PLAN OF RAILING ON BRIDGE DECK (WITHOUT SIDEWALK SHOWN, WITH SIDEWALK SIMILAR)  (REINFORCING STEEL NOT SHOWN FOR CLARITY)

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. SUPERFLECTED BRIDGE: At the option of the Contractor the Traffic Railing on superflected bridges may be constructed perpendicular to the roadway surface. The cost of all modifications will be at the Contractor's expense.

ELEVATION OF INSIDE FACE OF RAILING

TRAFFIC RAILING - (CORRAL SHAPE)
PLAN OF RAILING WITH GUARDRAIL ON APPROACH SLAB WITHOUT SIDEWALK (APPROACH SLAB WITH ADJACENT SIDEWALK SIMILAR)

(REINFORCING STEEL NOT SHOWN FOR CLARITY)

**Begin placing Railing Bars 7P1 or 7P2 and 4V on Approach Slab at the barrier end and proceed toward Begin or End Bridge to ensure placement of guardrail bolt holes.** If required, adjustments to bar spacing for Bars 7P1 or 7P2 and 4V shall be made immediately adjacent to Begin or End Bridge.

**NOTE:**
For details of reinforcing steel, see Elevation View above for Reinforcement.

**CROSS REFERENCES:**
For Sections see Sheets 3 and 4.
For Quantities and Quantity Breakdown see Sheet 5.

**DESIGN STANDARDS:**
TRAFFIC RAILING - (CORRAL SHAPE)

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

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

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

**NAME OR DATE**
BRIDGE NUMBER

**Approach Slab End Section ~ 22'-6" Min., 27'-6" Max.**

**Approach Slab (Flexible Pavement Approach Slab Shown, Rigid Pavement Approach Slab Similar)**

**Approach Slab End Section ~ 22'-6" Min., 27'-6" Max.**

**Approach Slab (Flexible Pavement Approach Slab Shown, Rigid Pavement Approach Slab Similar)**

**Begin or End Approach Slab**

**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.
1. End Post detailed above, Intermediate Post and Approach Slab End Section similar.

2. For decks to 8 ft thick, 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 ft place Bars 7P1 and 7P2 and 4V with 6" embedment.

3. Alternately Bars 7P1 and 7P2 at each post. At End Posts 3 each (Min.) required, at Intermediate Post 6 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.

RAILING ADJACENT TO SIDEWALK NOTES:

1) End Post detailed above, Interior Post and Approach Slab End Section similar.

2) For decks to 8 ft thick, 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 ft place Bars 7P1 and 7P2 and 4V with 6" embedment.

3) Alternately Bars 7P1 and 7P2 at each post. At End Posts 3 each (Min.) required, at Intermediate Post 6 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.

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

SECTION A-A (WITH CURB SHOWN, WITHOUT CURB SIMILAR)

SECTION C-C

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

(ASSHOW, APPROACH SLAB (RIGID PAVEMENT APPROACHES) SIMILAR)

SECTION B-B

TYPICAL SECTIONS THRU RAILING ON BRIDGE DECK WITH SIDEWALK (SHOWN)

(ASSHOW, APPROACH SLAB (FLEXIBLE PAVEMENT APPROACHES) SIMILAR)

END VIEW D-D

CROSS REFERENCES:

For Locations of Sections see Sheets 1 and 2.
For Quantities and Rebar Details see Sheet 5.

INDEX NO. 424 SHEET No. 4 of 7
CONVENTIONAL REINFORCING STEEL BENDING DIAGRAMS

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>1</td>
<td>7' - 4&quot;</td>
<td>15.00</td>
</tr>
<tr>
<td>P2</td>
<td>1</td>
<td>7' - 3&quot;</td>
<td>14.82</td>
</tr>
<tr>
<td>P3</td>
<td>1</td>
<td>7' - 2&quot;</td>
<td>14.65</td>
</tr>
<tr>
<td>***P4</td>
<td>1</td>
<td>7' - 3&quot;</td>
<td>14.82</td>
</tr>
<tr>
<td>* P5</td>
<td>4</td>
<td>2'-11&quot;</td>
<td>1.94</td>
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<tr>
<td>R1</td>
<td>6</td>
<td>As Req'd</td>
<td>1.5 (LB/LF)</td>
</tr>
<tr>
<td>R2</td>
<td>5</td>
<td>As Req'd</td>
<td>1.04 (LB/LF)</td>
</tr>
<tr>
<td>* R3</td>
<td>4</td>
<td>As Req'd</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 6'-2&quot; Min.</td>
<td>Varies 10'-3&quot; Max.</td>
</tr>
<tr>
<td>** S3</td>
<td>4</td>
<td>13'-3&quot;</td>
<td>7.52</td>
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<tr>
<td>T</td>
<td>6</td>
<td>13'-4&quot;</td>
<td>17.02</td>
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<tr>
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<td>5</td>
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<tr>
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<td>2.12</td>
</tr>
<tr>
<td>***V2</td>
<td>4</td>
<td>3'-6&quot;</td>
<td>2.34</td>
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* Bars 4P5 and 4R3 are to be used with a curb only.
** Bend Bars 4S1, 4S2 & 4S3 around a #3 Stirrup Pin.
*** Bars 7P4 & 4V2 are to be used on C-I-P Concrete Retaining Walls.

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 ØA = 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.

REMARKS:

1. 2'-6" Min.
2. 2'-0" Min.
3. 1'-3" Min.

CONVENTIONAL REINFORCING STEEL BENDING DIAGRAMS

BARS 6R1, 5R2 & 4R3 * Length As Required

Typical 10'-0" Section w/o Curb

Typical 10'-0" Section w/Curb

Approach Slab with Guardrail End Section

TRAFFIC RAILING - (CORRAL SHAPE)

ITEM | CONCRETE QUANTITY (CY) | REBAR QUANTITY (LB)
-----|------------------------|-------------------
Typical 10'-0" Section w/Curb | 1.13 | 451
Typical 10'-0" Section w/o Curb | 1.03 | 428
Approach Slab with Guardrail End Section | 0.14 | (per LF)
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 obtuse 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.

APPORACH 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.

PARTIAL PLAN VIEW OF BRIDGE DECK AND APPROACH SLAB - SKEW ANGLE GREATER THAN 15 DEGREES

NOTES:
1) Alternate Bars 7P1 with Bars 7P2 and reverse direction of every other Bar 4V1 as detailed above to facilitate placement of concrete.

2) Shift deck transverse reinforcement minimally to allow placement of Bars 7P & 4V.

END POST & APPROACH SLAB END SECTION - PLACE BARS 7P3 & 4V1 IN OBTUSE CORNERS OF INTERSECTION OF DECK JOINT AND GUTTER LINE. PLACE BARS 7P1 & 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):
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.
NOTES:

1) Railing ends at deck expansion joints shall follow the deck joint with allowance for joint movement. Expansion joints 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) Use Bars 4V1 (not shown) shall be placed perpendicular or radial to the gutter.

3) Exterior Post reinforcement of exterior post shall follow the exterior post line.

4) Bridge Deck Transverse Reinforcement may be shifted minimally as required to allow proper placement of Bars 7P & 4V. Bars 7P2 & 4V2 shall be used on alternate sides of the exterior post depending on the direction of the skew, see Diagram above. Bridge Deck Transverse Reinforcement may be shifted if conflicts occur.

5) End Post - alternate Bar 7P1 with Bar 7P2 and reverse direction of every other Bar 4V1 to facilitate placement of concrete.

6) Use Bars 7P2 and reverse direction of Bars 4V1 where skew restricts use of Bars 7P1 & 4V1.

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.

PARTIAL PLAN VIEW OF BRIDGE DECK AND APPROACH SLAB WITH SIDEWALK - SKEW ANGLE GREATER THAN 15 DEGREES

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) Bridge Deck Transverse Reinforcement may be shifted minimally as required to allow proper placement of Bars 7P & 4V. Bars 7P2 & 4V2 shall be used on alternate sides of the exterior post depending on the direction of the skew, see Diagram above. Bridge Deck Transverse Reinforcement may be shifted if conflicts occur.

3) Exterior Post - alternate Bar 7P1 with Bar 7P2 and reverse direction of every other Bar 4V1 to facilitate placement of concrete.

4) End Post - alternate Bar 7P1 with Bar 7P2 and reverse direction of Bars 4V1 (as detailed) where possible. Approach Slab Transverse Reinforcement may be shifted if conflicts occur.

5) End Post - alternate Bar 7P1 with Bar 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 & 4V1.

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.