PLAN OF RAILING ON BRIDGE DECK (WITHOUT SIDEWALK ShOWN, WITH SIDEWALK SIMILAR) (APPROACH SLAB WITHOUT GUARDRAIL WITH OR WITHOUT SIDEWALK SIMILAR) (Reinforcing Steel Not Shown For Clarity)

BARRIER Delineator Spacing

<table>
<thead>
<tr>
<th>Distance - Edge of Travel Lane to Face of Railing</th>
<th>Spacing (Ft.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 4'</td>
<td>40'</td>
</tr>
<tr>
<td>4' to 8'</td>
<td>80'</td>
</tr>
<tr>
<td>&gt; than 8'</td>
<td>None Required</td>
</tr>
</tbody>
</table>

TRAFFIC RAILING NOTES

CONCRETE AND REINFORCING STEEL: See Structures Plans General Notes. AGGREGATE LIMITATION: The aggregate used in the concrete mix shall be a #67 aggregate.

GUARDRAIL: For Guardrail connection details see Index No. 400. SUPERFLOATED BRIDGES: at the option of the Contractor the Traffic Railing on superfloated bridges may be constructed perpendicular to the roadway surface. The cost of all modifications will be at the Contractor's expense.

TRAFFIC RAILING NOTES: This railing has been structurally evaluated to be equivalent or greater in strength to other railings which have been crash tested to NCHRP Report 350 T1-4 Criteria.

CONCRETE AND REINFORCING STEEL: See Structures Plans General Notes.

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ELEVATION OF INSIDE FACE OF RAILING WITH GUARDRAIL ON APPROACH SLABS GREATER THAN 40'-0" ALONG GUTTER (WITHOUT CURB SHOWN, WITH CURB SIMILAR)

**Approach Slabs greater than 40'-0" (Measured Along Gutter Line)**

- **Approach Slab End Section ~ 22'-6" Min., 27'-6" Max.**
  - **Approach Slab (Flexible Pavement Approach Slab Shown, Rigid Pavement Approach Slab Similar)**
  - **Bars 4S1 (Placed with Bars 7P1 or 7P2 & 4V) (Typ.)**
  - **Bars 4S1 sp. @ 1'-4" ; Bars 4V, 7P1 & 7P2 sp. @ 8"**
  - **2'-0" Gap (Field Cut)**
  - **Field Cut Bars 6R1 8'-0" Long (Centered about Guardrail Bolt Connection)**
  - **Approach Slab End Section ~ 22'-6" Min., 27'-6" Max.**

**SECTION THRU RECESSED V-GROOVE TO FORM INSCRIBED LETTERS AND FIGURES**

- **Paint Recessed Surfaces Black**

**NOTES:**
- (NF) means Near Face.
- (FF) means Far Face.

**CROSS REFERENCES:**
- For Sections see Sheets 3 and 4.
- For Quantities and Quantity Breakdown see Sheet 5.
**SECTION A-A** (WITH CURB SHOWN, WITHOUT CURB SIMILAR)

**SECTION B-B**

**SECTION C-C**

**END VIEW D-D**

**TYPICAL SECTIONS THRU RAILING ON BRIDGE DECK WITH SIDEWALK (SHOWN) (RAILING ON APPROACH SLAB SIMILAR)**

**TYPICAL SECTIONS THRU RAILING END SECTION ON APPROACH SLAB WITH SIDEWALK AND GUARDRAIL**

(Bar R, S and T not shown for clarity)

**Traffic Railing - (Corral Shape)**

**PARTIAL PLAN VIEW OF BRIDGE DECK AND APPROACH SLAB WITH SIDEWALK**

(Rails and slabs thicker than 8"/203 mm in Taper)

1) End Post detailed above, Interior Post and Approach Slab End Section similar.
2) For decks to 8"/203 mm, place Bars 7P1 and 7P2 and 4V with the bottom mat of reinforcement as shown in Section A-A. For decks and slabs thicker than 8"/203 mm, place Bars 7P1 and 7P2 and 4V with 6"/152 mm embedment.
3) Alternate Bars 7P1 and 7P2 at each post. At End Posts 3 each (Min.) required, at Intermediate Post 2 each required.
4) Reverse direction of every other Bar 4V1 to match direction of Bars 7P1 or 7P2.
5) Shift deck and approach slab transverse reinforcement minimally to allow placement of Bars 7P & 4V.
**BILL OF REINFORCING STEEL**

<table>
<thead>
<tr>
<th>MARK</th>
<th>SIZE</th>
<th>LENGTH</th>
<th>LB/BAR</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1</td>
<td>7</td>
<td>7'-4&quot;</td>
<td>15.00</td>
</tr>
<tr>
<td>P2</td>
<td>7</td>
<td>7'-3&quot;</td>
<td>14.92</td>
</tr>
<tr>
<td>P3</td>
<td>7</td>
<td>7'-2&quot;</td>
<td>14.65</td>
</tr>
<tr>
<td>P4</td>
<td>7</td>
<td>7'-3&quot;</td>
<td>14.82</td>
</tr>
<tr>
<td>P5</td>
<td>4</td>
<td>2'-31&quot;</td>
<td>1.94</td>
</tr>
<tr>
<td>R1</td>
<td>6</td>
<td>As Reqd.</td>
<td>1.5 (LB/LF)</td>
</tr>
<tr>
<td>R2</td>
<td>5</td>
<td>As Reqd.</td>
<td>1.04 (LB/LF)</td>
</tr>
<tr>
<td>R3</td>
<td>4</td>
<td>As Reqd.</td>
<td>0.67 (LB/LF)</td>
</tr>
<tr>
<td>S1</td>
<td>4</td>
<td>5'-0&quot;</td>
<td>3.34</td>
</tr>
<tr>
<td>S2</td>
<td>4</td>
<td>Varies</td>
<td>6'-2&quot; Min. to 10'-3&quot; Max.</td>
</tr>
<tr>
<td>S3</td>
<td>6</td>
<td>12'-3&quot;</td>
<td>7.52</td>
</tr>
<tr>
<td>T</td>
<td>6</td>
<td>13'-4&quot;</td>
<td>17.02</td>
</tr>
<tr>
<td>U</td>
<td>5</td>
<td>4'-8&quot;</td>
<td>4.87</td>
</tr>
<tr>
<td>V1</td>
<td>4</td>
<td>3'-2&quot;</td>
<td>2.12</td>
</tr>
<tr>
<td>V2</td>
<td>4</td>
<td>3'-6&quot;</td>
<td>2.34</td>
</tr>
</tbody>
</table>

**REINFORCING STEEL NOTES:**

1. All bar dimensions in the bending diagrams are out to out.
2. The reinforcement for the railing on a C-I-P Concrete Retaining Wall shall be the same as detailed above for a 8" deck with \( \Theta A = 90° \) where applicable. If bottom horizontal legs of Bars 7P1, 7P3 and 4V1 prohibit placement, Bars 7P4 and 4V2 may be substituted for Bars 7P1, 7P3 and 4V1 as shown.
3. All reinforcing steel at the open joints shall have a 2" minimum cover unless otherwise noted.
4. At Construction Joints Bars 6R1, 5R2 and 4R3 may be continuous or spliced. Where bars are spliced provide a 2'-6" Min. lap length for Bar 6R1, a 2'-0" Min. lap length for Bars 5R2 and a 1'-3" Min. lap length for Bars 4R3.
5. The skew angle for Bars 7P3 may vary from joint to joint and side to side, see Structures Plans, Superstructure Sheets for details.

**CONVENTIONAL REINFORCING STEEL BENDING DIAGRAMS**

**ITEM**

<table>
<thead>
<tr>
<th>ITEM</th>
<th>CONCRETE QUANTITY (CY)</th>
<th>REBAR QUANTITY (LB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Typical 10'-0&quot; Section w/Curb</td>
<td>1.13</td>
<td>451</td>
</tr>
<tr>
<td>Typical 10'-0&quot; Section w/o Curb</td>
<td>1.03</td>
<td>428</td>
</tr>
<tr>
<td>Approach Slab with Guardrail End Section</td>
<td>0.14</td>
<td>(per LF)</td>
</tr>
</tbody>
</table>

**TRAFFIC RAILING - (CORRAL SHAPE)**
NOTES:
1) Railing expansion joint shall match the deck expansion joint which shall be turned perpendicular or radial to the gutter line. See Structures Plans, Superstructure and Approach Slab Sheets for details.
2) Bars 4S1 (not shown) shall be placed perpendicular or radial to the gutter.

BRIDGE DECK AND APPROACH SLAB WITHOUT GUARDRAIL ATTACHED (SHOWN):
3) End Post & Approach Slab End Section - Place Bars 7P1 & 4V1 in acute corners of intersection of deck joint and gutter line. Place Bars 7P3 & 4V1 in acute corners of intersection of deck joint and gutter line as required. Interior Post - Use Bars 7P1 and 4V1 placed with bottom mat of reinforcement. Shift deck or slab reinforcement minimally to allow proper placement of Bars 7P and 4V and to facilitate placement of concrete.

APPROACH SLAB WITH GUARDRAIL ATTACHED (NOT SHOWN):
4) Place Bars 7P1 & 4V1 in acute corners of intersection of deck joint and gutter line as required. Shift deck or slab reinforcement minimally to allow proper placement of Bars 7P & 4V and to facilitate placement of concrete.
5) Begin placing Railing Bars 7P & 4V 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 7P & 4V shall be made immediately adjacent to Begin or End Bridge.

APPROACH SLAB WITH GUARDRAIL ATTACHED (SHOWN):
6) Bars 7P at end of the railing shall be field cut and shifted to maintain clarity, see Railing End Taper Detail Sheet 2 for similar details.

GENERAL NOTES:
1) Deck Expansion Joint at begin or end bridge shown. Deck Expansion Joints at Pier or Intermediate Bents are similar.
2) 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.
NOTES:
1) 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.
2) Bars 4S1 (not shown) shall be placed perpendicular or radial to the gutter.
3) Edge of Approach Slab adjacent to the roadway shall follow end of railing. Bars 7P at end of the railing shall be cut and shifted to maintain clearance, see detail bottom left this sheet for similar details.
4) Bars 7P & 4V shall be rotated to match bridge deck reinforcement. Shift deck transverse reinforcement minimally to allow placement of Bars 7P & 4V.
5) Railing End Post and reinforcement detailed above. Railing Interior Post reinforcement similar.
6) Approach Slab with Guardrail Attached (shown):
7) Begin placing Railing Bars 7P & 4V 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 7P & 4V shall be made immediately adjacent to Begin or End Bridge.

NOTES:
1) 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.
2) Bars 4S1 (not shown) shall be placed perpendicular or radial to the gutter.
3) Deck transverse reinforcement may be shifted minimally as required to allow proper placement of Bars 7P & 4V and to facilitate placement of concrete. Bars 7P1 & 4V1 shall be used on opposite sides of the joint depending on the direction of the skew, see Detail above. Approach Slab reinforcement may be shifted if conflicts occur.
4) Interior Post - alternate Bars 7P1 with Bars 7P2 and reverse direction of every other Bar 4V1 to facilitate placement of concrete.
5) End Post - alternate Bars 7P1 with Bars 7P2 and reverse direction of Bars 4V1 (as detailed) where possible.
6) Use Bars 7P2 and reverse direction of Bars 4V1 where skew restricts use of Bars 7P1 & 4P1.
7) Begin placing Railing Bars 7P & 4V 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 7P & 4V shall be made immediately adjacent to Begin or End Bridge.