December 18, 2019

GEOTECHNICAL DESIGN BULLETIN NO. 2019-3

SUBJECT: Corrections and Additions to 2019 GDM

EFFECTIVE DATE: Immediately

SUPERSEDES: As Noted

RE: None

The Geotechnical Design Support Office is making the following Additions and Revisions (see attachments) to the SCDOT Geotechnical Design Manual (2019).

Section 13.10.1 – Delete and replace Table 13-6
Section 14.8.2 – Delete and replace the last Sentence of the 2nd Paragraph
Section 14.8.3 – Delete and replace the 2nd Paragraph of Item 2 of the 3rd Paragraph
Section 14.8.3 – Delete Equation 14-8
Section 16.9.1 – Delete and replace the 4th Sentence of the 3rd Paragraph

Jeff Sizemore, P.E.
Geotechnical Design Support Engineer

JCS:neh
Attachments
ec:
John Boylston, Director of Preconstruction
Robert Isgett, Director of Construction
David Cook, Director of Maintenance
Robert Perry, Director of Traffic Engineering
Chris Gaskins, RP Engineer – Design Build
Rob Bedenbaugh, Preconstruction Support Engineer

Ladd Gibson, Dir. of Mega Projects
Jennifer Necker, RP Engineer –Lowcountry
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Table 13-6, Sand-Like Shear Strengths

Liquefaction Potential	Liquefaction Triggering Criteria	Soil Shear Strength
Cyclic Liquefaction	$(D/C)_{SL\text{-}Sand} > \varphi_{SL\text{-}Sand}$ $(0.7 \leq R_u \approx 1.0)$	Use Idriss and Boulanger (2008) or Olson and Johnson (2008) residual shear strength of liquefied soils (τ_{rl}) correlations. Sections 13.10.2.1 and 13.10.2.2 **Equation 13-48** $$\phi_{rl} = tan^{-1}\left(\frac{\tau_{rl}}{\sigma'_{vo}}\right) \leq \phi_{Peak}$$ or **Equation 13-49** $$\tau_{rl} = \sigma'_{vo} * tan\,\phi_{rl} \leq \sigma'_{vo} * tan\,\phi_{peak}$$
No Liquefaction	$(D/C)_{SL\text{-}Sand} \leq \varphi_{SL\text{-}Sand}$ $(R_u < 0.70)$	Peak undrained shear strength (τ_{peak}). See Chapter 7.

14.8.2 Downdrag Loads

Therefore, based on the relationship between the fully liquefied shear strength (τ_{rl}) and the peak undrained shear strength (τ_{peak}), use a limited friction angle ($\phi_{rl\text{-}lim}$) of 20° to determine the downdrag load induced by soils that have undergone liquefaction.

14.8.3 Lateral Soil Response of Liquefied Soils (P-y Curves)

Use a reduced soil friction angle for limited liquefaction ($\phi_{rl\text{-lim}}$) of 20° to develop the P-y curves.

16.9.1 <u>Traditional Approach</u>

For those Sand-Like soil layers that undergo SSL, a limited shear strength ($\tau_{rl\text{-}lim}$) shall be used to determine DD_{SL}. For those soils not affected by SSL, peak undrained shear strength (τ_{peak}) shall be used in the determination of DD_{SL}.