Innovations Showcase

Guardrail Calculator

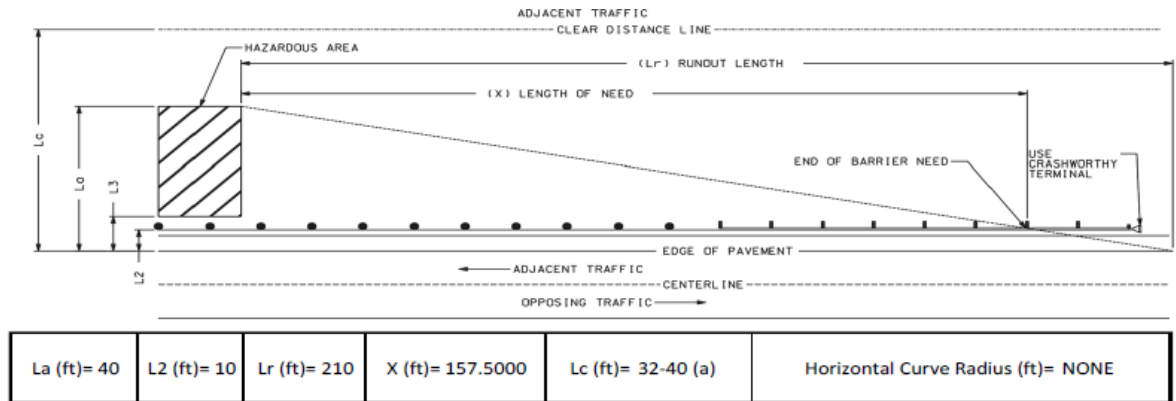| La (ft)= 40	L2 (ft)= 10	Lr (ft)= 210	X (ft)= 157.5000	Lc (ft)= 32-40 (a)	Horizontal Curve Radius (ft)= NONE

Description

For years designers and technicians have used MoDOT's Guardrail Length Need Program to help assess and design guardrail needs on projects. In recent years, the program has become outdated and no longer automatically calculates the correct length of need for guardrail components. This is mostly in part because AASHTO tables have been modified for run-out lengths for the various design criteria that MoDOT encounters. The Guardrail Calculator is a quick and easy Guardrail Length of Need spreadsheet calculator. This innovation is a simple spreadsheet to aid a designer that by entering and selecting a few design variables have instantaneous and correct guardrail data.

Benefit

The calculator spreadsheet saves MoDOT money by correctly evaluating guardrail length of need based on updated AASHTO tables since the new run-out lengths dictate shorter runs of guardrail than the old tables. It simplifies work by the ease of use for the designer. While the spreadsheet contains some complicated formulas, the user will not have to use them. The user simply opens the file, saves it as their own document then adds a few project details and variables. The results are automatic. Also, since it is an Excel spreadsheet, it is easily modified without programming experience. The spreadsheet saves the user time by eliminating the need to look up correct AASHTO tables for calculating. By using the spreadsheet in the design process, safety is improved since the most accurate guardrail analysis for the various hazards that require the safety and protection that guardrail offers.

Materials and Labor

5 hours of staff time with no material costs. Spreadsheet shown on back page.

For More Information Contact:

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Additional photos or videos can be seen by accessing the Innovations Challenge SharePoint page at: http://sharepoint/systemdelivery/TP/Documents/InnovationsChallenge.aspx.

Length of Need Spreadsheet

Date:	County:	Route:	Job Number:
Current Date	Any County	Any Route	Any Job Number

Comments:	describe the location

INPUT DATA:

TRAFFIC SPEED (MPH)	⇨	60	Select or Enter Design Speed
DESIGN (ADT)	⇨	2250	Enter Traffic Volume
SLOPE TYPE	⇨	Fill 4:1 - 5:1	Select Slope
DIRECTION	⇨	Adjacent	Select Direction of Traffic
BRIDGE	⇨	YES	Select Yes or No
BARRIER TYPE	⇨	Safety Barrier	Select Barrier Type
HORIZONTAL CURVE RADIUS (ft)	⇨	NONE	Select Radius If Applicable See Note (e)
(La) Lateral Extent (ft)	⇨	40	Select or Enter Extent of Hazardous Area (La) or same/greater than (Lc)
(L2) Lateral Distance (ft)	⇨	10	Select or Enter (L2) Distance (See Diagram Below)

BEGIN STATION ⇩	END STATION ⇩	BEGIN LOG MILE ⇩	END LOG MILE ⇩
+00.00	+00.00	0.000	0.000

OUTPUT DATA:

(Lc) Clear Zone (ft)	32-40 (a)	Clear Zone; (a), (b), or (d) values, See Notes
(Lr) Runout Length (ft)	210	AASHTO Table 5-10(b)
X (ft)	157.5000	Length of Need
MGS Bridge Appr. Trans. Section (ft)	37.5	Bridge Approach Transition Section included in Length of Need
MGS End Anchor (ft)	0.00	N/A
MASH CW End Terminal (ft)	31.25	Approx. Length of section of MASH CW End Terminal included in Length of Need
	16.5	Aprox. Length of section of MASH CW End Terminal Beyond Length of Need
MGS Guardrail Length (ft)	100.0	8 Section(s) of 12.5' MGS Type Guardrail Required
Approximate Total Guardrail Length (ft)	181.25	Bridge Transition Section or End Anchor, Entire CW End Terminal, and Guardrail

STATION RANGE		LOG MILE RANGE	
N/A	N/A	N/A	N/A

La (ft)= 40	L2 (ft)= 10	Lr (ft)= 210	X (ft)= 157.5000	Lc (ft)= 32-40 (a)	Horizontal Curve Radius (ft)= NONE

Notes:

(a) - Where a sight specific investigation indicates a high probability of continuing crashes, or such occurrences are indicated by crash history, the designer may provide clear zone distances greater than the distance shown. Clear zones may be limited to 30 ft for practicality and to provide a consistent roadway template if previous experience with similar projects or designs, indicates satisfactory performance.

(b) - Since recovery is less likely on the unshielded, traversable 3:1 slopes, fixed objects should not be present in the vicinity of the toe of these slopes. Recovery of high speed vehicles that encroach beyond the edge of the shoulder may be expected to occur beyond the toe of the slope. Determination of the width of the recovery area at the toe of the slope should take into consideration right-of-way availability, environmental concerns, economic factors, safety needs, and accident histories. Also, the distance between the edge of the travel lane and the beginning of the 3:1 slope should influence the recovery area provided at the toe of slope.

(c) - For roadways with low volumes it may not be practical to apply even the minimum values found in AASHTO Table 3.1. Refer to the AASHTO Roadside Design Guide Chapter 10 for additional guidance for urban applications and Chapter 12 for additional considerations for low-volume roadways.

(d) - When design speeds are greater than the values provided, the designer may need to provide greater clear-zone distances. Select desired Lateral Extent of Hazardous Area (La).

(e) - If a Horizontal Curve value between 330 and 2950, is selected, a Curve Correction Factor will be applied to the Clear Zone distance. Select radius closest to your curve. Select the larger radius if half way between. This corrected Clear Zone distance may affect the distance the designer will use for the extent of the hazardous area (La) and will greatly affect the Length of Need. The clear-zone correction factor is applied to the outside of curves only. Select None for straight roadways and horizontal curves with a radius flatter than 2950 ft. (AASHTO Table 3.2)