**\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*   
NAVFAC PTS-A10 (December 2018)  
 -----------------------------  
Preparing Activity: NAVFAC SUPERSEDING PTS-A10 (February 2018)  
  
PERFORMANCE TECHNICAL SPECIFICATION  
   
\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\***

SECTION A10  
  
FOUNDATIONS  
12/18

**\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*   
NOTE: This section is intended to be used as a guide and contains requirements that are common to many different types of facilities. In addition, there may be special requirements for a particular project that are not addressed at all. The RFP preparer will need to incorporate additional information to address these special requirements in this PTS and corresponding Part 3 ESR. Do not delete building elements that are not required for the project, and do not change the Uniformat paragraph designations (example A102001). Uniformat designations are unique to the products they are assigned to. However, the subparagraphs numerical extension (example – 1.2 or a,b,c of the Uniformat designations may change if subparagraphs are deleted.  
  
This guide specification is formatted utilizing Uniformat II, an industry recognized standard, ASTM E 1557. When the RFP preparer chooses to add a paragraph that does not apply to an existing building element already included in the specification, refer to the Uniformat/WBS located on the NAVFAC Design-Build Website for a listing of Uniformat II designations and definitions.  
  
NOTE: The RFP preparer may view or hide the criteria notes in this PTS section by modifying the WORD preferences for "Hidden text". To view the criteria notes, choose "File" then "Option". Click "Display" then check the "Hidden text" box under "Always show these formatting marks on the screen". In the same section, check the box for "Print hidden text" under "Printing options" to print the criteria notes.  
\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\***

**\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*   
TABLE OF CONTENTS  
   
A10 GENERAL  
A10 1.1 DESIGN GUIDANCE  
A10 1.2 GENERAL REQUIREMENTS  
A10 1.3 PERFORMANCE VERIFICATION AND ACCEPTANCE TESTING  
A10 1.4 DESIGN SUBMITTALS  
A10 1.5 CONSTRUCTION SUBMITTALS  
A1010 STANDARD FOUNDATIONS  
A1010 1.1 SHEETING AND SHORING  
A1010 1.2 TERMITE CONTROL  
A101001 WALL FOUNDATIONS  
A101002 COLUMN FOUNDATIONS AND PILE CAPS  
A1020 SPECIAL FOUNDATIONS  
A102001 PILE FOUNDATIONS  
A102001 1.1 DRIVING EQUIPMENT  
A102001 1.2 INSTALLATION TOLERANCES  
A102001 1.3 MISLOCATED AND DAMAGED PILES  
A102001 1.4 PILE SPACING  
A102001 1.5 COATED PILES  
A102002 CAISSONS  
A102003 UNDERPINNING  
A102004 DEWATERING  
A102005 RAFT FOUNDATIONS  
A102006 PRESSURE INJECTED GROUTING  
A1030 GROUND FLOOR SLABS  
A103001 STANDARD SLAB ON GROUND  
A103003 TRENCHES  
A103004 PITS AND BASES  
A103005 FOUNDATION DRAINAGE  
A103005 1.1 PERIMETER FOUNDATION DRAINAGE  
A103090 OTHER SLAB ON GROUND  
A103090 1.1 BLOCK OR BOARD PERIMETER INSULATION  
\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\***

**A10 GENERAL**

RFP Part 3 including the Engineering System Requirements (ESR) provide project specific requirements. The RFP Part 4, Performance Technical Sections (PTS) provide generalized technical requirements that apply to multiple facility types and include more requirements than are applicable to any one project. Therefore, only the RFP Part 4 requirements that apply to the project and further define the RFP Part 3 project specific requirements are required.

**A10 1.1 DESIGN GUIDANCE**

Provide the design and installation in accordance with the following references. This Performance Technical Specification (PTS) adds clarification to the fundamental requirements contained in the following Government Standards. The general requirements of this PTS section are located in PTS Section Z10, *General Performance Technical Specification*.

**A10 1.1.1 Government Standards**

UNIFIED FACILITIES CRITERIA (UFC)

|  |  |
| --- | --- |
| UFC 1-200-01 | DoD Building Code (General Building Requirements).(A reference in this PTS section to UFC 1-200-01 requires compliance with the Tri-Service Core UFCs that are listed there, which includes the following significant UFC(s):UFC 3-101-01, ArchitectureUFC 3-220-01, Geotechnical EngineeringUFC 3-301-01, Structural Engineering |

UNIFIED FACILITIES GUIDE SPECIFICATIONS (UFGS)

|  |  |
| --- | --- |
| UFGS Section 31 00 00 | Earthwork |

**A10 1.2 GENERAL REQUIREMENTS**

**A10 1.2.1 Earthwork**

Prepare the following UFGS Specification as part of the project specification and include the prepared specification section in the design submittal for the project:

UFGS Section 31 23 00.00 20 *Excavation and Fill*

**A10 1.2.2 Geotechnical Report**

**A10 1.2.2.1 Subsurface Soils Information**

Any provided subsurface soil information is included for the Contractor’s information only, and is not guaranteed to fully represent all subsurface conditions. The data included in this RFP is to assist in proposal preparation. Perform such subsurface exploration, investigation, testing, and analysis for the design and construction of the foundation system at no additional cost to the Government.

**A10 1.2.2.2 Contractor-provided Geotechnical Engineer**

Retain a Geotechnical Engineer experienced and licensed in the geographic region of the project to interpret any provided data as related to the design concept and develop requirements for bidding. Requirements stated in Parts 3 and 4 of the RFP take precedence over any content of any included geotechnical report. Additional requirements for the geotechnical design of this project are provided elsewhere in this RFP.

Coordinate all work by the Contractor-provided Geotechnical Engineer with the Contracting Officer and ensure that work does not conflict with Base operations. When providing the Foundation Work Design submittal, provide the Contractor's Geotechnical Report (an Adobe Acrobat PDF version on CD and two printed copies) for review and record keeping purposes. The report becomes the property of the Government. Provide the Geotechnical reports generated during construction, such as pile load tests or PDA results, pile driving results and analysis, to the Contracting Officer (an Adobe Acrobat PDF version and two printed copies) for record keeping purposes.

**A10 1.2.2.3 Contractor-Provided Geotechnical Report**

Submit a written Geotechnical report based upon Government-provided subsurface investigation data and all additional field and laboratory testing accomplished at the discretion of the Contractor's Geotechnical Engineer. The Geotechnical Report must include all requirements listed in UFC 3-220-01, *Geotechnical Engineering*, paragraph entitled "Section 1803 "Geotechnical Investigations"; in addition, include the following:

a. The project site description, vicinity map and site map indicating the location of borings and any other sampling locations. Provide 24 hour groundwater observations for at least 20% of the borings, minimum one boring. Provide notes explaining any abbreviations or symbols used and describing any special site preparation requirements.

b. Results of all applicable field and laboratory testing, whether Government or Contractor-provided. Address existing subsurface conditions, selection and design of the foundation and floor slab, all underground construction including utility installation and all other site-specific requirements (such as soil stabilization and slope stability).

c. Engineering analysis, discussion and recommendations addressing:  
  
1) Settlement analysis. Settlement must be limited as required in EM 1110-1-1904, *Settlement Analysis*  
  
2) Bearing Capacity Analysis.  
  
3) Foundation selection and construction considerations (shallow, deep, special); dimensions, and installation procedures.  
  
4) Site preparation (earthwork procedures and equipment), compaction requirements, building slab preparation (as applicable), soil sensitivity to weather and equipment, groundwater influence on construction, mitigation of expansive soils or liquefaction potential, dewatering requirements, slope stability, and other necessary instructions.  
  
5) Sheeting and shoring considerations, as applicable  
  
6) Pavement design calculations with parameters defined, actual or assumed, and recommended thicknesses and materials, whether for design or for proposed modifications to the RFP provided pavement design   
  
7) Haul routes and stockpile locations for earthwork, as applicable.  
  
8) Calculations to support conclusions and recommendations.  
  
9) Present recommendations on a structure-by-structure Basis.

Provide the Geotechnical Report signed by the Contractor-provided Geotechnical Engineer.

Submit report accompanied by a cover letter identifying any report recommendations of the report proposed to be adopted into the design which are interpreted by the Contractor as a change condition to the Geotechnical or Pavement related requirements of the RFP.

**A10 1.2.2.4 Geotechnical Site Data required in Design Drawings**

The Contractor's final design drawings must include the Government-provided subsurface data presented in the RFP as noted below, as well as all additional borings and laboratory test data results performed by the Contractor. The data provided must include:

a. Logs of Borings and related summary of laboratory test results and groundwater observations. Provide 24-hour groundwater observations for at least 20% of the borings, minimum one boring. Provide notes explaining any abbreviations or symbols used and describing any special site preparation requirements.

b. Indicate locations of all borings on the drawings. Revise applicable design drawings to reference the Contractor’s Geotechnical Report as being a basis for design.

**A10 1.2.3 Pile Driver Analyzer (PDA)**

If deemed necessary by the Contractor's Geotechnical Engineer, the dynamic wave equation method of analysis, pile driver analyzer, must be used to validate pile and pile hammer compatibility, establish pile driving criteria, establish terminal penetration resistance, or verify as-driven capacity of the pile. Provide PDA or static load test(s) for piles with required allowable design capacity equal to or greater than 40 tons.

**\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*   
NOTE: Utilize this paragraph to list tests to be performed by the Contractor as required by the Designer of Record (DOR).  
\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\***

**A10 1.3 PERFORMANCE VERIFICATION AND ACCEPTANCE TESTING**

Provide verification of satisfactory construction and system performance of the foundations via Performance Verification Testing, and by field inspection, as detailed in this section of the RFP and in Part 2 Section 01 45 00, *Quality Control*. Provide special tests and special inspections in accordance with Part 2 Section 01 45 00.

**A10 1.3.1 Earthwork**

Perform quality assurance for earthwork in accordance with International Building Code (IBC) Chapter 17 and UFGS Section 31 23 00.00 20. A competent person, as defined by COE EM 385-1-1, under supervision of a registered Professional Engineer is required to provide inspection of excavations and soil/groundwater conditions throughout construction. The Engineer must perform periodic site visits throughout construction to assess site conditions. The Engineer, with the concurrence of the Contractor and the Contracting Officer, must update the excavation, sheeting, shoring, and dewatering plans as construction progresses to reflect actual site conditions and submit the updated plan and a written report (with professional stamp) at least monthly informing the Contractor and the Contracting Officer of the status of the plan and an accounting of Contractor adherence to the plan; specifically addressing any present or potential problems. The Engineer must be available to meet with the Contracting Officer at any time throughout the contract duration. The Contractor will bear all costs of the Engineer.

**A10 1.3.2 Piles**

If piles are required, perform quality assurance for pile construction in accordance with UFC 1-200-01, *DoD Building Code (General Building Requirements)*. Pile installation procedures and installed piles must be inspected and found to be in compliance with these specifications prior to acceptance of the work.

Provide test piles as directed by the Contractor’s Geotechnical Engineer.

Perform pile load tests, if required, in accordance with UFC 1-200-01.

Submit results of the pile test program and final pile installation criteria to the Contracting Officer prior to installation of the production piles.

If deemed necessary by the Contractor’s Geotechnical Engineer, use the dynamic wave equation method of analysis, pile driver analyzer, to validate pile and pile hammer compatibility, establish pile driving criteria, establish terminal penetration resistance, or verify as-driven capacity of the pile.

Perform PDA or static pile load test (American Society for Testing and Materials - ASTM D 1143) for piles with an allowable design capacity equal to or greater than 40 tons. When required, perform PDA on all indicator or test piles. Perform CAPWAP analysis on at least one test (indicator) pile to determine capacity with a minimum three-day set-up and develop pile installation criteria.

**A10 1.4 DESIGN SUBMITTALS**

Provide design submittals in accordance with Z10, *General Performance Technical Specifications*, Part 2 Section 01 33 10.05 20, *Design Submittal Procedures*, Facilities Criteria (FC) 1-300-09N, *Navy and Marine CorpsDesign Procedures,*UFC 3-220-01, *Geotechnical Engineering, and* UFC 1-200-01*, DoD Building Code (General Building Requirements)*.

UFGS sections listed below or in the body of the PTS text are to be used by the Designer of Record (DOR) as a part of the design submittal. The DOR must edit these referenced UFGS sections and submit them as a part of the design submittal specification. Edit the specification sections in accordance with the limitations stated in PTS Section Z10, *General Performance Technical Specifications*.

**\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*   
NOTE: NAVFAC has made every effort to use commercial standards in the PTS sections. If project requirements dictate the use of a UFGS section as a standard, add a paragraph here listing the required UFGS section. State in the paragraph that the DOR must edit this UFGS section in accordance with PTS Z10 and submit it as a part of the design submittal.  
\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\***

UFGS Section 31 23 00.00 20 *Excavation and Fill*

**A10 1.5 CONSTRUCTION SUBMITTALS**

Submit construction submittals in accordance with PTS Section Z10, *General Performance Technical Specifications*. In addition to the Z10 requirements, the Designer of Record (DOR) must approve the following submittals as a minimum:

All structural elements necessary for construction

Contractor-provided geotechnical report

Controlled fill or backfill material tests

Test pile and production pile installation records

Pile load testing reports

As-Built drawings - Include a statement on the drawings indicating the method used to verify the allowable design capacity of the piles (load tests or PDA).

**A1010 STANDARD FOUNDATIONS**

**A1010 1.1 SHEETING AND SHORING**

Provide sheeting and shoring as required. Provides sheeting and shoring plans signed by the Contractor's Geotechnical Engineer.

**A1010 1.2 TERMITE CONTROL**

**A1010 1.2.1 Termite Control Barrier System**

Formulate and apply termiticide in accordance with the manufacturer's label directions. Provide termiticide with a label bearing evidence of registration by the U.S. Environmental Protection Agency or appropriate requirements of the host country.

Apply termiticide to the soil that will be covered by or lie immediately adjacent to the building(s) and structure(s), providing a protective barrier against subterranean termites.

Maintain the Pest Management Maintenance Record, DD Form 1532-1 and submit the Pest Management Report, DD Form 1532 as required.

Provide applicator(s) that are licensed or certified by the Federal government or the state or the host country, as applicable.

**A1010 1.2.2 Warranty**

Provide a 3-year written warranty against infestations or reinfestation by subterranean termites of the buildings or building additions constructed under this contract. Perform annual inspections of the building(s) or building addition(s). If live subterranean termite infestation or subterranean termite damage is discovered during the warranty period, and building conditions have not been altered in the interim:

a. Perform treatment as necessary for elimination of subterranean termite infestation;

b. Repair damage caused by termite infestation;

c. Reinspect the building approximately 180 calendar days after the repair.

**A1010 1.2.3 Visual Inspection Guide**

To maintain resistance to termites, complete the system and do not disturb, penetrate or damage during the remaining contract time period. Provide Manufacturer’s Guidance for performing a visual assessment of the installed system to ensure the system provides the designed termite physical barrier.

**A101001 WALL FOUNDATIONS**

Provide foundation walls as required in accordance with the requirements of this section and other portions of this RFP.

**A101002 COLUMN FOUNDATIONS AND PILE CAPS**

Provide column foundations or pile caps and grade beams as required in accordance with the requirements of this section and other portions of this RFP.

**A1020 SPECIAL FOUNDATIONS**

**A102001 PILE FOUNDATIONS**

Where piles are required, design, install, and test piles (including sheet piles, as applicable) in accordance with UFC 1-200-01, except as noted otherwise. Provide piles in accordance with the requirements of the Contractor’s Geotechnical Engineer, and the following paragraphs.

**A102001 1.1 DRIVING EQUIPMENT**

Provide piles (including sheet piles, as applicable) to the required tip elevation and capacity with the appropriate equipment as recommended by the Contractor's Geotechnical Engineer. Provide pile hammer(s) of sufficient weight and energy to suitably install piles without damage.

Drive production piles with the same hammer, cap block, and cushion materials, and using the same operating conditions as test piles, including pre-augering and spudding.

Pile driving equipment must match the equipment assumptions on which the pile driving formulae used to determine blow counts are based.

**A102001 1.2 INSTALLATION TOLERANCES**

Locate the center of pile butts not more than four horizontal inches from the location indicated at cutoff elevation. Manipulation of the piles is not permitted. In addition to the stated tolerances, provide a minimum clear distance of five inches between the heads of piles and the edges of pile caps.

Locate top of sheet piles at cutoff elevation within 1/2 inch horizontally and 2 inches vertical of the location indicated. Manipulation of the piles is not permitted.

A variation of not more than 2 percent from the vertical for plumb piles, or not more than 4 percent from the required angle for batter piles will be permitted.

**A102001 1.3 MISLOCATED AND DAMAGED PILES**

Remove and replace with new piles those piles that are damaged, mislocated, or installed out of alignment tolerance or provide additional piles, installed as directed by the Contractor's Geotechnical Engineer and approved by the Contracting Officer, at no additional cost to the Government.

**A102001 1.4 PILE SPACING**

For cast-in-place concrete or augercast piles, provide adequate distance, as determined by the Contractor's Geotechnical/Structural Engineer, between freshly placed concrete and other pile installation operations to avoid damage to concrete.

**A102001 1.5 COATED PILES**

Handle treated or coated piles so as to protect the treatment or the coating. Repair damage or defects to treatment or coating.

**A102002 CAISSONS**

If required, provide caissons as required in accordance with the requirements of this section and other portions of this RFP.

**A102003 UNDERPINNING**

If required, underpin existing construction as required in accordance with the requirements of this section and other portions of this RFP.

**A102004 DEWATERING**

Dewater site for foundation construction as required by soil conditions and local subsurface and surface water, including rainfall, and considering any potential adverse impact on adjacent facilities, including settlement. Dewatering requirements and methods must be established by the Contractor’s Geotechnical Engineer, based on his subsurface exploration and investigation.

**A102005 RAFT FOUNDATIONS**

If required, provide a raft foundation as required to achieve the requirements of this section and other portions of this RFP and as required by the Contractor’s Geotechnical Engineer.

**A102006 PRESSURE INJECTED GROUTING**

If required, pressure inject grout as required in accordance with the requirements of this section and other portions of this RFP.

**A1030 GROUND FLOOR SLABS**

**A103001 STANDARD SLAB ON GROUND**

If allowed by site conditions and recommended by the Contractor-provided Geotechnical Engineer, provide standard concrete slab on grade to meet the required loading requirement in accordance with the requirements of this section and other portions of this RFP.

Design and construct floor slab on grade in accordance with EM 1110-1-1904, Settlement Analysis, and so that any settlement of the floor slab will not result in harmful distortion of the floor, nor vertical misalignment of the floor with other building components (such as doorways and trenches), building utilities or with pile-supported building elements. If these above conditions cannot be met, provide a pile supported slab.

**A103003 TRENCHES**

Provide reinforced concrete trenches with water proof joints and seals to prevent ground water infiltration.

**A103004 PITS AND BASES**

Provide reinforced concrete pits and bases with water proof joints and seals to prevent ground water infiltration.

**A103005 FOUNDATION DRAINAGE**

**A103005 1.1 PERIMETER FOUNDATION DRAINAGE**

Provide a perimeter drainage system shall be provided to remove water away from the foundation of the facility and to be deposited in the storm sewerage system of the site. Provide perforated pipe for the foundation drainage system of the type specified, and of a size sufficient to remove water from the foundation successfully. Provide one, or a combination of more than one, of the following types of pipe:

a. Corrugated Polyethylene (PE) Drainage Pipe: ASTM F 405, heavy duty, for pipe 3 to 6 inches in diameter inclusive; ASTM F 667 for pipe 8 to 24 inches in diameter. Fittings must be manufacturer's standard type and must conform to the indicated specifications.

b. Acrylonitrile-Butadiene-Styrene (ABS) Pipe: ASTM D 2751, with a maximum SDR of 35.

c. Polyvinyl Chloride (PVC) Pipe: ASTM F 758, Type PS 46, ASTM D 3034, or ASTM F 949 with a minimum pipe stiffness of 46 psi.

Installation includes wrapping the pipe with filter fabric sock and careful bedding of the pipe with appropriate fill material to ensure that the pipe does not become obstructed with the bedding material.

**A103090 OTHER SLAB ON GROUND**

**A103090 1.1 BLOCK OR BOARD PERIMETER INSULATION**

Provide only thermal insulating materials recommended by manufacturer for perimeter insulation. Provide one of the board or block thermal insulations listed below conforming to the following standards:

a. Extruded Preformed Cellular Polystyrene: ASTM C 578

Provide insulation to meet requirements of UFC 3-101-01, *Architecture*.

-- End of Section --