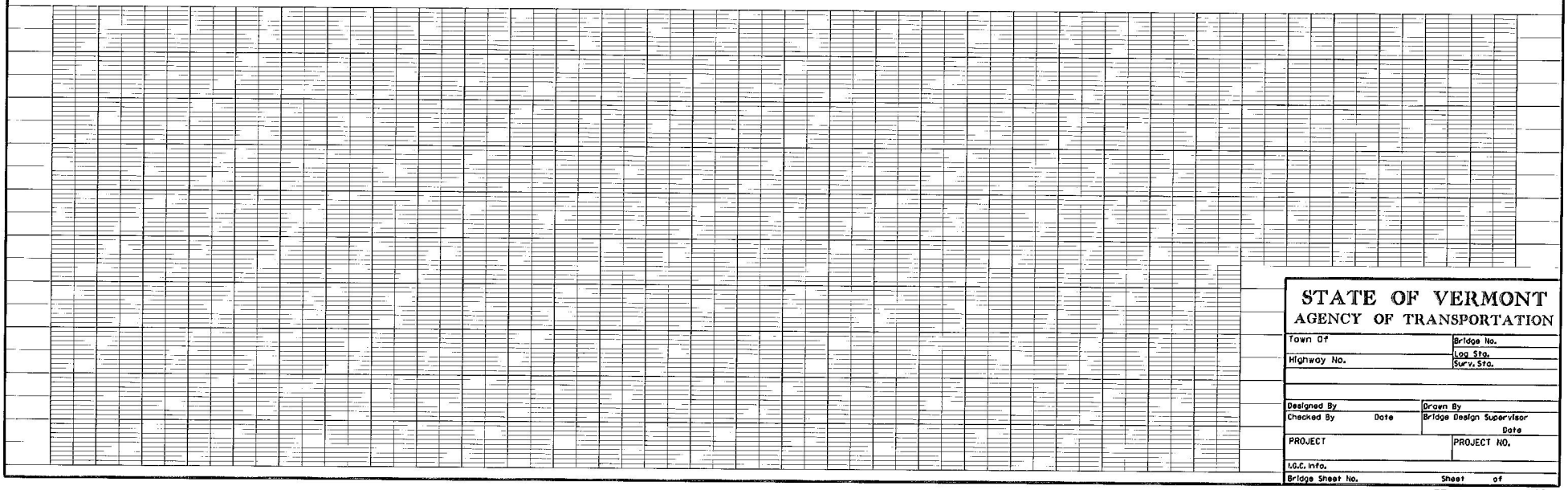
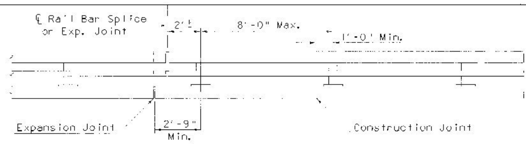
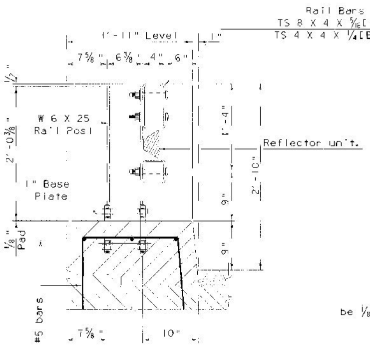


STATE OF VERMONT
AGENCY OF TRANSPORTATION

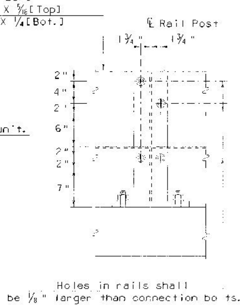
Town Of	Bridge No.
Highway No.	Log Sta. Surv. Sta.
Designed By	Drawn By
Checked By Date	Bridge Design Supervisor Date
PROJECT	PROJECT NO.
I.G.C. Info.	
Bridge Sheet No.	Sheet of



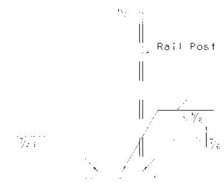
BRIDGE RAILING ELEVATION



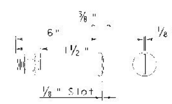
TYPICAL SECTION



ELEVATION

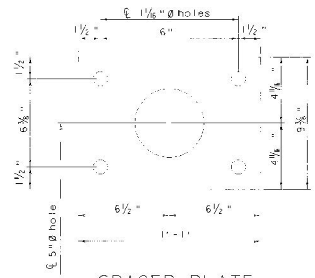


BASE WELD DETAIL

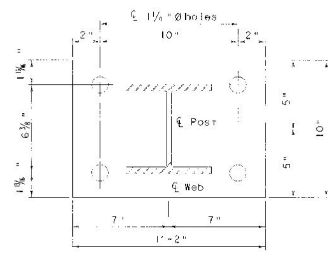


5/8" Ø M164 (TYPE I) ROUND HEAD BOLT

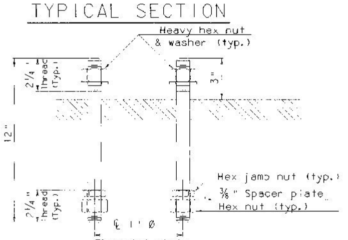
[with washer & lock nut]
[See Note No. 9]
Note: 3/4"Ø bolt detail similar to 5/8"Ø bolt.



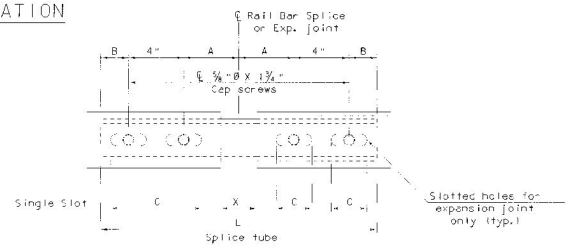
SPACER PLATE



POST & BASE PLATE

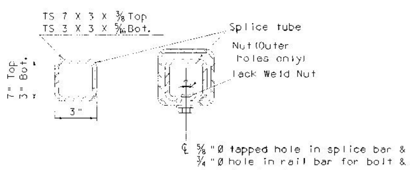


RAIL POST ANCHORAGE

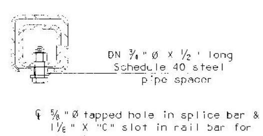


RAIL BAR SPLICE & EXP. JOINT DETAIL

[Bottom View]

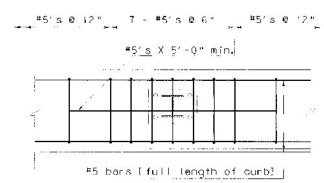


RAIL BAR SPLICE SECTION



EXPANSION JOINT SECTION

For details not shown, see "Rail Bar Splice Section"



CURB REINFORCING PLAN

NOTES

1. All work and materials shall conform to the provisions of Section 525 - Railings of the Standard Specifications for Construction.

2. Tubing and posts shall meet the requirements of Section 732 - Railing materials of the Standard Specifications for Construction.

3. All exposed cut or sheared edges shall be rounded to a 1/16" radius and be free of burrs.

4. Rail posts shall be set normal to grade.

5. Sections of rail bar shall be attached to a minimum of two [2] rail posts and preferably to at least four [4] posts.

6. Rail bar expansion joints shall be provided in any rail bay spanning a superstructure expansion joint. Expansion joint width shall be "X" at 45 °F and will be adjusted in the field by the Engineer.

7. All parts shall be galvanized after fabrication in accordance with AASHTO M111, except that hardware shall meet the requirements of AASHTO M232. Parts shall be blast - cleaned prior to galvanizing in accordance with SSPC - SP6.

8. Rail posts anchoring nuts shall be tightened to a snug fit and given an additional 1/8 turn.

9. Rail bars may alternatively be attached using 5/8"Ø AASHTO M164 (Type I) or 3/4"Ø ASTM A307 Grade A round head bolts inserted through the face of the bar. Holes in posts shall be 1/16" larger than the bolt size.

10. Holes in rails for rail bar attachment may be field - drilled. Holes shall be coated with an approved zinc - rich paint prior to erection.

11. If there is a conflict between these Standard Details and the Design Drawings, the requirements of the Design drawings shall be followed.

12. Any bending of rail shall be by shop procedure only.

MATERIALS

Rail bars........................ASTM A500, Grade B or ASTM A501
Rail posts............................ASTM A709/A709M, Grade 50
All other shapes & plates.............ASTM A709/A709M, Grade 36
Anchor studs..ASTM A449
All other bolts [unless noted]..............AASHTO M164, TYPE I

Nuts for ASTM A307 bolts and AASHTO M164 bolts shall comply with AASHTO M291. Nuts for anchor studs shall comply with ASTM A563.

Washers shall comply with ASTM F436 specification.

1/8" pad shall comply with standard specification subsection 731.01 or 731.02.

Set screws for delineation devices shall conform to ASTM Specification F880, condition CW, Alloy Type 304.

SPLICE & EXPANSION JOINT TABLE

T	A	B	C	L	X
Splice	4"	2"	--	20"	3/4"
≤4"	4"	2"	2 1/2"	20"	2 1/2"
>4" ≤ 6 1/2"	5 1/2"	2 3/8"	3 1/2"	23 3/4"	4"
>6 1/2" ≤ 9"	6 1/2"	3 3/8"	9"*	27 3/4"	5"
>9" ≤ 13"	8 1/2"	4 3/8"	11"*	33 3/4"	7"

T = Total Movement   * = Single Slot

REVISIONS AND CORRECTIONS

OCTOBER 16, 1997 - ORIGINAL APPROVAL DATE
REVISION: ENGLISH SPECIFICATIONS FOR FASTENERS CORRECTED. SET SCREWS FOR DELINEATION DEVICES SPECIFIED. EXP. JT. DIM. IN CURB SET TO 2'-9" FROM POST. J.H.W. 06-05-98

APPROVED

DIRECTOR OF PROJECT DEVELOPMENT

STRUCTURES DESIGN ENGINEER

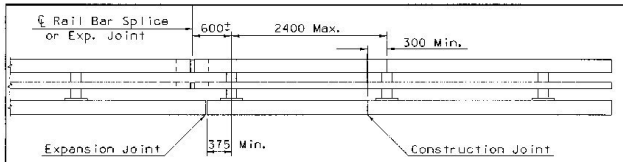
N.E.T.C. BRIDGE RAIL

VERMONT AGENCY OF TRANSPORTATION

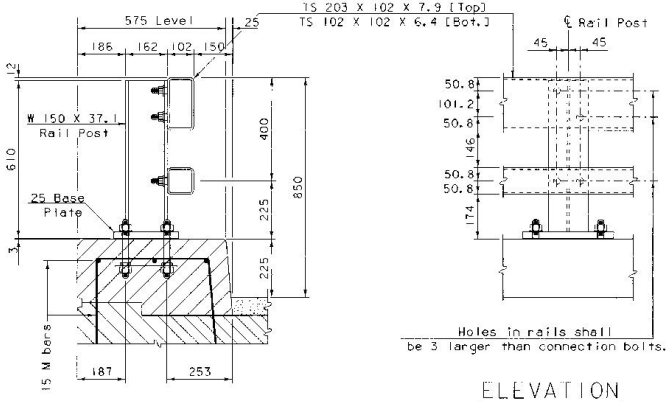
STANDARD BR1-97

1. All dimensions are in millimeters unless otherwise noted.
2. All elevations and stations are in meters.

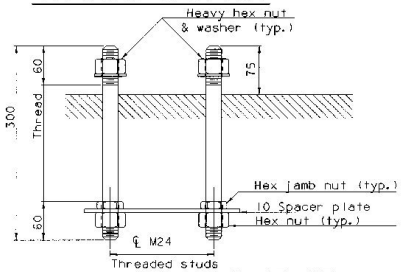
Metric



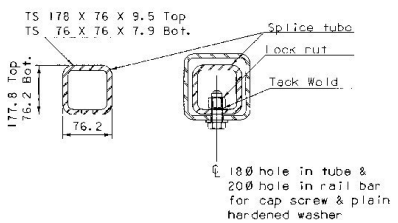
BRIDGE RAILING ELEVATION



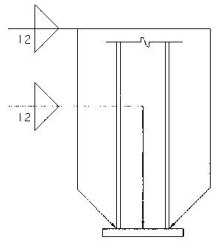
TYPICAL SECTION



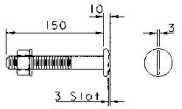
RAIL POST ANCHORAGE



RAIL BAR SPLICE SECTION



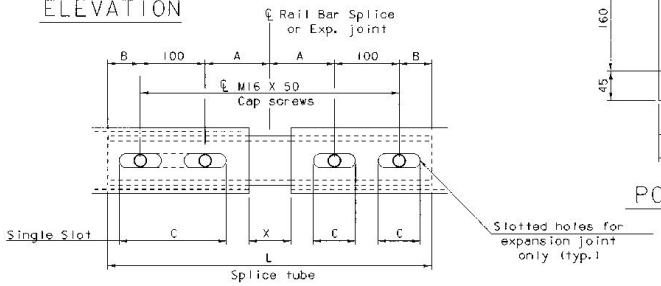
BASE WELD DETAIL



M16X2 M164M (TYPE 1) ROUND HEAD BOLT

[with washer & lock nut]
[See Note No. 9]
Note: M20X2.5 similar to M16X2

ELEVATION



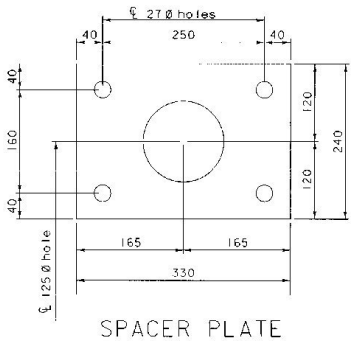
RAIL BAR SPLICE & EXP. JOINT DETAIL

[Bottom View]

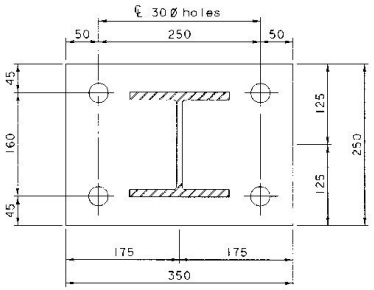
℄ 18Ø hole in plate & 28 X "C" slot in rail bar for cap screw & plain hardened washer

EXPANSION JOINT SECTION

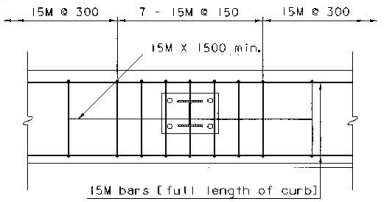
For details not shown, see "Rail Bar Splice Section"



SPACER PLATE



POST & BASE PLATE



CURB REINFORCING DETAIL

NOTES

1. All work and materials shall conform to the provisions of Section 525 - Railings of the Standard Specifications.

2. Tubing and posts shall meet the requirements of Section 732 - Railing materials of the Standard Specifications for Construction.

3. All exposed cut or sheared edges shall be rounded and free of burrs.

4. Rail posts shall be set normal to grade unless otherwise shown.

5. Lengths of rail bar shall be attached to a minimum of two [2] rail posts and to at least four [4] posts whenever possible.

6. Rail bar expansion joints shall be provided in any rail bay spanning a superstructure expansion joint. Expansion joint width shall be "X" at 7 °C and will be adjusted in the field by the Engineer.

7. All parts shall be galvanized after fabrication in accordance with AASHTO M111, except that hardware shall meet the requirements of AASHTO M232. Parts shall be blast - cleaned prior to galvanizing in accordance with SSPC - SP6.

8. Rail posts anchoring nuts shall be tightened to a snug fit and given an additional ⅛ turn.

9. Rail bars may alternatively be attached using M16 AASHTO M164M (Type 1) or M20 ASTM F568M, Class 4.6 round head bolts inserted through the face of the bar. Holes in posts shall be 2 mm larger than the bolt size.

10. Holes in posts for rail bar attachment may be field - drilled. Holes shall be coated with an approved zinc - rich paint prior to erection.

11. Bolts in expansion joints shall be tightened only to a point that will allow rail movement.

12. The alternate curb projection shown is intended for use with granite bridge curb.

13. If there is a conflict between these Standard Details and the Design Drawings, the requirements of the Design drawings shall be followed.

MATERIALS

Rail bars.....ASTM A500, Grade B or ASTM A501
Rail posts.....ASTM A709/A709M, Grade 345
All othe shapes & plates.....ASTM A709/A709M, Grade 250
Anchor studs.....ASTM F568M, Class 8.8
All other bolts [unless noted].....ASTM F568M, Class 4.6

Nuts for ASTM F568M, Class 4.6 bolts and Class 8.8 studs shall comply with AASHTO M291M.

Washers shall comply with ASTM F436M specification.

SPLICE & EXPANSION JOINT TABLE

T	A	B	C	L	X
Splice	100	50	--	500	20
≤ 100	100	50	65	500	65
>100 ≤165	140	60	90	600	100
>165 ≤225	165	85	225*	700	125
>225 ≤330	215	110	275*	850	175

T = Total Movement * = Single Slot

REVISIONS AND CORRECTIONS

APPROVED

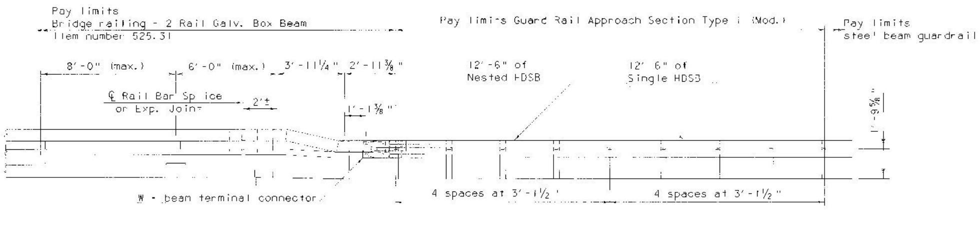
SECRETARY OF TRANSPORTATION	DATE
DIRECTOR OF CONSTRUCTION AND MAINTENANCE	DATE
DIRECTOR OF ENGINEERING	DATE
STRUCTURES ENGINEER	DATE

N.E.T.C. BRIDGE RAIL

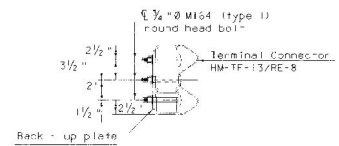
VERMONT AGENCY OF TRANSPORTATION

STANDARD BR1-97

DRAWN BY: J.P. SPILAK DATE: 16 JANUARY 1997

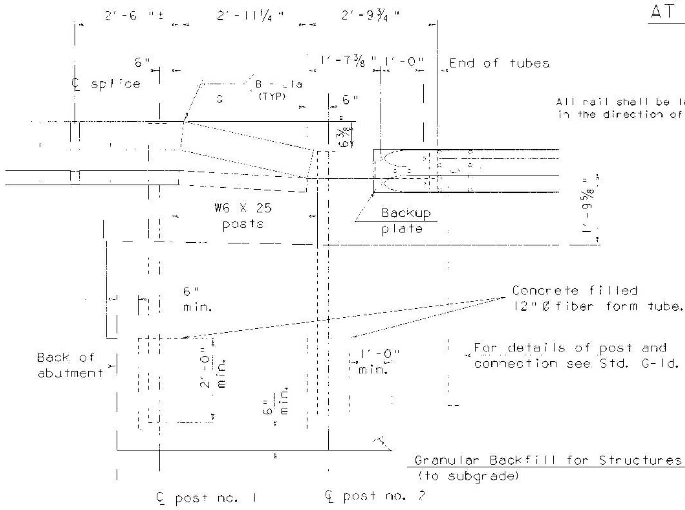

Pay limits
Bridge railing - 2 Rail Galv. Box Beam
Item number 525.31
Pay limits Guard Rail Approach Section Type I (Mod.)
Pay limits
steel beam guardrail
8'-0" (max.)
6'-0" (max.)
3'-11¼"
2'-11⅜"
12'-6" of
Nested HDSB
12'-6" of
Single HDSB
℄ Rail Bar Splice
or Exp. Joint
2'±
1'-1⅜"
1'-9⅝"
W - beam terminal connector
4 spaces at 3'-1½"
4 spaces at 3'-1½"

RAILING TRANSITION ELEVATION

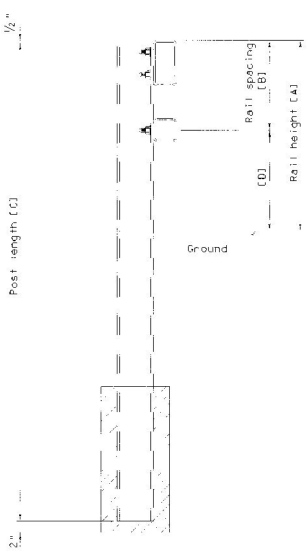


SECTION THROUGH GUARD RAIL CONNECTION AT TERMINAL CONNECTOR

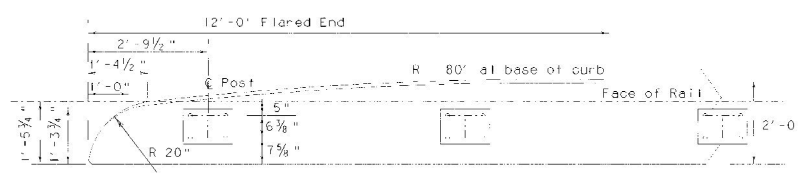
TABLE OF DIMENSIONS				
Post Number	Rail Height [A]	Rail Spacing [B]	Post Length [C]	Rail Height [D]
1	2'-10"	1'-4"	7'-0"	1'-5⅝"
2	2'-3⅝"	10"	6'-5"	1'-5⅝"


2'-6"±
2'-11¼"
2'-9¾"
6"
℄ splice
1'-7⅜"
1'-0"
End of tubes
6"
6⅜"
All rail shall be lapped
in the direction of travel.
W6 X 25
posts
Backup
plate
1'-9⅝"
6"
min.
Concrete filled
12" Ø fiber form tube.
Back of
abutment
2'-0"
min.
1'-0"
min.
6"
min.
For details of post and
connection see Std. G-1d.
Granular Backfill for Structures
(to subgrade)
℄ post no. 1
℄ post no. 2

ELEVATION



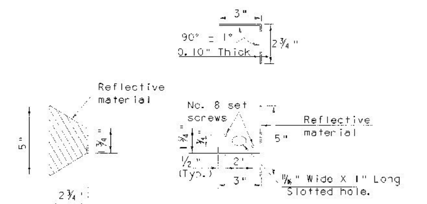
TYPICAL SECTION



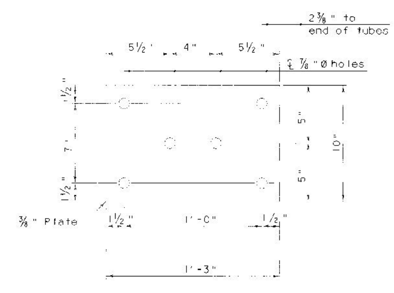
PLAN VIEW

Notes:

1. Refer to standard detail BR1-97 for additional details, notes and materials specifications.
2. To facilitate field fit - up of the transition railing posts shall be set loosely into fiber form tubes while transition parts are being assembled. Post holes shall be backfilled with a concrete mix approved by the Engineer. Payment for components, including backup plate and end terminal connector for guard rail, and installation shall be considered incidental to Bridge railing.
3. The reflectorized aluminum delineation is to be erected every 30' (or closet post) with 2 No. 8 X ¾" self tapping screws. Delineators shall meet specification requirements for ASTM B209 alloy 5052-H32
4. Reflective material shall meet requirements of subsection 750.08 and shall be of encapsulated lens silver or amber. Amber is to be installed on the driver's left and silver on their right.
5. On bridges with a sidewalk, delineators are not to be installed on the sidewalk side of the bridge (i.e. delineators installed only on the curb side and on the approach on the curb side). Payment shall be subsidiary to all other items.



DELINEATION DEVICE DETAILS



BACK - UP PLATE

REVISIONS AND CORRECTIONS	APPROVED
OCTOBER 16, 1997 - ORIGINAL APPROVAL DATE REVISION: CORRECTIONS TO TUBE WELD AT BEND, DIMENSION LINE. J.H.W. 06-05-98	DIRECTOR OF PROJECT DEVELOPMENT STRUCTURES DESIGN ENGINEER

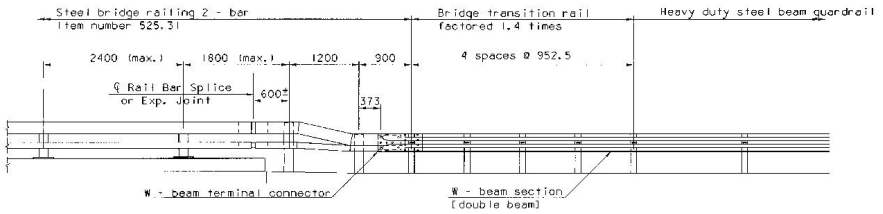
N.E.T.C. BRIDGE RAIL

VERMONT AGENCY OF TRANSPORTATION

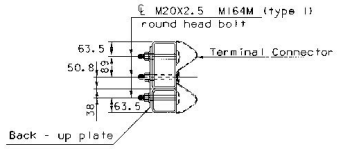
STANDARD BR2-97

d:\env\eng_ian\detail sbr297.dgn

Metric



RAILING TRANSITION ELEVATION



SECTION THROUGH
GUARD RAIL CONNECTION
AT TERMINAL CONNECTOR

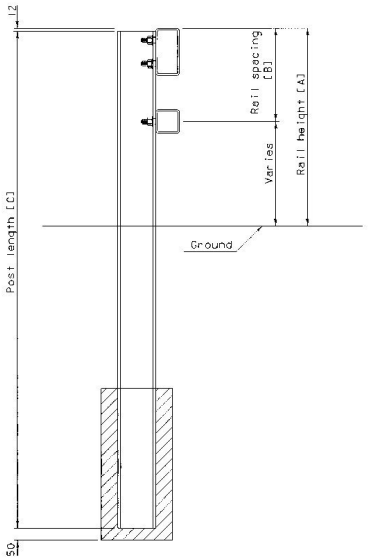
Notes:

1. Refer to standard detail BRI-97 for additional details, notes and materials specifications.

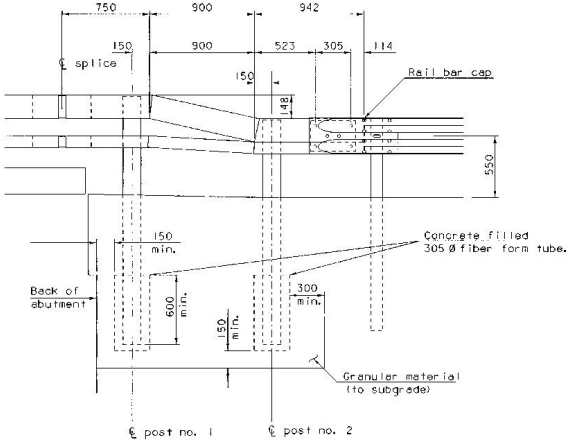
2. The bottom rail may be bent to shape from one continous length of stock provided that the fabricator can achieve the required geometry without deforming the tube.

3. To facilitate field fit - up of the transition railing posts shall be set loosely into fiber form tubes while transition parts are being assembled. Post holes shall be backfilled with a concrete mix approved by the Engineer. Payment will be considered incidental to the steel transition railing pay item.

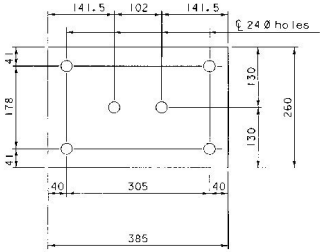
TABLE OF DIMENSIONS			
Post Number	Rail Height [A]	Rail Spacing [B]	Post Length [C]
1	850	400	2135
2	702	254	1990



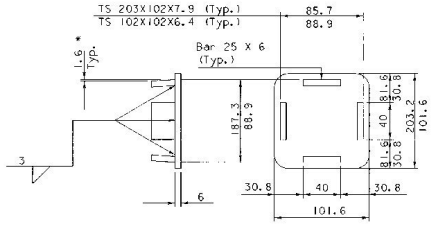
TYPICAL SECTION



ELEVATION



BACK - UP PLATE



* Drive fit

RAIL BAR CAP

Note: Corner radius shall match rail bar

REVISIONS AND CORRECTIONS

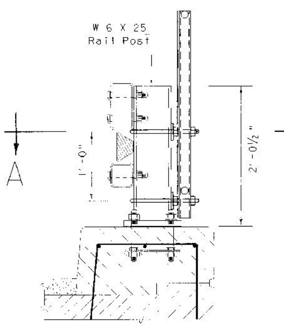
APPROVED	
SECRETARY OF TRANSPORTATION	DATE
DIRECTOR OF CONSTRUCTION AND MAINTENANCE	DATE
DIRECTOR OF ENGINEERING	DATE
STRUCTURES ENGINEER	DATE

N.E.T.C. BRIDGE RAIL

VERMONT AGENCY OF TRANSPORTATION

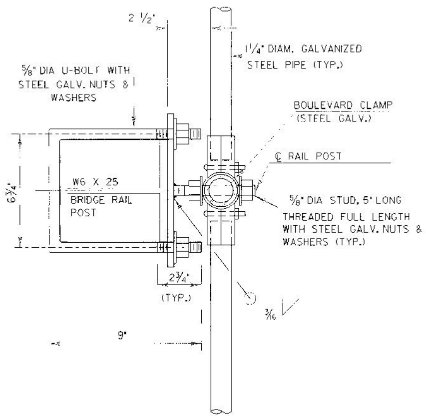
STANDARD BR2-97

DRAWN BY: J.P. SPILAK DATE: 16 JANUARY 1997

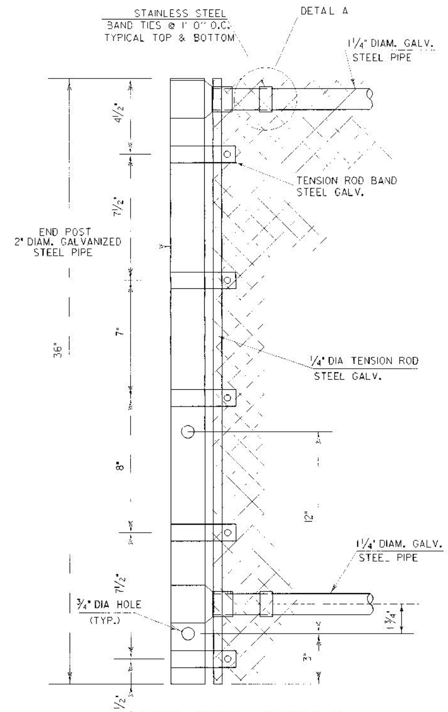


TYPICAL SECTION

NOTE: FOR DIMENSIONS SEE SHEETS BR1 & BR2.



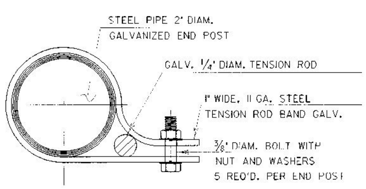
SECTION A-A



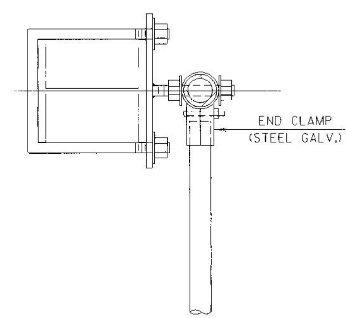
END POST DETAILS

NOTES

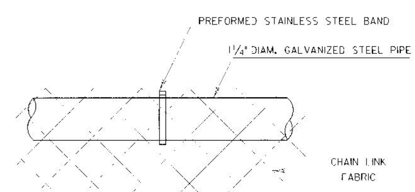
1. THREADS OF STUDS AND U-BOLTS TO BE 5/8-11 UNC.
2. ALL CONNECTION PLATES TO BE GALVANIZED AFTER FABRICATION.
3. 1¼" PIPE LENGTH SHALL BE FIELD CUT TO FIT POST SPACING.
4. CHAIN LINK FABRIC TO BE KNUCKLED TOP AND BOTTOM.
5. ALL BOLTS, NUTS AND WASHERS SHALL CONFORM TO THE SPECIFICATIONS FOR ASTM A307.
6. ALL STEEL PLATES SHALL CONFORM TO THE SPECIFICATION FOR AASHTO M270 GRADE 36.
7. ALL GALVANIZING SHALL CONFORM TO THE REQUIREMENTS OF AASHTO M-111 WITH HARDWARE AND FITTINGS CONFORMING TO THE REQUIREMENTS OF AASHTO M-111 OR AASHTO M-232 WHICHEVER IS APPLICABLE. ALL BOLTS, NUTS AND WASHERS SHALL BE EITHER HOT-DIP GALVANIZED IN ACCORDANCE WITH THE ABOVE AASHTO REQUIREMENTS OR MECHANICALLY GALVANIZED USING A MECHANICALLY DEPOSITED PROCESS CONFORMING TO THE REQUIREMENTS OF AASHTO M-298, CLASS 110.
8. GALVANIZED CHAIN-LINK FABRIC SHALL BE TYPE I (ZINC) CLASS D AS SPECIFIED IN AASHTO M-181.
9. SNOW BARRIER SHALL BEGIN AT THE BRIDGE RAIL POST WHICH WILL PROVIDE A MIN. DISTANCE OF 20' (AS SHOWN) OR AS DIRECTED BY THE ENGINEER.
10. ALL REFERENCES TO THE DIAMETERS OF GALVANIZED STEEL PIPE SHALL REFER TO THE OUTSIDE DIAMETER (O. D.).



TENSION ROD BAND



PLAN VIEW AT END POST



DETAIL A

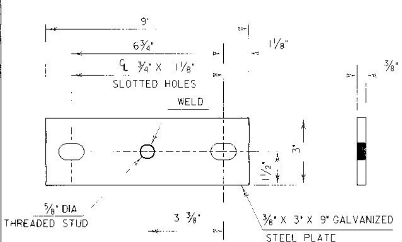
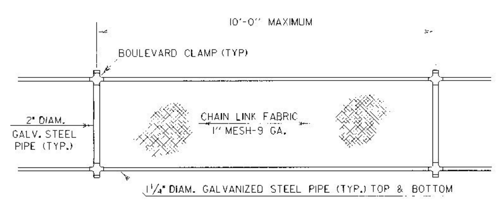
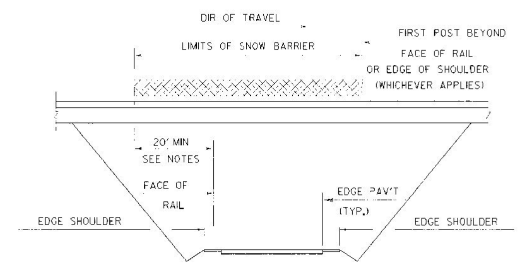


PLATE DETAILS



ELEVATION SNOW BARRIER



SCHEMATIC SNOW BARRIER LIMITS

REVISIONS AND CORRECTIONS	APPROVED		
OCTOBER 16, 1997 - ORIGINAL APPROVAL DATE REVISION: END POST DETAILS CORRECTED. J.H.W. 06-23-98	DIRECTOR OF PROJECT DEVELOPMENT STRUCTURES DESIGN ENGINEER	SNOW FENCE FOR N.E.T.C. BRIDGE RAIL	VERMONT AGENCY OF TRANSPORTATION — STANDARD BR3-97