOR TO TOP OF EVERY SIXTH GUARDRAIL STRONG POST SPACER BY MECHANICAL MEANS SUCH AS NAILING OR STAPLING. ADHESIVE ALONE WILL NOT BE ACCEPTED. REFER TO DRAWING TEB 3.01 FOR REFLECTOR DETAILS.
  - FASTEN REFLECTOR TO TOP OF EVERY SIXTH GUARDRAIL STEEL OFFSET BLOCK WITH APPROVED ADHESIVE. REFER TO DRAWING TEB 3.01 FOR REFLECTOR DETAILS.
  - TRANSITION ZONE CAN BE WOOD OR STEEL POST WITH WOOD SPACER BLOCK. REFER TO STANDARD DRAWING TEB 3.01 FOR POST DETAILS.
  - TYPICAL STRONG POST SYSTEM CAN BE WOOD, STEEL, OR PLASTIC POST WITH WOOD SPACER BLOCK. REFER TO STANDARD DRAWING TEB 3.01 FOR POST DETAILS.

ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE INDICATED.

No.	REVISIONS	BY	DATE
2	NOTE 8 AND 9 ADDED	HC	11 MAR 2016
1	NOTES 6 AND 7 REVISED	PM	9 JUL 09

Approved:			
Allan Kwan Executive Director, Technical Standards Branch			
Date: NOVEMBER, 2007			

## TRANSITION OF W-BEAM GUARDRAIL TO TL-4 SINGLE SLOPE CONCRETE ROADSIDE BARRIER

Prepared By: NSP	Checked By: WS	Scale: N.T.S	Dwg No.: <b>RDG-B6.15</b>
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**APPENDIX B7**

**MISCELLANEOUS DRAWINGS**



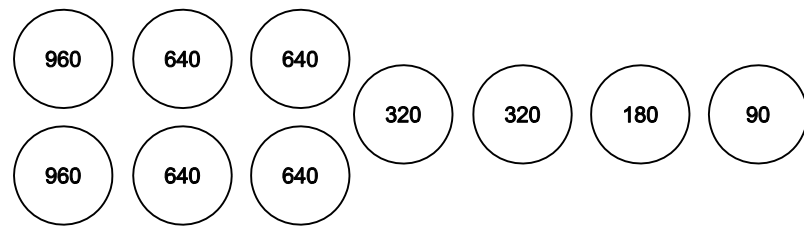
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## Appendix B7 Miscellaneous Drawings

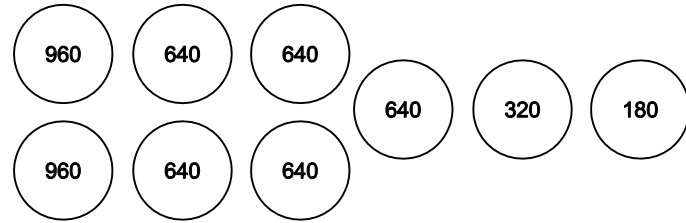
### TABLE OF CONTENTS

Dwg. No.	Drawing Title	Page Number
TEB 3.19	Sand Barrel Cushion System	H-APP-B7-1
TEB 3.51	Guide Post Delineation for Guardrail	H-APP-B7-3
TEB 1.81	Typical Breakaway Wood Post	H-APP-B7-4
RDG-B7.1	TL-3 W-Beam Guardrail Placement at Minor Structures and Box Culverts	H-APP-B7-5
RDG-B7.2	TL-4 Single Slope Concrete Barrier Transition at Median Light Standard – Sheet 1 of 2	H-APP-B7-6
RDG-B7.3	TL-4 Single Slope Concrete Barrier Transition at Median Light Standard – Sheet 2 of 2	H-APP-B7-7
RDG-B7.4	Placement and Protection of Overhead Sign Supports for Divided Roads – Sheet 1 of 2	H-APP-B7-8
RDG-B7.5	Placement and Protection of Overhead Sign Supports for Divided Roads – Sheet 2 of 2	H-APP-B7-9

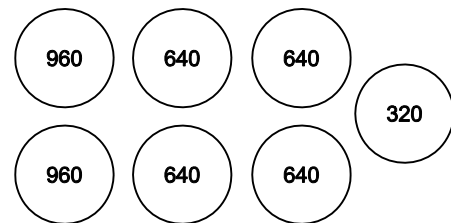
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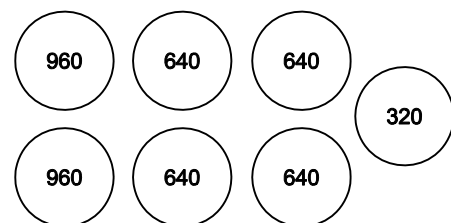
**BARREL ARRAY - 80km/h**



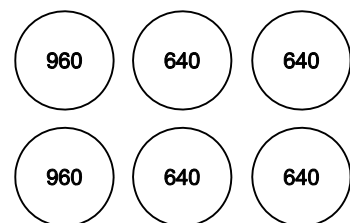
**BARREL ARRAY - 70km/h**



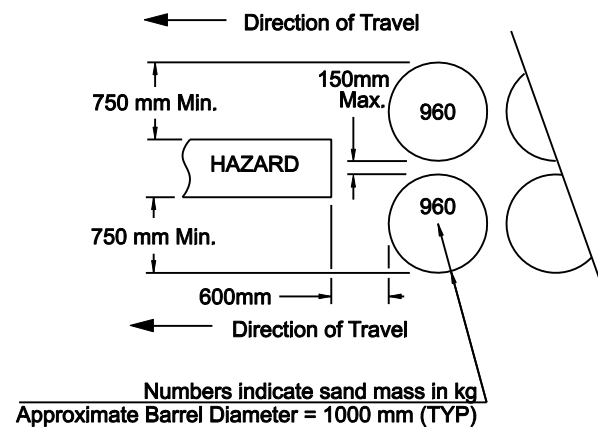
**BARREL ARRAY - 60km/h**



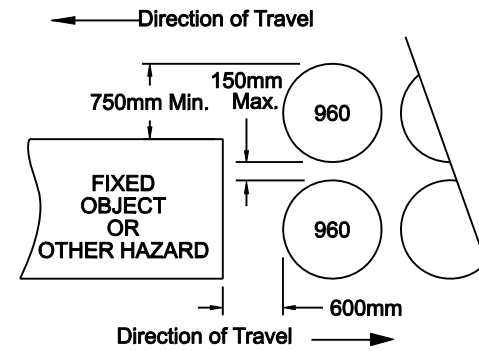
**BARREL ARRAY - 50km/h**



**BARREL ARRAY - 40km/h**

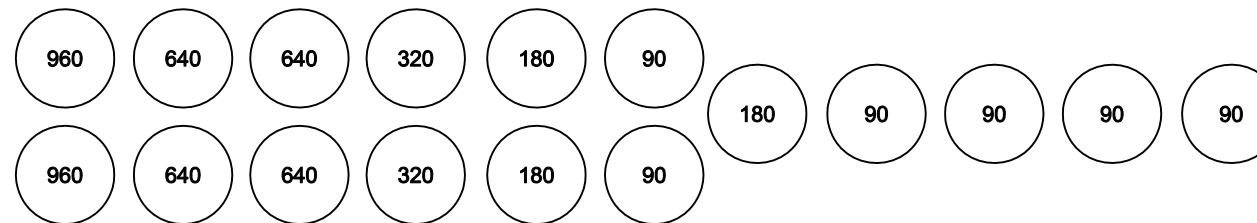


**ONE DIRECTION TRAFFIC**

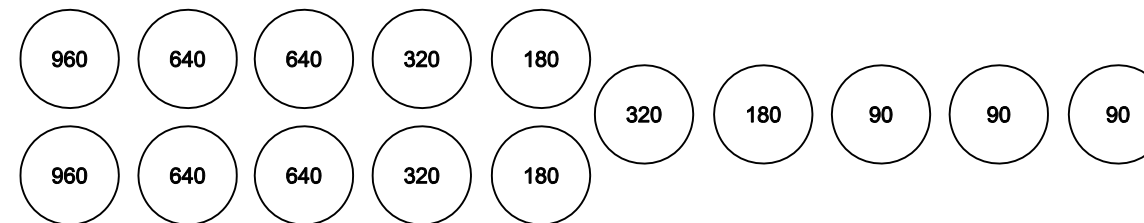


**TWO DIRECTION TRAFFIC**

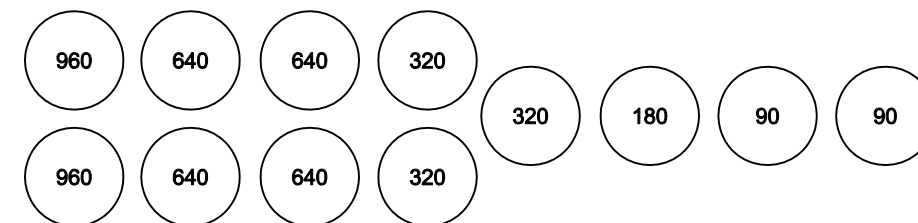
Numbers indicate sand mass in kg  
Approximate Barrel Diameter = 1000 mm (TYP)



**BARREL ARRAY - 110km/h**



**BARREL ARRAY - 100km/h**



**BARREL ARRAY - 90km/h**

**General notes:**

1. Only crash tested components meeting NCHRP 350 requirements shall be used. The systems currently available are:
  - a. Energite Inertia Barrier System by Quixote Transportation Safety Inc.
  - b. Fitch Sand Barrel System by Quixote Transportation Safety Inc.
  - c. TraFFix Impact Attenuator Sand Barrels by TraFFix Devices Inc.
2. The sand mass shall be clearly marked on each barrel.
3. For permanent installations, the Fitch System shall be used.
4. The systems shall be installed strictly in accordance with manufacturer's recommendations.
5. The sand barrel systems are non-directional and break up during impact. The vehicle speed is slowed by transfer of its momentum to the sand, allowing for safe, steady deceleration. Sand and plastic parts from the system will scatter in the direction of impact.
6. Fill sand shall conform to ASTM C-33 – washed concrete sand or approved equal. Moisture content of sand shall be three percent or less to minimize caking. The sand shall be mixed with an appropriate percentage of rock salt when use during freezing temperature is expected.
7. Barrels shall be set as far from the traveled way as possible to minimize the number of brush or nuisance hits.
8. Barrel layout shall conform with the configuration for the appropriate posted highway speed.
9. In the case of work zone installations, the design speed shall be at least equal to the speed posted through the work zone.

**REQUIRES DEPARTMENT APPROVAL ON NEW INSTALLATIONS**

△			
△	APPROVAL NOTE ADDED	P.M.	02 JUL 13
No.	REVISIONS	BY	DATE

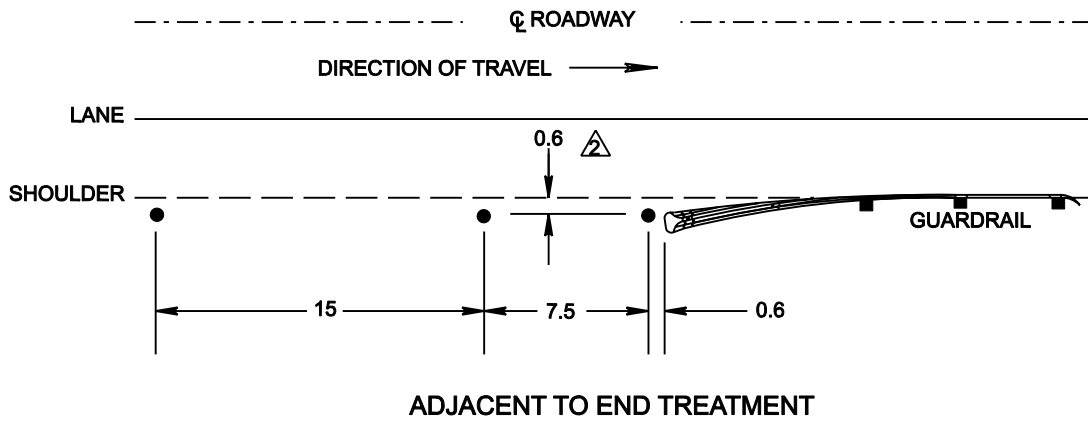
Approved:  
Original signed by  
Allan Kwan  
  
Executive Director,  
Technical Standards Branch  
  
Date: NOVEMBER 23, 2004



**SAND BARREL CUSHION SYSTEM**

Prepared By: M.T.	Checked By: R.Y.	Scale: N.T.S.	Dwg No.: TEB 3.19
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**LEGEND:**

- DELINEATOR GUIDEPOST

**NOTE:**

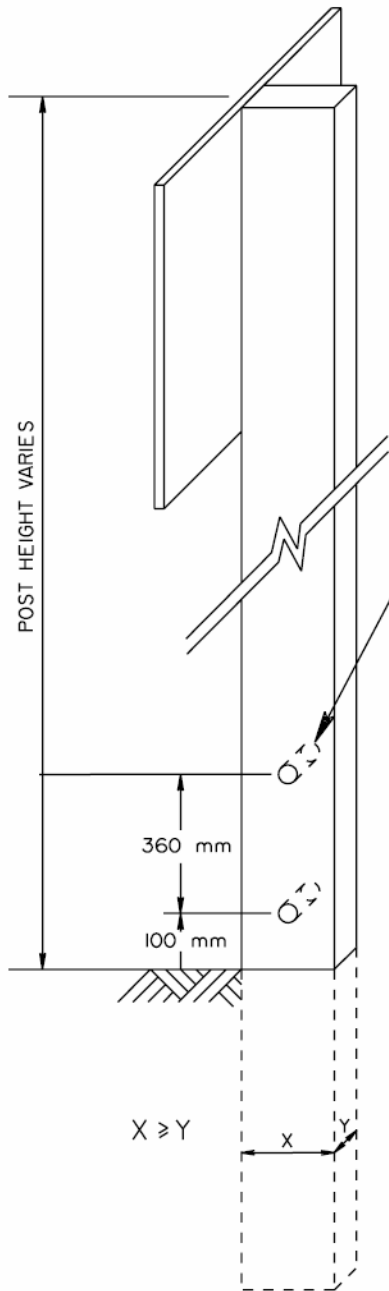
VARIOUS TYPES OF END TREATMENTS MAY BE USED AS PER PROJECT REQUIREMENTS.

	Post Offset	B.K.	01 Nov 07
	Note added	B.K.	12/07/05
No.	REVISIONS	BY	DATE

Approved: Original approved by Alberta Transportation and Utilities Traffic Operation Branch ----- Executive Director, Technical Standards Branch	
Date: DECEMBER 11, 1992	

## GUIDE POST DELINEATION FOR GUARDRAIL

Prepared By: M.T	Checked By: B.K	Scale: N.T.S.	Dwg No.: TEB 3.51
------------------	-----------------	---------------	-------------------



2-38 mm DIA. HOLES TREATED WITH AN APPROVED WOOD PRESERVATIVE.

FILL EACH HOLE WITH A SINGLE PIECE OF CLOSED CELL INSULATION (E.G., EXPANDING STYROFOAM) CUT FLUSH WITH FACE OF POST.

THE ORIENTATION OF THE POSTS FOR THE SIGN MOUNTING SHALL BE IN ACCORDANCE WITH X AND Y AS SHOWN.

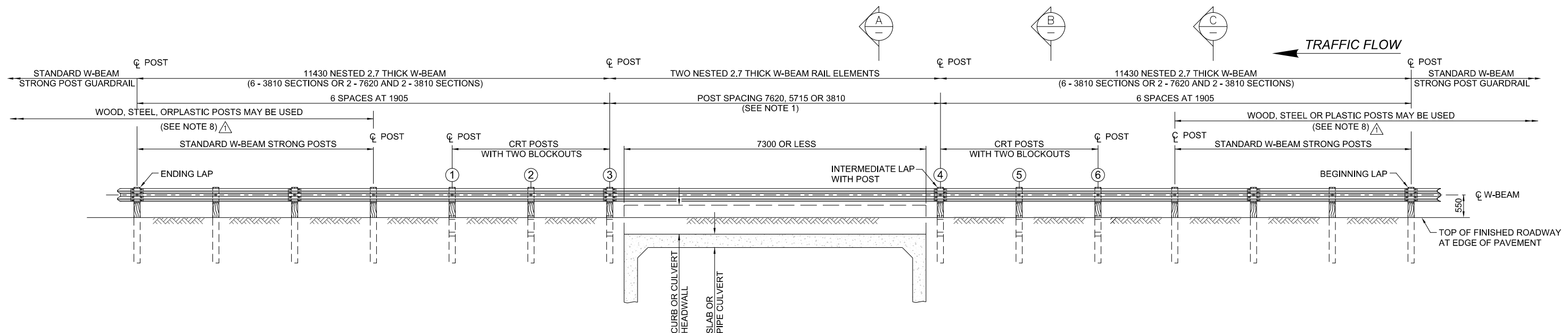
HOLES ARE TO BE DRILLED PERPENDICULAR TO THE DIRECTION OF TRAFFIC FLOW.

DIRECTION OF TRAFFIC FLOW →

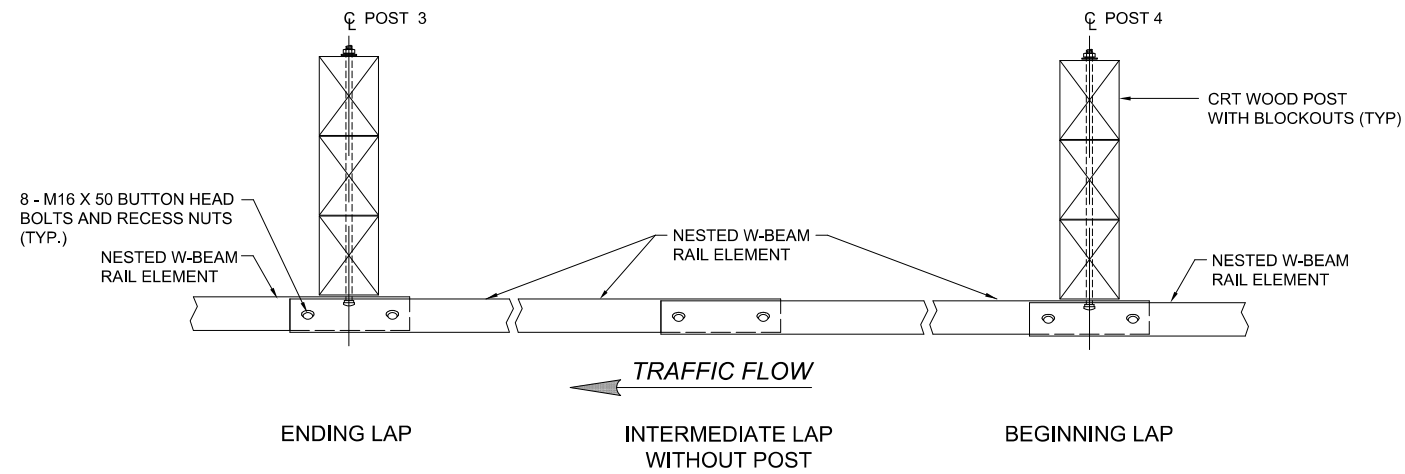
NOTE:  
 THE BREAKAWAY FEATURE FOR WOOD POSTS WITH CROSS-SECTIONAL DIMENSIONS GREATER THAN 100 mm X 100 mm IS REQUIRED FOR POSTS LOCATED WITHIN THE CLEAR ZONE AND DESIRABLE FOR POSTS LOCATED OUTSIDE THE CLEAR ZONE (WITHIN HIGHWAY RIGHT-OF-WAY).

	DWG. No.	TEB 1.81
	Date	JUNE 13/08
	Revision	
	Revision	

TYPICAL  
BREAKAWAY WOOD POST

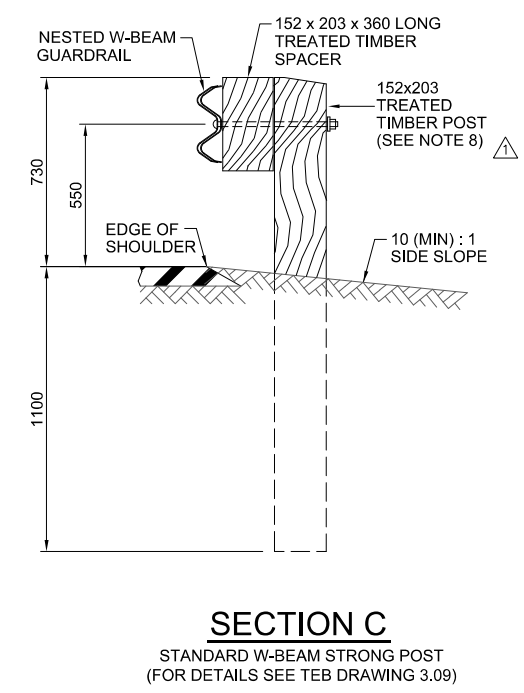
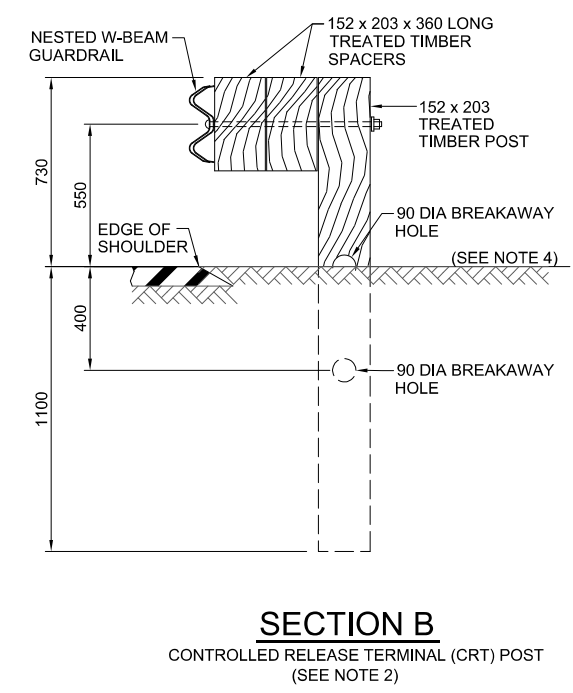
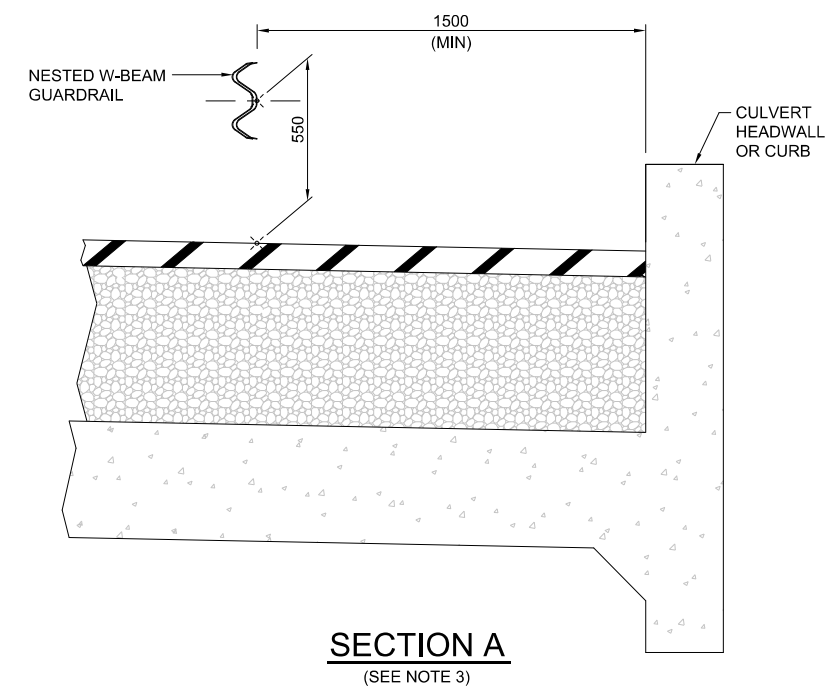


**ELEVATION**



**NOTES:** ⚠

1. 7620 RAIL LENGTHS MAY BE USED TO ELIMINATE THE INTERMEDIATE LAP WITHOUT A POST. DO NOT PLACE A LAP WITHOUT A POST UNLESS NEEDED DUE TO LENGTH OF GAP.
2. POST 1 THRU 6 ARE CRT POSTS WITH TWO BLOCKOUTS. (SEE SECTION B FOR DETAILS)
3. INSTALL THE BACK FACE OF THE NESTED GUARDRAIL A MINIMUM OF 1500 FROM THE FACE OF THE CURB-LIKE HEADWALL.
4. MAINTAIN FLAT SIDE SLOPE GRATING AT POST LOCATIONS.
5. LAP ALL RAIL SECTIONS IN THE DIRECTION OF TRAFFIC FLOW.
6. ALL FITTINGS AND HARDWARE SHALL BE GALVANIZED.
7. THIS DESIGN MEETS NCHRP REPORT 350 EVALUATION CRITERIA FOR TL-3
8. TYPICAL STRONG POST SYSTEM CAN BE WOOD, STEEL OR PLASTIC POST WITH WOOD SPACER BLOCK. REFER TO STANDARD DRAWING TEB 3.01 FOR POST DETAILS.



ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE INDICATED.

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⚠	NOTE 8 ADDED	HC	11 MAR 2016
No.	REVISIONS	BY	DATE

Approved:  
  
Allan Kwan  
Executive Director,  
Technical Standards Branch

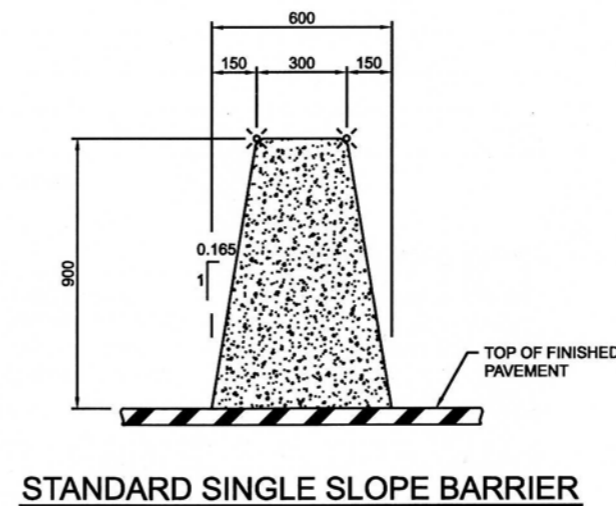
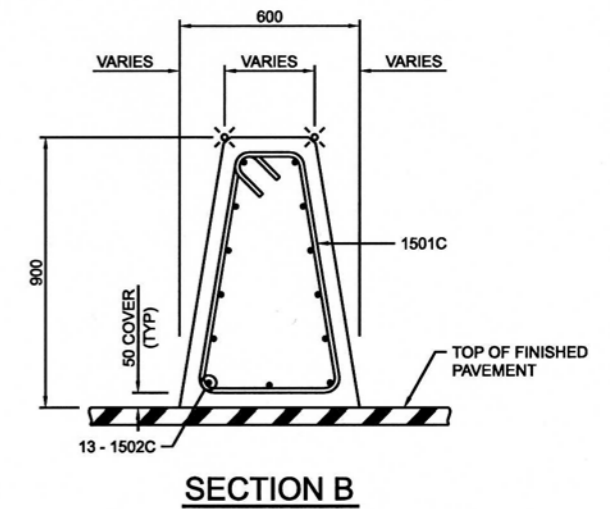
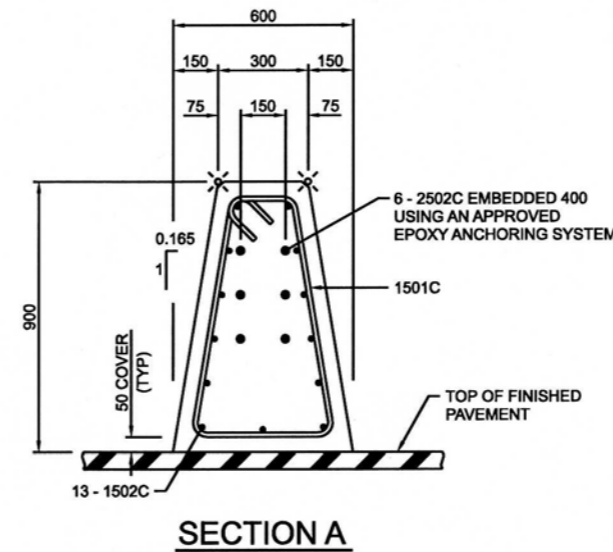
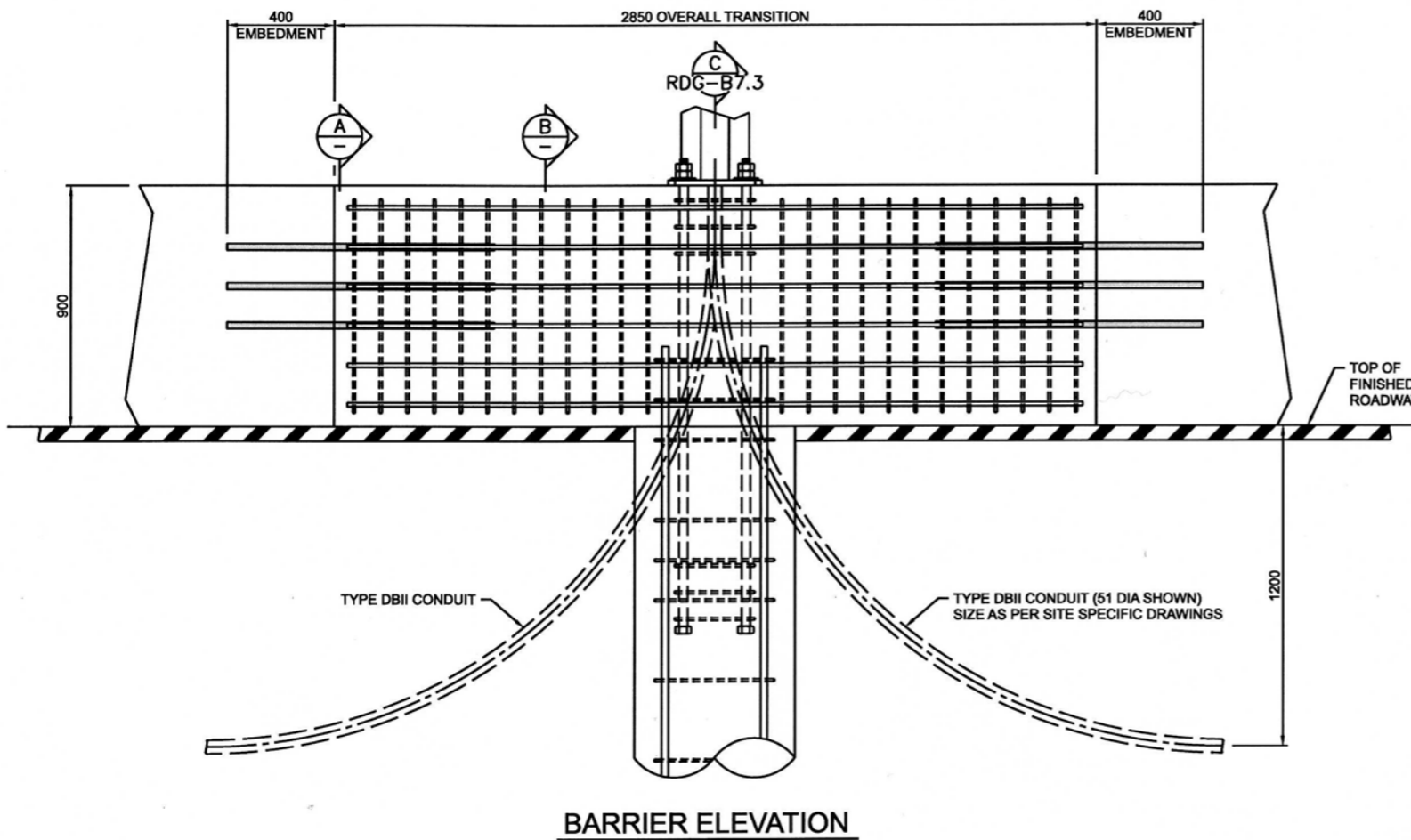
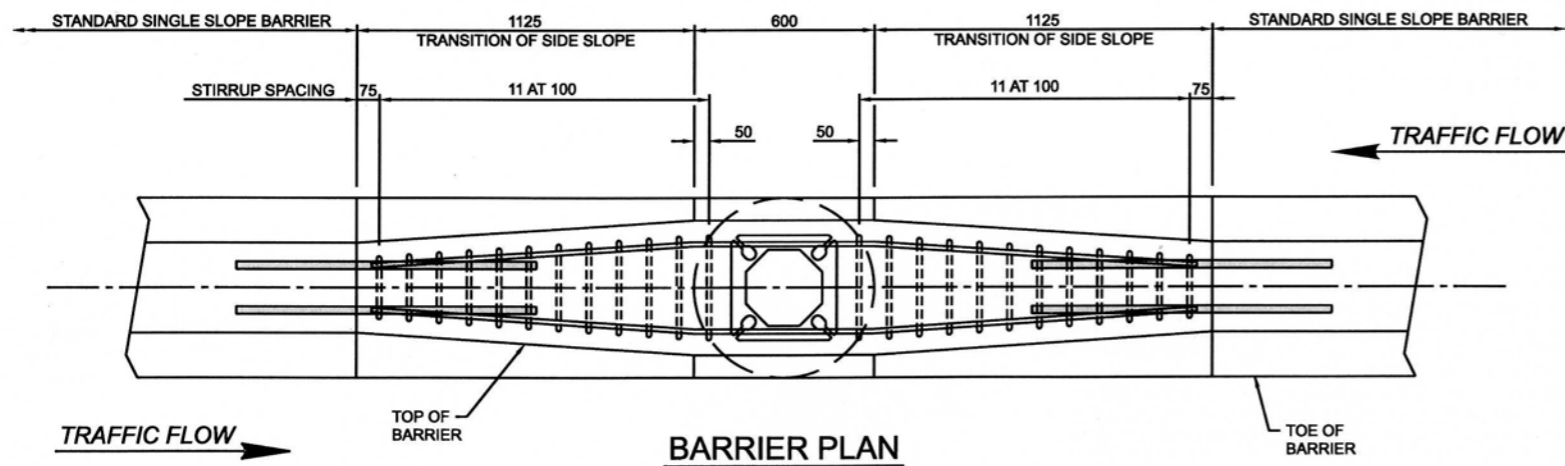
Date: NOVEMBER, 2007



**TL-3 W-BEAM  
GUARDRAIL PLACEMENT  
AT MINOR STRUCTURES  
AND BOX CULVERTS**

Prepared By: MO	Checked By: WS	Scale: N.T.S.	Dwg No.: RDG-B7.1
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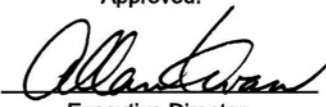
**NOTES:**

1. PROVIDE 20mm CHAMFER AT TOP EDGES OF BARRIER.
2. CONCRETE FOR PILES SHALL BE CLASS "PILE" UNLESS OTHERWISE SPECIFIED (MINIMUM 28 DAY COMPRESSIVE STRENGTH OF 25 MPa).
3. BARRIER CONCRETE SHALL BE SULPHATE RESISTANT MODIFIED CLASS C UNLESS OTHERWISE SPECIFIED (MINIMUM 28 DAY COMPRESSIVE STRENGTH OF 35 MPa).

**CONSTRUCTION NOTES:**

1. PLACING CONCRETE FOR THE BARRIER TRANSITION MAY BE DONE BY:
  - i. REMOVING THE 2850mm LONG SECTION OF SLIP FORMED BARRIER BY SAW CUTTING.
  - ii. OR BLOCKING OUT THE 2850mm LONG SECTION OF SLIP FORMED BARRIER USING FORMED CONSTRUCTION JOINTS DURING CONCRETE PLACEMENT OF THE STANDARD SINGLE SLOPE BARRIER.
2. EXCAVATIONS MADE THROUGH THE ACP AND SUPPORTING ROAD BASE MATERIAL TO EXPOSE THE ELECTRICAL CONDUIT SHALL BE MADE ONLY WITHIN THE 2850 X 600 FOOTPRINT OF THE TRANSITION BARRIER. COMPETENT MATERIAL SUCH AS COMPACTED ROAD BASE OR CONCRETE MAYBE USED FOR BACKFILLING THE EXCAVATION TO TOP OF FINISHED ROADWAY.
3. PROVIDE LONGITUDINAL SAW CUTS THROUGH ACP ALONG BOTTOM EDGE OF BARRIER PRIOR TO DRILLING OF PILE HOLE. SAW CUTS SHALL BE OF SUFFICIENT LENGTH AND DEPTH TO PREVENT CHIPPING DURING PILE HOLE DRILLING.
4. ALLOW PILE CONCRETE TO CURE AT LEAST 3 DAYS PRIOR TO PLACING BARRIER CONCRETE.
5. SIZE AND LOCATION OF CONDUIT MAY VARY AS PER SITE SPECIFIC DRAWINGS. MODIFICATIONS TO THE CONCRETE STEEL REINFORCING AND/OR ANCHOR BOLT ASSEMBLY, SUCH AS TO ACCOMMODATE PLACEMENT OF THE CONDUIT, SHALL NOT BE MADE WITHOUT THE CONSULTANT'S PERMISSION.

No.	REVISIONS	BY	DATE

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 Executive Director,  
 Technical Standards Branch

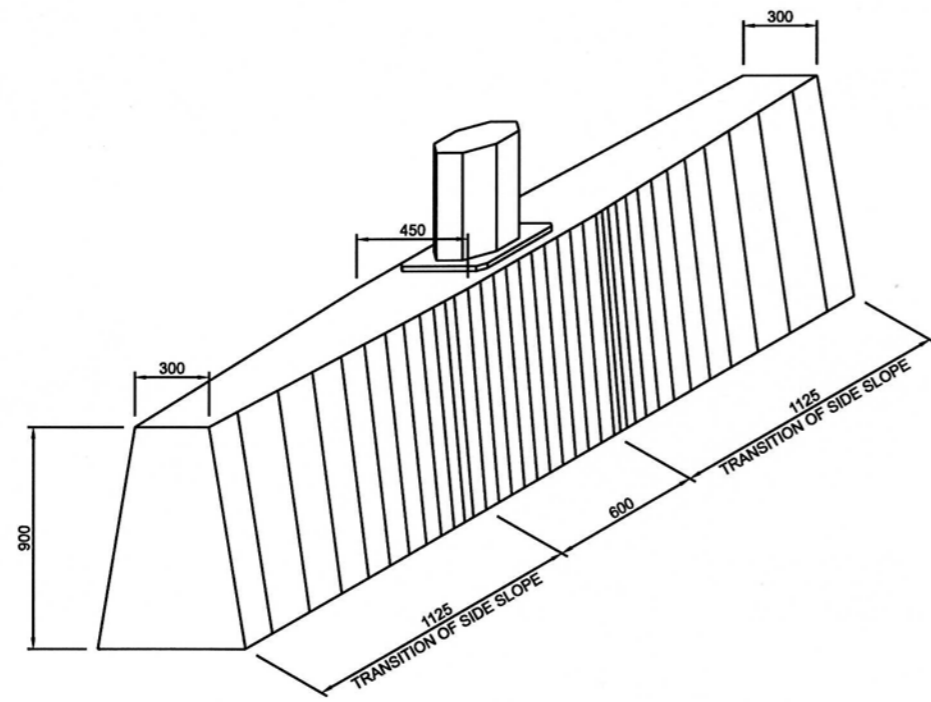
**Alberta**  
 INFRASTRUCTURE AND  
 TRANSPORTATION

Date: NOVEMBER, 2007

**TL-4 SINGLE SLOPE  
 CONCRETE BARRIER TRANSITION  
 AT MEDIAN LIGHT STANDARD  
 SHEET 1 OF 2**

Prepared By: NVS	Checked By: WS	Scale: N.T.S.	Dwg No.: <b>RDG - B7.2</b>
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ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE INDICATED.



**SINGLE SLOPE MEDIAN BARRIER TRANSITION ISOMETRIC**

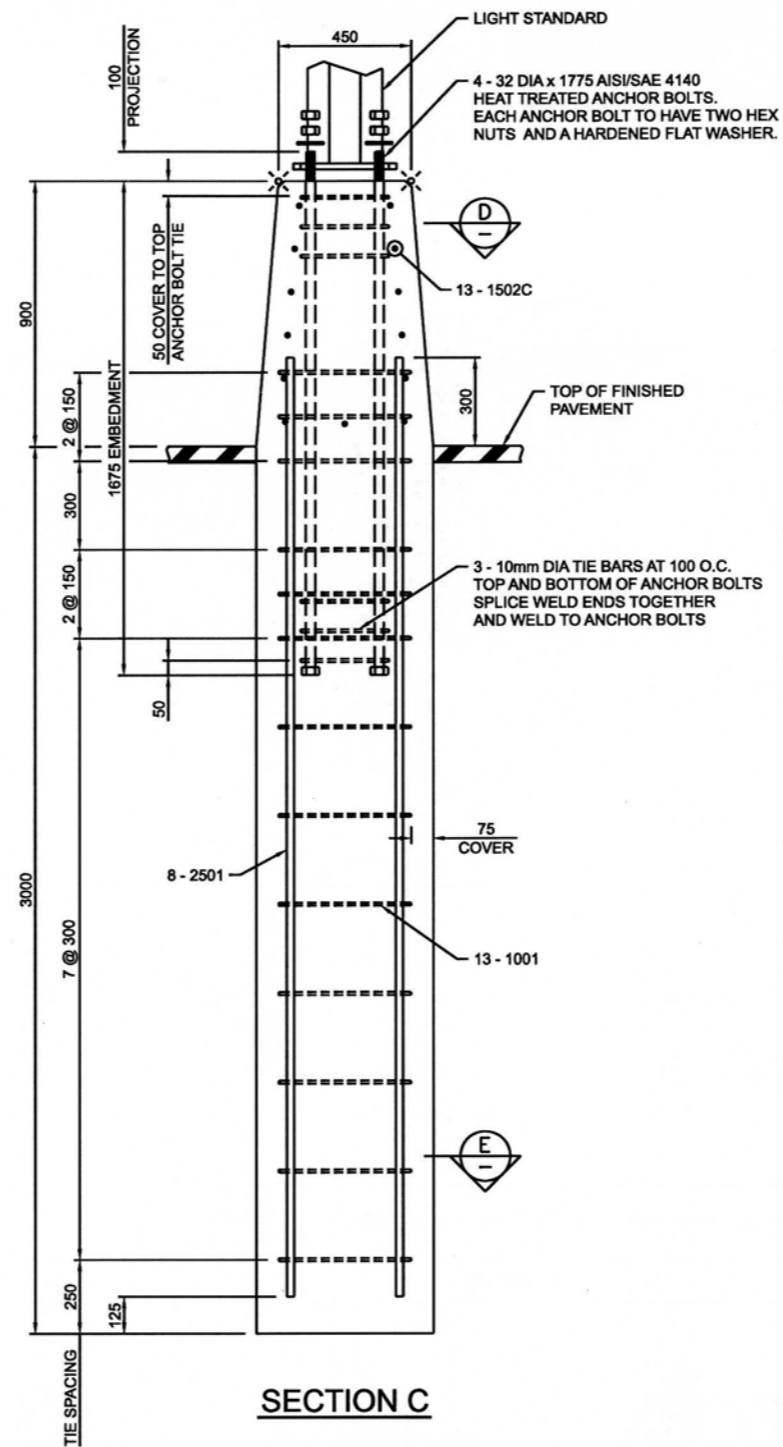
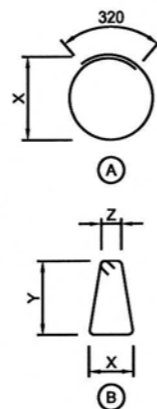
BAR LIST: TRANSITION BARRIER								
MARK	SIZE	NO.	TYPE	X	Y	Z	LENGTH	MASS
1001	10	13	A	450	-	-	1 750	18
1501C	15	24	B	LENGTH: X = 480 Y = 800 Z = VARIES FROM 210 TO 353 IN INCREMENTS OF 13			2 660 (AVG)	100
*1502C	15	13	STR	-	-	-	2 750	56
2501	25	8	STR	-	-	-	3 175	100
2502C	25	12	STR	-	-	-	1 000	47

\* FIELD BEND TO SUIT

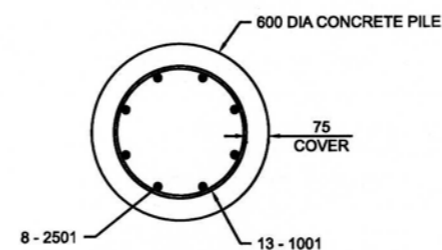
PLAIN	TOTAL kg =	118
EPOXY COATED	TOTAL kg =	203
	TOTAL kg =	320

**BAR LIST NOTES:**

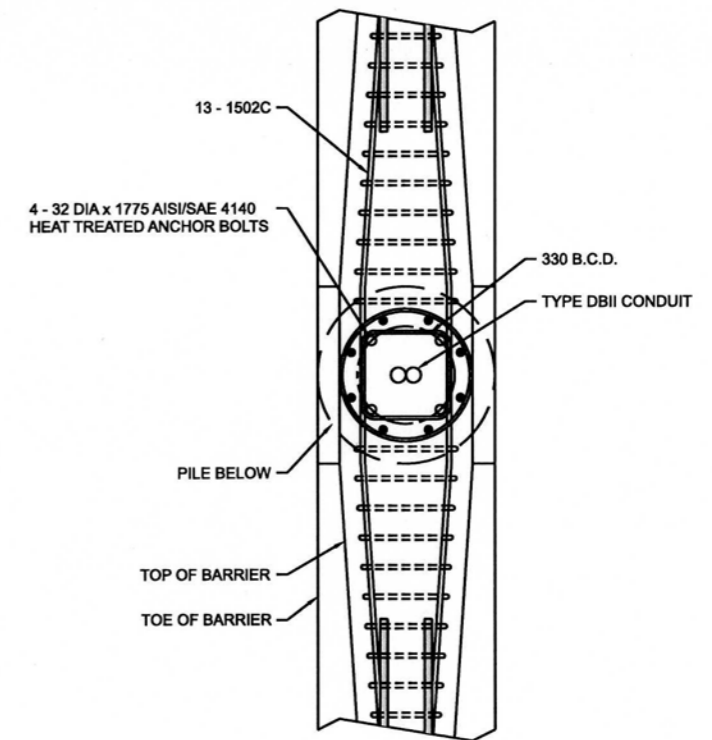
- DIAMETERS OF ALL BENDS AND DETAILS OF ALL HOOKS, UNLESS NOTED OTHERWISE, SHALL CONFORM TO THE RECOMMENDED SIZES DETAILED IN THE REINFORCING STEEL MANUAL OF STANDARD PRACTICE, FIRST CANADIAN EDITION 1992, PUBLISHED BY THE REINFORCING INSTITUTE OF CANADA.
- REINFORCING STEEL SHALL BE IN ACCORDANCE WITH CAN/CSA-G30.18M92 "BILLET STEEL BARS FOR CONCRETE REINFORCEMENT".
- ALL REINFORCING STEEL SHALL BE GRADE 400 UNLESS NOTED OTHERWISE.
- "C" DENOTES EPOXY COATED REINFORCEMENT.



**SECTION C**



**SECTION E**



**SECTION D**

No.	REVISIONS	BY	DATE

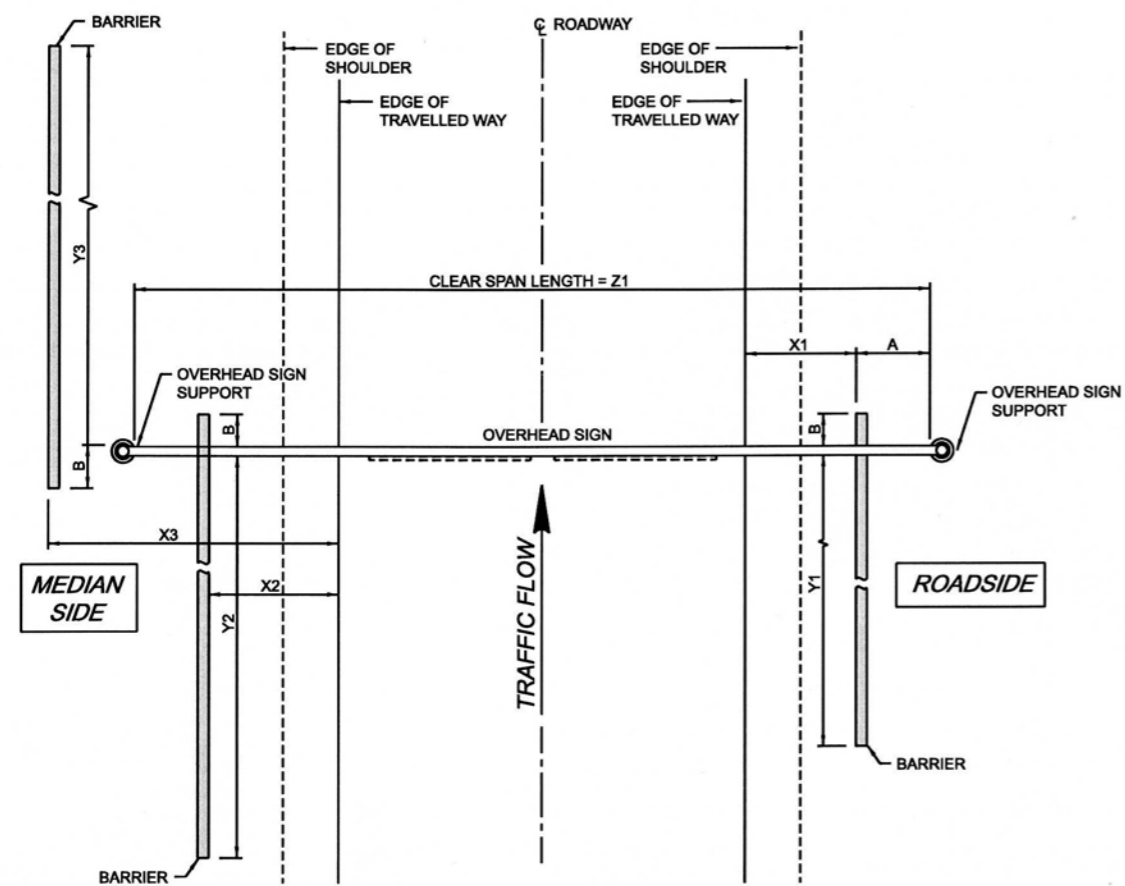
Approved:  
  
 Executive Director,  
 Technical Standards Branch  
 Date: NOVEMBER, 2007

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 TRANSPORTATION

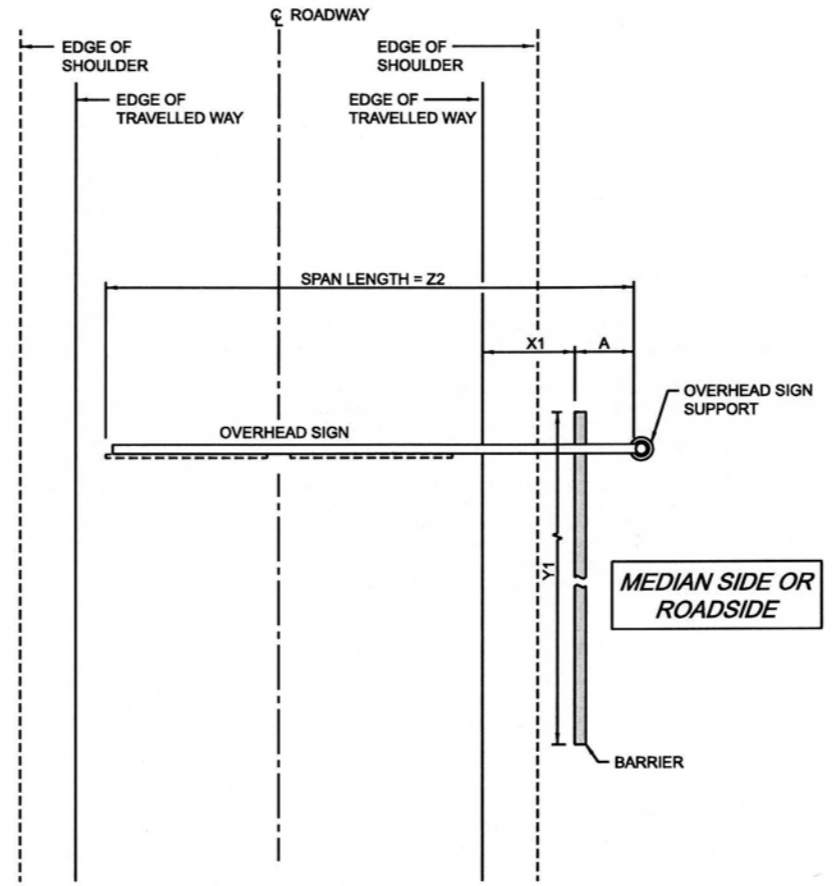
**TL-4 SINGLE SLOPE  
 CONCRETE BARRIER TRANSITION  
 AT MEDIAN LIGHT STANDARD  
 SHEET 2 OF 2**

Prepared By: NVS	Checked By: WS	Scale: N.T.S.	Dwg No.: RDG - B7.3
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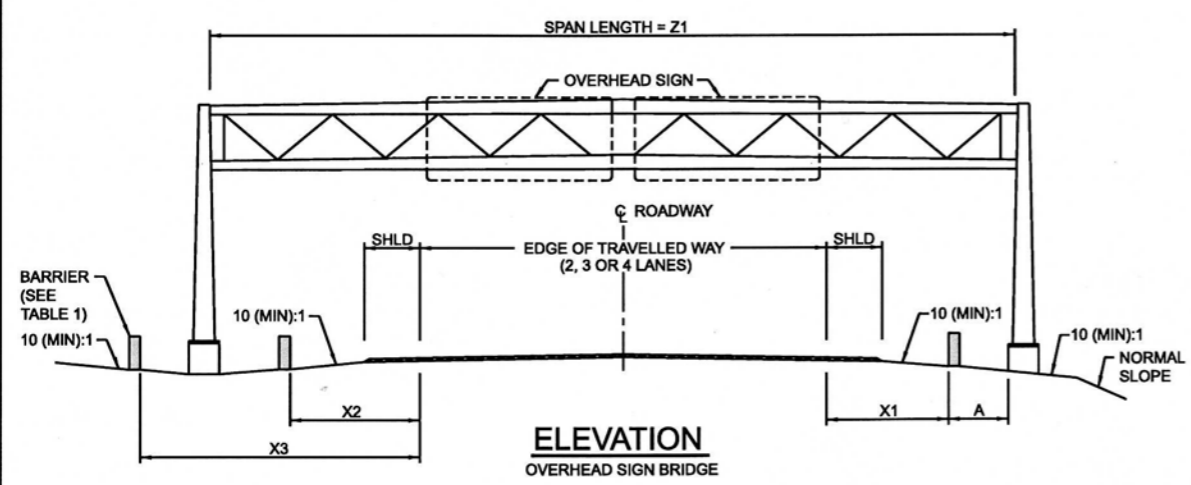
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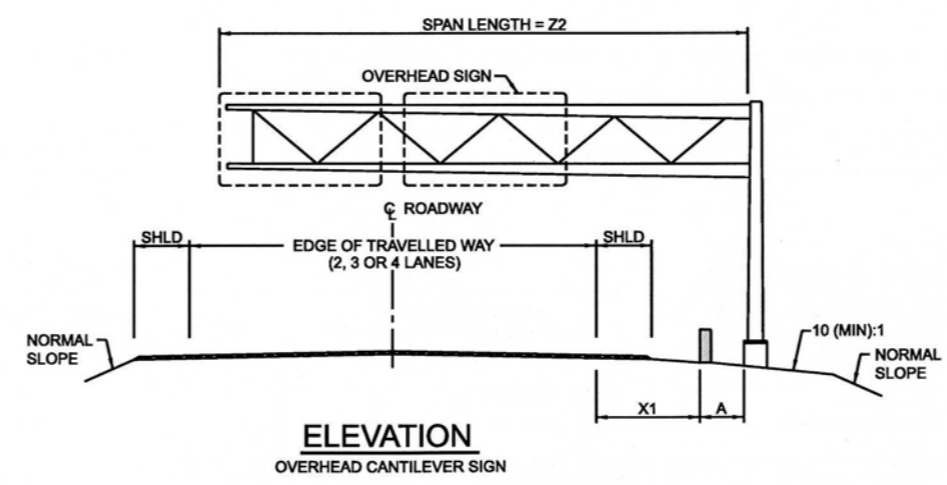
**PLAN VIEW**  
OVERHEAD SIGN BRIDGE



**PLAN VIEW**  
OVERHEAD CANTILEVER SIGN



**ELEVATION**  
OVERHEAD SIGN BRIDGE



**ELEVATION**  
OVERHEAD CANTILEVER SIGN

**NOTES:**

- APPLICABLE FOR URBAN AND RURAL CROSS SECTIONS
1. BASED ON BENEFIT/COST ANALYSIS WITH CONSIDERATIONS FOR COLLISION COSTS, CANTILEVER SIGN STRUCTURES ARE GENERALLY PREFERRED OVER OVERHEAD SIGN BRIDGE STRUCTURES, UP TO THE SPECIFIED MAXIMUM CANTILEVER SPAN LENGTH PROVIDED IN TABLES 2 AND 3.
  2. THE USE OF SAND BARRELS (SEE AIT STANDARD DRAWING TEB 3.19) IS RECOMMENDED WHEN OVERHEAD SIGN SUPPORTS ARE PLACED AT OR JUST BEYOND THE CLEAR ZONE LINE.
  3. OVERHEAD SIGN SUPPORTS LOCATED WITHIN THE CLEAR ZONE REQUIRE BARRIER PROTECTION.
  4. WHEN A BARRIER SYSTEM IS WARRANTED, THE THREE BEAM BULLNOSE BARRIER SYSTEM IS GENERALLY RECOMMENDED, PROVIDED THAT THERE IS SUFFICIENT SPACE IN THE MEDIAN OR SHOULDER FOR PROPER INSTALLATION. REFER TO RDG-B5.6 AND RDG-B5.7 FOR THREE BEAM BULLNOSE GENERAL LAYOUTS.
  5. ALTERNATE BARRIER SYSTEMS SHOWN IN TABLE 1 MAY BE USED IF PROVEN BY BENEFIT-COST ANALYSIS.
  6. BARRIERS SHALL BE LOCATED AT OR BEYOND THE RECOMMENDED SHY LINE OFFSET.
  7. THE SELECTED BARRIER SYSTEM SHALL BE INSTALLED AS PER THE APPLICABLE AIT STANDARD DRAWING(S).
  8. VARIANCES FROM TABLES 2 AND 3 MAY BE REQUIRED ON A SITE SPECIFIC BASIS TO ACCOMMODATE LIMITING FACTORS SUCH AS ROADSIDE OBSTACLES, ENCROACHING SIDESLOPES, AND ROAD CURVATURE. IN SUCH CASES, A SITE-SPECIFIC BENEFIT-COST ANALYSIS MAY BE REQUIRED TO DETERMINE THE OPTIMUM OVERHEAD SIGN SPAN AND BARRIER SYSTEM CONFIGURATION.
  9. THE LENGTH OF NEED (LON) SHOWN IN TABLES 2 AND 3 ARE BASED ON ALIGNING THE BARRIER PARALLEL TO THE ROADWAY. THE LON MAY BE REDUCED BY FLARING THE BARRIER. REFER TO THE DEPARTMENT'S ROADSIDE DESIGN GUIDE FOR MAXIMUM FLARE RATES.
  10. SUPPORTS FOR CANTILEVER SIGNS IN URBAN AREAS WITH NARROW MEDIANS WITH CONTINUOUS MEDIAN CONCRETE BARRIER ARE GENERALLY PREFERRED IF PLACED ON THE CONCRETE MEDIAN BARRIER AS OPPOSED TO THE SUPPORT BEING LOCATED ON THE ROADSIDE.
  11. SUPPORTS FOR CANTILEVER SIGNS IN RURAL AND URBAN AREAS IN WIDER MEDIANS (WITHOUT CONTINUOUS CONCRETE MEDIAN BARRIER) ARE MORE ECONOMICAL IF PLACED ON THE ROADSIDE.
  12. THE MINIMUM SETBACK DISTANCE "A" PROVIDES ALLOWANCE FOR THE MAXIMUM DYNAMIC DEFLECTION OF THE BARRIER.
  13. REFER TO SECTION H.5.4.4 FOR ZONE OF INTRUSION CONSIDERATIONS.

**ASSUMPTIONS**

1. CLEAR ZONE DISTANCES USED IN THE DEVELOPMENT OF THIS STANDARD DRAWING WERE BASED ON THE ASSUMPTION OF FILL SIDE SLOPES OF 6:1 OR FLATTER.
2. TRAFFIC VOLUMES USED FOR BENEFIT-COST ANALYSIS IN THE DEVELOPMENT OF THIS STANDARD DRAWING WERE ASSUMED TO BE 10 000 VPD, 30 000 VPD, AND 50 000 VPD FOR 4-LANE, 6-LANE, AND 8-LANE DIVIDED HIGHWAYS, RESPECTIVELY.
3. COLLISION COSTS FOR BENEFIT-COST ANALYSIS WERE OBTAINED USING THE COMPUTER PROGRAM RSAP (ROADSIDE SAFETY ANALYSIS PROGRAM).

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No.	REVISIONS	BY	DATE

Approved: *Allan Stewart*  
Executive Director,  
Technical Standards Branch

Date: NOVEMBER, 2007

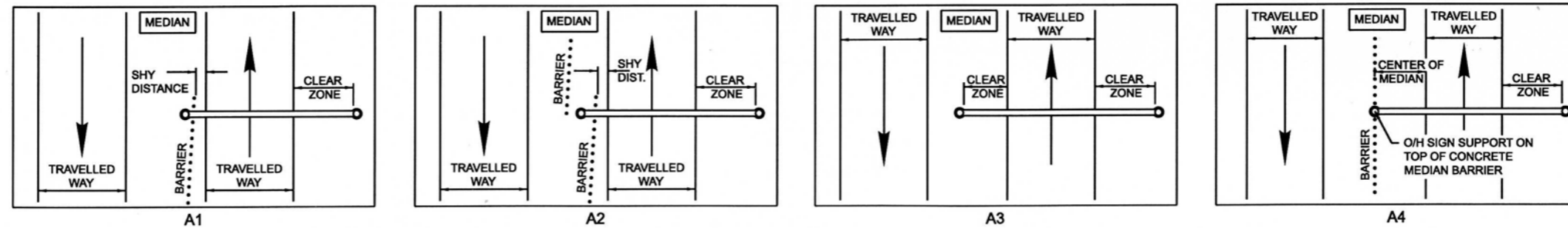
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**PLACEMENT AND PROTECTION  
OF OVERHEAD SIGN SUPPORTS  
FOR DIVIDED ROADS  
SHEET 1 OF 2**

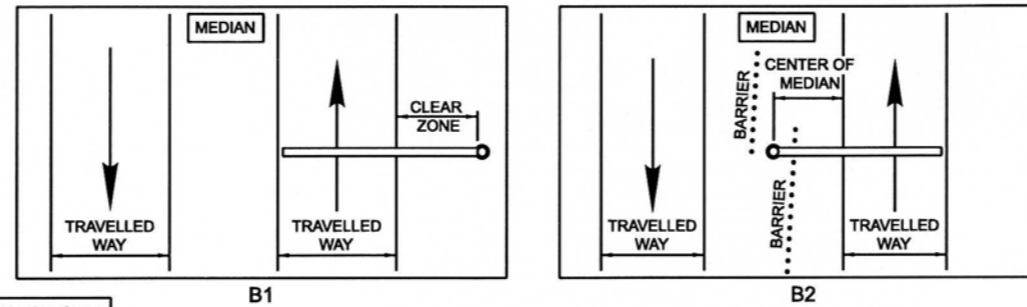
Prepared By: MO	Checked By: WS	Scale:	Dwg No.: RDG-B7.4
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**SIGN BRIDGE SCENARIOS**



**CANTILEVER SIGN SCENARIOS**

**NOTES:**

1. SETBACK DISTANCE "A" INCLUDES WIDTH OF BARRIER PLUS A DYNAMIC DEFLECTION ALLOWANCE.
2. FOR RIDGED BARRIERS, REFER TO SECTION H.5.5 OF THE ROADSIDE DESIGN GUIDE FOR ZONE OF INTRUSION CONSIDERATIONS.
3. "P" INDICATES THE OVERHEAD SIGN SUPPORT DIAMETER.
4. "C" INDICATES SITE SPECIFIC CLEARANCE DISTANCE, REFER TO SECTION H.3.2.1 OF THE ROADSIDE DESIGN GUIDE.
5. FOR OBSTACLE OFFSET FROM TRAVELLED WAY, REFER TO SHEET 1 OF 2. THE OBSTACLE COULD BE AN OVERHEAD SIGN SUPPORT OR BARRIER, WHICHEVER IS CLOSER TO THE TRAVELLED WAY. IF THE OBSTACLE IS AN OVERHEAD SIGN SUPPORT, THEN  $x \geq C$ . IF THE OBSTACLE IS A BARRIER THEN  $x \leq C$  (GENERALLY) IN ALL CASES "x" SHALL BE GREATER THAN THE SHYLINE OFFSET UNLESS OTHERWISE DICTATED BY UNIQUE SITE SPECIFIC CIRCUMSTANCES

**TABLE 1 - MINIMUM BARRIER SETBACK AND EXTENSION**

BARRIER TYPE	SETBACK FROM HAZARD, A (mm) - (SEE NOTE 1) (SEE SHEET 1 OF 2)	EXTENSION, B (mm)
HIGH TENSION CABLE	APPROX. 2500 (REFER TO PROPRIETOR SPECS.)	10000
PRECAST CONCRETE	VARIES (UP TO 2400 mm FOR UNANCHORED)	9000
STRONG POST W-BEAM	2100	4000 *
MODIFIED THRIE BEAM	1200	4000 *
THRIE BEAM BULLNOSE	1200	4000
CIP CONCRETE	750	3000

\* WHEN ANCHORED WITH A CABLE ANCHOR TERMINAL (REFER TO RDG-B1.1 AND RDG-B5.1)

**TABLE 2 - BARRIER GEOMETRIC PARAMETERS FOR " RURAL " CROSS SECTIONS**

AIT DESIGN DESIGNATION	ROADWAY FACILITY (No. OF LANES)	DESIGN SPEED (Km/hr)	OBSTACLE OFFSET ** X1 (m)	OBSTACLE OFFSET ** X2 (m)	OBSTACLE OFFSET ** X3 (m)	LENGTH OF NEED Y1 (m)	LENGTH OF NEED Y2 (m)	LENGTH OF NEED Y3 (m)	OVERHEAD SIGN BRIDGE		CANTILEVER SIGN	
									CLEAR SPAN Z1 (m)	SCENARIO REFERENCE	CLEAR SPAN Z2 (m)	SCENARIO REFERENCE
RAD-410.4-80	4	80	C	C	-	-	-	-	7.4 + 2C	A3	MAX: 7.4 + C (ROADSIDE)	B1
RAD-410.4-100	4	100	C	2.4	-	-	150	-	9.8 + C + A	A1	MAX: 7.4 + C (ROADSIDE)	B1
RAD-410.4-110	4	110	C	2.8	2.8 + 2A + P	-	150	150	10.2 + C + A	A2	MAX: 7.4 + C (ROADSIDE)	B1
RAD-411.4-80	4	80	C	C	-	-	-	-	7.4 + 2C	A3	MAX: 7.4 + C (ROADSIDE)	B1
RAD-411.4-100	4	100	C	2.4	-	-	150	-	9.8 + C + A	A1	MAX: 7.4 + C (ROADSIDE)	B1
RAD-411.4-110	4	110	C	2.8	2.8 + 2A + P	-	150	150	10.2 + C + A	A2	MAX: 7.4 + C (ROADSIDE)	B1
RAD-412.4-120	4	120	C	C	-	-	-	-	7.4 + 2C	A3	MAX: 7.4 + C (ROADSIDE)	B1
RFD-412.4-130	4	130	C	C	-	-	-	-	7.4 + 2C	A3	MAX: 7.4 + C (ROADSIDE)	B1
RFD/RAD-616.6-130	6	130	C	C	-	-	-	-	11.1 + 2C	A3	MAX: 11.1 + C (ROADSIDE)	B1

\*\* SEE NOTE 5

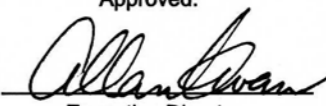
**TABLE 3 - BARRIER GEOMETRIC PARAMETERS FOR " URBAN " CROSS SECTIONS**

AIT DESIGN DESIGNATION	ROADWAY FACILITY (No. OF LANES)	DESIGN SPEED (km/hr)	OBSTACLE OFFSET ** X1 (m)	OBSTACLE OFFSET ** X2 (m)	OBSTACLE OFFSET ** X3 (m)	LENGTH OF NEED Y1 (m)	LENGTH OF NEED Y2 (m)	LENGTH OF NEED Y3 (m)	OVERHEAD SIGN BRIDGE		CANTILEVER SIGN	
									CLEAR SPAN Z1 (m)	SCENARIO REFERENCE	CLEAR SPAN Z2 (m)	SCENARIO REFERENCE
UCD-408.4-80	4	80	-	-	-	-	-	-	-	-	-	-
UAD/UCD-409.9-70	4	70	-	-	-	-	-	-	-	-	-	-
UAD-410.4-80	4	80	C	C	-	-	-	-	7.4 + 2C	A3	MAX: 7.4 + C (ROADSIDE)	B1
UAD-410.4-100	4	100	C	2.4	-	-	150	-	9.8 + C + A	A1	MAX: 7.4 + C (ROADSIDE)	B1
UAD-410.4-110	4	110	C	2.8	2.8 + 2A + P	-	150	150	10.2 + C + A	A2	MAX: 9.4 (MEDIAN)	B2
UAD-411.4-80	4	80	C	C	-	-	-	-	7.4 + 2C	A3	MAX: 7.4 + C (ROADSIDE)	B1
UFD-411.9-80	4	80	C	FLARED	FLARED	-	CONTINUOUS	CONTINUOUS	9.9 + C	A4	MAX: 9.4 (MEDIAN)	B2
UAD-411.4-100	4	100	C	2.4	-	-	150	-	9.8 + C + A	A1	MAX: 7.4 + C (ROADSIDE)	B1
UFD-411.9-100	4	100	C	FLARED	FLARED	-	CONTINUOUS	CONTINUOUS	9.9 + C	A4	MAX: 9.4 (MEDIAN)	B2
UAD-411.4-110	4	110	C	2.8	2.8 + 2A + P	-	150	150	10.2 + C + A	A2	MAX: 9.4 (MEDIAN)	B2
UAD-613.1-80	6	80	C	FLARED	FLARED	-	100	100	13.6 + C	A4	MAX: 11.1 + C (ROADSIDE)	B1
UAD-613.1-100	6	100	C	FLARED	FLARED	-	100	100	13.6 + C	A4	MAX: 11.1 + C (ROADSIDE)	B1
UAD/UCD-616.6-80	6	80	C	FLARED	FLARED	-	CONTINUOUS	CONTINUOUS	14.6 + C	A4	MAX: 14.6 (MEDIAN)	B2
UAD/UCD-616.6-100	6	100	C	FLARED	FLARED	-	CONTINUOUS	CONTINUOUS	14.6 + C	A4	MAX: 14.6 (MEDIAN)	B2
UAD/UCD-616.6-110	6	110	C	2.8	-	-	150	-	11.1 + C + A	A1	MAX: 11.1 + C (ROADSIDE)	B1
UAD/UCD-616.6-120	6	120	C	FLARED	FLARED	-	CONTINUOUS	CONTINUOUS	14.6 + C	A4	MAX: 14.6 (MEDIAN)	B2
UAD/UCD-616.6-130	6	130	C	3.2	3.2 + 2A + P	-	150	150	11.1 + C + A	A2	MAX: 11.1 + C (ROADSIDE)	B1
UAD/UCD-820.8-100	8	100	C	FLARED	FLARED	-	CONTINUOUS	CONTINUOUS	18.2 + C	A4	MAX: 18.2 (MEDIAN)	B2
UAD/UCD-820.8-110	8	110	C	FLARED	FLARED	-	CONTINUOUS	CONTINUOUS	18.2 + C	A4	MAX: 18.2 (MEDIAN)	B2
UAD/UCD-820.8-130	8	130	C	FLARED	FLARED	-	CONTINUOUS	CONTINUOUS	18.2 + C	A4	MAX: 18.2 (MEDIAN)	B2

\*\* SEE NOTE 5

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Approved:   
 Executive Director,  
 Technical Standards Branch

Date: NOVEMBER, 2007

**Alberta**  
 INFRASTRUCTURE AND  
 TRANSPORTATION

**PLACEMENT AND PROTECTION  
 OF OVERHEAD SIGN SUPPORTS  
 FOR DIVIDED ROADS  
 SHEET 2 OF 2**

Prepared By: MO	Checked By: WS	Scale: N.T.S	Dwg No.: RDG-B7.5
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