South Carolina
Department of Transportation

December 12, 2018

GEOTECHNICAL DESIGN BULLETIN NO. 2018-1

SUBJECT: 2019 Geotechnical Design Manual version 2.0 (GDM v2.0)

EFFECTIVE DATE: Refer to First Paragraph

SUPERSEDES: 2010 Geotechnical Design Manual version 1.1

RE: None

The GDM v2.0 will be effective for all projects that have not completed the Roadway Design Field Review or Preliminary Bridge Plan phases of project development as of January 2, 2019. The GDM v2.0 may be used for projects that have advanced past these phases, in its entirety, at the discretion of the Geotechnical Engineer-of-Record (GEOR) with concurrence of the project development team.

GDM v2.0 may be viewed or downloaded from the Department's website at https://www.scdot.org/default.aspx, by searching for "Geotechnical Design Manual".

The following paragraphs highlight some of the changes between GDM v2.0 and the preceding GDM v1.1. The first major difference between GDM v2.0 and GDM v1.1 is additional field testing requirements contained in Chapter 4 of GDM v2.0. Additional testing locations are required at the end bent of bridges as well as additional laboratory testing.

Another change is some of the performance limits established in GDM v1.1 are either deleted or modified in GDM v2.0. For example, GDM v1.1 provided performance limits for bridges. These performance limits have been removed from GDM v2.0 since these limits were actually measured at the bridge deck and not at the top of the foundation. Further, GDM v1.1 also provided performance criteria at the Extreme Event I (EE I, i.e., seismic design) that were required to be met, which in some cases proved to be conservative. GDM v2.0 still requires the performance of geotechnical structures to be checked at the EE I limit state; however, there are no performance limits provided. Instead, the design team (Design Manger, Program Manager, Structural Engineer-of-Record, Geotechnical Engineer-of-Record and other members of the team as appropriate) will determine the actual acceptable performance of the structure and will use these project specific performance limits to determine the acceptability of the overall bridge system (i.e., the embankments that connect the bridge to the roadway, etc.). This acceptability will determine if or how much ground improvement will be required.

Another significant change between GDMs v1.1 and v2.0 is the way the Acceleration Design Response Spectrum (ADRS) curve is determined. In GDM v1.1, the ADRS curve is determined using a Site Class developed from the shear wave velocity (V_s) of the upper 100 feet of soil at the site and site amplification factors (termed F-factors) to modify the ground motion to account for the 100 feet of soil at the site. The F-factors used in GDM v1.1 were obtained from the AASHTO LRFD Bridge Design Specifications. These F-factors were developed from sites located in California, which has soil and rock conditions very different from South Carolina. To correct this problem SCDOT performed a research project to develop F-factors that were specific to South Carolina. The results of this research have been incorporated into GDM v2.0. This is a significant shift in the way ADRS curves are developed, since Site Class will no longer be used and V_s will be used directly to develop the F-factors, which will vary as V_s varies.

In v2.0 of the GDM, SCDOT is using a behavior based system to model soil instead of the more traditional physical (grain-size) based system. This will allow soils to be better modeled based on material behavior and less on physical characteristics. The use of this system is similar to the way concrete and steel are handled.

The remaining changes in GDM v2.0 are either cosmetic or a rearrangement of information contained within the GDM (i.e., Sections were moved between Chapters).

Training for individual Chapters or groups of Chapters will be developed by SCDOT and will be provided to GEORs to further their understanding of GDM v2.0. Dates for the training will be announced once the training modules have been completed.

Questions, concerns, or recommendations for future revisions should be addressed to the Geotechnical Design Support Section of Preconstruction Support.

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