

Maine Department of Transportation

Highway Program

Design Guidance

Title: Barrier Layout – Length of Need	Issue Date: June 1, 2014
Discipline: General Engineering	Revision Date: February 25, 2019
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Approved By: Bradford Foley, P.E.	Reference: Guardrail and Guardrail Terminal Policy

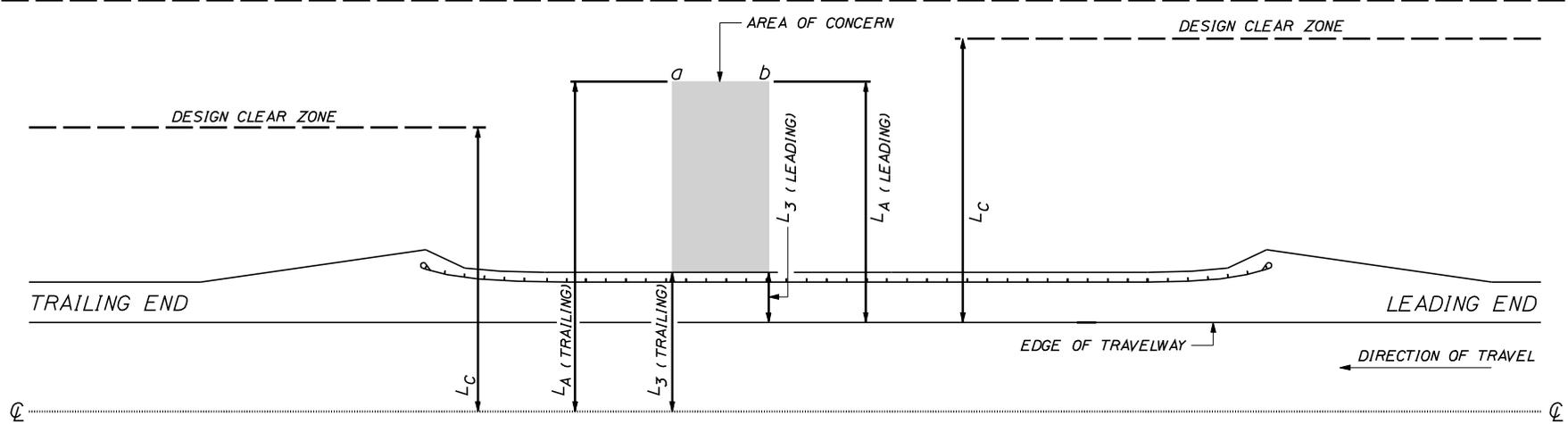
Background:

Length of Need is a term that refers to the length of guardrail needed beyond a hazard to adequately shield the hazard itself. The exact length is measured from the point where the hazard ends to the point where the guardrail terminal becomes redirective, typically at the third post in from the end.

Guidance:

The Department establishes Length of Need based on the detailed methodology presented in the *AASHTO Roadside Design Guide* with the following points of clarification:

1. Selection of an appropriate Lateral Extent of the Area of Concern (L_A) distance is a critical part of the design process. Selection shall be made as illustrated in [Figure 1](#).
2. For embankments, when the required project Clear Zone (L_C) value is beyond the edge of pavement, use the offset distance to the toe of the last 3:1 slope as the Clear Zone (L_C). Set L_A equal to L_C for determining the Length of Need.
3. For the trailing end on two-way roadways, when the Clear Zone (L_C) is less than the offset distance to the area of concern (L_3), no additional barrier is warranted but a crashworthy terminal shall be used.
4. For the trailing end on one-way roadways, use a 90-degree exit angle. Unanchored guardrail ends shall be placed 50 feet beyond the area of concern. Anchored guardrail ends shall be placed 12.5 feet beyond the area of concern. Crashworthy terminals are not required.



NOTES:

OFFSETS DEFINED FROM THE EDGE OF TRAVELWAY FOR THE LEADING END AND THE CENTERLINE FOR THE TRAILING END.

L_C = DESIGN CLEAR ZONE OFFSET

L_A = LATERAL OFFSET TO THE FARTHEST POINT OF THE AREA OF CONCERN. THE FARTHEST POINT IS DEFINED AS THE BACK FACE OF AN OBSTACLE OR THE TOE OF A NON-TRAVERSABLE EMBANKMENT.

L_3 = LATERAL OFFSET TO THE NEAREST POINT OF THE AREA OF CONCERN. THE NEAREST POINT IS DEFINED AS THE FRONT FACE OF AN OBSTACLE OR THE TOP OF A NON-TRAVERSABLE EMBANKMENT.

a,b = POINTS REPRESENTING THE TOE OF SLOPE AT THE LAST 3:1 SLOPE FOR EMBANKMENTS OR THE BACK FACE OF AN OBSTACLE

c = POINT REPRESENTING THE NEAREST POINT OF THE AREA OF CONCERN.

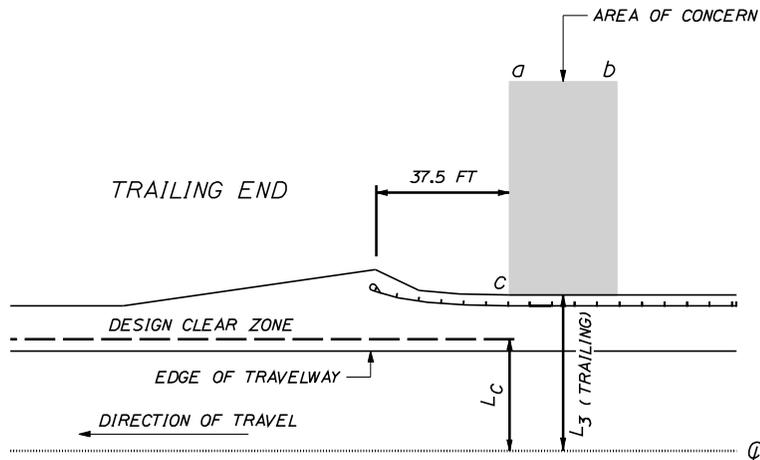
OBSTACLES

IF $L_C > L_A$: USE L_A
 IF $L_3 < L_C < L_A$: USE L_C AS L_A

EMBANKMENTS

ALWAYS USE L_A
 L_A IS MEASURED TO THE TOE OF THE LAST 3:1 SLOPE.

APPLIES TO LEADING AND TRAILING ENDS



OBSTACLES AND EMBANKMENTS

IF $L_C < L_3$:
 NO ADDITIONAL BARRIER NECESSARY BEYOND POINT C. A CRASHWORTHY TERMINAL SHALL BE USED.

APPLIES TO TRAILING ENDS

FIGURE 1 - SELECT A LATERAL EXTENT