APPENDIX L

DESIGN CALCULATION PACKAGE

GEOTECHNICAL DESIGN MANUAL

January 2022

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DESIGN CALCULATION PACKAGE

The GEOR is required to provide design calculation packages that summarize the calculations performed for each project. Do not include extensive computer printouts. SCDOT only anticipates being given the input parameters used in the specific model and the outcome of the modeling with results used for design clearly indicated. The first page of the design calculation package consist of General Project Information, this sheet shall be placed at the beginning of the design calculation packages and only needs to be provided once. The second page of the package is Geologic Profile that will provide the information indicated on the sheet as well as any other the GEOR feels is pertinent to the project. Similar to the General Project Information this sheet only needs to be presented once. The final sheet, Design Calculations, is to be used with each analysis conducted for the project, i.e., end bent piles, interior bent piles, bridge embankments, roadway embankments, SSL calculations, etc. The Geologic Profile and the Design Calculations require not only the initials of the engineer who conducted the analysis, but also the initials of the engineer who reviewed the calculations. The reviewer should meet the requirements contained in Chapter 3.

GENERAL PROJECT INFORMATION

Project Name:_____   **Prepared by:**_____
County:_____   **Date Prepared:**_____
SCDOT Project Number:_____   **GEC Project No.:**_____

PROJECT INFORMATION

Project Type:
Existing Conditions: *Include items such as bridge dimensions (length and width), structure type (if known), width of approach roadways, shoulder widths (include paved and unpaved), existing fill heights, embankment width at bridge, known utilities, include any significant existing structures that will remain in place*
Proposed Conditions: *Include items such as bridge dimensions (length and width), structure type, width of approach roadways, should widths (include paved and unpaved), proposed fill or cut heights, embankment width at bridge, ERSs required, proposed utilities of significance, and any significant appurtenances.*

GEOLOGIC PROFILE

Project Name:_____   **Computed by:**_____
County:_____   **Date Computed:**_____
SCDOT Project Number:_____   **Checked By:**_____
                                              Date Checked:_____
                                              GEC Project No.:_____

SOIL STRATIGRAPHY AND SHEAR STRENGTH INFORMATION

For each layer of soil provide the following information
- *Provide the top and bottom elevations*
- *Classification*
  - *USCS*
  - *AASHTO*
  - *Soil Behavior*
- *Moisture Content*
- *Atterberg Limit*
- *% Passing No. 200 Sieve*
- *Range of N_{meas} and $N_{measaverage}$*
- *Range of N_{60} and $N_{60average}$*
- *Range of $N^*_{1,60}$ and $N^*_{1,60average}$*
- *Unit Weight*
- *Total and Effective Shear Strength Properties*
  - *ϕ and ϕ'*
  - *c and c'*
- *For Sand-Like Soils include the following*
  - *Modulus of Elasticity*
  - *Liquefied Residual Shear Strength, ϕ_{rl} or τ_{rl}*
- *For Clay-Like Soils include the following*
  - *Effective Preconsolidation Pressure*
  - *Compression Index, C_c or $C_{\varepsilon c}$*
  - *Recompression Index, C_r or $C_{\varepsilon r}$*
  - *Secondary Compression Index, C_a or $C_{\varepsilon a}$*
  - *Coefficient of Consolidation, c_v*
  - *Seismically induced Residual Shear Strength, τ_{rl}*

For each layer of rock provide the following information
- *Provide the top and bottom elevations*
- *Classification and type*
- *Shear strength*
- *Percent Recovery*
- *Coring Time Rate*
- *RQD*
- *RMR*
- *GSI*

DESIGN CALCULATIONS

Project Name:_____   **Computed by:**_____
County:_____   **Date Computed:**_____
SCDOT Project Number:_____   **Checked By:**_____
                                                  Date Checked:_____
                                                  GEC Project No.:_____

Subject:_____

Objective

Indicate what the analysis is for and why it is being performed.

Given/Assumptions

List givens and knowns and any assumptions used during this analysis.

Design Standards

List design standards used (e.g., 2022 GDM, 2020 AASHTO, etc.)

Software

Provide software, version being used and provider/creator of software. Follow procedures provided in Chapter 26 to verify acceptability of software. For GEC internally prepared software, provide verification that software was checked prior to being used.

Soil Parameters

Provide a discussion of soil parameters used.

Methodology

Provide a discussion of the methodology used including if it varies from the requirements of the GDM. If a different methodology is used other than those allowed in the GDM, provide verification that the RPG/GDS or OES/GDS concurred with allowing different methodologies. If a different methodology is used, provide a detailed discussion of how the methodology is applied and what assumptions the method makes in design. Include a list of references concerning the development and application of the methodology.

Results and Discussions

Provide a discussion of the results including the corresponding tables required in the GER, see Chapter 21. Attach portions of the computer printouts to include the input files and the files

indicating the results only. No detailed computer printouts are to be provided. On the results indicate the required resistance, Factor of Safety (Resistance Factor) or other result from analysis, if the analysis is provided in tabular form.