GENERAL NOTES

1. This index provides guardrail transition and connection details for approach end guardrail on existing bridges, and anchorage details for trailing end traffic railing retrofits and safety shapes on existing bridges. Sheets 1 through 23 apply to bridges with retrofitted traffic railings. (Sheet 2 shows the trailing end guardrail connections.) Sheet 24 applies to bridges with safety shaped traffic railing. Construct the guardrail transitions and connections where shown in the plans.

2. The schemes identified by Arabic numerals in this index are complementary to the bridge traffic railings barrier retrofit schemes with like numeral identification in Index Nos. 470 through 476, 480 through 483. The schemes in this index identified by Roman numerals are supplementary to bridge safety shaped traffic railing barrier where determined to be in accordance with applications of criteria specified in the Instructions for Design Standards (IDS-470 & IDS-480).

3. For trailing end guardrail connections for existing bridges with either Vertical Face Retrofits or Safety Shape Traffic Railing, see the Trailing End Transition Connection to Rigid Barrier detail shown in Index No. 400. Likewise, for miscellaneous guardrail construction details that are not provided in this index, refer to Index No. 400.

NOTES FOR GUARDRAIL TRANSITIONS CONNECTING TO TRAFFIC RAILING RETROFITS ON EXISTING BRIDGES

1. The transition detail shown on this sheet shows all the standard post spacings within the typical thrie-beam approach transitions connecting to existing bridges with retrofit traffic railings, and (b) depict the typical alignments of the approach transitions.

2. The curb and gutter flare shown on this sheet is typical of flares that are to be constructed when approach slab curbs extend to the beginning of the slab, and where other treatment to curb blunt ends are not in place.

3. The special steel post for roadway thrie-beam transitions detailed on this sheet is specific to all transition applications on this index that require one or more steel posts.

The special steel post and base plate assembly shall be fabricated in accordance with Specification Section 967.

Anchor studs shall be fully threaded rods in accordance with ASTM F1554 Grade 36 or ASTM A193 Grade B7. All nuts shall be heavy hex in accordance with ASTM A563 or ASTM A19.

4. Anchor studs and nuts shall be hot-dip zinc coated in accordance with the Specifications. After the nuts have been snug tightened, the anchor stud threads shall be single pitch distanced immediately above the top nuts to prevent loosening of the nuts. Distanced threads shall be coated with a galvanizing compound in accordance with the Specifications.

Adhesive bonding material systems for anchors shall comply with Specification Section 937 and be installed in accordance with Specification Section 416-4. Nested beam extensions and points for terminal connector attachments will vary for traffic railing barrier vertical face retrofits.

The plan views for the vertical face retrofit barriers show the primary configurations for each particular scheme. The associated pictorial views show the variations.

5. For installing thrie-beam terminal connector to traffic railing vertical face retrofits, see notations on Sheets 32 through 15 and the Flag notation on Sheet 23.

6. Payment for connections to traffic railing vertical face retrofits are to be made under the contract unit price for Bridge Anchorage Assembly, EA., and shall be full compensation for bolt hole construction, terminal connector, terminal connector plate and bolts, nuts and washers.

DESIGN NOTES FOR GUARDRAIL TRANSITIONS CONNECTING TO TRAFFIC RAILING RETROFITS ON EXISTING BRIDGES

1. For selection of an appropriate transition scheme, see the Instructions for Design Standards (IDS-470 & IDS-480) for instructions to the Structures and Roadway engineers.
**Approach Guardrail Treatments for Bridges with Concrete Traffic Railing**

**Extending Less Than Full Approach Slab Length in Narrow Medians with Flush Shoulders**

### Guardrail Lengths

<table>
<thead>
<tr>
<th>Median Width (ft)</th>
<th>6' Bridge Shoulders</th>
<th>10' Bridge Shoulders</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>110 Taper Rate</td>
<td>115 Taper Rate</td>
</tr>
<tr>
<td></td>
<td>Panels (No.) Length (ft)</td>
<td>Panels (No.) Length (ft)</td>
</tr>
<tr>
<td>10</td>
<td>1.5</td>
<td>165.25</td>
</tr>
<tr>
<td>20</td>
<td>1.5</td>
<td>165.25</td>
</tr>
<tr>
<td>24</td>
<td>6.5</td>
<td>165.25</td>
</tr>
</tbody>
</table>

The lengths in this table are based on standard widths for roadway and bridge median shoulders. Length requirements for both standard and narrow bridge shoulders and end anchorage or end shielding requirements shall be determined on a site specific basis. When crash cushions are required on approach roadway shoulders, their sizes may be determined by the residual speeds (S') along the runouts from the approach roadway; however, when calculated speeds (S') are less than 30 mph, crash cushions shall be no less in size than for 30 mph; see speed diagram left. The number of panels may be reduced when installing a crash cushion more than 2.5' in width; see * below.

*Number shown is the minimum number of panels plus a W-Thrie beam transition panel; single faced guardrail must have a length of five (5) or more panels.

### Sizing Crash Cushions Located on Opposite Roadway Shoulders

**Point of Impact Speed (S)** For Determining Crash Cushion Size:

\[ S = \frac{1}{C - D} \times \text{(Design Speed)} \]

**Speed (S')** For Installing Crash Cushions on Opposing Shoulder:

\[ S' = \frac{S}{C} \]

**Note:** The guardrail configurations shown apply only to parallel or near parallel bridges with open medians.
SEE INDEX NO. 471 - SCHEME 1

SEE INDEX NO. 471 - SCHEME 2

SEE INDEX NO. 471 - SCHEME 3

PARTIAL PLAN VIEWS OF GUARDRAIL APPROACH TRANSITIONS AND CONNECTIONS
FOR BRIDGE TRAFFIC RAILING (THRIE-BEAM RETROFIT)
PARTIAL PLAN VIEWS OF GUARDRAIL APPROACH TRANSITIONS AND CONNECTIONS FOR BRIDGE TRAFFIC RAILING (THRIE-BEAM RETROFIT)
PARTIAL PLAN VIEWS OF GUARDRAIL APPROACH TRANSITIONS AND CONNECTIONS FOR BRIDGE TRAFFIC RAILING (THRIE-BEAM RETROFIT)
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PICTORIAL VIEWS OF GUARDRAIL APPROACH TRANSITIONS AND CONNECTIONS FOR BRIDGE TRAFFIC RAILING (THRIE-BEAM RETROFIT)

- SEE INDEX NO. 471 - SCHEME 1
- SEE INDEX NO. 471 - SCHEME 2
- SEE INDEX NO. 471 - SCHEME 3

Nest beam transition block in absence of curb

Existing railing and pedestrian guardrail with post removed
Key post or angled wing post removed

Traffic railing (Thrie-beam retrofit)

Roadway guardrail transition

Nested W-beam

PICTORIAL VIEWS OF GUARDRAIL APPROACH TRANSITIONS AND CONNECTIONS FOR BRIDGE TRAFFIC RAILING (THRIE-BEAM RETROFIT)
PICTORIAL VIEWS OF GUARDRAIL APPROACH TRANSITIONS AND CONNECTIONS FOR BRIDGE TRAFFIC RAILING (THRIE-BEAM RETROFIT)
PICTORIAL VIEWS OF GUARDRAIL APPROACH
TRANSITIONS AND CONNECTIONS FOR BRIDGE
TRAFFIC RAILING (THRIE-BEAM RETROFIT)
SEE INDEX NO. 481 - SCHEME 1

SEE INDEX NO. 481 - SCHEME 2

SEE INDEX NO. 481 - SCHEME 3

PARTIAL PLAN VIEWS OF TRAFFIC RAILING (VERTICAL FACE RETROFIT)
PARTIAL PLAN VIEWS OF TRAFFIC RAILING (VERTICAL FACE RETROFIT)
(INDEX 482 SHOWN, INDEX 405 SIMILAR)

Note:
* 21" x 12" x 14' Thrie-Beam Connector Plate (Back-Up Plate), and 3/8" x 12" Long
  NS Hex Bolts And Nuts (5 Req'd.) With 25' OD Plain Round Washers Under Heads And Nuts

SEE INDEX NOS. 405 OR 482 - SCHEME 2

SEE INDEX NOS. 405 OR 482 - SCHEME 3
PARTIAL PLAN VIEWS OF TRAFFIC RAILING (VERTICAL FACE RETROFIT)
(INDEX 482 SHOWN, INDEX 405 SIMILAR)
**PARTIAL PLAN VIEWS OF TRAFFIC RAILING (VERTICAL FACE RETROFIT)**

Note:

"21" x 12" x 5/8" Thrie-Beam Terminal Connector Plate (Back-Up Plate), and 5/8" HS Hex Bolts And Nuts (12" Long For Scheme 1 And Length To Fit For Schemes 2 And 3/5 Req'd) With 27" OD Plain Round Washers Under Heads And Nuts

**SEE INDEX NO. 483 - SCHEME 1**

**SEE INDEX NO. 483 - SCHEME 2**

**SEE INDEX NO. 483 - SCHEME 3**

**GUARDRAIL TRANSITIONS AND CONNECTIONS FOR EXISTING BRIDGES**

**REVISION NO.**

**SHEET NO.**

**DESCRIPTION: FY 2017-18 DESIGN STANDARDS**

**INDEX NO. 402**

**NO. 15 of 24**
PICTORIAL VIEWS OF GUARDRAIL APPROACH TRANSITIONS AND CONNECTIONS FOR BRIDGE TRAFFIC RAILING (VERTICAL FACE RETROFIT)
PICTORIAL VIEWS OF GUARDRAIL APPROACH TRANSITIONS AND CONNECTIONS FOR BRIDGE TRAFFIC RAILING (VERTICAL FACE RETROFIT) (INDEX 482 SHOWN, INDEX 405 SIMILAR)

* Post Bolts At First Standard (3'-1"") Post Hole Location On Bridge (7" Min. From End of Bridge). Use #8-1/8 HS Hex Bolts And Nuts With 2" OD Plain Round Washers Under Heads And Nuts.
PICTORIAL VIEWS OF GUARDRAIL APPROACH TRANSITIONS AND CONNECTIONS FOR BRIDGE TRAFFIC RAILING (VERTICAL FACE RETROFIT)
(INDEX 482 SHOWN, INDEX 405 SIMILAR)
PICTORIAL VIEWS OF GUARDRAIL APPROACH TRANSITIONS AND CONNECTIONS FOR BRIDGE TRAFFIC RAILING (VERTICAL FACE RETROFIT)

- Use:\n  - 3/8" OD Plain Round Washers Under Heads And Nuts.
  - 3/8" Hex Bolts And Nuts

- Post Bolt Placement:
  - 2 1/2" Min. From End Of Bridge.
PICTORIAL VIEWS OF GUARDRAIL APPROACH TRANSITIONS AND CONNECTIONS FOR BRIDGE TRAFFIC RAILING (VERTICAL FACE RETROFIT)

See Index No. 483 - Scheme 3

*Post Bolts at First Standard (3'-1") Post Hole Location on Bridge
(7" Min. From End of Bridge). Use 7/16" HS Hex Bolts and Nuts
With 2½ OD Plain Round Washers Under Heads And Nuts.
GUARDRAIL TRAILING END ANCHORAGE IN ABSENCE OF OTHER HAZARDS

GUARDRAIL TRAILING END ANCHORAGE WHEN OTHER HAZARDS PRESENT

TRAILING END GUARDRAIL AND ANCHORAGE FOR BRIDGE TRAFFIC RAILING (THRIE BEAM RETROFITS)
GUARDRAIL TRANSITIONS TO EXISTING FLAT SLAB BRIDGES

SCHEME I

Use Of Scheme I Shall Be Determined In Accordance With The Instructions For Design Standards (IDS-402).

GUARDRAIL TRANSITION TO EXISTING FLAT SLAB BRIDGES

APPROACH POSTS AND SPECIAL OFFSET BLOCKS

1. When the guardrail attachment overlays the Bridge Number, Bridge Name or Date on the traffic railing, provide an aluminum sign panel with the obscured information. Attach the sign panel to the face of the traffic railing adjacent to the Three-Beam Terminal Connector with 1/8" x 1" long concrete screws or expansion anchors at each corner, as approved by the Engineer. The sign panel shall be a minimum 1/8" thick and meet the requirements of Specification Section 700 with a white background and 3" tall black letters and sized appropriately to contain the information required. The cost of the sign panel shall be included in the cost of the Guardrail Bridge Anchorage Assembly.

2. When retrofitting three-beam guardrail to existing wing posts or existing bridge safety shape traffic railing, attachment construction to be paid for under the contract unit price for Guardrail Bridge Anchorage Assembly, EA, and shall be full compensation for bolt hole construction, terminal connector, terminal connector plate(s) and bolts, nuts and washers.

NOTES FOR GUARDRAIL TRANSITIONS TO SAFETY SHAPE TRAFFIC RAILINGS ON EXISTING BRIDGES

GUARDRAIL APPROPRIATE TRANSITIONS AND CONNECTIONS FOR EXISTING FLAT SLAB, PRESTRESSED BEAM AND GIRDER BRIDGES WITH SAFETY SHAPE TRAFFIC RAILING EXTENDING LESS THAN FULL APPROACH SLAB LENGTH

PREVIOUS

\[21"x12"x9/16" Three-Beam Terminal Connector Plate (Back-Up Plate), and \(4\times2\times18" Long, 11.5" Long with 3½\" Min. Thread Length For Bridge Safety Shape Railing)\] M5 Hex Bolts And Nuts (5 Reqd). With 2½ OD Plain Round Washers Under Heads And Nuts. (When Attaching Guardrail To Existing Wing Posts Or Bridge Rails, Care Should Be Exercised To Avoid Damaging Conduits And Their Utilities That May Be Routed Through Wing Posts Or Bridge Rails. When Conduits And Their Utilities Are Encountered, At Least Five M5 Hex Bolts Shall Be Installed In Any Of The Seven Holes Provided In The Three-Beam Terminal Connector.)