

Maine Department of Transportation

Highway Program

Design Guidance

Title: Box Culvert End Slope Treatment

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Discipline: Highway Engineering

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Background:

The design of slopes around box culvert ends is an important aspect of box culvert design that affects project cost, safety, and long-term maintenance of the culvert. This guidance provides some basic criteria to be used in the design of box culvert end slope treatments.

Guidance:

Guardrail Requirements:

Since guardrail systems can be a hazard, use should always be limited to those situations where the guardrail system is less of a hazard than what is behind it. Considering ways to eliminate or minimize guardrail usage is encouraged. As indicated in Design Guidance – Sideslopes and Backslopes, when the height of fill from the roadway surface to the toe of slope is greater than or equal to twenty feet, guardrail is generally required. Other situations where guardrail should be considered include roadway curvature, crash history, and the presence of existing guardrail.

Mitered Ends:

If guardrail is determined to be necessary, mitering the box culvert ends should be considered. Mitering the box culvert ends reduces the amount of exposed concrete and minimizes the perception of excessive culvert length.

Non-Mitered Ends:

If guardrail is determined to be unnecessary, box culvert ends shall not be mitered. A recoverable slope of 4:1 or flatter will be required at least to the project clear zone. To reduce the amount of exposed concrete and minimize the perception of excessive culvert length, steepen the end treatment slopes to 1.75:1, vary the slopes on top of the box culvert, and consider reducing the box culvert skew.

The following details illustrate the application of these strategies.