This railing has been structurally evaluated to be equivalent or greater in strength to other safety shape railings which have been crash tested to NCHRP Report 350 TL-4 Criteria.

CONCRETE AND REINFORCING STEEL: See Structures Plans General Notes.

GUARDRAIL: For Guardrail connection details see Index Nos. 400 and 410.

SUPERELEVATED BRIDGES: At the option of the Contractor the Traffic Railing on superelevated bridges may be constructed perpendicular to the roadway surface. If an adjoining railing is constructed plumb, transition the end of the Traffic Railing from perpendicular to plumb over a minimum distance of 20'-0". The cost of all modifications will be at the Contractor's expense.

PEDESTRIAN AND BICYCLE RAILING: See Index Nos. 821 and 822 for Notes, Details and post spacings for Traffic Railings with Aluminum Pedestrian / Bicycle Bullet Railings.

V-GROOVES: Construct $\frac{1}{2}$" V-Grooves plumb. Space V-Grooves equally between $\frac{3}{4}$" Open Joints and at V-Groove locations on Retaining Wall footings.

NAME, DATE AND BRIDGE NUMBER: The Name and Bridge Number shall be placed on the Traffic Railing so as to be seen on the driver's right side when approaching the bridge. The Date shall be placed on the driver's left side when approaching the bridge. The Name shall be as shown in the General Notes in the Structures Plans. The Date shall be the year the bridge is completed. For a widening when the existing railing is removed, use both the existing date and the year of the widening. Black plastic letters and figures 3" in height may be used, as approved by the Engineer, in lieu of the letters and figures formed by $\frac{1}{2}$" V-Grooves. V-Grooves shall be formed by preformed letters and figures.

BARRIER DELINEATORS: Barrier Delineators shall meet Specification Section 993. Install Barrier Delineators on top of the Traffic Railing 2" from the face on the traffic side at the spacing shown in the table above. Barrier Delineator color (white or yellow) shall match the color of the near edgeline. The cost of the Barrier Delineators shall be included in the Contract Unit Price for the Traffic Railing.

JOINTS: See Plans, Superstructure, Approach Slab and Retaining Walls Sheets for actual dimensions and joint orientation. Provide open Railing Joints at Deck Expansion Joint locations matching the dimensions of the Deck Joint. For Treatment of Railings on skewed bridges see Sheet No. 3.

Provide $\frac{3}{4}$ Intermediate Open Joints at:
1. Superstructure supports where slab is continuous.
2. Ends of approach slabs when adjacent to retaining walls and at expansion joints on retaining wall junction slabs.
SECTION A-A
TYPICAL SECTION THRU TRAFFIC RAILING
(Section thru Bridge Deck shown, Section thru Approach Slab and Retaining Walls similar)

SECTION A-A
(Showing Bars 5V and 5S)

DETAIL "A"
(Railing on Approach Slab shown, Railing on Retaining Wall similar)

NOTE: Omit Railing End Transition and Guardrail if Index 410 Concrete Barrier Wall is used beyond the Approach Slab or Retaining Wall. See Structures Plans, Plan and Elevation Sheet and Roadway Plans. If Railing End Transition is omitted, extend Typical Section to end of the Approach Slab or limiting station on Retaining Wall, and space Bars 5P and 5V at 8" (Typ.)

VIEW B-B
(Section thru Approach Slab shown, Section thru Retaining Walls similar)

NOTES:
Rotate Bars 5V in Railing End Transition to maintain cover. Begin placing Railing Bars 5P and 5V on Approach Slab at the barrier end and proceed toward Begin or End Bridge to ensure placement of guardrail bolt holes.

CROSS REFERENCE:
For locations of Section A-A and View B-B see Sheet 1.

*Where railings of adjacent bridges are to be built back to back, the outside vertical plane of the railing and deck/approach slab may coincide along a plane centered 1'-8" from each gutter line. A bond breaker will be required. See Structures Plans, Superstructure Sheets for Details.
NOTES:
1) Concrete Parapet reinforcement is not affected by skew angle, see Index No. 820 for details.
2) Parapet expansion joint shall match the deck expansion joint which shall be turned perpendicular or radial to the gutter line. See Structures Plans, Superstructure Sheets for details.
3) Traffic Railing reinforcement vertical Bars 5V & 5P may be shifted up to 1" (Max.) and rotated up to 10 degrees as required to allow proper placement. Bars 5V adjacent to expansion joints shall be field adjusted to maintain clearance and spacing, extra Bars 5V will be required. Bars 5V bottom horizontal portion shall be cut so as to maintain maximum bottom horizontal length of bar to each vertical leg being placed, the remainder of bar shall be discarded. Cut Bars 5V may be rotated to maintain clearance.
4) Railing ends at deck expansion joints shall follow the deck joint with allowance for joint movement. Expansion joint at the inside face of parapet shall be turned perpendicular or radial to this line. See Structures Plans, Superstructure and Approach Slab Sheets for details.
5) 1/2 Intermediate Open Joints and V-Grooves in railing and parapet shall be placed perpendicular or radial to the gutter line or inside face of parapet line. See Structures Plans, Superstructure Sheets for locations.
6) At begin or end approach slab extend slab at the railing ends 3' (gutter side or back face of railing as required) shown to provide a base for casting of the railing.
7) Begin placing Railing Bars 5P and 5V on Approach Slab at the railing end and proceed toward Begin or End Bridge to ensure placement of guardrail bolt holes. If required, adjustments to the bar spacing for Bars 5P and 5V shall be made immediately adjacent to Begin or End Bridge.

GENERAL NOTES:
1) Work this Sheet with Traffic Railing, Pedestrian/Bicycle Railing, and Approach Slab Indexes as applicable.
2) Deck Expansion Joint at begin or end bridge shown. Deck Expansion Joints at 1/2 Pier or Intermediate Bents are similar.
3) Partial Plan Views shown are intended as guides only. See Structures Plans, Superstructure and Approach Slab Sheets for skew angles, joint orientation, dimensions and details.
4) Railings on Raised Sidewalks shall be treated similar to the Partial Plan View of Bridge Deck with Traffic Railing.
5) If Welded Wire Reinforcement is used in lieu of conventional reinforcement, placement of the WWR vertical elements shall be similar to those shown above. Clipping of horizontal elements to facilitate placement shall be minimized where possible. When clipping is required, supplement horizontal elements by lap splicing with deformed bars having an equivalent area of steel.
WELDED WIRE REINFORCEMENT NOTES:
1. At the option of the Contractor Welded Wire Reinforcement (WWR) may be utilized in lieu of all Bars 5P, 5S and 5V. WWR must consist of Deformed wire meeting the requirements of Specification Section 931.
2. WWR at Railing End Transition shall be field bent inward as required (Pieces 1 & 2) to maintain cover. The vertical wires (D30.7) in Piece 1 shall be cut as shown and the gutter portion bent inward as required to allow placement.

REINFORCING STEEL NOTES:
1. All bar dimensions in the bending diagrams are out to out.
2. The ØA and the ØB vertical dimensions shown for Bar 5V are based on a bridge deck without a raised sidewalk. If a raised sidewalk is to be provided, increase these dimensions to achieve a 6" minimum embedment into the bridge deck. See Structures Plans, Superstructure and Approach Slab Sheets.
3. The reinforcement for the railing on a retaining wall shall be the same as detailed above for a 8" deck with ØA = ØB = 90°
4. All reinforcing steel at the open joints shall have a 2" minimum cover.
5. Bars 5S may be continuous or spliced at the construction joints. Bar splices for Bars 5S shall be a minimum of 2'-0".

INTERMEDIATE JOINT SEAL NOTES:
1. At Intermediate Open Joints, seal the lower 6" portion of the open joint with Pre-cured Silicone Sealant in accordance with Specification Section 922.
2. Apply sealant prior to any Class V finish coating and remove all curing compound and loose material from the surface prior to application of bonding agent.
3. The cost of the Pre-cured Silicone Sealant shall be included in the Contract Unit Price for the Traffic Railing.


Pre-cured Silicone Sealant (4" wide)

DETAIL "B" - SECTION AT INTERMEDIATE OPEN JOINT

CONVENTIONAL REINFORCING STEEL BENDING DIAGRAMS

ROADWAY CROSS-SLOPE

<table>
<thead>
<tr>
<th>LOW GUTTER</th>
<th>HIGH GUTTER</th>
</tr>
</thead>
<tbody>
<tr>
<td>CROSS-SLOPE</td>
<td>CROSS-SLOPE</td>
</tr>
<tr>
<td>0% to 2%</td>
<td>90°</td>
</tr>
<tr>
<td>2% to 6%</td>
<td>93°</td>
</tr>
<tr>
<td>6% to 10%</td>
<td>96°</td>
</tr>
</tbody>
</table>

8A and 8B shall be 90° if Contractor elects to place railing perpendicular to the deck and approach sides.

LENGTH AS REQUIRED

BILL OF REINFORCING STEEL

<table>
<thead>
<tr>
<th>MARK</th>
<th>SIZE</th>
<th>LENGTH</th>
</tr>
</thead>
<tbody>
<tr>
<td>S</td>
<td>5</td>
<td>5'-7&quot;</td>
</tr>
<tr>
<td>V</td>
<td>5</td>
<td>5'-1&quot;</td>
</tr>
</tbody>
</table>

CONVENTIONAL REINFORCING STEEL BENDING DIAGRAMS

REINFORCING BAR 5S

REINFORCING BAR 5V

END STIRRUP BAR 5V

(Two Required per Railing End Transition)

ESTIMATED TRAFFIC RAILING QUANTITIES

<table>
<thead>
<tr>
<th>ITEM</th>
<th>UNIT</th>
<th>QUANTITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concrete</td>
<td>CY/LF</td>
<td>0.104</td>
</tr>
<tr>
<td>Reinforcing Steel</td>
<td>LR/LF</td>
<td>27.12</td>
</tr>
</tbody>
</table>

(The above quantities are based on a 2% deck cross slope; railing on low side of deck.)