

## GENERAL NOTES

1. The illustrations for guardrail applications are standard configurations; adjustments are to be made as required by site specific conditions to attain optimum design for function, economy and serviceability.
2. The beginning of guardrail need shall be at the greatest of the upstream distances from the hazard, as determined from Figures 1 and 2, and other application details of this Index.
3. One Panel (i.e. panel length) equals 12'-6". Guardrail shall be constructed with rail elements 12'-6" in length except where 25'-0" elements are called for by this and other standards (indexes) or specifically called for in the plans.  
  
Post spacings shall be 6'-3" except that reduced spacings shall be used for (a) transitions to anchorages at rigid structures such as bridges (See Detail J and Index No. 402 ) and transitions to redirective crash cushions, (b) the conditions in Note No. 7 below, (c) special post applications, (d) reduced post spacing required for specific end anchorage assemblies, and, (e) specific spacings called for in the plans.
4. Guardrail mounting height for the W-beam without rubrail and for thrie-beam is 1'-9" to the center of beam, and for W-beam with rubrail 2'-0" to center of beam. Modified thrie-beam shall be mounted at a height of 2'-0" to center of beam. The height is critical and shall be attained in all cases; a tolerance of 3" above and 1" below the standard mounting heights is permissible over necessary surface irregularities (e.g., across shoulder gutters, inlets and roadway surface break lines).
5. All guardrail panels, end sections and special end shoes shall be lapped in the direction of adjacent traffic.
6. Flared end anchorage assemblies providing 4' offset are the standard end treatments for single face free standing guardrail approach ends. Parallel end anchorage assemblies for guardrail approach end treatments will be constructed only when restraints prevent construction of flared end anchorages.  
  
Guardrail end anchorage assemblies shall be of the type called for in the plans. If the plans call for end anchorage assembly "Flared" and does not identify the specific system(s) to be used, the contractor has the option to construct any FDOT approved flared assembly provided in this Index or identified on the Qualified Products List (QPL), subject to the conditions identified in the approved Index drawings, or QPL drawings if applicable.  
  
If the plans call for end anchorage assembly "parallel" and does not identify the specific system(s) to be used, the contractor has the option to construct any FDOT approved parallel assembly provided in this Index or identified on the QPL, subject to the conditions identified in the approved Index drawings, or QPL drawings if applicable.  
  
If the plans call for a specific end anchorage assembly, substitutions with other end anchorage assemblies will not be permitted unless approved by the Engineer. Approved substitutions will not be eligible for VECP consideration.  
  
Proprietary end anchorage systems must be identified on the QPL. Manufacturers seeking approval of proprietary end anchorage systems for inclusion on the QPL must submit application along with design documentation showing the end anchorage system is crash tested to NCHRP Report 350 Test Level 3 criteria, is accepted by FHWA for use as a guardrail end anchorage system, and is compatible with FDOT guardrail systems. System approvals will be contingent on FDOT's evaluation of crash test performance results for consistency with FDOT guardrail application and use. If approved, installation drawings signed and sealed by a professional engineer licensed in the State of Florida will be required.
7. At above ground rigid hazards where the face of guardrail is offset from the hazard less than the 4' minimum for standard W-beam, other guardrail configurations may be applicable; see General Note No. 11 and the minimum offset table on Sheet 17. For guardrail with post spacing less than 6'-3" the reduced spacing should extend a minimum of one panel in advance of the hazard. When minimum offset cannot be attained safety shape concrete barrier shall be used unless other shielding is approved by the Engineer of Record. See Index No. 410 for safety shape concrete barriers and typical applications, and the plans for special barrier shapes and applications.
8. In addition to use at roadside hazards or other areas where the Engineer has deemed guardrail necessary, guardrail should be considered on flush shoulder sections where fill slopes are steeper than 1:3 within the clear zone and fill heights are greater. Curbed sections where fill slopes are steeper than 1:3 and fill heights are 6' or greater within 22' of the traveled way should be evaluated for installation of guardrail. Additional guidance for evaluating the need for guardrail can be found in the Plans Preparation Manual.
9. The guardrail to bridge connections contained in this Index are for bridges with Test Level 4 traffic railing barriers. For guardrail to concrete barrier wall connections see Index No. 410. For existing bridges receiving retrofit traffic railing barriers see Index No. 402.
10. The W-beam guardrail system in this index is the standard system to be used on the State Highway System where a Test Level 3 semi-rigid barrier is required.
11. Thrie-beam guardrail panels shall be used in guardrail transitions to bridge traffic railing barriers, to concrete and certain water filled safety shaped barriers, certain crash cushions and as a continuous barrier when called for in the plans. For additional information on rail attachment, post spacings, nested rails, location of thrie-beam transition panels and offset block configurations see details elsewhere in this Index, and Index Nos. 402, 410 and 414. The use of thrie-beam guardrail with standard offset blocks (Test Level 3 semi-rigid system) may be considered where one or more of the conditions listed below or similar conditions are anticipated or exist:
  - a. W-beam deflection is marginal,
  - b. W-beam with rubrail considered functionally deficient, continued ...

- continued ...
- (c) Vehicle overriding W-beam is probable,
  - (d) Drainage will be impeded or blocked by the use of concrete barrier wall (subject to deflection space requirements),
  - (e) High frequency of repairs to W-beam,
  - (f) Spandrel beam with low deflection needed around unrelocatable structure,
  - (g) Accommodating passenger vehicles heavier or larger than the standard passenger car (e.g., passenger vans and small buses).

The modified thrie-beam guardrail is a Test Level 4 semi-rigid system and may be used where a Test Level 4 guardrail is required.

12. Single face median guardrail for bridges located on divided roadways shall be constructed the same as outer roadway guardrail under the following conditions:
  - (a) Wide medians where approach end anchor is located outside of opposing roadway clear zone,
  - (b) Medians of uniform width that are occupied by other transportation and joint use facilities,
  - (c) Medians of uniform or variable widths with independent vertical alignments not suited to normal median guardrail installations,
  - (d) Medians of bifurcated roadways.
13. Straight rail sections may be used to construct radii of 125' or greater. For radii less than 125' the rail must be fabricated (shop-bent) to fit.
14. Crash cushions may be required in lieu of or in conjunction with guardrail at locations where space does not permit development of sufficient guardrail length, offset or crashworthiness at terminals. Crash cushions shall be constructed at or in lieu of Type II assemblies located in the approach clear zones.
15. Corrugated sheet steel beams, end shoes, end sections and back-up plates shall conform to the current requirements of AASHTO M180, Class A, Type II (zinc) coating. All other metallic components, hardware and accessories shall be in conformance with the appropriate current AASHTO requirements.  
  
Recycled beams: Used Class A guardrail beams that have been refurbished to condition new (AASHTO M180) may be used for both construction of new guardrail and maintenance of existing guardrail. Refurbishing shall include stripping of the existing galvanizing, restoration of the base metal in section and straightness free of warp and deformation, and, reglazing to AASHTO Type II specifications. Refurbished beams that retain ruptured holes, gashes or tears will not be accepted.
16. Steel offset blocks other than modified thrie-beam offset blocks are not permitted for new guardrail construction. Existing steel offset blocks may remain throughout the service life of the existing guardrail. Permissible post and offset block combinations are tabulated on Sheet 15.
17. Where necessary to enlarge or add holes to galvanized guardrail, the work will be done by drilling or reaming. Damaged galvanized guardrail will be metalized in accordance with Sections 562 and 971 of the Standard Specifications. No burning of holes will be permitted.
18. For guardrail reflector details see Sheet 15.
19. Any run of guardrail with existing concrete posts that is being reset under a construction or maintenance contract shall be reset using timber or steel posts. Repair within a run of guardrail with existing concrete posts can be made with either steel, timber, sound salvaged concrete posts; replacement in kind of damaged posts is to be made when like posts are on hand at time of repair.
20. Substitutions between thrie-beam guardrail and concrete barrier wall are not eligible for VECP consideration.
21. On roadways designated for reverse laning, all downstream ends of guardrail that are not shielded or that are not designed as approach end terminals shall be marked with post-mounted Type 3 Object Markers. Trailing bridge ends and trailing shoulder concrete barrier wall ends shall be marked with Type 3 Object Markers except where there is trailing end guardrail. Object markers to be installed facing reverse laning traffic. The cost of the object marker shall be included in the cost of the guardrail.

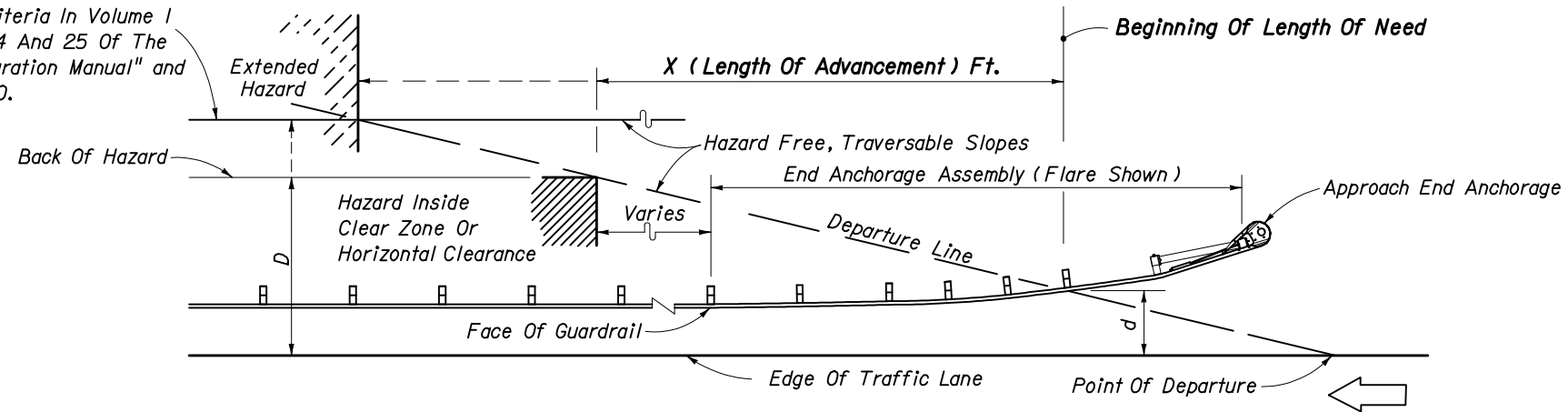


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Clear Zone Limit Or Horizontal Clearance Limit In Accordance With The Criteria In Volume I Chapters 2, 4 And 25 Of The "Plans Preparation Manual" and Index No. 700.



Design Speed mph	X (Length Of Advancement) Ft. <sup>■</sup>
≤ 45	= 16 (D-d)
≥ 50	= 13 (D-d)

■ Length of advancement determined from the diagram and equations above establishes the location of the upstream beginning length of need for guardrail, however, the length of advancement can be no less than that required by other details of this index.

The flared end anchorage with 4' nose offset is shown in the diagram above, however, the diagram applies to other configurations that may occur at the beginning of length of need, such as, other flare designs; upstream returns; and, other upstream deflected, tangent and curvilinear conditions.

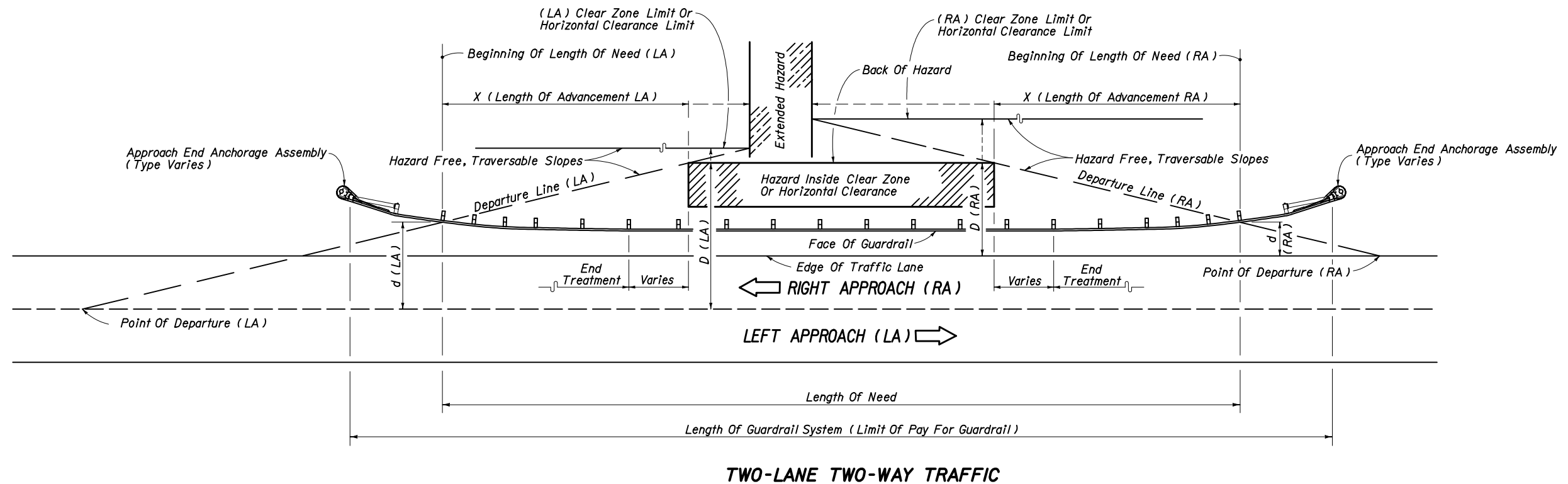
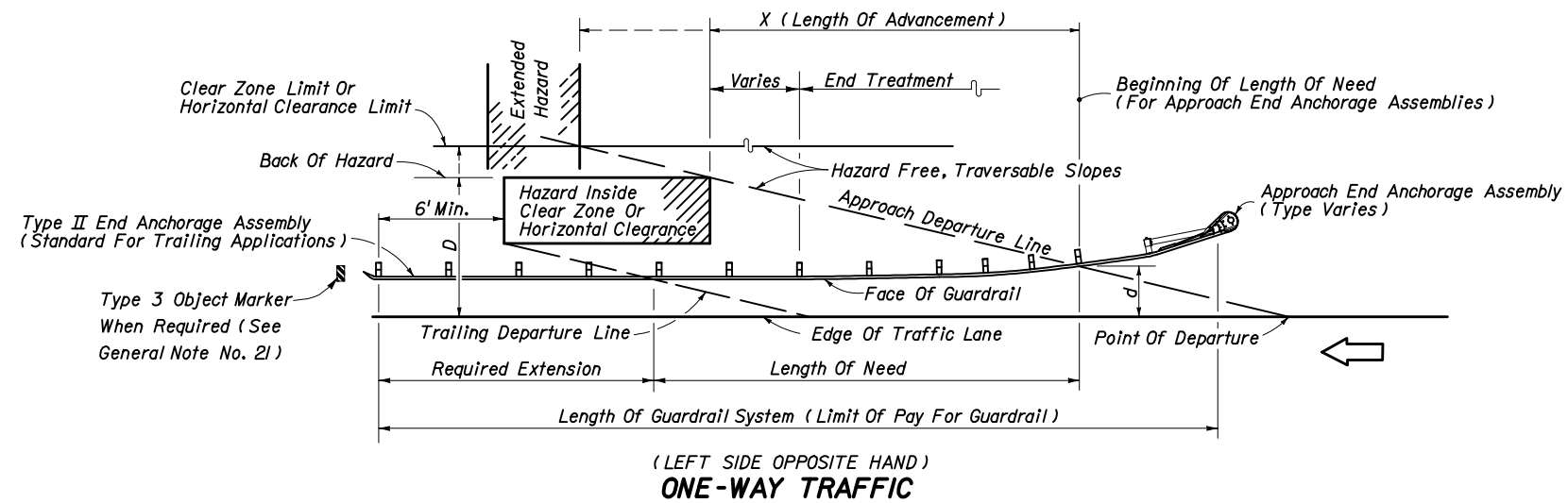
**Equation Variables:**

D=Distance in feet from near edge of the near approach traffic lane to either (a) the back of hazard, when the hazard is located inside the clear zone or horizontal clearance or (b) the clear zone or horizontal clearance outer limit, when the hazard extends to or goes beyond the clear zone or horizontal clearance limit. For left side hazards on two-way undivided facilities, D is measured from the inside edge of the near approach traffic lane (see Figure 2).

d=Distance in feet from the near edge of the near approach traffic lane to the face of guardrail at its intersection with the departure line. For left side hazards on two-way undivided facilities, d is measured from the inside edge of the near approach traffic lane (see Figure 2).

**LENGTH OF ADVANCEMENT - FIGURE 1**





For description of the dimensions  $D$ ,  $d$  and  $X$ , see Length of Advancement - Figure 1.  
For additional shoulder guardrail information, see Details B and C.

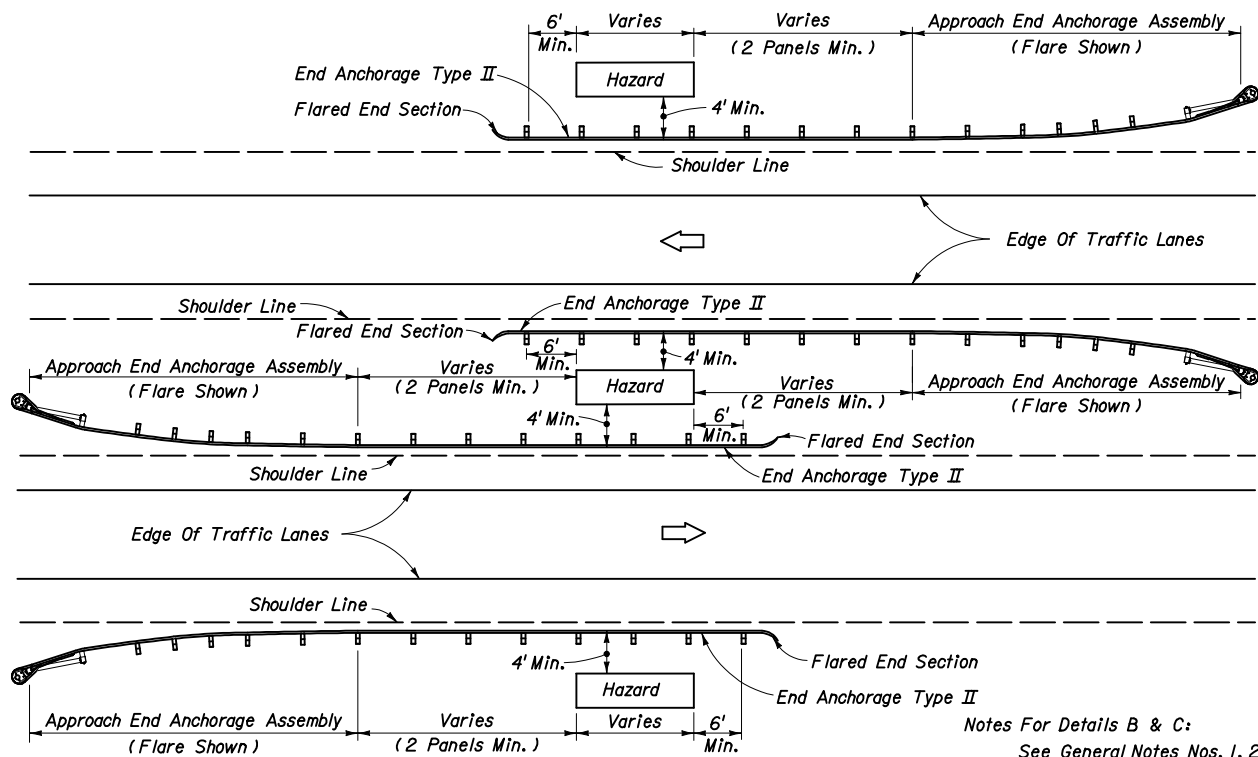
**LOCATING TERMINALS ON SHOULDER GUARDRAILS - FIGURE 2**



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**DIVIDED ROADWAY- DETAIL B**

Median Guardrail Applications Shown Are For Locations Where Approach End Anchorage Assemblies Are Outside Of The Opposing Roadway Clear Zone.

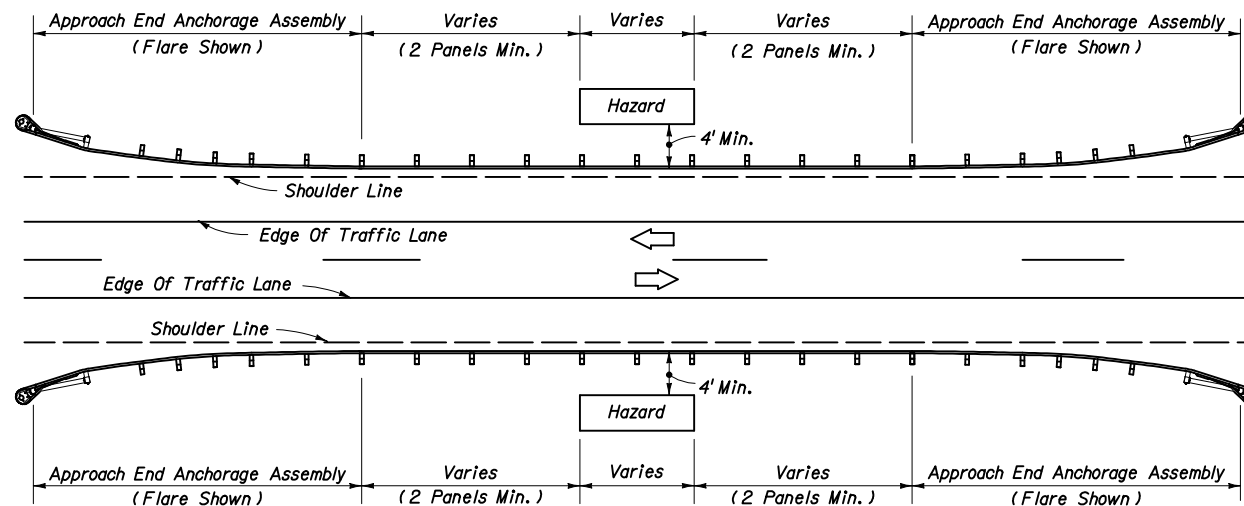
Notes For Details B & C:

See General Notes Nos. 1, 2, 3, 4, 5, 6, 7 and 8.

See Details K and L for guardrail offsets.

For end anchorage assemblies see sheets elsewhere in this index and the plans.

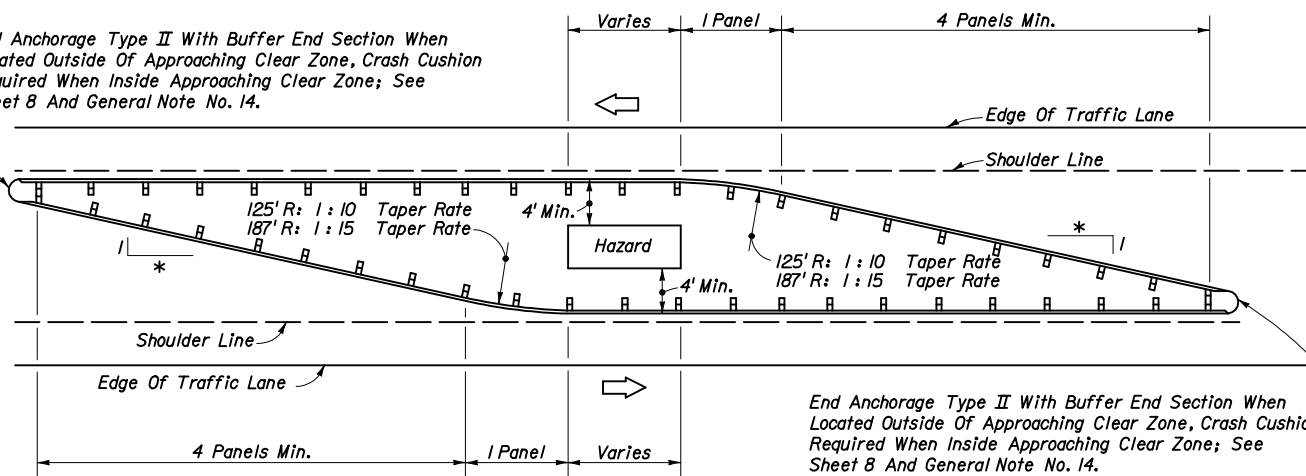
For hazards that require shielding and are located back of curb see other sheets of this index, and where rigid barrier is required see Index No. 410.



**UNDIVIDED ROADWAY- DETAIL C**

**GUARDRAIL APPLICATION FOR ROADSIDE HAZARDS**

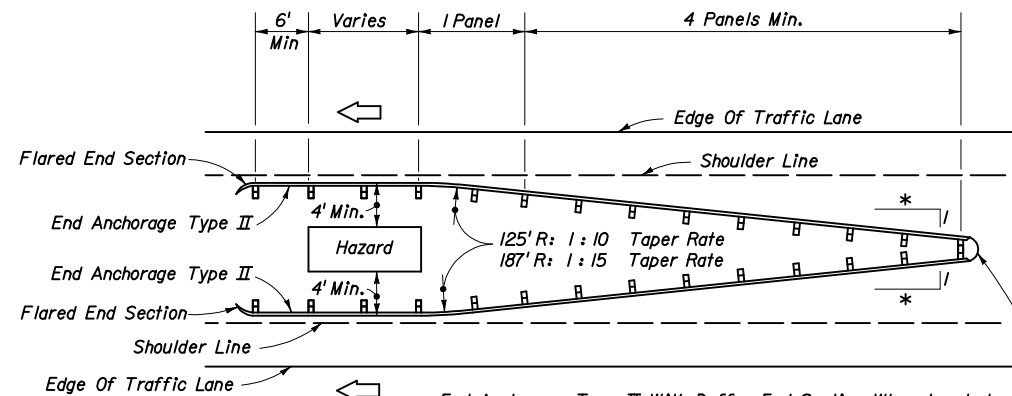
End Anchorage Type II With Buffer End Section When Located Outside Of Approaching Clear Zone, Crash Cushion Required When Inside Approaching Clear Zone; See Sheet 8 And General Note No. 14.



**OPPOSING TRAFFIC- DETAIL D**

This Guardrail Configuration Applies Where Approach End Anchorage Assemblies Cannot be Located Outside Of The Opposing Roadway Clear Zone.

End Anchorage Type II With Buffer End Section When Located Outside Of Approaching Clear Zone, Crash Cushion Required When Inside Approaching Clear Zone; See Sheet 8 And General Note No. 14.



**ONE-WAY TRAFFIC- DETAIL G**

End Anchorage Type II With Buffer End Section When Located Outside Of Approaching Clear Zone, Crash Cushion Required When Inside Approaching Clear Zone. See General Note No. 14.

\* 1:10 Taper Rate For Design Speeds ≤ 45 mph  
 1:15 Taper Rate For Design Speeds ≥ 50 mph

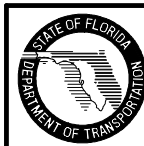
Notes For Details D & G:

See General Notes Nos. 1, 2, 3, 4, 5, 7, and 14.

See Details K and L for guardrail offsets.

For hazards that require shielding and are located back of curb see other sheets of this index, and where rigid barrier is required see Index No. 410.

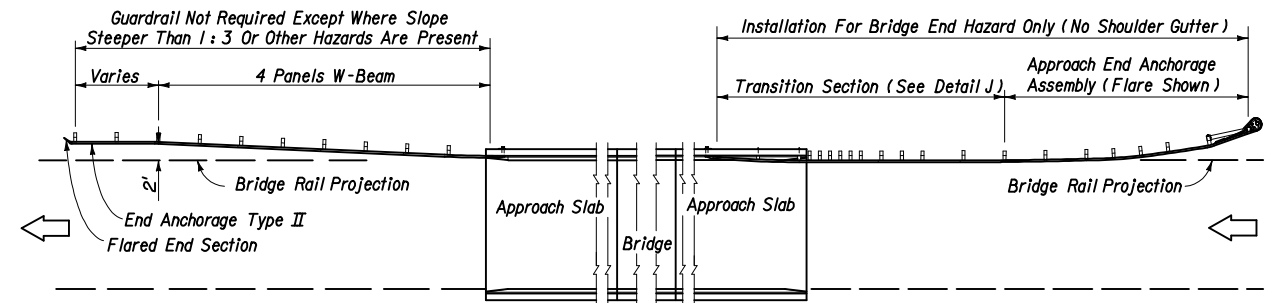
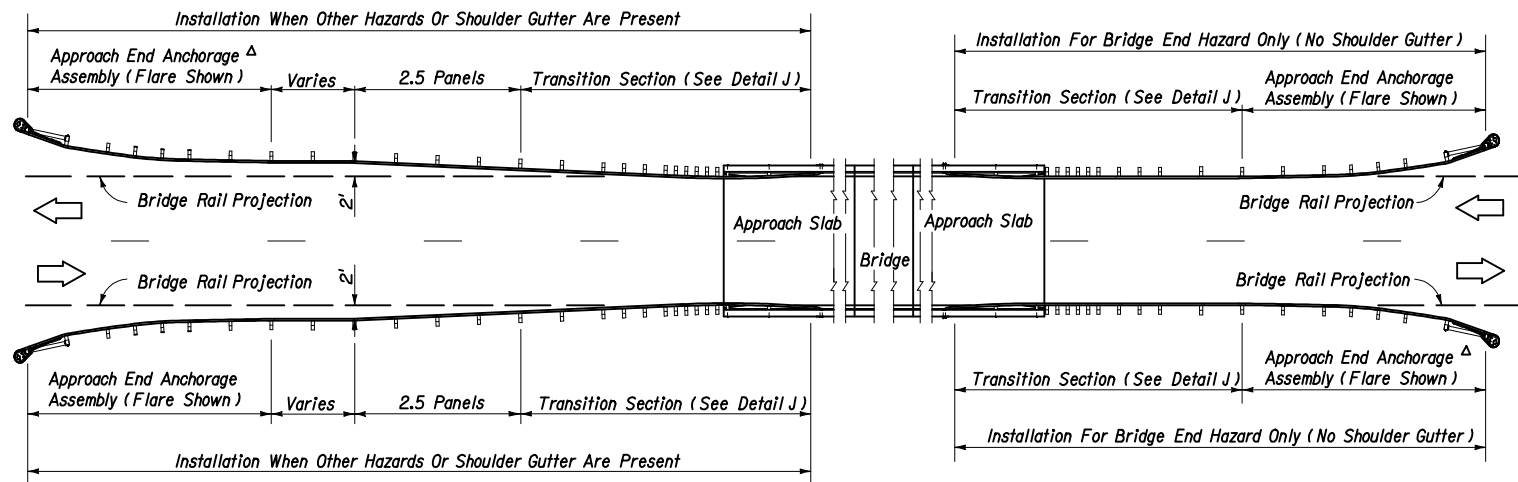
**GUARDRAIL APPLICATION FOR NARROW MEDIAN AND GORE HAZARDS**



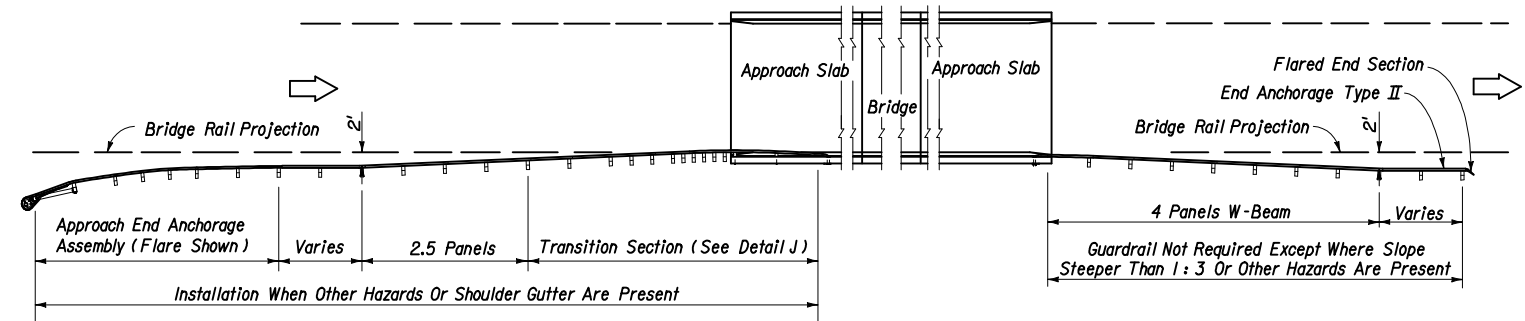
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For Median Guardrail See Sheets 7 & 8 And General Note 12.



<sup>Δ</sup>With Four Or More Lanes Trailing Guardrail Anchorages May Be As Shown In Detail P Unless Other Anchorage Called Out In The Plans  
**UNDIVIDED ROADWAY - DETAIL O**

**DIVIDED ROADWAY - DETAIL P**

Notes For Details O & P:

See General Notes Nos. 1, 2, 3, 4, 5, 6, 8 and 9. See Detail J for approach connections to bridges.

For end anchorage assemblies see sheets elsewhere in this index and the plans.

Shoulder gutter in itself does not require the installation of guardrail.

**GUARDRAIL APPLICATIONS FOR BRIDGES WITH FULL WIDTH SHOULDERS AND SAFETY SHAPE TRAFFIC RAILING BARRIER EXTENDING FULL LENGTH OF APPROACH SLAB**

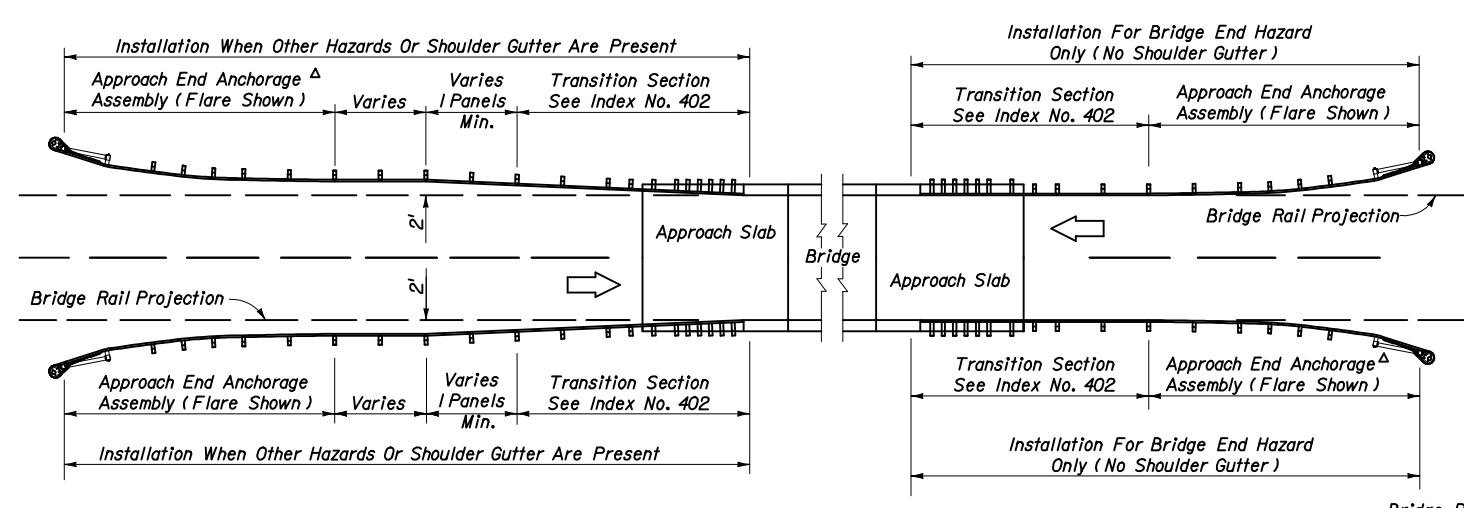


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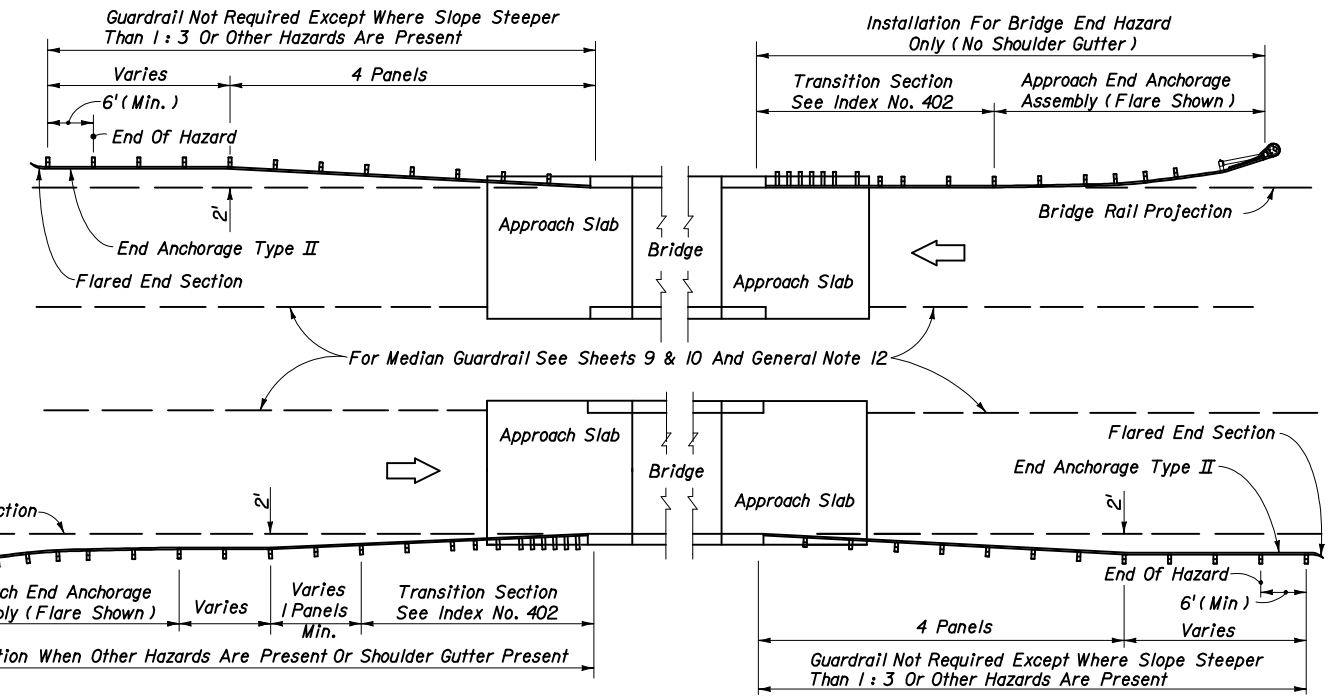
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$\Delta$ With Four Or More Lanes Trailing Guardrail Anchorages May Be As Shown In Detail I Unless Other Anchorage Called Out In The Plans

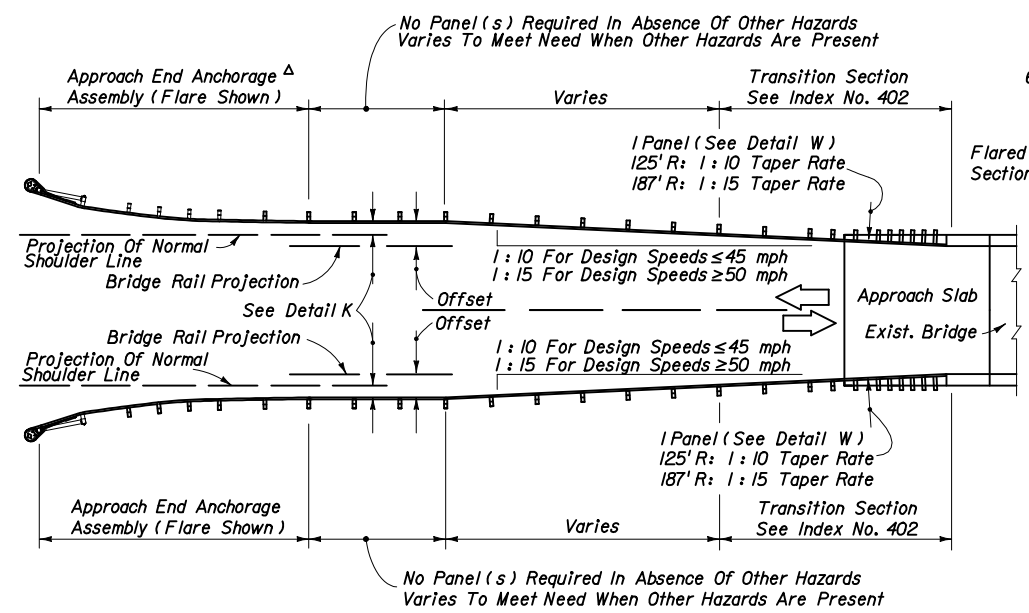
**UNDIVIDED ROADWAY - DETAIL H**



**DIVIDED ROADWAY - DETAIL I**

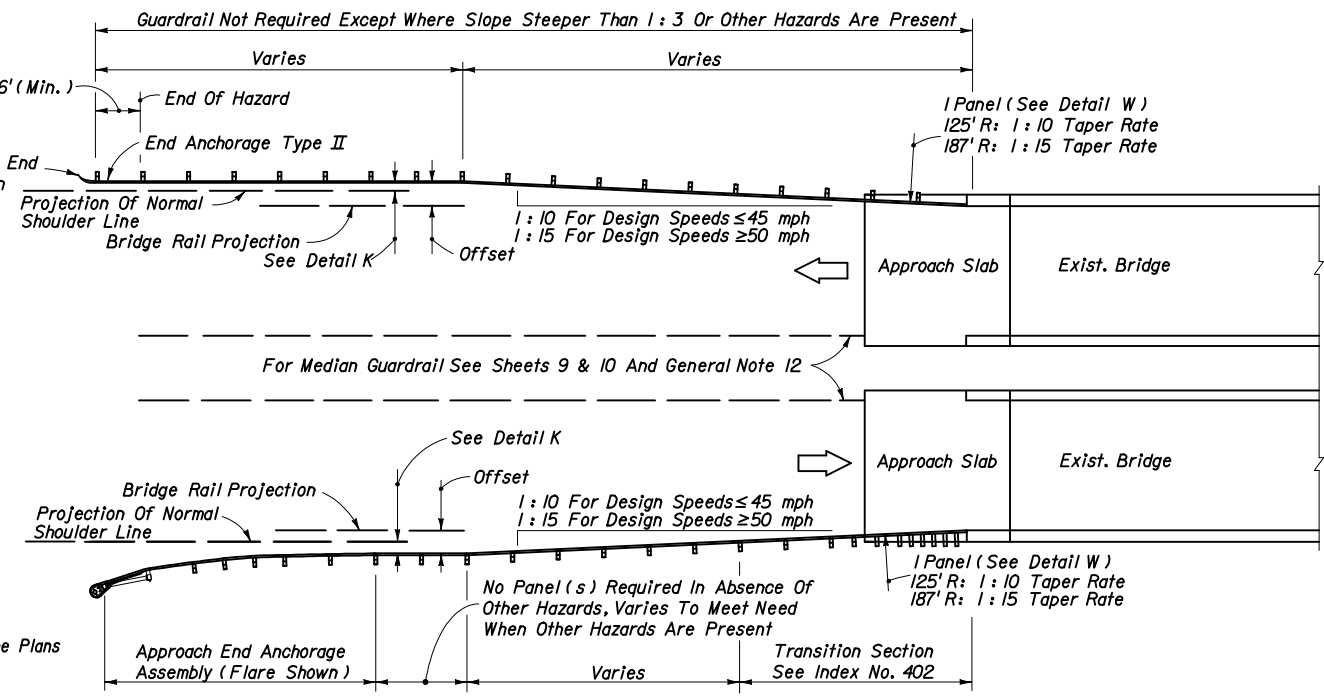
Notes For Details H & I:  
 See General Notes Nos. 1, 2, 3, 4, 5, 6, 8, and 9. See Detail N and Index No. 402 for approach connections to bridges.  
 For end anchorage assemblies see sheets elsewhere in this Index and in the plans.  
 Shoulder gutter in itself does not require the installation of guardrail.

**GUARDRAIL APPLICATIONS FOR BRIDGES WITH FULL WIDTH SHOULDERS AND SAFETY SHAPE TRAFFIC RAILING BARRIER EXTENDING LESS THAN FULL APPROACH SLAB LENGTH**



$\Delta$ With Four Or More Lanes Trailing Guardrail Anchorages May Be As Shown In Detail I Unless Other Anchorage Called Out In The Plans

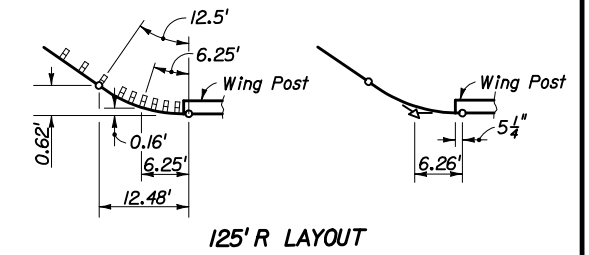
**UNDIVIDED ROADWAY - DETAIL S**



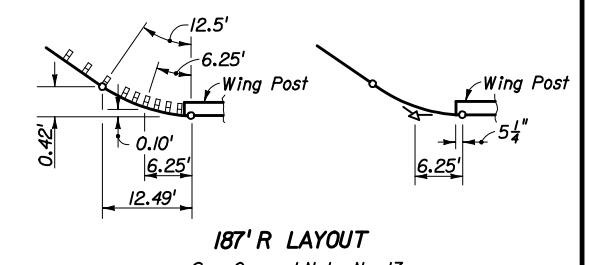
**DIVIDED ROADWAY - DETAIL T**

Notes for Details S & T:  
 See General Notes Nos. 1, 2, 3, 4, 5, 6, 8 and 9. See Detail N and Index No. 402 for approach connections to bridges.  
 For end anchorage assemblies see sheets elsewhere in this Index and the plans.

**GUARDRAIL APPLICATIONS FOR BRIDGES WITH LESS THAN FULL WIDTH SHOULDERS AND SAFETY SHAPE TRAFFIC RAILING BARRIER EXTENDING LESS THAN FULL APPROACH SLAB LENGTH**



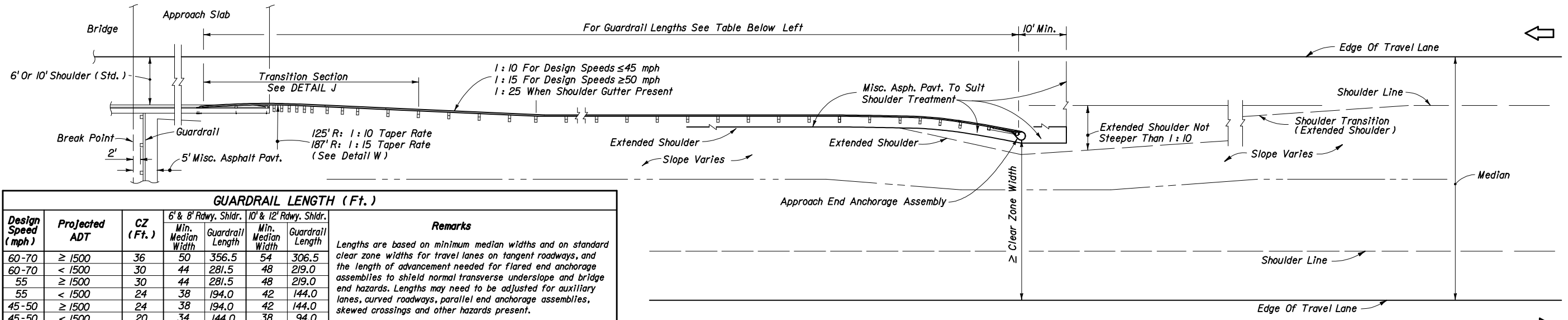
**125' R LAYOUT**



**187' R LAYOUT**

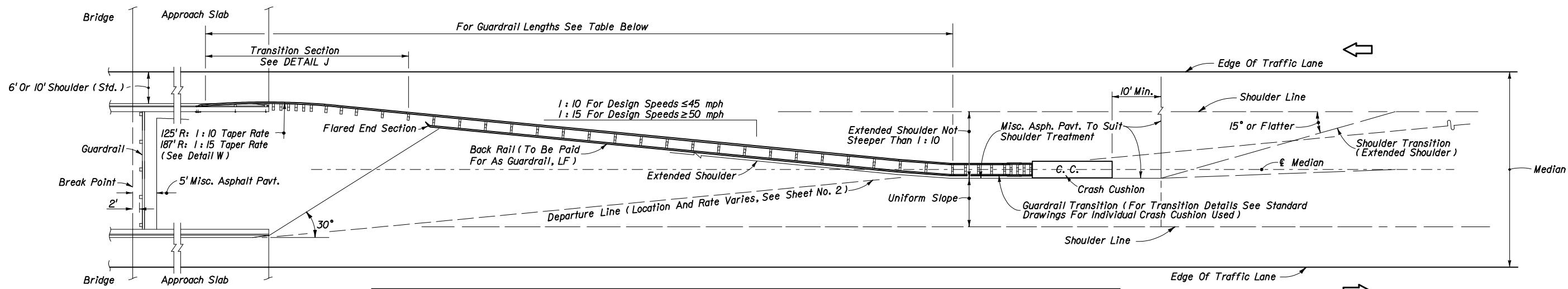
See General Note No. 13

**STANDARD PANELS SET TO RADIALS ADJOINING BRIDGES**  
**DETAIL W**



Design Speed (mph)	Projected ADT	CZ (Ft.)	6' & 8' Rdwy. Shldr.		10' & 12' Rdwy. Shldr.		Remarks
			Min. Median Width	Guardrail Length	Min. Median Width	Guardrail Length	
60-70	≥ 1500	36	50	356.5	54	306.5	Lengths are based on minimum median widths and on standard clear zone widths for travel lanes on tangent roadways, and the length of advancement needed for flared end anchorage assemblies to shield normal transverse underslope and bridge end hazards. Lengths may need to be adjusted for auxiliary lanes, curved roadways, parallel end anchorage assemblies, skewed crossings and other hazards present.
60-70	< 1500	30	44	281.5	48	219.0	
55	≥ 1500	30	44	281.5	48	219.0	
55	< 1500	24	38	194.0	42	144.0	
45-50	≥ 1500	24	38	194.0	42	144.0	
45-50	< 1500	20	34	144.0	38	94.0	
45-50	Urban % Curb	24	38	194.0	42	144.0	
35-40	Urban % Curb	18	32	144.0	36	81.5	

Note: For approach end anchorage assemblies see sheets elsewhere in this Index and the plans.  
**WHEN END TERMINAL IS OUTSIDE OF OPPOSING ROADWAY CLEAR ZONE**

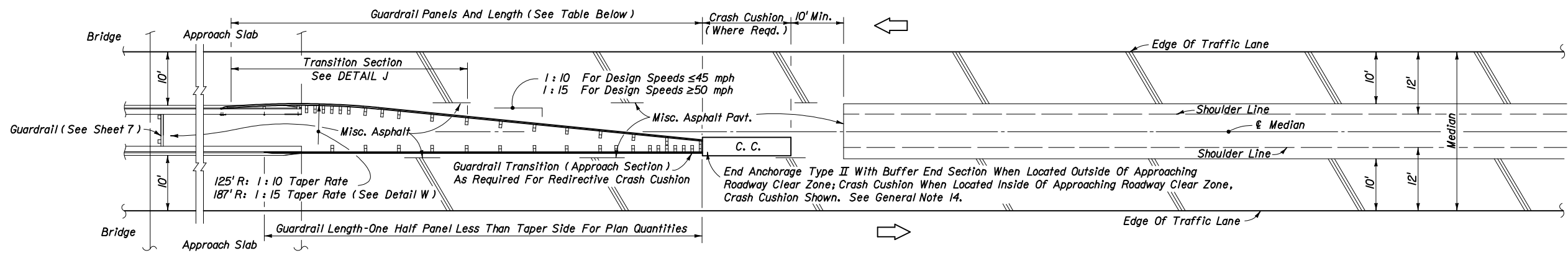


Median Width (Ft.)	1:10 TAPER RATE								1:15 TAPER RATE							
	6' Bridge Shoulder				10' Bridge Shoulder				6' Bridge Shoulder				10' Bridge Shoulder			
	Panels (No.)		Length (Ft.)		Panels (No.)		Length (Ft.)		Panels (No.)		Length (Ft.)		Panels (No.)		Length (Ft.)	
	Front	Back	Total	Total	Front	Back	Total	Total	Front	Back	Total	Total	Front	Back	Total	Total
32	9.5	6	15.5	193.75	6.5	4	10.5	131.25	13.5	10	23.5	293.75	8.5	6	14.5	181.25
34	10.5	7	17.5	218.75	7.5	5	12.5	156.25	14.5	11	25.5	318.75	9.5	7	16.5	206.25
36	10.5	7	17.5	218.75	7.5	5	12.5	156.25	15.5	12	27.5	343.75	10.5	8	18.5	231.25
38	11.5	8	19.5	243.75	8.5	6	14.5	181.25	16.5	13	29.5	368.75	11.5	9	20.5	256.25
40	12.5	9	21.5	268.75	9.5	6	15.5	193.75	17.5	13	30.5	381.25	13.5	11	24.5	306.25
42	13.5	9	22.5	281.25	10.5	7	17.5	218.75	19.5	15	34.5	431.25	14.5	11	25.5	318.75
44	14.5	10	24.5	306.25	10.5	7	17.5	218.75	20.5	16	36.5	456.25	15.5	12	27.5	343.75
46	14.5	10	24.5	306.25	11.5	8	19.5	243.75	21.5	17	38.5	481.25	16.5	13	29.5	368.75
48	15.5	11	26.5	331.25	12.5	9	21.5	268.75	22.5	17	39.5	493.75	17.5	13	30.5	381.25

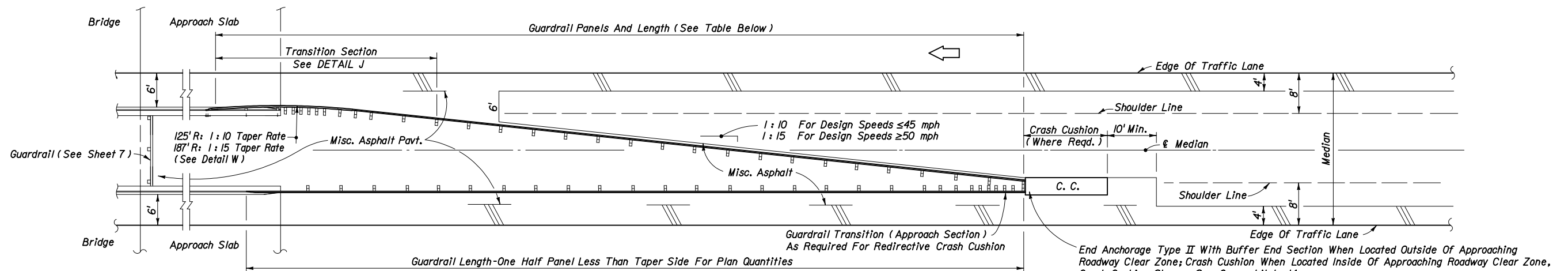
The lengths shown on this table are typical for roadways with standard width shoulders. Length requirements shall be determined on a site specific basis for both standard width and narrow bridge shoulders and end anchorage or end shielding use.

**WHEN END TERMINAL CANNOT BE LOCATED OUTSIDE OF OPPOSING ROADWAY CLEAR ZONE**

**APPROACH GUARDRAIL TREATMENTS FOR BRIDGES WITH SAFETY SHAPE TRAFFIC RAILING  
 EXTENDING FULL APPROACH SLAB LENGTH IN WIDE MEDIANS WITH FLUSH SHOULDERS**

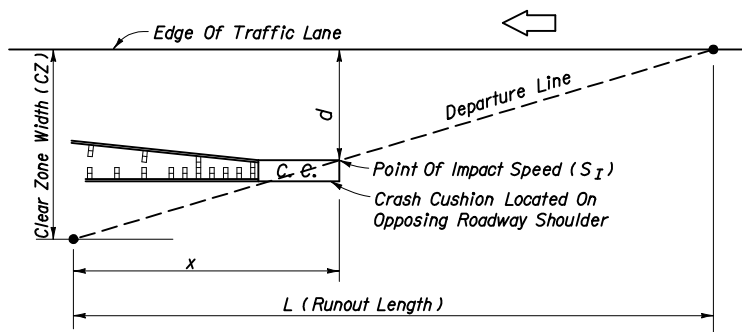


**MEDIANS WITH 10' BRIDGE SHOULDERS**



**MEDIANS WITH 6' BRIDGE SHOULDERS**

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



Speed ( $S_I$ ) For Determining Crash Cushion Size:

$$S_I = \frac{x}{L} (\text{Design Speed}) = \frac{(CZ-d)}{CZ} [\text{Design Speed}]$$

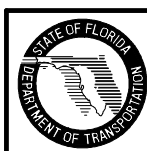
**SIZING CRASH CUSHIONS LOCATED ON OPPOSING ROADWAY SHOULDERS**

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	14.5	181.25	20.5	256.25	7.5	93.75	10.5	131.25
28	12.5	156.25	18.5	231.25	6.5	81.25	8.5	106.25
26	11.5	143.75	15.5	193.75	5.5*	68.75	6.5	81.25
24	9.5	118.75	13.5	168.75	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. When crash cushions are required on opposing roadway shoulders, their sizes may be determined by the residual speeds ( $S_I$ 's) along the runouts from the approach roadways; however, when calculated speeds ( $S_I$ '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-Three beam transition panel; single faced guardrail must have a length of five (5) or more panels.

**APPROACH GUARDRAIL TREATMENTS FOR BRIDGES WITH SAFETY SHAPE TRAFFIC RAILING EXTENDING FULL APPROACH SLAB LENGTH IN NARROW MEDIANS WITH FLUSH SHOULDERS**



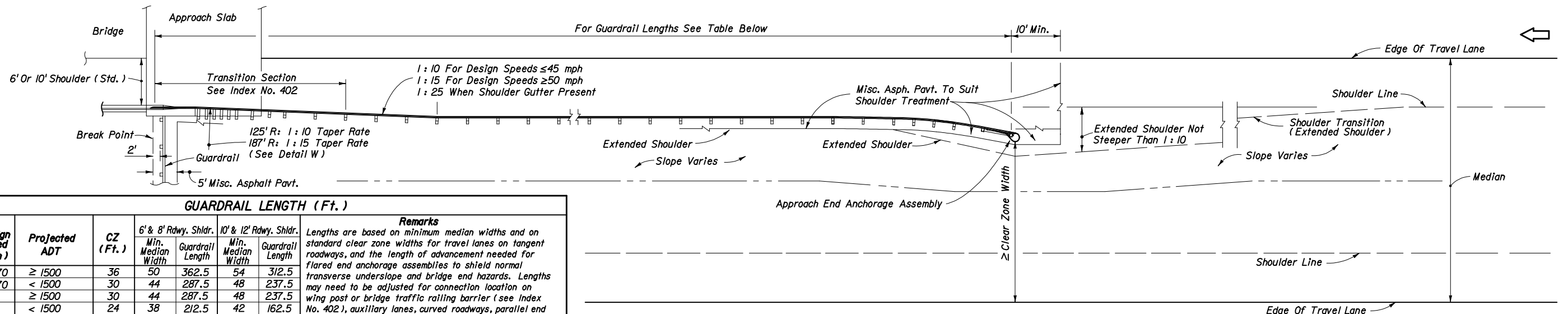
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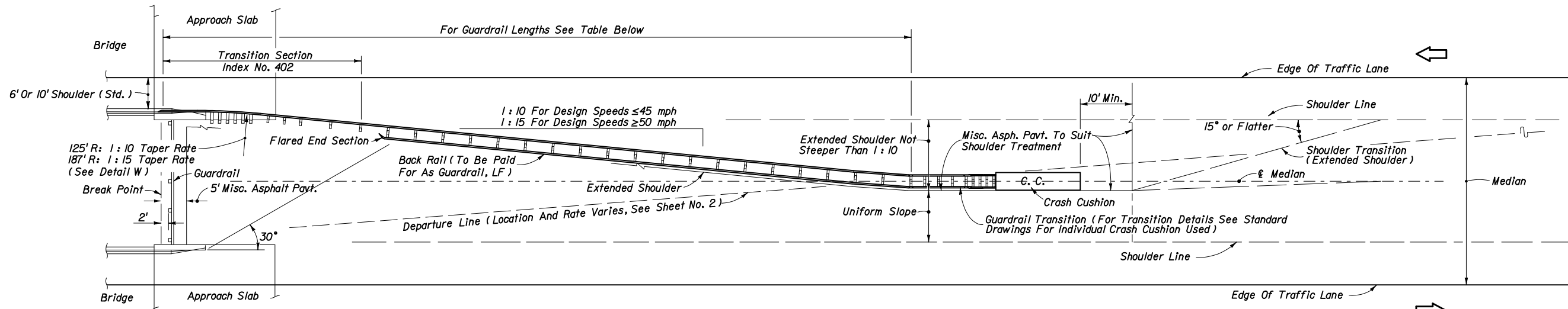
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GUARDRAIL LENGTH (Ft.)							
Design Speed (mph)	Projected ADT	CZ (Ft.)	6' & 8' Rdwy. Shldr.		10' & 12' Rdwy. Shldr.		Remarks
			Min. Median Width	Guardrail Length	Min. Median Width	Guardrail Length	
60-70	≥ 1500	36	50	362.5	54	312.5	Lengths are based on minimum median widths and on standard clear zone widths for travel lanes on tangent roadways, and the length of advancement needed for flared end anchorage assemblies to shield normal transverse underslope and bridge end hazards. Lengths may need to be adjusted for connection location on wing post or bridge traffic railing barrier (see Index No. 402), auxiliary lanes, curved roadways, parallel end anchorage assemblies, skewed crossings and other hazards present. When the wing post is replaced by bridge traffic railing barrier, reference Detail J and see Index No. 402.
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 % Curb	24	38	212.5	42	162.5	
30-40	Urban % Curb	18	32	162.5	36	100.0	

Note: For approach end anchorage assemblies see sheets elsewhere in this Index and the plans.  
**WHEN END TERMINAL IS OUTSIDE OF OPPOSING ROADWAY CLEAR ZONE**

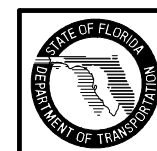


Median Width (Ft.)	GUARDRAIL LENGTHS															
	1:10 TAPER RATE								1:15 TAPER RATE							
	6' Bridge Shoulder				10' Bridge Shoulder				6' Bridge Shoulder				10' Bridge Shoulder			
	Panels (No.)		Length (Ft.)		Panels (No.)		Length (Ft.)		Panels (No.)		Length (Ft.)		Panels (No.)		Length (Ft.)	
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. When the wing post is replaced by bridge traffic railing barrier, reference Detail J and see Index No. 402. 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.

**WHEN END TERMINAL CANNOT BE LOCATED OUTSIDE OF OPPOSING ROADWAY CLEAR ZONE**

## APPROACH GUARDRAIL TREATMENTS FOR BRIDGES WITH SAFETY SHAPE TRAFFIC RAILING EXTENDING LESS THAN FULL APPROACH SLAB LENGTH IN WIDE MEDIANS WITH FLUSH SHOULDERS

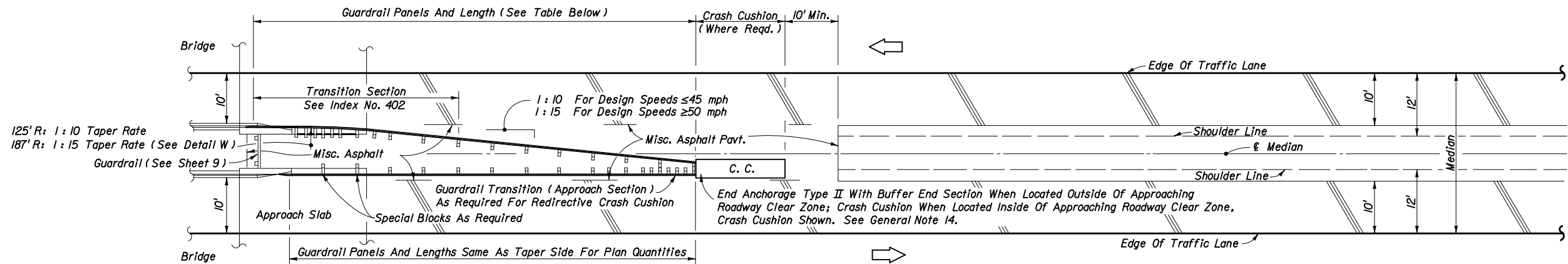


2006 FDOT Design Standards

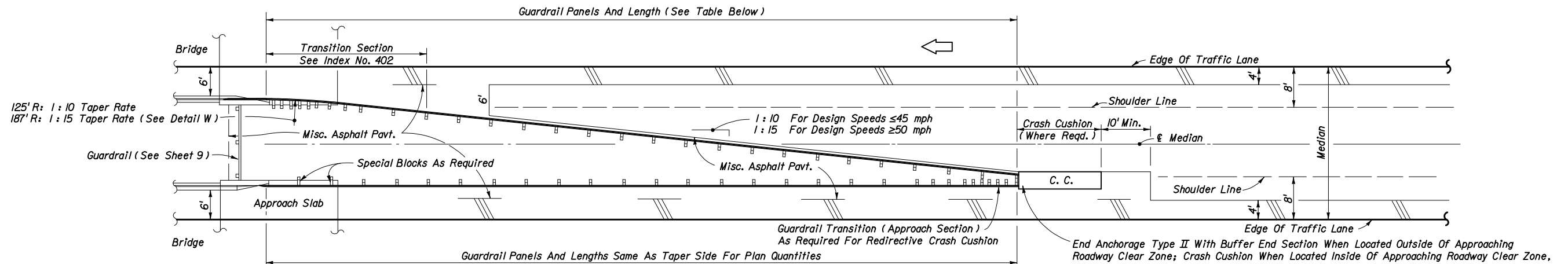
GUARDRAIL

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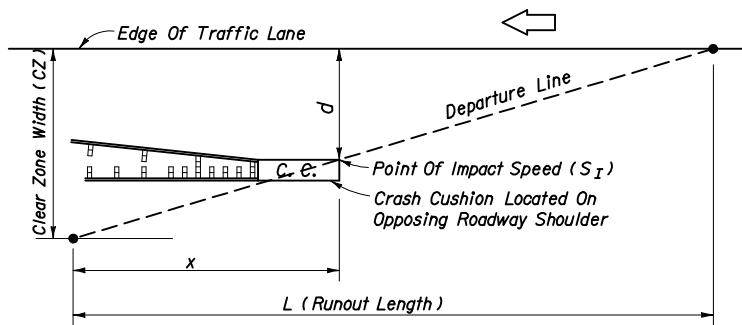


**MEDIANS WITH 10' BRIDGE SHOULDERS**



**MEDIANS WITH 6' BRIDGE SHOULDERS**

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



Speed ( $S_1$ ) For Determining Crash Cushion Size:

$$S_1 = \frac{x}{L} (\text{Design Speed}) = \frac{(CZ-d)}{CZ} [\text{Design Speed}]$$

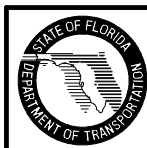
**SIZING CRASH CUSHIONS LOCATED ON OPPOSING ROADWAY SHOULDERS**

MEDIAN WIDTH (Ft.)	GUARDRAIL LENGTHS							
	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. When crash cushions are required on opposing roadway shoulders, their sizes may be determined by the residual speeds ( $S_1$ 's) along the runouts from the approach roadways; however, when calculated speeds ( $S_1$ '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-Three beam transition panel; single faced guardrail must have a length of five (5) or more panels.

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



2006 FDOT Design Standards

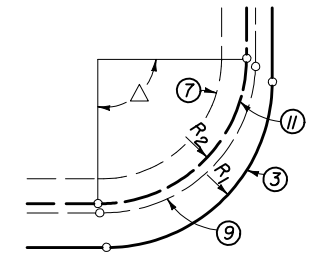
**GUARDRAIL**

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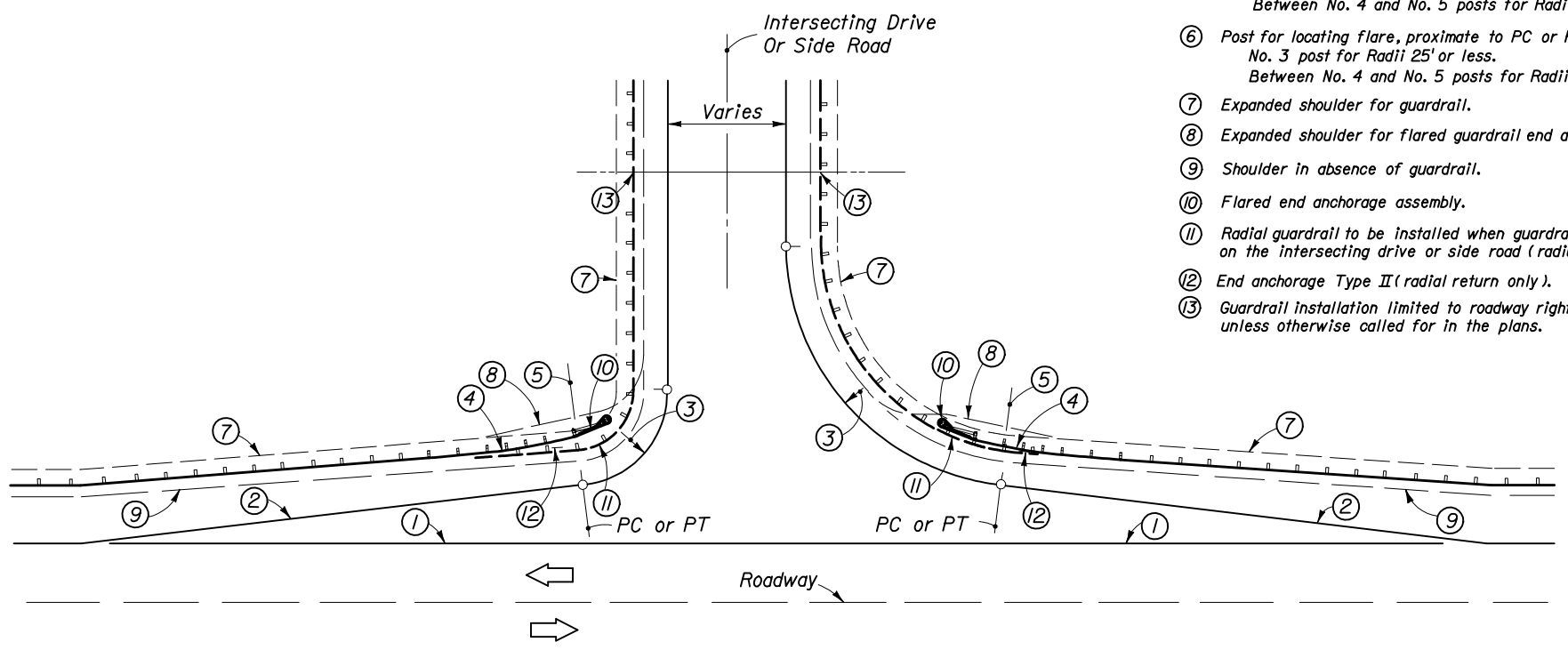
RADIAL GUARDRAIL						
Normal Turnouts						
Taper			Simple Curve			
$R_1$	$R_2$	Panels Required	$\Delta$	$R_2$	Panels Required	$\Delta$
15'	25'	3	85° 56'	25'	3	85° 56'
20'	25'	3	85° 56'	25'	3	85° 56'
25'	25'	3	85° 56'	25'	3	85° 56'
30'	25'	3	85° 56'	25'	3	85° 56'
35'	25'	3	85° 56'	25'	3	85° 56'
40'	40'	5	89° 31'	40'	5	89° 31'
45'	40'	5	89° 31'	40'	5	89° 31'
50'	40'	5	89° 31'	40'	5	89° 31'

Note: Only 25' and 40' radius panels are to be used for return guardrail on normal turnouts. On skewed turnouts the number of panels used and their arrangement with straight panels will be as shown in the plans or as directed by the Engineer.

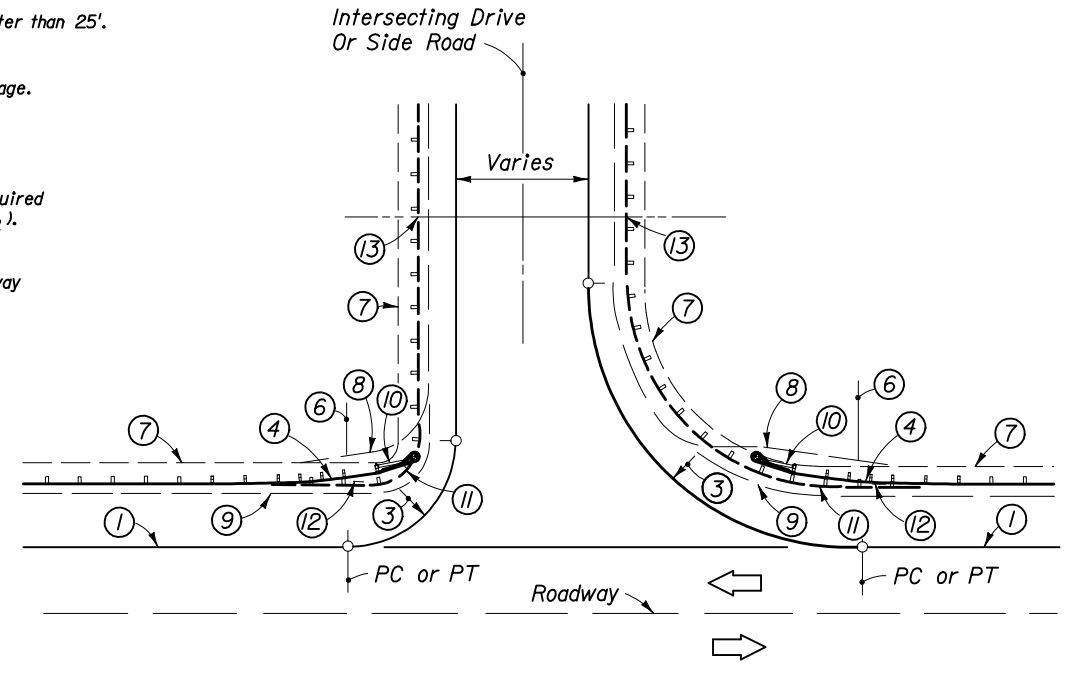


RADIAL GUARDRAIL

- LEGEND**
- ① Edge of traffic lane for simple curve turnouts. Edge of travel lane for taper turnouts.
  - ② Taper.
  - ③ Pavement return (radius  $R_1$ ).
  - ④ Flared end anchorage to be installed except when existing guardrail on intersecting drive or side road adjoins the project.
  - ⑤ Post for locating flare, proximate to PC or PT:  
No. 2 post for Radii 25' or less.  
No. 3 post for Radii >25' and <50'.  
Between No. 4 and No. 5 posts for Radii 50' or greater.
  - ⑥ Post for locating flare, proximate to PC or PT:  
No. 3 post for Radii 25' or less.  
Between No. 4 and No. 5 posts for Radii greater than 25'.
  - ⑦ Expanded shoulder for guardrail.
  - ⑧ Expanded shoulder for flared guardrail end anchorage.
  - ⑨ Shoulder in absence of guardrail.
  - ⑩ Flared end anchorage assembly.
  - ⑪ Radial guardrail to be installed when guardrail required on the intersecting drive or side road (radius  $R_2$ ).
  - ⑫ End anchorage Type II (radial return only).
  - ⑬ Guardrail installation limited to roadway right of way unless otherwise called for in the plans.



TAPER TURNOUTS

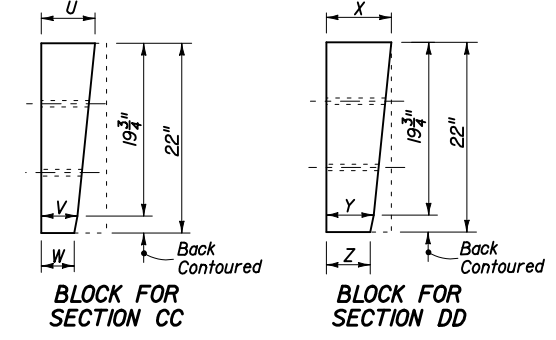
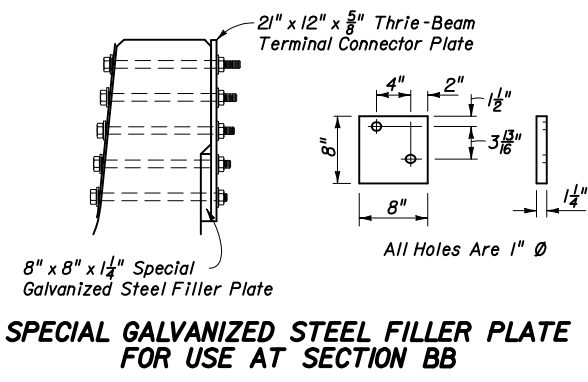
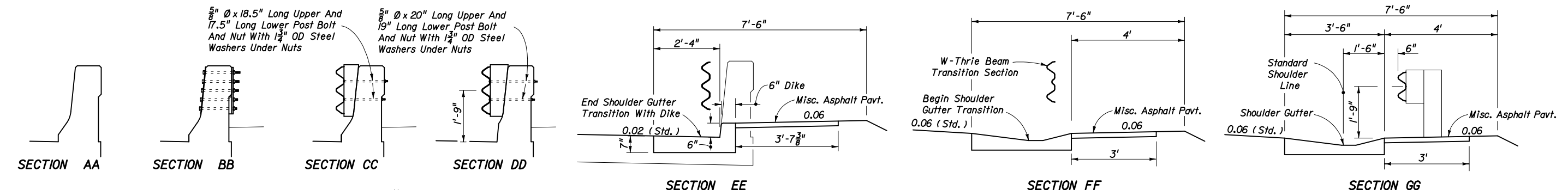
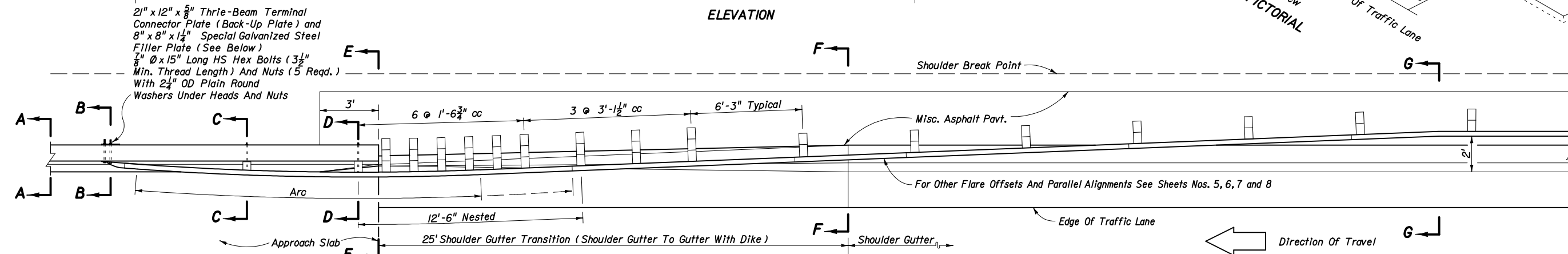
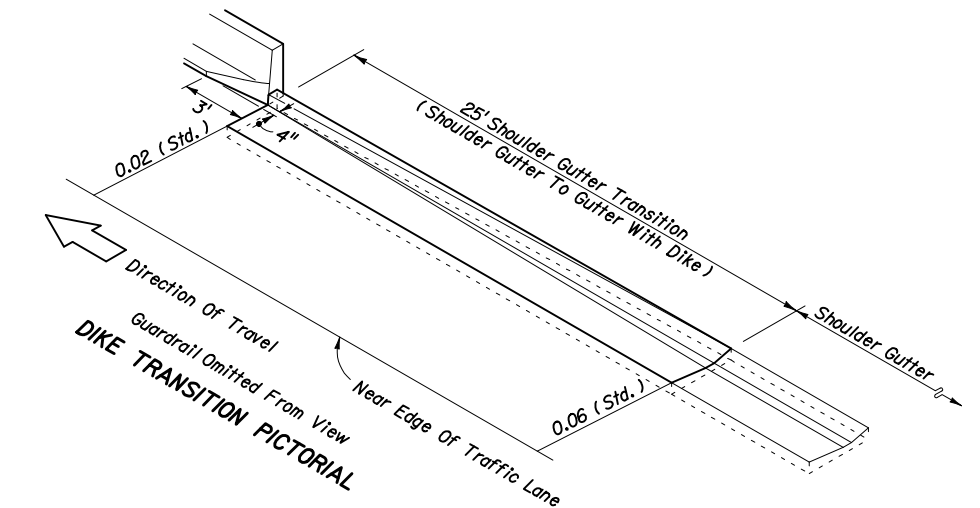
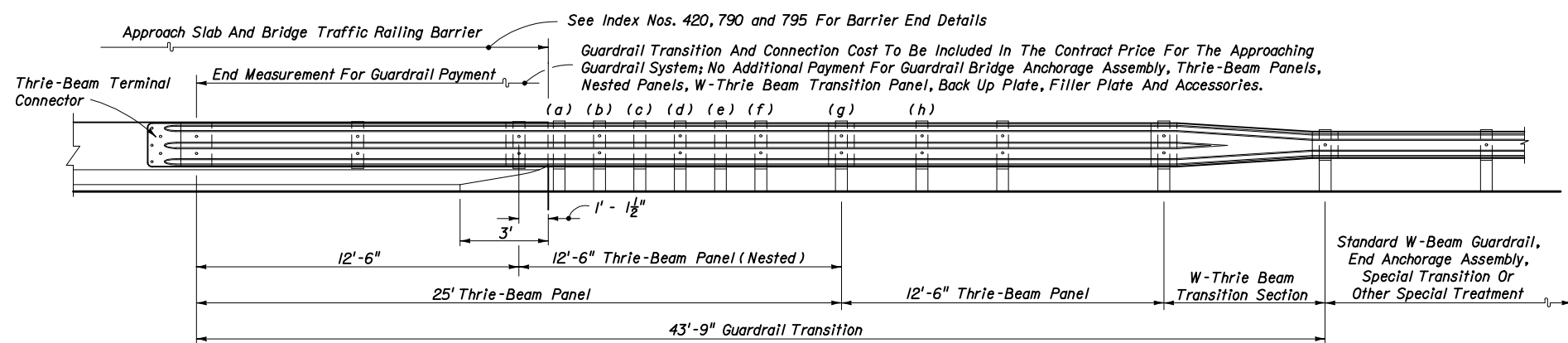


SIMPLE CURVE TURNOUTS

Note: The guardrail application shown on this sheet are for highways with flush shoulders and no restraints for constructing flared end anchorages and minimum lengths of guardrail. For highways with flush shoulders and restraints to constructing flared anchorages, see General Note No. 6.

Where openings in guardrail are required in close proximity to bridge traffic rails or ends of concrete barrier walls, and minimum length guardrail with flared end anchorages can not be applied, either controlled release returns or energy absorbing terminals are to be applied.

**GUARDRAIL APPLICATIONS FOR INTERSECTING DRIVES AND SIDE ROADS ON RURAL FACILITIES**



APPLICATIONS	SECTION CC			SECTION DD		
	U	V	W	X	Y	Z
Single Face Guardrail	6 1/8"	4 1/8"	3 5/8"	7 1/2" nom.	5 1/2" nom.	5" nom.
Double Face Guardrail With Timber Posts	5 1/8"	3 3/8"	2 5/8"	6 1/2" nom.	4 1/2" nom.	4" nom.
Double Face Guardrail With Steel Posts	4 3/8"	2 3/8"	1 7/8"	5 3/4"	3 3/4"	3 1/4"

For Double Face Guardrail Connections To Median Bridge Traffic Railing Barrier, See Index No. 410 'Guardrail Connection To Concrete Barrier Wall Approach Ends'.

**GUARDRAIL TRANSITION NOTE**

When shoulder gutter is required, the 25' long dike transition, shown in the 'PLAN' and 'PICTORIAL' above, is required. Double offset blocks are shown for guardrail installations adjacent to shoulder gutter/dike transitions; single offset blocks shall be installed in absence of shoulder gutter. Nested rails shall not be bolted to the blocks and posts at posts (a), (c), and (e). One 16d galvanized nail shall be driven between each post and block, and between double blocks, in order to prevent block rotation, see '16d NAIL FOR PREVENTION OF OFFSET BLOCK ROTATION', this Index.

**GUARDRAIL APPROACH TRANSITION AND CONNECTION FOR BRIDGES WITH SAFETY SHAPE TRAFFIC RAILING BARRIERS EXTENDING FULL LENGTH OF APPROACH SLAB**

**DETAIL J**