

BRIDGE DESIGN MEMORANDUM – DM0211

TO: RPG Structural Engineers
Design Consultants

DATE: July 7, 2011

RE: *SCDOT Geotechnical Design Manual*, Version 1.1
Revisions to Chapters 4, 8, 9, 10, and 17

The first paragraph of Section 4.3 of the *SCDOT Geotechnical Design Manual* shall be amended by inserting the following sentence between the fifth and sixth sentences:

Any requests to deviate from these minimum requirements shall be made in writing and shall be forwarded to the PCS/GDS for consideration. All testing shall be to a sufficient depth to effectively evaluate the appropriate limit state conditions and shall fully penetrate any formation that will affect performance (e.g., settlement or slope instability of a roadway embankment or roadway structure).

The paragraph in Section 4.3.3 of the *Manual* shall be deleted and replaced with the following paragraph:

All roadway embankments shall have one testing location at least every 500 feet along the roadway embankment. In addition, roadway embankments within 150 feet of a bridge end shall have a minimum of two testing locations; one at the bridge end (which is also used for bridge foundation design) and one at a point 150 feet from the bridge end. The testing location 150 feet from the bridge end must be to a depth that is sufficient to effectively evaluate Extreme Event I limit state for the roadway embankment design.



Table 8-11 of the *Manual* shall be deleted and replaced with the following table:

Table 8-11, Roadway Structure Operational Classification (ROC)

Roadway Structure Operational Classification (ROC)	Description
I	Roadway embankments located within 150 feet of a bridge with OC = I. Roadway structures located within 150 feet of a bridge with OC = I. Rigid walls with heights greater than 15 feet. Flexible walls with heights greater than 50 feet.
II	Roadway embankments located within 150 feet of a bridge with OC = II. Structures (not classified as ROC = I) located within 150 feet of a bridge with OC = II.
III	Roadway embankments located within 150 feet of a bridge with OC = III. Structures (not classified as ROC = I) located within 150 feet of a bridge with OC = III. Structures (not classified as ROC = I) located more than 150 feet from a bridge.
IV	Roadway embankments located more than 150 feet from a bridge.

Chapters 9 and 10 of the *Manual* shall be amended to include a Roadway Structure Operational Classification (ROC) = IV. All embankments classified as ROC = IV shall be designed and evaluated for the strength and service limit states. Unless approved otherwise by the Director of Preconstruction, embankments classified as ROC = IV shall only be designed and evaluated for Extreme Event I limit state when all of the following conditions exist:

- The embankment is a causeway (i.e., an embankment constructed over marshy land or in water).
- The embankment is located on a route that has no detour.
- The embankment is located on a route having a current ADT that equals or exceeds 3000 vpd.

The resistance factors (Chapter 9) and performance limits (Chapter 10) for embankments classified as ROC = IV shall be the same as the requirements for embankments classified as ROC = III.

Section 10.2.2 of the *Manual* shall be amended by inserting the following paragraph between the second and third paragraphs:

The Service and Damage Level descriptions in Tables 10-1 and 10-2 are intended to apply to bridges and roadway structures other than embankments. Because soils found in-place and within embankments may significantly vary within short distances both vertically and horizontally due to South Carolina geology, it is difficult to associate closure time and degree of collapse along a continuous embankment. Generally, it is not economically feasible to entirely prevent failure of an embankment due to a seismic event. Observations from past earthquakes around the world indicate that embankment failures are isolated and discontinuous after a seismic event and the accessible area along the top of the embankment has for the most part remained traversable. Based on these observations, embankments that are not designed for seismic events should still be traversable even though they may exhibit significant damage that will require repair.

The paragraph and table (Table 10-27) in Section 10.7.2.1 of the *Manual* shall be deleted and replaced with the following paragraph:

The Performance Objective for embankments at Extreme Event I limit state is that the embankments remain stable during the seismic design event. For embankments adjacent to structures, this objective is based on the potential for the embankments to contribute to the collapse of the structure should the embankments fail.

In Section 17.1 of the *Manual*, the third paragraph shall be deleted and replaced with the following:

Embankments with heights less than 3 feet and slopes of 2H:1V or flatter generally do not require stability analysis. However, for all embankment heights, the calculated settlement values must conform to the applicable performance limits.

These revisions shall apply to all projects where design has not been substantially completed.

*Original Signed by James W. Kendall, Jr.
on July 7, 2011*

James W. Kendall, Jr., P.E.
Preconstruction Support Engineer

JWK:afg

ec: Bridge Construction Engineer
Bridge Maintenance Engineer
FHWA Structural Engineer

File:PC/BWB

Preconstruction Support Managers
Regional Production Engineers
RPG Design Managers