

**CHAPTER A-0  
Part 2**

**Revised July 2020**

**SOILS**

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## CHAPTER A-0-2

### SOILS

#### 2.1 GENERAL.

2.1.1 *Soils Section.* The Soils Section is responsible for all soil mechanics and geotechnical design of all structures within the Savannah District military boundary. This section provides the Architect-Engineer (A-E) all Geotechnical Reports associated with military design and construction.

2.1.2 *Chapter Description.* This chapter describes requirements pertaining to foundation design and presents data that can be expected in the reports and other items prepared by Soils Section and provided to the A-E. This chapter also lists the specific requirements of submittal stages for geotechnical design features. The Savannah District Corps of Engineers will inform the A-E in the Specific Instructions portion of the contract whether subsurface investigation testing and a foundation design analysis report are required. When required, the Savannah District's Geotechnical and HTRW Branch will accomplish subsurface investigations, field sampling, and laboratory testing, and provide the results to the A-E in report, memo, or email format.

2.1.3 *Geotechnical Report.* A Geotechnical Report will be furnished to the A-E when drilling, testing, and analysis is completed. The Geotechnical Report will be titled appropriately for the information being presented and may be provided in report, memo, or email format. The Geotechnical Report will be based on the data furnished by the A-E on SAS Form Letter 363. Any change in siting or changes to the basic information furnished in the SAS FL 363 shall be provided immediately as these changes will likely affect the analysis. The provided report will typically include the allowable soil bearing value, minimum depth to the base of footing, depth of the groundwater table, special foundation requirements, waterproofing measures, and marked-up specifications. The Geotechnical Report is not limited to the above information and may direct types of foundation to be used at the site, various soil parameters for retaining wall design, critical soil parameters, instrumentation requirements, special construction procedures, required compaction efforts, excavation and drainage requirements, dewatering specifications, borrow area usage, CBR and subgrade modulus values, and any other pertinent foundation and site design information. The analysis may include several alternatives for the solution to a given problem. If this is the case, the A-E then has the latitude of using the solution most compatible with their design. The Geotechnical Report will be furnished the A-E at the time to proceed with final design or as soon thereafter as practicable.

2.1.4 *Field Tests.* Specialty field tests, such as pH measurements, resistivity testing, in-place bearing tests, and percolation/infiltration tests will be included as applicable for use in design by the A-E. Request for soil percolation/infiltration tests should be made by the A-E through the Savannah District Project Manager.

2.1.5 *Preliminary Geotechnical Report.* A preliminary report based on available data in the area can be furnished to the A-E if requested but is subject to change pending results of the subsurface investigation, soils testing, and final analysis.

2.1.6 *Determination of Foundation Investigations.* The Savannah District Geotechnical and HTRW Branch, Soils Section, will determine:

2.1.6.1 The location of borings (including depth of holes) based on the adequacy of the detailed site plan.

2.1.6.2 The location of any required field tests. It should be emphasized that soil borings and testing of soil samples are usually conducted during the concept or preliminary stages and are based on a firm siting of the proposed structures. After completion of the field investigation, the Savannah District will furnish the location of the soil borings which the A-E will locate on an appropriate Plan Sheet(s). The soil boring logs and soil test data will be provided to the A-E for placement on full size drawing sheets and addition to the project drawing set. The A-E should save space on the index for these drawings. Soil Boring Logs and Soil Test Data drawings will be designated "B"-Plates.

## 2.2 APPLICABLE PUBLICATIONS.

UFC 3-220-01	Geotechnical Engineering
UFC 3-320-06A	Concrete Floor Slabs on Grade Subjected to Heavy Loads
IBC (prevailing edition)	International Building Code
UFC 4-151-10	General Criteria for Waterfront Construction

## 2.3 PRECONCEPT SUBMITTAL REQUIREMENTS.

No requirements for 10% design.

## 2.4 CONCEPT (35%) DESIGN SUBMITTAL REQUIREMENTS.

### 2.4.1 *Design Analysis.*

a. Provide a completed SAS Form Letter 363 (Exhibit 2-1) for each structure involved in the contract. (The foundation analysis will be based on information presented in this form along with other data requested on the form.) Provide column and wall loads for the existing building when there is a planned building addition.

b. Incorporate recommendations presented in the Preliminary Report or Final Report if it has been provided at this design stage.

### 2.4.2 *Design Drawings.*

a. Provide a copy of the site plan in electronic format to the Savannah District's Geotechnical and HTRW Branch, Attention: Chief, Soils Section, for the purpose of locating borings. This site plan shall be of sufficient detail to include locations of all proposed structures, roads, parking areas and contours, as well as any existing features such as buildings, fences, roads, parking areas and existing contours. The site plan shall also include the state plane coordinate system for the particular state in which the project is located. Finished floor elevations, of all structures and finished grade elevations shall be indicated. When there is a building addition, the A-E shall provide a plan, which will locate the existing footings and columns. This plan shall also include the depths of existing footings.

b. Locate borings and field test symbols on an applicable plan if locations have been provided by the Savannah District during concept design. A note "See complete logs of borings on plate(s) B- through B- . " will be placed on the same plan. Add the appropriate symbol to legend. The symbols shown on Exhibit 2-2 will be used to identify borings and other exploration techniques on military projects. The soil boring logs as provided by Soils Section will be placed on full size drawing sheets and added to the project drawing set. The A-E should save space on the index for these drawings.

**2.5 PRELIMINARY (60%) DESIGN SUBMITTAL REQUIREMENTS.** Comply with comments on the Concept (35%) review.

**2.6 FINAL (100%) DESIGN SUBMITTAL REQUIREMENTS.**

a. Comply with comments on the Preliminary (60%) design review.

b. Return specifications required by the Savannah District along with A-E prepared specifications for final review.

c. Include all soil test location, log, and test data drawings and required specifications in the Index for drawings and Table of Contents for specifications.

**2.7 CORRECTED FINAL SUBMITTAL REQUIREMENTS.**

Comply with comments on Final (100%) Design Review and any comments not resolved from previous reviews..

**2.8 TECHNICAL REQUIREMENTS.**

**2.8.1 Deep Foundations.** Recommendations for the type of deep foundation system to be used (piling, caissons, etc.), the size and length of the piling, and the allowable bearing capacity of each pile will be provided. The A-E shall determine the number of piles, actual spacing, and the pile cap design.

**2.8.2 Earth Liners.** Savannah District will provide the A-E with the overall geologic conditions, the in-situ and constructed permeabilities that can be obtained using native materials and stabilizing agents, liner thicknesses, and slope stabilization requirements. The A-E will be required to apply for all necessary permits. As part of the permitting process they will be required to determine the classification of the material to be contained, the permeability necessary to contain the material, and the size and functional configuration of the containment area.

**2.8.3 Cathodic Protection and Grounding Systems.** Savannah District will perform all pH tests, salinity tests, resistivity measurements, etc., required to design corrosion control and grounding systems. The need for these tests shall be identified and furnished by the A-E at the concept design stage. The A-E shall inform the project manager of the required testing methods, testing locations, ground rod lengths etc. These tests will not be performed unless the requirements are identified by the A-E. The raw field data will be provided in report format without interpretation or recommendations. The A-E shall inform the appropriate Savannah District project manager immediately if additional field data is required for the design of the corrosion control and the grounding systems.

2.8.4 *Permanent Water Well Design and Construction.* The A-E will be required to determine the functional location of the well, to verify the liter per minute (or gpm) requirements of the facility, to verify future demands planned for the well, and to determine the pump size, type and setting after receipt of aquifer test data. The A-E shall prepare all drawings and specifications (Section 02671 WATER WELL or 02672 WATER WELLS as appropriate) required to construct the well. In some cases, Savannah District may construct the actual well during the design stage of the project.

2.8.5 *Structures.* Recommendations for the type of foundation system to be used, the allowable bearing capacity, the depth of placement for the footings, and recommendations for floor slab preparation will be provided. The A-E shall size all footings, grade beams, slabs, etc., utilizing the recommendations and restrictions detailed. An Earthwork specification for the structures will also be required by Savannah District. (See Chapter A-2, STRUCTURAL, for further design requirements).

2.8.6 *Pavements.* The allowable design CBR and modulus of subgrade reaction parameters along with required compaction efforts will be provided for pavement subgrades. Guidance will be offered on the types of base course materials available in the area and design strengths. The A-E shall design all pavement types, thicknesses, geometry and locations, and prepare all pavement material specifications. (See Chapter A-1, SITE DEVELOPMENT, for deviations, exceptions, and further design requirements.)

2.8.7 *General Earthwork and Special Features.* Undercutting requirements, fill and backfill placement procedures, types of equipment to use, and earthwork procedures for special features such as retaining walls, embankment construction, earth covering of structures, basements, buried and mounded tanks, utilities, etc. will be provided. It will be the responsibility of the A-E to incorporate these requirements and to use the furnished parameters and guidance in the design.

2.8.8 *Specifications.* The A-E shall use Savannah District guide specification Section 31 00 00 EARTHWORK in the contract specifications. Note that this specification has been modified from the National CEGS guide and must be requested from Savannah District. The A-E will mark up the specification as necessary to meet the project requirements.

## **EXHIBITS**

2-1	SAS FL 363 Foundation Data
2-2	Subsurface Exploration Symbols

## FOUNDATION DATA

Project Title: \_\_\_\_\_

FY- \_\_\_\_\_ , P.N. \_\_\_\_\_ ,

Location: \_\_\_\_\_

A-E Firm: \_\_\_\_\_

A-E Phone No. \_\_\_\_\_

1. The following information is furnished relative to the foundation analysis for the subject project. (A separate CESAS FL 363 should be completed for each structure involved in the project.)

a. Type of structural system: (Brief Statement)

b. General Scope: \_\_\_\_\_ ft. x \_\_\_\_\_ ft \_\_\_\_\_ no stories \_\_\_\_\_.

(Check applicable blocks below)

- |  |   |
|--|---|
| <input type="checkbox"/> Slab-on Grade   | <input type="checkbox"/> Basement Walls         |
| <input type="checkbox"/> Crawl Space   | <input type="checkbox"/> (1) Fixed at 1st Floor |
| <input type="checkbox"/> Retaining Walls   | <input type="checkbox"/> (2) Fixed at Footings  |
| <input type="checkbox"/> Areas Recessed below F.F. (Provide with info for Item 2. below) |   |

c. Type of Foundation: (Check applicable blocks and fill in loads)

- |   |   |
|---|---|
| <input type="checkbox"/> Mat. Foundation  | <input type="checkbox"/> Approx. Max. Load on Mat. Foundation _____ Kips/SF |
| <input type="checkbox"/> Spread Footings  | <input type="checkbox"/> Approx. Max. Col. Load _____ Kips                  |
| <input type="checkbox"/> Wall Footings    | <input type="checkbox"/> Approx. Max. Wall Load _____ Kips/ft.              |
| <input type="checkbox"/> Foundation Walls | <input type="checkbox"/> Grade Beams  |
| <input type="checkbox"/> Rolled Edge Slab | <input type="checkbox"/> Combined Footings (See Item 2. below)              |
| <input type="checkbox"/> Piles            | <input type="checkbox"/> Underpinning (See Item 2. below)                   |

d. Other:

- Pre-Engineered Building      Yes \_\_\_\_\_ No \_\_\_\_\_
- Basement and/or Crawl Space Elevation \_\_\_\_\_ FT
- Finished Floor Elevation \_\_\_\_\_ FT

2. Specific information and/or details relevant to the foundation analysis are provided attached to this form.

3. Included is one reproducible electronic copy of the detailed site plan and a plan showing the location of columns and walls for structures. (If the maximum column load exceeds 100 Kips or the maximum wall load exceeds 3 K/ft., the individual load, dead and live, for each footing shall be provided on the location plan of columns and walls.)

4. Boring locations will be determined by Savannah District personnel.

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A-E Representative

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Date

**SUBSURFACE EXPLORATION  
SYMBOLS**

SOIL TEST BORING (B- #)



CONE PENETROMETER TEST (CPT- #)



FLAT PLATE DILATOMETER TEST (DMT- #)



VANE SHEAR TEST (VST- #)



PERCOLATION / INFILTRATION TEST (PT- #)



TEST PIT (TP- #)



\*\*\* End of Section \*\*\*