

TRANSMITTAL MEMORANDUM 23-01

To: KYTC Staff


From: Michael Carpenter, PE
Director
Division of Structural Design

Date: February 8, 2023

Subject: KYTC Division of Structural Design
Geotechnical Guidance Manual
GT-604-4 (Retaining Structures & Reinforced Soil Slopes)

With this memorandum the attached section GT-604-4 (Retaining Structures & Reinforced Soil Slopes) of the Kentucky Transportation Cabinet's Division of Structural Design Geotechnical Guidance Manual replaces and supersedes the referenced section in the most current publication of the manual (KYTC Geotechnical Guidance Manual 2005 / TM 19-02 Chapter 600).

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<p style="text-align: center;">GEOTECHNICAL</p> 	<p><i>Section</i></p> <p style="text-align: center;">RETAINING STRUCTURES & REINFORCED SOIL SLOPES</p>
	<p><i>Subject</i></p> <p style="text-align: center;">Railroad Rail Retaining Structures</p>

WHEN TO USE RAILS Railroad rails installed as drilled-in piling may be used for correction of landslides in sidehill sections or embankments involving the roadway shoulder and a limited portion of the driving lanes. Refer to **Exhibit 34a** for typical railroad rail installation details.

MODELING Except in cases where slope inclinometers or other instrumentation indicate that a mass of stable soil underlies the failure surface, it will be assumed that the failure surface is located at the top of bedrock. Determination of the depth to bedrock and field soil classifications may be made with disturbed soil borings. Rock cores shall be obtained if disturbed soil borings prove inconclusive in determining top of bedrock. Upon request, the Geotechnical Branch will analyze site conditions and determine the appropriate design method.

MINIMUM EMBEDMENT Minimum embedment into bedrock is approximately half the distance from the ground surface to the bedrock. A slightly deeper pre-augered hole may be necessary to allow for auger cuttings falling into the hole and possibly preventing the rail from extending to the required embedment depth.

CENTER-TO-CENTER SPACINGS Minimum center-to-center spacing of the rails is 2 feet. Maximum spacing is 4 feet, since soil arching between the rails may not develop if larger spacings are allowed.

USE OF MULTIPLE ROWS Multiple rows of rails may be required when conditions warrant. When using this method, a spacing of approximately 2 feet between staggered rows is required to allow the rows to act as a unit in retaining the sliding mass.

ORIENTATION OF**THE RAILS**

Flanges on the rails shall be positioned perpendicular to the direction of landslide movement to utilize the full strength of the rail cross-section.

RAIL SIZE

Rails come in multiple sizes (Lbs/YD). The designer shall clearly indicate the minimum size rail required.

BACKFILLING**OF HOLES**

Installed rails shall be backfilled with concrete, pea gravel, crushed limestone, or crushed sandstone. The granular backfill material shall have 100 percent passing the ½-inch sieve. Drill cuttings are not permitted. Granular backfill shall be shoveled or dropped in small amounts to prevent voids from forming around the rails. Depending on design criteria, in some instances grout or flowable fill backfill may be required by the Geotechnical Services Branch. Backfilling is incidental to the price per linear foot for installation.

RETENTION OF**SOIL BACKFILL**

Rails are not to be damaged when placing or compacting backfill behind the rail wall. Retention of the backfill may require the use of lagging. Lagging may be wood, guardrail, or concrete panels. Lagging shall be extended to bedrock or to a minimum depth of 12 feet below the finished grade in front of the retaining structure.

EROSION CONTROL

Severe erosion on the slope below a rail structure could be detrimental to its long-term performance. Suitable erosion control shall be provided as a part of the initial design if there is a potential for severe erosion.

