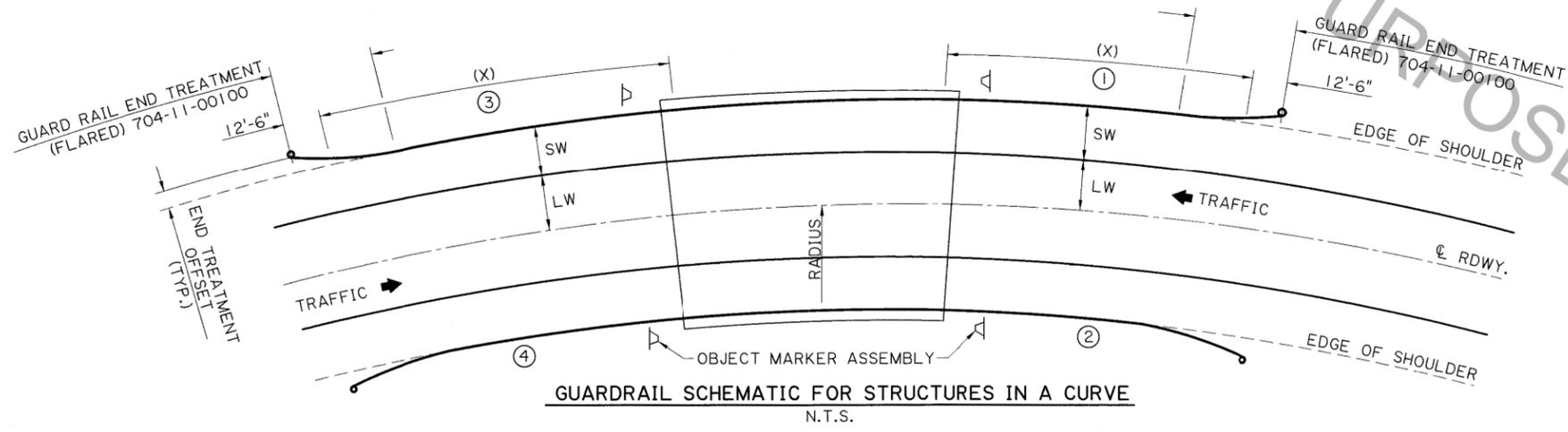


BRIDGE END GUARD RAIL ON MEDIAN SIDE

NOTES:

- \* 1. GUARD RAIL INSTALLATIONS MAY BE PAVED USING INCIDENTAL CONCRETE PAVING (4" THICK) (706-03-00100) OR 4" MIN. ASPHALTIC CONCRETE. THE INCIDENTAL CONCRETE OR ASPHALT WILL BE USED IF A LAYOUT DETAIL, PAY ITEM AND QUANTITY IS INCLUDED IN THE PLANS. SEE SHEET 10 FOR REQUIRED POST DETAILS WHEN PAVING IS USED AROUND THE POSTS.
- ☑ 2. FRONT GUARD RAIL SHALL BE FLARED IN ACCORDANCE TO THE DESIGN SPEED.
- △ 3. GUARD RAIL SHALL BE FLARED TO MEET THE FRONT GUARD RAIL.
- ⊙ 4. USE A GUARD RAIL END TREATMENT (BI-DIRECTIONAL), ITEM 704-11-00300.
- 5. THE BACKSIDE GUARD RAIL AND END TREATMENT MAY BE ELIMINATED AND A GUARD RAIL END TREATMENT (FLARED OR TANGENT) MAY BE UTILIZED INSTEAD ON THE ONCOMING END OF BRIDGE IF THE BACK OF THE GUARD RAIL END TREATMENT IS OUT OF THE CLEAR ZONE (Lc) FOR THE OPPOSING TRAFFIC.
- 6. BOLT HOLE LOCATIONS ON THE CONCRETE BARRIER STANDARD ARE FOR THE THRIE BEAM TERMINAL CONNECTOR. WHEN W BEAM TERMINAL CONNECTORS ARE USED THE LOCATION OF THESE HOLES SHALL BE ADJUSTED TO FIT THE BOLT HOLE PATTERN FOR THE W BEAM TERMINAL CONNECTOR AS SHOWN ON SHEET 3 OF 10.



GUARDRAIL SCHEMATIC FOR STRUCTURES IN A CURVE N.T.S.

FORMULA FOR COMPUTING GUARD RAILS IN A CURVE

$$\textcircled{1} \textcircled{2} \quad A = \cos^{-1} \left[ \frac{R+LW}{R+LW+CZ_c} \right] - \cos^{-1} \left[ \frac{R+LW}{R+LW+SW} \right] \quad \textcircled{3} \textcircled{4} \quad A = \cos^{-1} \left[ \frac{R}{R+CZ_c} \right] - \cos^{-1} \left[ \frac{R}{R+LW+SW} \right]$$

$$X = \frac{A(R+LW+SW)}{57.3} \quad X = \frac{A(R+LW+SW)}{57.3}$$

NOTES:

- 1. GUARD RAILS COMPUTED IN ACCORDANCE WITH THE ABOVE EQUATIONS SHALL BE INSTALLED PARALLEL WITH THE CURVE OF THE ROADWAY. END TREATMENT SYSTEMS SHALL USE APPLICABLE OFFSETS WHEN REQUIRED.
- 2. LENGTH OF NEED (X) ON ONE WAY TRAFFIC SHALL USE THE EQUATION SHOWN FOR LOCATION ① & ②. WHEN A BRIDGE IS LOCATED IN A RADIUS > 2860 ft.; THE LENGTH OF NEED (X) SHALL BE COMPUTED AS STRAIGHT GUARD RAIL (USE X,Y,Z EQUATIONS ON SHEET 2 OF 10) WITH A FLARE RATE AS PER TABLE 4, SHEET 2 OF 10.

CZc : ADJUSTED CLEAR ZONE FOR HORIZONTAL CURVE, FT. SEE SHEET 2 OF 10.

R : RADIUS OF CURVE @ CL ROADWAY, FT  
 LW : LANE WIDTH, FT.  
 SW : SHOULDER WIDTH, FT.  
 X : LENGTH OF NEED, FT.  
 A : ANGLE AT CENTER FOR LENGTH OF NEED, DEGREE



DESIGNED BY P. FOSSIER	CHECKED BY K. BRAUNER	DATE 7-13-2015
CONTROL SECTION C. OWENS	REVISION DESCRIPTION P. FOSSIER	DATE 7-13-2015
STATE PROJECT MARCH 2015	SERIES NUMBER 5 OF 10	CHIEF ENGINEER James P. Williams

DATE: 7-13-2015

CHIEF ENGINEER: James P. Williams

APPROVED BY: [Signature]

DATE: [Blank]

REVISION DESCRIPTION: [Blank]

BY: [Blank]

DATE: [Blank]

CHIEF ENGINEER: [Blank]

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 Paul B. Fossier, Jr.  
 7/8/15

HIGHWAY GUARD RAILS

GR-200

BRIDGE & STRUCTURAL DESIGN