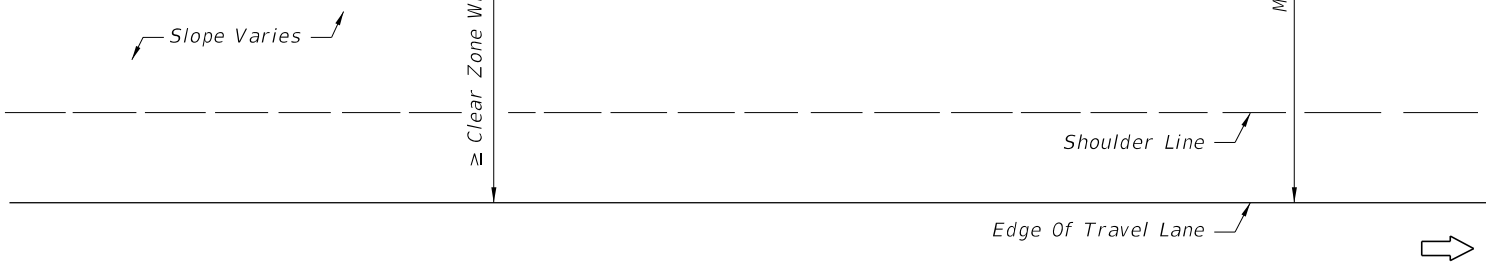
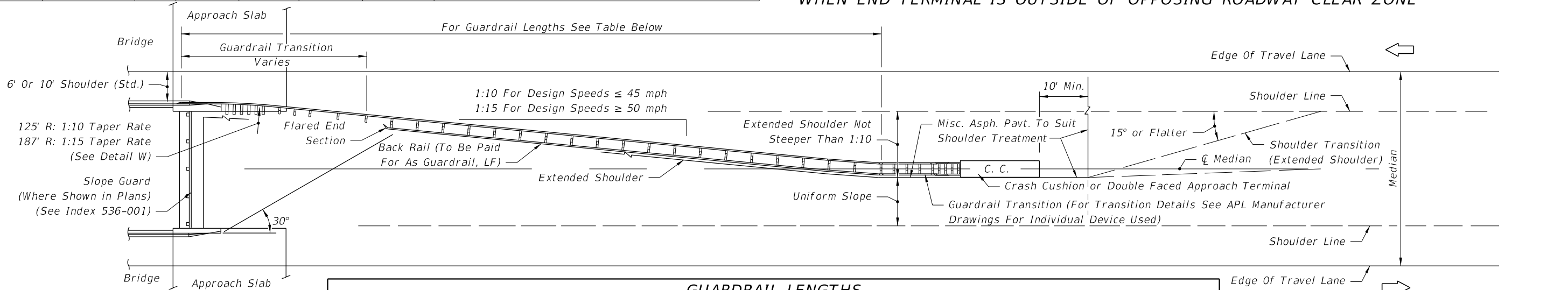


GUARDRAIL LENGTH (Ft.)							Notes: Lengths shown in the tables are based on Length of Advancement design and consider minimum median widths and clear zone widths for opposing travel lanes. Length of Advancement values are intended to better match existing conditions and layouts. Where a designer chooses to use the newer Length of Need process, the lengths shown in the tables may be superseded as detailed in the Plans. Lengths may also require adjustment for connection location on wing post or bridge traffic railing barrier, auxiliary lanes, skewed crossings, and other hazards if present.
Design Speed (mph)	Projected ADT	CZ (Ft.)	6' & 8' Rdwy. Shldr.		10' & 12' Rdwy. Shldr.		
			Min. Median Width	Guardrail Length	Min. Median Width	Guardrail Length	
60-70	≥ 1500	36	50	362.5	54	312.5	
60-70	< 1500	30	44	287.5	48	237.5	
55	≥ 1500	30	44	287.5	48	237.5	
55	< 1500	24	38	212.5	42	162.5	
45-50	≥ 1500	24	38	212.5	42	162.5	
45-50	< 1500	20	34	162.5	38	112.5	
45-50	Urban w/o Curb	24	38	212.5	42	162.5	
35-40	Urban w/o Curb	18	32	162.5	36	100.0	



Note: For Approach Terminals, see sheets elsewhere in this Index and the plans.  
**WHEN END TERMINAL IS OUTSIDE OF OPPOSING ROADWAY CLEAR ZONE**

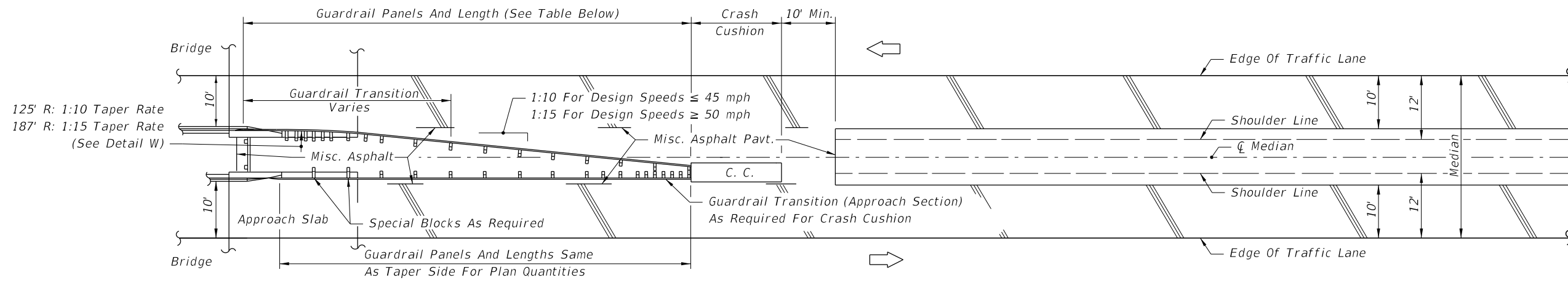


GUARDRAIL LENGTHS																
Median Width (ft.)	1:10 TAPER RATE								1:15 TAPER RATE							
	6' Bridge Shoulder				10' Bridge Shoulder				6' Bridge Shoulder				10' Bridge Shoulder			
	Panels (No.)		Length (Ft.)		Panels (No.)		Length (Ft.)		Panels (No.)		Length (Ft.)		Panels (No.)		Length (Ft.)	
	Front	Back	Total	Total	Front	Back	Total	Total	Front	Back	Total	Total	Front	Back	Total	Total
32	7.5	6	13.5	168.75	4.5	3	7.5	93.75	11.5	9	20.5	256.25	7.5	6	13.5	168.75
34	8.5	6	14.5	181.25	5.5	4	9.5	118.75	12.5	10	22.5	281.25	7.5	6	13.5	168.75
36	9.5	7	16.5	206.25	6.5	5	11.5	143.75	13.5	11	24.5	306.25	8.5	7	15.5	193.75
38	10.5	8	18.5	231.25	7.5	6	13.5	168.75	14.5	12	26.5	331.25	10.5	9	19.5	243.75
40	10.5	8	18.5	231.25	7.5	6	13.5	168.75	16.5	13	29.5	368.75	11.5	9	20.5	256.25
42	11.5	8	19.5	243.75	8.5	6	14.5	181.25	17.5	14	31.5	393.75	12.5	10	22.5	281.25
44	12.5	9	21.5	268.75	9.5	7	16.5	206.25	18.5	15	33.5	418.75	13.5	11	24.5	306.25
46	12.5	9	21.5	268.75	10.5	8	18.5	231.25	19.5	16	35.5	443.75	14.5	12	26.5	331.25
48	14.5	11	25.5	318.75	11.5	9	20.5	256.25	20.5	16	36.5	456.25	16.5	13	29.5	368.75

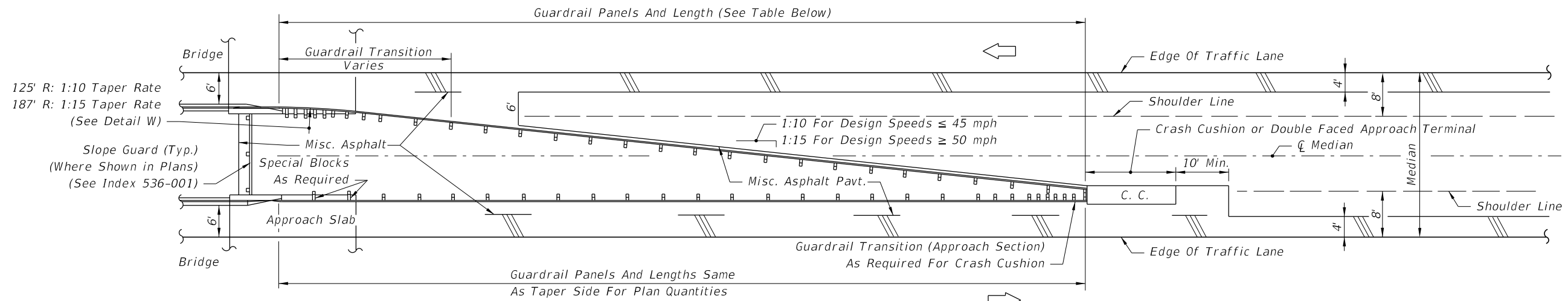
The lengths shown on this table are typical for roadways with standard width shoulders and a relocated connection to the existing wing post. Length requirements shall be determined on a site specific basis for both standard width and narrow bridge shoulders and for end anchorage or end shielding use. See design notes in above table.

**WHEN END TERMINAL CANNOT BE LOCATED OUTSIDE OF OPPOSING ROADWAY CLEAR ZONE**  
**APPROACH GUARDRAIL TREATMENTS FOR BRIDGES WITH CONCRETE TRAFFIC RAILING**  
**EXTENDING LESS THAN FULL APPROACH SLAB LENGTH IN WIDE MEDIANS WITH FLUSH SHOULDERS**

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**MEDIANS WITH 10' BRIDGE SHOULDERS**



**MEDIANS WITH 6' BRIDGE SHOULDERS**

Note: The guardrail configurations shown apply only to parallel or near parallel bridges with open medians.

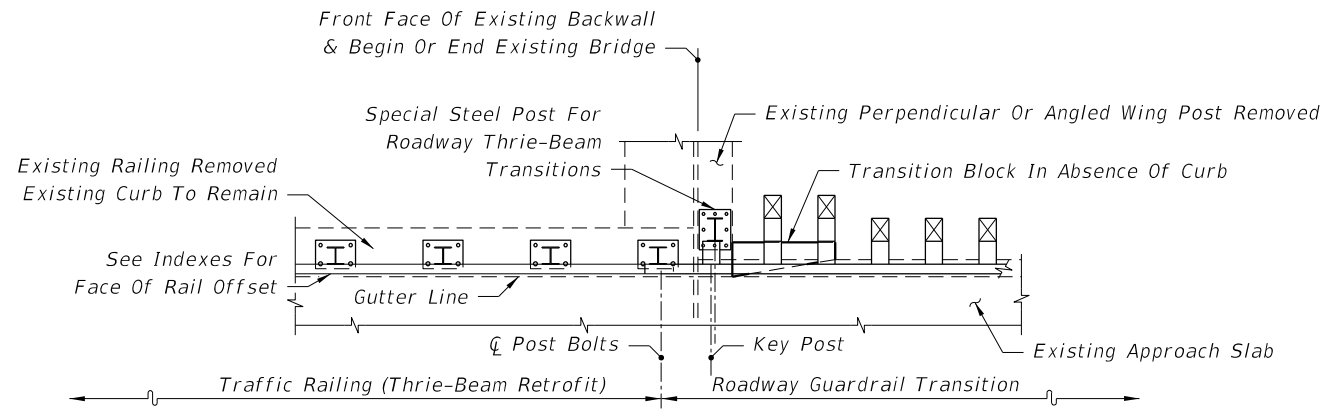
GUARDRAIL LENGTHS								
MEDIAN WIDTH (Ft.)	6' BRIDGE SHOULDERS				10' BRIDGE SHOULDERS			
	1:10 TAPER RATE		1:15 TAPER RATE		1:10 TAPER RATE		1:15 TAPER RATE	
	PANELS (No.)	LENGTH (Ft.)	PANELS (No.)	LENGTH (Ft.)	PANELS (No.)	LENGTH (Ft.)	PANELS (No.)	LENGTH (Ft.)
30	12.5	156.25	18.5	231.25	6.5	81.25	9.5	118.75
28	11.5	143.75	16.5	206.25	5.5	68.75	7.5	93.75
26	9.5	118.75	14.5	181.25	5.5*	68.75	5.5*	68.75
24	8.5	106.25	11.5	143.75	5.5*	68.75	5.5*	68.75

The lengths shown in this table are based on standard widths for roadway and bridge median shoulders. Length requirements for both standard width and narrow bridge shoulders and end anchorage or end shielding requirements shall be determined on a site specific basis. The number of panels may be reduced when installing a crash cushion more than 2.5' in width; see \* below.

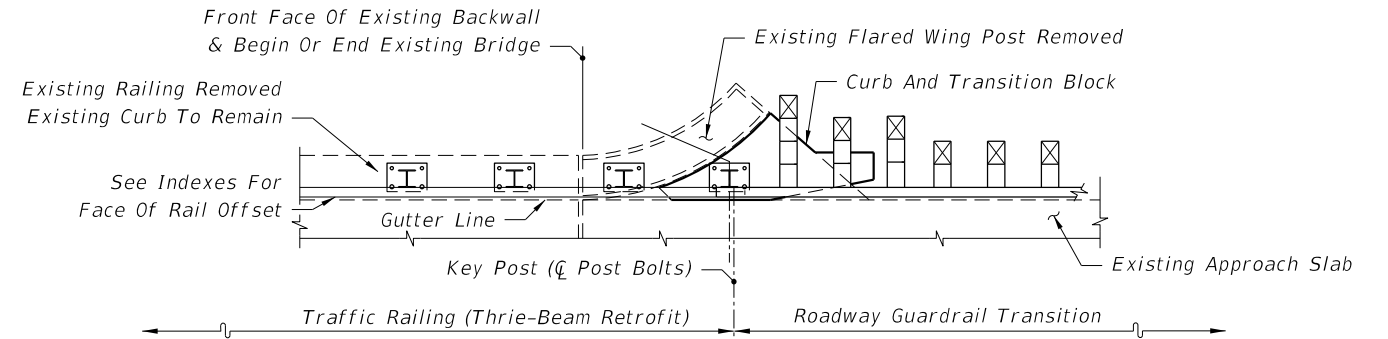
\*Number shown is the minimum number of panels plus a W-Three beam transition panel; single faced guardrail must have a length of five (5) or more panels.

**APPROACH GUARDRAIL TREATMENTS FOR BRIDGES WITH CONCRETE TRAFFIC RAILING  
EXTENDING LESS THAN FULL APPROACH SLAB LENGTH IN NARROW MEDIANS WITH FLUSH SHOULDERS**

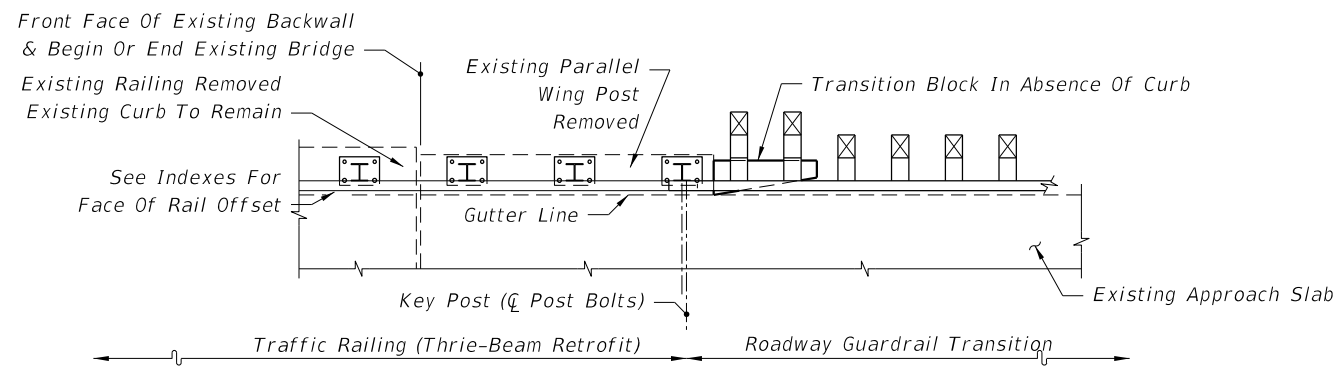
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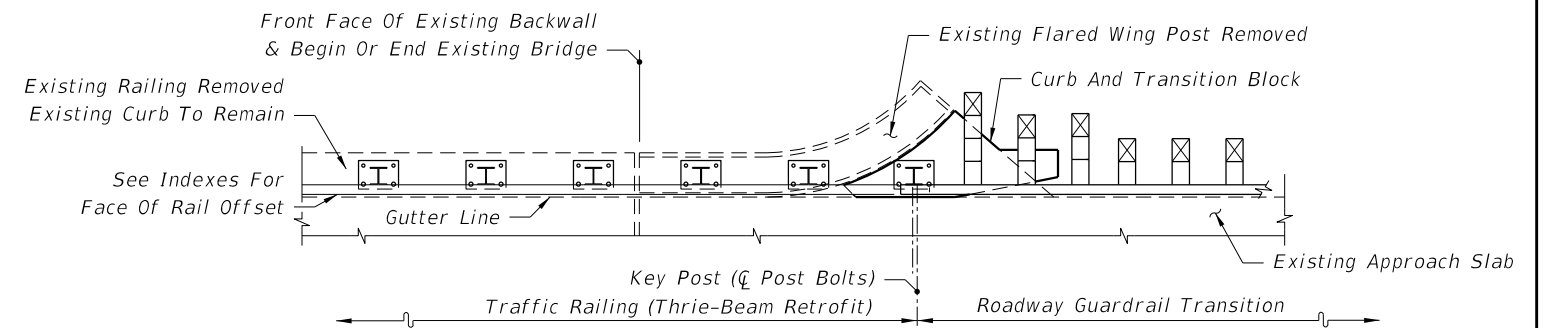
SEE INDEX 460-471 - SCHEME 1



SEE INDEX 460-471 - SCHEME 3




SEE INDEX 460-471 - SCHEME 2

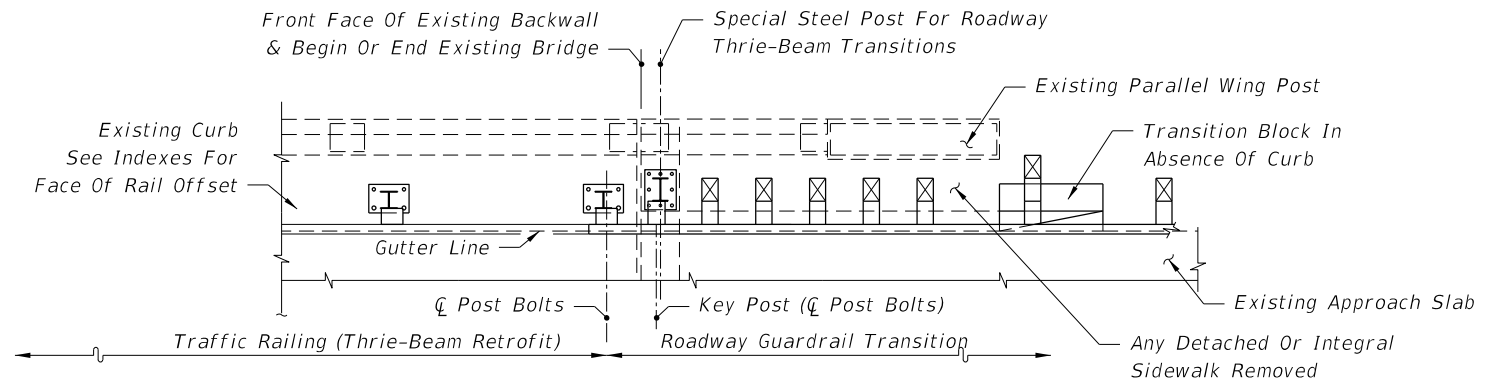


SEE INDEX 460-471 - SCHEME 3

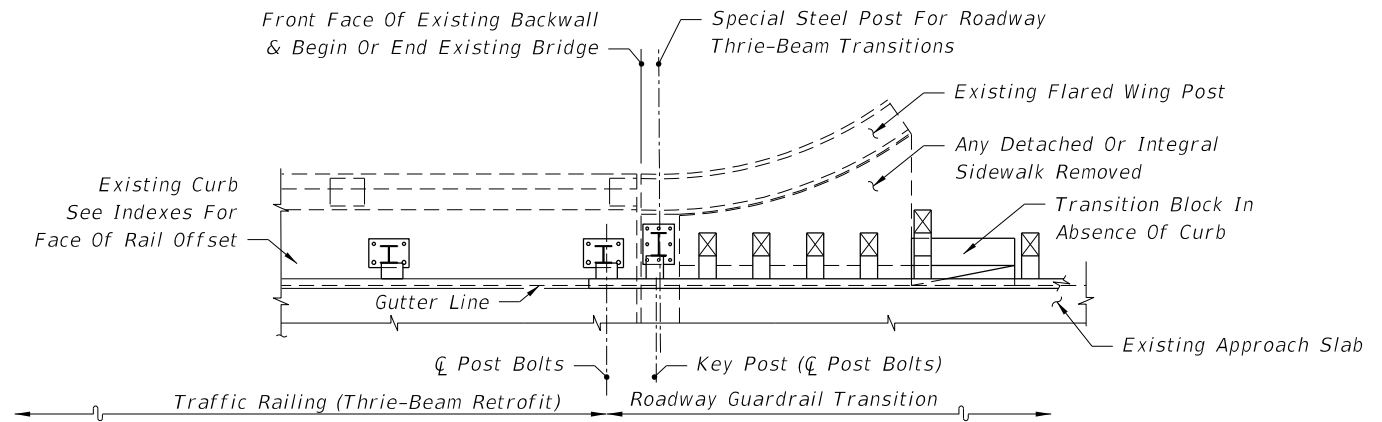
PARTIAL PLAN VIEWS OF GUARDRAIL APPROACH TRANSITIONS AND CONNECTIONS  
FOR BRIDGE TRAFFIC RAILING (THRIE-BEAM RETROFIT)

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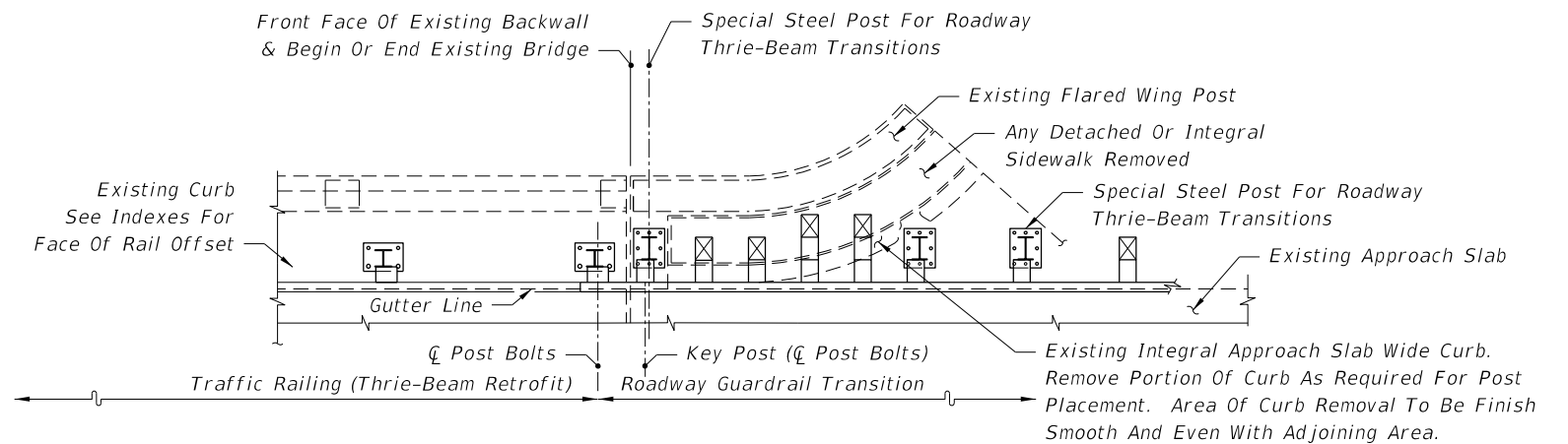
LAST REVISION 11/01/19	REVISION DESCRIPTION:	 FY 2023-24 STANDARD PLANS	GUARDRAIL TRANSITIONS AND CONNECTIONS FOR EXISTING BRIDGES	INDEX 536-002	SHEET 5 of 28
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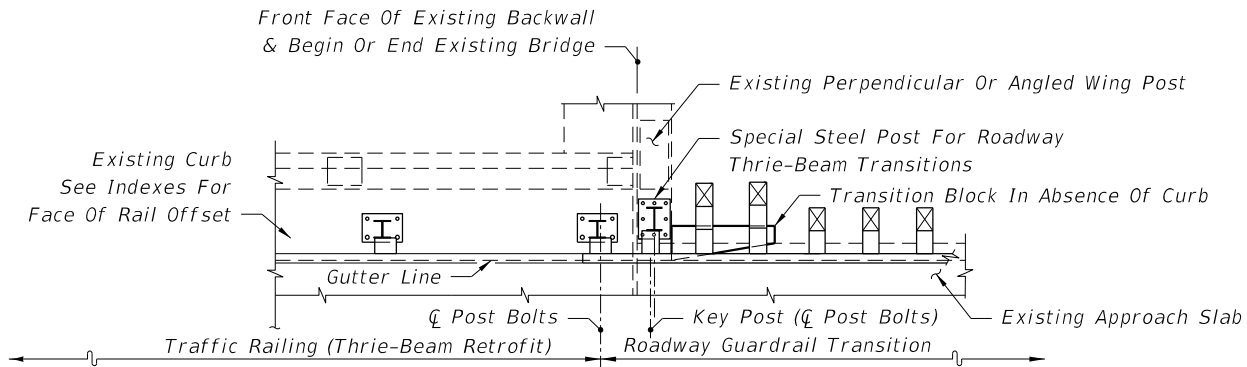
SEE INDEXES 460-472 & 460-475 - SCHEME 2



SEE INDEXES 460-472 & 460-475 - SCHEME 2




SEE INDEXES 460-472 & 460-475 - SCHEME 2

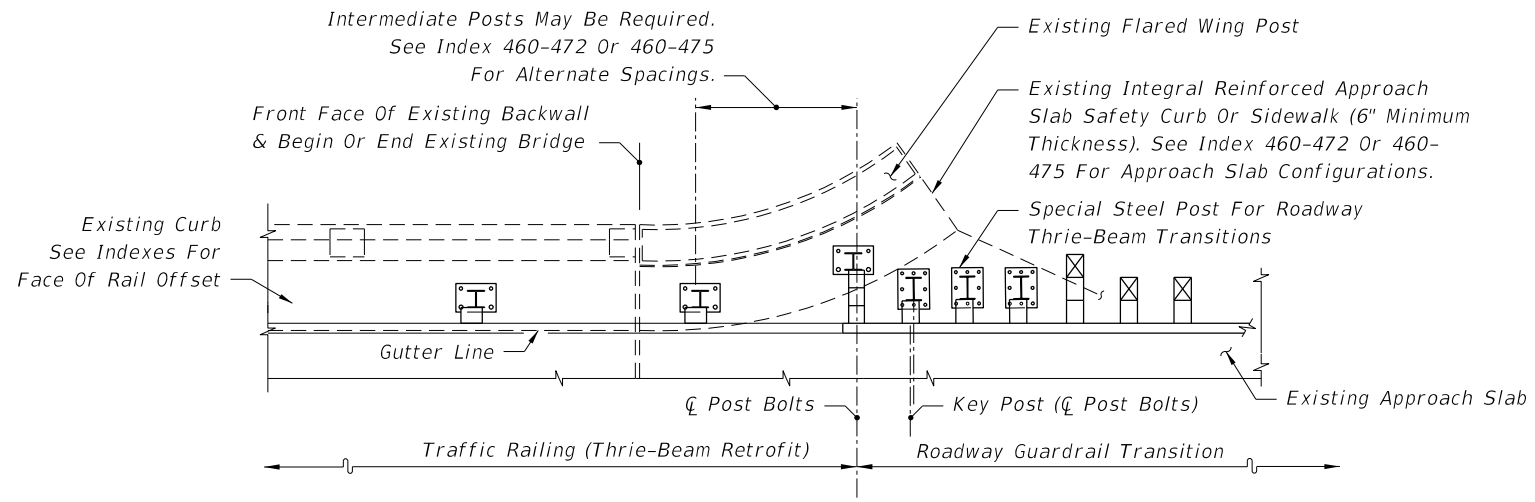


SEE INDEXES 460-472 & 460-475 - SCHEME 1

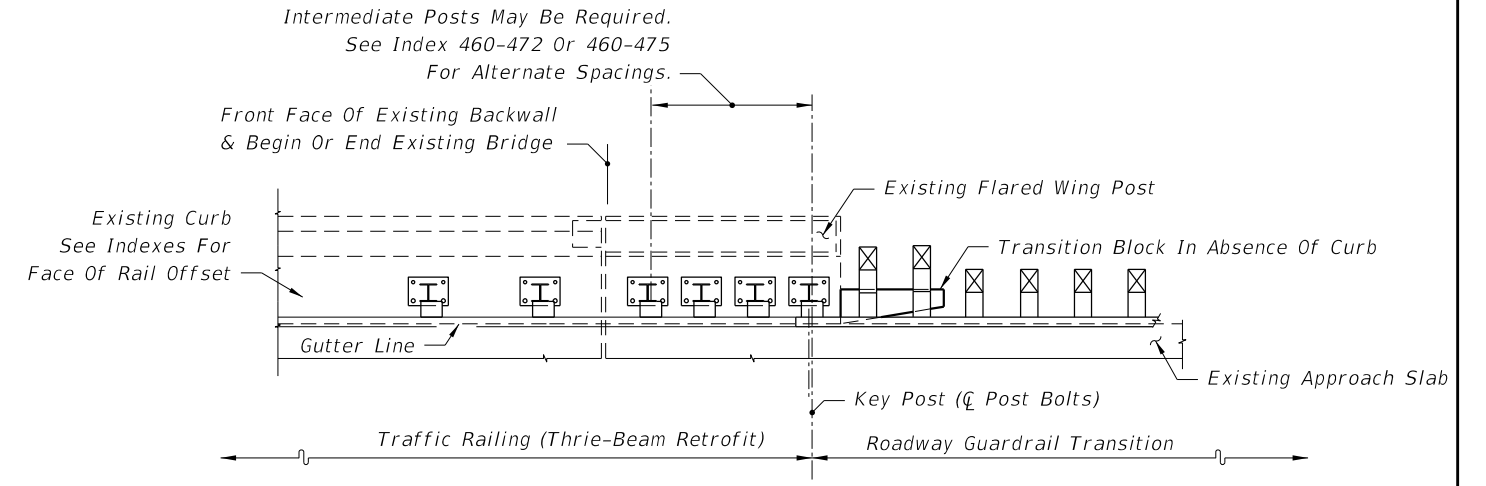
PARTIAL PLAN VIEWS OF GUARDRAIL APPROACH TRANSITIONS AND CONNECTIONS  
FOR BRIDGE TRAFFIC RAILING (THRIE-BEAM RETROFIT)

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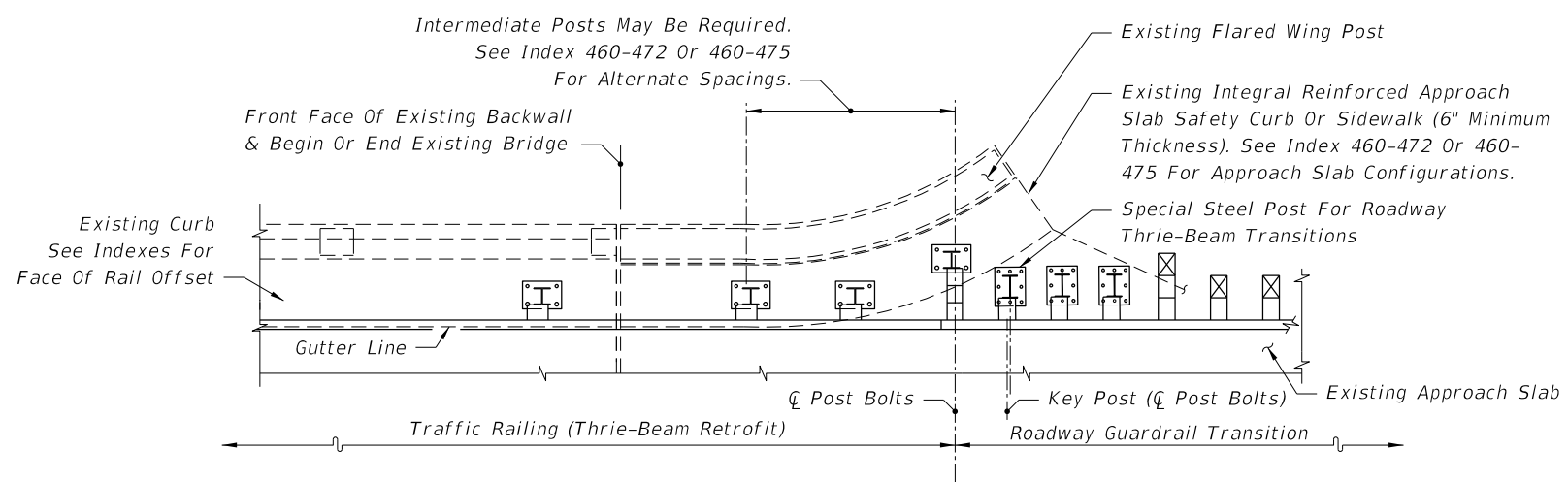
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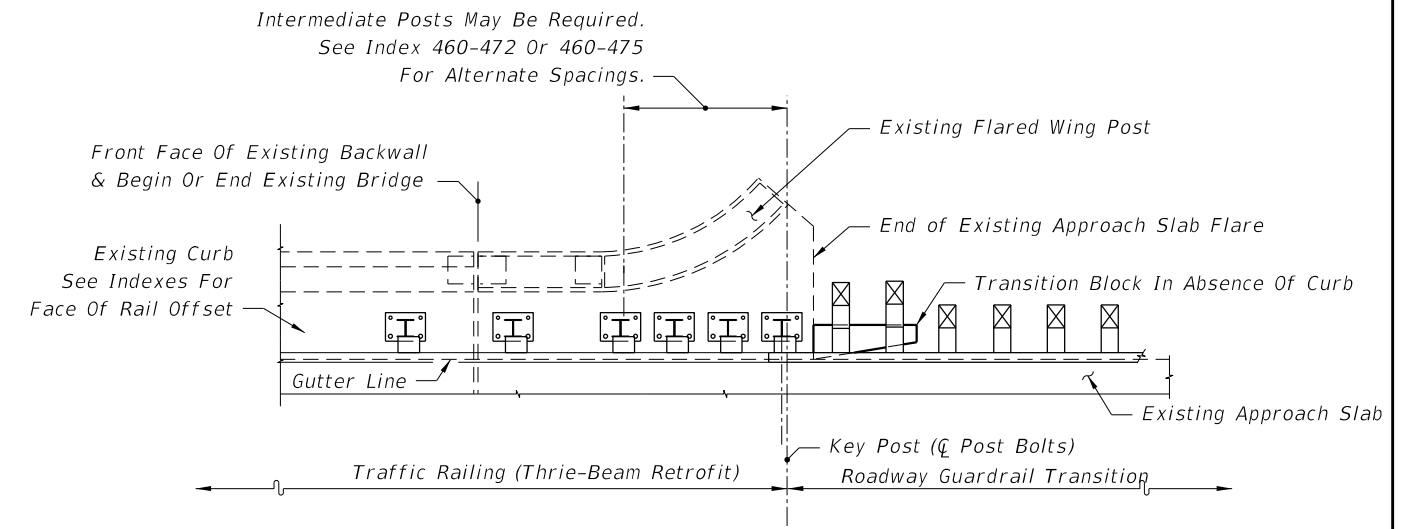
SEE INDEXES 460-472 & 460-475 - SCHEMES 3 & 4



SEE INDEXES 460-472 & 460-475 - SCHEMES 5 & 6




SEE INDEXES 460-472 & 460-475 - SCHEMES 3 & 4

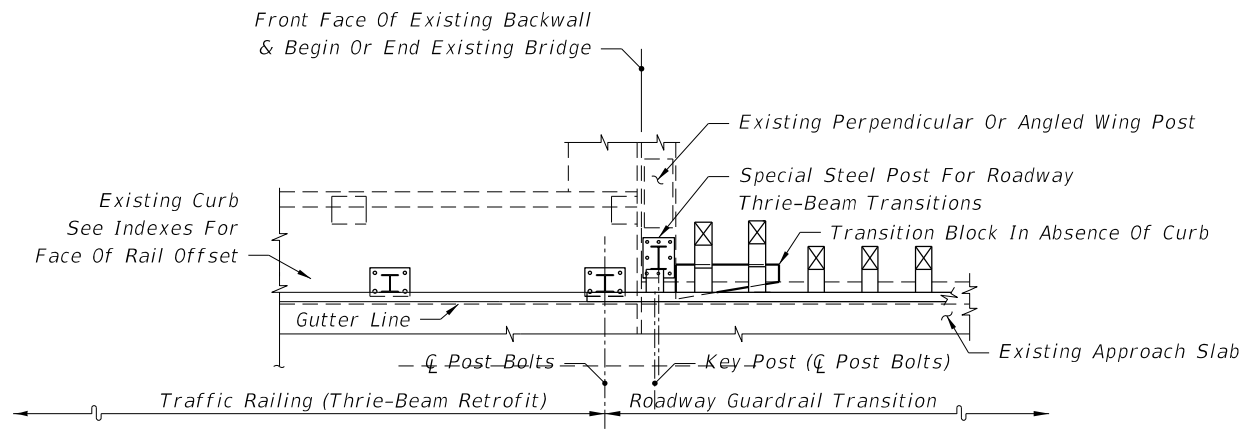


SEE INDEXES 460-472 & 460-475 - SCHEMES 5 & 6

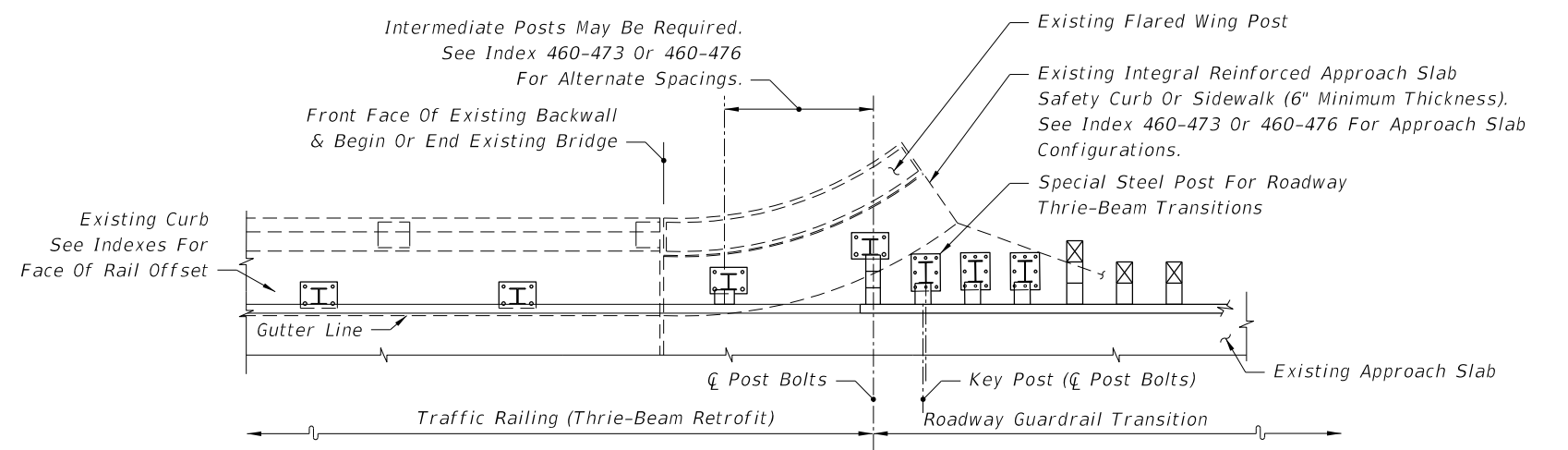
PARTIAL PLAN VIEWS OF GUARDRAIL APPROACH TRANSITIONS AND CONNECTIONS FOR BRIDGE TRAFFIC RAILING (THRIE-BEAM RETROFIT)

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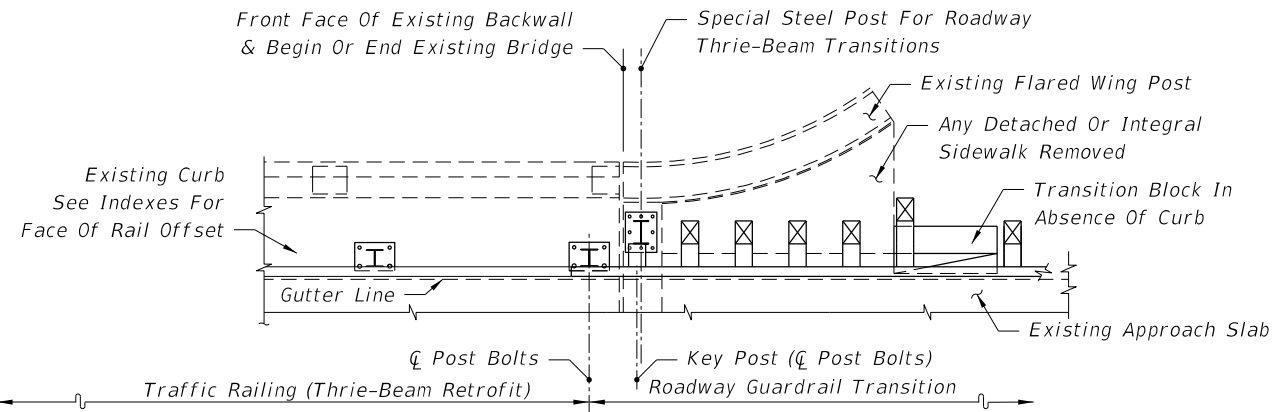
LAST REVISION 11/01/19	REVISION DESCRIPTION:	 FY 2023-24 STANDARD PLANS	GUARDRAIL TRANSITIONS AND CONNECTIONS FOR EXISTING BRIDGES	INDEX 536-002	SHEET 7 of 28
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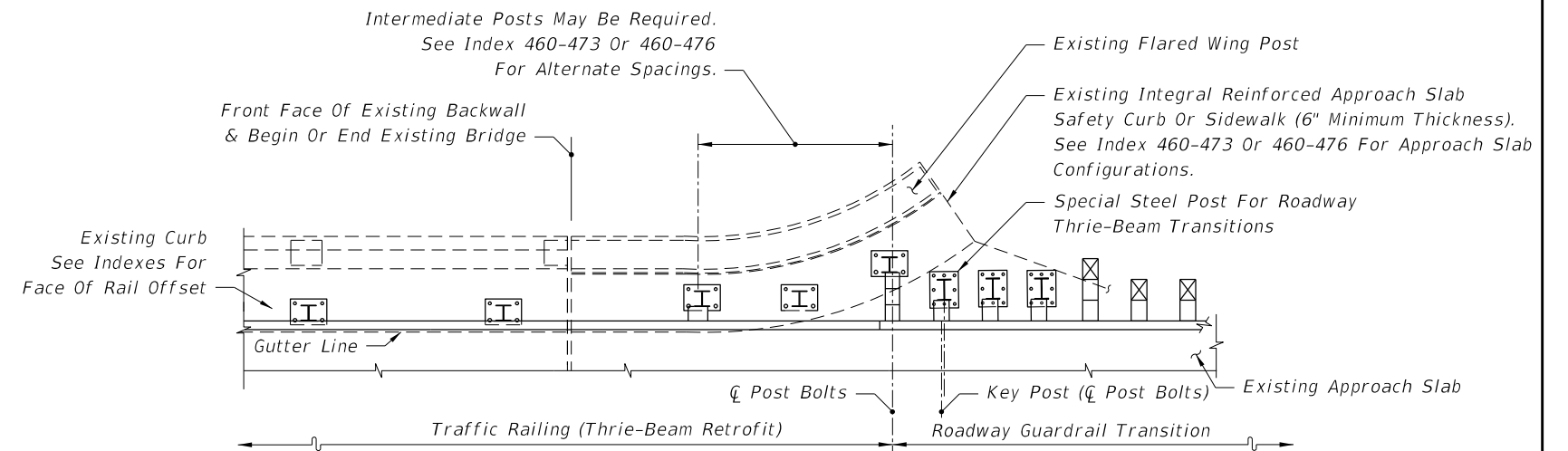
SEE INDEXES 460-473 & 460-476 - SCHEME 1



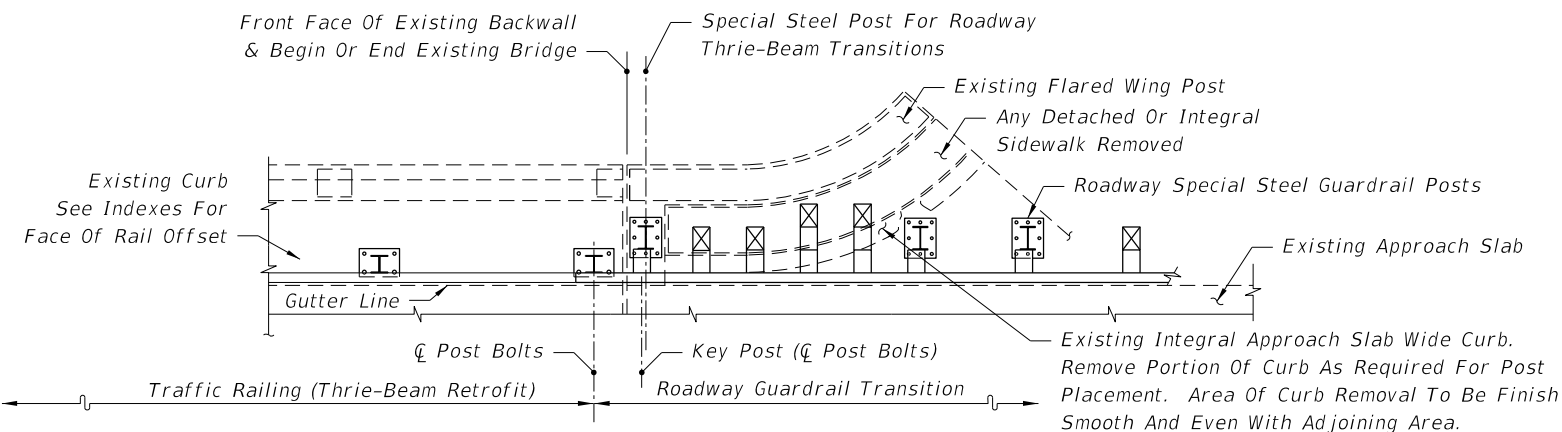
SEE INDEXES 460-473 & 460-476 - SCHEMES 3 & 4



SEE INDEXES 460-473 & 460-476 - SCHEME 2




SEE INDEXES 460-473 & 460-476 - SCHEMES 3 & 4



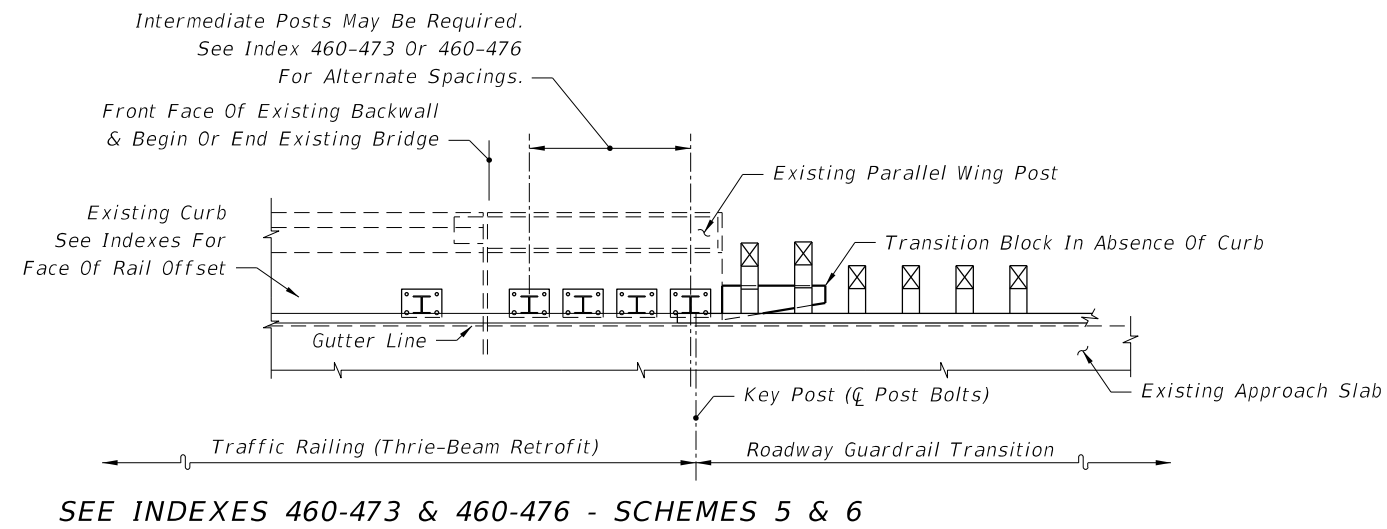
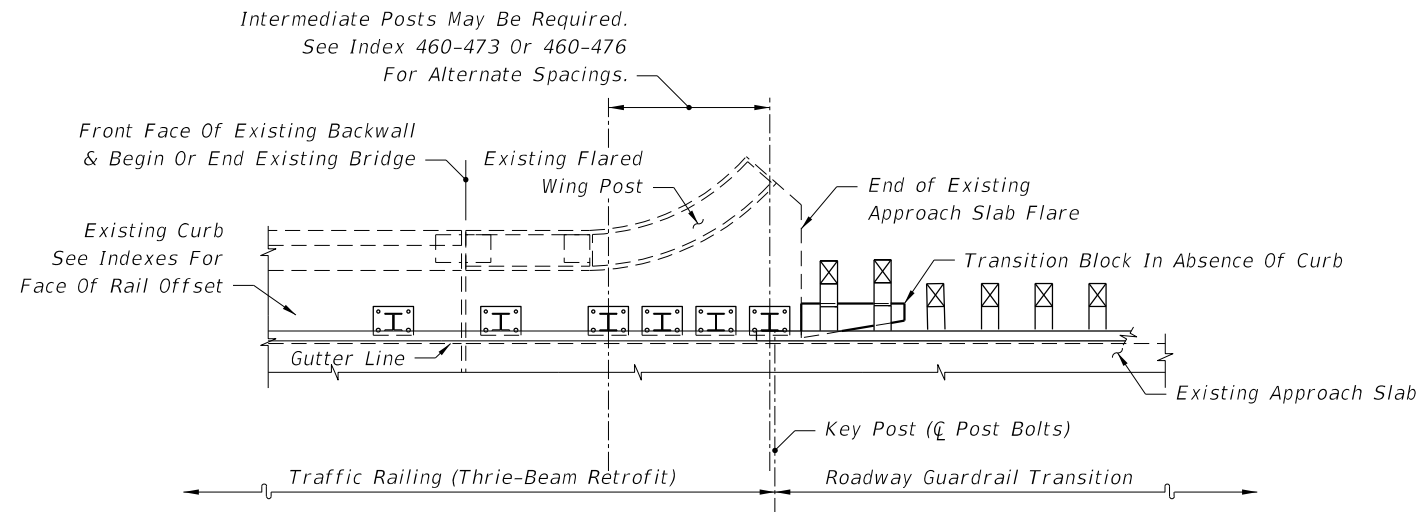
SEE INDEXES 460-473 & 460-476 - SCHEME 2

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

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LAST REVISION 11/01/19	REVISION DESCRIPTION:	 FY 2023-24 STANDARD PLANS	GUARDRAIL TRANSITIONS AND CONNECTIONS FOR EXISTING BRIDGES	INDEX 536-002	SHEET 8 of 28
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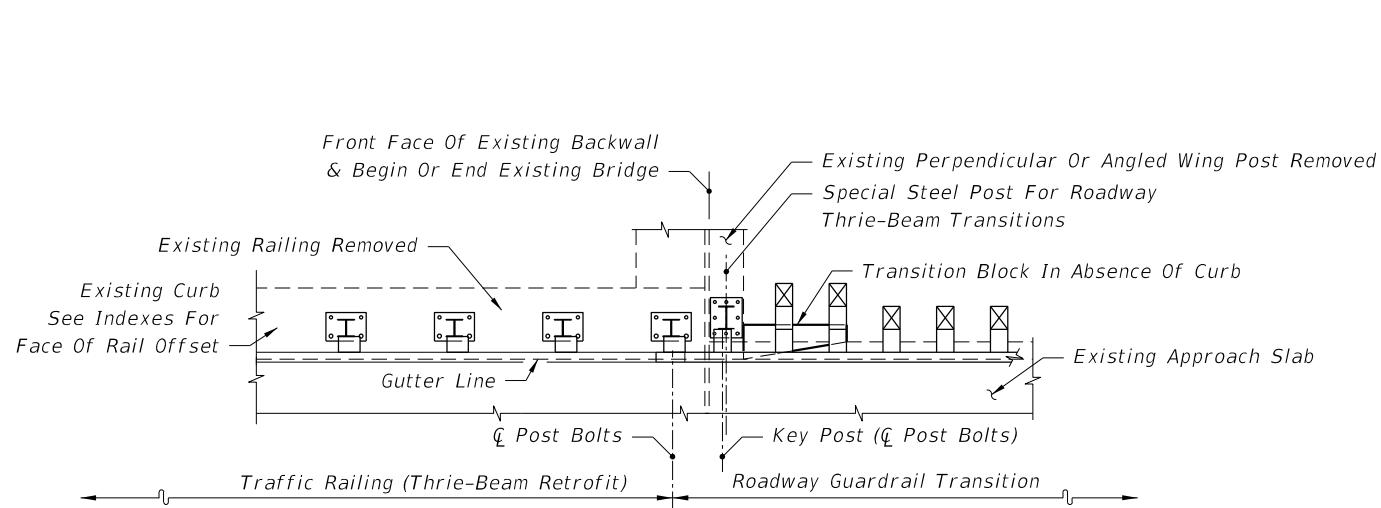




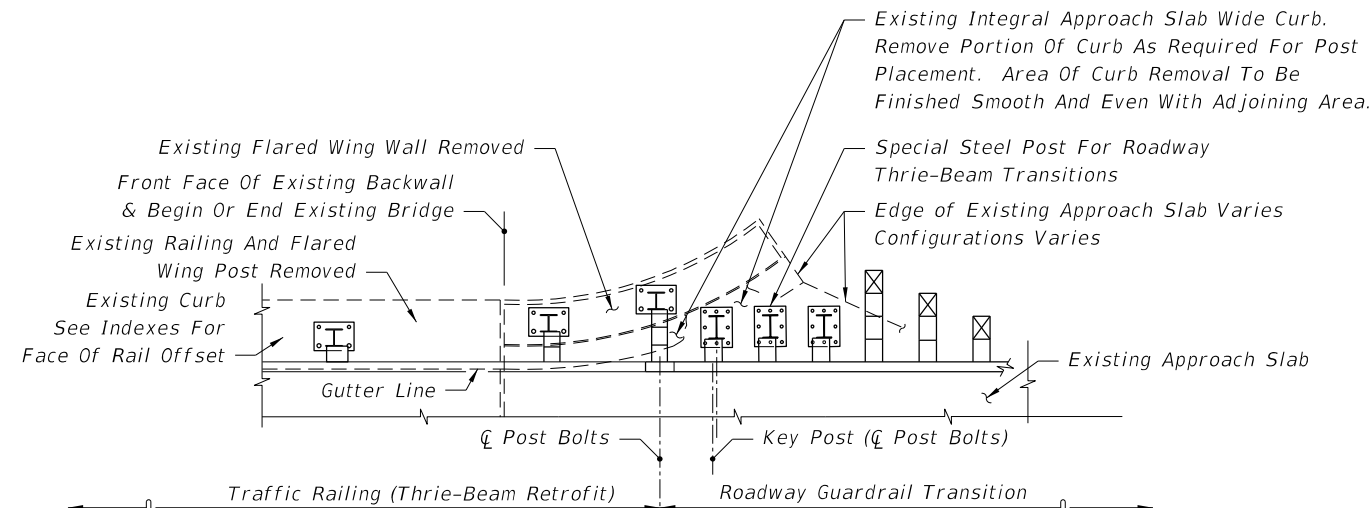
**PARTIAL PLAN VIEWS OF GUARDRAIL APPROACH TRANSITIONS AND CONNECTIONS  
FOR BRIDGE TRAFFIC RAILING (THRIE-BEAM RETROFIT)**

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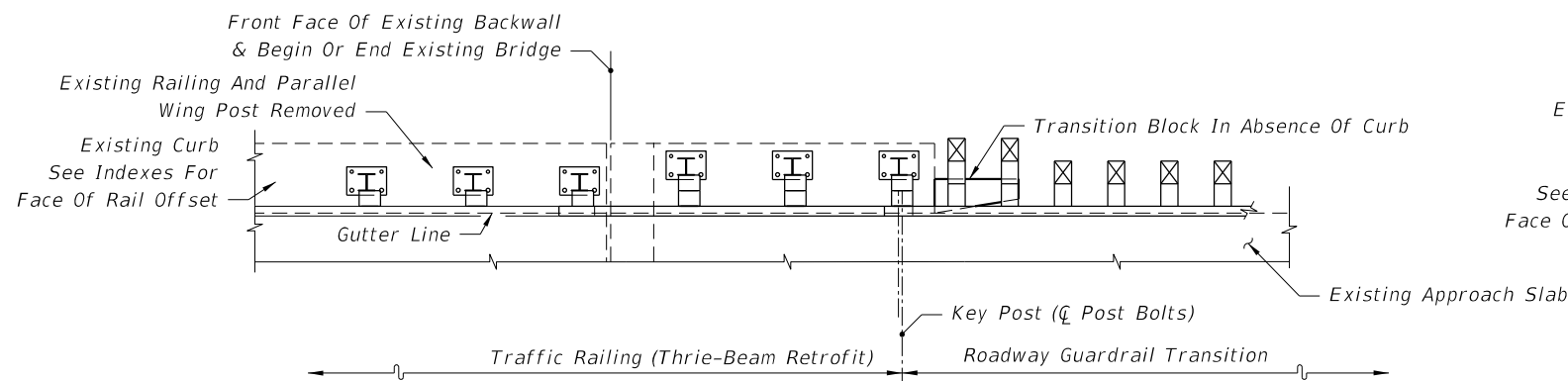
LAST REVISION 11/01/19	REVISION DESCRIPTION:	 FY 2023-24 STANDARD PLANS	GUARDRAIL TRANSITIONS AND CONNECTIONS FOR EXISTING BRIDGES	INDEX 536-002	SHEET 9 of 28
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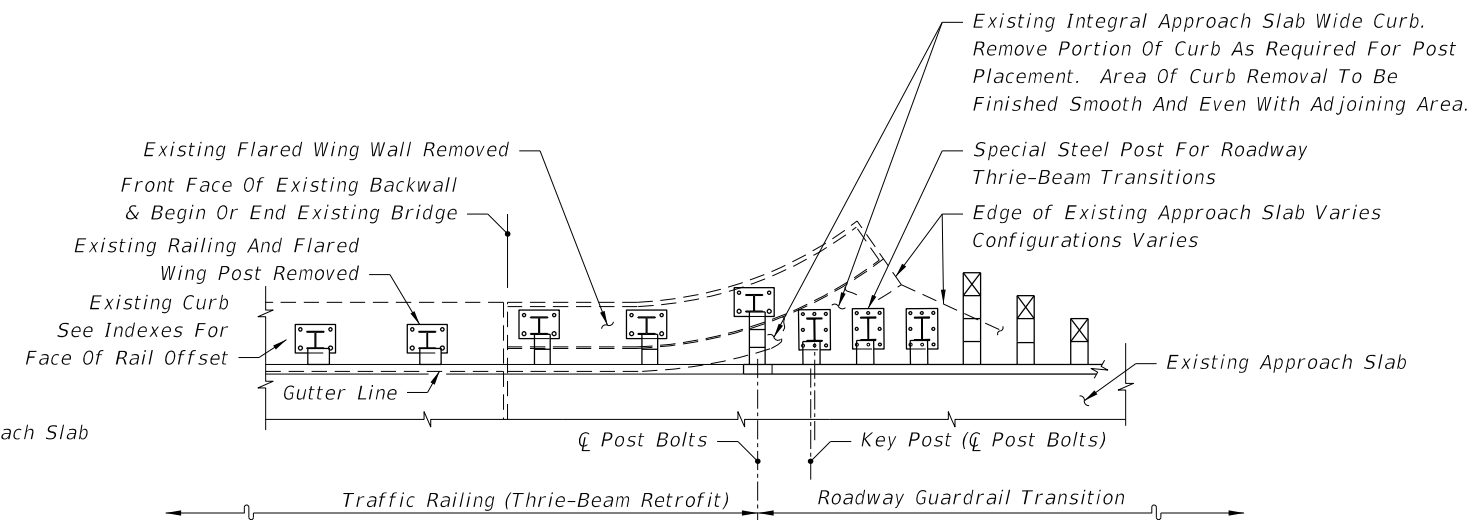
SEE INDEX 460-474 - SCHEME 1



SEE INDEX 460-474 - SCHEME 3




SEE INDEX 460-474 - SCHEME 2

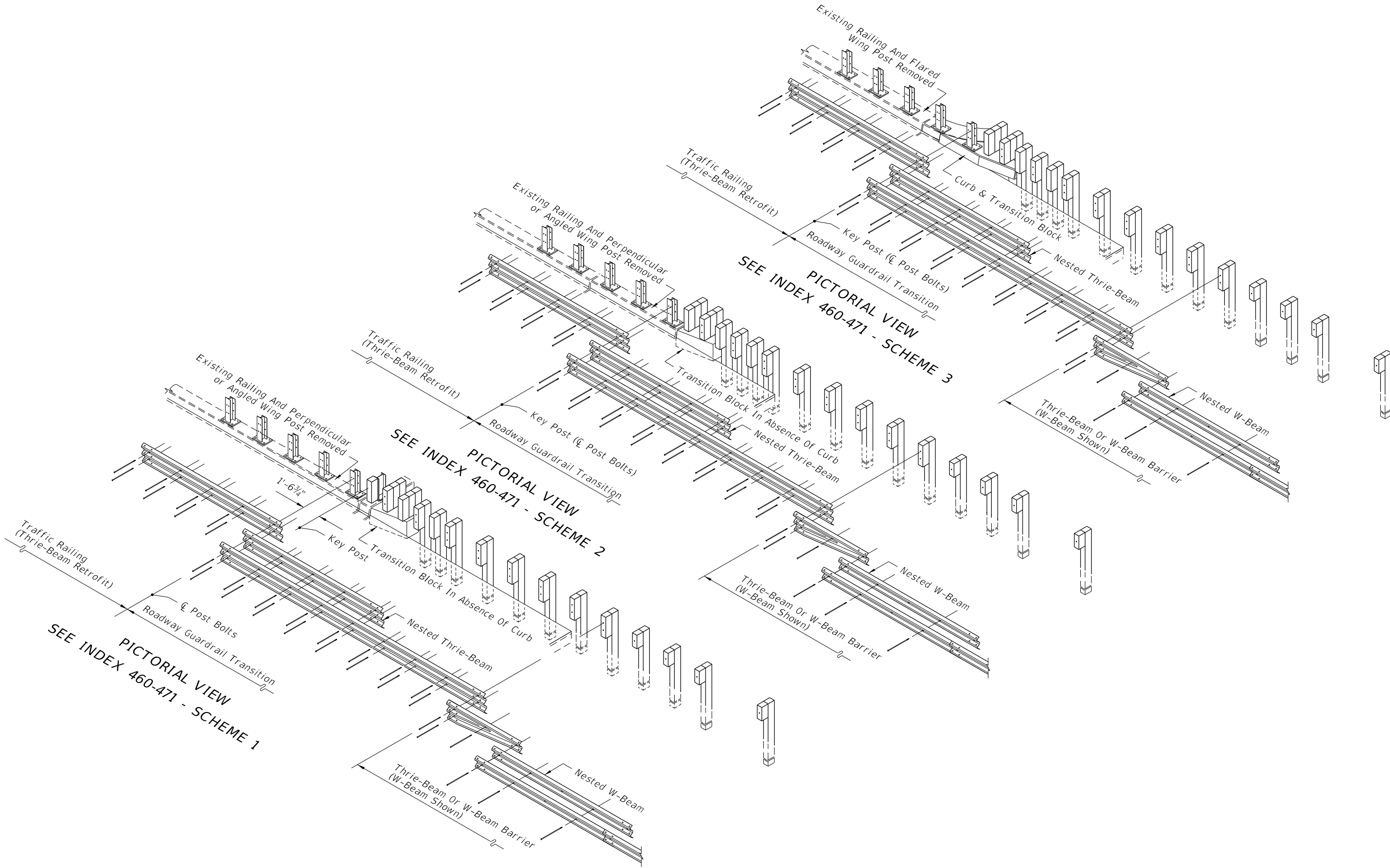


SEE INDEX 460-474 - SCHEME 3

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

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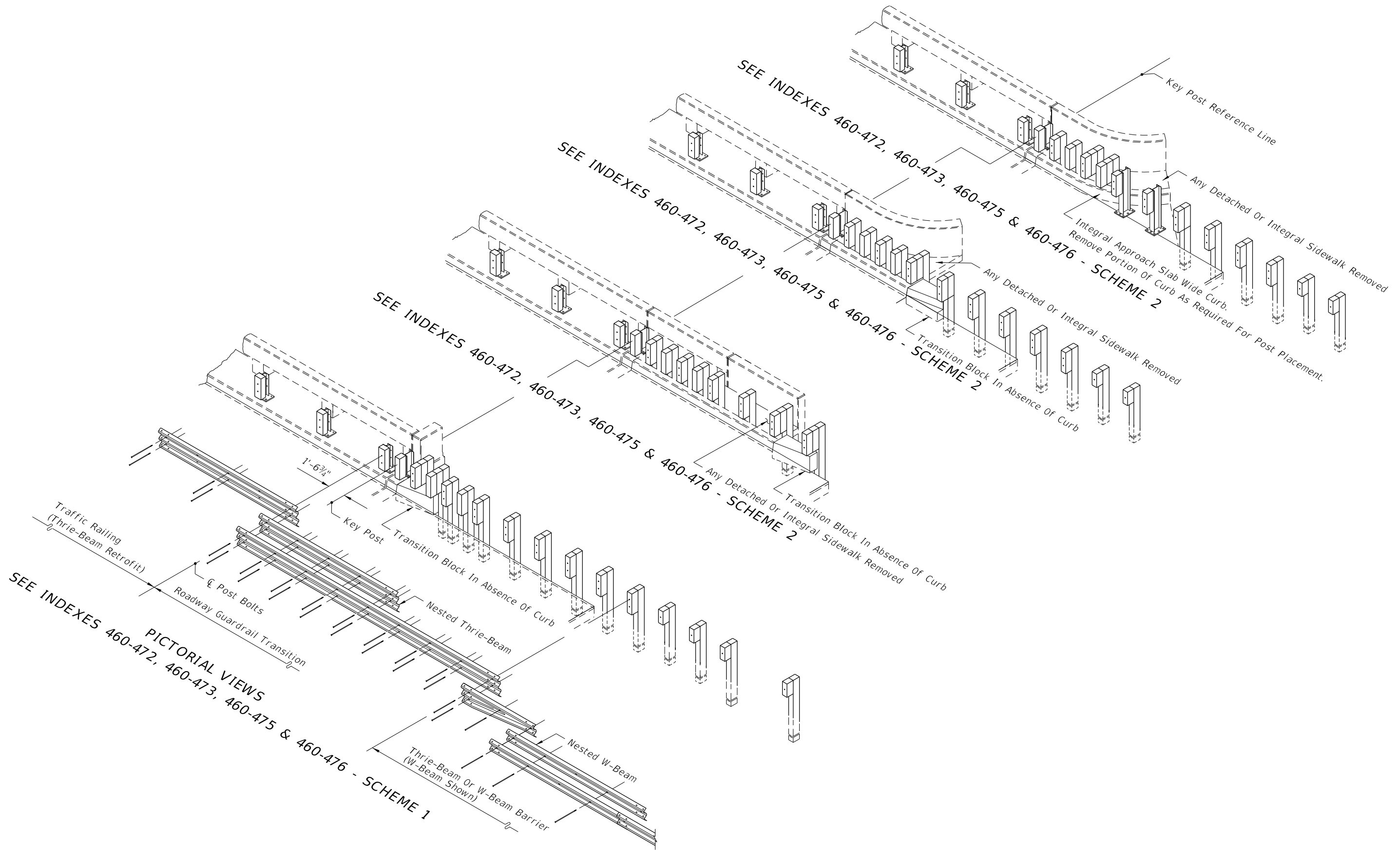
LAST REVISION 11/01/19	REVISION DESCRIPTION:	 FY 2023-24 STANDARD PLANS	GUARDRAIL TRANSITIONS AND CONNECTIONS FOR EXISTING BRIDGES	INDEX 536-002	SHEET 10 of 28
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PICTORIAL VIEWS OF GUARDRAIL APPROACH TRANSITIONS AND CONNECTIONS FOR BRIDGE TRAFFIC RAILING (THRIE-BEAM RETROFIT)


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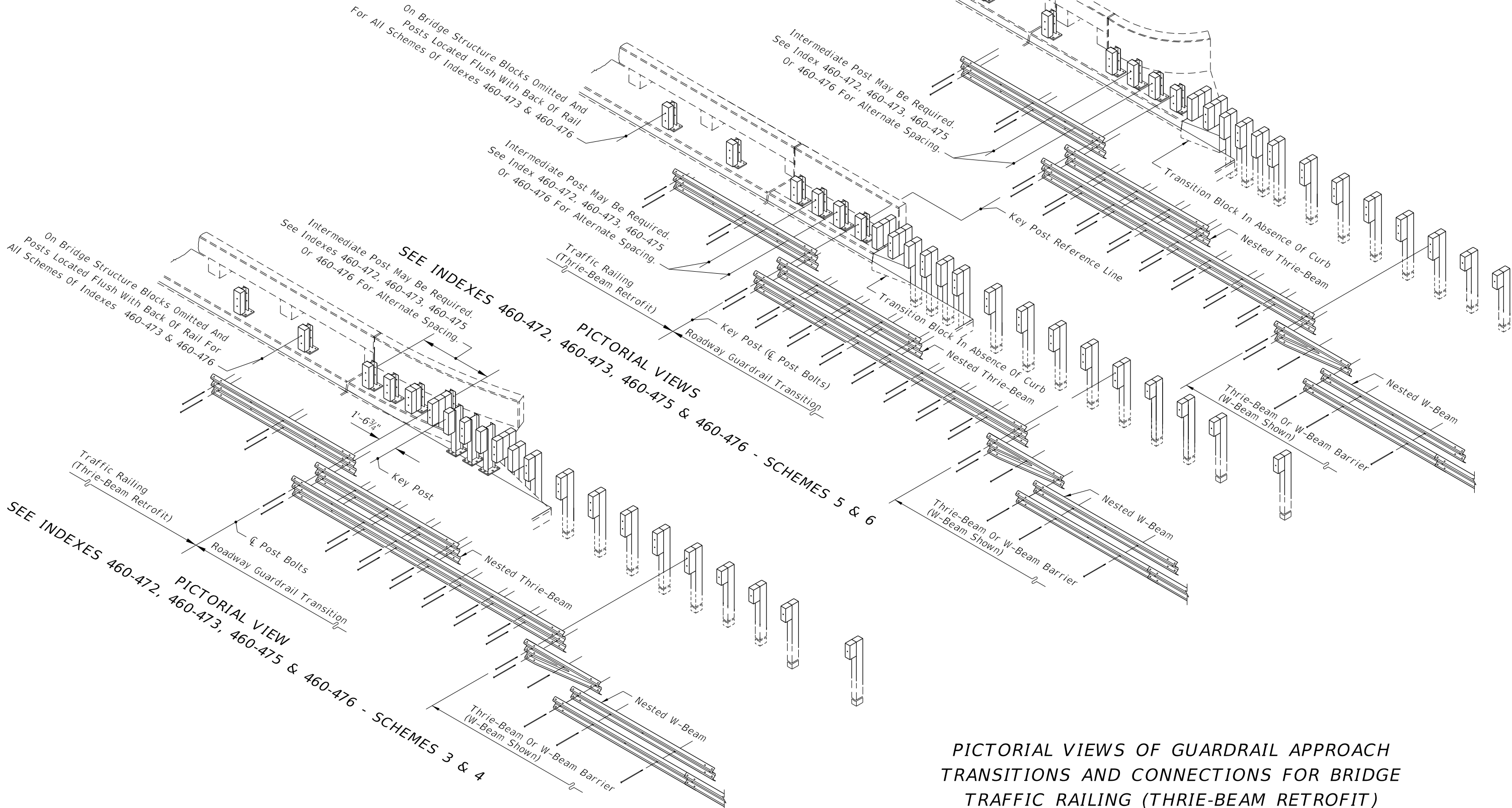
LAST REVISION 11/01/19	REVISION DESCRIPTION:	 FY 2023-24 STANDARD PLANS	GUARDRAIL TRANSITIONS AND CONNECTIONS FOR EXISTING BRIDGES	INDEX 536-002	SHEET 11 of 28
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PICTORIAL VIEWS OF GUARDRAIL APPROACH TRANSITIONS AND CONNECTIONS FOR BRIDGE TRAFFIC RAILING (THRIE-BEAM RETROFIT)


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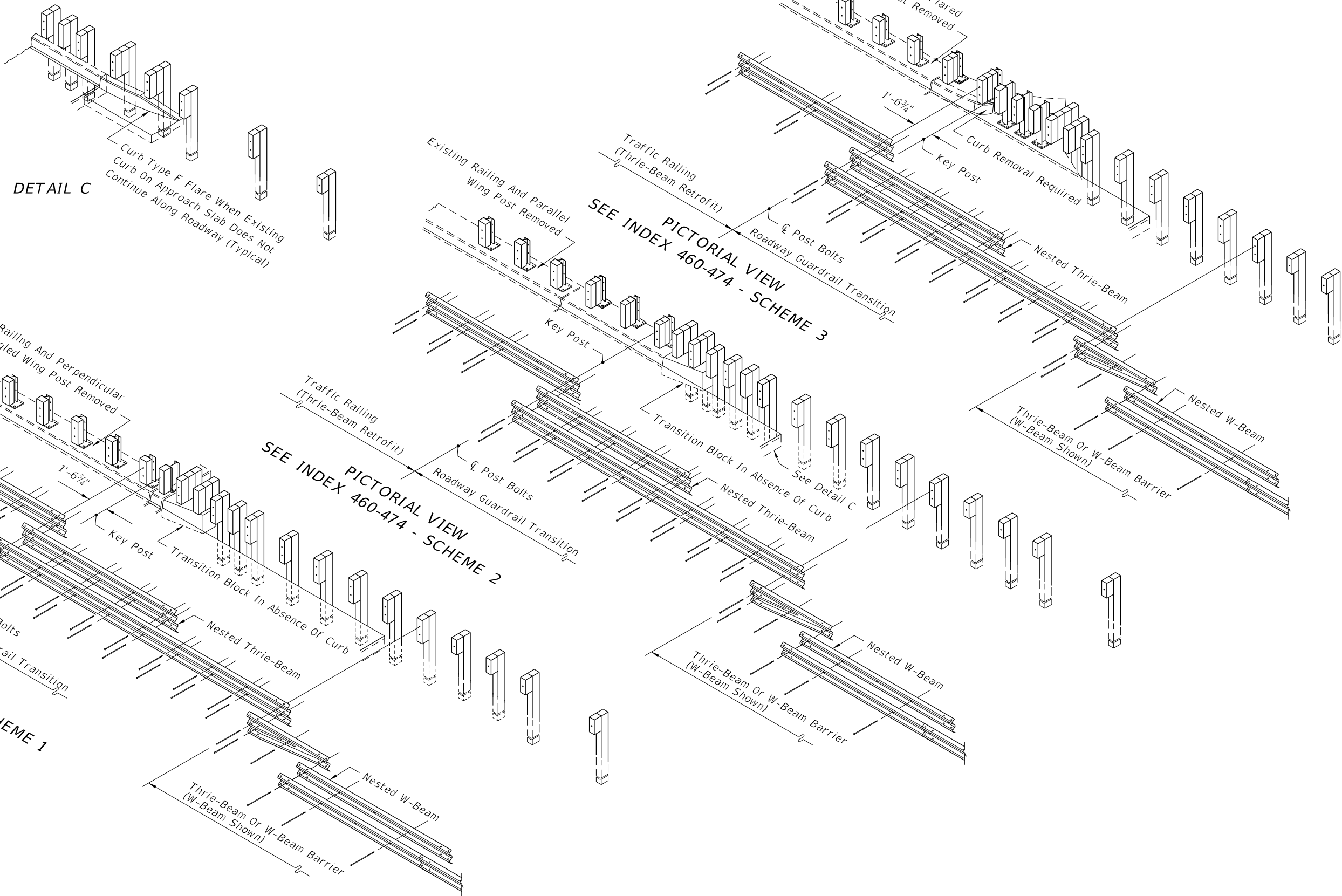
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PICTORIAL VIEWS OF GUARDRAIL APPROACH TRANSITIONS AND CONNECTIONS FOR BRIDGE TRAFFIC RAILING (THRIE-BEAM RETROFIT)

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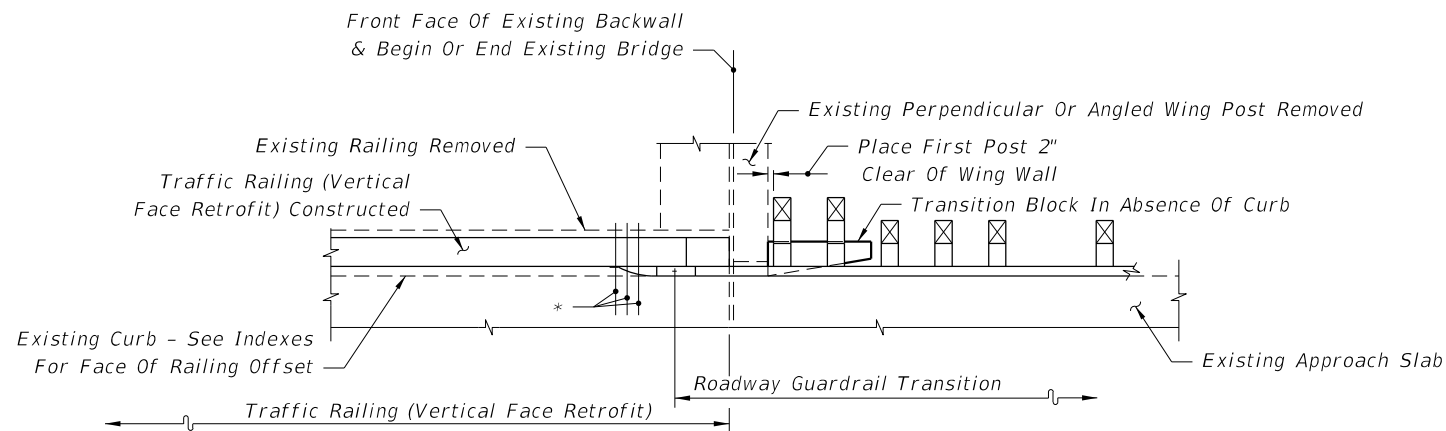
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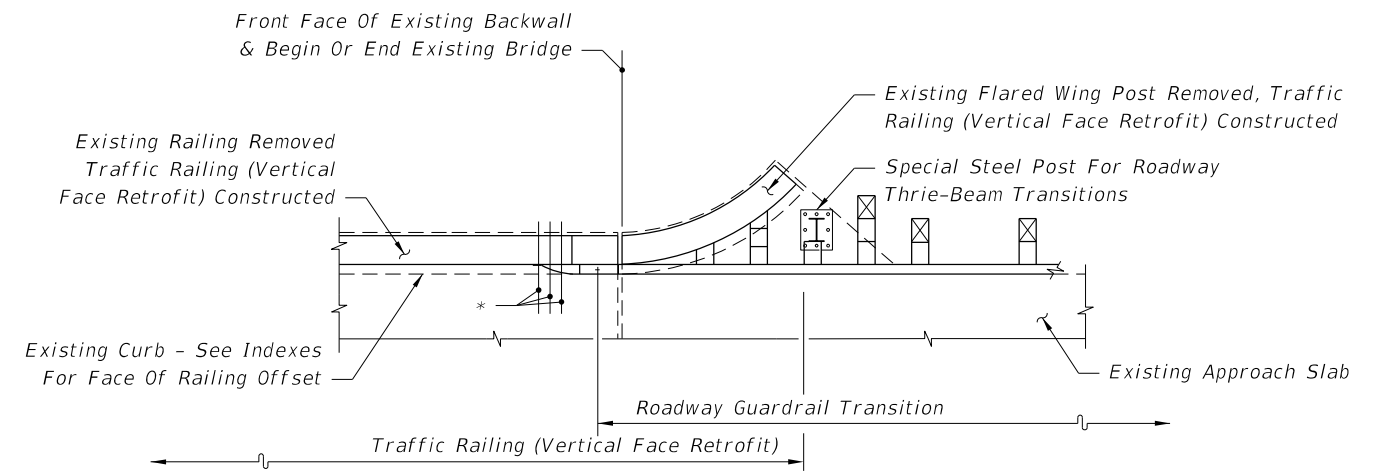
PICTORIAL VIEWS OF GUARDRAIL APPROACH TRANSITIONS AND CONNECTIONS FOR BRIDGE TRAFFIC RAILING (THRIE-BEAM RETROFIT)

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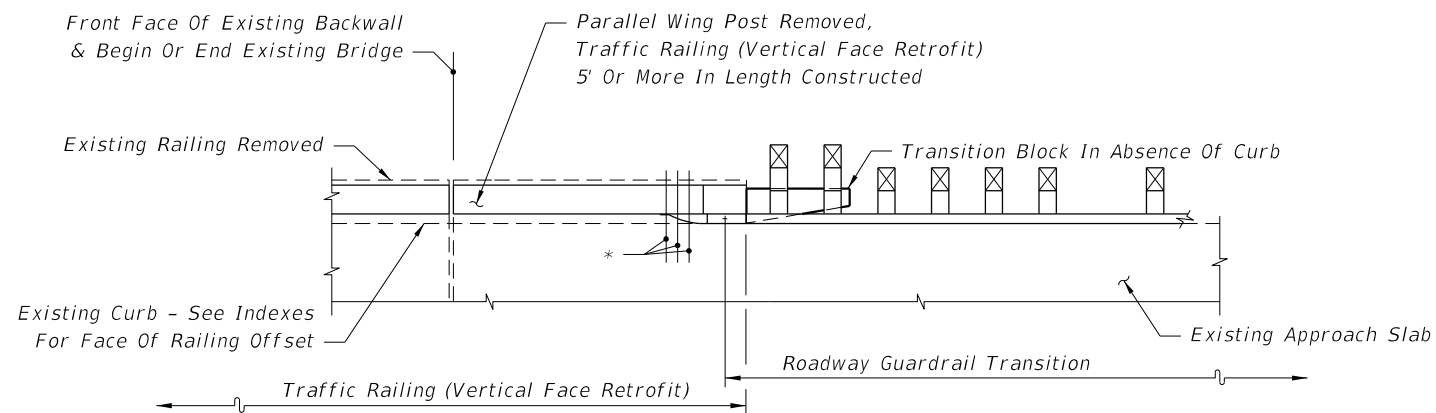
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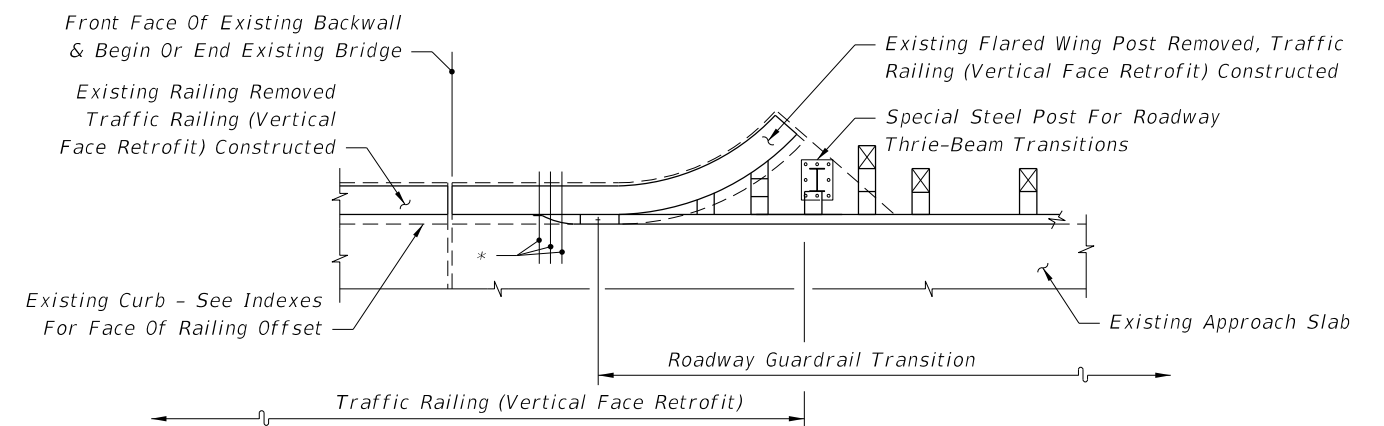
SEE INDEX 521-481 - SCHEME 1



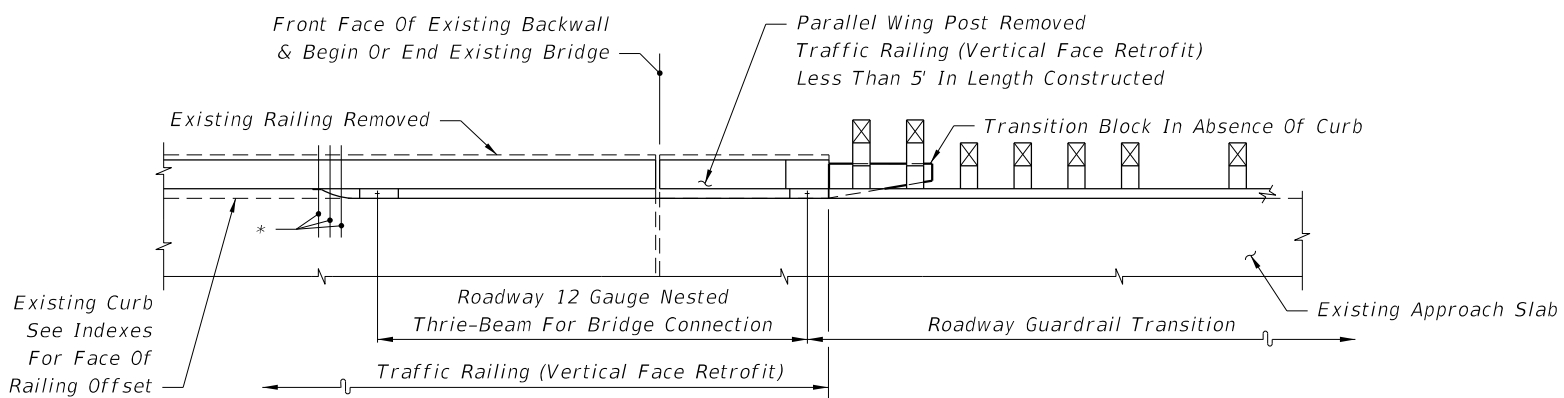
SEE INDEX 521-481 - SCHEME 3



SEE INDEX 521-481 - SCHEME 2



SEE INDEX 521-481 - SCHEME 3




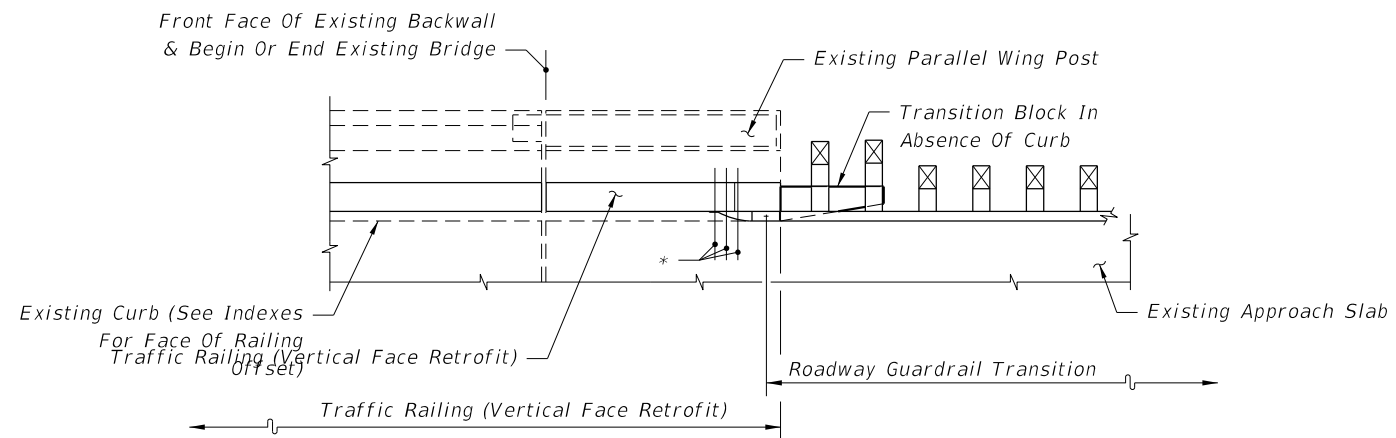
SEE INDEX 521-481 - SCHEME 2

Note:  
 \* 21" x 12" x 5/8" Thrie-Beam Terminal Connector Plate (Back-Up Plate), And 7/8"Ø x 12" Long HS  
 Hex Bolts And Nuts (5 Req'd.) With 2 1/4" OD Plain Round Washers Under Heads And Nuts

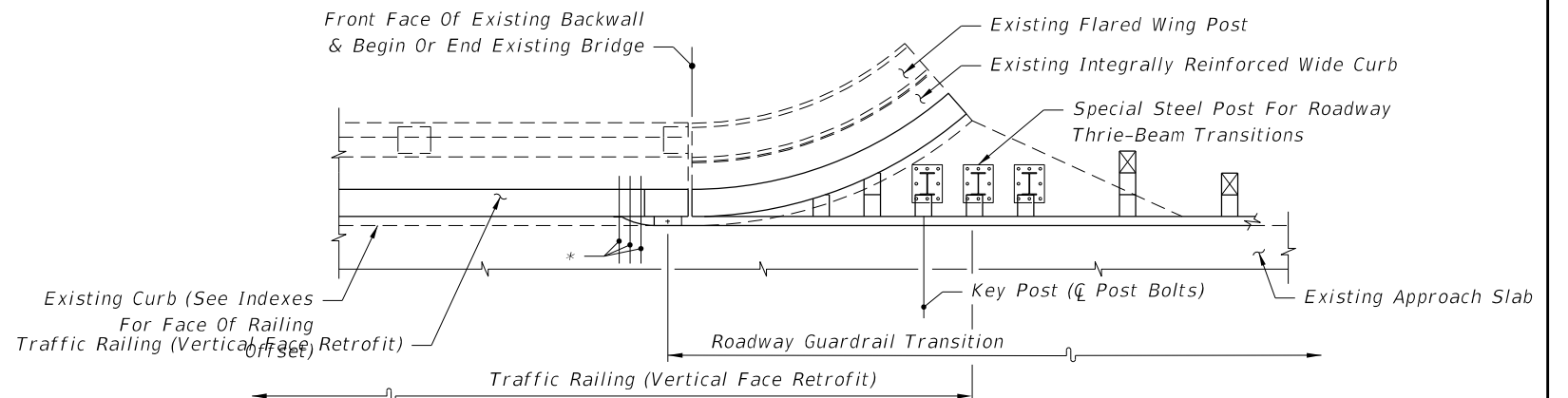
PARTIAL PLAN VIEWS OF TRAFFIC RAILING (VERTICAL FACE RETROFIT)

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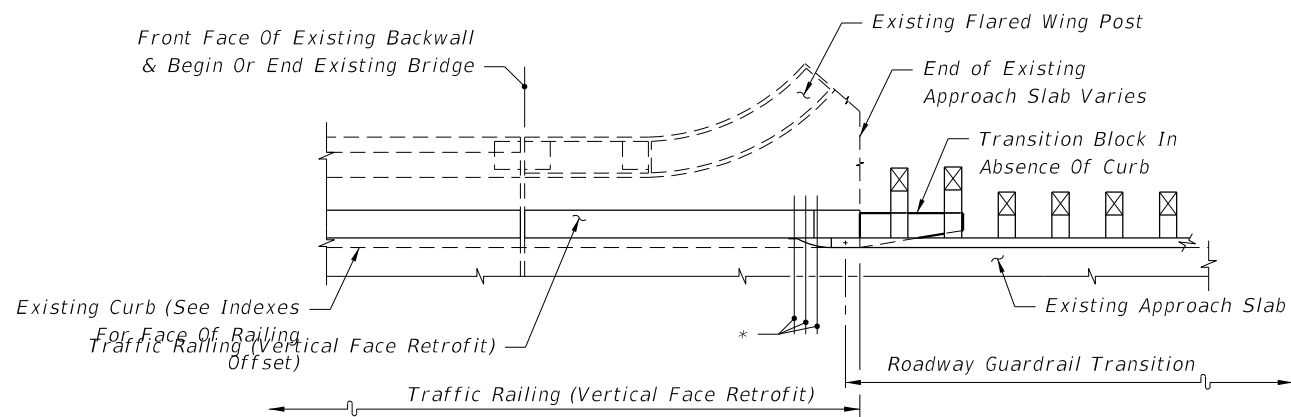
LAST REVISION 11/01/19	REVISION	DESCRIPTION:		FY 2023-24 STANDARD PLANS	GUARDRAIL TRANSITIONS AND CONNECTIONS FOR EXISTING BRIDGES	INDEX 536-002	SHEET 15 of 28
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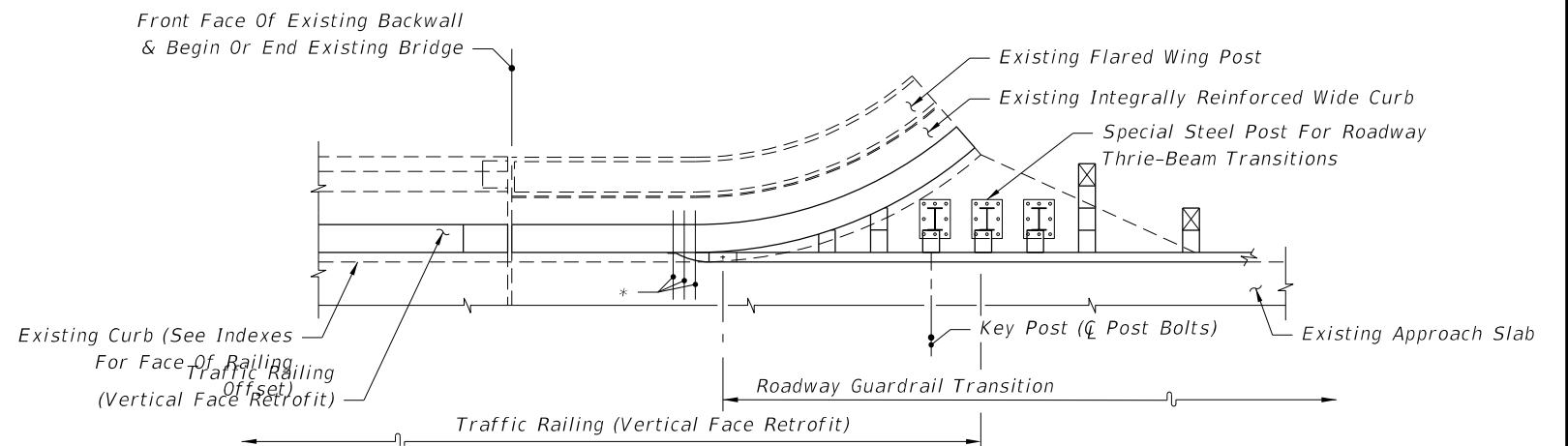
SEE INDEX 521-405 OR 521-482 - SCHEME 2



SEE INDEX 521-405 OR 521-482 - SCHEME 3



SEE INDEX 521-405 OR 521-482 - SCHEME 2




SEE INDEX 521-405 OR 521-482 - SCHEME 3

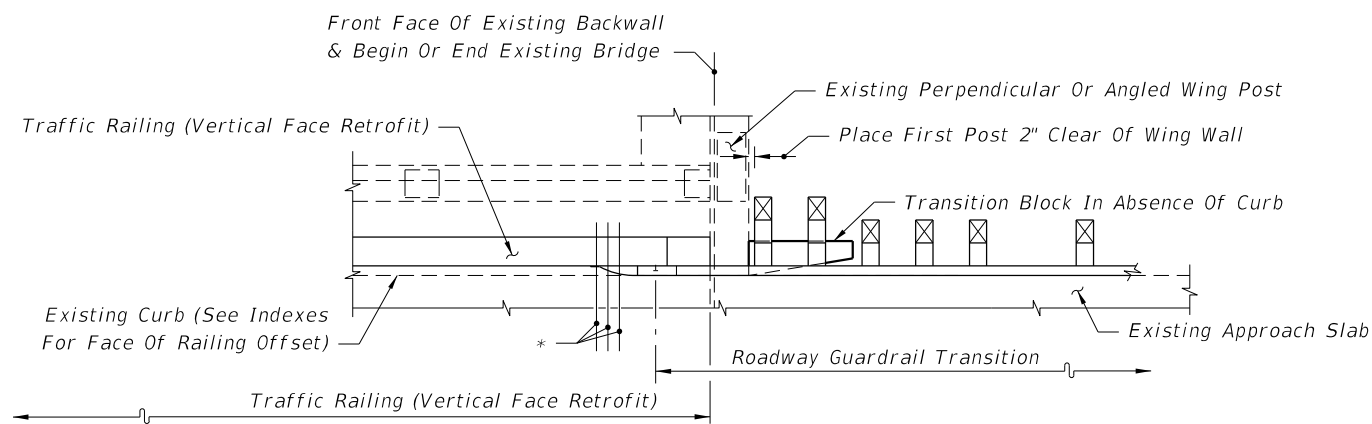
Note:  
 \* 21" x 12" x 5/8" Thrie-Beam Terminal Connector Plate (Back-Up Plate), And 7/8"Ø x 12" Long  
 HS Hex Bolts And Nuts (5 Reqd.) With 2 1/4" OD Plain Round Washers Under Heads And Nuts

PARTIAL PLAN VIEWS OF TRAFFIC RAILING (VERTICAL FACE RETROFIT)  
 (INDEX 521-482 SHOWN, INDEX 521-405 SIMILAR)

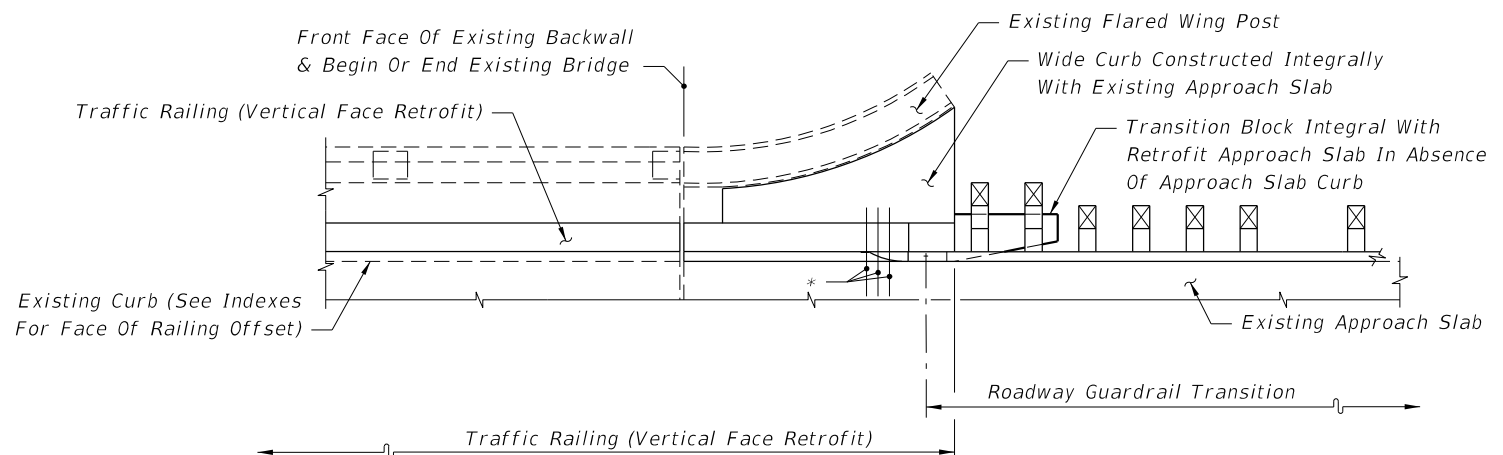
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LAST REVISION 11/01/19	REVISION DESCRIPTION:	 FY 2023-24 STANDARD PLANS	GUARDRAIL TRANSITIONS AND CONNECTIONS FOR EXISTING BRIDGES	INDEX 536-002	SHEET 16 of 28
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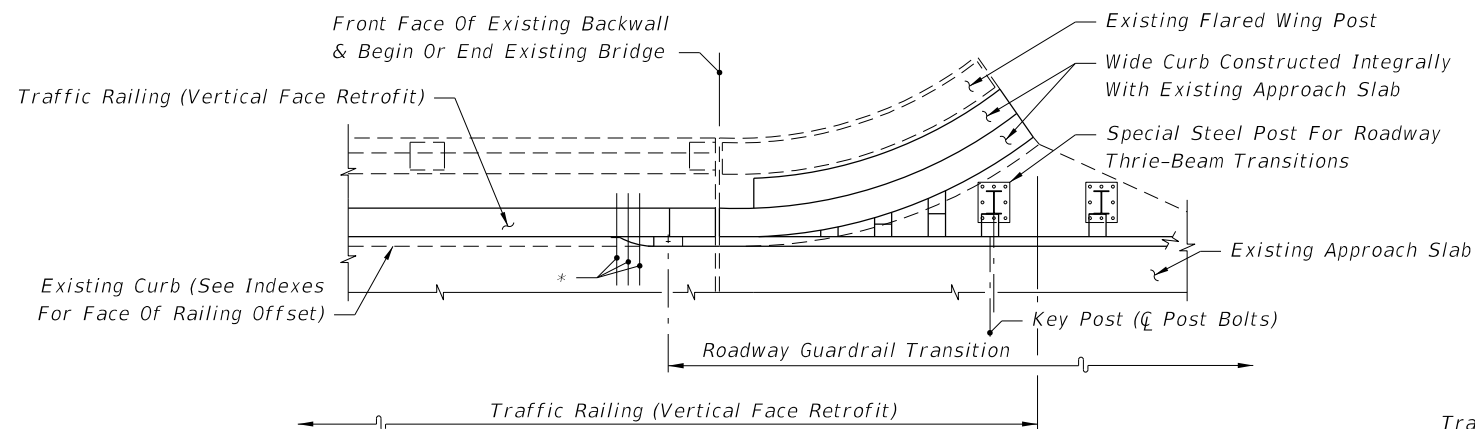




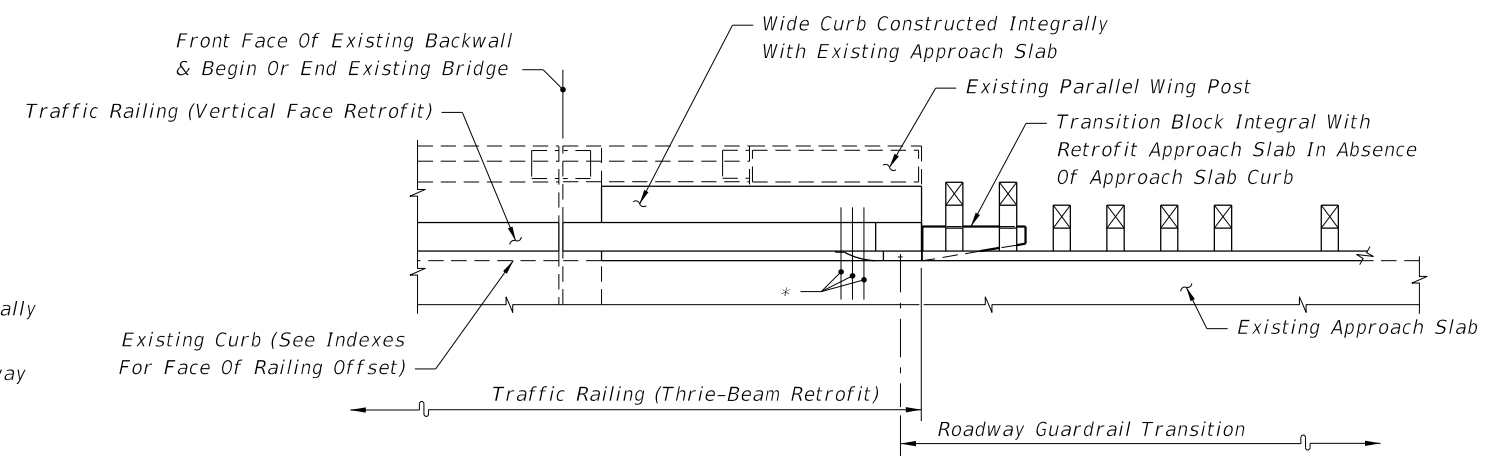
SEE INDEX 521-405 OR 521-482 - SCHEME 1



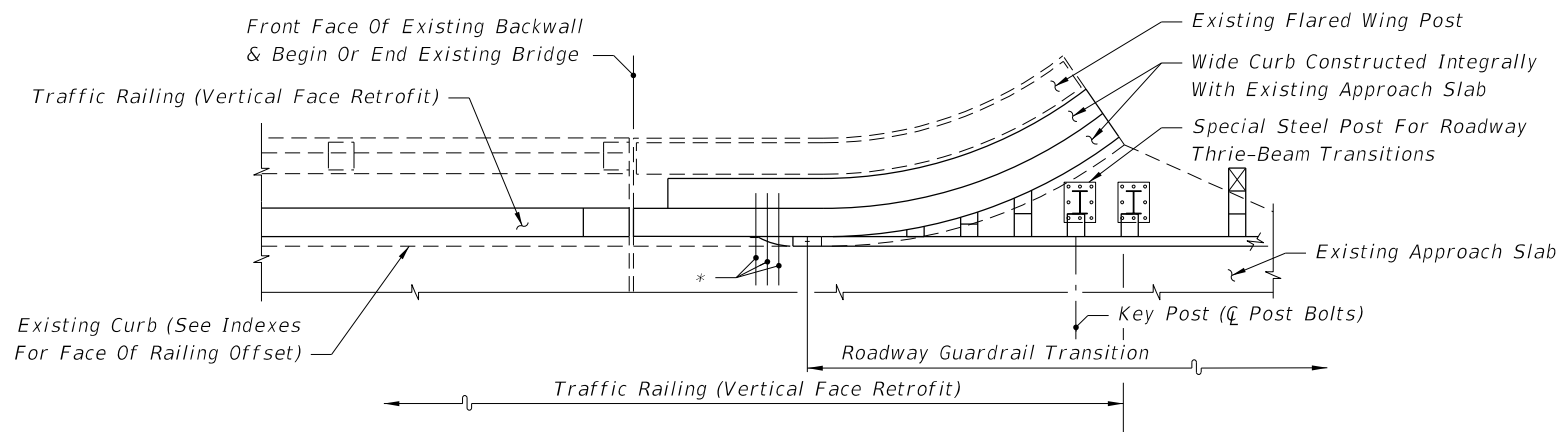
SEE INDEX 521-405 OR 521-482 - SCHEME 5



SEE INDEX 521-405 OR 521-482 - SCHEME 4



SEE INDEX 521-405 OR 521-482 - SCHEME 5




SEE INDEX 521-405 OR 521-482 - SCHEME 4

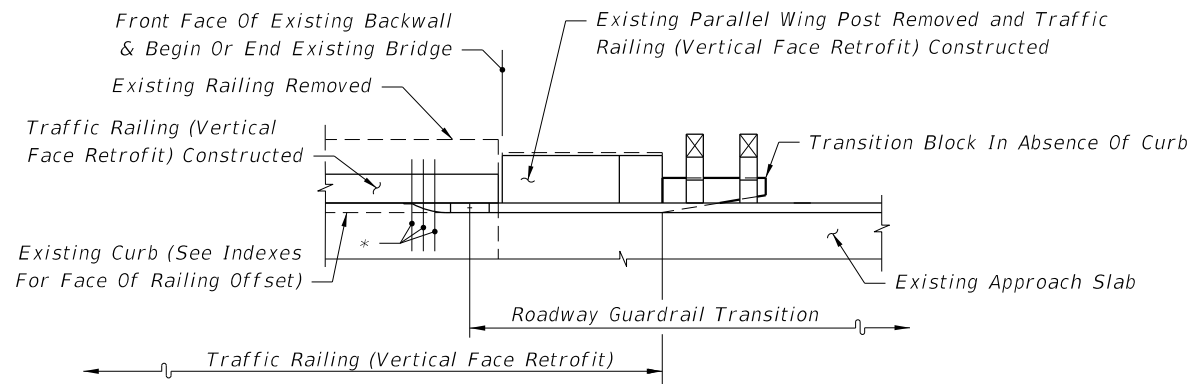
Note:  
 \*21" x 12" x 5/8" Thrie-Beam Terminal Connector Plate (Back-Up Plate), And 7/8"Ø x 12" Long HS Hex Bolts And Nuts (5 Req'd.) With 2 1/4" OD Plain Round Washers Under Heads And Nuts

PARTIAL PLAN VIEWS OF TRAFFIC RAILING (VERTICAL FACE RETROFIT)  
 (INDEX 521-482 SHOWN, INDEX 521-405 SIMILAR)

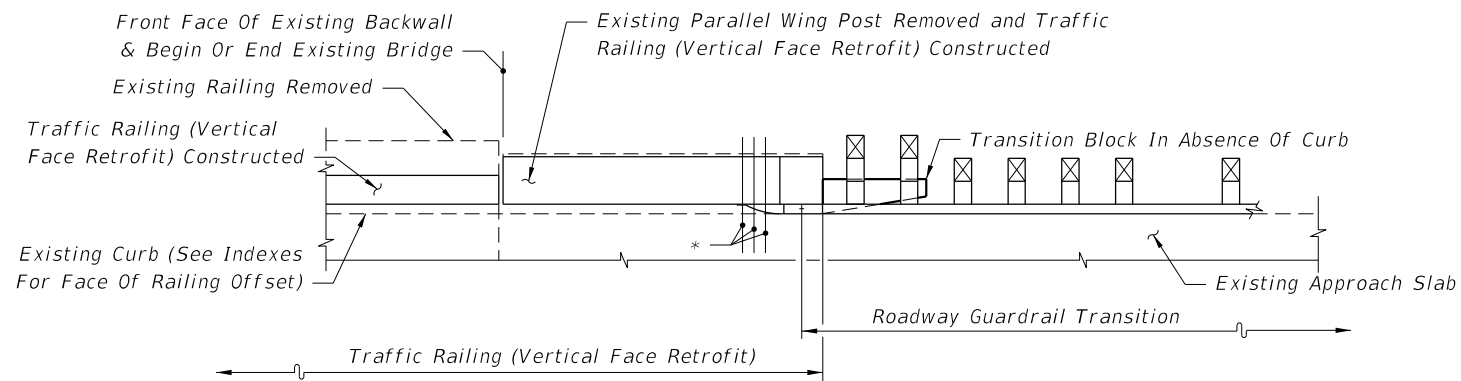
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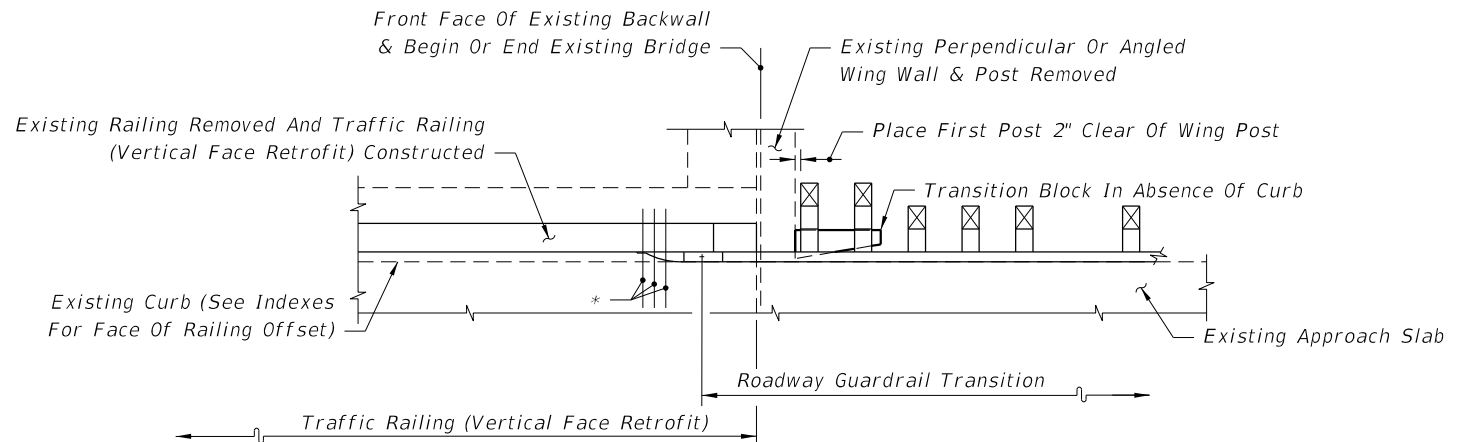
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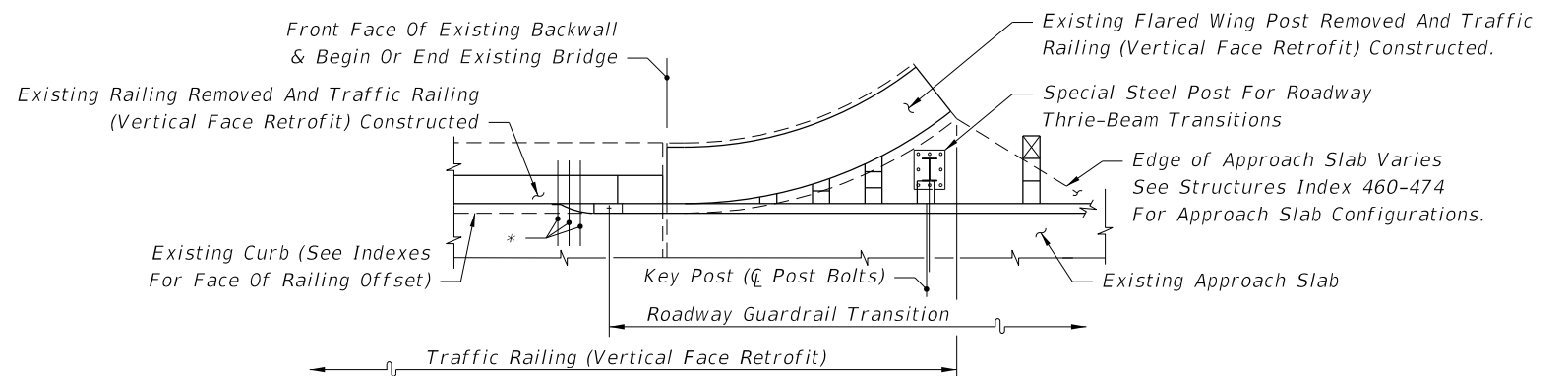
SEE INDEX 521-483 - SCHEME 2



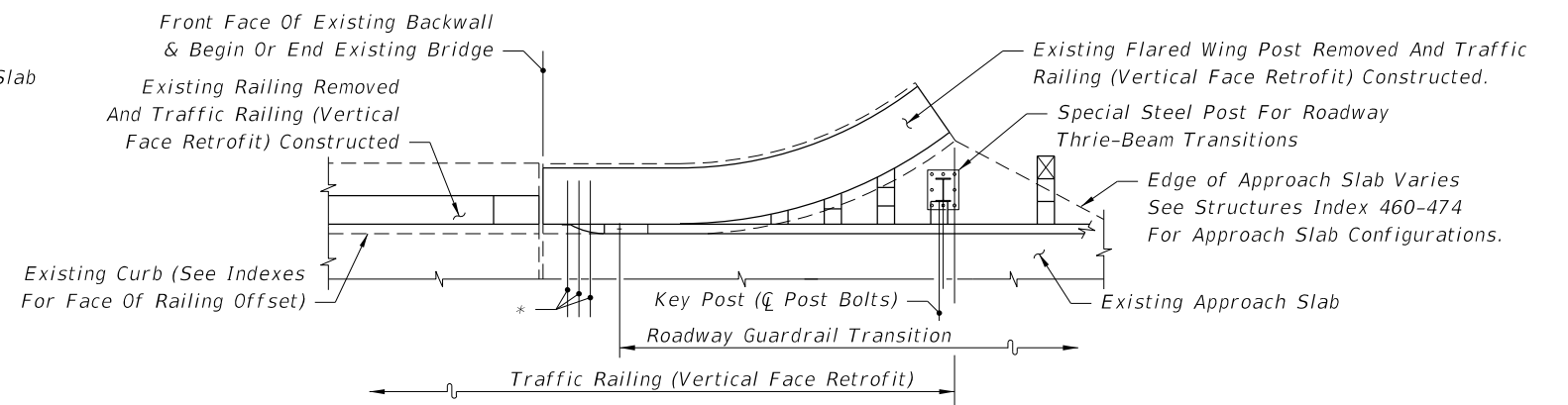
SEE INDEX 521-483 - SCHEME 2



SEE INDEX 521-483 - SCHEME 1



SEE INDEX 521-483 - SCHEME 3




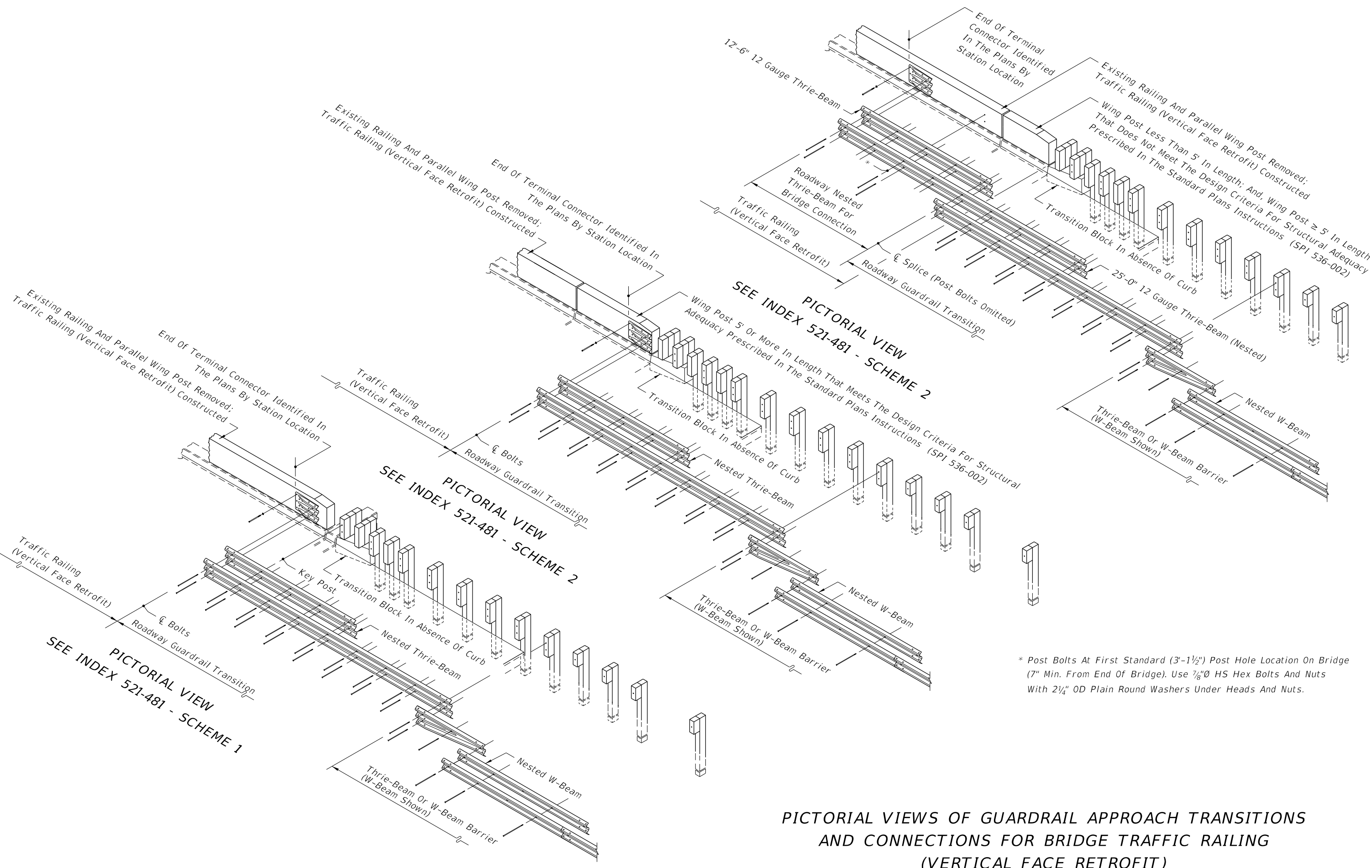
SEE INDEX 521-483 - SCHEME 3

Note:

\* 21" x 12" x 5/8" Thrie-Beam Terminal Connector Plate (Back-Up Plate), And 7/8"Ø HS Hex Bolts And Nuts (12" Long For Scheme 1 And Length To Fit For Schemes 2 And 3) (5 Req'd.) With 2 1/4" OD Plain Round Washers Under Heads And Nuts

**PARTIAL PLAN VIEWS OF TRAFFIC RAILING (VERTICAL FACE RETROFIT)**

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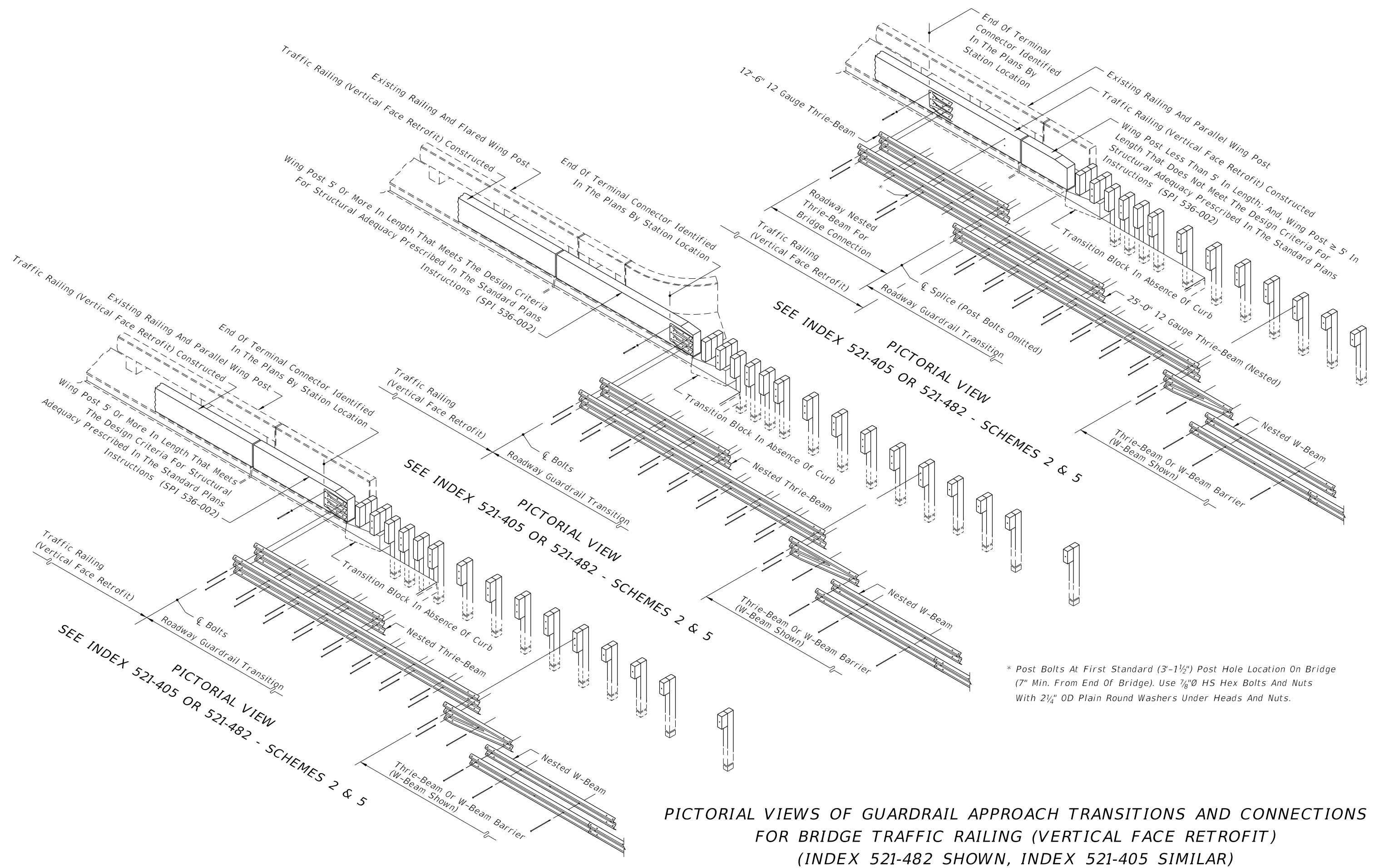
\* Post Bolts At First Standard (3'-1½") Post Hole Location On Bridge (7" Min. From End Of Bridge). Use 7/8" HS Hex Bolts And Nuts With 2¼" OD Plain Round Washers Under Heads And Nuts.

PICTORIAL VIEWS OF GUARDRAIL APPROACH TRANSITIONS AND CONNECTIONS FOR BRIDGE TRAFFIC RAILING (VERTICAL FACE RETROFIT)

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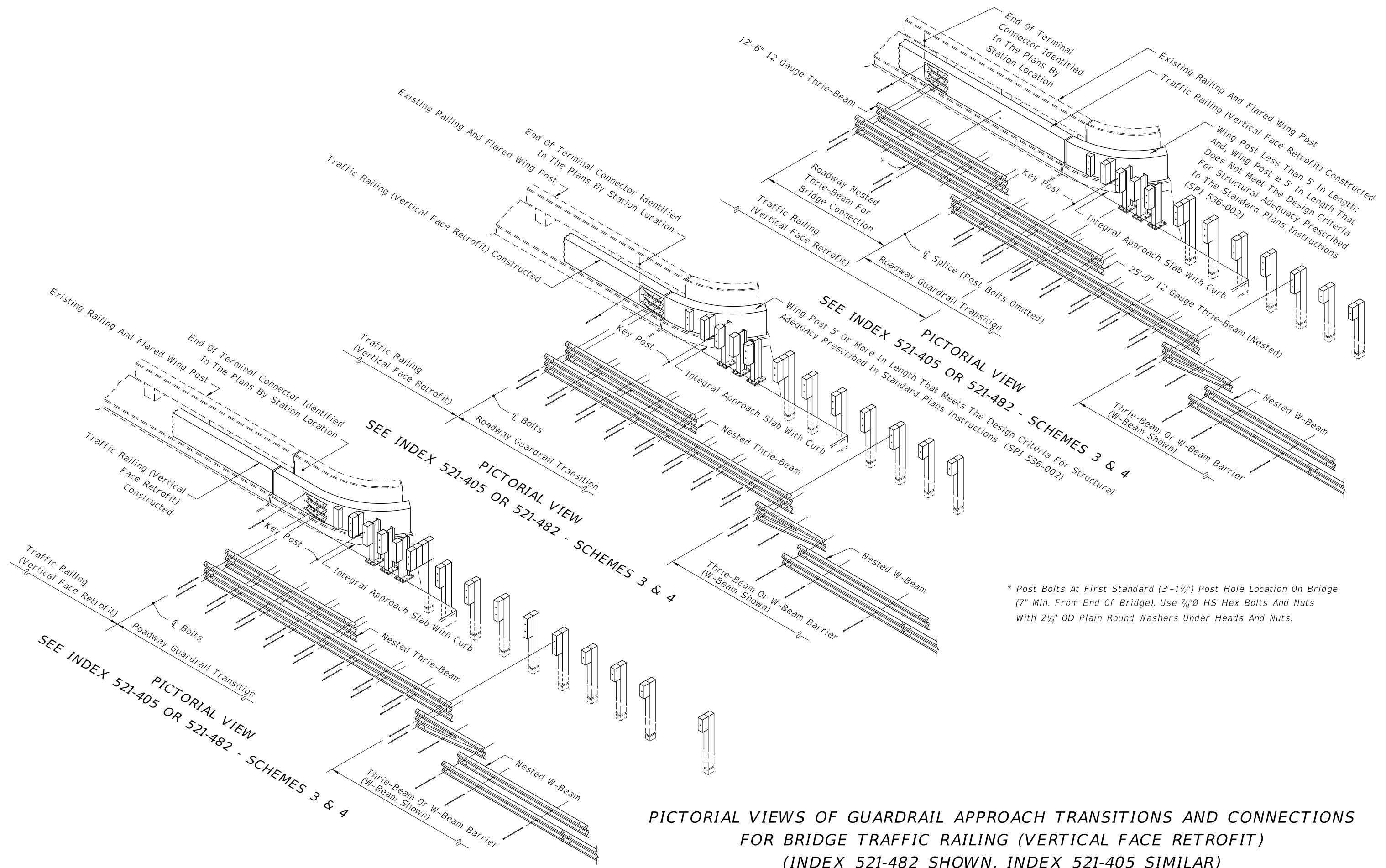




PICTORIAL VIEWS OF GUARDRAIL APPROACH TRANSITIONS AND CONNECTIONS FOR BRIDGE TRAFFIC RAILING (VERTICAL FACE RETROFIT) (INDEX 521-482 SHOWN, INDEX 521-405 SIMILAR)

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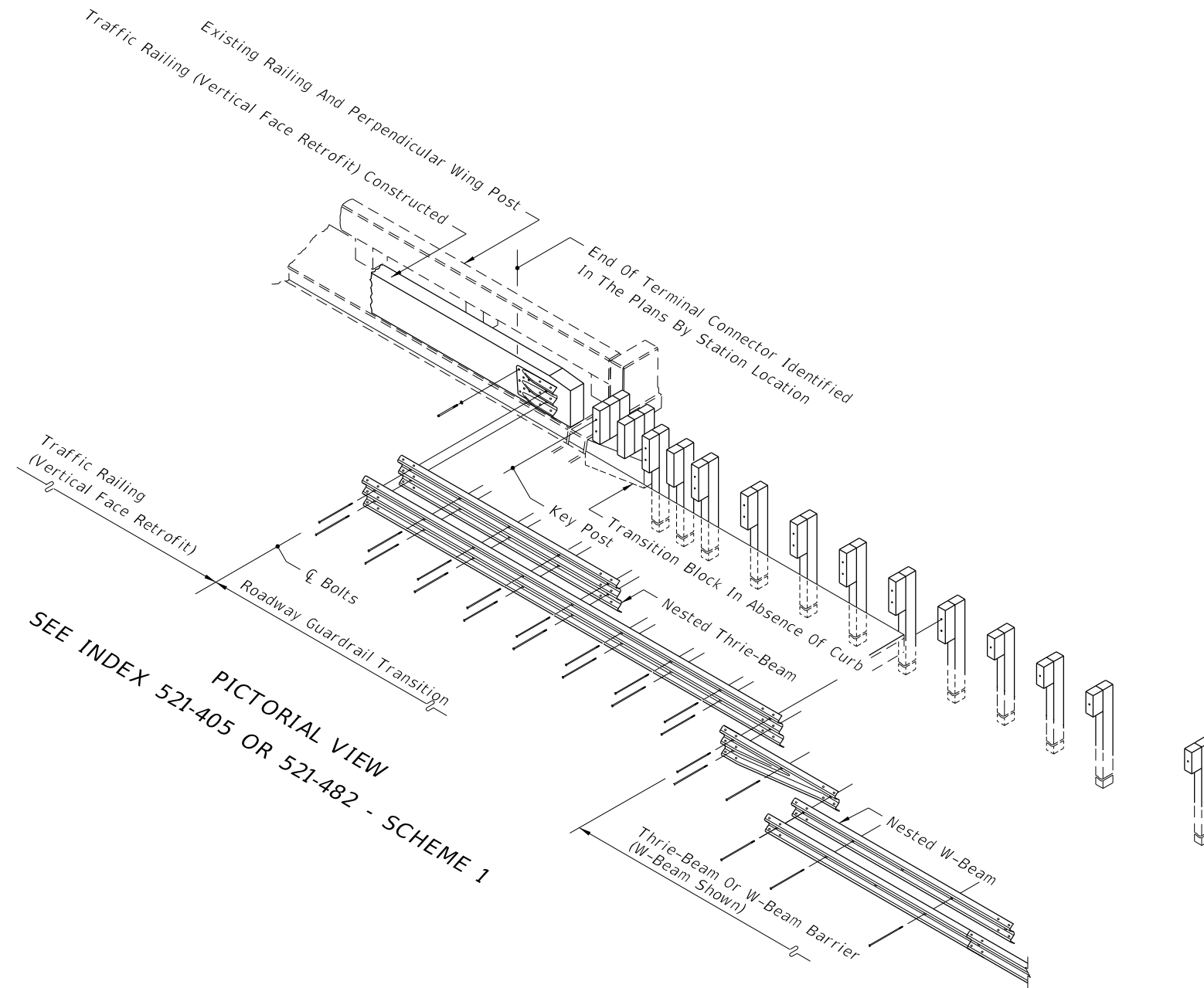


PICTORIAL VIEWS OF GUARDRAIL APPROACH TRANSITIONS AND CONNECTIONS FOR BRIDGE TRAFFIC RAILING (VERTICAL FACE RETROFIT) (INDEX 521-482 SHOWN, INDEX 521-405 SIMILAR)

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PICTORIAL VIEW  
 SEE INDEX 521-405 OR 521-482 - SCHEME 1

PICTORIAL VIEWS OF GUARDRAIL APPROACH TRANSITIONS AND CONNECTIONS FOR BRIDGE TRAFFIC RAILING (VERTICAL FACE RETROFIT) (INDEX 521-482 SHOWN, INDEX 521-405 SIMILAR)

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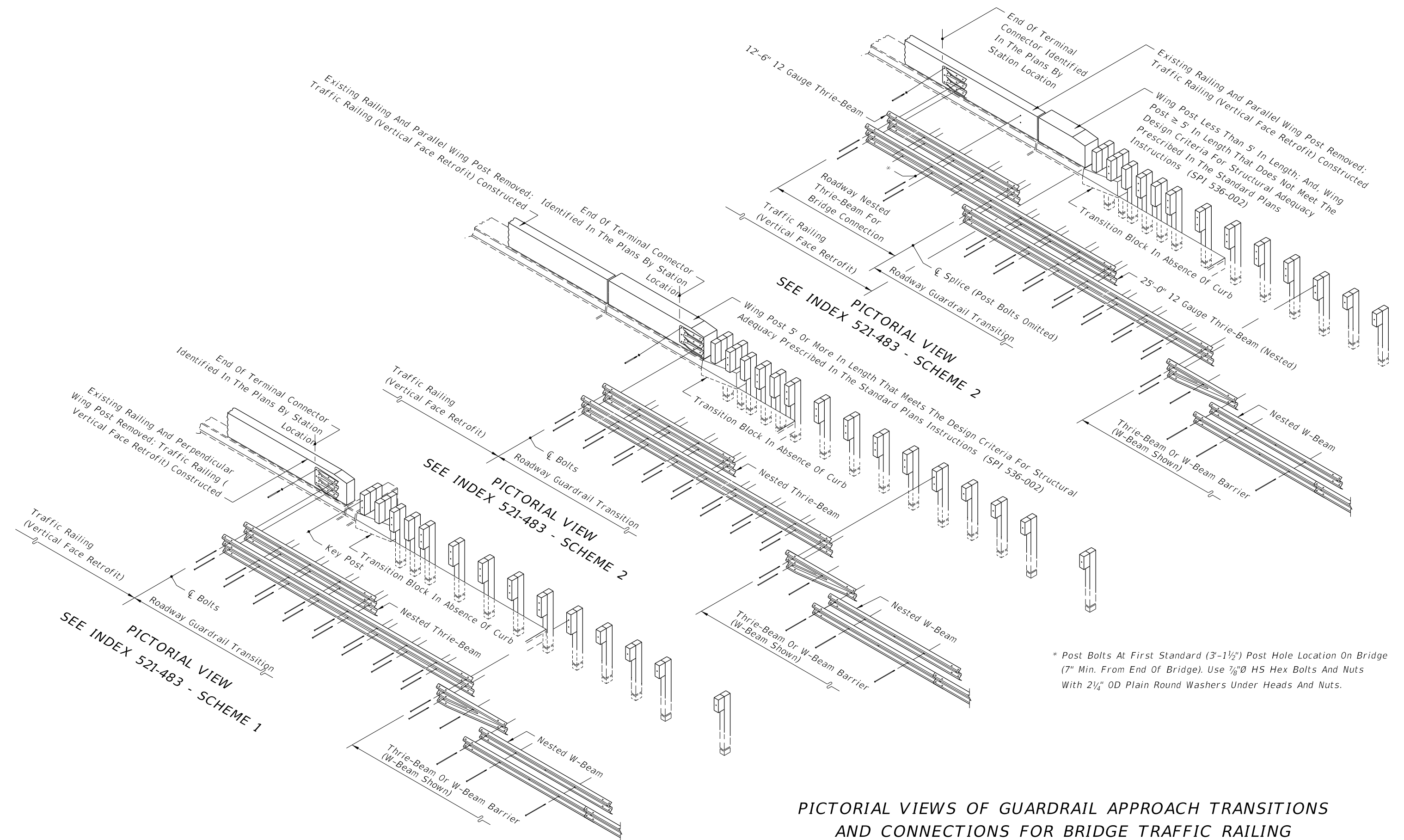
FY 2023-24  
 STANDARD PLANS



GUARDRAIL TRANSITIONS AND CONNECTIONS FOR EXISTING BRIDGES

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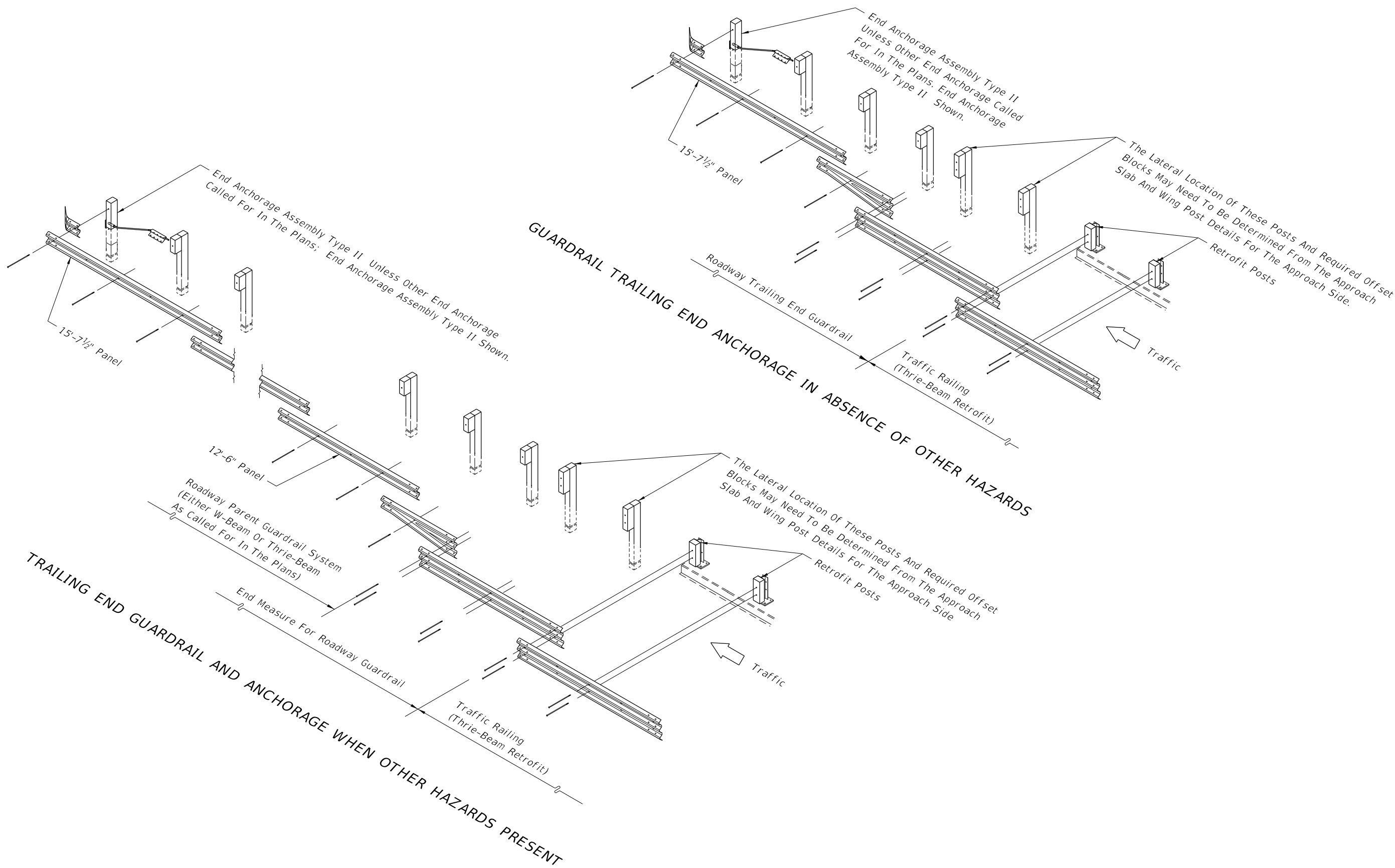
\* Post Bolts At First Standard (3'-1 1/2") Post Hole Location On Bridge (7" Min. From End Of Bridge). Use 7/8" HS Hex Bolts And Nuts With 2 1/4" OD Plain Round Washers Under Heads And Nuts.

PICTORIAL VIEWS OF GUARDRAIL APPROACH TRANSITIONS AND CONNECTIONS FOR BRIDGE TRAFFIC RAILING (VERTICAL FACE RETROFIT)

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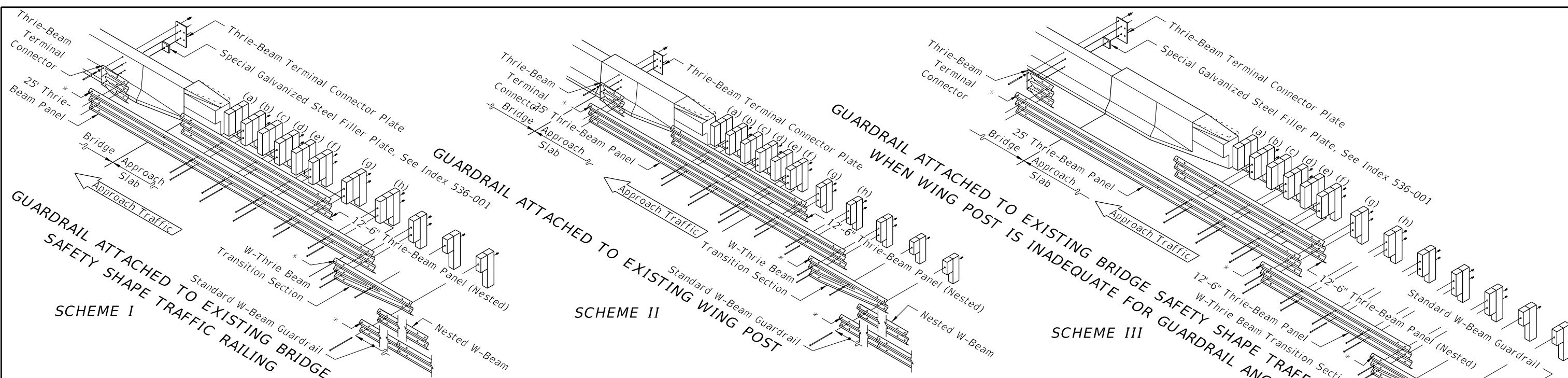




TRAILING END GUARDRAIL AND ANCHORAGE FOR BRIDGE TRAFFIC RAILING (THRIE BEAM RETROFITS)

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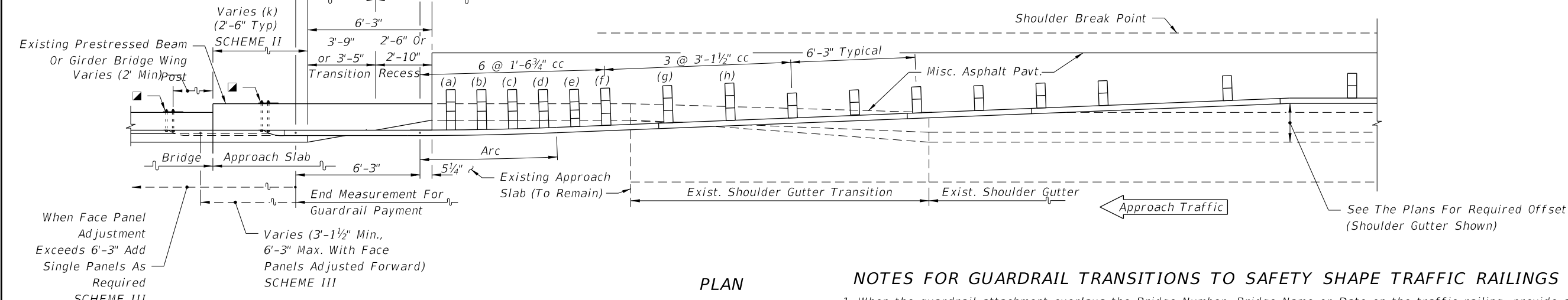


Use Of Scheme I Shall Be Determined In Accordance With The Standard Plans Instructions (SPI 536-002).  
**GUARDRAIL TRANSITION TO EXISTING FLAT SLAB BRIDGES**

\* Splice Locations: Thrie-Beam - 12 Guardrail Splice Bolts And Recessed Nuts  
 W-Beam - 8 Guardrail Splice Bolts And Recessed Nuts  
 Use Of Schemes II And III Shall Be Determined In Accordance With The Standard Plans Instructions (SPI 536-002).  
**GUARDRAIL TRANSITIONS TO EXISTING PRESTRESSED BEAM OR GIRDER BRIDGES**

**APPROACH POSTS AND SPECIAL OFFSET BLOCKS**

Block assemblies for special offsets can be made up of one special block plus one standard size block or of three standard size blocks field dressed to approximately equal size, with the pieces secured for relative position by 16d galvanized nails, see '16d NAIL FOR PREVENTION OF OFFSET BLOCK ROTATION' - Index 536-001. The nested rails shall not be bolted to the blocks and posts at posts (a), (c) and (e). The details shown are for approach slabs with internal edge dike extending beyond parapet type traffic railing termini.



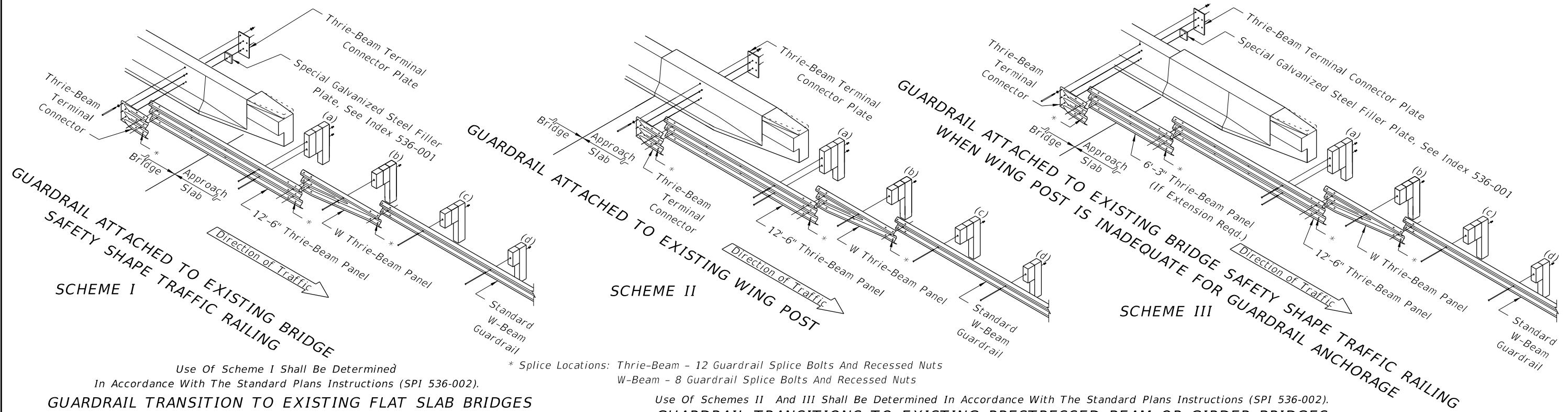
**NOTES FOR GUARDRAIL TRANSITIONS TO SAFETY SHAPE TRAFFIC RAILINGS ON EXISTING BRIDGES**

- 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 Thrie-Beam Terminal Connector with 1/4"Ø x 1" long concrete screws or expansion anchors at each corner, as approved by the Engineer. The sign panel shall be a minimum 1/16" thick and meet the requirements of Specification 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.
- When retrofitting thrie-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.

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

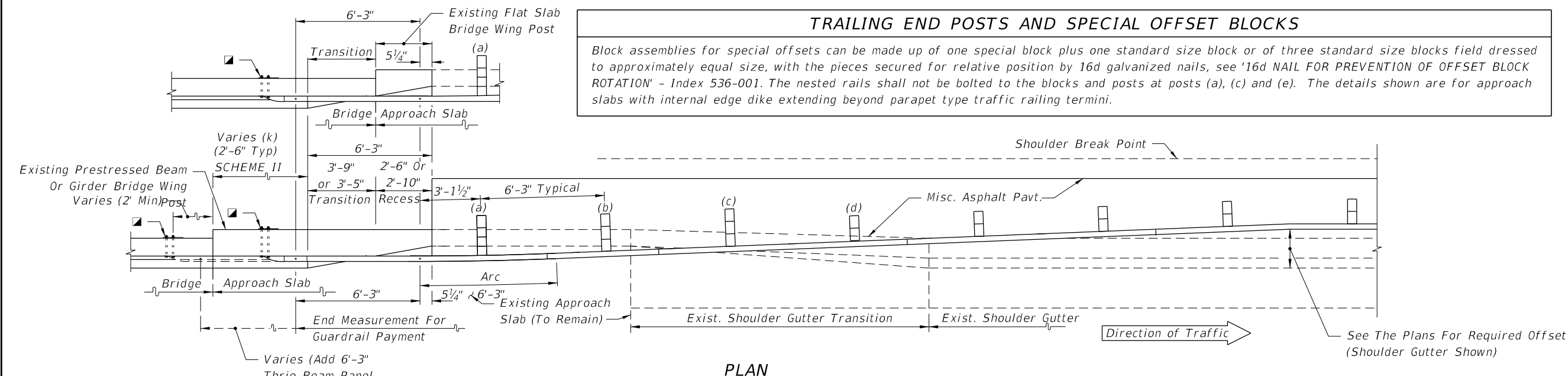
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Use Of Scheme I Shall Be Determined  
 In Accordance With The Standard Plans Instructions (SPI 536-002).  
**GUARDRAIL TRANSITION TO EXISTING FLAT SLAB BRIDGES**

\* Splice Locations: Thrie-Beam - 12 Guardrail Splice Bolts And Recessed Nuts  
 W-Beam - 8 Guardrail Splice Bolts And Recessed Nuts  
 Use Of Schemes II And III Shall Be Determined In Accordance With The Standard Plans Instructions (SPI 536-002).  
**GUARDRAIL TRANSITIONS TO EXISTING PRESTRESSED BEAM OR GIRDER BRIDGES**



**PLAN**

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

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 Thrie-Beam Terminal Connector with 1/4"Ø x 1" long concrete screws or expansion anchors at each corner, as approved by the Engineer. The sign panel shall be a minimum 1/16" thick and meet the requirements of Specification 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 thrie-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.

**GUARDRAIL TRAILING END TRANSITION CONNECTIONS FOR EXISTING FLAT SLAB, PRESTRESSED BEAM AND GIRDER BRIDGES WITH SAFETY SHAPE TRAFFIC RAILING EXTENDING LESS THAN FULL APPROACH SLAB LENGTH**

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