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Mobile District Design Manual

US Army Corps of Engineers

Mobile District

109 St. Joseph Street

Mobile, Alabama 36602

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TABLE OF CONTENTS

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CHAPTER 1
GENERAL INSTRUCTIONS

INDEX

CHAPTER 1
GENERAL INSTRUCTIONS

1.1 GENERAL

1.1.1 PURPOSE

This Mobile District Design Manual prescribes standard procedures and instructions to accomplish the required design, drawings, specifications, project definition narrative, design analyses, cost estimates, and related support tasks for Military, Interagency and International Services (IIS), and to the extent applicable Civil Works construction projects under the direction of the US Army Corps of Engineers (USACE), Mobile District. This manual is written for the purpose of assisting Designers of Record (DOR), both In-House (I-H) and Architect-Engineer (A-E) firms - whether acquired by Mobile District to prepare original design or as part of a contractor team preparing design as part of a Design-Build acquisition, with a consistent logical approach to performing design and developing design related documents. The format presented is for the development of fully detailed 100% complete design drawings and fully edited Unified Facility Guide Specifications (UFGS) for use in a Design-Bid-Build (DBB) and Design-Build (DB) Request for Proposal (RFP) construction contract solicitation and is applicable to subsequent DB Contractor's design after award products. A DB RFP may include performance and or/prescriptive specifications which allow/require technical criteria that vary from the specific requirements of this manual. See CHAPTER 24 DESIGN-BUILD (DB) REQUEST FOR PROPOSAL (RFP) DEVELOPMENT for DB requirements.

1.1.2 PROPONENT

The Chief of Design Branch and Chief of Quality Management Branch, Engineering Division, Mobile District, is responsible for maintaining this Design Manual. Comments on, proposed corrections or improvements to, or discrepancies in the Manual should be addressed to these two offices.

1.2 APPLICABLE PUBLICATIONS

Applicable publications are listed in various chapters of this Manual. The most recent editions of the cited publications will be referenced at the start of Concept Design (35%) for Design-Bid-Build projects or Draft Design for Design-Build projects and later incorporated, as appropriate, in work prescribed by this manual. These publications are supplemented by the Unified Facilities Guide Specifications to form design criteria. Unless specifically stated otherwise in this Manual or the A-E Task Order (TO) Scope of Work (SOW), the designer is responsible for obtaining all publications applicable to the design of the project including, but not limited to, the cited publications. The recommended source for many publications is the Whole Building Design Guide (WBDG)

which contains Unified Facilities Criteria (UFC), Unified Facilities Guide Specifications (UFGS), Engineering and Construction Bulletins (ECB), USACE Technical Manuals (TM), Air Force Engineering Technical Letters (AFETL), industry and other government standards. The WBDG can be accessed through the following web site:

https://www.wbdg.org/ffc/dod

For A-E projects, additional project specific customer and user requirements, or additional publications and references, may be listed in the A-E Scope of Work. The A-E furnishes copies of all instructions, manuals, and other documents pertaining to design requirements to all consultants to ensure a completely coordinated design.

1.3 INSTRUCTIONS

1.3.1 PRE-DESIGN SCOPING MEETING

The USACE Project Manager (PM) will request that designers attend a pre-design scoping meeting at the project site and participate in discussions prior to the preparation of a design budget for in-house designs, or fee proposal and negotiation for a project designed by A-E. During these discussions, all aspects of the required effort, which will affect the designer's effort, will be addressed.

- I-H Design. The PM or Engineering Technical Lead (ETL) will be responsible for recording minutes from the pre-design scoping meeting.
- A-E Design. The A-E will be responsible for recording the minutes from the pre-design scoping meeting. Upon submission, review and approval by the PM, these minutes will be incorporated as part of the A-E requirements. The A-E designer will be furnished a draft SOW containing project specific design criteria and instructions. After the predesign scoping meeting, the A-E designer will receive a request to furnish a fee proposal for accomplishing the work agreed upon during the conference.

1.3.2 QUALITY MANAGEMENT

A Quality Management Plan is required for all projects. See CHAPTER 3 QUALITY MANAGEMENT for specific requirements.

1.3.3 STUDIES, RENDERINGS AND MODELS

- Studies - At various times, studies will be required that do not conveniently fit into the design phases and procedures required in this Manual. In such cases, requirements will be detailed in the Task Order Scope of Work (TO SOW).
- Models and interior/exterior color renderings necessary for a visual presentation to the customer will be furnished only as determined during the

pre-design meeting, funded, and as directed in the A-E Scope of Work for A-E projects.

- Renderings - The style of rendering and number of views required will be determined at the Pre-Design conference. Final rendering size/s, matting, framing, and glazing will also be established at that conference. Each framed rendering will include project name, project location, U.S. Army Corps of Engineers, Mobile District, and the A-E firm name. The number and size of unframed photographs of the rendering/s will also be determined at the Pre-Design conference. These requirements will be incorporated in the final TO SOW issued to the A-E.
- Models - The size, scale, construction method and materials, and functions of the model will be determined at the Pre-Design conference. These requirements will be incorporated in the final TO SOW issued to the A-E.

1.4 CHARRETTE

The requirements for a charrette will be as specified in the SOW. Additional charrette requirement may be determined during the pre-design meeting. CHAPTER 4 CHARRETTES provides additional information.

1.4.1 LIFE, HEALTH, AND SAFETY STANDARDS

UFC 1-200-01 DoD BUILDING CODE will be used by all designers as the basis and as a “road map” for determination of code requirements. UFC 3-600-01 FIRE PROTECTION FOR FACILITIES supplements and directs the DORs in following the appropriate codes and standards related to Fire and Life Safety. Refer to CHAPTER 16 FIRE PROTECTION, for further direction. Requirements in these and other UFCs are not exhaustive and are not a substitute for good design. Where the UFCs are silent, the DOR is responsible for the competent design of all portions of a project following applicable non-Government codes and standards, and commercial, customary practice. The facilities, systems, and equipment design standards of the Occupational Safety and Health Act, Code of Federal Regulations, Title 29, Chapter XVII, Parts 1910 and 1926, as applicable, will be incorporated by the designer into all design and analyses. Other customer-specific health and safety regulations will be determined during the pre-design conference and incorporated in the design effort. Any problem in incorporating these standards due to conflicts with other technical criteria will be promptly submitted to the ETL for resolution.

1.4.2 DESIGN FOR PEOPLE WITH DISABILITIES

Unless specifically stated otherwise in the SOW, all facilities will be designed to be accessible to and usable by people with disabilities in accordance with UFC 01-200-01.

1.4.3 TOPOGRAPHIC SURVEYS, EASEMENTS, AND UTILITIES

Unless otherwise specified during the pre-design conference, topographic, hydrographic, and utility surveying and mapping data will be provided. Chapter 07 SURVEYING AND MAPPING, GEOGRAPHIC INFORMATION SYSTEMS AND DATA MANAGEMENT, provides specific instructions. Specific requirements for A-E designs will be included in the SOW. Subsurface utility investigation using Ground Penetrating Radar or other means of determining the three-dimensional location of underground utility lines will be specifically addressed in the SOW.

1.4.4 FOUNDATION INVESTIGATION

Unless otherwise determined during the pre-design conference, foundation investigations will be provided (including soil and rock borings, sampling, laboratory testing, and pile load tests, where applicable), as well as tests such as percolation tests for septic tanks, soil resistivity tests for grounding and cathodic protection systems and infiltrometer test for storm water detention ponds. CHAPTER 9 GEOTECHNICAL provides specific instructions. Specific requirements for A-E designs will be included in the SOW.

1.4.5 REGULATORY PERMITS

Responsibilities for regulatory permits include:

- The designer will contact the appropriate federal, state, local, and interstate pollution and environmental control agencies to determine the permits required and the procedures and documentation necessary to obtain them. A written record of each such contact will be prepared and furnished within five working days to the Project Manager with copies to all parties involved.
- Where formal documents are required to be submitted to obtain permits, the designer will prepare all such documents and provide them in a "ready for signature" condition. This includes necessary copies of the plans, specifications, design analyses, and other required supporting documentation. After review by the USACE and comment incorporation, the corrected documents will be forwarded by USACE to the Installation for signature by the appropriate official and submission to the appropriate agency. Permit requirements will be ascertained and documented by the designer during the Concept Design stage.
- The designer will provide the following information and data for each required permit with the Concept submittal:

- Permitting authority (State, local, etc.)
- Type of permit required (construction, operation, etc.)
- Procedure and time necessary to complete the permit application
- Fees required

- Designer to provide a statement that the project is covered by variances or that permits are not required. If a variance is required, the procedures for obtaining the variance will be provided. If a permit is not required, reasons and supporting justification (i.e., cite state, local, and/or other regulations) will be furnished.
- Designer to provide an evaluation of all state and/or local regulations to determine if monitoring devices are needed. Where required, monitoring devices will be included in the project design.
- The designer will provide the completed permit applications not later than the Interim submittal or 60 days prior to the Final submittal, whichever is earlier. Permit applications will be ready for signature by the appropriate official and submission to the approving authority.
- With the Final submittal, the designer will provide all supporting documents, plans, and specifications. The designer will also have accomplished the necessary coordination to obtain permit application approvals.

1.4.6 SUSTAINABLE DESIGN

Sustainable design is an integrated approach to planning, designing, building, operating, and maintaining facilities in a collaborative and holistic manner among all stakeholders. It is meant to reduce the environmental impact and ownership cost of facilities; improve energy efficiency and water conservation; and provide safe, healthy, and productive built environments. The project specific criteria will be determined during the pre-design meeting or charrette. The SOW will identify requirements for A-E projects. See CHAPTER 6 SUSTAINABLE DESIGN AND DEVELOPMENT for specific requirements.

1.4.7 ANTI-TERRORISM/FORCE PROTECTION

Anti-Terrorism/Force Protection is an inherent part of all projects. See CHAPTER 5 ANTITERRORISM / FORCE PROTECTION, for specific requirements.

1.4.8 VALUE ENGINEERING (VE)

- The VE program applies to most procurement acquisitions that are federally funded and managed by the U.S. Army Corps of Engineers including, but not limited to, Civil Works and Military construction projects, Environmental, Hazardous, Toxic and Radioactive Waste (HTRW) and Military Munitions

Response Program (MMRP) projects, Support For Others (SFO), Formerly Used Defense Site (FUDS), Formerly Utilized Sites Remedial Action Program (FUSRAP) and any other federal funded programs. See CHAPTER 26 VALUE ENGINEERING for more information.

- For Army projects this includes projects with a total construction cost exceeding $2 million including O&M projects.
- When dollar thresholds are met, discuss the coordination of requirements, conduct, and reporting of results with the Project Manager and the Engineering Technical Lead so that they may coordinate with the district Value Engineering Officer.
- See paragraph 1.7.4 VALUE ENGINEERING for additional information.

1.4.9 BUILDING INFORMATION MODELING

1.5 ADVANCED MODELING (BIM / CIM / CAD)

Advanced Modeling refers to BIM, CIM, and CAD technologies. See CHAPTER 29 ADVANCED MODELING for more information.

1.5.1 PROJECT FILES AND DOCUMENT MANAGEMENT

Bentley ProjectWise, an enterprise engineering document management system will be used during design to manage the project files documents including drawings, design analyses, and supporting information for both A-E and I-H projects. For A-E contracted projects, the A-E will provide the project file documents to the ETL to be uploaded into ProjectWise. ProjectWise will also be used to archive completed projects including design analyses, plans, specifications, and As-Built drawings.

It is the responsibility of the designer to review as-built drawings acquired at the start of design to confirm existing conditions and to verify all interfaces between new and existing work.

Contractor-prepared digital as-built drawings will be provided via CD/DVD or other suitable medium by the responsible Resident Engineer through the PM and ETL to the Engineering Technical Services Section (EN-TS). EN-TS will in turn copy these As-Built drawings to the ProjectWise Archive.

1.5.2 DESIGN TEAM PROJECT VISITS

Design team member additional project visits will be made as appropriate during the design phases. These visits will be used for design review conferences, to coordinate with users and the Installation, and to observe, record, and evaluate existing conditions, and other features that have an impact on the design.

1.5.3 DESIGN BUDGET

The design budget will be prepared following the pre-design scoping meeting. For A-E projects, the SOW will define project requirements. Development of the design budget will be the responsibility of the ETL, with coordination from the PM for approval.

1.5.4 INSTALLATION CRITERIA

The ETL will maintain Installation specific design criteria which will be readily available to I-H and A-E Project Delivery Team (PDT) members. The ETL will update the Installation criteria using Installation specific lessons learned and evaluation of construction changes.

1.5.5 DESIGN SCHEDULE

The ETL is responsible for the design schedule in coordination with the A-E or I-H PDT. The ETL will work with Engineering Division's Primavera(P6) Scheduler to ensure that the schedule is uploaded to P6 and maintained. Requirements for initial development and updates to design schedule for A-E contracted projects are outlined in the TO SOW.

1.6 DEFINITIONS

1.6.1 DESIGN ANALYSIS

- The Design Analysis (DA) is not a construction contract document, but rather documentation of the basis of design for the Resident Engineer, and digital archival document for Engineering Division. The design analysis should be developed from Concept Design to include a discussion of any new or unfamiliar products, critical product features, critical milestones that may require designer consultation, critical decisions or items of stakeholder-interest revealed in design meetings, shop drawings of particular interest or criticality or anticipated difficult construction features.
- The design analysis is a written explanation of the project design and is expanded and revised for each submission. The design analysis will contain a summary of the criteria for and the history of the project design, including criteria designated by the customer, letters, codes, references, conference minutes, and pertinent research. The justification for each major selection and design decision will be clearly stated. Design calculations, computerized and manual, will be included in the design analysis in digital format. Narrative descriptions of design solutions will also be included. Diagrams and sketches to convey design concepts may be provided to illustrate all written material. Design phase review comments and the specific actions (annotations) taken in response to each comment from the preceding design phase review will be

included with each submission of the design analysis. A separate section with pertinent notes to the Resident Engineer will also be included. Specific requirements for the design analysis are provided in other chapters of this Manual.

1.6.2 DRAWINGS

Drawings are required in each design submittal. The drawings at each submittal stage will be complete, thoroughly checked, and coordinated. Specific drawing requirements are defined below and in other chapters of this Manual.

1.6.3 SPECIFICATIONS

The Unified Facilities Guide Specifications (UFGS) 48 division format is mandatory. The specifications will be developed in accordance with guidance provided below and in other chapters of this Manual.

1.7 SUBMITTAL REQUIREMENTS

1.7.1 GENERAL

Requirements for each submittal are generally described below. Additional requirements are contained in other chapters of this Manual. Specific instructions for A-E design projects for number of copies, addressing, and other instructions are provided in the SOW submittal registry. Covers for all submittals will be white with black letterings. (Colored covers on plans and spec books are reserved for advertised solicitations only). Submittals will not include the solicitation number on the drawings, specs or covers. (Solicitation numbers on plans and spec books are reserved for advertised solicitations only.)

1.7.2 PROJECT DEFINITION (10%)

This submittal represents approximately 10% of the design effort and will be used to document and validate projects requirements and the construction cost. The submittal will include preliminary schematic plans, a narrative describing each aspect of the project including a sustainable design points assessment checklist and narrative, energy scoresheets, and a parametric cost estimate. This level of design effort equates to the final report prepared to document charrette completion (see CHAPTER 4 CHARRETTES).

1.7.3 CONCEPT DESIGN (35%)

This submittal represents approximately 35% of the design effort and will be of sufficient detail to show how the users' functional and technical requirements will be met, indicate the designer's approach to the solution of technical problems, show

compliance with design criteria or provide justification for noncompliance, and provide a valid estimate of cost. The Concept Design consists of:

- Design Analysis
- Design narrative, notes to the Resident Engineer, and design calculations for all disciplines. See respective discipline chapters, within this document, for requirements of 35% design submittal.
- Intended (outline) specifications list
- Regulatory permitting memorandums
- Concept drawings. See respective discipline chapters, within this document, for requirements of 35% design submittal.
- Bidding schedule with Bid Options identified when applicable
- Concept cost estimate
- Required information and data for each required permit
- Annotated Project Definition review comments

1.7.4 VALUE ENGINEERING

- Shortly after or in conjunction with the Concept Design submittal, the designer will perform a Value Engineering (VE) Study as directed. It is strongly recommended that the VE Study be conducted at the Installation for which the project is intended and involve user and Installation representatives such as representatives from the Base Civil Engineer or Directorate of Public Works organizations.
- VE Study. This effort will include study of design memorandum documents, cost data, and other information furnished as the basis of the design. The VE study will develop alternate designs to achieve the required mission(s) or function(s) at the lowest overall cost consistent with performance for structures, structure or facility siting, site development, equipment, electrical and materials or methods. The study includes examination of high-cost items including life cycle cost, anticipated construction time and conservation of energy. Design details and analysis will be considered and alternatives developed as appropriate. The VE team should consider the latest technology in development of alternatives to achieve maximum results for life cycle cost, energy conservation, functional use, maintainability and first cost (construction) savings.
- The VE Team. The VE Team Leader will be headed by an architect or engineer with no prior input or knowledge of the design. Other disciplines generally required for participation are civil, structural, mechanical, electrical, and cost

engineering. Similarly, VE team members will have no prior input to, or knowledge of the design. Selected team members will be different from the design team. All members should have experience performing VE analysis.

- VE Report. The results of the study will be prepared and submitted on 8 1/2" x 11" bond paper. Back-up data and detailed estimates will be included. Sketches may be 8 1/2" x 11" or 11" x 17”-foldouts. Pages must be sequentially numbered in the lower right-hand corner for assembly purposes. Report will include as a minimum:
  - Transmittal letter
  - Cover Sheet
  - Table of Contents
  - Summary of existing and proposed design
  - Study Methodology
  - Tabulation of proposed changes with first cost savings, operations and maintenance costs, and energy savings displayed separately. Life cycle cost analysis will be included. Present worth and annualized cost will be computed using ten percent (10%) per annum.
  - Advantages and disadvantages of proposed changes
  - Appropriate drawings for each proposed change showing the existing conditions and proposed alternatives
  - Estimates comparing the existing design with all proposed changes
  - Results and conclusions
  - Recommendations will include comments concerning the feasibility of implementation of each proposal. A separate summary tabulation will be included in the front of the report indicating if the change is minor or major with recommendations concerning the most efficient way to accomplish each change.
  - List of possible design conflicts
  - Summary of VE Actions
- VE Report Distribution. The report summarizing the VE proposals will be submitted to those listed in the TO SOW Design Submittal Distribution List, or as determined by the PM and ETL when prepared in-house. Confirm other reporting requirements with the District VE Officer.

- Presentation of VE Study Results. The VE team leader will attend a half-day meeting at the start of the Concept Design (35%) Review Conference at the project site to present the VE proposals. The presentation will be scheduled with the Corps of Engineers Project Manager at least 14 calendar days prior to the proposed presentation date.
- Implementation of VE analysis recommendations will not compromise the functional and quality requirements of the facility. A VE study should not eliminate features used to meet Leadership in Energy and Environmental Design (LEED) requirements or certification per the most current Air Force policy. A VE study will not eliminate features required to comply with Occupational Safety and Health Act (OSHA) standards.
- Implementation of Approved VE Changes. VE proposals accepted by the Government will be incorporated into the subsequent submittals of the design project. The designers will be required to validate savings for accepted proposals for their final impact on the project cost estimate.
- The Value Engineering Proposals and ideas become the property of the Government and may be used on future contracts or designs without additional compensation to the A-E.
- The Government reserves the right to perform value engineering studies on A-E projects either during or after the completion of design. The Value Engineering Studies may be performed by the Government's in-house staff or by another A-E. The Government, at its discretion, may modify the A-E's contract to implement any or all design changes resulting from the Value Engineering Studies or the engineering evaluations after completion of design. The A-E will identify a candidate list of areas to be considered for Value Engineering evaluation. Of primary concern are areas that appear to be too costly because of design restraints placed on the A-E by the project criteria and design requirements.

1.7.5 INTERIM DESIGN (65%)

This submittal, if required, is intended to ensure that funding limitations are not being exceeded and that the drawings, design analysis, specifications, and cost estimate are proceeding in a timely manner and that the design criteria and previous review comments are being correctly interpreted. Redlined marked up specifications will be submitted at this design phase. The Interim Design will consist of:

- Design Analysis developed to approximately 65% completion. See respective discipline chapters, within this Manual, for requirements of 65% design submittal.

- Approximately 65% complete drawings including those addressing construction phasing. See respective discipline chapters, within this Manual, for requirements of 65% design submittal.
- Detailed cost estimate developed to approximately 65% completion including Bid Options where applicable.
- Redlined marked-up specifications.
- Annotated Concept review comments from P (DrChecks).
- Completed permit applications (if an Interim submittal was not required, the completed permit applications are required 60 days prior to the Final submittal).

1.7.6 95% DESIGN (UNREVIEWED)

This submittal represents a 95% complete design except for the incorporation of any review comments resulting from the review of the submittal. The 95% Design will consist of:

- Design Analysis developed to approximately 95% completion. It will include all backup material previously submitted and revised as necessary, all design calculations, all explanatory material giving the design rationale for any design decisions which would not be obvious to an engineer reviewing the Final drawings and specifications, and any information for the Resident Engineer that will assist in administering the construction contract. See respective discipline chapters, within this Manual, for requirements of 95% design submittal.
- 95% complete drawings including those addressing project construction phasing. See respective discipline chapters, within this Manual, for requirements of 95% design submittal.
- Specifications. Redlined marked up specifications if an Interim submittal was not made. Final edited specifications if an Interim submittal was made. The contract front-end (boiler plate) will be completed by the Mobile District Technical Services Section (EN-TS) and forwarded to the A-E for inclusion in the Final Design Submittal. The Submittal Register must be edited and included.
- Bidding schedule and an Explanation of Bid Items. Identify Bid Options where applicable.
- Detailed 95% complete cost estimate.
- Annotated Interim review comments from Projnet.
- All supporting documentation required for permit application approvals.

1.7.7 100% FINAL DESIGN (REVIEWED)

This submittal represents a fully designed package (design analysis, specifications, and drawings) including annotated 95% design submittal review comments that answer and/or incorporate review comments resulting from the review of the 95% design submittal. This includes a 100% complete bidding schedule and Explanation of Bid Items as well as a detailed 100% complete cost estimate. This submittal will serve to back check and close out all prior ProjNet review comments in addition to any unresolved design deficiencies. The project will not proceed to Ready-To-Advertise (RTA) until all comments and unresolved design deficiencies are resolved to the satisfaction of the ETL and PM.

1.7.8 READY-TO-ADVERTISE (RTA)

This submittal represents a complete design which is ready to proceed forward as an advertised solicitation. A Solicitation Number will be added on the packaged design plans and specification book volumes.

CHAPTER 2

PRESENTATION OF DATA

INDEX

CHAPTER 2

PRESENTATION OF DATA

2.1 GENERAL

2.1.1 STANDARDS FOR PRESENTATION OF DATA

The guidelines, standards, and reference materials contained within this Manual will be used for preparation of all documents, unless otherwise noted during the pre-design conference and in the SOW. The SOW for each project is specific and may include additional requirements of the customer, user, location, or Installation.

2.1.2 DOCUMENT FORMAT AND GUIDELINES

All documents presented will be legible and clearly expressed. The standard formats for each type of document are described throughout this Manual. Each and all required documents submitted should be adequately titled and dated. The documents should show the stage of the submittal clearly marked on the cover. Pages within any section or chapter of a document will be consecutively numbered, indexed, and cross-referenced so that specific information can be easily located.

2.1.3 APPLICABLE PUBLICATIONS

The Mobile District Engineering Division website address listed below provides links to Design Guides, Design Analysis and the Mobile District Design Manual:

https://www.sam.usace.army.mil/Missions/Military-Missions/Engineering/

2.2 SUBMITTAL REQUIREMENTS

This section covers format requirements for the deliverables for all submittals. Instructions will be followed unless otherwise specified in the SOW. The Project Code, official title of the project, Solicitation number and advertising date will be provided by the ETL. A submittal report is required for all submittals and will be presented in the same format as an RTA report. See Appendix A-1. All drawing title block information must be complete for each submittal. See CHAPTER 29 ADVANCED MODELING for additional submittal requirements. Reports, Design Analysis and Cost Estimate will be 8 ½" x 11". If hard copies are required by the SOW, 8 ½" x 11" will be double sided and drawings will be single sided half size unless otherwise required. All hard copy submittals will be bound.

2.2.1 MINIMUM SUBMITTAL REQUIREMENTS (FULL DESIGN / DESIGN-BID-BUILD)

- 10% Project Definition

- Charrette Report
- Cost Estimate
- Drawings
- Advance Modeling PXP

- 35% Concept Design
  - Reports
  - Design Analysis
  - Cost Estimate
  - Drawings
  - Advanced Modeling files
  - List of applicable Specifications

- 65% Interim Design
  - Reports
  - Design Analysis
  - Bid Schedule
  - Cost Estimate
  - Drawings
  - Specifications (Red Line)
  - Advanced Modeling files

- 95% Design (Unreviewed)
  - Reports
  - Design Analysis
  - Bid Schedule
  - Cost Estimate
  - Drawings
  - Specifications
  - Advanced Modeling files

- 100% Final Design (Reviewed)
    - Reports
    - Design Analysis
    - Bid Schedule
    - Cost Estimate
    - Drawings
    - Specifications
    - Advanced Modeling files
- RTA
    - Bid Schedule
    - Drawings (With Solicitation Number & Advertise Date)
    - Specifications (With .SEC Files)
    - Cost Estimate
- Pre-Award (Including Amendments)
    - Bid Schedule
    - Conformed Drawings
    - Conformed Specifications
    - IGE
    - Advanced Modeling files

2.2.2 DESIGN-BUILD (DB) REQUEST FOR PROPOSAL (RFP) NARRATIVE

Sections 01 10 10 DESIGN REQUIREMENTS and 01 10 12 DESIGN AFTER AWARD narratives will be prepared in the format shown in CHAPTER 24 DESIGN-BUILD (DB) REQUEST FOR PROPOSAL (RFP) DEVELOPMENT.

2.3 DOCUMENT REVIEW AND COORDINATION

- The designer will check and coordinate with each involved design discipline on each submittal for omissions, repetition, and resolution of all conflicts. The designer will prepare the drawings and specifications with the expectation that the construction contractors will be able to complete construction without any additional assistance or issuance of modifications to correct design deficiencies. Coordination among disciplines, and between drawings and specifications, is essential.

- The Unified Facility Guide Specifications (UFGS) contain design information shown as “notes” to the designer. These notes include restrictions and guidelines on the selections of materials and of construction methods and may include details and information that must be shown on

drawings. The designer will coordinate these notes, drawings and other submittal data with the guide specifications and customer specific criteria.

2.4 REPORTS AND DESIGN ANALYSIS

Reports and Design Analyses submitted at various design phases will follow the below guidelines:

2.4.1 MEDIA AND FORMAT

- The narrative and Design Analysis will be printed on 8 ½" x 11" paper except when larger paper 11" x 17" folded to 8 ½" x 11", is required for drawings, graphs or special calculation forms.
- Documents will be prepared in Microsoft (MS) Word (.docx) or MS Excel format (.xlsx). Hand calculations and other support documentation will be scanned into PDF format.

2.4.2 ORGANIZATION

- The documents will be in a sequential binding order and bound under a cover indicating the name of the facility. The cover will carry the designation of the submittal.
- The official sections and section titles are as follows:
    - General
        - General
        - Needs List
    - Foundation Conditions
    - Site Development
        - Siting
        - Pavements
        - Grading and Storm Drainage
        - Fencing
        - Railroads
        - Environmental Protection
    - Landscaping, Irrigation, Planting and Turfing
    - Exterior Utilities

    - Water
    - Sanitary/Wastewater
    - Gas
    - Steam Distribution
    - Special Considerations
    - Electrical
    - Communications
- Anti-Terrorism/Force Protection
- Fire Protection
    - Site Design and Utilities
    - Life Safety
    - Fire Suppression
    - Fire Detection and Alarm
- Architectural
    - Architectural
    - Interior Design
- Structural
- Mechanical
    - Heating, Ventilation and Air Conditioning
    - Plumbing
    - Special Considerations
    - Special Mechanical Systems and Equipment
    - Boiler Plants
    - Air Pollution Control and Equipment
- Electrical
    - Electrical
- Electronic Systems
- Cathodic Protection
- Cybersecurity

-
- Sustainable Design Development
- Cost Estimate
- Construction Coordination
    - Notes to the Resident Engineer

Appendix "A" – (Insert title here)

Appendix "B" - (Insert title here)

Appendix "C" - (Insert title here)

2.4.3 FILE STRUCTURE AND FILE NAMING CONVENTION

Individual design narrative files will be named as follows:

[Project Code] - [Submittal Milestone/Stage] - [Chapter Number] – [Discipline].docx (example: MHY22006-35-7-Architectural.docx for an architectural design narrative submitted at 35%)

2.4.4 DESIGN CALCULATIONS

The design calculations will be presented with a title page and index. When design calculations page count is greater than 600 pages, they will be bound separately from the narrative part of the design analysis. A table of contents, which will be an index of the indices, will be furnished when there is more than one volume. The source of loading conditions, sketches, supplementary graphs, formulas and references will be identified. Assumptions and conclusions will be explained. Calculation sheets will have dates and names of the persons making the calculations and checkers. For all digital (PDFs), they will be bookmarked following the above format.

2.4.5 FORMAT

- Font: Arial, Size 12, black for all text and page numbering
- No underlining
- Section titles may be all capitals
- Margins:
    - Left 1.25”
    - Right 0.75”

- Top 1.0”
- Bottom 1.0”

- Page numbering: bottom center. Note page numbering leads with section number.
- Two spaces behind a paragraph letter or number. Do not tab after a paragraph number or letter.
- Single spaces behind any period or colon
- One space behind a comma
- Tab settings at 0.5” increments
- List specifications using a comma and a space after the specification number, followed by specification section title. The format follows:

  “a. UFGS Section 03 30 04 CONCRETE FOR MINOR STRUCTURES”.

  - Refer to the ETL for the official job title. Spell out the state name. Do not abbreviate.
  - Example of "Parenthetical Hierarchy":
  - TITLE
  - Text.....
  - Text.....

    A sample narrative format structure is provided in APPENDIX A2.

CHAPTER 3

QUALITY MANAGEMENT

INDEX

CHAPTER 3

QUALITY MANAGEMENT

3.1 GENERAL

3.1.1 SCOPE

This chapter provides quality management criteria, standards, and practices for the delivery of quality products and services to Mobile District customers. This applies to all in-house (I-H) and Architect-Engineer (A-E) members of the Project Delivery Team (PDT). Quality management concepts and principles are the same for Civil Works (CW) and Military Construction (Milcon) projects, although governing regulations differ in naming convention, approval authority, and other details. For this chapter, differences between CW and Milcon will be noted in the text. Interagency and International Support projects are assumed to follow Milcon requirements unless project specific documents specify otherwise.

3.2 APPLICABLE PUBLICATIONS

Air Force Instruction (AFI)

AFI 32-1023	Designing and Constructing Military Construction Projects

Engineer Regulation (ER)

ER 5-1-11	USACE Business Process
ER 11-1-321	Army Programs Value Engineering
ER 415-1-11	Biddability, Constructability, Operability, Environmental and Sustainability (BCOES) Reviews
ER 415-1-13	Design and Construction Evaluation (DCS)
ER 1110-1-8158	Centers of Expertise Program
ER 1110-1-8159	Engineering and Design, DrChecks
ER 1110-2-112	Required Visits to Construction Sites by Design Personnel
ER 1110-2-1150	Engineering and Design for Civil Works Projects
ER 1110-3-12	Military Engineering and Design Quality Management

ER 1110-345-100	Design Policy for Military Construction
ER 1165-2-217	Water Resources Policies and Authorities Civil Works Review Policy

Engineer Manual (EM)

EM 5-1-11	Project Delivery Business Process (PDBP)

Engineer Pamphlet (EP)

EP 715-1-7	Architect-Engineer Contracting in USACE

3.3 DEFINITIONS

3.3.1 QUALITY MANAGEMENT PLAN (QMP)

For MilCon Projects, The QMP is a written plan that defines how quality management will be executed for USACE design products, including contracted or brokered work. The QMP is prepared by the ETL in accordance with ER 1110-3-12 and in coordination with the PDT.

3.3.2 REVIEW PLAN (RP)

For Civil Works Projects, the RP identifies the review steps and details for a project. Review plans are prepared by PDTs and approved by the Major Subordinate Command (MSC) in accordance with ER 1165-2-217.

3.3.3 QUALITY CONTROL PLAN (QCP)

The QCP is a component of the QMP. The QCP defines how Quality Control will be executed for products. For internal USACE designed projects (In-House or I-H), the QCP will be prepared by the ETL, implemented during the project execution phase, and may be updated as required during project execution. For A-E contracted design projects, the QCP will be prepared by the A-E design project manager. Additional criteria and guidance can be found in ER 1110-3-12.

3.3.4 QUALITY ASSURANCE PLAN (QAP)

The QAP is a component of the QMP and is prepared by the TL in concert with the PDT during the project planning phase. The Quality Assurance Plan defines how quality assurance will be executed on products that are completed by another District, government agency, or A-E resources. The Quality Assurance Plan is implemented during the project execution phase. Additional criteria and guidance can be found in ER 1110-3-12.

3.3.5 MOBILE DISTRICT PROJECT MANAGER (PM)

The PM is responsible for managing the project scope, schedule changes and authorization matters with the customer and higher authority.

3.3.6 MOBILE DISTRICT ENGINEERING TECHNICAL LEAD (ETL)

The ETL is responsible for coordinating all project activities within Engineering Division including those with the A-E, when utilized, and is the day-to-day interface between Engineering Division and the PM. The ETL is also the primary point of contact within Engineering Division for Installation /customers and Construction Division.

3.3.7 DESIGNER OF RECORD (DOR)

The single person responsible and liable for the adequacy and safety of a design. For In-House design projects, this is the Chief of Engineering. For A-E work, this is the principal of the firm in charge of the project. Although the DOR is a single person in an organization, the term “DOR” is often used to refer to the designing organization.

3.3.8 CONTRACTING OFFICER’S REPRESENTATIVE (COR)

The COR is the responsible party charged with providing oversight of A-E services contracts by the Contracting Officer (KO). The Engineering TL and the COR may be the same person for a project. Refer to EP 715-1-7 for specific qualifications and responsibilities of the COR.

3.3.9 MOBILE DISTRICT ENGINEERING QUALITY MANAGER (QM)

The Quality Manager (QM) is responsible for ensuring that all components of the QMP, including, but not limited to District Quality Control (DQC), District Quality Assurance (DQA), Independent Technical Reviews (ITR) and BCOES certifications, are completed satisfactorily and documented in ProjectWise and or ProjNet.

3.3.10 PROJECT DELIVERY TEAM (PDT)

The PDT consists of everyone necessary for successful development and execution of all phases of the project. The PM is responsible for ensuring that the necessary disciplines and perspectives are represented within the PDT. Each member of the PDT is responsible for delivering quality products and must remain knowledgeable about critical project requirements. Each PDT member must conduct and/or facilitate project reviews to ensure consistency and effective coordination across all project disciplines.

3.3.11 REVIEW MANAGEMENT OFFICE (RMO)

For Civil Works projects, the RMO is the designated USACE organization overseeing quality reviews by reviewing, endorsing, and enforcing the RP.

3.3.12 DISTRICT QUALITY CONTROL (DQC)

District Quality Control (DQC) reviews are technical checks and reviews on in-house designs. DQC reviews, sometimes called “Peer Reviews”, are discipline-by-discipline, comprehensive reviews conducted as the project work continues.

3.3.13 INDEPENDENT TECHNICAL REVIEW (ITR)

For Milcon Projects, ITR is a review by a qualified person or team, external to the PDT, optimally external to the “Home” District, and not involved in the day-to-day production of a product, for the purpose of confirming the proper application of clearly established criteria, regulations, laws, codes, principles and professional practices.

3.3.14 AGENCY TECHNICAL REVIEW(ATR)

For Civil Works projects, a review to ensure overall technical analyses and approaches are correct and compliant with all pertinent USACE guidance to achieve high quality work products and facilitate vertical alignment early in work product development. ATR team members are always from outside the district. ATR is only required for certain projects as defined in Chapter 5 of ER 1165-2-217.

3.3.15 BIDDABILITY, CONSTRUCTABILITY, OPERABILITY, ENVIRONMENTAL AND SUSTAINABILITY (BCOES) REVIEWS

A review performed to ensure that the government’s contract requirements are clear, executable and readily understandable by private sector bidders or proposers. It will help ensure that the construction be efficient and in an environmentally sound manner and that the construction activities and projects are sufficiently sustainable.

3.3.16 AFTER ACTION REVIEW (AAR)

An AAR is a professional discussion of an event focused on improving the performance of the organization or team. The focus of the AAR is analyzing what was supposed to happen, what actually happened, and why it happened.

3.3.17 LESSON LEARNED

Lessons learned is the learning gained from the process of performing the project, whether positive or negative.

3.3.18 BEST PRACTICE

A best practice is a process, technique, or innovative use of technology, equipment, or resources that has a proven record of success in providing significant improvement in cost, schedule, quality, performance, safety, environment or other measurable factors that impact an organization.

3.4 PLAN-DO-CHECK-ACT CYCLE

The Plan-Do-Check-Act (PDCA) cycle is the guiding quality management procedure for USACE business processes. Quality management policies and procedures are organized and presented by their associated PDCA phase. The PDCA cycle is illustrated in Figure 1-1 with each PDCA step summarized below.

- **Plan –** Design the QMP to document and achieve customer requirements and provide for high quality products and services. Include QMP activities in the project budget and schedule.
- **Do –** Implement the QMP Quality Control procedures.
- **Check –** Implement the QMP Quality Assurance procedures and evaluate the project results.
- **Act –** Identify and implement process changes for continual, real-time improvement.

Figure 1-1. Plan-Do-Check-Act (PDCA) Cycle

3.4.1 PLAN PHASE: QUALITY PLANS

Quality is planned for and managed according to the QMP or RP. During the project planning phase, the PM will lead the PDT in the development of an effective PMP that complies with the PDBP and ER 5-1-11: USACE Business Process. The QMP or RP is an integral part of the PMP and lays out project-specific plans and processes for quality control and quality assurance. Refer to the Quality Management Plan Guide Appendix of ER 1110-3-12 or Developing and Approving

process section of ER 1165-3-17 for details on developing a QMP or RP, respectively.

The QCP or QAP, when needed, will be prepared, approved, and implemented prior to design start for Milcon Projects. For A-E projects, the QCP will be prepared in accordance with A-E standard practice and submitted to the ETL. The A-E will be responsible for adhering to all other Quality Management requirements identified in the A-E's Appendix A Scope of Work.

The RP for CW projects will be prepared at the start of a project. Endorsement by the RMO and approval by the MSC should occur prior to the first major milestone.

3.4.2 DO PHASE: QUALITY CONTROL

Quality Control (QC) is that part of quality management focused on ensuring performance meets agreed upon customer requirements that are consistent with law, regulations, policies, sound technical criteria, schedules and budget. QC focuses on the PRODUCT. Basic quality control tools include DQC Reviews, ITRs, ATRs and BCOES Reviews. The QCP, QAP, or RP that was developed during the Planning Phase, will be implemented during the project execution phase or "Do" Phase. The TL will update the QCP, QAP, or RP as required for changing project conditions and incorporated Lessons Learned.

DQC reviews must be performed by designated individuals not involved in the day-to-day production of the project/product, and from the senior staff or other qualified personnel identified by the responsible supervisor. DQC reviews will be performed at every stage of the design and must be performed prior to the submission of the deliverables for Customer Review and/or ITR or ATR review. For A-E projects, the contractor's approved QC plan will be followed for performing quality checks that meet this intent.

ITR for Milcon projects is a review by a qualified person or team, external to the PDT, optimally external to the "Home" District, and not involved in the day-to-day production of a project/product, for the purpose of confirming the proper application of clearly established criteria, regulations, laws, codes, principles and professional practices. All products, including those prepared by other agencies and contractors, will be subject to an ITR. ITR is a holistic, comprehensive review of the project. While ITR is a critical component of quality control, it will not replace DQC or other quality control processes. For A-E projects, the ITR will typically occur within Mobile District.

ATR for CW projects has similar purposes as an ITR but will always occur outside of Mobile District.

Review of a project's biddability, constructability, operability, and environmental aspects is a required element of design quality control and quality assurance reviews. At a minimum, three BCOES reviews must occur according to ER 415-1-

11. The reviews must be conducted at the concept design stage, at the final document stage and for a final backcheck review. The PM and ETL must ensure distribution of complete design packages to BCOES reviewers. Reviewers will record all comments related to the BCOES aspects of the project within the scheduled design review periods. BCOES reviews should be coordinated to occur concurrently with ITR or ATR to the greatest degree possible.

DQC, ITR, ATR, and BCOES reviews will document comments and recommendations using the DrChecks module in ProjNet according to ER 110-1-8159. If an A-E proposes using a different system for capturing comments and recommendations in their QCP, they will be considered on a case-by-case basis.

The PM and/or ETL must initiate and route certifications for all final products and final documents. The certifications signed by ETL, PM, and the Chief of Engineering Function must indicate that the issues raised by the review teams have been resolved.

3.4.3 CHECK PHASE: QUALITY ASSURANCE

- **Design QA** – Quality assurance (QA) is defined as that part of quality management focused on providing confidence that project quality requirements defined in the PMP will be fulfilled. QA focuses on the PROCESS. QA is the means of ensuring that the project or product meets the requirements for technical adequacy, and that QC activities have been properly performed and documented. Together, the engineering and design QA/QC activities must be effective in producing engineering and design products that meet the required quality standards. The QAP, prepared by the ETL and PDT during the planning phase for A-E Milcon projects, will be implemented during execution of the engineering and design phase. The ETL will update the QAP as required for changing project conditions.

  For in-house Milcon and Civil Works Projects, a separate QAP is not required. For in-house Milcon, the QA is not performed by Mobile District and for CW projects, the QA requirements are captured in the RP.

- **Construction QA –** Construction Quality Management is a combined responsibility of the construction contractor and the Government. The contractor is always responsible for construction Quality Control. The Engineering PDT will give priority to supporting construction contract activities, as response time is critical to ensure cost-effective contract execution. The PM will ensure that the engineer support to construction is adequately resourced, including A-E construction phase (Title II) services (as required). Site visits by the appropriate PDT members, coordinated by the ETL, are encouraged to verify conditions assumed during the design phase and offer technical support to the field staff relative to design intent. Needed changes to the contract documents will be formalized and initiated by field personnel and coordinated

with the ETL to the appropriate discipline lead (for in-house designs) or A-E (for contracted designs) for review.

The PDT, whether an A-E or in-house, must prepare an Engineering Considerations and Instructions for Field Personnel (ECIFP) according to specific Military Programs or Civil Works guidance from the respective Ers. An ECIFP is a brief document outlining the engineering considerations used to make design decisions. It includes the project discussions on the intent and why specific designs and materials were selected and any features requiring special attention. ECIFP is the transition document from engineering to construction and is a required part of the DDR.

The Designer of Record (DOR) will review all Design Modifications or construction changes that have a significant impact on design, including Value Engineering Change Proposals, waivers and system changes, to ensure that design intent, safety, health and environmental requirements are not compromised. All design modifications will be coordinated with the ETL to the appropriate discipline lead or DOR and will be reviewed for design deficiencies that may require changes in design criteria.

When using the DB delivery method, the contractor provides integrated design and construction services while USACE performs quality control and quality assurance of solicitation documents, and quality assurance on both design and construction deliverables. The contractor is responsible to perform quality control on both design and construction deliverables.

3.4.4 ACT PHASE: CONTINUAL IMPROVEMENT

Continual improvement is a performance imperative for every command and is achieved through the review of project results, identification of non-conformities and systemic problems, tools for root cause analysis and implementation of appropriate corrective actions. The process of continual quality improvement leads to the refinement of the overall quality system. Processes and tools for continual improvement include quality management review, AAR, lessons learned, best practices and quality metrics.

- **After Action Review –** An After-Action Review (AAR) is a professional discussion of an event focused on improving the performance of the organization or team. The focus of the AAR is analyzing what was supposed to happen, what happened, and why it happened. Through the AAR process, the team compares the actual outcome with the expected outcome of a program, project, event, activity, or service, identifies gaps and corrective actions and develops lessons learned. For MILCON projects, an AAR must be performed when these phases/events are completed: planning charrette; design; construction; and the nine-month post-completion inspection.

  An AAR must also be performed when:

- An error or other significant change causes one or more of these conditions to occur: a cost increase of five percent or more, a design schedule slippage of 30 days or more, a construction time growth of 60 days or more and/or a consequent reduction in project quality.
- An innovation has resulted in a significant project success.
- Results of the AARs should be documented in the DDR.

- **Lessons Learned and Best Practices –** ER 5-1-11 requires the PDT to capture Lessons Learned associated with project changes and whenever projects and/or phases of projects are completed. Lessons Learned and best practices may be identified during AARs or may be identified at other points in the project, in which case they should still be documented as part of the AAR.

  Lessons Learned and best practices should be documented in the DDR.

CHAPTER 4
CHARRETTES

INDEX

CHAPTER 4

CHARRETTES

4.1 GENERAL

4.1.1 CHARRETTE GUIDELINES

This chapter outlines charrette guidelines for a project. The charrette process is applicable during the Planning/Programming phase of a project and during the Design phase. These guidelines should assist in directing project design teams, project managers, and customers in the charrette process and expectations. This chapter addresses the process, expectations, and tools to be used to accomplish a charrette.

4.1.2 CHARRETTE PROCESS

Charrettes are an intensive process where designers, users and customers team together to gather information and define project requirements. The charrette process focuses on producing a feasible plan, with minimal rework, by maximizing face-to-face time between the customers and design team. This allows the design team to receive immediate feedback on design concepts as they are developing.

- Benefits of a Charrette:
    - Facilitates a fully integrated design approach where function, aesthetics, sustainability, budget and schedule can be considered together to maximize achievement of project goals
    - Promotes a creative environment for identifying and incorporating sustainable strategies that result in reduced resource consumption, lower life-cycle costs and maximum health and environmental performance
    - Helps balance a wide range of project goals and requirements while also fully meeting expectations for security, accessibility, site and utility constraints and other design objectives
    - Customer buy-in and commitment of a design concept at the earliest stage, where decisions have the smallest impact to cost, schedule and quality
    - Fosters quick and efficient development of project goals and analysis of multiple design solutions (Everyone works together at the same time in a common location)

- Saves time and money by collaborating on ideas, issues and concerns early in the design process to avoid late iterative redesign activities including costly “surprises” later in the design and construction process
- Process can eliminate the need for rework because the design work continually reflects the wisdom of each specialty
- Focuses entire team’s commitment on project quality, schedules and budget

4.2 APPLICABLE PUBLICATIONS

Department of Energy (DOE)

Guide to Integrating Renewable Energy in Federal Construction

National Charrette Institute (NCI)

National Renewable Energy Laboratory (NREL)

Handbook for Planning and Conducting Charrettes for High-Performance Projects (Handbook)

White, Edward. *Site Analysis: Diagramming Information for Architectural Design.* Trade Paperback Edition, Architectural Media Ltd, 1983.

White, Edward. *Space Adjacency Analysis: Diagramming Information for Architectural Design.* Trade Paperback Edition, Architectural Media Ltd, 1986.

Whole Building Design Guide

DD Form 1391 Preparation Planning Charrette Process (ECB 2003-8)

Planning and Conducting Integrated Design (ID) Charrettes

http://www.wbdg.org/resources/charrettes.php

Unified Facilities Criteria (UFC)

High Performance and Sustainable Building Requirements (UFC 1-200-02)

4.3 CHARRETTE PLANNING PROCESS

4.3.1 PREPARATION

The preparation stage should guide the charrette process, ensure support from key individuals and organizations, clarify objectives and determine logistics for the event. Before dates have been set, the Project Manager (PM) and the Project Design Team (PDT) will understand where the project stands by asking the following critical questions:

- Is the project program developed? The program includes the estimated size of the project, functions and adjacencies of the required spaces, average number of occupants in the spaces, the time of use of the spaces, lighting, and space condition (e.g., temperature and humidity) requirements and any unique requirements for specific spaces.
- Has the project site been selected or narrowed to a small number of alternatives? Having one or more alternative sites identified will allow the participants to narrow down the appropriate site addressing project goals. This may also require analysis by the PDT before the charrette.
- When will personnel resources be available to conduct the charrette? Planning and organizing a charrette require considerable staff.
- Are funding resources available for the charrette? The costs to conduct a charrette can vary widely and must be negotiated with the PM.
- Is there a “Stakeholder Champion”? The stakeholder champion should be one or more individuals who are closely involved in the project, can be decisive, and have previous experience and time with the project and/or building functionality and usage.
- For large-scale projects, are issues to be addressed in the charrette well defined? These issues could include overall master planning, transportation, facilities construction or renovation, operations and maintenance, green procurement and contracting and education and outreach.
    - Is there a standard design? Multiple military projects require a standard building layout/program, definitive designs or design criteria. The PDT and stakeholders will be familiar with design requirements before the charrette occurs.

4.3.2 SCOPE

The PM should work with all stakeholders to confirm that all project scope information has been provided and uploaded into the project charrette folder.

- This information should include but not be limited to DD form 1391, design directives, standard designs, utility maps, environmental information, and Installation design guides. PDT will review project information and determine any project concerns, determine participants to invite and if there are any gaps in the project information.

4.3.3 SCHEDULE

PM will work with the PDT, stakeholders and additional participants to establish the best possible dates for the charrette. When a multiple building complex is involved, each building of the complex will have individual charrettes. PM should investigate potential conflicts (such as holidays or other events and conferences) that could make it difficult for any of the participants to attend.

Once dates have been determined, the PM should finalize all logistical needs for the charrette. This will include reserving a suitable conference room that will accommodate all participants, in addition to a projector and projector screen, internet access, and conference phone. The PM will send out the charrette date to all participants (Outlook Invite) and schedule the initial PDT meeting.

The initial PDT meeting should be held at least three days prior to the charrette work week. Charrette lengths may vary depending on the design phase (Planning vs. Design). The charrette can be broken into multiple time periods if longer than five days. For instance, only meeting for three days during the first week and then returning to meet three days during the following week. The initial charrette breakout will be no less than three consecutive days.

PM will consider the added cost in remobilizing the design team for each breakout. The overall timeline of a charrette includes PDT prep time, charrette work week and a minimum of two additional weeks to complete the report. The following illustrates the minimum time commitment needed from PM, PDT and supervisors to complete a charrette. The example timeline below should be considered when assigning PDT and workload.

Week 1

Day 1-5 PDT Prep

Week 2

Day 1 PDT Travel Day/In-Brief/Scope
Day 2 Program development
Day 3 Develop Concept Plans
Day 4 Revise Concept Plans
Day 5 Out-Brief/PDT Travel

Week 3

Day 1-2 Charette Pit

Week 4/5

Day 5 Charrette Report Due

- PDT Prep Time:
  - Prep work is essential to being fully prepared for the upcoming project charrette work week.
  - Prep work will include preparing for the Initial PDT meeting. PDT will begin analysis, assuming enough information has been provided at the time. Analysis may include sustainability research, gathering lessons learned, etc.
- Charrette Agenda:
  - Facilitator will draft the charrette workweek agenda
  - PM and PDT will review charrette agenda
  - Agenda will be sent to all participants
  - Agenda should consider a typical charrette process, see Figure 4-1.
- Charrette Workweek:
  - Charrette In-Brief
  - Charrette Workdays with customer review periods
  - Charrette Out Brief
- Post Charrette Activities:

- Post Charrette PDT Pit
    - 1-2 Day event where the PDT continues to focus on charrette feedback and completing the charrette report. This meeting should include all PDT working in one location. (Facilitator should reserve conference room for PDT)

- **Final Charrette Report completed.** This report is typically due two weeks after Charrette workweek.

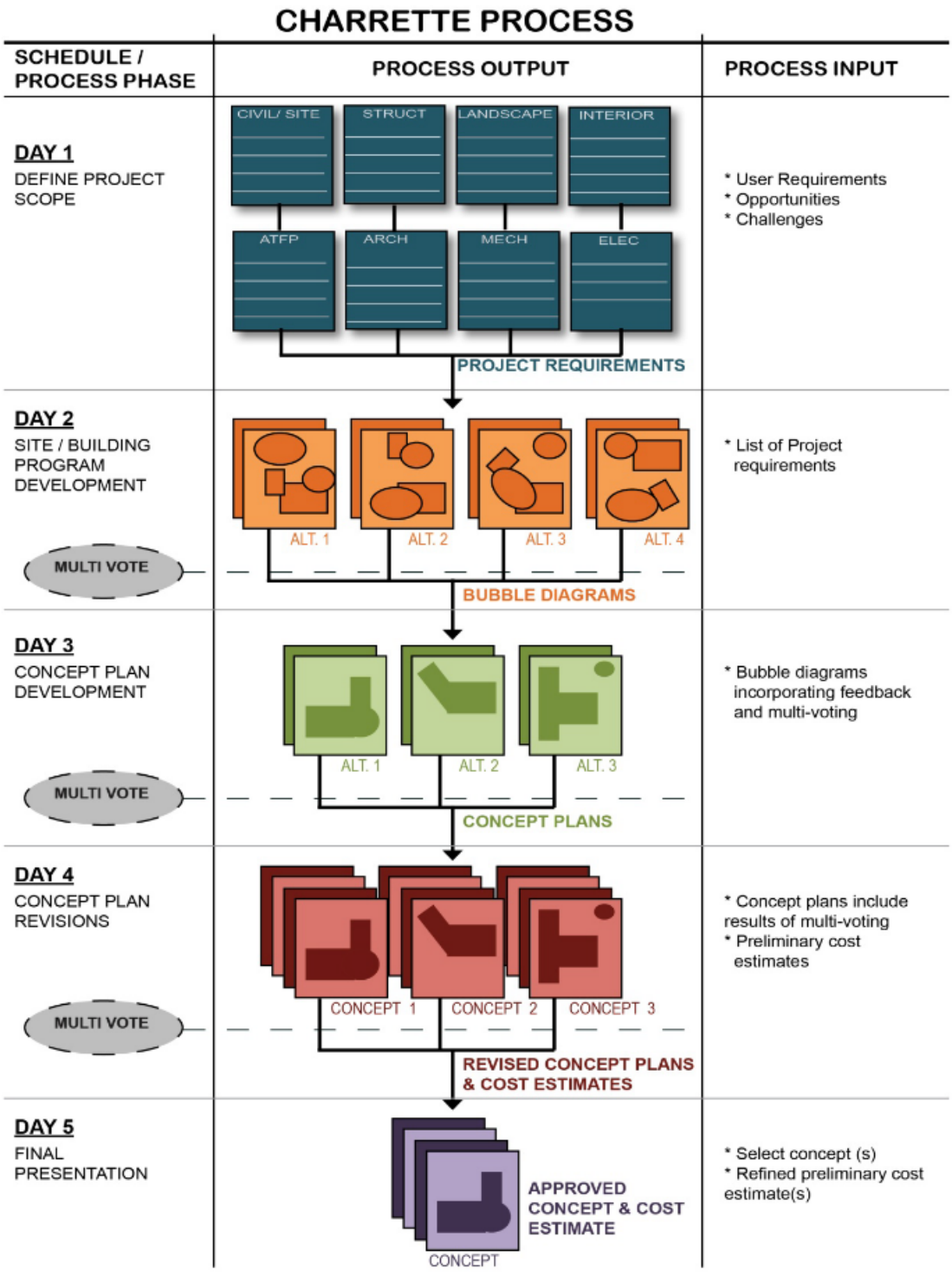

CHARRETTE PROCESS
SCHEDULE / PROCESS PHASE
PROCESS OUTPUT
PROCESS INPUT
DAY 1
DEFINE PROJECT SCOPE
CIVIL/ SITE
STRUCT
LANDSCAPE
INTERIOR
ATFP
ARCH
MECH
ELEC
PROJECT REQUIREMENTS
* User Requirements
* Opportunities
* Challenges
DAY 2
SITE / BUILDING PROGRAM DEVELOPMENT
MULTI VOTE
ALT. 1
ALT. 2
ALT. 3
ALT. 4
BUBBLE DIAGRAMS
* List of Project requirements
DAY 3
CONCEPT PLAN DEVELOPMENT
MULTI VOTE
ALT. 1
ALT. 2
ALT. 3
CONCEPT PLANS
* Bubble diagrams incorporating feedback and multi-voting
DAY 4
CONCEPT PLAN REVISIONS
MULTI VOTE
CONCEPT 1
CONCEPT 2
CONCEPT 3
REVISED CONCEPT PLANS & COST ESTIMATES
* Concept plans include results of multi-voting
* Preliminary cost estimates
DAY 5
FINAL PRESENTATION
CONCEPT
APPROVED CONCEPT & COST ESTIMATE
* Select concept (s)
* Refined preliminary cost estimate(s)

Figure 4-1

4.3.4 INITIAL PDT MEETING

The PM should organize an initial PDT charrette meeting to assemble the PDT and begin the charrette process. Typically, an initial charrette meeting will last between 1 to 2 hours. The meeting should begin shaping the charrette. PM will ask all PDT members to review the critical questions under Section 4.3.1 (preparation) and research possible sustainable solutions prior to this initial meeting. Geo-technical Engineer will be included along with the charrette PDT. During the initial meeting the PM, facilitator, and PDT will discuss the following:

- Confirm Charrette Date (start and end)
- Confirm Charrette location
- Confirm all resources have been identified and provided
- Identify all needed charrette participants and are invited
- Define and review roles and responsibilities of each PDT member, including assigning roles
- Set expectations about level of effort for the PDT before, during and after the charrette
- Discuss project information
- Obtain consensus on understanding the project scope
- Develop and Confirm charrette goals
- Organize and confirm all travel logistics
    - PM should identify hotel and confirm an evening working space (conference room, lobby, etc.) for PDT
    - When evening workspace is not available on the Installation, PDT will attempt to stay at the same hotel
- Discuss charrette agenda
- Determine when to conduct the site visit (pre-charrette site meeting, site visit w/customer, etc.)
- Agree on Roles and Responsibilities and identify PDT member for each general team role
- PDT will brainstorm potential sustainable strategies
    - Begin documenting sustainability integrative process/discussions
- PDT will identify lessons learned that involve multiple disciplines

End the Initial PDT charrette meeting by reviewing action items. Remind all PDT members to save down the charrette folders. Charrette folders allow for constant document storage and include charrette templates, background information, etc. PM and ETL will prepare meeting minutes and distribute to all PDT members.

4.3.5 BUDGET

A charrette budget should be developed after the initial kickoff meeting and once the entire PDT understands the project scope. All disciplines must read the project scope, understand expectations of time spent during the charrette, and discuss expectation of deliverables before determining charrette budget. Charrette budget will include prep work, initial meeting, charrette workdays, and post charrette workdays.

The facilitator or ETL should identify any standard charrette budget items for the team. The ETL or facilitator should coordinate with the PDT members when preparing the budget. The PM will then consolidate the overall design budget which will be sent to the customer. The design charrette budget is part of the normal design process, not a separate activity and should be included with the overall design budget.

4.3.6 SUSTAINABILITY PLAN

Sustainability will be integrated throughout the design process. This integration starts at each charrette opportunity. PDT will brainstorm design concepts to accomplish all mandates, and make certain sustainable initiatives have an appropriate life cycle cost. Brainstorming will be started as a part of the team's initial meeting and continued through the charrette process. PDT will prepare concepts and information to assist the stakeholders in decision-making during the charrette. Charrettes are an opportunity to educate stakeholders on sustainable options to meet all goals. Per ECB 2013-25, the Energy and Sustainability (E&S) Record Card will be submitted to HQUSACE following all planning charrettes. Otherwise, final design authority (Code 6/7/T) will not be provided.

4.4 ROLES AND RESPONSIBILITIES

It is imperative that each PDT member understand their role in the charrette. Each PDT member will not passively attend the charrette, but rather should be producing portions of the design that contribute to the overall success of the project.

4.4.1 DISCIPLINE ROLES

These team roles and responsibilities identify what each discipline is responsible for to help make each charrette a success.

- Supporting Roles by USACE PM and ETL and construction representative(s) from local resident office:
    - PM –
        - Resolve Charrette Logistics
            - Location
            - Equipment
            - Hotel
        - Confirm Stakeholder List
        - Locate appropriate personnel for PDT questions
        - Confirm project scope
        - Combine project budget
        - Coordinate project schedule
        - Maintain availability throughout the entire charrette process
        - Organize building/site tours
            - May have to get PDT into secure areas
    - Construction –
        - Gather lessons learned (LL)
        - Attend charrette (design charrette)
        - Provide feedback on Charrette Report
    - ETL - The ETL or the Facilitator should plan out the charrette and keep focused on how to achieve the objectives in the specified time frame but remain flexible and be ready to adjust the plan.
        - Establish charrette week schedule
        - Create agenda
            - Coordinate with PM and PDT
            - Provide copies of agenda
        - Prepare a sign-in sheet that lists name, organization, and phone number

- Insert project specific information into charrette templates
- Compile daily notes from all disciplines
-
    - Instruct each discipline to take notes daily and provide notes at the end of each day.
    - Facilitator then organizes daily notes into one master note file for coordination. This may highlight any conflicting information and allows meeting notes to be completed before the end of the charrette.
    - Maintain an Issue Log recorder (aka “Parking Lot”). Adding any open issues or undecided question(s) identified to the parking lot/Issue Log to remind everyone of items needing resolution.

- Compile Charrette Report

4.5 CHARRETTE ACTIVITIES

Charrette activities identify the charrette process and optional tools which can be adjusted to meet the project needs and enhance input from each customer. Activities can be utilized during Planning and Design Charrettes.

4.5.1 SET UP

- Establish Start Time:
    - This time will allow plenty of opportunity for PDT to arrive promptly, within work hours. In addition, start time will allow for a minimum of one hour set up time prior to the In-brief. The set-up time will be used by the facilitator and PDT to get organized and arrange the room, if needed.
- Room Set Up:

    The room set up will consist of the following:

    - Post a copy of the Agenda near the entrance of the room. (This agenda will need to be updated as changes are made.)
    - Provide copies of the agenda at the front entrance.
    - PDT will set up near each other with easy access to power and communication.
    - Determine area for posting information on empty wall space that allows for maximum visibility.

- Post background information like site map, standard floor plans, etc.

4.5.2 WELCOME AND INTRODUCTIONS

PM/Facilitator will welcome everyone to the charrette, explain charrette process, and describe project scope. PM will ensure the project scope has been finalized. Invite the Champion/Customer senior official to make any opening comments. Have all participants introduce themselves and briefly discuss logistics like restrooms and vending.

4.5.3 DETERMINE PROJECT GOALS

All known goals will be posted ahead of time. PM/Facilitator will ask the group to confirm goals and request any additional project goals from participants. Goals will include project statement, specific sustainable design goals, etc. Goals will be referred to throughout the charrette process.

4.5.4 CONDUCT SITE VISIT

Before site visit, explain logistics of conducting the site visit, including any travel issues. Remind all participants of the schedule for the site visit. Confirm a PDT member will be taking photos of the site.

4.5.5 STAKEHOLDER INTERVIEWS

Not all stakeholders will be available to attend the entire charrette. Therefore, conduct interviews with stakeholders to gather specific information that will affect the design of the project. Use the posted agenda to adjust the schedule to accommodate stakeholder normal work schedule. PDT members should be certain to bring up relevant information at the general review sessions.

- Typical Stakeholders include:
    - Customer Representatives for specific functions
    - Utility operators or representatives for:
- Gas, water, electric power, sanitary sewer, communications
- Environmental
    - Maintenance personnel
    - Physical Security personnel
    - Fire Department
    - Facility managers
- Typically, PDT Members conducting interviews include:

- Architect, Interior Designer, Facilitator typically interview users for space relationships
- Other interviews may include Installation staff with the following designers:
    - Civil Engineers
    - Mechanical Engineers
    - Electrical Engineers
    - Fire Protection Engineers
    - Structural Engineers

4.5.6 MULTI-VOTING

Toward the end of the General Review Session, PDT will initiate multi-voting to obtain direction from the customer and stakeholders. Multi-voting allows input from a large group and allows a variety of input to be heard.

- Place functional diagrams on the wall for all to see
- Hand out green and red dots to customers, stakeholders, and PDT
- Instruct participants to place green dots (positive idea) on each functional diagram and on specific portions of the schemes
- Allow sufficient time for all participants to place dots
- Discuss trends revealed by the dots with the charrette participants
- Ask for clarification of why dots were placed at specific locations
- Colored dots begin to reveal the preferred functional diagrams and design concepts

4.5.7 DEVELOP FUNCTIONAL DOCUMENTATION

PDT will walk through known programming documents, DD Form 1391, and/or assist stakeholders in defining the building program.

- STORYBOARD
    - A “storyboard” is a system of capturing project requirements on index cards that can be referred to by all participants for the entire length of the charrette. Make sure participants understand that it is imperative to get all important requirements on a card and on the wall. These cards create the detailed project scope and are the basis for the design. This process allows everyone to be an active participant in the design process and can

be used to brief anyone who shows up at the charrette and be brought up to speed on the process and status.

- Discuss with participants each functional area and capture all the specific requirements on index cards.
- Break the functional areas into logical groups (admin areas, classrooms, warehouse space, sleeping rooms, support spaces, etc.)
- Use one index card for each requirement (suggest using black sharpie).
- Post cards on wall using drafting dots.
- Group cards in a logical order on the wall. Be prepared to move cards around.
- Provide stakeholders and PDT with cards and sharpies to write down requirements. This lets people keep track of thoughts while discussion is occurring and lets stakeholders be actively engaged in the process.

o PROGRAMMING SPREADSHEET

- The programming spreadsheet focuses on occupancy, programming square feet, and design square feet. This tracking system allows the PDT to track compliance with DD Form 1391, programming needs, Army/AF regulations, and charrette solutions. The spreadsheet is typically managed by the PDT Architect.

o SPACE DATA SHEETS

- Space data sheets are the documented storyboard requirements and notes. These sheets allow the PDT to locate all functional specific information in one place and are an integral piece to the Charrette Report. Space data sheets are typically started by the Interior Designer, but other disciplines should add information before the final report.

4.5.8 SITE ANALYSIS

It is essential to conduct a thorough analysis of the site to identify all external factors that will shape the layout of the facility on the site. The site analysis will help determine building orientation, location of entrances and glazing, preservation of significant site features and vehicular access to the site.

o Identify major traffic patterns

o Show property boundary

- Indicate utility lines
- Identify drainage issues
- Identify endangered habitat
- Show major vegetation
- Illustrate potential for views
- Influences of adjacent sites

Review site analysis with customers and stakeholders and incorporate comments

Figure 2 – Site Comparison Matrix

Factor	Site 1	Site 2	Site 3	Site 4	Site 5
Environmental Restrictions	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable
Location	Acceptable	Ideal	Ideal	Acceptable	Ideal
Space Available	Acceptable	Poor	Ideal	Ideal	Poor
Site Development	Acceptable	Poor	Acceptable	Ideal	Poor
Sanitary Sewer	Poor	Ideal	Ideal	Ideal	Ideal
Industrial Sewer	Poor	Ideal	Ideal	Acceptable	Ideal
Fire Water	Poor	Ideal	Ideal	Ideal	Ideal
Domestic Water	Acceptable	Ideal	Ideal	Acceptable	Ideal
Communication	Poor	Acceptable	Acceptable	Ideal	Acceptable
Power	Ideal	Ideal	Ideal	Ideal	Ideal
Natural Gas	Poor	Ideal	Ideal	Acceptable	Ideal
Design Guidance	Acceptable	Ideal	Ideal	Ideal	Ideal

4.5.9 FUNCTIONAL DIAGRAMMING

The PDT will use the index card storyboard to generate graphical elements (2D or 3D) and begin developing functional diagrams. It is highly recommended to generate multiple functional diagrams that have different organizational schemes. All schemes should incorporate all major functional requirements and be influenced by the site analysis and sustainable strategies. Recommend naming the different functional diagrams for ease of identification.

- USACE South Atlantic Mobile District (CESAM or SAM) typically utilizes REVIT and Sketch-up to develop functional diagrams
- Use colors for major functional areas
- Keep diagrams simple (bubble type single line diagrams)
- Generally, develop three to five different functional diagram alternatives

- All diagrams should be consistent in level of development and presentation

4.5.10 MASSING STUDIES

The PDT will utilize the programing square footage requirements to develop block massing diagrams. Massing diagrams allow for quick concept layouts to be developed for feedback. Massing is completed through a 3D exercise to evaluate spatial volumes, etc. Complex projects or shorter charrettes may end up only developing massing diagrams due to time, information, or scope changes. These concepts are an integral step toward an initial floor plan.

Rooms shown in diagram are color-coded to both the programing spreadsheet and the space data sheets for consistency throughout the charrette process.

4.5.11 MINI CONCEPT DEVELOPMENT/SMALL GROUP DISCUSSION

The PDT will conduct small group discussions with stakeholders to develop specific concept designs for critical functional areas. The critical functional areas will have a greater level of detail than the overall concept designs. The mini-concept designs help ensure that the concept designs are appropriate and can accommodate the specific sizes and shapes of these areas.

Concept areas could include:

- Conference rooms
- Training rooms
- Kitchens
- Restrooms
- Mechanical rooms
- Electrical rooms
- Communication rooms

4.5.12 CONCEPT DESIGNS

The PDT will develop the functional diagrams into concept designs. Concept designs begin to add more detail to the design concepts such as circulation and support spaces. They also begin to incorporate minimum concept development created by PDT members.

- Utilize multi line diagrams
- Incorporate structural framing concept
- Incorporate sustainable features

4.5.13 SUSTAINABLE STRATEGIES

Sustainable strategies should be discussed as a PDT during preparation, during the charrette and fully analyzed for the Charrette Report. These strategies need to line up with customer goals. Sustainable strategies to reduce energy, conserve water, utilize day lighting and power generation, should be discussed with stakeholders and Installation maintenance shops.

ENERGY

- Increased Insulation
- Geothermal mechanical systems
- Thermal Mass
- Spectrally Enhanced Lighting (SEL)
- Solid State Lighting (LEDs)
- Transpired Solar Collector
- Natural ventilation
- Reduced plug loads

DAY LIGHTING

- Double or triple glazed windows
- Motion sensors
- Low E glass
- Clearstory Windows
- Light shelves
- Exterior louvers
- Low walls and furniture

WATER CONSERVATION

- Dual flush toilets
- Low flow faucets
- Water collection

ONSITE POWER GENERATION

- Wind Turbines
- Photovoltaic panels

- **Integrated Process.** Project design team will describe the team's integrative process within the charrette report. The report will include sustainable strategies considered and results guiding designer decisions. The charrette report will be considered the Basis of Design and any owner specific requirements will be identified within each discipline chapter. These Owner Project Requirements (LEED OPR) will detail the functional requirements of the project and the expectations of how the facility will operate.
- **Conceptual Energy Diagrams.** Create multiple 3D functional diagrams and import to energy modeling software to quickly analyze energy use for different building geometries.
    - Explore multiple layouts and massings, orientations, materials, glazing and shading.
    - This may be completed utilizing Energy Plus (E+1), Autodesk Ecotect, Trane Trace, etc.

- **Conceptual Day lighting Analysis.** Create multiple 3D functional diagrams and import lighting modeling software to quickly analyze luminance levels for different building geometries.
    - Explore different layouts and massings, orientation, glazing's and shading devices.
    - This may be completed utilizing DiaLux, IES VE-Pro, Autodesk Ecotect, etc.

4.5.14 CUSTOMER REVIEW SESSIONS:

During the charrette, plan daily review sessions to gather all customer representatives and stakeholders to review charrette progress.

- PDT presents diagrams
- Be consistent on level of description for each concept
- Hold open discussion to get verbal input on each concept
- Review any questions that surfaced during 'PDT Work Sessions'

4.5.15 PDT WORK SESSIONS

PDT Work Sessions are scheduled times within the charrette agenda that allow PDT members to work on analysis, diagrams and coordination with each other. During this time, the team will begin to produce concepts for the next 'Customer Review Sessions'. Each discipline should be confirming that the information they have gathered matches other discipline's notes and work together to provide blocking information to help develop the concepts. In addition, energy modeling and/or charrette report chapters can be developed.

4.5.16 PHOTOGRAPHY

An arranged PDT member, or multiple members, will document the process through photographs. Typical images are as follows:

- Discussion Sessions
- Site
- Existing facilities
- Equipment
- Project context (surrounding buildings/features)
- View from the site in all directions
- "Storyboard" cards

- Design schemes

4.5.17 OUT-BRIEF

The out-brief will close the formal charrette work week with stakeholders. This brief will cover where the project started, where the project is going and what deliverable participants should expect by a given time for review. Out-brief should include the following information:

- Intent
- Outline
- Purpose
- Site Plan – Concept
- Architectural Program –Confirm square footage
- Conceptual blocking / floor plans
- Conceptual Exterior images / elevations
- Interior – Info. / Sample Space Data Sheets
- Agreements
- Cost Status
- Summary
- Questions / Action Items

4.5.18 CHARRETTE REPORT

The charrette report will document all stakeholders input and programming needs for the facility and decisions made between stakeholders and PDT. This information will be utilized throughout the design process. All stakeholders will have an opportunity to review the report and provide comments. Dr. Checks will be utilized for the review process.

CHAPTER 5
ANTITERRORISM / FORCE PROTECTION

INDEX

CHAPTER 5

ANTITERRORISM / FORCE PROTECTION

5.1 GENERAL

5.1.1 SCOPE

This chapter provides guidance for preparation and development of projects in accordance with the Department of Defense (DOD) AT/FP requirements. Specific design submittal requirements in this chapter supplement the requirements in CHAPTER 1 GENERAL INSTRUCTIONS. All required documents, including drawings and design analysis, will be in accordance with CHAPTER 2 PRESENTATION OF DATA.

5.2 APPLICABLE PUBLICATIONS

Unified Facilities Criteria (UFC)

UFC 1-200-01	Design: General Building Requirements
UFC 4-010-01	DOD Minimum Antiterrorism Standards for Buildings
UFC 4-023-03	Design of Buildings to Resist Progressive Collapse

5.3 PROJECT DEFINITION (10%)

5.3.1 GENERAL CONSIDERATIONS

AT/FP design will be integrated into the overall facility design from the beginning of the project. At the Project Definition phase, the designer will investigate the AT/FP measures required for the project and determine whether or not the building is considered an “inhabited building” in accordance with the definition in UFC 4-010-01.

For buildings that are outside an Installation perimeter, use UFC 4-020-01 to establish project requirements with input from the user’s security personnel. Based on the project specific Design Basis Threat and Level of Protection (determined per UFC 4-020-01), design the project for the resulting standoff distance in accordance with APPENDIX C of UFC 4-010-01.

In addition, any building elements requiring special design, such as mail rooms, equipment enclosures, progressive collapse, etc. will be noted for use in preparing the cost estimate.

5.3.2 NARRATIVE

The Project Definition narrative will include, but not be limited to, the following items as applicable:

- List all antiterrorism/force protection references used in the Project Definition design including Government design documents, industry standards, and criteria given to the designer at the charrette or predesign meeting.

- List the building category, the location of the facility within a controlled perimeter and the level of protection required.

- Indicate the standoff distances to Installation perimeter to be provided. For Installations outside of an Installation perimeter, indicate standoff distances to be provided and describe the proposed construction to meet antiterrorism/force protection requirements.

- Describe any progressive collapse requirements and their impact on the structural system provided. Discuss how continuity, redundancy, or energy dissipating capacity will be provided in the structural system.

- List any building elements such as mail rooms, equipment enclosures, etc. requiring special design to meet antiterrorism/force protection requirements and describe the proposed design solution. These items will be noted for use in preparing the cost estimate.

5.4 CONCEPT DESIGN (35%)

5.4.1 GENERAL CONSIDERATIONS

The antiterrorism/force protection design will be included in the drawings, calculations, and design analysis of each discipline involved. Antiterrorism/force protection design will be to the concept design level required by the applicable design discipline, as stated in this Manual.

5.4.2 DESIGN ANALYSIS

The Concept Design analysis will include a separate section on antiterrorism/force protection design. This section will include but not be limited to the following items as applicable:

- List all antiterrorism/force protection references used in the Project Definition design including Government design documents, industry

standards, and criteria given to the designer at the charrette or predesign meeting.

- List the building category, the location of the facility within a controlled perimeter, and the level of protection required.

- Note the setback distances to be provided and describe the proposed construction to meet antiterrorism/force protection requirements.

- Describe any progressive collapse requirements and their impact on the structural system provided. Discuss how continuity, redundancy or energy dissipating capacity will be provided in the structural system. The discussion of the design solution will reflect the level of a concept design, as described in this document for the structural discipline.

- List any building elements such as mail rooms, equipment enclosures, etc., requiring special design to meet antiterrorism/force protection requirements and describe the proposed design solution. The proposed design solution will be developed to the level of a concept design, as described in this document for the discipline involved.

5.5 INTERIM DESIGN (65%)

The antiterrorism/force protection design will be included in the drawings, redlined marked up specifications, calculations, and design analysis of each discipline as appropriate for the type of project. Antiterrorism/force protection design will be to the Interim Design level required by the applicable design discipline. In addition, the designer will incorporate or answer all comments received from the Concept Design submittal review.

5.5.1 DESIGN ANALYSIS

The Interim Design Analysis will include a separate section on antiterrorism/force protection design. The Interim Design Analysis will include all the information required in the Concept submittal advanced to Interim Design level.

5.6 95% DESIGN (UNREVIEWED)

The antiterrorism/force protection design will be included in the drawings, calculations, and design analysis of each discipline as appropriate for the type of project. Antiterrorism/force protection design will be to the final design level required by the applicable design discipline. In addition, the designer will incorporate or answer all comments received from the Interim Design submittal review.

5.6.1 DESIGN ANALYSIS

The Final Design Analysis will include a separate section on antiterrorism/force protection design. The Final Design analysis will include all the information required in the Interim submittal advanced to Final Design level.

5.6.2 SPECIFICATIONS

Final edited or redlined marked up specifications will be submitted in accordance with CHAPTER 23 SPECIFICATIONS. Specifications will include all antiterrorism/force protection requirements such as loadings for window and door frames and special glazing.

5.7 100% Final (REVIEWED 100%)

The comments generated concerning the 95% submittal will be incorporated in the design analysis, drawings and final edited specifications before they are submitted as Ready-to-Advertise (RTA). Refer to CHAPTER 1 GENERAL INSTRUCTIONS for RTA submittal requirements.

5.8 TECHNICAL REQUIREMENTS

5.8.1 GENERAL CONSIDERATIONS

Project design will incorporate mandatory DoD standards for new buildings and for existing inhabited buildings, as required, in accordance with UFC 4-010-01.

For buildings that are outside an Installation perimeter, use UFC 4-020-01 to establish project requirements with input from the user's security personnel.

To the extent possible within the project constraints, the "Recommended Antiterrorism Measures for New and Existing Buildings" UFC 4-010-01, Appendix A, will also be incorporated. Antiterrorism/force protection design will be integrated into the overall facility design from the beginning of the project through coordination of all disciplines. Antiterrorism/force protection requirements will be met in the most effective and economical method. These methods include maximizing standoff distances, preventing building collapse, minimizing hazardous flying debris, providing effective building layout, limiting airborne contamination, providing mass notification and facilitating future upgrades. Antiterrorism/force protection requirements will be coordinated with all other applicable DoD building and design criteria and policies. Where other criteria dictate more stringent requirements, the provisions of those criteria will be followed.

CHAPTER 6

SUSTAINABLE DESIGN AND DEVELOPMENT

INDEX

CHAPTER 6

SUSTAINABLE DESIGN AND DEVELOPMENT

6.1 GENERAL

6.1.1 SCOPE

Projects will be designed or constructed to comply with the Federal Sustainable Design and Development requirements. These requirements are detailed in UFC 1-200-02 High Performance and Sustainable Building Requirements, and they reinforce the importance of sustainable development concepts in the planning, design, construction and operation of facilities and infrastructure. The goal is to reduce the environmental impact and ownership cost of facilities; improve energy efficiency and water conservation; and provide safe, healthy and productive built environments.

This chapter gives general guidelines for the preparation of drawings, specifications and design analysis as related to Sustainability Design and Development (SDD) Guidelines. Specific submittal requirements in this chapter supplement the requirements of CHAPTER 1 GENERAL INSTRUCTIONS. All required documents, including drawings and the design analysis, will be prepared in accordance with CHAPTER 2 PRESENTATION OF DATA.

6.1.2 DESIGN SUBMITTALS

The following submittal guidelines have been developed for the most common new facilities and major renovations. Designs will meet the criteria as outlined in UFC 1-200-02 and the various Sustainable Design Guidelines as outlined within this section. Projects not meeting those criteria will be developed in accordance with agreed upon project criteria as determined by the project development team.

Project submittals will be in accordance with the outlined criteria:

- The requirements will be defined, developed and agreed upon at the predesign conference and will become part of the contract.
- Design submittals will be reviewed for general compliance with criteria. Some detailed checks will be made. Complete and independent checking of the design should be accomplished by the designer. The designer is fully responsible for the design. The design should be complete and accurate. It should be thoroughly checked for errors, conflicts (both within and between disciplines) and proprietary requirements. No proprietary restrictions may be included in the contract unless specifically authorized.

6.2 APPLICABLE PUBLICATIONS

The following publications form a part of this Manual to the extent indicated by the references thereto. The latest version in effect at the time of design start will be used.

Unified Facilities Criteria (UFC)

UFC 1-200-01	DoD Building Code
UFC 1-200-02	High Performance and Sustainable Building Requirements

Laws

EPAC 2005	Energy Policy Act of 2005
EISA 2007	Energy Independence Security Act of 2007

Executive Orders and other Directives

E.O. 13834	Efficient Federal Operation (May 2018)
E.O. 13834	Implementing Instructions for Executive Order 13834 (April 2019)

Guiding Principles for Sustainable Federal Buildings (Dec. 2020)

Determining Compliance with Guiding Principles for Sustainable Federal Buildings (1 Feb 2016)

Sustainable Policy Department of Defense Sustainable Building Policy (10 Nov. 2013)

Air Force Criteria

Air Force Sustainable Design & Development (SDD) implementation Guidance, memorandum dated 2 June 2011

AFCEC A-GRAM 17-01 Change to AF New Construction and Major Renovation Certification Requirements.

Army Criteria

Army Sustainable Design and Development Policy (SDD) dated Jan 2017

Engineer Regulations (ER) 1110-1-8173 Energy Modeling and Life Cycle Cost Analysis (30 Dec. 2017)

USACE Army LEED v4 Implementation Guide, September 2014

NAVFAC Criteria

Department of the Naval Sustainable Building Policy (17 Sept. 2014)

6.3 PROJECT DEFINITION SUBMITTAL (10%)

The Project Definition narrative will include the requirements stated below and will include all data and any calculations if required to support design decisions and estimates at this stage of design. The analysis will incorporate specific criteria furnished and conference minutes for all systems considered. The analysis will include the following:

- Point Based Rating System: Submit the appropriate SDD rating tool and supporting narrative as part of the Design Analysis. The narrative will be developed in a paragraph format matching the rating tool structure. For each point or points in the rating tool, provide a brief description in the narrative of the feature and how the point/s will be achieved. Briefly describe future operation and maintenance requirements for selected features. For features considered but not incorporated briefly describe the feature and reason/s for non-selection. For each point to be achieved, include a brief description of specific actions required of the Resident Engineer and Contractor during construction.
- Non-Point Based Rating System: Submit the appropriate SDD rating tool and supporting narrative as part of the Design Analysis. The narrative will be developed in a paragraph format matching the rating tool structure. Provide a brief description in the narrative of the feature and how the incorporated sustainability items will be achieved. Briefly describe future operation and maintenance requirements for selected features. For features considered but not incorporated, briefly describe the feature and reason/s for non-selection. For each sustainability item to be achieved, include a brief description of specific actions required of the Resident Engineer and Contractor during construction.
- For all SDD rating systems the respective sustainability scoresheets and if applicable, the third-party compliance review scoresheets will be submitted. It is understood that the early phases of the design may require some assumptions to be made to complete the sustainability scoresheets. Where required, initial registration of the project should occur at this phase for the required third party tracking system.

6.4 CONCEPT DESIGN (35%)

6.4.1 DESIGN ANALYSIS

The Concept Design Analysis will include the requirements stated below and will include all data and calculations to support design decisions and estimates at this stage of design. The analysis will incorporate specific criteria furnished and conference minutes of all systems considered. The analysis will include the following:

- Provide the SDD rating tool, Sustainability Scoresheets and narrative required at Project Definition.
- Point Based Rating systems: For each anticipated achievable point or points that requires production of a document, calculation to measure achievement of goals or meetings, furnish the documents, calculations and minutes of meetings applicable to support the point/s achievement as part of the narrative.
    - For projects registered with the U.S. Green Building Council (USGBC / GBCI), initiate and submit LEED forms documenting project scope and responsibilities. Initiate individual forms with anticipated measures to fulfill point credits. Provide the project scope and responsibilities information, and draft LEED forms as part of the narrative.
    - Initiate information, coordination requirements, and Contractor and Government construction activities and substantiation required to document a certifiable project (or certification if required) at the applicable required certification level.
    - As indicated in USACE Army LEED Implementation Guide, provide draft Basis of Design, Commissioning Plan and Owner's Project Requirements documents with this submittal. USACE Templates for these documents can be retrieved from the ETL and/or PM.
- Non-Point-Based Rating systems: For each anticipated achievable sustainability item that requires production of a document, calculation to measure achievement of goals or meetings, furnish the documents, calculations and minutes of meetings applicable to support the item's achievement as part of the narrative.
    - For projects registered with the GBCI or other applicable third-party reviewer, initiate and submit Guiding Principle Compliance forms documenting project scope and responsibilities. Initiate individual forms with anticipated measures to fulfill Guiding Principles Compliance categories. Provide the project scope and responsibilities information, and draft Third Party Compliance forms as part of the narrative.
    - Initiate information, coordination requirements, and Contractor and Government construction activities and substantiation required to

document a certifiable project (or certification if required) at the applicable required certification level.

6.5 INTERIM DESIGN (65%)

6.5.1 DESIGN ANALYSIS

The Design Analysis will include incorporation of specific furnished and review conference minutes of all systems considered and items determined through continued development of the design. The analysis will also incorporate all updated compliance documentation initiated during previous submittals as well as any new documentation required to support amended design considerations. It will also include:

- Any revisions made necessary by comments from any previous submittal
- Updated Sustainability Scoresheets
- Updated Third Party review worksheets and documentation (if applicable)

6.5.2 SPECIFICATIONS

Develop red-lined marked up specifications supporting SDD including sections,

- 01 33 29 Sustainability Requirements and Reporting,
- 07 05 23 Pressure Testing an Air Barrier System for Air Tightness
- 07 27 10.00 10 Building Air Barrier System.

6.5.3 DRAWINGS

Drawings should incorporate identification of sustainability related items such as Air Barrier Diagrams depicting location of barrier and demonstrating a complete air barrier system. Drawings will also incorporate details outlining proper installation of sustainability related building design components.

6.6 95% DESIGN SUBMITTAL (UNREVIEWED)

6.6.1 DESIGN ANALYSIS

The Design Analysis will include incorporation of specific furnished and review conference minutes of all systems considered and items determined through continued development of the design. The analysis will also incorporate all updated compliance documentation initiated during previous submittals as well as any new documentation required to support amended design considerations. It will also include:

- Any revisions made necessary by comments from any previous submittal

- Updated Sustainability Scoresheets
- Updated Third Party review worksheets and documentation (if applicable)

6.6.2 SPECIFICATIONS

Develop edited specifications supporting SDD including sections:

- 01 33 29 Sustainability Requirements and Reporting,
- 07 05 23 Pressure Testing an Air Barrier System for Air Tightness
- 07 27 10.00 10 Building Air Barrier System.

6.6.3 DRAWINGS

Drawings should incorporate identification of sustainability related items such as Air Barrier Diagrams depicting location of barrier and demonstrating a complete air barrier system. Drawings will also incorporate details outlining proper installation of sustainability related building design components. Drawings should also include incorporation of applicable comments from previous submittals.

6.7 100% FINAL DESIGN (REVIEWED)

The comments generated during the 95% Review will be answered or incorporated into the completed design analysis (not amended sheets), specifications and drawings before they are submitted as the Final Design Submittal.

- The analysis will be complete and will support the requirements of the project. All third party reviewer checklist, sustainability scoresheets, and third party Reviewer documentation will be completed. If applicable, third party review of design criteria will be submitted for design credit certification / compliance.
- The drawings and specifications will be complete and thoroughly checked for technical accuracy, code and scope of work compliance and compatibility with other disciplines.

6.8 TECHNICAL REQUIREMENTS

6.8.1 INSTALLATION SPECIFIC REQUIREMENTS

In addition to the requirements stated in this document, criteria specific to a particular Installation will also be incorporated. This criteria is in many instances more restrictive than this document and must be obtained and used from the beginning of each project. In addition, when applicable per UFC 1-200-02, criteria from Third Party Reviewers may require varying compliance criteria. Designer is responsible for compliance with their documentation requirements.

6.8.2 COMMISSIONING

General: All buildings will be commissioned. An independent Commissioning Authority (CxA) is required for each project as outlined in UFC 1-200-02. The CxA will be provided for each project prior to the mid-point of construction document development. Mobile District will not serve as the CxA, however in some instances, Mobile District may contract with an outside CxA for support of the project. In which case, Designer will provide CxA with necessary documentation during design submittals for proper review of documents. Designer is responsible for incorporating applicable review comments into the various design submittal documents.

Fundamental and enhanced Commissioning are required unless modified by the UFC 1-200-02, or by the project development team. As such, at a minimum, the required energy related systems to be commissioned are:

- HVAC&R
- Lighting & Daylighting Controls
- Domestic Hot water System
- Renewable Energy Systems

Note: Additional systems when identified in the Owners Project Requirements or other sections of this Design Guide

CHAPTER 7
SURVEYING AND MAPPING, GIS AND DATA MANAGEMENT

INDEX

CHAPTER 7

SURVEYING AND MAPPING, GEOGRAPHIC INFORMATION SYSTEMS AND DATA MANAGEMENT

7.1 SURVEYING AND MAPPING

This section presents general requirements for surveying and mapping and the processing of the data that may be required for the work necessary in the design and advance planning of assigned projects. The contractor, operating as an independent contractor and not an agent of the Government, will provide all labor, material, and equipment necessary to perform all surveying and mapping services listed in The Rates for Services (Schedule B) as requested by the Government during the effective period of the contract. Work may be required anywhere within the boundaries of the Mobile District, South Atlantic Division or worldwide. During the prosecution of the work, the contractor will provide adequate professional supervision and quality control to assure the accuracy, quality, completeness, and progress of work. The Contracting Officer or authorized representative will direct all work.

7.2 APPLICABLE PUBLICATIONS

Surveying and Mapping will be in strict compliance with the relevant sections of the following:

EM-1110-1-1000	Photogrammetric Mapping
EM-1110-1-1002	Survey Markers and Monumentation
EM-1110-1-1003	NAVSTAR Global Positioning System Surveying
EM-1110-2-1009	Engineering and Design - Structural Deformation Surveying
EM-1110-1-1005	Engineering and Design: Control and Topographic Surveying
EM-1110-2-1003	Hydrographic Surveying
EM-1110-1-2909	Geospatial Data and Systems
EM 1110-2-6056	Standards and Procedures for Referencing Project Elevation

Grades to Nationwide Vertical Datums: A/E/C CADD Standards

Minimum Technical Standards (MTS) requirements as defined by the applicable State Professional Land Surveyor Board.

The EM's listed take precedence over District Manuals.

EM's may be acquired from:

https://www.publications.usace.army.mil/usace-publications/engineer-manuals/

The A/E/C CADD Standards are available from the website listed below:

https://cadbimcenter.erdc.dren.mil/

7.3 PROJECT DEFINITION

7.3.1 GENERAL STATEMENT OF SURVEYING AND MAPPING SERVICES

The designer will submit a general statement (scope of work) as to what type surveying and mapping services will be required for the site plan. The following information is required:

- Name and location of the project
- Type of surveying and/or mapping services (boundary, topographic, hydrographic, route location surveys, etc.)
- English or metric units
- Site map to scale showing area to be surveyed (acres, length of route location survey, etc.). Scale required for the new survey is 1"=30" (~3cm = 10m) and 1ft (0.25 meter) contour interval
- General description of utilities (above and/or underground) that will be located (if applicable), along with other special requirements or features that need to be identified such as trees or wetland areas.
- Datums to be used. Default will be NAVD 88 for vertical and NAD 83 for horizontal. If older datums are to be used, it should be specified in request with justification.

7.3.2 EXISTING HORIZONTAL AND VERTICAL SITE CONTROL

If existing horizontal and vertical control is on record, it may be obtained from the Corps of Engineers at the following address:

U. S. Army Engineer District, Mobile

Attention: CESAM-EN (Survey Unit)

Post Office Box 2288

Mobile, Alabama 36628-0001

The Government will furnish all pertinent horizontal and vertical control data available on file. The following information is required:

- Location and name of the project
- General site map showing location

7.4 SURVEYING AND MAPPING SERVICES

The following surveying and mapping services may be necessary in the design and advance planning of assigned projects.

7.4.1 GEODETIC AND CONTROL SURVEYS

Includes surveys in which the figure and size of the earth are considered and is used for precise location of basic points suitable for controlling other surveys. Includes 1st, 2nd and 3rd order horizontal and vertical control surveys, geodetic astronomy, gravity and magnetic surveys in accordance with the Standards and Specifications for Geodetic Control Networks published by the Federal Geodetic Control Committee dated September 1984. Conventional, electronic instrumentation, inertial, satellite and other survey methods as applicable may be utilized.

7.4.2 TOPOGRAPHIC AND PLANIMETRIC SURVEYS

Includes acquisition of surveying and mapping data representing three-dimensional spatial relationships on the earth's surface of natural and manmade features including determining an accurate model of the terrain. May also include location of subsurface utilities. This data may be required for planning, cost estimating, engineering, design, construction, master planning, operations and recording as-built conditions. Conventional and electronic instrumentation, remote sensing, inertial, satellite and other survey methods as applicable, may be used.

7.4.3 ROUTE LOCATION SURVEYS

These include roads, railroads, levees and channels, etc.

7.4.4 QUANTITY

These include preconstruction and/or final cross sections and computations of quantities.

7.4.5 LAYOUT SURVEYS

These include staking of buildings, structures, utilities, roads, railroads, etc.

7.4.6 HYDROGRAPHIC SURVEYS

Surveys of Channels, Lakes, Rivers, Bays and open Coastal Waters in support of Engineering Design, construction and operations and maintenance. Includes acquisition of hydrographic and surveying and mapping data representing three-dimensional spatial relationships on the earth's surface. This data may be required for planning, cost estimating, engineering, dredging, design, construction, sedimentation, master planning, operations and as-built conditions, Conventional and electronic instrumentation, and remote sensing, inertial, satellite, side scan sonar, sub-bottom profiling, marine magnetometer, and other surveying methods as applicable may be utilized.

7.4.7 PRECISE SURVEYS

First, second or third order horizontal and vertical surveys to monitor movement of locks, dams and other structures.

7.4.8 BOUNDARY AND CADASTRAL SURVEYING

Includes boundary/improvements and easement surveys on both private and public lands. Contractors are responsible for acquiring permissions and approvals for accessing private lands and for gaining security clearances as required for Military and Civil Works projects. Boundary surveying will meet or exceed the requirements of the pertinent state licensing board.

7.4.9 PHOTOGRAMMETRIC SERVICES

Includes acquisition of surveying and mapping data from measurement of digital and film photographs representing either three dimensional or planimetric spatial relationships on the earth's surface. Stereo plotting, bridging, photographic laboratory and reproduction services, acquisition of aerial photography, photogrammetric mapping to include film negatives, film positives, dispositive, photo indexes, photo enlargements, computations, compilation histories and mapping on stable base materials.

7.4.10 AIRBORNE LIDAR SURVEYING

May include topographic and bathymetric collection as well as RGB, multispectral and hyperspectral. In addition post collection processing of lidar and imagery may be required as specified.

7.4.11 STATIONARY TERRESTRIAL LASER SCANNING

Laser scanning applications that are performed from a static vantage point on the surface of the earth.

7.4.12 MOBILE TERRESTRIAL LASER SCANNING

Laser scanner technology in combination with Global Navigation Satellite Systems (GNSS) and other sensors to produce accurate and precise geospatial data from a moving vehicle. MTLS platforms may include Sport Utility Vehicles, Pick-up Trucks, Hi-Rail vehicles, boats and other types of vehicles.

7.4.13 MAPPING AND CHARTING

These include the preparation (i.e., design, compilation, digitizing, scribing, drafting and printing) of map and chart products. These depict man-made and natural features of a part to the surface of the earth in their correct positions and at an established scale relative to a coordinate reference system. These may be associated with engineering, land/boundary, geodetic and/or cartographic surveys. Conventional, electronic or computer assisted design & CADD systems as applicable may be utilized.

7.4.14 SUBSURFACE UTILITY INVESTIGATIONS

- Where there are a number of known utilities and communication lines crossing the proposed construction site, a Subsurface Utility Investigation is recommended. Per the industry standard, ASCE 38-02, Subsurface Utility Investigations, are categorized based on the quality of information obtained in an ascending level as follows:
    - Quality Level D (QL D): Information derived solely from existing records or verbal recollections.
    - Quality Level C (QL C): Information obtained by surveying and plotting visible above-ground utility features and by using professional judgment in correlating this information to Quality Level D information.
    - Quality Level B (QL B): Information obtained through the application of appropriate surface geophysical methods to identify the existence and approximate horizontal position of subsurface utilities. "Quality level B" data are reproducible by surface geophysics at any point of their depiction. This information is surveyed to applicable tolerances and reduced onto plan documents.
    - Quality Level A (QL A): Information obtained by the actual exposure (or verification of previously exposed and surveyed utilities) of subsurface utilities, using (typically) minimally intrusive excavation equipment to

determine their precise horizontal and vertical positions, as well as their other utility attributes. This information is surveyed and reduced onto plan documents. Accuracy is typically set at 15mm vertical, and to applicable horizontal survey and mapping standards.

- The minimum acceptable Subsurface Utility Investigation will be a Quality Level B. All subsurface utilities and communications lines will be located to an accuracy of plus or minus 6-inches (0.15M). All subsurface utility information obtained during the investigation will be shown on drawings containing the topographical survey. It is recommended that a professional utility locating firm be contracted to do the utility location as opposed to One-Call and Dig Permit markings.
- For projects on military Installations, the subsurface utility location process will usually be complex and time consuming and may involve multiple government and civilian offices. This fact should be taken into account when planning these surveys.
- One-Call and Dig Permit markings: These marks are placed by others. The surveyor has no control over these marks or knowledge of their integrity. These marks can be recognized only as a source of non-qualified information. Survey of these marks leads only to QL D information, not QL B information.

7.4.15 DIGITAL DATA

A digital CADD file, with the survey data is required in the latest release AutoCAD, unless otherwise specified in A-E Scope of Work. CADD drawing will comply with all layering standards as specified in the latest version of the A/E/C CAD Standard. The designer will store and maintain a copy of all electronically created digital files (CD's, tapes, etc) through the construction phase of the project. These files will be made available to the Government upon request and will be maintained with no additional cost to the Government.

Latest version of AEC CADD standards:

https://cadbimcenter.erdc.dren.mil/

7.5 MINIMUM TECHNICAL STANDARDS FOR SURVEYING AND MAPPING SERVICES

7.5.1 REGISTERED LAND SURVEYOR

All surveying and mapping services will be accomplished under the direction/supervision of a Registered Land Surveyor in the State in which the project is located. Site plan mapping will be signed and sealed with the following statement: "I HEREBY STATE THAT THIS SURVEY AND DRAWING(S) MEETS OR

EXCEEDS THE MINIMUM TECHNICAL STANDARDS FOR THE PRACTICE OF LAND SURVEYING IN (insert State in which survey was performed)".

7.5.2 HORIZONTAL AND VERTICAL DATUMS

Horizontal: Unless otherwise stated within the Scope of Work, all horizontal data will be referenced to NAD83 with a projection in the local state plane coordinate system.

Vertical: It is the policy of USACE that the designed, constructed and maintained elevation grades of projects will be reliably and accurately referenced to a consistent nationwide framework, or vertical datum—i.e., the National Spatial Reference System (NSRS) or the National Water Level Observation Network (NWLON) maintained by the U.S. Department of Commerce, National Oceanic and Atmospheric Administration (NOAA). The current orthometric vertical reference datum within the NSRS in CONUS is the North American Vertical Datum of 1988 (NAVD88). The current NWLON National Tidal Datum Epoch (NTDE) is 1983-2001.Unless otherwise stated within the Scope of Work, all vertical data will be referenced to NAVD88. The use of a geoid model to convert from ellipsoid heights to orthometric heights is permissible only with the GEOID 03 model or a later version, unless a different model is explicitly stated within the scope of work.

The site survey will be accomplished with no less than third (3rd) order accuracy and procedure. Assumed coordinates and vertical positions can be used only with the Government's permission. CADD drawings will indicate which horizontal and vertical control datum were used for the site surveys.

7.5.3 SURVEY MONUMENTS

A minimum of three permanent survey control points will be established on or adjacent to the design site. Survey control points must be established in areas that will not be disturbed prior to and during the construction phase of the project. Designation and date established will be stamped on each survey control point. No less than third (3rd) order horizontal and vertical control will be established on each survey control point. A symbol indicating the location of the control point will be shown on the survey and design drawings.

All survey control points will have U-SMART forms filled out as completely as possible and turned in with final deliverables. U-SMART forms can be downloaded from the following website:

http://usmart.sec.usace.army.mil/

The following are requirements for a survey monument:

- If set in soil, monument will be composed of a durable ferrous or magnetic material with minimal length of eighteen inches and cross-section area of material of 0.5 square inches.
- If set in existing concrete curbs, sidewalks, headwall etc. will be securely grouted with epoxy grout.
- Identify with durable marker or cap bearing designation, date and Registration Number of the land surveyor in charge.
- Be detectable with conventional instruments for finding ferrous or magnetic objects

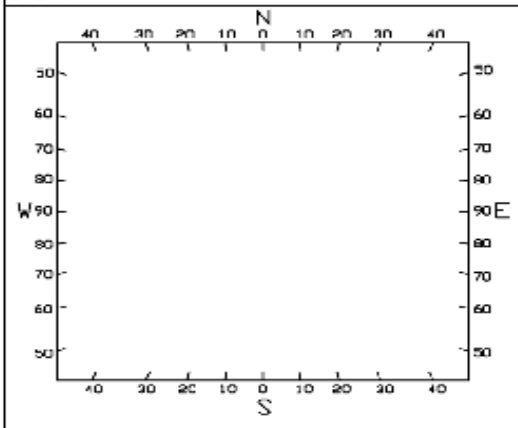
Any found or set monuments will be documented in Rev Form 977 as shown here:

REPORT ON ESTABLISHMENT OF SURVEY MARK

DESIGNATION OF MARK: 40140	DATE ESTABLISHED: Feb 9, 2011
SITE TITLE/PROJECT NAME: BEALE AIR FORCE BASE	
QUADRANGLE: SMARTVILLE	INDEX:
COUNTY: YUBA	STATE: CALIFORNIA

HORIZONTAL INFORMATION	
SURVEY METHOD: STATIC GPS NETWORK	
DATUM: NAD83 (FEET)	EPOCH: 2006
GEOGRAPHIC COORDINATES	
LATITUDE:	39°07'48.86174"N (based on BAFB control)
LONGITUDE:	121°19'18.92554"W
STATE PLANE COORDINATES	
GRID ZONE:	0402-California 2
CF=	0.999916366
NORTHING (Y)	2174153.35
EASTING (X)	6754008.61
UTM COORDINATES	
GRID ZONE	10-126W TO 120W
CF=	0.999844734
Y=	14214440.76
X=	2116285.36
VERTICAL INFORMATION	
DATUM: NAVD88 (FEET)	EPOCH:2006
ORTHOMETRIC EL.=	391.44
ELIPSOID HEIGHT=	299.11
SURVEY METHOD:	STATIC GPS NETWORK
GEOID:	

POSITION ESTABLISHED BY: (CONTRACTOR'S NAME)
ELEVATION ESTABLISHED BY:(CONTRACTOR'S NAME)
DETAILED STATION DESCRIPTION:
NE COR. SEC. 29, T15N, R6E, MDB&M
#6 REBAR 36" LONG W/ 3-1/4" ALUMINUM CAP
STAMPED "2011 BEALE AFB LS 6124"
UP 0.6' IN MOUND OF STONES



Map View

	OBJECT	DIRECTION	DIST. (FT.)
1	6' carsonite post	S 05° W	2.70
2	¾" tag 6124 in FP	N 17° W	6.70
3			
4			


Image Close-up View


Image Horizon View

REVISED FORM 977

7.5.4 COMPLIANCE WITH APPLICABLE LAWS

All personnel will strictly observe the laws of the United States or other governing body affecting operations at all sites. The personnel will comply with applicable laws under which they are operating including those concerning the inspection and operation of equipment and the licensing of engineers, land surveyors, pilots, mechanics and other personnel. It is further understood and agreed that the

designer assumes full responsibility for the safety of his employees, plant and materials.

7.5.5 SECURITY CLEARANCE

Personnel working on military projects will be capable of obtaining a temporary security clearance. The following information could be required if the project is located in a restricted area: Full Name, Position, Social Security Number, Date of Birth, Place of Birth, Security Clearance, Citizenship, Drivers License Number and State of Drivers License. Include with this list the Name and Phone Number of a Point of Contact in case of an Emergency. It is the responsibility of the Designer to assure all personnel listed can obtain the clearance.

7.6 DESIGNER'S RESPONSIBILITY FOR UNSATISFACTORY SITE SURVEYS

If the site surveying and mapping services are found to be in error prior to and through the construction phase of the project, the designer will be responsible for all cost in connection with correcting such errors. The designer will be responsible to the Government in accordance with applicable law for all damages to the Government caused by negligent performance of any services.

7.7 GEOGRAPHIC INFORMATION SYSTEMS (GIS)

This section presents general requirements for GIS and the processing of the data that may be required for the work necessary in the design and advance planning of assigned GIS projects. The contractor, operating as an independent contractor and not an agent of the Government, will provide all labor, material and equipment necessary to perform all GIS services listed in The Rates for Services (Schedule B) as requested by the Government during the effective period of the contract. Work may be required anywhere within the boundaries of the Mobile District, South Atlantic Division or worldwide. During the prosecution of the work, the contractor will provide adequate professional supervision and quality control to assure the accuracy, quality, completeness and progress of work. The Contracting Officer or his authorized representative will direct all work.

7.7.1 APPLICABLE PUBLICATIONS

GIS work will be in strict compliance with the relevant sections of the following:

EM-1110-1-2909 Geospatial Data and Systems

1.1.1 GIS DATA FORMATS

GIS data formats include vector and or raster. Acceptable raster formats for georeferenced imagery include MrSID with world file (SDW), JPEG with world file (JFW), and TIFF 4.0 with world file (TFW), and ERDAS Imagine. Raster formats for digital elevation models (DEM) include ESRI GRID, TIFF, and IMAGINE IMAGE.

Acceptable GIS data formats for vector data will include ESRI shape files, personal and file geodatabases, TIN and TERRAINS.

7.7.2 DATA STANDARDS

Unless otherwise directed geospatial data deliverables that are designated for a GIS will conform to the SDSFIE standards. An on-line reference to this standard is found at:

http://www.sdsfie.mil

- Spatial Data Standard for Facilities, Infrastructure, and Environment (SDSFIE): This standard defines the nomenclature of feature datasets, feature classes and attributions of all features stored within the geodatabase. This standardization allows the data and custom applications to be easily shared among other districts and agencies that use Spatial Data Standards.
    - SDSFIE provides a standardized grouping of geographically referenced (geospatial) features such as real-world features or objects depicted graphically on a map at their real-world location (coordinates). Each geospatial feature has an attribute table "attached" that contains pertinent data about the geospatial feature.
    - The SDSFIE is the only "nonproprietary" GIS data content standard designed to be used with the predominant commercially available off-the-shelf GIS, CADD (e.g., ESRI ArcGIS, AutoDesk AutoCAD and Map, and Bentley MicroStation and GeoGraphics), and relational database software (e.g., Oracle, Microsoft Access and SQL Server). Its nonproprietary design, in conjunction with its universal coverage positions SDSFIE as the standard for GIS implementations throughout the Department of Defense (DoD).
- GIS Projections and Datums

  All GIS data will use North American Datum (NAD) of 1983, or World Geodetic Systems (WGS) of 1984 coordinate system datums, and when applicable, the North American Vertical Datum of 1988 (NAVD88) to ensure data alignment and accuracy. Data should be displayed using an appropriate projection for project or Installation use. The projection and datum must be documented in the metadata and provided whenever the data is distributed. A resource for explanation of projections and datums can be found in EM-1110-1-2909 Geospatial Data and Systems.
- Data Quality

All GIS data will be created and maintained at a quality and resolution that ensures accuracy and usefulness for project or Installation management and mission support.

1.1.2 METADATA REQUIREMENTS

- All data produced or acquired by the USACE must have Federal Geographic Data Committee (FGDC) compliant metadata. If data is produced or acquired by a contractor, the contractor is to provide metadata files for all geospatial data produced under any contract. Geospatial data is information identifying the geographic location and characteristics of natural or constructed features and boundaries on Earth. The geospatial data that must meet these requirements are those generated in a: Geographic Information System (GIS); Land Information System (LIS); Remote Sensing or Image Processing system; Computer-Aided Design and Drafting (CADD) system; Automated Mapping/Facilities Management (AM/FM) system; as well as other computer systems that employ or reference data using absolute, relative or assumed coordinates. The metadata file should conform to the Spatial Data Transfer Standards (SDTS)/Federal Information Processing Standard (FIPS) 173, Federal Geographic Data Committee (FGDC) standards, and the Spatial Data Standard for Facilities, Infrastructure and Environment (SDSFIE).

    - Output from the metadata generator software (CorpsMet or ArcCatalog Metadata creator) is the standard format for all metadata files created for USACE. The digital metadata files must be provided along with each final product deliverable, unless approved in writing by the Contracting Officer.

7.8 DATA MANAGEMENT

In projects where geospatial data is collected, a Data Management Plan (DMP) is a required component of the Project Management Business Process (PMBP), per Chapter 4 of EM 1110-1-2909. The DMP is a metric set forth by HQUSACE as a means to reduce data redundancy in the Districts, to track existing data and to facilitate the implementation of enterprise data management. This data collection and management plan covers Computer Aided Design and Drafting (CADD) and Geographic Information System (GIS) products. Implementation of this plan will allow Project Delivery Teams (PDTs) comprised of experts from various USACE Districts to work collaboratively on a project. For this collaboration to become a reality, the USACE must follow established criteria, policy and guidance for the acquisition, processing, storage, distribution and use of geospatial data. Project Delivery Team members who are responsible for collecting spatial data and producing Computer Aided Design and Drafting (CADD) and Geographic Information System (GIS) products, have a major role to play in the success of this effort.

7.8.1 APPLICABILITY

This plan will apply to all district civil and military projects that will have a geospatial component at any phase of the project. Scopes of work and project management plans will address the geospatial data component of the project to make sure that data is being collected, used and managed in such a way as to maximize its value throughout the life-cycle of the project and the related programs.

7.8.2 FUNDING

Funding for the preparation and implementation of this plan will be provided by the individual project to which it applies.

7.8.3 GEOSPATIAL RESPONSIBILITIES OF THE PDT

The PDT needs to define:

- Data objectives and quality requirements
- Data format
- Data collection methods and what data are available, in development or stored (both on- and off-site)
- Timeliness of data availability
- Data analysis and access - the uses of the data
- How to incorporate this data into the project decision process
- Data access, storage and control - how the data will be managed over time

7.8.4 ROLE OF THE GEOSPATIAL AND CADD SPECIALISTS ON THE PROJECT DELIVERY TEAM (PDT)

- Support the PDT in the efficient execution of civil, military construction and environmental restoration projects.
- Help protect the investment in CADD, geospatial data, applications and institutional knowledge.
- Facilitate the sharing of CADD and geospatial data among civil, military and environmental projects.
- At the project initiation phase, determine how large of a role CADD and geospatial technologies will play.
- Educate the project managers and PDT members on how CADD and geospatial technology can be used to add value to the project.

- Identify CADD and geospatial data requirements and ensure that the appropriate CADD, geospatial and data standards are followed. This includes following the current A/E/C CADD standard, Spatial Data Standards for Facilities, Infrastructure and Environment (SDSFIE) and development of FGDC metadata.
- Acquire existing geospatial datasets from federal, state, local agencies, the public domain and available through USACE licenses agreements.
- Reformat data as required for use with the geospatial technologies.
- Create new data layers through the integration of existing and acquired data.
- Integrate CADD and GIS data.
- Identify CADD and geospatial application requirements needed for the project.
- Develop geospatial technology applications in accordance with applicable guidelines and standards.
- Perform spatial analysis and data modeling.
- Provide data visualization and mapping products.
- Develop and maintain a geospatial data management plan for the life cycle of the project.

7.8.5 GEOSPATIAL DATA CHECKLIST

The Geospatial Data Checklist will be completed by project geospatial technical leads to ensure project efforts to collect geospatial and geotechnical data meet required configuration, system and data quality requirements. All projects that include tasks to use or produce geospatial data must clearly state what will be collected, what will be delivered, the format it will be delivered in and who will be responsible for updates and maintenance. This is necessary whether the work is done by contract or by District staff. This checklist is designed to aid project team members with writing geospatial data collection and management portions of the Project Management Plan (PMP). This checklist is to be filled out by the Project Manager and the project's geospatial data technical lead. This checklist becomes a permanent part of the project's geospatial data plan and subsequently the project's PMP.

CHAPTER 8

ENVIRONMENTAL PROTECTION

INDEX

CHAPTER 8

ENVIRONMENTAL PROTECTION

8.1 GENERAL

This chapter presents general requirements for the preparation of plans, specifications and design analyses for environmental protection. The requirements for environmental protection for US Army projects will generally follow the order of federal environmental regulations and guidance, federal worker protection regulations and guidance, state environmental regulations, US Army policy and guidance, Unified Facilities Criteria (UFC), Military Handbooks (MIL-HDBK), Technical Instructions (TI), Engineering Instructions (EI) and Technical Manuals (TM). US Air Force projects will generally follow the same criteria order as above, except that US Air Force policy and guidance will be followed. The designer must always keep in mind that the listed publications and guidance above are minimum standards. Where local, state, and federal regulations (and sometimes Host Nation Standards) require a larger or more robust requirement, those regulations must be followed and supersede the military requirements. Where details are left to the designer, standards dictated herein will be applied. Specific design submittal requirements in this chapter supplement the requirements in the GENERAL INSTRUCTIONS chapter of this Design Manual. All required documents, including drawings and design analysis, will be in accordance with the PRESENTATION OF DATA chapter of this Design Manual.

8.1.1 ENVIRONMENTAL PROTECTION

Environmental protection design includes the presence, exposure to, handling, or disposal of existing hazardous materials. In addition, environmental protection design includes storage tank removal and groundwater monitoring well installation and abandonment.

8.1.2 HAZARDOUS MATERIALS

Regulated hazardous materials cause health problems. Heavy metals such as mercury, cadmium, chromium and lead cause health problems that can lead to death. Many hazardous compounds are additives to existing products or systems, such as chromium, polychlorinated biphenols (PCBs), formaldehyde, arsenic and chloride compounds. Others are by-products or deterioration products from materials stored or processes that occurred in the buildings. The Environmental Protection Agency (EPA) and the Occupational Safety and Health Administration (OSHA) have adopted regulations requiring control procedures for exposure and disposal of materials containing these compounds. These regulations also provide guidance to ensure safe working conditions during demolition or renovation of

buildings or structures. Hazardous materials that may be present at a site include, but are not limited to, the following:

Asbestos

Lead paint (or other coatings containing lead and/or heavy metals such as cadmium and chromium)

Fluorescent lamps (may contain mercury)

Lighting ballast (may contain PCBs)

Thermostats (may contain mercury)

Window mounted AC units (may contain chlorofluorocarbons (CFCs))

- **Hazardous Materials Inspection -** It is the designer's responsibility to determine the presence of hazardous building materials (HBMs) including asbestos, lead and other heavy metals in paint and dust, mercury and PCBs, radioactive materials or biohazards, and implement the safeguards for removal. In some cases, HBM surveys may be conducted by USACE or the Installation. However, all buildings in which renovation or demolition will be conducted must have a HBM survey conducted. Unless the using agency can provide location and quantities of HBMs through recent survey report of analytical sampling and testing results with the DD Form 1391, other programming documents, or supplemental data at the Predesign Conference, the designer will be responsible for determining the presence and/or absence of HBMs for all renovation, rehabilitation, or demolition projects. HBMs will be assumed present in all buildings unless verification is made otherwise. The designer will report building history (construction dates) with submittal. The designer that indicates an inability to determine the existence of HBMs will inform the Mobile District in writing at the submittal of the initial fee proposal. HBM survey may then be accomplished independently by the using agency or Mobile District for incorporation into the construction documents.

  - **Asbestos Survey -** Perform asbestos survey for evaluating worker exposure and the applicability of OSHA 29 CFR 1926.1101, Asbestos, to the project, for preparing UFGS Specification 02 82 00 11/18 ASBESTOS REMEDIATION; and for assessing applicability of Resource Conservation and Recovery Act (RCRA) waste disposal standards to renovation debris. Perform survey in accordance with EPA 40 CFR 61.145, Standard for Demolition and Renovation (NESHAP) requirements and follow EPA Asbestos Hazard Emergency Response Act (AHERA–40CFR763) sampling protocols and in accordance with Alabama state regulations, using EPA accredited Asbestos Building inspectors licensed by Alabama

for inspections, and using EPA accredited Asbestos Management Planners licensed by Alabama to review reports. The laboratory used to determine asbestos content in bulk materials will be accredited by the National Institute of Science and Technology (NIST) under National Voluntary Laboratory Accreditation Program (NVLAP) for asbestos analysis. Asbestos will be identified, sampled, analyzed and validated in accordance with the requirements of 40 CFR 763, Subpart E. The survey will include as a minimum, bulk sampling to indicate percentage, age, and type of asbestos found; exact location of sample(s); amount of asbestos (linear or square footage, as appropriate); accessibility; condition; friability; and all other factors described in the Environmental Protection Agency (EPA) document EPA 560/5-85-024, titled "Guidance for Controlling Asbestos-Containing materials in Buildings." Destructive bulk sampling of materials is authorized, and sample location will be coordinated with the facility management.

- **Heavy Metals in Paint Survey -** Perform survey for heavy metals in paint for the purpose of evaluating worker exposure and the applicability of OSHA 29 CFR 1926.62, Lead in Construction, and 29 CFR 1910.1025, Lead, OSHA 29 CFR 1910.1026, Chromium (VI), OSHA 29 CFR 1910.1024, Beryllium, and 29 CFR 1910.1027, Cadmium, to the project, for preparing UFGS Specification 02 83 00 11/18 LEAD REMEDIATION, and for assessing applicability of RCRA waste disposal standards to painted renovation debris. The contractor will conduct a visual examination of both vertical and horizontal interior and exterior surfaces/component systems to be impacted by the work for determining the presence of heavy metals. The contractor will define a sampling strategy in a Sampling Plan (prepared by the contractor) that emphasizes taking only the very minimum number of samples required to determine the presence of heavy metals on the building components. Surfaces selected for sampling will be prioritized to analyze first those having the highest probability of containing heavy metals. Paint chips will be taken of component systems, and the contractor will rank order the samples for laboratory analysis with instructions to the laboratory to stop the analyses once a positive result is obtained demonstrating the need for compliance with 29 CFR 1926.62(d). If the XRF is used for field-testing (XRF may be used in addition to paint chips, not in lieu of paint chips), sampling will be prioritized by the Contractor to minimize the number of readings taken, typically one XRF reading per component system. Inconclusive and negative XRF results will be supplemented by laboratory paint chip analysis with paint chips collected directly from the XRF tested substrate that best represents the quantified in cubic centimeters (cc) of surface area for the component system. The paint chip will be a destructive sample collected and submitted to the laboratory following the laboratory’s SOP for collecting paint chip samples to determine heavy metals loading per cc of surface area. Destructive bulk sampling of materials is typically authorized, and sample location does not have to be repainted, but this should be confirmed. Use a

laboratory participating in the EPA National Lead Laboratory Accreditation Program (NLLAP) by being accredited by either the American Association for Laboratory Accreditation (A2LA) or the American Industrial Hygiene Association (AIHA) and that is successfully participating in the Environmental Lead Proficiency Analytical Testing (ELPAT) program to perform sample analysis. Laboratories selected to perform blood lead analysis must be OSHA approved.

- **Heavy Metals and Silicates in Dust Survey -** Perform survey for crystalline silicates and heavy metals in dust not adhered to surfaces for the purpose of evaluating worker exposure and the applicability of OSHA 29 CFR 1926.1153, Occupational Exposure to Respirable Crystalline Silica, OSHA 29 CFR 1926.62, Lead in Construction, and 29 CFR 1910.1025, Lead, OSHA 29 CFR 1910.1026, Chromium (VI), OSHA 29 CFR 1910.1024, Beryllium, and 29 CFR 1910.1027, Cadmium, to the project, and for assessing applicability of RCRA waste disposal standards to renovation debris covered with dust containing heavy metals. Select appropriate sampling method based on location, substrate, amount of dust, etc. Micro-vacuum samples will be collected in accordance with ASTM standard D7144-05: Standard Practice for Collection of Surface Dust by Micro-vacuum Sampling for Subsequent Metals Determination, whereas dust wipe sampling will be conducted in accordance with ASTM Standard E1728-16: Standard Practice for Collection of Settled Dust Samples Using Wipe Sampling Methods for Subsequent Lead Determination. Use a laboratory participating in the EPA NLLAP by being accredited by either the A2LA or the AIHA and that is successfully participating in the ELPAT program to perform sample analysis.

- **Hazardous Waste Determination -** Collect samples to determine the potential RCRA waste classification for all waste streams anticipated to be generated by the renovation for the purpose of determining if the renovation waste stream will require handling and disposal as hazardous waste in accordance with RCRA subtitle C requirements. Collect a representative sample of the anticipated renovation debris waste stream and have the samples analyzed for RCRA metals content by Toxicity Characteristic Leaching Procedure (TCLP). The laboratory selected will maintain current National Environmental Laboratory Accreditation Program (NELAP) certification. The representative sample of the renovation debris will include, but not be limited to, a proportionate amount of painted surface, doors, windows, structural components, roofing material, concrete and unpainted wood. It is anticipated that the TCLP analysis of renovation debris waste stream will result in a RCRA metals TCLP concentration less than the regulatory limit. However, if the TCLP analysis results in a concentration greater than the regulatory limit, the contractor will collect an additional round of representative samples and have

them analyzed by TCLP. Based on the analytical results of the TCLP, the contractor will characterize the waste in accordance with 40 CFR 261.

- **Miscellaneous Toxic/Hazardous Materials -** Inspect for and sample miscellaneous toxic and/or hazardous materials as encountered for heavy metals for the purpose of evaluating worker exposure and the applicability of OSHA 29 CFR 1926.62, Lead in Construction, and 29 CFR 1910.1025, Lead, OSHA 29 CFR 1910.1026, Chromium (VI), OSHA 29 CFR 1910.1024, Beryllium and 29 CFR 1910.1027, Cadmium, to the project, and for assessing applicability of RCRA waste disposal standards. In addition, note the presence of HVAC units (may contain CFCs), HVAC thermostats (may contain mercury), and Window mounted AC units (may contain chlorofluorocarbons CFCs).

- **Asbestos –** For all structures to be demolished or renovated, the designer will determine if the structure has been inspected for asbestos containing materials. If it has, the designer will obtain the asbestos inspection report and determine if it is sufficient to be used for demolition design. If the existing report is not sufficient, or if there is not an existing inspection report, the designer will consult the asbestos regulations for the state in which the project is located and will recommend to the PM that an inspection be conducted in accordance with the appropriate state guidance and statute. Typically demolition of any structure is not permitted without a valid asbestos inspection report. Once a valid asbestos inspection report is provided, the designer will prepare the asbestos abatement design if required by the activities to be conducted. For example, if renovations will disturb asbestos containing material, an asbestos abatement design is required. If it is not anticipated that renovations will disturb asbestos containing material, this information will be noted and documented in the design. In all cases, the asbestos inspection report will be included in the appendices.

- **Lead Based Paint -** For all structures to be demolished or renovated, the designer will determine if the structure has been inspected for lead based paint and primer. If it has, the designer will obtain the inspection report and determine if it is sufficient to be used for demolition design. If the existing report is not sufficient, or if there is not an existing inspection report, the designer will discuss with the Project Manager (PM) whether the PM wants to fund a lead inspection. The alternative to a lead inspection is to assume all paint/primer contains detectable levels of lead. Any detectable concentration of lead in paint/primer may trigger certain provisions of OSHA regulations. Given the sensitivity (i.e. very low detection limit) of the testing methods commonly used to identify lead in paint, most paints and primers are found to contain some detectable concentration of lead, and therefore trigger the OSHA regulation. The PM will direct the designer whether to conduct a survey for lead paint or just assume all paint/primer contains detectable levels of lead and design as such. Once a decision is made, the designer will prepare the design to limit

exposure to lead and to dispose of lead containing items appropriately, if required by the activities to be conducted. For example, if renovations will disturb confirmed or potential lead containing paint or primer, a design is required. If it is not anticipated that renovations will disturb confirmed or potential lead containing paint or primer, this information will be noted and documented in the design. In all cases, if a lead paint inspection is available, the report will be included in the appendices.

8.1.3 PERMITS

A list of any existing environmental permits obtained by the Installation or project office, and all new environmental permits required by federal, state, regional and local environmental laws and regulations, will be included in the specific specification section under which the permit applies. Environmental permits include, but are not limited to, the following:

- Demolition and Asbestos Abatement Notification
- NPDES permit for Dewatering

Permits for other disciplines are addressed in the specific chapter for that discipline.

8.1.4 NATIONAL ENVIRONMENTAL PROTECTION ACT (NEPA) DOCUMENTATION

In the event that the Government has prepared any NEPA Documentation, i.e. Record of Environmental Consideration (REC), Environmental Impact Statement (EIS), Environmental Assessment (EA), Air Force form 813 Request For Environmental Impact Analysis, or a Findings of No Significant Impact (FONSI), the designer will prepare the design so that it is entirely compatible with any and all requirements of that NEPA Documentation. This includes, but is not limited to, design of phasing to avoid nesting for sensitive species, work practices when around sensitive species, sensitive species avoidance, wetlands, and special work practices in historically sensitive areas.

8.1.5 ENVIRONMENTAL STUDY SITES

Existing Environmental Study Sites include Environmental Restoration Program (ERP), Installation Restoration Program (IRP) Sites, Solid Waste Management Units (SWMU), Areas of Concern (AOC), Military Munitions Response Program (MMRP) sites, Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) and RCRA sites, Underground Storage Tanks (UST) and Aboveground Storage Tanks (AST) sites, Aqueous Film Forming Foam (AFFF) and Per- and Polyfluoroalkyl substances (PFAS) sites, etc. The designer will gather all information available from the PM and the Installation about the presence of existing environmental study sites within the footprint and within 500 feet of the project site.

Relevant information includes management action plans (MAP), Installation Action Plans (IAP), environmental investigation reports, land use controls plans, letters and other documents concerning environmental investigations and remediation (clean-up), even if the site has been granted a No Further Action status by the regulatory agency (because No Further Action status is sometimes granted where contamination remains in place). Any contaminated or potentially contaminated soil within the project limits of construction (including excavation for utilities outside of the building footprint) will be included in the design. Because contaminated groundwater can be drawn in from outside the project limits of construction during dewatering, contaminated groundwater within the project area and up to approximately 500 feet in all directions from the project area will be included in the design. The impact of contaminated soil and contaminated groundwater on worker protection, excavation, dewatering, waste generation and disposal and vapor intrusion will be addressed in the design. Information associated with environmental study sites include, but are not limited to, the following:

Contaminated Soil

Contaminated Groundwater

Vapor Intrusion

Dewatering

Monitoring Wells

Land Use Controls

UST/AST and Piping

Munitions and Explosives of Concern (MEC)

- **Vapor Intrusion -** Vapor intrusion is the migration of volatile chemicals from the subsurface into the indoor air of buildings located above the contamination. The potential for volatile chemical vapor intrusion into buildings should be evaluated when volatile chemicals are present in soil, soil gas or groundwater that underlies or has the potential to underlie future buildings. The designer must account for this possibility and design mitigation for vapor intrusion into future buildings. It may be necessary for the designer to conduct vapor intrusion modeling for the future building to determine if this modeling indicates a potential risk and there may be a complete human exposure pathway. Methods to prevent vapor intrusion include vapor barriers and ventilation. Barriers installed as moisture barriers are not sufficient to prevent vapor intrusion.

- **Dewatering -** Contaminated groundwater under or near construction can result in contamination being present in dewatering effluent. If dewatering is necessary due to high water conditions or other unavoidable factors, the contractor may encounter groundwater containing chemicals within the dewatering effluent. To plan for that possibility of drawing contamination into the dewatering effluent, the designer will address permitting, handling, storage, characterization, treatment, and disposal of the dewatering effluent within the design. Dewatering is also addressed in CHAPTER 9 GEOTECHNICAL, in this Manual. If the design is in the State of Florida, the designer will also consider the requirements specific to Florida, depending on the circumstances at the site, as follows:

    - Dewatering activities which discharge water to surface water or into storm sewers, require a permit. Reference Construction with Dewatering FAQ at:
    - https://floridadep.gov/water/stormwater/content/construction-dewatering-faq
    - Generic Permit for the Discharge of Ground Water from Dewatering Operations (DEP Form 62-621.300(2)(a) incorporated in subsection 62-621.300(2), F.A.C. Effective Date 02/10/2015) Dewatering projects in Florida that discharge to surface waters or stormwater systems are required to operate under the coverage the Generic Permit for the Discharge of Ground Water from Dewatering Operations, which covers the discharge of non-contaminated ground water associated with dewatering activities.
    - Generic Permit for Stormwater Discharge from Large and Small Construction Activities DEP Form 62-621.300(4)(b) incorporated in subsection 62-621.300(4), F.A.C. Effective Date 02/10/2015. The Construction Generic Permit (CGP) can also be used to discharge water from groundwater dewatering operations if the property is either (a) not identified as a contaminated site and there is no identified contaminated site within 500 feet, or (b) it is identified as a contaminated site, but DEP documentation confirms that the contamination has been remediated or the pollutants of concern from the contaminated site are not present in groundwater at the project site at concentrations equal to or greater than the surface water criteria in Rule 62-302.530, F.A.C.. SWPPP (BMPs) and frequent testing to confirm water meets surface water quality requirements before discharging on to surface, are required.
    - If contamination in the vicinity of the site that causes or contributes to violations of water quality standards is encountered, dewatering cannot operate under the generic permits listed above, but may qualify for

coverage under Rule 62-621.300(1), F.A.C. NPDES Generic Permit for Discharges from Petroleum Contaminated Sites, or under an individual wastewater permit on the appropriate form listed in Rule 62-620.910, F.A.C.

- NPDES Generic Permit for Discharges from Petroleum Contaminated Sites DEP Form 62-621.300(1)(a) incorporated in subsection 62-621.300(1), F.A.C. Effective Date 09/30/2018. If contamination in the vicinity of the site is caused by petroleum constituents, dewatering may be able to operate under the NPDES Generic Permit for Discharges from Petroleum Contaminated Sites.
- A permit is not required if the contractor chooses to re-infiltrate the water via an Infiltration gallery in accordance with State of Florida requirements. This requirement is specific to the State of Florida.

- **Monitoring Well Protection, Abandonment, and Replacement Groundwater** - Monitoring wells are often present at environmental study sites. Location of wells should be indicated on design drawings. Construction activities should avoid damaging or disturbing any monitoring wells and will protect wells from the introduction of contaminants (mud/dirt or PVC glue introduced/caps or plugs removed/risers compromised) that may be located in construction areas. Wells that must be removed, are to be removed in accordance with the well abandonment procedures specific to the environmental study site where the well is located. Wells to be removed are usually required to be replaced in accordance with the well installation procedures specific to the environmental study site where the well is located.
- **Munitions and Explosives of Concern (MEC) -** Munitions and Explosives of Concern (MEC) encountered on MMRP sites will be treated as extremely dangerous and must be reported immediately. MEC is Unexploded Ordnance (UXO), Discarded Military Munitions (DMM), or Munitions Constituents (MC) in sufficient amounts or concentrations to pose an explosive hazard. Activities performed by Corps employees, or its contractors could be subject to encountering MEC if the land was used for military activities. These hazards may be found on land surface or subsurface, or in bodies of water. As described in Engineer Manual (EM) 385-1-97 (2013) Explosives - Safety and Health Requirements Manual, the responsible authority (for example, Installation or district commander or a designated representative) will determine whether there is a probability for encountering MEC at a project site, whether construction support is required and the level of such support required based on site-specific data prior to beginning construction operations or other activities. Every effort will be made to determine whether munitions-related activities ever occurred on the land/waters where operations or activities will take place. This is called a MEC Probability Assessment. Installation or

responsible authority will, based on available historical documents or prior environmental response actions, conduct an assessment to determine the probability for encountering MEC. The Probability Assessment will consider the past or current use of the property where military or munitions-related activities occurred, as well as the anticipated project action and associated activities. Upon these considerations, a determination will be made to the probability of encountering MEC with the successful execution of the project. Supplemental information, such as that provided by a geophysical assessment, may also be included to support historical summaries and findings of probability. This determination will be documented and used to plan the level of support required (e.g., no support, on-call support, or a removal action within the affected footprint). The designer will request information relevant to MEC at the site (for example, the MEC Probability Assessment), and will record the determination made by responsible authority in the MEC Probability Assessment as follows:

- State the probability for encountering MEC at a project site.
- If the responsible party has not completed a MEC Probability Assessment, state whether the planning has been completed to prepare the MEC Probability Assessment.
- If there is a probability for encountering MEC at a project site, state whether construction support is required.
- If construction support is required, state the level of such support required.
- If construction support is required, state whether support will be provided by separate pre-award or pre-construction munitions response project or Inclusion of MEC construction requirements in contract solicitation.

8.1.6 MOLD

Molds are types of fungi that can be found both indoor/outdoor environments. Mold grows on almost any organic substance with the presence of moisture and oxygen. Indoors, porous materials such as wood, sheetrock, carpet, upholstery, wallpaper, drywall, ceiling tiles, clothing, paper, etc. provide a food source that can support mold growth. Mold may be recognized by sight – discolored walls, fabrics, or ceilings, visible mold growth, or water damage, or smell – bad odor, such as musty, earthy, or foul stench. Mold can grow where there is enough moisture or high humidity. Controlling the moisture is key to stopping indoor mold growth. Moisture can come from but not limited to flooding from outside (storm water, overflowing lakes, storm surge), flooding from inside (overflown sinks, tubs, toilets, air conditioners), condensation (indoor humidity too high or surfaces too cold), water leaks from outside the building (roofs, walls, floors), and indoor plumbing leaks or broken water pipes. The presence of mold in the air is normal, however mold should not be allowed to grow and multiply indoors. When this happens, the level of exposure can

increase, thereby increasing the risk of potential health problems. Mold is also discussed in CHAPTER 18 HEATING, VENTILATING, AND AIR CONDITIONING.

8.1.7 WETLANDS

Wetlands issues identified in the NEPA documentation may be mentioned if the wetlands issues impact the Environmental Protection issues of the design. The disturbance, dredge, and/or fill of wetlands, however, are not typically addressed in the Environmental Protection section but are instead addressed elsewhere within the design, typically by the discipline causing the disturbance of the wetlands.

8.2 APPLICABLE PUBLICATIONS AND REGULATIONS

Department of Defense publications include, but are not limited to, the following:

EM 385-1-1 (2014)	Safety and Health Requirements Manual
EM 385-1-97 (2013)	Explosives - Safety and Health Requirements Manual

See specifications for applicable Code of Federal Regulations (CFR)

Publications and guidance documents:

Environmental Protection Agency (EPA), American Society for Testing and Materials (ASTM), Underwriters Laboratories (UL), etc.

The list of CFRs and publications and guidance documents is too numerous to list in this Manual.

8.3 PROGRAMMING CHARRETTE DESIGN AND PREDESIGN MEETING

The programming charrette and predesign meeting documentation will provide a description of the anticipated environmental protection issues listed in Section 8.1 of this chapter that will be applicable for the project, any data gathered about environmental issues, and any data needed to design the environmental protection for the project. If an environmental protection issue listed in Section 8.1 of this chapter is not applicable, the narrative will state that the issue is not applicable so that the reviewer knows the issue was considered.

8.4 PROJECT DEFINITION (10%)

The project definition (which includes the project charrette) will contain a narrative description of each environmental protection issue listed in Section 8.1 of this chapter. If an environmental protection issue listed in Section 8.1 of this chapter is not applicable, the narrative will state that the issue is not applicable, along with the reasoning for the decision, so that the reviewer knows the issue was considered. Provide list of design

criteria. Give the basis and reasons for design, i.e., goals, objectives and priorities. Clearly explain the environmental issues at the site, the documentation available and the documentation needed to complete the design.

8.5 CONCEPT DESIGN (35%)

8.5.1 DESIGN ANALYSIS

The Design Analysis will contain a narrative description of each environmental protection design issue listed in Section 8.1 of this chapter. If an issue is not applicable, the narrative will state that the issue is not applicable so that the reviewer knows the issue was considered. The environmental protection design will be based on the most economical plan consistent with the applicable criteria. Include in the design analysis any assumptions made or source of information if not included in manuals, guides or instructions. The design analysis will be sufficiently complete to clearly show project requirements. Prepare outline specifications as directed in CHAPTER 23 SPECIFICATIONS in this Manual.

8.5.2 DRAWINGS

An environmental protection drawing may be required at the discretion of the designer. The designer will decide if a drawing is necessary based on the complexity of the environmental issue that requires protection. For example, if the construction site is located on a landfill, the environmental design may benefit from an environmental protection drawing showing the limits of the landfill, showing land use controls associated with the landfill and providing notes about the requirements for handling and disposal of landfill debris. The environmental protection drawing, if included, will be adequately detailed to show existing conditions and new work, if appropriate. If separate environmental protection drawings are not required, the designer will ensure that adequate notes and designations are added to the drawings for other disciplines. Notes will include references to the specific environmental specification. Examples of notes and designations to be added to the drawings for other disciplines are listed below:

- Add notes and designations for environmental study sites on site drawings
- Add notes and designations for lead paint and asbestos containing materials on architectural drawings.
- Add notes and designations for monitoring wells to be protected or abandoned on site drawings

8.5.3 APPENDICES

Appendices will contain all applicable reports documenting all known environmental issues associated with the site as listed in Section 8.1 of this chapter. Reports

documenting all known information about existing hazardous materials, existing environmental study sites, NEPA documentation, permitting, MEC Probability Assessment, asbestos inspections, and any other miscellaneous documents that provide information about the environmental issues at the specific site will be included. The information in the appendices will be referenced by name in the design analysis and on the drawings, as necessary. Documents anticipated to be included in the appendices are as follows:

- Asbestos Inspection Reports
- Lead Paint Inspection Reports
- Hazardous Material Inspection Reports
- Mold Assessments
- Demolition and Asbestos Abatement Notifications
- Record of Environmental Consideration (REC)
- Environmental Impact Statement (EIS)
- Environmental Assessment (EA)
- Air Force form 813 Request For Environmental Impact Analysis
- Findings of No Significant Impact (FONSI)
- Environmental Study Site Investigation Report
- Excerpts from Installation Action Plan
- MEC Probability Assessment

8.6 INTERIM DESIGN (65%)

1.1.3 DESIGN ANALYSIS

The Interim Design Analysis will include all items in the Concept Design Analysis and any necessary updates or revisions.

8.6.1 DRAWINGS

The Interim Design Drawings will include all items on the Concept Design Drawings and any necessary updates or revisions.

8.6.2 SPECIFICATIONS

Provide redlined marked up specifications in accordance with CHAPTER 23 SPECIFICATIONS of this Manual. Typical specifications sections utilized for environmental design are as follows:

01 57 19	TEMPORARY ENVIRONMENTAL CONTROLS
02 61 13	EXCAVATION AND HANDLING OF CONTAMINATED MATERIAL
02 82 00	ASBESTOS REMEDIATION
02 83 00	LEAD REMEDIATION
02 84 16	HANDLING OF LIGHTING BALLASTS AND LAMPS CONTAINING PCBs AND MERCURY
02 85 00	MOLD REMEDIATION

- **TEMPORARY ENVIRONMENTAL CONTROLS -** The guide Specification 01 57 19 TEMPORARY ENVIRONMENTAL CONTROLS provides the requirements for environmental protection and other temporary environmental controls. The special environmental requirements with which the contractor must comply must be developed during the design process, included in the bidding documents, and made a part of the contract. The special environmental requirements must be developed by the Designer from such documents as NEPA compliance measures specified in the Categorical Exclusion documentation, EA, or the EIS, the Installation Master Plan, or the Installation Storm Water Management Plan. Many States and Municipalities have more stringent or additional requirements; edit this section to include weblinks to the State or Local requirement. Add the State and Local source to the Reference list and cite within the body of this section. Clearly state in this section deviations from the State and Local requirements. Installation specific 01 57 19 TEMPORARY ENVIRONMENTAL CONTROLS are available for the following Installations: Fort Rucker, Eglin Air Force Base (AFB), Hurlburt Field, and Tyndall AFB. Where an Installation specific 01 57 19 TEMPORARY ENVIRONMENTAL CONTROLS is available, it should be used. The designer is required to edit the 01 57 19 TEMPORARY ENVIRONMENTAL CONTROLS specification, even ones that have been edited by the government to be Installation specific.

8.7 95% DESIGN

8.7.1 DESIGN ANALYSIS

The Final Design Analysis will be a refinement of the Interim Design Analysis. Design analysis will include all references for design assumptions. Design analysis will incorporate all accepted comments from the previous design submittal.

8.7.2 DRAWINGS

Final plans will be the refinement and completion of the interim drawings. All comments relating to interim, or concept design will be incorporated in the final drawings. Where crowded conditions exist due to proximity of other phases of the work, sufficient sections and elevations will be shown to clearly indicate the exact location of new facilities. The number of elevations and details will be sufficient to allow construction and installation of the work without additional design work by the contractor. A legend will be provided on drawings to clearly differentiate between existing and new construction. Existing construction is generally indicated by light symbols and new construction is indicated by heavy black symbols.

8.7.3 SPECIFICATIONS

Provide redlined marked up specifications if not provided at the Interim submittal. Provide final edited specifications if an Interim submittal was prepared in accordance with the CHAPTER 23 SPECIFICATIONS, in this Manual. Guide specifications will be included in this submittal. Specifications will not be restrictive. Generally, the description will be such that at least three major manufacturers can meet the specified requirements. Do not use trade names in the specifications unless a sole source authorization has been approved.

8.8 100% FINAL DESIGN

All final design drawings and specifications will have incorporated comments from the preceding reviews before submittal as Ready To Advertise.

CHAPTER 9

GEOTECHNICAL

INDEX

CHAPTER 9

GEOTECHNICAL

9.1 GENERAL

This chapter outlines the content and requirements for the development of two Geotechnical Report efforts. The USACE – Mobile District requires two levels of subsurface investigations and geotechnical evaluations for projects based on the type of design contract. For Design Build (DB) contracts, a preliminary evaluation is required which involves assessing the general subsurface conditions without development of geotechnical recommendations. This information will be included in a Request For Proposal (RFP) Package. The successful DB contractor will further develop the preliminary investigation with a complete geotechnical design report using their own engineer, once loadings, grades and construction materials/methods are developed. The second type of study will be a full geotechnical investigation and design scope and will be provided to a USACE selected Architect-Engineer (A-E) firm to provide a full set of specifications and plans. This type of contract scenario is a design, bid, build (DBB) and is the more common project development process. Once the final plans and specifications are completed, the project will be advertised for construction.

A Geotechnical Report in support of a DB contract is typically identified as a “Subsurface Investigation Report” or “Data Report” and is used for “Bidding Purposes Only”. This type of report provides minimal subsurface investigation information and is developed to provide a general description of the subsurface soil profile, groundwater and site conditions to assist the DB firm with their proposal in response to the RFP. Prior geotechnical investigations that are located in the immediate vicinity of the proposed facility will be included in the RFP, and in certain situations, if deemed adequately representative of local subsurface conditions (with regards to number of boring, coverage, testing, and depth), this information can be used without any new geotechnical investigation. The Government’s geotechnical engineer will make the determination of the need for further geotechnical investigation.

A DBB report is the Foundation Report of record which is provided to the project designers, whether by USACE or an A-E firm, to develop a completed project design with a construction-level set of plans and specifications. The term “Geotechnical Report” is used synonymously for both types of reports hereinafter. The Geotechnical Report will be provided to all designers for use in design and incorporated in the various submittal stages. As soon as possible after the locations of the primary structures/features are confirmed (this usually follows the completion of the charrette report), the Geotechnical and Dam Safety Section of Mobile District (EN-GG) will, upon request, perform a search for any existing subsurface data for the selected site and identify the need for an additional subsurface investigation at the site. EN-GG, or the A-E if included in the statement of work, will plan and perform such additional geotechnical subsurface investigation at the

project site, as required, and provide to the designer a comprehensive Geotechnical Report as early in the design as practicable but not later than the Interim Design (50-65%) submittal. In the following sections are lists the specific requirements of the submittal stages for geotechnical design features.

9.2 APPLICABLE PUBLICATIONS

9.2.1 AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM) SPECIFICATIONS

Many of the "Guide Specifications" reference ASTM specifications. Most of the ASTM specifications that are usually referenced by geotechnical specifications can be found in Volume 04.08 of ASTM. Listed below are the most frequently used ASTM specifications.

C 117	Test Method for Material Finer Than 75-um (No. 200) Sieve in Material Aggregates for Washing
C 136	Method for Sieve Analysis of Fine and Coarse Aggregates
D 420	Recommended Practice for Investigating and Sampling Soil and Rock for Engineering Purposes
D 421	Practice for Dry Preparation of Soil Samples for Particle-Size Analysis and Determination of Soil Constants
D 422	Method for Particle-Size Analysis of Soils
D 653	Terminology relating to Soil, Rock and Contained Fluids
D 698	Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lb/ft3) (600kN-m-m/3)
D 1140	Test Method for Amount of Material in Soils Finer than the No. 200 (75-um) Sieve
D 1241	Specification for Materials for Soil-Aggregate Subbase, Base, and Surface Courses
D 1452	Practice for Soil Investigation and Sampling by Auger Borings (1990)
D 1556	Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method

D 1557	Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort
D 1586	Method for Penetration Test and Split-Barrel Sampling of Soil
D 1587	Method for Thin-Walled Tube Sampling of Soils
D 2113	Method for Diamond Core Drilling for Site Investigation (1987)
D 2167	Test Method for Density and Unit Weight of Soil In-Place by the Rubber Balloon Method (1990)
D 2216	Test Method for Laboratory Determination of Water (Moisture) Content of Soil and Rock
D 2487	Classification of Soils for Engineering Purposes
D 2488	Practice for Description and Identification of Soils (Visual-Manual Procedure)
D 2922	Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (shallow Depth)
D 2937	Test Method for Density of Soil in Place by the Drive-Cylinder
D 3017	Test Method for Moisture Content of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
D 3740	Practice for Evaluation of Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design
D 4043	Guide for Selection of Aquifer Test Method in Determining Hydraulic Properties by Well Techniques
D 4044	Test Method (Field Procedure) for Instantaneous Change in Head (Slug Test) for Determining Hydraulic Properties of Aquifers.
D 4318	Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils
D 4428/4428M	Test Method for Crosshole Seismic Testing

D 4718	Practice for the Correction of Unit Weight and Water Content for Soils Containing Oversize Particles
D 4829	Test Method for Expansion Index of Soils
D 5299	Decommissioning of Groundwater Wells, Vadose Zone Monitoring Devices, Boreholes and Other Devices for Environmental Activities
G 57	Method for Field Measurement of Soil Resistivity Using the Wenner Four-Electrode Method (1984)

9.2.2 GOVERNMENT TECHNICAL PUBLICATIONS

Government engineering and technical manuals should be used in conjunction with the ASTMs for accomplishing foundation design as applicable for the project features. The engineering manuals can be accessed at:

https://www.publications.usace.army.mil/usace-publications/engineer-manuals/

Other guidance includes that from Alabama Department of Environmental Management (ADEM) accessed at:

http://www.adem.alabama.gov

Design manuals (DM), Engineer Manuals (EM), Technical Manuals (TM) and Technical Instructions (TI) to be used by the geotechnical discipline include but are not limited to the following:

DM-1110-1-1	Engineering and Design Geotechnical Manual for Surface and Subsurface Investigations (USACE South Atlantic Division manual)
UFC 3-220-01	Geotechnical Engineering
UFC 3-220-05	Dewatering and Groundwater Control
UFC 3-220-04	Backfill for Subsurface Structure
UFC 3-250-01	Pavement Design for Roads and Parking Areas
UFC 3-250-03	Standard Practice Manual for Flexible Pavements

UFC 3-250-04	Standard Practice Concrete Pavements
UFC 3-250-11	Soil Stabilization for Pavements
EM 1110-1-1804	Geotechnical Investigations
EM 1110-1-1-1904	Settlement Analysis
EM 1110-1-1-1905	Bearing Capacity of Soils
EM 1110-1-2908	Rock Foundations
EM 1110-2-1902	Slope Stability
EM 1110-2-1906	Laboratory Testing
EM 1110-2-1913	Design and Construction of Levees
EM 1110-2-2906	Design of Pile Foundations
TM 5-818-1	Soils and Geology Procedures for Foundation Design of Buildings and Other Structures (Except Hydraulic Structures)
TM 5-818-5	Dewatering and Groundwater Control
TM 5-818-7	Foundations in Expansive Soils
TM 5-818-8	Engineering Uses of Geotextiles
TI 800-01	Design Criteria
TI 800-03	Design Build Instructions

See CHAPTER 10 CIVIL SITE and CHAPTER 13 STRUCTURAL for additional publications to be used in the design of roads, airfields and buildings.

9.3 PROJECT DEFINITION (10%)

The Project Definition Submittal should have a geotechnical chapter that states the known general geology and physiology of the project site. The chapter should state the site's history and its status as a potential site of Hazardous, Toxic, and Radioactive Waste (HTRW) contamination and risk of Unexploded Ordinance (UXO). The chapter should identify any available and relevant existing subsurface data at the site and state whether additional subsurface investigation is required for the design of the project. The chapter should describe and state the status of any ongoing subsurface investigation. The chapter should identify the entities responsible for providing any required additional subsurface

investigation, the Geotechnical Report and for providing the geotechnical specifications. The entities typically should be either EN-GG or the designer.

9.4 SUBSURFACE INVESTIGATION AND GEOTECHNICAL REPORT

9.4.1 SUBSURFACE INVESTIGATION

Planning for and implementation of the subsurface investigation program will be performed by the entity tasked to perform the subsurface investigation. A detailed Safety Plan will be submitted to USACE as part of the subsurface investigation planning and will be in accordance with the USACE Safety Manual (EM 385-1-1).

9.4.2 PLANNING

The subsurface investigation should be planned considering the regional geology, existing subsurface information at the site or its vicinity, the site history, and locations of project features. The history of the site should be considered to assess whether subsurface conditions may have changed since existing subsurface information was obtained. A preliminary boring location plan showing proposed locations of borings, test pits, resistivity tests, infiltration tests, etc. should be prepared. Drilling instructions detailing the type, sampling intervals and required depths of borings, should be prepared. The method of locating boreholes should be planned and coordinated.

- Boring Locations and Elevations
    - All forms of subsurface investigations (boreholes, test pits, Cone Penetrometer, etc.) is referred to as “boring”. If the designer is tasked to perform the subsurface investigation, accurate determination of locations and elevations of borings including any required surveys will be the designer’s responsibility unless specifically stated otherwise in his statement of work. Locations of borings at their as-drilled locations will be documented both using coordinates on the drilling logs and showing the locations on the boring location map. Datum and units of location coordinates and elevations will be indicated on the boring logs and boring location map. All changes to proposed boring locations at any stage should be documented.
    - Whenever possible, it is recommended that the project surveyor be requested to record the boring locations during the project surveyor’s field work. This will require the geotechnical firm to provide staked and labeled boring locations in the field and provide a boring location plan to the survey team. If the survey team is scheduled prior to drilling field work, it is recommended that the surveyor be requested to stake the boring locations and label the stakes/paint with the elevation and boring number.

The surveyor's statement of work should include recording the boring name and ground surface elevation at the proposed boring location and appropriate coordinates.

- If borings on land are not staked out in advance by the project surveyor, a handheld GPS unit may be used to stake out boring locations. The accuracy of the GPS unit will be recorded on the boring logs. Handheld GPS units will not be used to determine boring ground surface elevation. Ground surface elevations may be estimated from the project topographic survey.

- For offshore borings in water too deep or rapid to stake out, location survey measurements will be made while and after navigating to the required location. Mudline or bottom surface elevations typically should be determined by correlation of water depth measurements at the boring locations and concurrent gage readings of the water levels. The water depth, date and time of measurement should be recorded on the boring log for all such water depth measurements. A minimum of two water measurements should be made, one at the beginning of the boring and a second at the end. If the sampling platform is influenced by the tide or is unstable, additional measurements will be made and recorded periodically as necessary to calculate the correct sampling depths.

- The means and method of locating borings will be described in the Geotechnical Report.

- **Drilling and Sampling -** A copy of the preliminary boring location plan and drilling instructions containing specific requirements for drilling, sampling, backfilling of boreholes, disposition of samples, etc. should be provided to the EN-GG drilling inspector for drilling performed in-house by EN-GG or should be included in the drilling contractor's or subcontractor's statement of work. For drilling by contractor or subcontractor, it is expected a geologist or engineer will be provided full time to direct the drilling/sampling and classify soils recovered from the sampling. Right-of-entry, special access requirements (keys to gates, etc.) and drilling permits will be obtained where required and coordinated with the facility and EN-GG. No drilling will be performed prior to obtaining line locate (DIG) and utility clearance. A copy of the signed permit will be retained at the drill site during drilling activities.

  Laboratory testing will be performed on selected samples as needed to accurately characterize the subsurface conditions at the site and to determine parameters for design analysis. Tests will be appropriate for the type of materials encountered in the borings. Laboratory tests will be performed by a certified laboratory. Proper sample handling and logging will be used to track movement and ownership of all samples. Proper

containers and transporting methods will be adhered to. Laboratory testing methods should include but not limited to: Atterberg Limits, gradation tests, moisture contents, strength tests, consolidation tests, environmental testing for corrosion potential (i.e. pH, sulfate, chlorides, resistivity), California Bearing Ratio (CBR) and Proctor Density tests and other pertinent tests.

- Abandonment of Bore Holes
    - All soil or core borings will be abandoned in accordance with State requirements, facility requirements or the following methods, whichever is most restrictive.
    - Each hole will be measured for depth before it is sealed to ensure freedom from obstructions that may interfere with effective sealing operations. Any obstruction will be cleared before proceeding with borehole sealing operations. It is not acceptable to allow borehole to fall-in and only seal the upper portion.
    - All borings in a Karst terrain area, regardless of depth, will be sealed by backfilling with concrete, grout, neat cement or a bentonite/cement mixture.
    - All other borings greater than 10 feet deep will be sealed by backfilling with concrete, grout, neat cement or a bentonite/cement mixture.
    - All other borings 10 feet or less in depth will be sealed by backfilling with concrete, grout, neat cement, or a bentonite/cement mixture or filled with soil or cuttings from the hole and tamped in place with the auger or bit.
    - All grout materials will be pumped into the borehole from the bottom to the top by pressure grouting with the positive displacement method (tremie method).
    - Each grouted borehole will be given time to allow the backfill material to settle in the borehole. If the backfill material settles two feet or more below ground surface (BGS) then the contractor will place more backfill material in the borehole to the top. If the backfill material is less than two feet BGS then the contractor may backfill the borehole using compacted native material.
- Environmental Guidance for Boreholes Located within Identified Study Sites - It is the designer's responsibility to coordinate with all state, local, facility and federal entities to determine investigation procedures and investigation derived waste (IDW) handling and disposal as deemed necessary for the known site conditions (HTRW, wetlands, etc.). These sites may be referred to as Environmental Study Sites, Installation Restoration Program (IRP) sites and Aqueous Film Forming Foam (AFFF) sites. For other common reference titles

see CHAPTER 8 ENVIRONMENTAL PROTECTION. If an unknown environmental condition is discovered during the investigation, the designer is required to suspend current exploration work, contact the appropriate entities, and adjust the investigation plan as necessary.

Boring activities inside of or within 50 feet of a designated Environmental Study Sites as defined in CHAPTER 8 ENVIRONMENTAL PROTECTION of this Manual may require the following methods as an example:

- Recovery of soil cuttings and containerized in 55-gallon drums. Sampling and testing of cuttings for full Resource Conservation and Recovery Act (RCRA) Toxicity Characteristic Leaching Procedure (TCLP), evaluation based on industry limits and disposal of at an appropriate offsite facility. Note that storage of containerized materials will remain within the vicinity of the boring location on the site until time of removal.
- Waste Profile and all waste manifests will be required to be signed by the appropriate facility representative prior to disposal.
- It is common practice to grout the entire borehole using tremie pipe from the bottom of the maximum penetration depth continuously to the ground surface.
- After completion of boring activities within Environmental Study Sites, decontamination of drilling equipment may be required.

- Borings that approach and/or exceed a confining layer may require additional requirements such as the following:
  - Continuous sampling for the entire exploration depth.
  - Provided penetration of a confining layer is required to satisfy the required sampling depth for geotechnical design purposes, a casing will be installed between the ground surface and the top of the confining layer and sealed with grout before boring may extend below the top of the confining layer.
- Direction for actual methods and requirements of drilling within Environment Study Site will be at the direction of the onsite Facility.

9.4.3 GEOTECHNICAL REPORT

As discussed in the prior sections, the geotechnical report may consist of a preliminary or data report as in the case of design-build RFP contracts or a geotechnical foundation report in the case of design-bid-build contracts. All reports should address the possible effects of seismic events, expansive soils, sink holes, storm surge and flood potential, corrosive soil conditions, slope instability,

liquefaction, environmental contamination and any other serious issues relevant to site development.

- The data report is similar to the foundation report without foundation recommendations and reports minimal interpretation of the field and laboratory data. This is justified as the design/build team will perform a full geotechnical foundation report for the project based on the final building locations, building configurations, civil site modifications and structural loads. The purpose of the data report is to provide an indication of soil and groundwater conditions at the project site for the responding DB teams to make preliminary estimates of project requirements and design/construction costs. Typical report sections include Project Data, Methodology of field and laboratory test programs, subsurface profile, groundwater and other relevant design or construction issues.

- The Geotechnical Foundation Report will be prepared by or under the direction of the geotechnical engineer or geologist responsible for the subsurface investigation. The Geotechnical Foundation Report will present the results of the subsurface investigation including laboratory testing and will offer recommendations for the design of structure foundations, pavements and other geotechnical features. Specialty field tests such as pH measurements, resistivity tests and percolation tests will be included for use in design, if appropriate. The designer will be responsible for selecting the structure foundation type based on the recommendations offered in the Geotechnical Report. The Geotechnical Report will contain all the required data to design the foundation, to include items such as construction and permanent dewatering, pile driving, slope stabilization, etc. The geotechnical investigation will adequately characterize the site geology and hydrogeology and will provide all geotechnical data required to complete the project design. The Geotechnical Report including logs of borings and laboratory test data will be made a part of the Design Analysis and will be reviewed by EN-GG if the Geotechnical Report was not prepared by EN-GG. The Geotechnical Report may be submitted for review prior to the conventional submittal dates if time permits. The designer should contact EN-GG if there are any questions about the content of the Geotechnical Report or the features required by the various submittal stages or if the project has been re-sited. The narrative portion of the Geotechnical Report and any sections or profiles containing interpretations of subsurface data should be included with design submittals but should not be included in contract documents.

- The Geotechnical Report Checklist (Appendix B, Exhibit 9-8) should be used to verify that the report is complete regarding the items described in the checklist.

- Structures: The Geotechnical Report will recommend the type of foundation system to be used for each primary structure and loading configuration (i.e. mass shear walls, elevator shafts, large tanks, dynamic loads, etc.) in the project. The designer will prepare earthwork specifications for the structures. See requirements for shallow foundations and deep foundations below and CHAPTER 13 STRUCTURAL for further design requirements.

- If shallow foundations are recommended, the Geotechnical Report will recommend the allowable bearing pressure, the depth of placement and bearing elevations for the footings, minimum footing widths and minimum footing embedment depths. Requirements for measures such as soil stabilization, removal and replacement of unsatisfactory materials, surcharge fills and capillary water barriers will be addressed in the Geotechnical report if these measures are needed. The designer will size all footings, grade beams, slabs, etc., utilizing the recommendations and restrictions presented in the Geotechnical Report. The designer will be responsible for obtaining all geotechnical data required for the design of each type of foundation during the subsurface investigation if tasked to perform the subsurface investigation.

- If deep foundations are recommended, the Geotechnical Report will provide recommendations for the type of deep foundation system to be used (piling, caissons, etc.), elevation of top of sound rock if applicable, the size and length of the piling or caissons, required tip elevations, and the allowable bearing capacity. The geotechnical designer will determine the size of piles or caissons, allowable spacing for full capacity, installation techniques not allowed (example, pre-drilling, jetting, etc.), impacts of vibrations due to driving, the number and method of testing and the pile cap design. The number and location of test piles and load tests to be specified in the construction contract should be recommended in the Geotechnical Report.

  - Dewatering Systems

    - Groundwater levels at borings, soil classifications and sieve analysis of aquifer samples, will be routinely conducted and included in the Geotechnical Report and will be used to determine routine requirements for temporary dewatering systems. More specialized investigation such as piezometer installation, field pumping tests, and laboratory permeability tests, may be used and are advisable if a large dewatering effort will be required. Based on the results of the geotechnical investigation, the designer will determine project dewatering requirements. All the required information necessary for the design of the system (hydrogeologic data, geotechnical analyses of sediments, aquifer properties such as hydraulic conductivity, transmissivity, storage coefficient, etc.) will be collected during the geotechnical investigation and presented in the Geotechnical Report. The use of slug tests to determine aquifer characteristics will

not be acceptable for dewatering designs. Dewatering where there is a possibility of drawing contamination into the dewatering effluent, will adhere to recommendations provided in CHAPTER 8 ENVIRONMENTAL PROTECTION, of this Manual.

- Short-term construction dewatering due to poor surface drainage, precipitation, or short duration work at or near the water table, is generally considered a contractor responsibility. Using information from the Geotechnical Report, the designer should alert the contractor to any known conditions that will require dewatering. When temporary construction dewatering will be required due to a consistently high-water table or the effects of underlying artesian aquifers, the designer will design and present a dewatering plan in sufficient detail that the contractor can bid on and install the dewatering system.

Design of long-term or permanent dewatering systems, including selection of well screen slot sizes, screen lengths, discharge pipe sizes, installation methods, etc., will be the responsibility of the designer. All groundwater dewatering designs should include the evaluation on the effects to other structures, foundations, pipelines and infrastructure, etc., which may result from the lowering of the groundwater level.

- Earth Liners – The geotechnical investigation and report should provide the designer with the overall geologic conditions, the in situ and constructed permeabilities that can be obtained using native materials and stabilizing agents, liner types and thicknesses and slope stabilization requirements. The designer 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. No earth liners will be permitted when material to be retained has a pH below five.

- Cathodic Protection and Grounding Systems – The geotechnical investigation and report should include all pH tests, salinity tests, sulfate tests, resistivity measurements, etc., required to design corrosion control and grounding systems. The raw field data will be provided in the Geotechnical Report. A qualified electrical designer will design all corrosion control and grounding systems required for the project.

- Permanent Water Well Design and Construction – If required by this scope of work, the designer will be required to determine the location of the well, verify the flow requirements, verify future demands based on facility estimates and determine the pump size and type. All drilling and/or well construction will be performed by a properly licensed driller if required

by local or State regulations. The permanent well design will be based on data collected from the installation and/or aquifer testing of a pilot well. Test well borings will be continuously sampled and visually logged by a qualified geologist. Additionally, the borehole will be geophysically logged to verify the visual log. Sediment samples from the anticipated production zone(s) will be analyzed for grain size distribution and any other required parameters to assist in the design of the well. The completed design will specify casing sizes and lengths, grouted intervals, well screen slot size(s), screen length, filter pack gradation, centralizer locations and testing requirements to ensure the straightness and plumbness of the borehole and completed well. All unused test holes or wells will be grouted from the bottom to the top by pressure grouting with the positive displacement method (tremie method).

- Pavements - The Geotechnical Report will recommend for pavement subgrades the allowable design CBR and modulus of subgrade reaction parameters with the required compaction effort. Guidance will be offered on the types of base course materials available in the area and design strengths. The designer will prepare all earthwork specifications for pavement subgrades. The designer will prepare all pavement material specifications with consultation from the Geotechnical Branch. See CHAPTER 10 CIVIL SITE, for deviations or exceptions.

- General Earthwork and Special Features – The Geotechnical Report will recommend undercutting requirements, fill and backfill placement procedures, types of compaction equipment to be used, and outline earthwork procedures for special features such as retaining walls, embankment construction, earth covering of structures, basements, buried and mounded tanks, utilities, etc. The designer will consult with the geotechnical engineer or geologist responsible for the subsurface investigation, or the office in their absence, in the design and preparation of specifications for any special features with geotechnical aspects that are not included or adequately described in the Geotechnical Report. For projects requiring gabion or riprap slope protection, the designer will also coordinate with EN-GG for required materials, investigations and/or specification requirements. Notification of the proposed slope protection should be given to EN-GG as soon as possible so as to allow time for any needed sampling and testing.

9.4.4 BORING LOGS

- Logs of borings will be provided as an appendix to the Geotechnical Report, design analysis, and contract specifications. Typically notated as Appendix A, see appendix B of this Manual. ENG Form 1836 and ENG Form 1836A, modified to 8.5 inch x 11 inch page size, as shown in Appendix B. Example

exhibits shown in Appendix B will be used for the first page and for continuation pages respectively for boring logs unless otherwise approved by EN-GG. Adobe Acrobat Portable Document Format (PDF) files named “logs.pdf” and “tests.pdf” will be provided for the appendices. General Notes, Soil Classification Legend, Rock Classification Legend, if applicable, and Abbreviations pages (Appendix B Exhibits 9-1, 9-2, 9-3, 9-4) will be included at the beginning of the logs.pdf file, followed by the boring location map, if applicable, and followed by the boring logs.

- Boring log data obtained for all subsurface investigations conducted for Mobile District projects, including Design-Build and A-E designed projects as well as in-house designed projects, will be stored and maintained by EN-GG for future use. Boring logs will be stored in the appropriate state plan file and titled, according to USACE standards.

9.4.5 BORING LOCATION MAP

Locations of borings, test pits, monitoring wells and piezometers will be shown on boring location map(s) in the appendix with boring logs in file logs.pdf, on civil site plans, or in both the logs.pdf file and on civil site plans. Boring location maps will be clearly legible when printed at 8.5 in. x 11-in. size if included in the logs .pdf file.

9.4.6 LABORATORY TEST DATA

- Laboratory test data will be provided as an appendix to the Geotechnical Report, design analysis, and contract specifications. Laboratory test data will be provided in a Portable Document File (PDF) file named “tests.pdf”.
- Laboratory test data obtained for all subsurface investigations conducted for Mobile District projects will be stored and maintained by EN-GG for future use. Soon after receipt of the CSV files containing laboratory data, EN-GG will import the data to the Borlog digital formats using the Borlog application.
    - Submittals - Generally, a full design will require the following submittal intervals: Project Definition (10%), Concept Design (35%), Interim Design (65%), Design (95%) and Final Design (100% reviewed). Each level of design can be limited by the contract documents which may not include design levels greater than 35%. To provide a general description of the design levels, the following section has been included for the geotechnical portion of the project scope of work.

9.5 CONCEPT DESIGN (35%)

9.5.1 DESIGN ANALYSIS

- Incorporate recommendations stated in the Geotechnical Report into the design.
- Provide geotechnical design calculations using parameters outlined in the Geotechnical Report and include a copy of the Geotechnical Report in the appendix of the design analysis.
- Notify the Geotechnical branch of any conflicts between the Geotechnical Report and concept design. If the topographic surveys are to be performed by the designer, then an electronic file copy in a DGN format of the survey must be sent to the entity performing the geotechnical investigation, as soon as possible, but not later than the date for the submittal of the 35% design.
- Include boring logs and laboratory test data as an appendix.

9.5.2 DESIGN DRAWINGS

- Locate soil borings, test pits, monitoring wells and piezometers on the civil site plan. Add the appropriate symbol to legend.
- Add note to civil site plan: "For logs of borings and test data, see." and reference the appendix that includes boring logs and test data.
- Provide the front section of the specifications regarding contract specifications and listing the Table of Contents for the specifications.

9.6 INTERIM DESIGN (65%)

- Comply with the accepted comments on the concept design.
- Perform any Concept Design tasks that were not completed.
- Provide redlined marked up specifications in accordance with CHAPTER 23 SPECIFICATIONS.

9.7 95% DESIGN (UNREVIEWED)

9.7.1 GENERAL

Comply with comments on the interim review. Perform any Concept Design or Interim Design tasks that were not completed.

- Provide redlined marked up specifications if not provided at the Interim submittal. Provide final edited specifications if an Interim submittal was prepared in accordance with CHAPTER 23 SPECIFICATIONS.
- Include boring logs and laboratory test data as an appendix of the specifications. EN-GG personnel should email files, logs.pdf and tests.pdf to the Specifications engineer, who should include them in the Appendix. Show

locations of borings, test pits, monitoring wells and piezometers either on a page in the appendix with boring logs (file logs.pdf) and/or on civil site plans.

9.7.2 DESIGN ANALYSIS

- Incorporate recommendations stated in the Geotechnical Report into the design.
- Provide foundation design calculations using parameters outlined in the Geotechnical Report and include a copy of the Geotechnical Report in the design analysis.
- Identify and resolve any conflicts between the Geotechnical Report and the design. Contact the author of the Geotechnical Report for assistance in resolving such conflicts if needed or if the Geotechnical Report needs to be modified.

9.7.3 DESIGN DRAWINGS

- Locate soil borings, test pits, monitoring wells and piezometers on civil site plan. Add the appropriate symbol to legend.
- Add note to civil site plan: "For logs of borings and test data, see." and reference the appendix that includes boring logs and test data.

9.7.4 SPECIFICATIONS

The designer for A-E designed projects or EN-GG for in-house design, will provide specifications required for geotechnical aspects of the project. If applicable, specifications provided by the geotechnical entity should include, but not be limited to:

31 00 00	EARTHWORK
31 00 00.10	EARTHWORK
31 31 16.13	CHEMICAL TERMITE CONTROL
31 00 00.15	EXCAVATION, FILLING AND BACKFILLING FOR BUILDINGS
31 00 00.16	EXCAVATION, TRENCHING, AND BACKFILLING FOR UTILITIES SYSTEMS

These Mobile District guide specifications sections 31 00 00.10 36, 31 00 00.15 36, and 31 00 00.16 36 are preferred over the Unified Facilities Guide Specifications

(UFGS) Section 31 00 00 and are recommended for use as applicable for earthwork for site work, at buildings, and for utilities, respectively. They are available through SpecsIntact software or from the Mobile District Geotechnical and Dam Safety Section. If the UFGS Section 31 00 00 is used as the only earthwork specification, it will be edited and care will be taken to ensure all applicable aspects of earthwork (for site work, at buildings and for utilities) are covered and those not applicable removed.

Other specifications related to geotechnical aspects of the project should be provided as applicable. Other UFGS can be found in SpecsIntact.

9.8 100% Final Design (REVIEWED)

- Comply with comments on the final design review.
- Include, or verify that they are included, any drawings and specifications in the Index of Drawings and the Table of Contents for specifications.
- Include boring logs and laboratory test data (PDF files named logs.pdf and tests.pdf) as appendices to the specifications.
- Do not include the narrative portion of the Geotechnical Report or any sections or profiles containing interpretations of subsurface data in contract drawings or specifications.

CHAPTER 10

CIVIL SITE

INDEX

CHAPTER 10

CIVIL SITE

10.1 GENERAL

10.1.1 SCOPE

This chapter states criteria, requirements and guidance for civil design. The design will be accomplished in accordance with appropriate technical publication documents and the basic requirements furnished in Statement of Work (SOW).

10.1.2 QUALITY OF DESIGN

It is the purpose of the U.S. Army Corps of Engineers (USACE) to obtain excellent siting and civil design resulting in efficient, economical, and effective long-term pavement, grading and drainage construction. The instructions in this chapter provide guidance for the design criteria to be used for civil/site design of a USACE project.

Reaching this goal is largely determined by site design and requires a commitment to quality that is sensitive to both the environment and needs of the facility users. Attention should be given to functional requirements, an aesthetic solution compatible with the surrounding area, life-cycle cost, energy conservation and reducing maintenance. It should be recognized that quality design does not imply added expense and can provide savings in operating, maintenance and construction costs.

10.2 DESIGN CRITERIA-APPLICABLE PUBLICATIONS

The design of the work shall be in accordance with the instructions contained in this Chapter and in other applicable chapters of the Mobile District Design Guide. Military publications, UFC criteria, and ERDC standards can be obtained on the Whole Building Design Guide website (https://www.wbdg.org/). Refer to hyperlinks listed with the UFC Appendix References for additional criteria links. AASHTO (transportation.org) and MUTCD (mutcd.fhwa.dot.gov). Applicable publications, current edition, from the following list shall be used in the design of this project:

UFC	Unified Facilities Criteria (UFC) including UFC Series 3- 200: Civil/Geotechnical/Landscape Architecture shall be utilized to provide planning, design, construction, sustainment, restoration, and modernization for Department of Defense (DOD) Projects. Whole Building Design Guide (https://www.wbdg.org/)

AASHTO	A Policy on Geometric Design of Highways and Streets, American Association of Highway and Transportation Officials (AASHTO)
SDDCTEA	Pamphlet 55-15: Traffic and Safety Engineering for Better Entry Control Facilities (https://www.sddc.army.mil/sites/TEA/Functions/SpecialAssistant/TrafficEngineeringBranch/Pages/pamphlets.aspx)
SDDCTEA	Pamphlet 55-17: Better Military Traffic Engineering (https://www.sddc.army.mil/sites/TEA/Functions/SpecialAssistant/TrafficEngineeringBranch/Pages/pamphlets.aspx)
MUTCD	Manual of Uniform Traffic Control Devices for Streets and Highways, United States Department of Transportation (USDOT).
EISA 438	EPA 841-B-09-001: Technical Guidance on Implementing the Stormwater Runoff Requirements for Federal Projects under Section 438 of the Energy Independence and Security Act (https://www.wbdg.org/ffc/epa/criteria/epa-841-B-09-001).
NPDES	State specific requirements document(s) and publications for National Pollutant Discharge Elimination System (NPDES) construction permits and best management plans.
ERDC/ITL	TR-19-6: A/E/C Graphics Standard
ERDC/ITL	TR-19-7: A/E/C Computer-Aided Design (CAD) Standard
ERDC USACE Civil 3D Standards v1.0	US Army Corps of Engineers Civil Engineering Template for Civil 3D
IDG	Installation Design guide (Army) (USACE Project Manager)
IFS	Installation Facility Standards (Air Force) (USACE Project Manager)
MIL-HDBK-1190	Facility Planning and Design Guide

Uniform Federal Accessibility Standards
(https://www.access-board.gov/aba/ufas.html)

Americans with Disabilities Act Accessibilities Guidelines (ADAAG)
(https://www.access-board.gov/ada/)

PCASE, Current Version.
(https://transportation.erdc.dren.mil/pcase/software.aspx)

10.3 PROJECT DEFINITION (10%)

10.3.1 PROGRAMMING CHARRETTE

A programming charrette, if required, will be held at the base, with representatives from the base, their command headquarters, the Corps of Engineers, and the Architect-Engineer (A-E) firm being in attendance. The programming charrette is a meeting to gather information for and prepare programming documents. The programming charrette will be attended by the Architect-Engineer's site/landscape designer, or representative thereof. The designer will provide a conceptual Site Plan and report documenting the project site and approximate location of the new site work for inclusion with the programming documents. Reference CHAPTER 4 CHARRETTES, of this Manual for more information.

10.3.2 PRE-DESIGN MEETING

A Scoping and a Criteria Review Conference may be attended by the Architect-Engineer's site/landscape designer. The conference will typically be held at the base, with representatives of the base, their command headquarters, the Corps of Engineers, and the A-E firm being in attendance. The purpose of the conference is to provide an opportunity for the A-E to gather project information and requirements. A site visit will be performed, and base mapping, utility and other pertinent site data needs to be gathered during the conference. Site information and requirements compiled during the meeting will be included in the meeting minutes that are prepared by the A-E upon completion of the Conference.

10.3.3 DESIGN CHARRETTE (10%)

A charrette may be performed to begin the A-E's design of the project. The charrette will be held at the base, with representatives from the base, their command headquarters, the Corps of Engineers, and the Architect-Engineer firm being in attendance. The charrette is a meeting to exchange design ideas and present requests and requirements. The Architect-Engineer's site/landscape designer will coordinate with all the representatives, striving to incorporate ideas, requests and requirements into the site design. Base mapping, utility and other pertinent site data will be gathered during, or prior to the charrette. Typically, the charrette will be

performed during a four-to-five-day period or as specified by the USACE coordinated through the customer. A site visit will be performed during the charrette. Several schemes for the site layout will be presented for consideration and comment by the attendees during the meeting. The Site Plan resulting from the attendees' combined efforts, suitable for presentation to high-ranking officers on the base, will be presented during a formal out-brief on the last day of the charrette. The Site Plan and a preliminary design analysis of the site requirements will be included in the charrette document, or meeting minutes, to be prepared by the A-E upon completion of the charrette.

- **Design Analysis -** The designer will develop a narrative which describes the conceptual site features based on the project requirements. The narrative will discuss siting requirements and site concerns including operational requirements and restrictions, special operational phasing requirements, wetlands, installation restoration program (IRP) sites, site UXO risk levels, cultural resources and soil and ground water contamination. Provide design Aircraft Type(s), Army Heliport Class, Air Force Airfield Type, and Runway Classification per UFC 3-260-01and UFC 3-260-02. Provide applicable airfield clearances required. The DA will also include a summary of the basic information and conclusions presented. Provide list of design criteria. Give the basis and reasons for design, i.e., goals, objectives and priorities. Clearly explain the recommended site development concept. Address energy conservation measures taken, in the site design. Document pollution prevention measures and other environmental considerations made during design.
- **Site Plans -** The conceptual site plan should be an efficient layout with emphasis given to user requirements. The plan will present the overall proposed work; airfield features, airfield clearance restrictions, facilities, building locations, parking areas, roads, limits of pavements and hardstands and pedestrian access points, as applicable to the project. The plan will be developed so that a preliminary cost estimate can be prepared. The PD will also include a summary of the basic information and conclusions presented in the previous submittal. Provide the PD Charrette plan assembly per the Schedule of the Required Drawing Assembly, Table 10-1. Additional drawings will be required based on special project needs.

10.4 CONCEPT DESIGN (35%)

The designer will develop a narrative and provide drawings which describe the conceptual site features based on the project requirements. The narrative will discuss siting requirements and site concerns including operational requirements and restrictions, special operational phasing requirements, wetlands, installation restoration program (IRP) sites, site UXO risk levels, cultural resources and soil and ground water

contamination. Provide Aircraft Type(s) and Runway Classification per UFC 3-260-01. Provide narratives, calculations, drawings, figures and tables to show the design requirements and criteria are clearly and adequately met. Provide airfield design analysis as outlined by Appendix B of UFC 3-260-02 to include: for Army Airfields, provide the Army/Heliport Class, and for Air Force Airfields, provide the Airfield Type, airfield clearances required and all applicable information for the project. Provide information regarding the following, as applicable for the project:

10.4.1 DESIGN ANALYSIS

- General overview of major site features planned, such as building orientation, drainage patterns, parking provisions, traffic circulation, provisions for the handicapped, security requirements, airfield requirements, airfield pavement work, etc.
- Provide a description of any locations of wetlands, as defined by Federal and/or State criteria, historically significant areas, and areas with endangered species of wildlife within the project site area. Describe and define IRP sites. All areas will be defined by qualified professionals and flagged in the field. The topographic survey will label and present the defined areas. Geometric coordinates will be clearly shown on the design drawings for all environmental areas, such as an IRP site or wetland boundaries.
- Provide applicable FEMA/State/Local flood maps.
- Discuss existing site features including general topography, acreage, boundaries and adjacent site usage.
- Impacts of new construction on existing facilities: for projects with critical phasing requirements, such as airfields or projects with major impacts to existing facilities such as active aircraft operations, present a preliminary phasing discussion. This preliminary phasing plan will be coordinated with the airfield management and the users. The preliminary plan will discuss anticipated lengths of construction, alternate phasing schemes, and project cost impacts. The operational phasing plan will be presented in plan form. Refer to UFC 3-260-01 for airfield construction and operational phasing.

10.4.1.1 Storm Drain Permit Application

- Perform preapplication meeting(s) with appropriate State regulatory agencies. Document all meeting minutes, notes, etc. include information in the 35% submittal.

10.4.1.2 Removals

- Preliminary discussion of items requiring removal or relocation

- Method and location of the disposition of waste or salvage materials

10.4.1.3 Geometry

- Provide rationale for locating major site elements.
- Airfields: Provide a tabular listing of specific clearances and requirements based on UFC airfield criteria and reference UFC paragraphs for all portions of the new airfield feature(s) and pertinent existing feature(s). Verify airfield clearances are met with regards to siting of new facilities. See Figure 10-1 for example of a Criteria Summary of Requirements
- Work Other Than Airfields: Provide geometric data, set back requirements or specific clearance requirements for major features of work, such as buildings, parking areas from streets, hardstands, and explosive arcs.

Figure 10-1

Example: Criteria Summary of Requirements

This example is for an apron project. This presents typical criteria requirement tables summarized for various features of an airfield project. Information to be presented in the Design Analysis should be based on the project specifics of the work to be performed.

Example: Pope AAF is a Class B Army Airfield. The design aircraft for the taxiways (Taxiway Alpha) accessing Pope AAF is the C-17. The controlling aircraft for the parking apron will be the C-27J.

Design Aircraft Dimension Specifications

	C-17*	C-27J**	CASA-212	C-12	UH-60
Wingspan (ft.)	170	95	70	55	54
Length (ft.)	174	75	54	44	56
Height (ft.)	55.1	32	21	15	17

*Controlling aircraft utilizing the airfield.

**Controlling Aircraft utilizing the apron.

Runway Criteria Summary of Requirements (Class B Army)

Criteria	Requirement	Criteria Location	Notes
Runway lateral clear zone	500 ft.	Table 3-2 UFC 3-260-01	Approx. allowable building height 125 ft.

Taxiway Criteria Summary of Requirements

Criteria	Requirement	Criteria Location	Notes
Clearance from taxiway centerline to fix or mobile object	150 ft.	Table 5-1 UFC 3-260-01	

Apron Criteria Summary of Requirements

Criteria	Requirement	Criteria Location		Notes
Parking space width	95 ft.	No. 2	Table 6-1 UFC 3-260-01	
Parking space length	75 ft.	No. 3	Table 6-1 UFC 3-260-01	
Wingtip clearance of parked aircraft	10 ft.	No. 4	Table 6-1 UFC 3-260-01	
Wingtip clearance on interior or secondary peripheral taxilanes	20 ft.	No. 5	Table 6-1 UFC 3-260-01	
Wingtip clearance on through or primary peripheral taxilanes	30 ft.	No. 6	Table 6-1 UFC 3-260-01	78 ft.
Distance from peripheral taxilane centerline to outside of apron boundary	25 ft.	No. 7	Table 6-1 UFC 3-260-01	
Grade in direction of drainage	Min. 0.5% Max. 1.5%	No. 9	Table 6-1 UFC 3-260-01	
Shoulder width	50 ft.	No. 10	Table 6-1 UFC 3-260-01	
Paved shoulder width	25 ft.	No.11	Table 6-1 UFC 3-260-01	

Transverse grade of paved shoulder	Min. 2.0% Max. 4.0%	No. 13	Table 6-1 UFC 3-260-01	
Transverse grade of unpaved shoulder	Min. 2.0% Max. 4.0%	No. 14	Table 6-1 UFC 3-260-01	
Distance from apron boundary to fixed or mobile object	52.5 ft.	No. 15	Table 6-1 UFC 3-260-01	
Grades in clear area beyond shoulders to fixed or mobile objects	Min. 2.0% Max. 10.0%	No. 16	Table 6-1 UFC 3-260-01	

Towway Criteria Summary of Requirements

Criteria	**Requirement**	**Criteria Location**		**Notes**
Horizontal clearance from towway centerline to fixed or mobile obstacles	72.5 ft.	No. 11	Table 5-6 UFC 3-260-01	

10.4.1.4 Storm Drainage

Provide a summary of specific Federal EISA, State and/or Local storm water permit requirements for water quality/quantity for the project including fees for permit applications and the name of the agency to which the permit application fee will be provided. Discuss Permit application schedule with regards to design milestones, submission, and signature process. Discuss the impacts on the site design. If no storm water permits or requirements are required, or if airfield restrictions supersede (See UFC 3-260-01), provide a statement to that effect. Provide documentation as appropriate.

- Discuss the preliminary storm water design scheme and discuss impacts on the existing storm drain systems.
- Discuss existing site soil types and parameters with regards to effects on storm water and stormwater discharges. Discuss susceptibility of existing soils to erosion and or sedimentation. Discuss preliminary erosion control or energy dissipation required.
- Provide selected design values to be used in the storm drainage calculations such as surface runoff coefficient, retardance coefficients, infiltration rate, and rainfall intensity based on a 10- year storm frequency. Provide any special storm frequency as necessary for the specifics of the project. Refer to UFC 3-201-01 for design storm criteria for airfield and non-airfield projects.
- Provide preliminary sizes of storm drainpipes.
- Provide preliminary size and preliminary calculations for required storm water LID treatment/storage ponds. Discuss impacts on the project site.
- Provide preliminary Pre and Post construction discharge values for the 10-year & 100-year storm event.
- Discuss the proposed storm drainpipe materials.

10.4.1.5 Grading

- Discuss existing site features affecting grading such as buildings, streets, curbs, walks, fences, water courses, ponds, elevation of high ground water, rock outcrop, airfield features, etc.
- Provide analysis, calculations, and documentation on Flood Resistant Design; see UFC 3-201-01, to include planned Design Floor Elevation (DFE)
- Cut or fill requirements and rough estimate of quantities.

- Discuss minimum and maximum slopes to be used in the design for site projects, airfields, roadways, ponds, embankments, ditches, pipes, etc.

10.4.1.6 Pavement Structure Design

For 35-percent Design Analysis if geotechnical information is not available for the project use preliminary or historical subgrade information to calculate preliminary PCASE reports for material thicknesses to obtain 35-percent cost information. Contact USACE EN-GG for assistance with historical information.

- Vehicular Pavements Design for Military and Non-Military Design Vehicles (non-airfield). Reference UFC 3 201 01 Paragraph 4-1 and UFC 3-250-01 Paragraph 3-5 for requirements for the use of PCASE or State DOT pavement designs for special military or non-military design vehicles. State DOT recognized pavement design criteria and State DOT materials layers are approved, per referenced paragraphs above, with additional requirements as listed herein. In addition to the State DOT recognized pavement design calculations, PCASE calculations and supporting soils data shall also be submitted for all pavements trafficked by military or non-military design vehicle traffic. The following list of PCASE requirements shall be provided for military pavement designs and State DOT material designs:
    - Correlate all State DOT material layers design values to CBR or Modulus of Subgrade Reaction (K) values as appropriate to the pavement type proposed.
    - Present specific traffic design values for which the preliminary pavement design thickness is based. Present the estimated traffic frequency for design life, design vehicle type(s), emergency vehicles, including the maximum weights of vehicles.
    - Present general discussion on existing subgrades and present preliminary soil parameter values in terms of CBR and Modulus of Subgrade Reaction (K). Correlate State DOT parameters (soils and traffic) to PCASE design input parameters.
    - Flexible Pavements - required thickness of base and pavement shall be based on the vehicular traffic, base course/drainage layer CBR, and preliminary subgrade CBR. For minimum pavement layer thickness requirements refer to UFC-3-250-01.
    - Rigid Pavements - required thickness of base and pavement shall be based on the vehicular traffic, base course/drainage layer, and preliminary subgrade (K). For minimum pavement layer thickness requirements refer to UFC-3-250-01.

- Present pavement subdrain systems for Drainage and Separation Layer requirements. Discuss existing subgrade permeabilities and requirements.
- Present in PCASE report as applicable for soil permeability rates. Refer to UFC 3-250-01.

- Aircraft Pavement Design

  Reference UFC 3-260-01, UFC 3-260-02, UFC 3-201-01 for requirements for all airfield pavement design. Present PCASE reports for all pavement features

  - For Rotary Wing and Fixed Wing facilities: Present the Class of Army Airfield/Heliport based on aircraft type and provide the Traffic Area. For Air Force facilities: Present the Airfield Type and the Traffic Area.

    - Flexible Pavements – present specific design values for which pavement thickness is based including the airfield class, type traffic area, gross weight of aircraft, number of passes, subgrade CBR values, frost zone, drainage layer requirements, and base CBR. Include resulting PCASE report presenting minimum thickness of flexible pavement, base, drainage layers, and subbases with supporting calculations as applicable. Include minimum compaction requirements.

    - Rigid Pavements – present specific design values for which the pavement thickness is based including the type of aircraft, design weight, any special gear configuration, Modulus of Subgrade Reaction (K) of both subgrade. The required thickness of non-reinforced concrete pavement shall be 90-day flexural strength concrete of 650 psi flexural strength. Provide the preliminary resulting pavement thickness. Include resulting PCASE report presenting minimum thickness of rigid pavement, base, drainage layers, and subbases with supporting calculations as applicable. Include minimum compaction requirements.

    - The designer shall coordinate with the Geotechnical and Dam Safety Section (EN-GG), for required Geotechnical investigations and specification requirements. Notification of the proposed airfield pavements design shall be provided to EN-GG as soon as possible to allow time for any geotechnical investigation.

    - Present the proposed base course type, drainage, and separation layers, select subbases, and subgrades. Present intended airfield compaction requirements refer to UFC 3-260-

02. For all drainage and separation layers refer to UFC 3-250-01.

10.4.1.7 Road and Streets, and Parking Areas

Geometric design shall be in accordance with the Transportation Engineering Agency SDDCTEA Pamphlet 55-17, and as applicable, the AASHTO Manual. As a minimum, provide the information below in a tabular form:

Present a listing of traffic volumes and vehicle types, include emergency vehicles.

Present AASHTO design vehicle(s) for which turning movements are to be provided for and corresponding minimum turning radius. Provide Auto-turn diagrams for design vehicles turning movements.

Present AASHTO design vehicle(s) for which turning movements are to be provided for and corresponding minimum turning radius. Provide Auto-turn diagrams for design vehicles turning movements.

- Present project design speed.
- Present maximum degree of curvature and control grades.
- Present sight and stopping distance requirements.
- Present lane and shoulder widths.
- Present cross-slopes for lanes and shoulders.
- Present embankment slopes planned.
- Present requirements for curbs, sidewalks, guardrails, traffic signs and markings, fencing, etc.
- Present rights-of-way and easements

10.4.1.8 Parking and Open Storage Areas

Discuss organizational parking space requirements and vehicle type requirements, reference the Transportation Engineering Agency SDDCTEA Pamphlet 55-17. Discuss non-organizational parking requirements referencing the number of parking spaces per the guidelines contained in UFC 3-201-01 Appendix B. Discuss any special user parking needs. The quantity of handicapped stalls will be determined by the ADAAG.

- Present size of individual parking spaces and number to be provided
- Present number and location of handicapped parking spaces
- Present general location of parking or storage areas

- Present location of ingress and egress
- Present pedestrian access
- Present use of 90°, 60°, or 45° parking and relation to traffic orientation
- Present parking area aisle widths and parking stall size

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10.4.1.9 Miscellaneous Site Features

- Present curbs, and curbs and gutters - types and locations
- Present sidewalks - width, and locations
- Present security fencing - justification, type, size and location of gates

10.4.1.10 Railroads

- Type of service for which track will be provided
- Anticipated volume
- Maximum grade and degree of curvature
- Features of track construction such as thickness and type of ballast, weight of rail, dimension of ties, size of turnouts, etc.
- Special requirements for track scales, bumpers, signals, grade crossings, derailers, etc.

10.4.1.11 National Pollutant Discharge Elimination System (NPDES) Construction Permit

Discuss and present specific requirements for State and/or Federal NPDES construction permit for the project. Discuss process and who will obtain the Permit.

10.4.1.12 Erosion and Sediment Control Plan

Discuss intended plan for the design of sediment and erosion control for the project.

10.4.1.13 Outline Specifications

List all Unified Facilities Guide Specifications that the designer intends to prepare to use for the project.

10.4.1.14 Additional Information

Discuss and present additional information or criteria needed for design.

10.4.2 PLAN DRAWINGS

As a minimum, provide the concept 35-percent plan assembly per the Schedule of Required Drawing Assembly Table 10-1. Additional drawings may be required based on special project needs. Drawing Sheet Files shall be numbered per the ERDC A/E/C CAD Standard.

10.4.2.1 Title Sheet and Index

- Present Project Title
- Plan Sheet Index.

10.4.2.2 Location and Vicinity Maps

- Indicate project site. Provide preliminary borrow and spoil areas, haul routes, access gate locations and name(s), and contractor's access to the site, contractor's staging and equipment areas.
- Present State vicinity map.
- Present Location map for local access to project site. Label street and roads as appropriate

10.4.2.3 General Notes

- Present preliminary design notes applicable to the project requirements

10.4.2.4 Legends and Abbreviations Sheet

- Present graphic symbols legends (all symbols and line types shall be in accordance with ERDC A/E/C Standards, see paragraph 10.2) for all symbols and line types to be used in plan assembly and topo survey.
- Present preliminary list of all abbreviations used in plan assembly.

10.4.2.5 Construction Phasing Plan

- If appropriate for the project, present the preliminary project construction overall phasing plan. Show planned phases of construction and closure impacts to existing facilities as required.
- Phasing plan may be of large scale to present the overall project phases. Present enlargements as required.

10.4.2.6 Airfield Operational and Phasing Plan

- Present the preliminary airfield operational and phasing plan for airfield areas impacted by the construction. Refer to UFC 3-260-01 for temporary and permanent closure requirements for airfields.
- Preliminary operational and phasing plan may of large scale to present the overall airfield plan during construction.

10.4.2.7 Provide Existing Conditions Sheets

Present the existing site condition topographic survey at minimum 1"=30' scale (1:300) with project horizontal coordinate system, plan north and true north, per ERDC/ITL TR-19-6 and TR-19-7. Refer to CHAPTER 7 SURVEYING AND MAPPING, GIS AND DATA MANAGEMENT.

- Display grid spot elevations and contours that are labeled and legible.
- Display all rigid pavement joint lines and joint intersection elevations.
- Provide survey notes to include who performed survey, date of survey, coordinate system and vertical datum.
- Provide survey control monument data.
- Provide geotechnical boring locations, if available.
- Presentation of line types will be unscreened in accordance with the A/C/E Graphics standards.

10.4.2.8 Demolition and Removal Plan

- Present graphically the limits and items to be demolished and removed.
- Pavement structures: Indicate pavement layer thickness (for removal depths) if information is available. Present geotechnical boring locations when available.
- Drawing scale will match the geometric layout and grading plan scales.

10.4.2.9 General Site Overview Plan

- Present the overall site plan of planned work (Scale may be determined by the designer to best fit project requirements) to include proposed project limits and/or limits of disturbance. This sheet may be omitted for small projects where the complete site can be presented on one geometric layout sheet(s).

- Annotate and label major items of new work, existing items to remain, and or phasing.
- Site survey topography with major existing features, buildings, and or roads shall be presented with the new work. Present major proposed work. (Contours are optional on overview plan).

10.4.2.10 Site/Transportation/Geometric Layout Plan

- Present a geometric site plan showing total development.
- Present and label all existing buildings and new facilities on plan. Do not present existing items which will be demolished and removed.
- Present the proposed geometry of the site plan using a minimum scale of 1” =20’ or 1" = 30'(1:300), unless otherwise approved by EN-GC. Include the existing topography without contours that shall remain after construction.
- Use graphic symbols to distinguish new and existing site features.
- Present sufficient geometric information to adequately locate all new major site elements including new facility buildings. Present parking aisle widths. Present curve return radii.
- Per ERDC/ITL TR-19-6 identify the horizontal coordinate system. Include a north arrow.
- Present centerline stationing for all new roads, streets, runways, taxiways, apron taxi lanes, mill and overlay projects. Roadways/streets and runways/taxiways shall have centerlines stationed with associated curve geometric data presented.

10.4.2.11 Typical Sections (new work and existing) for Airfields, Roadways & Parking Areas

- Airfields: Present preliminary typical sections for runways, taxiways, towways, helipads, and aprons. Present cross slopes, feature widths, and clearance zone widths as applicable per the current UFC 3-260-01.
- Roadways: Present preliminary typical sections presenting horizontal and vertical components with dimensions. Indicate lane widths, shoulder widths, curb and gutter, clearing limits, and cross-slopes. Pavement layers may also be provided if not presented in pavement sections.
- Parking Areas: Present preliminary typical section for various parking areas.

- Site sections: Present preliminary typical sections through building or site as applicable.

10.4.2.12 Grading and Storm Drainage Plan

- Present the preliminary grading with contours and drainage concept using finished grade 1-foot contours, include preliminary storm drainpipe sizes. Preliminary grading shall be completed to the extent that 35-percent earthwork quantities can be obtained.
- Present all new grading superimposed on existing topography. Label all existing contours.
- Present at a minimum scale of 1” =20’ or l" = 30' (1:300), unless otherwise approved by EN-GC.
- Present the proposed building(s) Finished Floor Elevation (FFE) and critical spot elevations, refer to UFC 3-201-01 (Refer to paragraph 10.4.1.4 b for Design Floor Elevation analysis). Establish FFE 6-inch (150mm) above finished grade at the building perimeter, refer to UFC 1-200-01. Provide stoops, ramps, and steps as required. Access points shall be per ADA and ADAAG requirements.
- Present existing utilities with the topography. If necessary, for clarity, show removals, relocations, and new work for utilities on separate plans as directed herein.
- Present proposed contour intervals with 1-foot (25cm) intervals, unless otherwise approved by EN-GC.

10.4.2.13 Centerline Profile

- Airfields: Present preliminary profile for runway and/or taxiway/towlanes centerlines. Present edge of pavement profiles if applicable for milling and overlay projects. Show existing ground line and proposed grade line with percent new grades indicated.
- Roads, Streets, & Parking Areas: Present preliminary profile for centerlines. Show existing ground line and proposed grade line with percent new grades indicated.

10.4.2.14 Paving Plan

Present new pavement areas. Label or graphically hatch the various types of thicknesses of new pavement structure areas.

Table 10-1						
Schedule of Required Drawing Assembly						
ITEM	**10%**	**35%**	**65%**	**95%**	**100% Final**	**RTA**
Title Sheet and Index (See Design Manual)		**P**	**P**	**C**	**F**	**F**
Location and Vicinity Maps		**P**	**P**	**C**	**F**	**F**
General Notes		**P**	**P**	**C**	**F**	**F**
Legend and Abbreviations		**P**	**P**	**C**	**F**	**F**
Construction Phasing Plan		**P**	**P**	**C**	**F**	**F**
Airfield Operational and Phasing Plan						
Existing Conditions		**P**	**C**	**C**	**F**	**F**
Demolition and Removal Plan	**P**	**P**	**C**	**C**	**F**	**F**
General Site Overview Plan		**P**	**C**	**C**	**F**	**F**
Site/Transportation/Geometric Layout Plan	**P**	**P**	**C**	**C**	**F**	**F**
Site Details			**P**	**C**	**F**	**F**
Typical Section Sheets		**P**	**C**	**C**	**F**	**F**
Grading and Storm Drainage Plan		**P**	**P**	**C**	**F**	**F**
Drainage Details			**P**	**C**	**F**	**F**
Centerline Profile Sheets		**P**	**P**	**C**	**F**	**F**
Storm Drain Profile Sheets			**P**	**C**	**F**	**F**
Stormwater Management Ponds			**P**	**C**	**F**	**F**
Cross Sections			**P**	**C**	**F**	**F**
Paving Plan		**P**	**P**	**C**	**F**	**F**
Concrete Layout, Elevation and Joint Plans			**P**	**C**	**F**	**F**
Pavement Construction Details			**P**	**C**	**F**	**F**
Plan Preliminary Best Management Practices Plan (Erosion and Sedimentation Control Plan) Project construction						
Erosion and Sediment Control Details						
Signing and Pavement Marking Plans			**P**	**C**	**F**	**F**
Signing and Pavement Marking Details			**P**	**C**	**F**	**F**
Signalization Plans			**P**	**C**	**F**	**F**
P - Preliminary						
C - Complete but subject to change						
F - Final						

10.4.1 SPECIFICATIONS

Provide a basic outline in accordance with CHAPTER 23 SPECIFICATIONS.

10.5 INTERIM DESIGN (65%)

Advance from concepts into Interim design. Comply with accepted comments from the concept review.

10.4.2 DESIGN ANALYSIS

Update and expand the Concept Design Analysis to support the submittal development and to include the following, as applicable:

10.5.1.1 Storm Drain Permit Application

Prepare draft stormwater permit application and submit to USACE for review and approval.

10.5.1.2 Storm Drainage Design

Present interim storm drainage design-calculations consistent with the requirements of UFC 3-201-01 and UFC 3-210-10 and based on the design values established in the Concept Design Analysis. Present the methodology for the storm design per allowable methods as presented in referenced UFCs. Present drainage basin and sub-basin maps with flow areas delineated, time of concentration and longest flow paths, delineate and indicate surface areas of paved and non-paved areas with acreage values. Present data as to land use runoff values (C). Present inlet design flows and head values. Present conveyance system design including pipe flows, slopes, materials, and velocity(s). Present outlet velocity and required energy dissipation structure as required. Present gutter/lane spread calculations as applicable. Present airfield pavements spread/inundations as applicable.

- Present a map outlining drainage areas affecting new construction.
- Present complete calculations for sizing conveyance systems, LID facilities, retention, and/or detention ponds, flow velocities, and energy dissipation requirements. Provide calculations verifying compliance with all applicable State regulations. Coordinate calculations with applicable State Regulatory Agencies. Present documentation of coordination meetings.
- Provide watertight joints for drainage pipe under all pavements (aircraft and vehicular) when the pipe is placed in a non- cohesive soil. Provide soil tight joints at all other locations.

- Present Pipe Profiles indicating the design storm Hydraulic Grade Line (HGL) for pipe systems. Refer to UFC 3-201-01 paragraph 3-5 for HGL requirements.

10.5.1.3 Pavement Design

- Present flexible and rigid pavement design calculations consistent with the requirements of the applicable UFC's and the U.S. Army Pavement-Transportation Computer Assisted Structural Engineering (PCASE) pavement design software Program and based on the various design values in the Concept Design Analysis.
- Present calculations for pavement options to be allowed.
- Present materials to be used in pavement structure and the design thickness of each layer.
- Present the minimum compaction requirements.

10.5.1.4 Additional Information

Update to provide additional information for construction phasing or for airfield projects operational and construction phasing.

10.5.2 PLAN DRAWINGS

As a minimum, provide the 65-percent plan assembly per the Schedule of Required Drawing Assembly, Table 10-1. Additional drawings shall be required based on special project needs.

10.5.2.1 Location and Vicinity Maps

Update from 35-percent to Interim.

10.5.2.2 General Notes

Update preliminary design notes applicable to the design.

10.5.2.3 Legends and Abbreviations Sheet

- Update from 35-percent as necessary, provide graphic symbols for all items used in plan assembly.
- Update from 35-percent as necessary, provide list of all abbreviations used in plan assembly.

10.5.2.4 Construction Phasing Plan

- If appropriate for the project, update the preliminary project construction overall phasing plan. Show planned phases of construction and closure impacts to existing facilities as required.
- Phasing plan may be of large scale to present the overall project phases. Update enlargements as required.

10.5.2.5 Airfield Operational and Phasing Plan

- Update the preliminary airfield operational and phasing plan for airfield areas impacted by the construction. Refer to UFC 3-260-01 and 3-260-04 for temporary and permanent closure requirements for airfields.
- Present a preliminary schedule of airfield phasing closures.
- Preliminary operational and phasing plan may be presented with a larger scale to clarify the overall airfield plan during construction.
- Provide special details as required.

10.5.2.6 Existing Conditions Sheets

Present the completed existing site condition topographic survey updated from 35-percent

10.5.2.7 Demolition and Removal Plan

Present the demolition and removal plan updated from 35-percent.

10.5.2.8 General Site Overview Plan

Present the General Site Overview plan updated from 35-percent.

10.5.2.9 Site/Transportation/Geometric Layout Plan

- Update the geometric layout of all items of new work using offset dimensions from existing/new structures or use state plane coordinates for locating new work. Coordinates shall be to the one hundred of a foot unless additional accuracy is required by the design.
- Provide locations of soil boring locations with designations.
- Show on the plan the construction centerline, right-of-way limits, project limits, and all critical topographical features such as roads, fences, buildings, streams, and railroads.

- Locate or refer to monuments and benchmarks for horizontal and vertical control.
- Provide geometric layout information necessary for establishment of the roadway centerline, new structures, building column lines, runway centerlines, taxiways, aprons, drainage systems, levees, special graded areas, parking areas, hardstands, fences, retaining walls, and clearing limits. Present coordinates, computed bearings, radii, curve data, super-elevation requirements, pavement widening requirements, and point of intersection for centerlines, to include all information required for the complete geometric layout of the project.
- When super-elevation is required, include in the plan a diagrammatic profile of how the super-elevation is obtained and tables of shoulder slopes versus cross slopes for the super-elevated section.
- Unless otherwise shown on the demolition and removal plan, note on the plans the size and type of all existing structures and the way they are to be utilized, removed, or otherwise affected by new work.
- If widening of the pavement is required in curves provide sufficient data to facilitate the construction.
- Present clearing and grubbing limits, project construction, and or disturbance limits.

10.5.2.10 Site Details

Present preliminary site details as applicable for the design requirements

10.5.2.11 Typical Sections (new work and existing) for Airfields, Roadways & Parking Areas

Update preliminary typical sections as applicable from 35-percent design.

10.5.2.12 Grading and Storm Drainage Plan

- Update all grading for new items of work.
- Indicate the proposed contours for new grading and provide spot elevations as required to facilitate field layout and critical elevations.
- Update and present layout of the new storm drainage system using the symbols presented in the legend.
- Present drainage structures with number designations corresponding to those used in the storm drainage schedule to be included in the drawings.

- Present critical spot elevations around the new building exterior perimeter. Present spot elevations for ramps and stoops as appropriate.
- Locate or refer to monuments and benchmarks for horizontal and vertical control.
- Present clearing and grubbing limits, project construction, and or disturbance limits.

10.5.2.13 Site Details

Present preliminary details of all drainage structures as appropriate.

10.5.2.14 Centerline Profile Sheets

- Airfields: Update from the 35-percent: present the design profile for runway, taxiway and aprons centerlines. Provide edge of pavement profiles if applicable for milling and overlay projects. Update existing ground line and new finish grade with percent new grades indicated. Present vertical curve data and length of curves including k values.
- Roads, Streets, & Parking Areas (parking areas as applicable): Update from the 35-percent: present the design profile for centerlines. Update existing ground line and interim new finish grade with percent new grades indicated. Present vertical curve data and length of curves including k values.
- Unless otherwise approved by EN-GC, use a vertical scale of 1” = 5’ and horizontal scale of 1”= 30’ or as appropriate to terrain as approved. Indicate and label beginning and ending tie points.
- Provide elevations at points where changes of grade occur.
- Indicate the percentage of slope for all grade lines. Provide special information pertaining to the profile and affecting the design such as curb grades, gutter grades, drainage structure inverts and top elevations, etc.
- Provide centerline grade elevations at each 50-foot station.
- Show new and existing drainage structures on the profile. Provide utility crossing as applicable.

10.5.2.15 Storm Drain Profiles

Present preliminary design profiles for all storm drains for airfield/roadway pipes/culverts/roof drains. Show existing ground line and proposed new finish grade. Indicate invert elevations of all drainage structures and storm

drainpipes. Present sizes of storm pipes, pipe slopes, pipe lengths, and new or existing structures or utilities crossing above or below the new storm drain.

10.5.2.16 Stormwater Management Ponds

Present preliminary plans for stormwater management ponds and structures as applicable to the design.

10.5.2.17 Cross Section

If applicable to the design, present the preliminary cross sections for the design.

10.5.2.18 Paving Plan

Present updated paving plan for all new pavement structure areas. Present hatched areas for each pavement type and thickness required.

10.5.2.19 Concrete Joint Plans

- Present preliminary concrete joint plans for all rigid traffic pavements. For airfield pavements joint plans shall be in accordance with UFC 3-260-02. For roads and hardstands, joint plans shall be in accordance with UFC 3-250-01. Present a joint layout plan for each concrete runway, apron, hardstand, road, or miscellaneous concrete pavement. Joint plans shall clearly indicate each type of joint with a different symbol with a corresponding joint legend presented. Designate specific slabs which require reinforcement per the applicable UFC. The scale of layout plans shall be enlarged to clearly show all details for layout and grading. Required scale shall be 1”=10’, 1”=20, or 1”=30’ or unless otherwise approved by EN-GC. Do not present joint layout plans combined with other plans.
- Concrete slab and Joint details: Provide preliminary details of all slab and joint type(s) as applicable to the project, for plain and reinforced rigid pavement. Provide steel chair detail. Provide detail of joint sealant. Provide schedule for steel reinforcement and dowels. For roads, hardstands, and other non-airfield rigid pavements refer to UFC 3-250-01. For airfield pavements, refer to UFC 3-260-02. Do not use Keyed Joints or the special Joint which extends new concrete under an adjacent existing slab. All new to existing joints shall be constructed with thickened edges or use the drill and dowel method, refer to applicable UFC referenced.
- Sidewalk joint layout: Sidewalk joints shall be in accordance with UFC 3-201-01 and UFGS 32 16 19 or superseded version. Provide details of

special sidewalk joints for entrances at buildings, handicap ramps, and circular drives, etc, as applicable.

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10.5.2.20 Pavement Construction Details

Present preliminary pavement layer details with compaction requirements for PCC and flexible pavements, not otherwise presented by the typical sections. Present milling details. Compaction requirements may be omitted if otherwise presented in the Section 31 00 00 Earthwork Specification. Pavement layer minimum thickness requirements shall be in accordance with the minimum required layers per the applicable UFC's and UFGS specification designer notes. Designer of record may present thicker layers as applicable for project design and constructability as approved by the Government.

10.5.2.21 Signing and Pavement Marking Plans

Present preliminary marking and signing plans. Marking and signage plans for vehicle traffic shall be based on the criteria presented in the SDDCTEA 55-17, the current issue of the Manual of Uniform Traffic Control Devices (MUTCD), and the State Highway Department Standard Drawings for the location of the project. Marking schemes for airfield pavements shall be in accordance with the criteria presented in the current version of UFC 3-260-04. Present marking plans at the same scale as the site plan. Enlargement sheets shall be incorporated as necessary to present all construction details clearly.

10.5.2.22 Signing and Pavement Marking Details

Present preliminary signing and marking details.

10.5.2.23 Signalization Plan

Present the preliminary signalization site plan.

10.5.2.24 UFGS Specifications

Provide current edition UFGS specifications edited for the project items and requirements. The 65% specifications shall be presented with redline edits visible. For airfield pavement specifications, only edit optional bracket items per USACE MCX-TSC requirements.

10.6 95% DESIGN SUBMITTAL

(95% - All references to 95% design herein shall be considered Unreviewed)

Advance design of all plan and details sheets to completion. Present the complete design for layout, grading, materials, marking, demolition and removal, drainage, erosion control, traffic control and construction phasing information with complete construction details.

Resolve or comply with comments from the previous reviews. As a minimum, provide the 95-percent unreviewed plan assembly per the Schedule of the Required Drawing Assembly, Table 10-1. Additional drawings shall be required based on special project needs.

10.6.1 DESIGN ANALYSIS

10.6.1.1 Storm Drain Permit Application

Submit final P.E. signed stormwater permit application to USACE for submission to installation for Commander's signature. Update previously prepared analysis to support final plans and specifications. All supporting design calculations shall be completed for pavement designs, storm drainage calculations, pond structure designs, as applicable.

10.6.2 PLAN DRAWINGS

- Progress the design to complete all drawings, as appliable to the project, per Table 10-1.
- Add remaining general notes to drawings as required.
- Insure correct cross-referencing among site drawings for appropriate details, sections, match lines, etc., as applicable.
- Eliminate all conflicts (horizontal and vertical) among site plans and architectural, structural, and utilities plans.

10.6.3 SPECIFICATIONS

- Provide final edited specifications in accordance with CHAPTER 23 SPECIFICATIONS. Complete specifications to cover all items of site work. Any required, permit applications, permit approval letters, and/or any requirements that apply to project construction, will be included as an appendix in the specifications.
- Ensure consistency of terminology between plans and specifications for notations on specific items of work.
- Perform check to ensure adequate referencing for construction details.

10.7 FINAL DESIGN

(100% - All references to 100% design herein shall be considered Reviewed with comments resolved)

10.7.1 FINAL DESIGN ANALYSIS

Final submittal of a complete analysis supporting the requirements of the project.

10.7.2 FINAL DESIGN DRAWINGS AND SPECIFICATIONS

Final submittal, complete and thoroughly checked drawings per Table 10-1 and UFGS specifications with all comments from all reviews incorporated or resolved. All required, permit application changes, permit approval letters, and/or any requirements that apply to project construction shall be included as an Appendix in the specification.

CHAPTER 11

WATER AND WASTEWATER UTILITIES

INDEX

CHAPTER 11

WATER AND WASTEWATER UTILITIES

11.1 GENERAL

This chapter presents general requirements for the preparation of plans, specifications, and design analyses for water supply and wastewater treatment systems. The designer must keep in mind that the listed publications and guidance above are minimum standards. Where local, state, and federal regulations (and sometimes Host Nation Standards) require a larger or more robust requirement, those regulations must be followed and supersedes the military requirements. Where details are left to the designer, standards dictated herein will be applied. Specific design submittal requirements in this chapter supplement the requirements in CHAPTER 1 GENERAL INSTRUCTIONS. All required documents, including drawings and design analysis, will be in accordance with CHAPTER 2 PRESENTATION OF DATA.

11.1.1 WATER SYSTEMS

Water supply systems include sources, pumping, treatment, storage and distribution of water used for domestic, industrial, irrigation and fire protection purposes.

11.1.2 WASTEWATER SYSTEMS

Wastewater systems include collection, pumping, treatment and disposal of domestic and industrial wastes.

11.2 APPLICABLE PUBLICATIONS

Unified Facilities Criteria (UFC)

UFC 3-230-01	Water Storage and Distribution
UFC 3-230-02	O&M: Water Supply Systems
UFC 3-230-03	Water Treatment
UFC 3-240-01	Wastewater Collection and Treatment
UFC 3-240-02	Domestic Wastewater Treatment
UFC 3-240-03	Operations and Maintenance (O&M) Wastewater Treatment
UFC 3-240-13F	Industrial Water Treatment Operation and Maintenance

UFC 3-600-01	Fire Protection Engineering for Facilities

National Fire Protection Association (NFPA)

NFPA 20	Installation of Stationary Pumps for Fire Protection
NFPA 22	Water Tanks for Private Fire Protection
NFPA 24	Private Fire Service Mains and Their Appurtenances
NFPA 291	Recommended Practice for Fire Flow Testing and Marking of Hydrants
IPC	International Plumbing Code, Latest Edition
Recommended Standards for Wastewater Facilities (GLUMBR, formerly Ten States' Standards): Health and Environmental Managers	
Recommended Standards for Water Works (GLUMBR, formerly Ten States' Standards): Health and Environmental Managers	
EPA 625/1-80-012	Design Manual: Onsite Wastewater Treatment and
Disposal Systems: Industry and Organizational Standards	

11.3 PROJECT DEFINITION (10%)

The project definition will contain a narrative description and a water and sanitary site plan. Construction of new facilities and major expansions to existing water and wastewater systems must comply with the procedural requirements of the applicable permitting agency or agencies having approval authority. Each state also has a department for pollution control projects involving point discharges. All designs of water and wastewater systems should be coordinated with the appropriate regulatory agency at all stages of design.

11.3.1 DESIGN ANALYSIS

The narrative will define the source of water for potable use and fire protection. The narrative will also describe any pretreatment, treatment and methods of wastewater disposal from the new facility.

11.3.2 WATER AND SANITARY SITE PLAN

The water and sanitary site plan will show all existing water lines and sanitary sewers. The new water lines for building service and fire flow will be shown from the point of connection to the existing water distribution system. All necessary

valves, fire hydrants, ground storage tanks, pump stations, etc., will be indicated. Building connections for wastewater will be shown from the building to the existing sanitary sewer system or onsite treatment system. All necessary septic tanks, grease traps, oil/water separators, treatment plants, manholes, lift stations, force mains, etc. will be shown. All pipe sizes will be indicated. At this stage or earlier, the designer will request a fire flow test(s) specifying exact hydrant locations required to flow and where residual pressure is to be measured. Request will be furnished to USACE project manager. Fire flow testing will be performed in accordance with the latest edition of NFPA 291.

11.4 CONCEPT DESIGN (35%)

11.4.1 DESIGN ANALYSIS

Base all new designs on the most economical plan consistent with the applicable criteria, i.e., UFC's, reference publications, etc. Include in the design analysis any assumptions made or source of information if not included in manuals, guides or instructions. The design analysis will be sufficiently complete to clearly show project requirements and utility support capacity. Prepare outline specifications as directed in CHAPTER 23 SPECIFICATIONS.

11.4.1.1 Water Supply Sources

The source of the potable water supply for domestic and industrial use and fire flow demand will be identified in this submittal. If lawn irrigation is required, the source of water for the irrigation system will also be identified in this submittal. Provide calculations indicating available supply and pressure versus required supply and pressure. If a pump, water storage tank, or any other peripheral equipment is required, provide calculations to support the selected pump size, storage tank volume and sizes of peripheral equipment. Individuals meeting the experience and training requirements of UFC 3-600-01 must accomplish design of fire pumping stations. The designer will determine in this submittal whether a fire pump station with or without a ground storage reservoir is required.

11.4.1.2 Water Service Lines

Service lines are the water lines connecting building piping to water distribution lines. The analysis for service lines will show service line size, domestic demand, velocity, and pressure drop between the water distribution line and building.

11.4.1.3 Water Distribution Lines

The water distribution system comprises the network of piping throughout building areas and other areas of water use or fire demand, and includes hydrants, valves, meters, backflow preventers and other appurtenances used to supply water for domestic, industrial, and firefighting purposes. If new water distribution lines are required to meet fire flow demands, a Hardy Cross or similar analysis will be provided in the Design Analysis. This will consist of a flow analysis based on recent fire flow test results from the nearest fire hydrants to the points of connection to the existing distribution system and fire flow demands developed from criteria contained in UFC 3-600-01 and NFPA, as appropriate. The flow through all lines will be balanced by use of a Hardy Cross analysis or other approved methodology. If the existing system is proven to be inadequate to supply the fire demand, revisions to the existing distribution system may be required. This will be documented even though it may not be part of the statement of work. The designer will request fire flow tests results through the Project Manager if not provided earlier.

11.4.1.4 Sanitary Sewers

New gravity sanitary sewers will be sized in this submittal. The design analysis will show wastewater flows, velocities, pipe sizes, elevations and pipe capacities. Where new sewage collection systems are to be connected to the existing system, the existing sewage collection system will be checked to determine whether it has adequate capacity for the additional flow. If the existing system does not have sufficient capacity, it will be revised to handle the increased flow. If the wastewater flow assessment capacity resolution is not part of the original project scope, the wastewater engineer will bring this assessment to the Project Manager's attention for instruction and direction. The design analysis will contain a narrative description with all necessary calculations for new wastewater lift stations and force mains showing flows, velocities, component capacities, head requirements, detention periods, etc. A design analysis is required for onsite sewage treatment and disposal systems (e.g. septic tank and tile drain field). Where in remote locations or similar surroundings, it is not economically feasible to connect to a municipal or incorporated wastewater system, an onsite disposal system will be evaluated as a solution. Coordination will be made with the appropriate county sanitarian to determine soil percolation rates to use for sizing the tile fields. Permits for septic tank and tile fields are not generally required for federal projects, but the criteria established by the local sanitary authorities is typically employed unless an appropriate justification can be cited. Although permitting through local health departments and state agencies for onsite disposal systems is not typically required, the rules and regulations required for design and placement of any onsite disposal system, will be followed in accordance with the local rules

and regulations to the extent practical. Coordination with local authorities is required to ensure that the Government is acting in good faith with rules and regulations.

11.4.1.5 Building Connections

Building connections are the sanitary sewers connecting the building plumbing system to the wastewater collection system. A design analysis of gravity building connections is not required if the same slope for the building plumbing can be maintained to the street line. If that slope cannot be maintained, an analysis will be provided to determine pipe slope. The minimum diameter pipe will be determined per the references listed in paragraph 11.2.

11.4.1.6 Lift Station

If a lift station and force main are required to transport the wastewater from the building, a design analysis is required to show rationale for pump selection and size of force main. When necessary, a surge pressure analysis will be performed to determine if pressure spikes need to be suppressed and specifically if the pressure class of the pipe and any associated pipe supports are subject to excess forces. A surge analysis should be performed if any force main velocities exceed four feet per second and lengths exceed 500 feet. As a minimum, on unbranched systems, the Joukowsky equation should be solved for the system to project a possible maximum pressure surge. Branched pumping systems will require a more in-depth analysis and must be evaluated individually rather than applying a general rule.

11.4.1.7 Domestic and Industrial Wastewater Treatment

Calculate the average and peak loadings for individual unit processes including hydraulic, organic, solids, etc. Provide detailed descriptions of proposed unit processes including type, size, capacity, supporting data and calculations showing the degree of treatment expected in each unit process, as well as the overall treatment efficiency. Provide narrative discussion of controls, instrumentation and proposed operating sequences or methods. Include discussion of features for operator safety and comfort. Provide narrative indicating that the treatment facility was designed to simplify operation and minimize maintenance. Provide calculations to support selected equipment and pipe sizes. Provide pollution control authority design requirements.

11.4.2 DRAWINGS

The water and sanitary site plan will be adequately detailed to show new work and connections to the existing water distribution system and wastewater collection system. The proposed designs will include sufficient details to obtain adequate

concept cost estimates for all items such as pump stations, distribution piping and connections: lift stations, force mains, sanitary sewer collection piping and manholes, and connections; septic tanks, holding tanks, equalization basins, oil separators, etc. The invert elevations of all new and existing sanitary sewer lines and the top and invert elevations of all new and existing manholes will be shown on concept plans. The water and sanitary site plans will be on a minimum scale as identified and required per the A/E/C Graphics Standard. The designer will provide any additional drawings other than those listed above which the designer considers necessary to show the intent of design.

11.4.3 WATER AND WASTEWATER PERMITTING

During this stage of the design process, the designer will address any concerns, permits or notifications that are required by federal, state, regional, and local laws and regulations. A separate section or paragraph will be provided in the design analysis under the applicable water or wastewater section's heading titled, "Permits". A separate sheet for each permit contact will be provided in the design narrative. The sheet will be in a block format and contain the following information: Subject; Type Permit Required; Approving Agency and Address; Point-of-Contact and Telephone Number; Fee; Agency Processing Requirements; and any Special Requirements or Information. The list will include but not limited to the following:

- Water construction permit for water line extension
- Sanitary sewer construction permit for sewer line extension
- Sanitary sewer treatment plant discharge
- Treatment Facilities - Active and Passive Systems (drinking water, industrial water, domestic wastewater, industrial wastewater, reuse water, etc.)

11.5 INTERIM DESIGN (65%)

11.5.1 DESIGN ANALYSIS

The Interim Design Analysis will include all items in the Concept Design Analysis and any necessary updates or revisions. Provide catalogue cuts, pump curves and any other manufacturer's information on selected equipment.

11.5.2 DRAWINGS

The following specific items will be submitted, when applicable:

11.5.2.1 Water Supply

Provide detailed floor plans and sections of treatment plants and pumping stations with equipment layout, piping and sufficient dimensions and elevations

to physically locate all items of equipment, piping, etc. Provide hydraulic profiles.

11.5.2.2 Domestic and Industrial Waste and Wastewater Treatment

Provide hydraulic profiles. Provide detailed floor plans and sections of structures with equipment layout, piping and sufficient dimensions and elevations to physically locate all items of equipment, piping, etc. Provide instrumentation and control schematics. Process flow diagrams (PFDs) and Piping and Instrumentation Diagrams (PIDs) should be almost fully developed at this level of design.

11.5.2.3 Water Distribution and Wastewater Collection Systems

Provide a site plan showing all existing and new valves, fire hydrants, manholes, pumping stations, laterals, meters, building or facility service connections, etc. Include sizes of all water lines, sanitary sewers and force mains. Invert and rim elevations are required for all manholes. Provide profiles of gravity sewers. Double lines are required for profile piping. Provide details for connecting new lines to existing systems.

11.5.3 SPECIFICATIONS

Provide redlined marked up specifications in accordance with CHAPTER 23 SPECIFICATIONS.

11.5.4 WATER AND WASTEWATER PERMITTING

At this level of design, coordination with federal, state and local regulators should have been performed. The project design should incorporate the required and reasonable requirements specified under approved regulations and code. In some instances, environmental regulators may ask for more than is reasonably required in the permitting process. It is the designer's responsibility to ensure that all the legal requirements are met for permitting but that discernment between what is required and what is desired but unbeneficial to either the state or the customer, should be discussed with the owner's environmental permitting group, the USACE Project Manager, environmental specialist at the District, and the MAJCOM as necessary. Rules and regulations will be adhered by the design agent in a similar manner as any private citizen would be subjected.

11.6 95% DESIGN (UNREVIEWED)

11.6.1 DESIGN ANALYSIS

The Final Design Analysis will be a refinement of the Interim Design Analysis. Design analysis will include all references for design assumptions. Design analysis will

incorporate all accepted comments from the previous design submittal. All pipe-sizing computations will be included in analysis. Piping analyses will show design flows, pipe sizes, friction factors, slopes, lengths, elevations where applicable, conducted quantity, and velocity in each line and detail any special support requirements. Provide flow diagrams in the analysis. Determination of pump heads will be based on complete takeoff of friction losses and static heads. Systems head curves are required for all pumping systems and will be validated on low, high and intermediate suction heads as well as discharge heads. Pumping stations with multiple pumps will be provided with pumping curves for the individual pumps and any combination of possible pump operation that will occur. Pump dynamic performance selected will be shown to operate within the operating range as determined by the manufacturer. Dynamic performance means at low or high suction pressures and low or high discharge pressures and the combination of conditions.

11.6.2 DRAWINGS

Final plans will be the refinement and completion of the interim drawings. All comments relating to interim or concept design will be incorporated in the final drawings. Where crowded conditions exist due to close proximity of other phases of the work, sufficient sections and elevations will be shown to indicate clearly the exact location of new facilities. The number of elevations and details will be sufficient to allow construction and installation of the work without additional design work by the contractor. Where equipment connection details are shown, indicate all required valves, trim, gages and fittings required. Coordinate with the specification requirements and ensure valves, fittings, etc., that are specified to be furnished with each piece of equipment, are included in the detail. Final plans will show all pipe sizes. Catwalks, ladders, platforms, access panels and doors required for operation and maintenance of equipment, valves and accessories will be detailed on the drawings. Performance characteristics for all items of equipment will be placed in carefully prepared equipment schedules. Equipment characteristics specified in "Note" fashion, or in random locations on the drawings are not acceptable. Equipment characteristics selected, will not be restrictive to any one manufacturer but must be competitive among at least three major manufacturers. Manufacturer's trade names will not be shown on the drawings. Electrical characteristics, horsepower ratings, classification of National Electrical Manufacturers Association (NEMA) type, if applicable, and except in special cases, rotation speeds will not be included in equipment schedules. Location of equipment and piping will be completely coordinated with other features of the project: architectural, plumbing, mechanical, structural, electrical, etc. Profiles will be provided for all new sanitary sewers and force mains. These profiles will indicate elevations, depth of bury, and interfering utilities which may be encountered. Profiles for building connections may not be required depending on length of run, topography and state permitting requirements. Complete construction details of water and sanitary sewer utilities as well as layouts, will be required on final plans. A legend will be provided on drawings

to clearly differentiate between existing and new construction. Existing construction is generally indicated by light symbols and new construction is indicated by heavy black symbols. Existing construction data such as pipe sizes, elevations, valves and fire hydrant locations, etc., pertinent to new construction, will be included on the drawings.

11.6.3 SPECIFICATIONS

Provide redlined marked up specifications if not provided at the Interim submittal. Provide final edited specifications if an Interim submittal was prepared in accordance with CHAPTER 23 SPECIFICATIONS. Guide specifications will be included in this submittal. Specifications will not be restrictive. Generally, the description will be such that at least three major manufacturers can meet the specified requirements. Do not use trade names in the specifications unless a sole source authorization has been approved. The subparagraphs on "Electrical Work" will be carefully coordinated with the electrical section of the specifications. There will be no conflicts as to which section covers starters, controls, or wiring and no conflicts as to the type of starters required for the individual items of equipment.

11.6.4 WATER AND WASTEWATER PERMITTING

- A list of all required construction permits, existing permits and new permits will be included in this specification section.
- All permits obtained by the user or required to be obtained by the user or designer will be listed by title, permit number or form number, permitting agency, effective date, and expiration date. The list will include but is not limited to the following:
  - Federal Aviation Administration Construction
  - General Permit for New Stormwater Discharge
  - State Wetlands Dredge and Fill Permit
  - Construction Permit for Water Line Extensions
  - Construction Permit for Sanitary Sewer Work
  - Air Pollution Construction Permit
  - Consumptive Use Permit for Water
- A separate list in the same format as above will also be prepared for all permits to be obtained by the contractor. Permits to be obtained by the contractor include but are not limited to the Well Drilling Permit.

11.7 100% FINAL DESIGN (REVIEWED)

All final design drawings, specifications and the design analysis and cost estimate will have incorporated comments from the preceding reviews before submitting as Ready To Advertise.

11.8 TECHNICAL REQUIREMENTS

11.8.1 STANDARD SYSTEMS CRITERIA

11.8.1.1 Building Services

- Water Service Lines

  Provide exterior water service line to all new buildings from existing and/or new water distribution systems. Size building water service line to meet the peak building demand as required in the IPC. Provide a gate valve or service stop near the connection point to the distribution system. The designer will ensure that all state and local cross connection requirements have been incorporated into the design. Any backflow preventor (BFP) required, will be coordinated with the user, owner, or public works group to ensure that all Installation, state, city, or other local criteria are met for the type and function of the BFP. The requirement and need for a BFP will be incorporated into the project in accordance with the local public works need and criteria to support the Installation-wide backflow prevention program.

- Building Connections (Sanitary)

  Building connections will be of either the gravity type or the force main type as required by the building site conditions. Gravity type sanitary sewers are preferable, if feasible, and will be designed and constructed in accordance with references listed in paragraph 11.2. Where gravity type building connections to a sanitary collection system are not possible, provide pneumatic ejectors or sewage pumps in the building or a lift station outside the building. The selection of pumps or ejectors will be based on the economy of initial installation and in coordination with the public works group responsible for operation and maintenance. A design analysis of gravity sanitary sewers for building connections is not required if the same slope for the building plumbing can be maintained to the street sewer. However, if the slope cannot be maintained, an analysis demonstrating maximum achievable velocity during peak flow must be provided with the proposed slope. Pipe diameter and slope must be shown on the drawings. Duplex units will be provided where ejectors or pumps are required. The capacity of each unit will be sufficient to handle the peak rates of flow. Other design characteristics will conform to references listed in paragraph 11.2.

11.8.1.2 Fire Protection

Provide fire protection site utilities drawings in accordance with CHAPTER 16 FIRE PROTECTION. Provide these drawings on the FS sheet series as applicable. These plans must be reviewed and approved by the QFPE as defined in UFC 3-600-01 and should only display information necessary for review of the DFPE (defined in UFC 3-600-01). In addition to this section, reference CHAPTER 16 FIRE PROTECTION for additional requirements.

- Distribution Lines and Fire Hydrants

  Provide distribution lines and additional fire hydrants, as necessary, in the building area in accordance with the applicable portions of UFC 3-600-01. The residual pressures at design flows at fire hydrants will not be less than 20 psi. Water lines will be installed parallel to streets and roads, but not under roadway pavements, except for crossings. The fire demand will be determined as specified in CHAPTER 16 FIRE PROTECTION and also as determined per references listed in paragraph 11.2. Provide fire hydrants in accordance with NFPA 24, UFC 3-230-01 and UFC 3-600-01.

- Facility Sprinkler Supply Lines

  Sprinkler supply lines will be at least the size required by the National Fire Protection Association. The adequacy of the existing or proposed distribution system and sprinkler lines to meet the sprinkler and hose stream demands as indicated in UFC 3-600-01 and a fire flow analysis or other approved means of analysis, must justify the proposed construction. Where required, augment the existing distribution system to meet the determined fire protection flow and pressure requirements. Provide cutoff valves on the supply lines in accordance with references listed in paragraph 11.2. Fire pumping stations will comply with UFC 3-600-01 and NFPA Codes 20, 24 and 409, as appropriate and will be designed by persons meeting requirements identified in UFC 3-600-01. If insufficient room is available in the designated fire suppression room exist to adequately locate the fire pump(s), a modular or pre-engineered fire pump enclosure should be considered and if reasonable, should be included as part of the project.

11.8.1.3 SANITARY COLLECTION SYSTEM

- Gravity Sewers

Where more than one building is involved, use a common gravity sewerage to the extent possible. Design is to conform to the applicable references listed in paragraph 11.2. Locate gravity sewers by the topography of the site to minimize excavation.

- Force Mains and Sewage Lift Stations

  Where gravity type sewerage is not possible or practical, sewage pumps will be installed in a sewage lift station constructed on the lowest terrain as possible in the vicinity and practical while complying with state and local ordinances regarding flood plain and nearby water features. Since force mains do not require a specific grade for satisfactory operation, they will be constructed as straight, short and as reasonable depth as possible. Routings for force mains will generally follow existing rights-of-way, roads or utility corridors. In the Mobile District, force mains are generally installed a minimum of 30 inches below final grade. Only in special cases should the force main be installed at 24 inches or less. Force mains and sewage lift stations will conform to the applicable requirements of UFC 3-240-01 and in conformity with the Ten State Standards (GLUMBR). Sewage pumps must be designed to meet actual projected head conditions of the force main and discharge point selected. The design point on the pump characteristic curve will be justified by plotting this curve against the system head capacity curve. The system head curve will be obtained by plotting the static lift plus the friction head at various flow rates and in conjunction with high- and low-level suction elevations and high and low discharge pressures as appropriate. Where pumps operate in parallel or series, combined curves will be provided. Intersection of characteristic curve with system head curve will be the design operating point. Where appropriate, grinder type pumps will be considered.

- Septic Tank and Tile Field

  Design septic tanks and tile fields in accordance with Manual of Septic Tank Practice, applicable state/local criteria, and design manual EPA 625/1-80-012. Prefabricated septic tanks approved by the state or local authority may be used providing the minimum wall thickness and calculations are provided for structural soundness.

- Oil Water Separators

  Oil/water separators will be provided for process wastewaters in accordance with references in paragraph 11.2 and as required by state and local regulators. Gravity separators will be designed and of the prefabricated type in accordance with API criteria. Oil/water separators will be selected to meet the effluent requirements for pretreatment by the EPA and/or applicable state agency. The effluent from the oil/water

separator will be routed to a sanitary sewer or an industrial sewer. Oil/water separators will be designed so that large quantities of storm water are not processed through the separator. Separators will be installed to meet Installation requirements for containment of hazardous wastes or oily wastes as required by the applicable state agency, the storm water pollution prevention plan, and the spill prevention and control plan. Overall project designs should be coordinated to minimize peak flow rates into separators and to prevent any extraneous flow into a separator. Before designing in a separator into a project, permission must be obtained due to environmental constraints at some bases.

- Treatment Plants

  Specific instructions for water treatment plants and/or wastewater treatment plants are provided in the Statement of Work.

- Seismic Provision

  All projects will include appropriate provision for protection of piping, equipment and underground utilities against damage from seismic events. Seismic design will include considerations for piping loops, flexible connections, reinforced supports, etc.

11.8.2 SUPPLEMENTAL DESIGN CRITERIA

11.8.2.1 Water Supply and Distribution

- Water wells will conform to AWWA standards and applicable state Public Health Department criteria for public water supplies. Specification for water wells will be based on current UFGS specification provided.

- The water well designer will coordinate the requirements or rehabilitation of wells with the Mobile District geologist (CESAM-EN-GG).

- Vertical water well turbine pumps larger than 5 hp will conform to AWWA requirements and the appropriate UFGS.

- Small, isolated facilities will utilize a hydropneumatic pressure tank and, as appropriate, a ground storage reservoir, as discussed below. Small systems will normally be located in a protective building. Where permitted by the state, pitless well adapters may be used. Use of well pits is prohibited.

- Water storage designs will comply with UFC 3-600-01, and AWWA D100 criteria for steel, concrete or composite tanks. Specifications will be based on the appropriate UFGS. Specific requirements for coatings and cathodic protection systems are discussed within this Design Manual. See

CHAPTER 22 CORROSION CONTROL AND CATHODIC PROTECTION SYSTEMS, for cathodic protection requirements.

- Hydraulic analyses will normally be made using a value of C = 100 for the roughness coefficient; however, consideration should be given to the use of coefficients greater than 100 when specifying concrete or plastic pipe. Changes in coefficients from new pipe to an aged pipe should be considered to ensure that excessive velocities or head pressures are not generated in new piping by using only coefficients for aged pipe.

- Water lines crossing railroads will be designed in accordance with the American Engineering and Maintenance-of-Way Association (AREMA), the specific commercial railroad authority and in accordance with any specific state and local requirement. All crossings will be installed in protective casings conforming to the requirements of all the organizations previously mentioned. Design should specify method of construction for each particular site (i.e., directional drilling, jack and boring, etc.). The designer will obtain permits from the railroad authority, as required. Permit application procedure and submittal should occur as soon as practicable.

- Water lines and appurtenances located in airfield pavement will conform to the requirements of applicable Airfield UFCs.

- The normal working pressure in the distribution system will be in accordance with the codes listed in paragraph 11.2. Where pressures are greater than 80, evaluation to determine if pressure control valves in a zoned control approach is appropriate. For an individual building where system delivery pressure exceeds 80 psi (550 kPa) and distribution control zones are not practical, the building will be equipped with a pressure regulator adjustable to meet the supply demand, but not exceed the 80 psi.

- Air release and vacuum relief valves will be provided in accordance with the requirements set forth in the Recommended Standards for Water Works, (GLUMVBR) (formerly 10-STATE STANDARDS). All air and release valve locations will include the design and provision for vaults or blow-off chambers.

- Thrust blocking and anchoring will be provided in accordance with the UFGS water lines specification. Generally, all tees, bends, plugs and hydrants will be provided with reaction blocking, tie rods or joints designed to prevent movement. Additional restraint may be necessary on fusible pipe at the connection to appurtenances or transitions to different pipe materials to prevent separation of joints. The restraint may be provided in the form of an anchor ring encased in concrete or other methods as approved by the reviewing authority. On the drawings, where the designer

provides details and tables for thrust blocking, the general equation will be provided in the event that the soil resistance pressure is less than that used to generate the table. A note on the drawings will direct the contractor to recalculate the restraint requirements in the event the actual soil pressure is less than that used to generate the table. A submittal will be required by the contractor to support the revised soil pressure and the table dimensions.

- Service lines to new buildings will be sized to meet peak building demands in accordance with the IPC. Provide control valves, in conjunction with the appropriate UFGS guide specification.

- All water lines, water wells and storage tanks, will be effectively sterilized with chlorine solution and tested bacteriologically safe in accordance with AWWA standards and as specifically required by state and local drinking water regulations before placing them in service. See current index listing of the UFGS guide specifications.

- Storage reservoirs will be provided with cathodic protection when required. Questions on cathodic protection should be addressed to the Mobile District Cathodic Protection Specialist. Coatings and paint will conform to state and federally approved coatings as approved for health concerns. An AWWA coating system will be specified if projection is beyond the regulatory boundaries of the state and federal environmental regulators.

11.8.2.2 Hydropneumatics Pressure Systems

- Use at small activities where the expense it too great or the demand is not enough to justify any other type of storage. Design the tank to meet the appropriate pressure vessel requirements. Provide air compressors, safety valve, and sight glass, to show the air/water ratio when diaphragm-type tanks are not practical. Typically, the tank should be designed as a branch connection to prevent excessive air entrainment in the distribution system.

- Controls. The controls of a hydropneumatics system will maintain the predetermined pressures, water levels and air water ratio within the tank. When duplex pumps are provided, controls will start only one pump at a time: pumps operation will be alternating. Pumps will operate simultaneously only when a single pump cannot maintain the predetermined low pressure. Controls will admit compressed air into the tank only when tank pressure at high water level is below normal.

- If required by the user/owner, provide a water meter on the service line from the pressure tank.

- Provide a hypochlorous disinfection system for water to be consumed by humans. Size to provide 1 mg/l chlorine residual when flowing at the peak four-hour rate. Consider using a hypochlorite feeding machine for intermittent pumping rates up to 200 GPM or when maximum chlorine demand is less than three pounds per day. When hypochlorite feeders are not practical and chlorine gas seems the only reasonable choice for disinfection, due consideration must be presented regarding local, state, and federal requirements concerning storage or hazardous materials. Generally, liquified gaseous chlorine is undesirable as a disinfectant. Coordination and guidance from the facility environmentalist and USACE engineers should be sought. Other options will be investigated that will eliminate the threat of a local hazard.
- Refer to the publication "Handbook of Chlorination" by George White (Van Nostrand Reinhold) and manufacturer's literature for details of design of chlorination systems.
- Bladder and diaphragm-type tanks will be designed and sized in accordance with the manufacturer’s instructions.

11.8.2.3 Wastewater Treatment and Disposal

Design of on-site treatment/disposal facilities will conform to applicable criteria published by the appropriate state regulatory agency or in OCONUS locations, if the host nation criteria is not available or does not apply, use EPA Design Manual, Onsite Wastewater Treatment and Disposal Systems, Oct. 1980. When appropriate, a "mound" system will be considered where high-water tables or impervious layers of soil exist. Other alternative systems may be considered when approved by the Installation and facility engineers and environmental specialists.

Where soil conditions at the site are such that a septic tank/tile field system cannot be used, consideration will be given to use a septic tank subsurface sand filter system. Design must conform to the above referenced documents for septic tanks.

- Pump stations (TI 814-10)
    - Force mains will be analyzed for water hammer conditions.
    - Minimum size force mains where nonclog pumps are used is four inches. Smaller pipe sizes can be considered when grinder pumps are used, but velocity constraints must be considered for all designs.
    - Small lift stations will be of the wet pit, submerged pump type.
    - Capacity of pumping stations will be sufficient to handle maximum rates of flow when the largest pump is out of service.

- Overflows will not be provided.
- A complete design analysis is required.
- Systems head curves are required for all pumping systems.
- Where lift stations are located close to populated areas or near dining facilities, consideration regarding odor controls will be evaluated and provided as necessary.
- Wastewater treatment plant designs will conform to applicable state criteria and Recommended Standards for Sewage Works (GLUMVBR, formerly Ten States' Standards). Designs will be based on meeting NPDES discharge permit limitations for the site, as provided by the state or EPA, depending on primacy.
- Wastewaters containing oils will be treated in accordance with the requirements of local environmental authorities. Oil water separators will be provided on effluent lines from aircraft and vehicular wash racks for pretreatment prior to discharge to a central sewage collection system. Where central sewage systems are nonexistent, package, coalescing type oil/water separators meeting state discharge criteria are required. Grit separators are required ahead of separators serving vehicle wash racks. Prior to design of separators, permission of the facility environmental representative may be required because of environmental constraints and the possibility of future contamination.
- Special requirements for fire pump stations/fire booster stations. A comprehensive transient analysis will be performed and submitted for pumping systems required to provide water pressure and flow for sprinkler systems and fire protection systems. The analysis will be a computerized model of the pipe, control and relief fittings and pumps required by the fire suppression system being designed. A report describing the analysis procedures, control methods, need for corrosion control, etc., will be submitted with the design analysis. As a minimum requirement, the following will be included in the analysis:
    - Pump start and stop against a closed (no flow) system such as motor or engine exercising only.
    - Single pump running with other pumps coming online to supplement the single pump.
    - Pump(s) trip in a single run mode and a multiple pump trip with all pumps tripping at the same instance.
    - Pump(s) start and stop at intermediate design flow; e.g., 35 to 50 percent.

- Analysis of all pressure relief or reduction elements such as air chambers, surge relief valves, bypass, etc.

- All assumptions used to model the system will be clearly explained. In addition, any physical phenomenon anticipated to occur will be described so that facility operations personnel can be made fully aware of these potential scenarios and take appropriate actions required.

CHAPTER 12

LANDSCAPING, IRRIGATION, PLANTING AND TURFING

INDEX

CHAPTER 12

LANDSCAPING, IRRIGATION, PLANTING AND TURFING

12.1 GENERAL

12.1.1 SCOPE

This chapter states criteria, requirements, and guidance for landscape, irrigation, planting and turfing are presented in this chapter as guidance for development of plans and specifications. The quality of design shall be comprehensive and shall be coordinated with pertinent aspects of the overall site development, the architecture of structures, and user requirements. The design shall be fully coordinated with other design disciplines including area drainage, exterior site lighting, site lighting which differentiates between pedestrian and parking, pedestrian circulation and parking, storm water treatment, and parking layout. The design shall address features such as berming, planting, irrigation, site furniture, site amenities (signs, bicycle parking racks, etc.), recreation facilities or areas, visual barriers, and energy conservation through planting. The design shall be accomplished in accordance with appropriate technical publication documents and the basic requirements furnished in Statement of Work (SOW).

12.1.2 QUALITY OF DESIGN

It is the purpose of the U.S. Army Corps of Engineers (USACE) to obtain excellent landscape, irrigation, planting and turfing design resulting in efficient, economical, and effective long-term landscaping construction. The instructions in this chapter provide guidance for the design criteria to be used for civil/site design of a USACE project.

12.2 DESIGN CRITERIA-APPLICABLE PUBLICATIONS

The design of the work shall be in accordance with the instructions contained in this Chapter and in other applicable chapters of the Mobile District Design Guide. Applicable publications from the following list shall be used in the design of this project:

The most recent editions of the following publications at Project Solicitation Issue Date (Advertise Date) will be referenced and incorporated (as appropriate) in work prescribed by this manual.

Installation/Base Design Guides for Plantings

Unified Facilities Criteria (UFC)

UFC 3-201-02	Landscape Architecture
UFC 4-010-01	Minimum Antiterrorism Standards for Buildings

12.3 PROJECT DEFINITION (10%)

12.3.1 PROGRAMMING CHARRETTE

A programming charrette, if required, will be held at the base, with representatives from the base, their command headquarters, the Corps of Engineers, and the A-E firm being in attendance. The programming charrette is a meeting to gather information for and prepare programming documents. The programming charrette will be attended by the A-E's site/landscape designer, or representative thereof. The designer will provide a conceptual Site Plan and report documenting the project site and approximate location of the new site work for inclusion with the programming documents.

12.3.2 PRE-DESIGN MEETING

A Scoping and a Criteria Review Conference may be attended by the Architect-Engineer's site/landscape designer. The conference will typically be held at the base, with representatives of the base, their command headquarters, the Corps of Engineers, and the Architect-Engineer firm being in attendance. The purpose of the conference is to provide an opportunity for the Architect-Engineer to gather project information and requirements. A site visit will be performed, and base mapping, utility and other pertinent site data gathered during the conference. Site information and requirements compiled during the meeting will be included in the meeting minutes that are prepared by the Architect-Engineer upon completion of the Conference.

12.3.3 DESIGN CHARRETTE (10%)

A charrette may be performed to begin the Architect-Engineer's design of the project. The charrette will be held at the base, with representatives from the base, their command headquarters, the Corps of Engineers, and the Architect-Engineer firm being in attendance. The charrette is a meeting to exchange design ideas and present requests and requirements. The Architect-Engineer's site/landscape designer and shall coordinate with all the representatives, striving to incorporate ideas, requests, and requirements into the site design. Base mapping and utility and other pertinent site data shall be gathered during, or prior to the charrette. Typically, the charrette will be performed during a four-to-five-day period or as specified by the USACE coordinated with the customer. A site visit shall be performed during the charrette. The Site Landscape Plan resulting from the attendees combined efforts, suitable for presentation to high-ranking officers on the base, shall be presented

during a formal out brief on the last day of the charrette. The Site Landscape Plan and a Design Analysis of the site landscape requirements shall be included in the charrette document, or meeting minutes, that are prepared by the Architect-Engineer upon completion of the charrette. The project definition shall verify the minimum design requirements for the work being performed in the landscape and irrigation plans. Specific boundaries, limits of the work being performed, shall be delineated to anticipate the level of development of the landscape and irrigation plans. Each plan will in turn be used to determine a preliminary cost estimate for the project. Specific use areas shall be located to determine the proper landscape treatment for those areas, from both the standpoint of material selection and functional use e.g. screening, canopy, color, enclosure etc. and/or turf, it shall also be communicated in the project definition.

12.4 CONCEPT DESIGN (35%)

12.4.1 DESIGN ANALYSIS

The landscape planting design narrative shall describe the conditions of the existing site, including an indication of existing plant materials that are to remain on the site. Specific site problems related to proposed development and the rationale for proposed plant locations shall be indicated. For the irrigation system, if applicable, the designers shall determine whether irrigation water will be supplied via potable water, shallow well, or grey water source if approved, and describe the materials to be used in the irrigation piping system, and the type of irrigation heads to be used in various locations. The narrative shall also include a list of suggested types and sizes of plant materials, which are to be used, based upon the designated functional and visual criteria, and installation specific planting lists. The concept cost estimate for landscaping, planting, and turfing shall be based on quantities derived from generalized locations and listed types and sizes of plant materials. The concept cost estimate for the landscape irrigation system shall be coordinated with the conceptual landscaping, planting, and turfing plan to estimate the type and quantity of irrigation heads and zone control valves to be used, as well as estimated irrigation pipe sizes and their linear feet of length, type of irrigation controller, and other system appurtenances.

12.4.2 DRAWINGS

The overall design approach shall depict factors, which affect existing site features and influence subsequent design proposals. The concept drawings shall be prepared at a scale, which corresponds with the civil/site layout and grading plans, and shall include reference coordinates, north arrows, graphic scales, and appropriate legends.

12.5 INTERIM DESIGN (65%)

Advance from 35% into 65% design. Comply with accepted comments from the concept review.

12.5.1 DESIGN ANALYSIS

Update the descriptive narrative, list of materials, and cost estimate shall be refined to correspond with the development of the 65% landscaping and irrigation plans. Provide current edition UFGS specifications redlined edited per the project items.

12.5.2 DRAWINGS

The interim design submittal shall expand the 35% design by development of an overall planting layout and shall include enlarged detail plans of specific areas, as needed, to clarify requirements. The proposed layout shall indicate shade trees, evergreen trees, flowering trees, shrub masses, etc., according to designated functional and visual locations of planting. A legend indicating sizes of plants recommended for each of the above categories shall be included. The preliminary design drawings and all subsequent plans shall indicate existing and proposed buildings, paved areas, signs, light standards, transformers, dumpster areas, storm drainage system, and other structures and utilities. If existing and proposed contours cannot be clearly indicated graphically on the plan, overlay of the drawings shall reveal that grades and elevations have been considered. Grassing limits, seeded, or sodded, shall be clearly described in the contract documents.

Irrigation Systems - Irrigation systems are typically included in projects as a performance specification with the actual design being performed by the contractor. Therefore, irrigation system plans should clearly delineate all required design information such as the limits of area to be irrigated; zones where specific types of spray heads or bubblers are to be used; locations for equipment such as for controllers, wells, tanks, etc., as applicable; protective casings under pavements to facilitate installation and/or future expansion; locations of existing piping and sprinkler heads connecting to an existing system; and the location of the water supply source that will be used to provide water service to the irrigation system.

12.5.3 SPECIFICATIONS

Provide redlined marked up specifications in accordance with CHAPTER 23 SPECIFICATIONS.

12.6 95% DESIGN SUBMITTAL (UNREVIEWED)

Advance design of all plan and details sheets to completion. Present the complete Landscaping, Irrigation, Planting, and Turfing Plan, and construction phasing information as applicable, with complete construction details.

Resolve or comply with comments from the previous reviews. Additional drawings shall be required based on special project needs.

12.6.1 DESIGN ANALYSIS

12.6.1.1 Design narrative

The descriptive narrative, list of materials and cost estimate shall be refined to correspond with the development of the completed planting and landscape irrigation plans.

12.6.1.2 Irrigation System

The performance irrigation specification must include guidance that complete irrigation system design calculations, which include pressures and gallonage, shall be submitted for review and approval before system installation begins. If the irrigation system obtains its water supply from an existing potable water supply source, then the irrigation system must be designed and installed so as not to degrade the existing water system pressure to any building in excess of 10 psi. Current fire flow tests must be obtained and included in these design calculations. It shall be the responsibility of the Contractor to obtain the most recent and current fire flow tests available before beginning any work. If another water supply source is used, then design calculations on this source must be submitted for review and approval before system construction begins.

12.6.2 DRAWINGS

12.6.2.1 Landscape Design Drawings

Complete landscaping design drawings, indicating proposed plants by a (+) mark for the plant location and a circle which is scaled at approximately 2/3 the ultimate growth spread (diameter) of plants, shall include a complete schedule of plant materials indicating botanical and common names, plan symbols, quantities, sizes, condition furnished, and pertinent remarks. Drawings shall also include the basic details for installation of tree, shrub, and ground cover planting, as well as any other applicable details for clarification of specific project requirements. Pertinent notes applicable to construction requirements, in addition to standard notes, shall be included. The design plan, plant schedule, details, notes, specifications, and subsequent cost estimates shall all correspond and be coordinated with the Civil/Site Plans.

12.6.2.2 Irrigation System Drawings (95%)

Irrigation system plans as described above shall be brought to completion and include detail drawings as needed to describe system performance. performance specification irrigation system design drawings shall be coordinated with the landscaping plan to provide adequate irrigation requirements/coverage to protect and maintain the health of all areas of plants, shrubs, and grassed areas. Pipes shall be run in sleeves under all paved areas. Locate ends of sleeves with 12-inch rebar. A system shall be selected for minimum maintenance and operational skill requirements, without waste of water, including the piping, valves, sprinkler heads, controller and wiring, and all of the other system appurtenances that help to make a complete and operable landscape irrigation system. The system selected shall be divided into zones and shall be automatically controlled. Rain sensors, as applicable, will be incorporated into the irrigation system controller to minimize water waste. Bubbler irrigation shall be used immediately adjacent to buildings to prevent staining from overspray.

12.6.3 SPECIFICATIONS

- Provide redlined marked up specifications if not provided at the 65% submittal. Provide final edited specifications if an 65% submittal was prepared in accordance with CHAPTER 23 SPECIFICATIONS. Complete specifications to cover all items of site work.
- Ensure consistency of terminology between plans and specifications for notations on specific items of work.

12.7 FINAL SUBMITTAL REQUIREMENTS (100% Reviewed)

All final design drawings, specifications, and the design analysis and cost estimate shall have incorporated comments from the preceding review before submittal as Final.

12.7.1 FINAL DESIGN ANALYSIS

Complete analysis supporting the requirements of the project.

12.7.2 FINAL DESIGN DRAWINGS AND SPECIFICATIONS

Complete thoroughly checked drawings and specifications, with all comments from the final review incorporated. All required, permits, permit approval letters, and/or any requirements that apply to project construction shall be included as an Appendix in the specification.

CHAPTER 13

STRUCTURAL

INDEX

CHAPTER 13

STRUCTURAL

13.1 GENERAL

13.1.1 SCOPE

This chapter provides criteria, requirements, and guidance for the structural design of buildings and other structures. Specific submittal requirements in this chapter supplement the requirements of CHAPTER 1 GENERAL INSTRUCTIONS. All required documents, including drawings and the Design Analysis, will be prepared in accordance with CHAPTER 2 PRESENTATION OF DATA.

13.2 APPLICABLE PUBLICATIONS

American Association of State Highway Traffic Officials (AASHTO)

LRFD Bridge Design Specifications

American Concrete Institute (ACI)

315R	Guide to Presenting Reinforcing Steel Design Details
318	Building Code Requirements for Structural Concrete and Commentary

American Wood Council

NDS	National Design Specification for Wood Construction
SDPWS	Special Design Provisions for Wind and Seismic

American Institute of Steel Construction (AISC)

341	Seismic Provisions for Structural Steel Buildings
360	Specification for Structural Steel Buildings

American Iron and Steel Institute (AISI)

North American Specification for the Design of Cold-Formed Steel Structural Members

American Society of Civil Engineers (ASCE)

7	Minimum Design Loads for Buildings and Other Structures
24	Flood Resistant Design and Construction

International Code Council (ICC)

IBC	International Building Code as modified by UFC 1-200-01
IRC	International Residential Code
IEBC	International Existing Building Code
ICC-600	Standard for Residential Construction in High-Wind Regions

The Masonry Society

TMS 402/602 Building Code Requirements and Specification for Masonry Structures

Metal Building Manufacturers Association (MBMA)

Metal Building Systems Manual

Precast/Prestressed Concrete Institute (PCI)

MNL 117 Manual for Quality Control for Plants and Production of Architectural Precast Concrete Products

MNL 120 PCI Design Handbook – Precast and Prestressed Concrete

MNL-122 Architectural Precast Concrete

Steel Deck Institute (SDI)

DDM03 Diaphragm Design Manual

No. 30 Design Manual for Composite Decks, Forms Decks and Roof Decks

Unified Facilities Criteria (UFC)

UFC 1-200-01	Design: General Building Requirements
UFC 3-301-01	Structural Engineering

UFC 4-023-03	Design of Buildings to Resist Progressive Collapse
UFC 3-320-06A	Concrete Floor Slabs on Grade Subjected to Heavy Loads

13.3 PROJECT DEFINITION (10%)

At the Project Definition phase, the designer must define the specific project requirements and confirm that they can be met within the project constraints. This is normally done through a charrette or other data gathering process. The structural engineer shall also coordinate with the architect at this phase to ensure that the architectural floor plan and other architectural features of the project can be framed and constructed economically.

The Project Definition submittal will consist of a narrative describing the structural loads, general design criteria and references and any unusual design conditions. The narrative shall include a brief description of the intended structural system or if the size of the project warrants, a description of the structural systems to be used for the comparative analysis.

13.4 CONCEPT DESIGN (35%)

13.4.1 STRUCTURAL SYSTEM SELECTION ANALYSIS

- Provide a rational justification for the proposed structural system. If justification for the structural system is based on economic reasons, provide a comparative analysis of alternate systems. The comparative analysis may be based on parametric cost comparisons.
- For projects with a construction value of $100,000,000 or greater, a comparative analysis of two or more competitive structural systems will be required unless indicated otherwise in the Statement of Work (SOW). A portion of each facility large enough to be representative of the entire structure will be designed in enough detail to provide for an estimate that will be the basis of the structural system selection. The portion of the structure selected for comparing alternate system costs will include framing for at least one typical bay of the roof, floor, and foundation systems. Additional costs of nonstructural systems attributable to a structural alternative will be included in the comparative cost estimate for that alternative. Determination of these additional costs must be based upon a concept of the complete building configuration, including architectural, mechanical, electrical, and other systems; hence, the main structural members must be sized to check for compatibility with ceiling, duct, lighting, and all other space demands. The method of providing the required degree of fire-resistance will be determined for each alternative and the cost must be included. The submittal will include the following items:

- A complete description, with sketches, of each structural system considered.
- Design calculations supporting the member sizes used for the cost estimate.
- A comparative cost for each system, clearly showing all costs and quantities used.
- An analysis of the study results with justification for the system selected.

13.4.2 DESIGN ANALYSIS

The following specific structural information will be provided in a brief consolidated format:

- References – List all references used in the Concept design including UFC, industry standards, and project specific criteria provided at the Charrette or pre-design meeting.
- Design Loads – Design load values to be used in the design will be identified, including roof and floor loads, wind loads, lateral earth pressure loads, seismic loads, etc., as applicable.
- Lateral Stability – Describe the method of providing lateral stability for the proposed structural system to resist seismic, wind and other lateral loads. Include sufficient calculations to verify the adequacy of the proposed lateral load resisting system.
- Fire Resistance – Describe the fire resistance requirements of the structure and the proposed materials and systems to be used.
- Antiterrorism/Force Protection (AT/FP) - and Progressive Collapse

  AT/FP and Progressive Collapse provisions which affect the structural design of the project will be identified and briefly described. Refer to CHAPTER 5 ANTITERRORISM / FORCE PROTECTION (AT/FP) for specific guidance related to AT/FP and Progressive Collapse.
- Structural Calculations – Calculations for typical roof, floor, and foundation members as applicable for the structural system proposed.

13.4.3 DRAWINGS

Sufficient framing plans and elevations are required for roof, floors and foundations, as applicable, to indicate layout of principal members. Typical sections will be

furnished through roof, floors, and foundations indicating materials and type of construction proposed. Drawings will contain a set of general notes indicating:

- Design dead, live, wind, seismic loading and other loads.
- References used in the structural design.
- Assumptions or geotechnical data used for foundation design.
- Applicable material strengths and requirements

13.5 INTERIM DESIGN (65%)

13.5.1 DESIGN ANALYSIS

The interim design analysis will include all items presented in the concept design analysis and any revisions necessitated by review comments on the Concept Submittal. Calculations will be included for all principal members, including the structure foundations. Structural design issues related to AT/FP and Progressive Collapse will be presented in the design analysis along with structural calculations related to these issues.

13.5.2 SPECIFICATIONS

Provide redlined marked up specifications in accordance with CHAPTER 23 SPECIFICATIONS.

13.5.3 DRAWINGS

Drawings for this submittal will include roof and floor framing plans, as applicable. All principal members will be shown on the plans. A foundation plan will also be furnished showing main footings and grade beams where applicable. Where beam, column, and footing schedules are used, they will be filled in sufficiently to indicate principal member sizes. Typical bar bending diagrams will be included if applicable. Typical sections will be furnished for principal roof, floor and foundation conditions. Slab-on-grade crack control joint locations will be indicated on plans and appropriate joint details will be provided. Formed concrete slab construction joint locations will be indicated on plans and appropriate joint details will be provided. Masonry wall control joint locations will be shown on the structural and architectural plans. Wall joints will be carefully coordinated between the structural and architectural plans. Masonry walls supported directly by thickened slabs will ensure that the slab crack control joints are located directly below the wall crack control joint. Typical applicable masonry construction details will be provided. Comments made on the Concept Submittal will be incorporated into the drawings for this submittal. The general notes will be developed to reflect the interim level of design.

13.6 95% DESIGN (UNREVIEWED)

13.6.1 DESIGN ANALYSIS

The Final design analysis will include all items in the concept and interim design analyses and any revisions necessitated by review comments on the Concept and Interim Design submittals. Complete calculations for all structural members will be included. Any calculation changes required by comments on the Interim and Concept Design submittals must be incorporated.

13.6.2 SPECIFICATIONS

Provide redlined marked up specifications if not provided at the Interim submittal. Provide final edited specifications if an Interim submittal was prepared in accordance with CHAPTER 23 SPECIFICATIONS.

13.6.3 DRAWINGS

Complete final plans, sections and details of all structural elements are required. Roof and floor openings, with details, will be shown on the structural drawings. Structural drawings will be carefully checked to ensure coordination with architectural, civil/site, mechanical and electrical drawings.

13.7 100% FINAL DESIGN (REVIEWED)

13.7.1 DESIGN ANALYSIS

A final complete set of structural calculations will be furnished, incorporating all changes made during the process of design. Calculations will be checked and verified by an engineer other than the original designer.

13.7.2 SPECIFICATIONS

Specification sections will incorporate all comments from previous submittals. All redlines will be removed from the specification sections and the specifications will be checked for brackets, section references and publication references.

13.7.3 DRAWINGS

Drawings will incorporate all comments from previous submittals. All drawings will be verified, finalized, and checked for consistency with the specifications.

13.8 TECHNICAL REQUIREMENTS

13.8.1 GENERAL

- Structural design will be in accordance with the criteria, requirements and guidance provided in IBC as modified by UFC 1-200-01 and the following requirements. Local building codes will not be used.
- The designer's Structural Engineer is responsible for ensuring that all mechanical and electrical equipment and other auxiliary building features such as sprinkler piping, etc., are properly supported and that all architectural features are adequately framed and connected. The structural engineer is also responsible for the design of all lesser structures such as utility vaults, pits, retaining walls, etc., although they may be shown on other disciplines' drawings.
- When future expansion of buildings or facilities is planned, it is especially important that the provisions made for the expansion are carefully developed and shown on the drawings.
- Building structural details will be shown on the structural drawings and not intermixed with architectural plans and details.

13.8.2 DESIGN LOADS

Load assumptions will be in accordance with IBC and UFC 1-200-01 with the following modifications:

13.8.2.1 Wind Load Criteria

The design requirements of ASCE 7 will be used, except for one- and two-family housing. Local building code requirements do not apply and will not be used. Wind-load criteria to be used for one- and two-family housing will be as set forth in IRC. Family housing projects located near coastal areas of the Gulf of Mexico and the Atlantic Ocean will comply with the design requirements of ICC-600.

13.8.2.2 Seismic Load Criteria

- Family Housing. Seismic criteria used for one- and two-family housing will be in accordance with the IRC.
- Bridges. Seismic criteria used for bridges will be as set forth in the AASHTO LRFDBDS-9 Standard Specification.
- All Other Structures. Seismic criteria used for structures other than family housing and bridges will be in accordance with the IBC as modified by UFC 1-200-01.

13.8.3 FOUNDATIONS

A minimum safety factor of 1.5 will be provided against uplift, sliding, overturning, or flotation. All below grade column base plates and anchor bolts will be completely encased in concrete. All below grade steel columns will be completely encased in concrete or coated with coal tar epoxy.

Coordinate the locations, sizes, and depths of all footings with below-grade piping system designed by the Mechanical, Plumbing or Fire Protection Engineer.

13.8.4 STRUCTURAL STEEL

Steel structures will be designed in accordance with the IBC. Shop connections for structural steel will be welded, and field connections will generally be made with high-strength bolts, ASTM A325 bearing-type connections. Connection angles will be a minimum 5/16 inch thick, and bolts will be a minimum ¾ inch in diameter. All connections other than standard AISC beam connections will be designed by the structural engineer and detailed on the final plans. Connections for the lateral load resisting system will not be delegated to the structural steel fabricator. When standard AISC beam connections are used, beam end reactions will be provided on the drawings. Design responsibility for all connections remains with the designer's Engineer of Record. Unless the structure involves very minor structural steel fabrication, the structural steel specification will be edited to include the requirement that the steel fabricator will be certified by the AISC Quality Certification Program for the appropriate category. For steel framed floor systems, design calculations will be submitted demonstrating that the floor system is acceptable in accordance with the "AISC Steel Design Guide Series #11: Floor Vibrations Due to Human Activity."

13.8.5 STEEL JOISTS

Steel joist construction will be in accordance with the IBC. Joists will be anchored to steel supports by bolting or field welding. Steel insert plates will be provided in concrete work as required. Maximum joist spacing will be 2.5 feet for floors and 5.0 feet for roofs. Where top chords are extended, the required section modulus of extensions will be shown on the drawings. Where equipment is hung from joists, details of joist reinforcement at hangar locations will be provided on the drawings. Floors will be designed to prevent excessive vibration. For joist supported floor systems, design calculations will be submitted demonstrating that the floor system is acceptable in accordance with the, "AISC Steel Design Guide Series #11: Floor Vibrations Due to Human Activity".

13.8.6 PRE-ENGINEERED METAL BUILDINGS

Pre-engineered metal buildings will be designed in accordance with the latest edition of the MBMA MBSM, except seismic loads will be in accordance with the IBC and all other loads will be in accordance with ASCE 7, except as noted. The metal

building system will be provided by a single manufacturer and will include all components and assemblies that form the building including the standing seam metal roof system. The metal building system will be required to be the product of a recognized steel building systems manufacturer who has been chiefly engaged in the practice of designing and fabricating metal building systems for a period of not less than five years. The erector will be required to have specialized experience in the erection of steel building systems for a period of at least three years. When pre-engineered buildings are used in conjunction with masonry, deflection of the building frame will be limited to H/600 to prevent cracking of the masonry.

13.8.7 COLD-FORMED STEEL

- Roof Trusses. Generally, cold-formed steel trusses will be pre-engineered and prefabricated in the manufacturer's plant from system components specifically manufactured for trusses. Trusses designed and fabricated from standard light gauge framing members and field fabricated trusses will be limited to only minor trusses. The designer will provide proper truss load diagrams on the drawings. The diagrams will show the design span length and all appropriate load components. Details showing required bearing conditions and connections will be shown on the contract drawings. A special specification section will be prepared for the cold-formed steel roof trusses. The truss fabricator will be required to have a minimum of three years' experience in the production of steel roof trusses. Complete shop drawings showing erection plan, bracing, truss configurations and truss joint connections, will be required to be submitted for approval.

- Cold-formed steel framing will be designed in accordance with IBC -. All cold-formed steel framing will be formed from steel that conforms to the requirements of ASTM A-653, Grade 33 or higher, having a minimum yield of 33 ksi. Minimum uncoated steel thickness (design thickness times 0.95) will be 0.0329 inches (20 gage). All cold-formed steel framing, connectors, etc., will receive a G60 galvanized coating, as a minimum. Deflection of exterior wall studs supporting masonry will be limited to L/600.

13.8.8 STEEL ROOF AND FLOOR DECK

Where steel roof and floor deck are used, the required section modulus and moments of inertia will be shown on the drawings. The type and quantity of decking connectors to be used to resist computed wind uplift and shear diaphragm forces will be clearly detailed on the final plans. Steel deck diaphragms will be designed in accordance with the SDI Diaphragm Manual. All decking will have a minimum galvanized coating conforming to ASTM A653, G60. Steel roof deck material will have a minimum thickness of 0.0295 inch (22 gage); non-composite steel form decking will have a minimum thickness of 0.0179 inch (26 gage); and composite steel form deck will have a minimum thickness of 0.0295 inch (22 gage). When the

underside surface of large areas of steel decking is exposed to view and indicated to be finish painted, the underside surface of the steel decking will be specified to be factory cleaned and factory primed with a finish paint compatible primer.

13.8.9 CONCRETE

- Concrete design and detailing will be in accordance with
- the IBC except as indicated below:
- All edge or spandrel beams will have continuous reinforcing top and bottom. As a minimum, two #5 bars, top and bottom will be used. Beams will have continuous ties at a maximum spacing of 16 inches.
- Slabs on grade will be designed in accordance with ACI 360, “Design of Slabs on Grade” and ACI 302, “Guide for Concrete Floor and Slab Construction”. Slabs-on-grade will be a minimum of four inches thick and reinforced with welded wire fabric, provided in flat sheets or deformed bars. Reinforcement will be placed approximately 1.5 inches from top of slab. Floor slabs-on-grade subject to heavy loads may be designed in accordance with UFC 3-320-06A, “Concrete Floor Slabs on Grade Subjected to Heavy Loads”. Floor slabs-on-grade will be divided by crack control joints spaced a maximum of 25 feet on center. Slab areas created by crack control joints will be as near as square as possible; slab area lengths will not be greater than twice the width. In addition, reentrant corners in slabs and discontinuous joints will be reinforced with two #4 bars, four feet long. Slabs-on-grade to receive moisture sensitive finishes, and inside enclosed facilities (i.e. buildings), will be placed on a minimum 15 mil vapor barrier.
- Reinforcing of concrete walls, continuous footings, and tie and bond beams will be continuous and, therefore, typical details showing the arrangement of reinforcing at corners and intersections of these members will be shown on the drawings.

13.8.10 PRECAST ARCHITECTURAL CONCRETE

Precast architectural concrete panels will be configured to prevent notches or excessive cutouts along the perimeter of the panels. Additional reinforcing will be provided at corners, notches, and cutouts to prevent cracks in the panels. Precast concrete panels will be waterproofed. Precast concrete panels will be designed and fabricated by an experienced and acceptable precast concrete manufacturer certified under either the Precast/Prestressed Concrete Institute or the National Precast Concrete Association Plant Certification Program. Precast design will conform to ACI 318/318R and PCI MNL-122. Precast concrete panels will be manufactured and cured in accordance with the applicable provisions of PCI MNL-117. Units will be set true to alignment and level, with joints properly spaced and

aligned both vertically and horizontally. Erection tolerances will be in accordance with the requirements of PCI MNL-117 and PCI MNL-122.

13.8.11 MASONRY CONSTRUCTION

- Masonry construction will be designed in accordance with the IBC. All structural masonry walls (load bearing walls, shear walls or exterior walls) will be designed as reinforced masonry, neglecting the tensile strength of masonry. Nonstructural masonry walls may be designed as unreinforced masonry. However, the minimum reinforcement in bond beams and around openings given for structural walls, will be incorporated.

- Minimum thickness of structural masonry walls will be 8 inches. Minimum bar size will be #4. Minimum reinforcement for structural masonry walls will be as follows: one vertical reinforcing bar provided continuously from support to support at each wall corner, at each side of each opening, at each side of control joints, at ends of walls and elsewhere in the wall panels at a maximum spacing of 48 inches. This minimum reinforcement will be the same size as the minimum vertical reinforcement provided for flexural stresses.

- Horizontal reinforcement in continuous masonry bond beams will be provided continuously at floor and roof levels and at the tops of all walls. Horizontal reinforcement will also be provided above and below all wall openings. These bars will extend a minimum of 40 bar diameters, but not less than 24 inches, past the edges of the opening. For masonry laid in running bond, the minimum horizontal reinforcement will be two #5 bars per bond beam. Lintel units will not be used in lieu of bond beam units.

- Exterior and interior masonry walls will have vertical control joints as follows: at changes in wall height or thickness, near wall intersections, at points of stress concentration, at control joints in foundation walls and control joints in floors that support masonry walls. The maximum vertical control joint spacing is generally recommended to be approximately 24 feet when using horizontal joint reinforcement spaced at 16 inches vertically.

- Particular attention will be given to details for the reinforcement of masonry construction. The horizontal and vertical wall reinforcement and reinforcement around openings and at all lintels will be clearly shown on the structural drawings and coordinated with the sections and details on the architectural drawings. Masonry control joint and expansion joint locations will be shown on the drawings.

- Horizontal reinforcing of CMU walls will be continuous and, therefore, typical details showing the arrangement of reinforcing at corners and intersections of these members will be shown on the drawings.

13.9 Antiterrorism/Force Protection

Antiterrorism/Force Protection design will be in accordance with CHAPTER 5 ANTITERRORISM / FORCE PROTECTION (AT/FP).

13.10 Required Standard Details

Certain standard structural details are required, as applicable, on all projects. Typical masonry details will be furnished showing details of horizontal and vertical wall reinforcement, reinforcement around openings and at lintels, and masonry control joints and brick expansion joints.

CHAPTER 14

ARCHITECTURAL

INDEX

CHAPTER 14

ARCHITECTURAL

14.1 GENERAL

14.1.1 SCOPE

This chapter states criteria, requirements, and guidance for architectural design. Specific requirements in this chapter supplement the requirements of CHAPTER 1 GENERAL INSTRUCTIONS. All required documents, including the drawings and the design analysis, will be prepared in accordance with CHAPTER 2 PRESENTATION OF DATA. In addition, coordinate with and provide life safety code analysis drawings in accordance with CHAPTER 16 FIRE PROTECTION. These drawings will be provided in the FL sheet series and not in the Architectural sheets.

14.1.2 ARCHITECTURAL QUALITY

The objective of the U.S. Army Corps of Engineers (USACE) is to obtain Installation compliant, cost-effective buildings which are designed using sound technical knowledge and which are constructed using recognized commercial building industry practices. For facilities/buildings not located on a military Installation, aesthetic properties will be determined with the client. The design will incorporate those characteristics which will provide buildings with present and continuing utility, durability, and desirability, provide a safe and healthy environment, meet sustainability goals and which will be economical to maintain for the life of the building.

14.2 APPLICABLE PUBLICATIONS

14.2.1 BUILDING CODE/CRITERIA COMPLIANCE

The following publications will be used to establish code compliance for architectural work. Additional discipline or customer specific publications will be incorporated as directed by the USACE Engineering Technical Lead.

UFC - Unified Facilities Criteria available at the Whole Building Design Guide website

https://www.wbdg.org/ffc/dod/unified-facilities-criteria-ufc

UFC 1-200-01	DoD Building Code

UFC 1-200-02	High Performance and Sustainable Building Requirements
UFC 3-101-01	Architecture
UFC 3-110-03	Roofing
UFC 3-120-10	Interior Design
UFC 3-190-06	Protective Coatings and Paints
UFC 3-450-01	Noise and Vibration Control
UFC 3-490-06	Elevators
UFC 3-600-01	Fire Protection Engineering for Facilities
UFC 4-030-01	Sustainable Development
UFC 4-010-01	DOD Minimum Antiterrorism Standards For Buildings
UFC 4-010-05	Sensitive Compartmented Information Facilities Planning, Design, and Construction
IBC	International Code Council, International Building Code (IBC)
IRC	International Code Council, International Residential Code (IRC)
NFPA 101	National Fire Protection Association (NFPA), Life Safety Code, NFPA 101 ABA

Accessibility Standard for Department of Defense Facilities

ABA	Accessibility Standard for Department of Defense Facilities https://www.access-board.gov/aba/
ADA	Americans with Disabilities Act https://www.access-board.gov/ada/

14.2.2 FUNCTIONAL CRITERIA

Department of Defense, other Customer functional criteria and military Installation specific criteria for use in the project will be determined during the pre-design conference.

14.2.3 COMMUNITY CRITERIA

Requirements of state and local governmental agencies (building department, health department, environmental agency, etc.) for projects conducted off military Installations will be determined during the pre-design conference.

14.2.4 ADDITIONAL RESOURCES

BHMA	Builders Hardware Manufacturers Association https://buildershardware.com/
FGIA	Fenestration & Glazing Industry Alliance https://fgiaonline.org/
MBMA	Metal Building Manufacturers Association https://www.mbma.com/
NRCA	National Roofing Contractors Association https://www.nrca.net/
SMACNA	Sheet Metal and Air Conditioning Contractors' National Association https://www.smacna.org/
SDI	Steel Door Institute https://steeldoor.org/
TCNA	Tile Council of North America https://www.tcnatile.com/
WBDG	Whole Building Design Guide https://wbdg.org/
WDMA	Window & Door Manufacturers Association https://wdma.memberclicks.net/
WI	Woodwork Institute https://woodworkinstitute.com/

14.3 10% PROJECT DEFINITION

During this phase the designer must define the customer's requirements and confirm that they can be met within the project's constraints. To that end, a comprehensive interface with the customer is required generally through a charrette or other previously approved data gathering process. The primary purpose of the design process at this stage is to gather any information from the customer that would be necessary in the design of the facility.

14.3.1 NARRATIVE

- **General Description of the Project –** State the purpose, function, and space requirements in sufficient detail to delineate and characterize functional features and the desired image or visual appearance of the project. The narrative will reflect the regional architecture as well as the visual characteristics of the existing facilities around the site.
- **Basis of Design Summary –** Provide a summary of the Basis of Design including, but not limited to, the following:
  - State the building construction type and occupancy classification appropriate to the model code(s) in use.
  - List the functional areas and describe their relationships.
  - List authorized space allocations.
  - Describe the Sustainable Design measures used in the design.
  - Describe the noise control criteria established for the design.
  - Describe methods to ensure safety and accessibility compliance with the latest requirements of OSHA and ABA Accessibility Standard for DoD.
  - State any requirements for exterior finish materials and color selection. Indicate that consultation has occurred with the Installation's Engineering Office, and that the Installation's program of architectural compatibility and the finish materials and colors selected for the project are in accordance with the Installation's approved standards.
  - Describe any special functional or technical requirements including, but not limited to, physical or classified document security, anti-terrorism and force protection and sustainable design.
- **Criteria** – List the functional and technical criteria used to guide the design work.
- **Building Organization Analysis** – Submit, as necessary, any graphic design aids such as affinity drawings, spatial organization and relationship matrices, and space layout sketches in a sequential order, with sufficient narrative to indicate the reasoning and justification for major design decisions. Any provisions for future expansion will be indicated, including schedules for phasing.
- **General Design Statement –** The designer will state the assumptions and rationale behind all major facility design decisions including, but not limited to, discussions of the following:

- Orientation to the sun, wind and water (when applicable)
- The relationship to any surrounding natural or manmade environment
- The interface with any contiguous traffic circulation
- The visual impact of the facility with regard to the overall area

- **Building Systems Analysis (Applicable only where no specific base criteria exist)** - Include any substantiating material to support the selection of architectural materials or systems. Selection will be based on a comparison of several alternate systems, which will be presented. Indicate the economic decision process (comparative cost analysis method, life-cycle analysis method, or other techniques used) and any other rationale utilized in the selection of the various systems. It must be evident that the designer has adequately conceived the project as a whole and that the systems selected represent the maximum value that can be obtained for the intended result. The following are some, but not necessarily all, of the systems that should be investigated and described:
  - Exterior wall systems
  - Passive solar systems
  - Fenestration
  - Roof systems
  - Interior partition systems
  - Openings in interior partitions (doors, windows, etc.)
  - Ceiling systems
  - Floor systems
  - Integrated building systems
  - Noise and/or acoustics control measures
  - Special equipment such as trash handling systems and dock levelers
  - Vertical transportation systems (escalators, elevators)

14.3.1.1 Design Calculations – Submit complete calculations for the following:

- Gross building areas. Areas not required in narrative when included on drawings.

- Net building areas. Areas not required in narrative when included on drawings.
- Calculations for plumbing fixture counts
- Roof Drainage (Roof drain sizes and quantities, gutters and downspout sizes) based on rainfall intensity at the project location, use SMACNA latest edition for location and intensity.
- "U" values for each exterior construction assembly (walls and roofs)

14.3.2 DRAWINGS

This submittal consists of one or more schematic floor plans which effectively indicate to the using agency that the function, circulation and life safety issues have been assessed and can be met by the proposed design. Include plan north and actual north arrows on all floor plans. At least one major elevation (preferably the front elevation) for each submitted building is required. A site plan is required to indicate the building orientation and circulation to the building entrances. The site plan will be coordinated with the requirements of CHAPTER 10 CIVIL SITE.

14.4 CONCEPT DESIGN (35%)

14.4.1 GENERAL CONSIDERATIONS

The minimum requirements for this submittal consist of floor plan(s) drawn to appropriate scale, a Life Safety Analysis Plan, exterior building elevations, typical wall sections to indicate material usage and structure and a design analysis. Additional drawings may be required at this submittal due to the complexity of the project (i.e., hospitals, research facilities, blast resistant structures, etc.) to adequately describe the proposed design.

14.4.2 DESIGN ANALYSIS

Update and continue development of the narrative submitted at the 10% PROJECT DEFINITION.

14.4.3 DRAWINGS

- **Composite Floor Plans –** When the main floor plans must be drawn in segments in order to comply with the requirements for scale and sheet size, provide a composite floor plan for each floor level. These plans will show the following:
  - The general building layout showing exterior walls, interior partitions and circulation elements (stairs, elevators, corridors, etc.) drawn to scale.

- The identification of major areas and their functional relationship
- Overall building dimensions, out to out
- Planning grid or column lines where applicable
- Matchline locations indicating larger scale floor plan segments, provide key plan where only portions of the floor plan are displayed.
- Cross-references for enlarged floor plans and building sections
- Include plan north and actual north arrows on all floor plans.

- **Floor Plans –** Provide a floor plan or floor plan segments, 1/8-inch scale minimum, 1/4-inch scale preferred (and mandatory for Health Care facilities), for each floor showing functional elements, drawn to scale. In addition, the following will be shown:
  - Planning grid and/or column lines
  - Overall and building element location dimensions
  - Room names and numbers
  - Finish floor elevations for each floor or change in floor level
  - Opening designations in walls (doors, windows, etc.)
  - All major equipment
  - Restroom layouts
  - Gross floor area tabulations if not shown in composite floor plans
  - Cross-references for sections and details
  - Provisions for the handicapped where required
  - Include plan north and actual north arrows on all floor plans
  - Show secure area boundaries.
  - Show fire and smoke rated walls on plans
- Roof Plan
  - Provide a roof plan showing the following:
  - Planning grid and/or column lines
  - Overall and building element location dimensions
  - Indication of roof slope and drainage

- Roof accessories (skylights, roof scuttles, etc.)
- Major roof-mounted equipment
- Gutters and downspouts
- Roof details cross-references
- Include plan north and actual north arrows on roof plans

- **Demolition Plans –** Floor plans showing demolition work in sufficient detail to indicate all existing building materials and finish conditions are required for renovation and modification projects. Drawings will be of sufficient detail to indicate "existing to remain," "existing to be removed," and new work and materials. Contractors are not required to site verify correctness or completeness of renovation and modification contract drawings and specifications during bid preparation, therefore, the drawings will be complete with adequate detail and descriptions of existing materials, assemblies, and systems (type, thickness, quantity spacing, length, width, height, etc.) to enable the contractor to bid on the project.
- Building Elevations

  Provide building elevations showing the exterior design of all major elevations. Each elevation will show the following:

  - Planning grid and/or column lines
  - Building masses
  - Door and window opening designations and penetrations by other disciplines
  - Identification of major building materials
  - Roof-mounted equipment and roof accessories when visible in elevations
  - Elevation and vertical dimensions of floor lines
- Building Sections

  Provide building sections as necessary to demonstrate the coordination of the structural, mechanical, and electrical systems. In addition, the following will be shown:

  - Planning grid and/or column lines
  - Structural system
  - Changes in floor levels

- Finish ceilings
- Floor-to-ceiling and floor-to-floor heights
- Floor elevations
- Spaces to be used by the lighting and HVAC systems
- Adjacent grades

- Typical Exterior Wall Sections

  Provide typical wall sections (3/4-inch scale). All sections will be fully noted. These sections will show the following:

  - Structural system
  - Exterior wall and roof assemblies
  - Ceiling systems
  - Floor-to-ceiling and floor-to-floor heights
  - Floor elevations
  - Spaces to be used by the lighting and HVAC systems
  - "U" values through roof, walls and floors

- **Life Safety Analysis Plan -** Life Safety Analysis Plan sheets will be referenced as “FL” sheets and placed after the Interior Drawing sheets in the contract drawing submittal set. Include the following data and provide a legend for symbols used on the drawings:

  - NFPA 101 Means of egress analysis: include arrangement of egress, number of exits, occupancy classifications, occupant load analysis, exit access width requirements of corridors, stairs and exit discharge capacity; provide diagrams of common path, dead ends, maximum travel distance. Indicate locations of portable fire extinguisher carriers (FEC) and exit light locations.
  - IBC Code compliance information: include occupancy classification, occupancy separations analysis, fire barrier walls, exterior wall fire resistance ratings, construction type, allowable floor area analysis, floor area by occupancy type and building height limitation; indicate rated wall requirements.

11.1.1 SPECIFICATIONS

Provide outline specifications in accordance with CHAPTER 23 SPECIFICATIONS.

14.5 INTERIM DESIGN (65%)

14.5.1 DESIGN ANALYSIS

The Design Analysis will include all items in the 35% Design Analysis narrative and any revisions made necessary by comments about the Concept Design submittal. In addition, verify site and building signage requirements. See CHAPTER 15 INTERIOR DESIGN, for interior signage requirements.

14.5.2 DRAWINGS

Incorporate comments from the 35% CONCEPT DESIGN review.

- Building Plans
  - Provide plans for each floor, roof and ceiling showing dimensions, functional arrangement and equipment for all areas, including corridors, exits, stairs and utility spaces.
  - The relationship of the building to exterior access, vehicle parking, service areas, etc., will be indicated on site plans.
  - Individual treatment will be given to special design or items involving deviation from normally accepted standards.
  - All column lines will be designated to aid in locating project components.
  - Identify fire walls, smoke partitions and all fire rated construction.
  - Show indications of phased construction if required.
  - Thoroughly cross-reference section cut symbols on plans and elevations to detail sheets.
  - Complete door and window details to minimum of 65%.
  - Identify all interior wall and partition types on floor plans and reference them to detail sheets showing construction, heights, fire ratings and acoustical ratings.
  - Interior Wall Sections
  - Furnishings layouts for typical rooms where required. (See CHAPTER 15 INTERIOR DESIGN for additional furniture placement plan requirements).
    - **Schedules -** The drawings will include finish schedules door, wall type, window, room names/numbers and equipment schedules.

Schedules need not be complete at this point; however, they will be sufficient to indicate the door and window sizes and major equipment items. Finish schedules requirements are included in CHAPTER 15 INTERIOR DESIGN.

- **Details -** In addition to the above requirements, show details of any significant design features and any sections necessary to demonstrate the required coordination of the various building systems.

14.5.3 SPECIFICATIONS

Provide redlined marked up specifications in accordance with CHAPTER 23 SPECIFICATIONS.

14.6 95% DESIGN

14.6.1 DESIGN ANALYSIS

The 95% Design Analysis narrative will include all items in the 65% Design Analysis narrative and any revisions made necessary by comments about the 65% Interim Design submittal.

14.6.2 DRAWINGS

- Complete to the extent required for the 100% Final Design. Drawings are to be complete, except for incorporation of comments about 95% Design submittal.
- Incorporate 65% Interim Design review comments into the drawings.
- Ensure that all details, sections, etc., necessary for the final documents have been added to the drawings and are complete and thoroughly cross-referenced.
- Complete all schedules. Ensure that hardware sets have been added to the door schedule and coordinated with the specifications.

14.6.3 SPECIFICATIONS

Provide redlined marked up specifications if not provided at the 65% Interim Design submittal. Provide final edited specifications if a 65% Interim Design submittal was prepared in accordance with CHAPTER 23 SPECIFICATIONS.

14.7 100% FINAL DESIGN

14.7.1 DESIGN ANALYSIS

Complete analysis supporting the requirements of the project.

14.7.2 DRAWINGS AND SPECIFICATIONS

Complete thoroughly checked drawings and specifications, with all comments from the 95% Design submittal review incorporated.

14.8 RTA Submittal

14.8.1 DESIGN ANALYSIS

Provide archive record copy of the analysis and supporting documents for the project.

14.8.2 DRAWINGS AND SPECIFICATIONS

Ensure backcheck is complete and add the solicitation number and the date at this stage to the borders.

14.9 TECHNICAL REQUIREMENTS

Materials and construction methods will comply with the instructional notes inserted in the applicable UFGS.

14.9.1 COORDINATION

All architectural work will be coordinated with work of other technical disciplines.

- Ensure adequate above-ceiling space for ductwork, piping, lighting, structural members, etc.
- Coordinate reflected ceiling plans with lighting and HVAC plans.
- Coordinate light switches with door swings.
- Coordinate electrical and mechanical drawings with architectural plans to assure proper power, gas, water, etc. for drinking fountains, kitchen and breakroom equipment, etc.
- Coordinate with other disciplines to ensure there are no conflicts in roof drain, exhaust fan, louvers and other similar item locations.
- Ensure that all louvers are coordinated with mechanical drawings and that no louvers are located in fire or smoke doors.
- Coordinate structural with architectural to ensure framing at all roof openings.
- Coordinate electrical and instrumentation to ensure utilities are provided for power operated doors and doors requiring electrical or electronic controls.
- Ensure all rated wall penetrations receive fire stopping or receive fire rated sealant around penetrations.

14.9.2 SITE WORK

- **Floor Relation to Grade –** The finish floor of concrete floor slabs on fill will be a minimum of six inches above the finished grade. Refer to UFC 1-200-01.
- **Access to Entrances –** All stoops, steps, or similar required access to entrances that will normally be built by a building contractor as differentiated from sidewalks, driveways, etc., which are normally constructed by a paving contractor, will be shown and detailed on the architectural drawings. Indicate spot elevations coordinated with structural and civil designs to assure positive drainage, means of egress and accessibility compliance. Ramps complying with the requirements of ABA Standard for DoD Facilities will be provided where required to allow access by the physically impaired.

14.9.3 MASONRY

- Coordinate with the project Structural Engineer for incorporation of standard CMU details.
- Coordinate with the project Structural Engineer for incorporation of an efflorescence-controlling admixture for mortar.
    - **Interior Walls and Partitions –** Concrete masonry units (CMU) for interior masonry walls and partitions will be not less than six inches in nominal thickness.
    - **Split Face and Fluted CMU –** Where split face or fluted units are used, provide smooth face units where concrete paving or flashing occurs, and where items are attached to, or penetrate CMU wall surfaces.
    - **Exterior Wall Systems (MASONRY/CONCRETE)** – Single wythe masonry walls to include single wythe concrete panels enclosing conditioned spaces are not acceptable weather barriers since these are subject to water and moisture migration. Stucco and systems similar to EIFS must be detailed to mitigate moisture vapor migration. Concrete panels with continuous insulation core with properties that serve as air and vapor barrier are acceptable. Exterior wall design system must meet air and vapor barrier design requirements.
    - **Coursing –** Concrete masonry unit coursing generally will be coordinated with door heights to minimize the need for cutting block.
    - **Miscellaneous Metals –** All access panels required to service mechanical items normally furnished and installed by the non-mechanical trades will be shown on the architectural drawings. Ensure that access panels, when required, are specified and detailed.

14.9.4 THERMAL AND MOISTURE PROTECTION

- **Insulation –** General standards for insulation, as indicated in the applicable UFGS, require insulation thickness as determined by the established "U" value for total roof or wall thickness and the type insulating material utilized. "U" values will be indicated as coordinated with the project Mechanical Engineer
- **Vapor and Air Barrier –** The exterior envelope of all cooled facilities will have a continuous, positive air and vapor barrier of at least 0.025 permeance as coordinated with the project Mechanical Engineer. Indicate on drawings the continuous envelope from finish grade to roof membrane.
- Moisture Barrier
    - Verify and incorporate appropriate moisture barriers in exterior veneer wall systems.
    - Standing seam metal roofs installed over a structural metal deck and rigid insulation will include a 40 mil, self-sealing, membrane type, secondary water barrier.
- **Mold Mitigation –** All products will be installed in accordance with manufacturer's environmental requirements, i.e. temperature, moisture, humidity, to prevent mold growth. Any gypsum board products installed prior to building dry in will be moisture resistant type.

14.9.5 ROOF SYSTEMS

- When roof top equipment is installed that will require maintenance, ensure that roof hatches are provided for multi-story buildings and access ladders, or roof hatches are provided for single story buildings. Hatches and ladders will be secured to prevent unauthorized access and comply with AT/FP requirements.
- The minimum roof slope for built-up roofs will be 1/4-inch per foot, however, the use of a "flat" built-up roof is discouraged except for facilities of unusual building configuration or extremely large areas. In no case will a built-up roof slope exceed two inches per foot. Roof slope for standing seam metal roofs will be 1 in 12 minimum. Installation policy will dictate required slope above that minimum.
- Confirm roof system warranty and water tightness requirements with the Installation prior to the 95% Design Submittal and incorporate these requirements in the specifications.
- An independent roofing consultant will be hired by the roofing subcontractor for roofs over 10,000 square feet. The consultant will review and approve roofing shop drawings prior to submittal to the Government. The consultant will be

present to monitor the entire roof installation. The consultant will be certified by the roofing manufacturer.

- Ensure that pressure treated wood or metal blocking is designed and shown in the drawings at roof edges.
- Follow manufacturer guidelines in design and installation to permit expansion/contraction of the roof system.
- All laps will be in the direction of water flow.
    - Standing Seam Metal Roofs
        - Roof panels will be a minimum thickness of 24-gauge steel or 0.040 aluminum.
        - Vented ridge caps are not desirable due to potential leaks.
        - Concealed, mechanically formed seams are preferred. Install with fasteners permitting expansion/contraction attached to the structural deck (when present) through rigid insulation (when present) or locking type seams (as opposed to snaplock type) for hurricane and high wind areas.
        - Roof penetration flashing, curbs, gutters and flashing will be the product of the roofing manufacturer.
        - Full length, job fabricated panels are recommended. Individual roof panels less than 50 feet in length with joints are not permitted.
        - Ensure that roof penetrations occur in the center of individual roof panels rather than at edges.
        - Roof edge gutters will be installed with gutter hangars and will not be attached directly to the roof membrane or fascia. The front edge of the gutter will be below the back edge at least 1 inch below the roof edge.
        - If fascia and/or soffit panels are to match the roof system color, ensure that different manufacturers provide matching colors. Roof panels are not acceptable as fascia.
        - Where rigid insulation is installed, ensure that its compressive strength is compatible with the standing seam metal roof system as recommended by the manufacturer.
    - **Other Roofs –** For other roof types comply with the UFC 3-110-03 Roofing and National Roofing Contractors Association standards.
    - **Sheet Metal –** In all cases sheet metal for various elements used throughout a building will be of the same basic metal. Atmospheric conditions will be considered in the selection of exposed sheet metal.

Different types of sheet metal that can cause accelerated corrosion (galvanic action) of either one will not be placed in direct contact. Sheet metal used on roofs with concrete roof tiles will not react with, nor corrode excessively, due to the concrete.

- **Gutters and Downspouts** – When downspouts are required, they will not drain directly onto a walk or platform. When downspouts must occur at walks or platforms they will pass through or under into underground drains or toward open ground beyond. Downspouts draining onto open ground will be diverted using precast concrete splash blocks to prevent erosion. Use of interior downspouts will be avoided wherever design permits. The use of scuppers should be maximized. Avoid built-in gutters behind fascia or parapet due to expansion/contraction of metal and surrounding material unless dictated by Installation requirements. All gutters will have leaf screens at locations susceptible to collection of leaves and other wind-blown debris. Gutters and downspouts will be designed using SMACNA.

14.9.6 DOORS

Door schedules will be indicated on the drawings. Use SDI (Steel Door Institute) naming conventions for all steel doors and frames.

- **Pedestrian Doors –** All pedestrian doors will be seven feet zero inches high, except in family housing where they may be six feet eight inches high. Door openings will, in general, be three feet zero inches wide, except for special purpose doors, toilet rooms (except for handicap) or closet doors in family housing, for instance.
- **Doors to Rooms –** Doors to rooms will be of adequate size to accommodate the installation and removal of furniture and equipment installed therein.
- Exterior Doors
  - Except in underground structures and floors above the first story of multi-story structures, doors to boiler or mechanical rooms, doors from power rooms, generator rooms and doors from similar areas should be to the outside of the building only. Electrical closet and air handling room doors may open in the building interior.
  - Where galvanized steel doors and frames are required, ensure use A60 designation in lieu of G type coatings.
- **Special-Purpose Doors -** Special-purpose doors such as rolling and coiling doors will be adequately designed to safely resist the design wind pressure. Rolling and coiling steel or aluminum doors will be designed so as to permit operation of the doors at maximum wind velocities defined in the area where used.

- Finish Hardware
    - Carefully read the "Notes to Specifier" for the UFGS hardware specification. Hardware will be selected from BHMA and ANSI standards. All cylinders will have seven pins. Provision of these items must conform to individual requirements of the Installation on which the project is located.
    - Floor mounted center door stops for door pairs will not be installed above floor level.
- **Hardware Set Designations –** Hardware set designations will be listed in the Door Schedule in preference to locating on the floor plans. Specification Section 08 71 00 DOOR HARDWARE, will provide the necessary hardware set designation numbers, plus description and function of each hardware item included in the Hardware Set.
- **Return Air –** Overall size of return air louvers located in doors will be included in the Door Schedule. Minimum bottom rail dimension will be 10 inches and the minimum stile dimension will be five inches. Door undercuts will be shown in the Door Schedule.

14.9.7 WINDOWS

- Window schedules and types will be indicated in the drawings.
- Ensure that window types and locations are coordinated with furniture placement to avoid blocking views.
- Glazing specification and schedule must be coordinated with window type and details along with sustainable design features. Glazing and frame openings will be compliant with UFC 4-010-01 requirements. Refer to CHAPTER 5 ANTITERRORISM / FORCE PROTECTION.

14.9.8 FINISHES

- **Acoustical Plaster and Acoustical Tile –** The use of acoustical plaster is discouraged. In electronics and communications facilities in which avoidance of dust is a major consideration, acoustical treatment will be limited to acoustical tile or gypsum wallboard with non-dusting characteristics. In high humidity locations, acoustical ceiling tile will be moisture resistant type.
- Ceramic Tile
    - Caulk joints between ceramic tile and bathroom fixtures (sinks, showers, tubs) in lieu of filling with grout.

- Ensure that ceramic tile Installation is coordinated with toilet accessories and light switches in restrooms.
- Tile systems will use TCNA Installation methods. Each detail will be called out on the drawing sheets and specifications corresponding to the TCNA.

- **Gypsum Wall Board –** Ensure that control joints are located in drawings and installed as recommended by gypsum wall board manufacturers.
- **Chair Rails –** In rooms with movable furniture, ensure that chair rails are installed at appropriate heights to protect wall finish.
- **Paint –** Exterior grade paint will be specified for interior spaces open to exterior humidity and temperature weather conditions (i.e., aircraft hangars, warehouses, etc.).
- **Wall Types –** Wall types will be scheduled on plans referenced to wall type details. Wall type details will delineate floor to structure above conditions.
- Equipment
  - Verify that partition thicknesses are sufficient for installation of recessed or semi-recessed equipment including toilet accessories.
  - Ensure that partition thicknesses are sufficient for installation of concealed plumbing utilities.
  - Ensure that ceiling recesses are provided at overhead coiling doors.
  - Provide adequate wall/ceiling blocking to support equipment being installed.
  - Provide naming conventions for toilet accessories as described in UFGS Specification Section 10 28 13 TOILET ACCESSORIES.

14.9.9 ROOMS AND SPACES FOR UTILITIES

Rooms and spaces for utilities, including mechanical and electrical equipment rooms, shafts, chases and chimneys, will be indicated on the Project Definition Design and subsequent submittal design drawings, even though their exact size may not be determined at that stage.

14.9.10 FLOOR DRAINS AND SLOPES

Floor drains and slopes, hose bibbs, and shower heads will be shown on the architectural drawings as well as on mechanical drawings and will be closely coordinated. All floors in areas requiring floor drains will be sloped toward the drains.

CHAPTER 15

INTERIOR DESIGN

INDEX

CHAPTER 15

INTERIOR DESIGN

15.1 GENERAL

15.1.1 SCOPE

This chapter states criteria, requirements, and guidance for interior design.

15.1.2 QUALITY

The objective of the USACE is to obtain attractive facilities that are designed using sound technical knowledge and constructed using recognized, good industry practices, as well as being cost effective. The design and construction will incorporate those characteristics which will provide facilities with present and continuing utility, durability and desirability, and which will be economical to maintain for the life of the structure. The design will also be such as to provide a safe and healthy environment.

15.1.3 SUSTAINABLE DESIGN

The USACE has a policy to support the design, construction, operation and reuse/removal of the built environment (infrastructure and buildings) in an environmentally and energy efficient manner. CHAPTER 6 SUSTAINABLE DESIGN AND DEVELOPMENT, contains detailed requirements.

15.1.4 MULTIPLE BUILDINGS

Unless directed otherwise, when a project includes multiple buildings, drawings will be sequenced so that each building has a separate stand-alone set of drawings. Sometimes project scope changes requires that options be identified.

15.2 APPLICABLE PUBLICATIONS

The following publications form a part of this Manual to the extent indicated by the references thereto. Most recent date at contact award is applicable.

Technical MOST RECENT VERSION OF:

TI 800-01	Technical Instructions, Design Criteria
UFC 3-710-01A	Code 3
TI 802-01	Design with Parametric Estimating

Instructions for Code 3 Design with Parametric Estimating

MOST RECENT VERSION OF:

UFAS	Uniform Federal Accessibility Standards
ADAAG	Americans with Disability Act Guidelines
UFC 3-120-10	INTERIOR DESIGN

US Air Force Interior Design Standards

UFC 3-600-01	Fire Protection Engineering for Facilities
NFPA 101	National Fire Protection Association, “Life Safety Code”, current edition
UFC 4-010-01	DoD Minimum Antiterrorism Standards for Buildings

15.3 CONCEPT DESIGN (35%)

15.3.1 GENERAL

Submittal content and format will be as described in UFC 3-120-10 Interior Design. This document is available from the Whole Building Design Guide, Unified Facilities Criteria, at:

https://www.wbdg.org/ffc/dod/unified-facilities-criteria-ufc

15.3.2 STRUCTURAL INTERIOR DESIGN

Provide 35% submittal in accordance with UFC 3-120-10. Establish general requirements and provide a concept furniture floor plan at this stage.

15.3.3 FURNITURE, FIXTURES, AND EQUIPMENT

When required by contract, provide 35% submittal for Furniture/Fixtures and Equipment in accordance with Interior Design, Furniture, Fixtures, and Equipment Interior Design. Establish general requirements and provide a concept furniture floor plan at this stage.

15.4 INTERIM DESIGN (65%)

15.4.1 GENERAL

This submittal consists of a limited number of drawings. Its purpose is to check progress, functional layout, and incorporation of concept review comments. Design does not stop at this submittal.

15.4.2 IMPLEMENT CONCEPT SUBMITTAL REVIEW COMMENTS

15.4.3 STRUCTURAL INTERIOR DESIGN

Provide 65% submittal in accordance with applicable, "Interior Design Presentation Format" Air Force, or UFC 3-120-10. Include interior signage plans and message schedule. Note any special features such as changeable components. Note (building-attached) exterior signage locations and types on drawings. All exterior signage will be in accordance with the "Installation Design Guide" for each respective Installation, where applicable.

15.4.4 FURNITURE, FIXTURES, AND EQUIPMENT DESIGN

When required by contract, provide 65% submittal in accordance with Furniture, Fixtures, and Equipment Interior Design. Submit furniture/furnishing plans for each floor showing the location and type of all furniture and furnishings as programmed by the project. When required by contract, indicate by schedule which items will be furnished and/or installed by the contractor and which will be furnished and/or installed by the Government.

- **Specifications –** The concept submitted Unified Facilities Guide Specifications (UFGS) list will be updated to include any new specifications based on the refined preliminary design. All specifications from the list will be tentatively marked up, with major edits, and submitted as part of the preliminary 65% submittal. Specifications will be submitted with red-line edits indicating all deleted/modified text.

15.5 95% DESIGN SUBMITTAL (Unreviewed)

15.5.1 IMPLEMENT CONCEPT AND PRELIMINARY REVIEW COMMENTS

15.5.2 STRUCTURAL INTERIOR DESIGN

Provide final submittal in accordance with applicable, "Interior Design Presentation Format" Air Force, or UFC 3-120-10 Interior Design, Chapter 4 Structural Interior Design.

15.5.3 FURNITURE, FIXTURES, AND EQUIPMENT

When required by contract, provide final submittal in accordance with UFC 3-120-10 Interior Design, Chapter 5 Furniture, Fixtures, and Equipment Interior Design.

15.6 100% FINAL DESIGN (Reviewed)

15.6.1 CORRECTED FINAL DESIGN SUBMITTAL

In the Corrected Final Design Submittal, the designer of record finalizes the construction documents. This includes the incorporation of approved comments

from the previous design submittal reviews. The Corrected Final Design Submittal requirements will be the same as the Final Design Submittal requirements. Unless indicated otherwise in the project Specific Instructions, this submittal will not be another review in ProjNet and is only for final backcheck of all comments.

15.6.1.1 Final Review Submittal

Implement final review submittal comments.

15.6.2 VERIFY CONISISTENCY

Verify consistency between plans, specifications and final corrections.

15.7 REQUIREMENTS FOR PREPARATION OF DESIGN/BUILD RFP PACKAGES

15.7.1 GENERAL

Unless indicated otherwise, RFP will be based upon “partial” design development as defined by TI 800-03 “Technical Instructions for Design-Build”.

15.8 TECHNICAL REQUIREMENTS

15.8.1 GENERAL

- **Technical Instructions** – In addition to the Criteria contained in the following paragraphs, interior design will comply with technical instructions. Materials and construction methods will comply with the instructional notes inserted in the applicable guide specifications.
- **Structural Interior Design –** Structural Interior Design (SID) is required for all projects unless specifically deleted by contract. In general, the SID provides samples of all interior and exterior finishes and signage.
- **Furniture, Fixtures, and Equipment** - Furniture/Fixtures and Equipment (FF&E) is provided only when required by contract. In general, the FF&E is an expansion of the SID that also addresses furniture and accessories. Furniture and accessories are purchased separate from the construction contract. When FF&E is requested, the A-E provides both the SID and FF&E required items.
- **Format and Content –** The format and content of SID and FF&E in accordance with "Interior Design Requirements", by U.S. Army Corps of Engineers, for all other projects except as modified in this chapter. When an FF&E is required, it will be formatted in a separate binder as described in Furnishings, Fixtures & Equipment Finder of "Interior Design Requirements".

- **Number of Copies -** Copies are required at each submittal unless indicated otherwise in the contract. One copy is to have actual physical samples unless indicated otherwise in the contract.

15.8.2 FINISHES

- **Color Schedules –** Color for color schedules (excluding prefinished items) for all Ft. Bragg, NC projects will be selected from FED-STD 595b. For all other projects, the use of FED-STD 595b for color schedules (excluding prefinished items) is optional. FED-STD 595b Color Fan Deck, with color chips for desk use, and 75 x 175 mm (3-inch by 5-inch) color chips by sets, can be ordered from the following address. (Cost of $72.00) Installations may have their own design guides for color selection.

  Global Engineering Documents
  15 Inverness Way East
  Englewood, CO 80112-5704
  1-800-854-7179

- **Finishes Disclaimer –** Interior and exterior finishes may be specified by using manufacturer and product names. When this is done, a disclaimer must be placed on the drawings or in specification where this is done that states the following:

  “The manufacturer's names and their products referenced indicate the color, texture and pattern required for the materials listed. The products furnished will meet the color, texture and pattern indicated as well as the material quality and performance specified in the applicable technical section. The use of manufacturer's names and products do not preclude the use of other manufacturer's products of approved equal color, texture, and pattern as long as all requirements in the technical sections are met”.

  MANUFACTURER SELECTED IS THE BASIS OF DESIGN FOR EACH PRODUCT THAT ALTERNATES MUST MEET.

15.8.3 HANDICAPPED ACCESSIBILITY

Where facilities for the handicapped are to be included in whole or in part, the design will be in accordance with the American With Disabilities Act Accessibility Guidelines (ADAAG), and Uniform Federal Accessibility Standards (UFAS). In case of conflict, the more stringent requirement will be followed.

15.8.4 STRUCTURAL INTERIOR DESIGN (SID)

- **Use of SID -** The SID is used during design to review color and finish selections, prewired workstations, and signage design. It is used by Government personnel during construction in review of contractor submittals. The construction contractor does not receive the SID; it is an internal document only and not part of the construction contract documents. All information relating to building finishes, prewired workstations and signage must be in the contract documents. DO NOT REFERENCE THE SID IN THE CONTRACT DOCUMENTS.
- **Prewired Workstations –** Prewired workstations (systems furniture) are included in the FF&E portion for certain projects. When this is the case, the construction contract documents will include prewired workstation design on I-Plates showing the location of the panels, worksurfaces, storage components and other elements of the typical workstations. All coordination with electrical/telephone/computer outlets will be indicated. The workstation layouts are provided for review by the Government to verify coordination of all disciplines, and the purchase of the furniture is not part of the construction contract. A disclaimer will be indicated on the I-Plate. All finishes and procurement information will be included in the FF&E submittal. Contractor will be responsible for verifying all measurements/connections on site before ordering pre-wired workstations. USACE electrical engineer will coordinate all electrical outlet locations with furniture placement for all in-house designs with USACE Interior Designer.
- **Special Requirements -** The interior designer will identify items in the SID or FF&E that require attachment to the building either by cutting or fitting.

15.8.5 FURNITURE/FIXTURES AND EQUIPMENT

- **Use of FF&E** - The FF&E is used during design to review proposed finishes and furniture layouts coded to the furniture illustrations, furniture items, fabrics, colors and furniture costs. It is used by the Government purchaser to procure the furniture. It is used by the User to direct Installation to verify that furniture items received match what was ordered. It is used by Government personnel who administer the construction contract.
- **Scope** - The FF&E is to include accessories such as lamps, clocks, framed artwork, artificial plants, trash receptacles, draperies, bedspreads in addition to furniture, finishes and signage.

15.8.6 SOURCES OF FURNITURE

The Government is required to purchase furnishings from mandatory sources. This includes GSA Federal Supply Service and UNICOR, see paragraph Unicor Waive. If the products offered by these sources do not meet the project requirements, then furnishings can be purchased from commercial vendors that have GSA contracts

under GSA's Multiple Award Schedules. Many commercial furniture companies have GSA contracts with pre-negotiated prices. Only when none of these sources can meet the project requirements can open market items be purchased. When selecting furnishings, always review mandatory sources first, then GSA contract sources, then open market sources. When the interior designer determines FF&E items available on contract do not meet the functional requirements, or there is no current GSA resource, a waiver to use open market sources is required. The designer will write a waiver/justification letter with salient features of that item. The letter will be addressed to:

Director of Furniture Commodity Center
GSA/FSS/FCNE
Crystal Mall Building #4, Room 1010
Washington, DC 20406

This letter will be included on the FF&E binder attached to the applicable order form.

- **Quality of Products –** The designer is to determine the project requirements and then select furnishings that meet these requirements. The products offered through mandatory government sources and GSA contracts represent a very wide range of quality and features. Being included in a GSA contract does not mean that a product meets any minimum quality standard. It is the responsibility of the designer to research products and determine their acceptability.
- **UNICOR Waive –** All furniture/furnishings will be selected under the guidance of the National Defense Authorization Act – FY 2002, S1438, Title VIII, Subtitle B, Sec 811, Para 2410 which states UNICOR is no longer a mandatory source for furniture and a waiver is not All furniture/furnishings will be selected from GSA Schedules.
  - The GSA web site is: www.gsa.gov
  - The UNICOR web site is: www.unicor.gov
- **Customer's Own Material (COM) –** COMs are not permitted, except when selecting fabrics for Army barracks projects designed under the Interior Design Manual for Single Soldier Housing and submitted to the USACE Huntsville District for procurement. A copy of the manual may be ordered by contacting: www.hnc.usace.army.mil.
- **Personal Computers –** Design of all workstations and office furniture, including executive offices, should assume the use of a personal computer and accommodate it with an articulating keyboard tray and corner work surface where feasible.

- **Medical Projects -** For medical projects where furniture items are included on the equipment list provided by the Government, the FF&E location codes will be the numbers from the equipment list.

CHAPTER 16

FIRE PROTECTION

INDEX

CHAPTER 16

FIRE PROTECTION

16.1 GENERAL

16.1.1 SCOPE

This Chapter provides guidance for preparation and development of life safety, site fire apparatus access, site fire utilities design, and fire protection systems including fire suppression and fire detection and alarm systems. Specific design submission requirements in this chapter supplement the requirements in CHAPTER 1 GENERAL INSTRUCTIONS. All required documents, including drawings and design analysis, will be in accordance with CHAPTER 2 PRESENTATION OF DATA.

16.2 APPLICABLE PUBLICATIONS

16.2.1 ALL PROJECTS

The below publications are relevant to the design of all fire protection features and systems for all projects.

Federal Law

ABA	Architectural Barriers Act

Unified Facilities Criteria (UFC)

UFC 1-200-01	DOD Building Code
UFC 3-310-04	Seismic Design for Buildings
UFC 3-600-01	Fire Protection Engineering for Facilities
UFC 4-010-01	DoD Minimum Antiterrorism Standards for Buildings
UFC 4-021-01	Design and O&M: Mass Notification Systems

American Society of Civil Engineers (ASCE)

ASCE-7	Minimum Design Loads and Associated Criteria for Buildings and Other Structures

National Fire Protection Association (NFPA)

NFPA 1	Fire Code (Latest Edition)

NFPA 10	Standard for Portable Fire Extinguishers (Latest Edition)
NFPA 13	Standard for the Installation of Sprinkler Systems (Latest Edition)
NFPA 20	Standard for the Installation of Stationary Pumps for Fire Protection (Latest Edition)
NFPA 72	National Fire Alarm and Signaling Code (Latest Edition)
NFPA 101	Life Safety Code (Latest Edition)

Unified Facilities Guide Specifications (UFGS)

UFGS are updated on a regular basis. Instructions on retrieving UFGS are covered in CHAPTER 23 SPECIFICATIONS.

- **Aircraft Hangars -** In addition to the Codes & Standards in 16.2.1 above, the below listed criteria specifically address Aircraft Hangar fire protection requirements.

Unified Facilities Criteria (UFC) DOD Aircraft Hangars – All, except as exempted by UFC 3-600-01

UFC 4-211-01	Aircraft Maintenance Hangars
UFC 4-211-02	Aircraft Corrosion Control Facilities

Designers will obtain all applicable Installation- and Service-specific UFCs and ETLs pertinent to the fire protection facility design as all applicable UFCs and ETLs are not listed herein. See CHAPTER 1 GENERAL INSTRUCTIONS, paragraph titled “APPLICABLE PUIBLICATIONS” which lists the web site which hosts Air Force, Army and Corps of Engineers design documents.

- **Military Medical Facilities –** In addition to the Codes and Standards 16.2.1 above, the below listed criteria specifically address fire protection requirements for Military Medical Facilities.

Unified Facilities Criteria (UFC)

UFC 4-510-01	Design: Military Medical Facilities

National Fire Protection Association (NFPA)

NFPA 99	Health Care Facilities Code (Latest Edition)

The Joint Commission

JCECS	Environment of Care Standards

16.3 PROJECT DEFINITION (10%)

16.3.1 GENERAL CONSIDERATIONS

The Designated Fire Protection Engineer for the Mobile District (DFPE) must be identified and assigned to the project. The Design Agent's Qualified Fire Protection Engineer (QFPE) must be identified, and qualifications submitted for approval for projects performed by contracted A-E Firms. Requirements for and definitions of the CFPE, DFPE, and QFPE are listed in UFC 3-600-01, chapter 2. The DFPE will approve or disapprove the submitted Professional Engineer for the role of QFPE on the project. During this phase the designer must define the customer's requirements and confirm that they can be met within the project's constraints. To that end, a comprehensive interface with the customer and local fire department personnel is generally required through a design charrette or other previously approved data gathering process. The primary purpose of the design process at this stage is to gather any information from the customer and the local fire department that would be necessary in the design of the facility. Construction types, allowable areas, allowable heights and protection levels for building elements and areas must be determined to ensure that the customer's required building can be constructed in accordance with applicable codes and standards. The requirement for a fire suppression system, the type(s) required, and purpose(s), along with a rough-order-of-magnitude estimate of major equipment sizes, should be provided at the Design Charrette for use in preparing the cost estimate and the sizing of required mechanical space(s). At a minimum, fire flow testing of site fire hydrants must be ordered and scheduled to be completed prior to the 35% Design submission date, regardless of if there is to be a fire sprinkler system or not. If there is currently no site infrastructure, flow testing of the nearest hydrants must be ordered, and the site utilities designer must provide an estimate of available flow and pressure when the site utilities are constructed. Fire pump requirements will be determined as early as possible, but no later than the 35% submission date, to ensure that the associated costs are included in the earliest estimate. Determination of the requirement for fire pumps will be based upon the fire flow test data from the project site and fire protection system design requirements for the project. Caution, for existing facilities, USACE Headquarters has emphasized the need to add sprinkler systems to existing buildings that are required by either the existing buildings provisions of NFPA 101 or UFC 3-600-01, paragraph 9-7.2.4 and the two following paragraphs. Refer to UFC 3-600-01, chapter 34 and NFPA 101, chapter 43 for definitions of the various types of work in existing facilities. At this time, the existing infrastructure for Fire Alarm and

Mass Notification systems (if applicable) must be determined and specific requirements for interconnection and reporting must be determined. Determinations must be made as to sole source requirements for specific equipment manufacturers and sole source justifications be submitted for approval.

- Aircraft Hangars: Determine which design standards (Air Force, Army, Navy) will apply to the project and state the determination in the Narrative/Design Analysis.
- Military Medical Facilities: Determine if one or more Risk Assessments are required to complete the project and provide in accordance with UFC 4-510-01 and NFPA 99 as applicable.

Where it becomes evident that a waiver of a specific requirement of the UFCs or the applicable code or standard requirement is required in order to satisfy a project-specific need, the QFPE must prepare the waiver request and submit to the DFPE who may reject it or commence the waiver request by obtaining the approval of the Mobile District Chief of Engineering Design and Construction and submitting it to the Component Fire Protection Engineer (CFPE) for approval. This process requires a significant amount of time and will impact the project schedule. Completed charrette reports represent a typical Project Definition (10%) design as referenced elsewhere in this Manual.

16.3.2 NARRATIVE

Fire Protection is the combination of five different fields of design that have traditionally belonged to:

Site and Civil Engineering	Fire Apparatus Vehicular Access
Site Utilities	Water Supplies and Fire Flow Testing
Architectural	Occupancy Classifications, Means of Egress, Life Safety Plans, Fire Resistance Ratings
Construction Types	Finishes for Walls, Ceilings, Floors, etc.
Mechanical	Fire Suppression Systems
Electrical	Fire Detection and Alarm Systems

For the design process, these designers may, of necessity, still provide the applicable portion of the design, however, the QFPE must be involved with and in responsible charge of each of these components of the design.

The narrative will include, but not be limited to, the following items as applicable:

- **Code Analysis** – List all references including Government design documents, industry standards, safety manuals, and any customer specific criteria.

Analysis will determine the applicability of Public Laws, UFCs, Service (Army, Air Force, Navy) Standards, Commercial Codes, and Non-Government Standards including their limits and where they do & do not apply. This analysis will be included in this narrative. A list of standards with no language indicating a path of compliance is not acceptable.

- **Site Data –** Describe plan for vehicular access including pavement/ground requirements and number of sides on which access is required. Also describe any special or other external hazards to the building(s) and any required separation distances.
- **Site Utility Water Supplies –** List any preliminary, historical, or relevant fire flow test data or water system supply information to include test date(s) and location(s) of hydrants tested. Include information as to requirements for fire water storage tank(s).
- **Architectural Building Features -** Occupancy(ies) and Use(s), Building Construction Type(s), Allowable Height, Number of Stories, Allowable Floor Area, Required Separations, Occupant Counts, Means of Egress, Travel Distance, Exits, Finishes. Describe any special hazards or enclosures as well as assumptions made in selecting the feature(s) described.
- **Suppression System Type(s) –** Describe the proposed type(s) of fire suppression system(s), the anticipated demand, and if fire pumps and/or storage tank(s) are required. Describe any special hazards or suppression requirements as well as assumptions made in selecting the system(s) described.
- **Fire Detection and Alarm –** Describe the Fire Alarm and Mass Notification System requirements. Describe any special hazards or detection requirements as well as assumptions made in selecting the system(s) described. Where additions or alterations to existing systems are to be made, verify that the systems can accommodate the additions or alterations.
- **Demolition –** Describe any required demolition and limits of demolition. Include any assumptions made about features, systems, and/or devices to be reused.
- **Environmental –** List any environmental concerns and address actions to be taken.

16.4 CONCEPT DESIGN (35%)

16.4.1 GENERAL CONSIDERATIONS

During the Concept Design, it is recognized that all floor plans and design decisions are preliminary for analysis purposes. Any dimensions and sizes required are rough,

order-of-magnitude figures to assure adequate space for installation and maintenance of equipment, and utility elements such as piping in congested areas. System calculations, while subject to change and only indicate approximate capacities of equipment, must be adequate to determine whether fire pumps and/or storage tanks are required. If in doubt, size for worst case conditions.

Equipment shown in plans is not shown in great detail but is shown merely as simple geometric forms with approximately correct dimensions and approximate order of magnitude sizes.

- **Design Analysis –** The Concept Design Analysis will include, but not be limited to, the following items as applicable:

- **Code Analysis –** Provide the same analysis as for the 10% Design but modify as necessary based on changes to the project/building(s)/site that have resulted from the progress of the design. List any changes since previous submission.

- **Site Data –** Describe plan for vehicular access including pavement/ground requirements and number of sides on which access is required. Also describe any special or other external hazards to the building(s) and any required separation distances. List any changes since previous submission. In addition, obtain all information necessary to determine the Seismic Design Category as defined in ASCE 7.

- **Site Utility Water Supplies –** List any preliminary, historical, or relevant fire flow test data or water system supply information to include test date(s) and location(s) of hydrants tested. Include information as to requirements for fire water storage tank(s). List any changes since previous submission.

- **Architectural Building Features –** Occupancy(ies) and Use(s), Building Construction Type(s), Allowable and Actual Height, Allowable and Actual Number of Stories, Allowable and Actual Floor Area, Required Separations, Allowable and Actual Occupant Counts, Means of Egress and widths, number of Exits, Finishes, etc. Describe any special hazards or enclosure as well as assumptions made in selecting the feature(s) described. List any changes since previous submission.

- **Suppression System Type(s) –** Describe the proposed type of fire suppression systems, the anticipated demand, and if fire pumps and/or storage tank are required. If water sprinkler systems are to be provided, preliminary hydraulic calculations will be prepared for the most hydraulically demanding area to insure that flow and pressure requirements can be met with the planned water systems. Describe any special hazards or

suppression requirements as well as assumptions made in selecting the system(s) described. List any changes since previous submission.

- **Fire Detection and Alarm –** Describe the Fire Alarm and Mass Notification System requirements. Describe any special hazards or detection requirements as well as assumptions made in selecting the system(s) described. Include the requirements for interfacing the new work with all existing systems and list the existing systems requiring interface. List any changes since previous submission.

- **Demolition –** Describe any required demolition and limits of demolition. Include any assumptions made about features, systems, and/or devices to be reused. List any changes since previous submission.

- **Environmental –** List any environmental concerns and address actions to be taken. List any changes since previous submission.

- **Secure Facilities –** Identify any special security requirements such as those for penetration of secure boundaries by piping or conduits.

- **Risk Assessments –** Include copies of any Risk Assessments conducted as Appendices to the Design Analysis. Address how the design will mitigate the risks enumerated in the assessment(s).

16.4.2 SPECIFICATIONS

Provide a basic outline in accordance with UFC 1-300-02 and taken from the available Unified Facilities Guide Specification sections under the Specifications & Criteria page at the UFGS link:

https://www.wbdg.org/

16.4.3 DRAWINGS

- **The Fire Protection Drawings –** including Site Civil, Site Utilities, Architectural Life Safety Plans, Fire Suppression Plans, and Fire Detection and Alarm Plans should be grouped together at the front of the set of drawings, before the Structural Drawings.

- **Quantity of Concept Drawings –** are to be kept to the minimum number required to convey basic systems information. Some system information required in the Concept Submission may logically be included on other discipline drawings in the design analyses and need not be completed on formal drawings. The Concept Design Drawings should include, but not be limited to, the following items as applicable:

- **Site Civil Plan –** Highlight the fire truck access, the fire department connection(s), and the locations of fire hydrants. Turn off or lighten extraneous lines/layers/levels/information such that the information of this paragraph is apparent. Ensure that the line symbology and abbreviations are clearly defined in the legend.

- **Site Utility Water Supply Plan –** Highlight the locations of water source mains, flow tested fire hydrants, fire pump houses, water storage tanks, and the service branch line(s) to the building as applicable. Turn off or lighten extraneous lines/layers/levels/information such that the information of this paragraph is apparent. Ensure that the line symbology and abbreviations are clearly defined in the legend.

- **Life Safety (Analysis) Plans –** Illustrate the location and rating of any fire-resistive construction such as occupancy separations, area separations, smoke compartments, exterior walls, shaft enclosures, corridors, stair enclosures, exit passageways and widths, door labels, door hold-opens, fire extinguisher cabinet locations, smokeproof doors, exit lights, and signage, and furniture, fixtures and equipment etc. Indicate any hazardous areas and their classification. Include Code Analysis sheet with data provided in narrative. Turn off or lighten extraneous lines/layers/levels/information such that the information of this paragraph is apparent. Ensure that the line symbology and abbreviations are clearly defined in the legend.

- **Fire Suppression Plans –** Indicate the location and coverage of any fire suppression systems (e.g., sprinkler risers, standpipes, fire department connection, etc.). Provide description of type sprinkler system to be provided (e.g., dry pipe, preaction, wet pipe, etc.). Address special sprinkler system coverages required for high-piled storage, in-rack systems, ESFR systems, etc. Plans should also include notes addressing security requirements (e.g., dielectric couplings, grounding, etc.). Indicate any special suppression requirements for hazardous areas. Turn off or lighten extraneous lines/layers/levels/information such that the information of this paragraph is apparent. Ensure that the line symbology and abbreviations are clearly defined in the legend.

    - For hangars, include design of fire suppression foam systems including foam concentrate tanks, foam fire pumps, foam proportioner locations, and foam generator locations with aircraft silhouettes indicated so as to compare discharge pattern with coverage of aircraft.

    - For inpatient care facilities, include sprinkler zoning plans which should coincide with smoke zones and fire alarm zoning if applicable.

- **Fire Detection and Alarm Plans –** Provide Fire alarm and mass notification floor plans dedicated to life safety components. Additional electronic systems

will not be shown on fire alarm floor plans, except those components that require integration with the fire alarm system. Plans should include notes addressing security requirements (e.g., dielectric couplings, grounding, etc.).

- Provide a complete fire alarm and symbol legend for all devices and equipment shown on the plans. Use NFPA standard symbology for fire alarm devices.
- Provide fire alarm and mass notification floor plans that show all panels, notification devices (including strobes, textual signs, speakers, horns, etc.), initiating devices (including pull stations, detection devices, switches, etc.), and other significant components. Include any required releasing service panels for special suppression systems.
- Show the proposed riser diagram for fire alarm and mass notification systems. Sizes of conduit, cables, etc., need not be included at the 30-35% design level.
- Indicate any special requirements for hazardous areas.
- For hangars, illustrate and indicate the preliminary locations of Releasing Service Fire Alarm Control Unit, Manual Release Stations, Manual Stop Stations, Beacons, and Infra-red/Ultraviolet flame detectors.
- For inpatient care facilities, include fire detection and alarm zoning to match the architectural smoke zones and suppression system zones.

16.5 INTERIM DESIGN (65%)

16.5.1 GENERAL CONSIDERATIONS

At this level of the design, the drawings should be 95 percent developed with only minor details missing and any outstanding questions awaiting answers called out distinctly on the plan sheets. The specifications should all be edited with markups (deletions and additions) showing. All floor plans should be set after making changes required by the review of the 35% Submission. All calculations should be sufficiently developed such that equipment sizes and locations should be locked in and interdisciplinary coordination is nearing completion.

16.5.2 DESIGN ANALYSIS

- All design decisions must be justified herein or indicate that an answer to a design question is still needed from a cognizant authority. A needs list should be in regular circulation among the members of the Project Team.

- The Interim Design Analysis will include, but not be limited to, the following items as applicable:
- **Code Analysis –** Provide the same analysis as for the 35% Design but modify as necessary based on changes to the project/building(s)/site that have resulted from the progress of the design. List any changes since previous submission.
- **Site Data –** Describe plan for vehicular access including pavement/ground requirements and number of sides on which access is required. Also describe any special or other external hazards to the building(s) and any required separation distances. List any changes since previous submission. If not yet acquired, obtain all information necessary to determine the Seismic Design Category as defined in ASCE 7.
- **Site Utility Water Supplies –** List any preliminary, historical, or relevant fire flow test data or water system supply information to include test date(s) and location(s) of hydrants tested. Include information as to requirements for fire water storage tank(s). For hangars, water supply must serve both the hangar bay sprinkler system demand and the foam suppression system demand simultaneously. List any changes since previous submission.
- **Architectural Building Features –** Occupancy(ies) and Use(s), Building Construction Type(s), Allowable and Actual Height, Allowable and Actual Number of Stories, Allowable and Actual Floor Area, Required Separations, Allowable and Actual Occupant Counts, Means of Egress and widths, number of Exits and, Finishes, etc. Describe any special hazards or enclosure as well as assumptions made in selecting the feature(s) described. List any changes since previous submission.
- **Suppression System Type(s) –** Describe the proposed type of fire suppression systems, the anticipated demand, and if fire pumps and/or storage tank are required. If water sprinkler systems are to be provided, preliminary hydraulic calculations will be prepared for the most hydraulically demanding area to insure that flow and pressure requirements can be met with the planned water systems. Describe any special hazards or suppression requirements as well as assumptions made in selecting the system(s) described.
    - For hangars, include calculations of fire suppression foam system water and foam concentrate flows and quantities to size foam concentrate tanks, foam fire pumps, service laterals, fire pumps, foam proportioners/inductors, foam generators, surge arrestors, and water storage. Provide hydraulic analysis based on layout presented in drawings to determine compliance with required coverage of aircraft silhouettes and full volume of foam requirements. Coordinate with Utilities Engineer. List any changes since previous submission.

- For inpatient care facilities, ensure that fire suppression demand is met by each of the two required service entrance water supplies.

- Fire Detection and Alarm: Describe the Fire Alarm and Mass Notification System requirements. Describe any special hazards or detection requirements as well as assumptions made in selecting the system(s) described. Include the requirements for interfacing the new work with all existing systems and list the existing systems requiring interface. Describe any obstacles to the interface with the existing systems and how they are to be overcome. Be sure to discuss any sole source justifications that may be needed. List any changes since previous submission. Provide a "Cone of Detection Plan" for the flame detectors including aircraft silhouettes to show that all areas have required coverage listed in UFC 4-211-01 (include in the interim submissions, but once approved, do not include in the construction drawings).
- Demolition: Describe any required demolition and limits of demolition. Include any assumptions made about features, systems, and/or devices to be reused. List any changes since previous submission.
- Environmental: List any environmental concerns and address actions to be taken. List any changes since previous submission.
- Secure Facilities: Identify any special security requirements such as those for penetration of secure boundaries by piping or conduits. List any changes since previous submission.
- Risk Assessments: Include copies of any Risk Assessments conducted as Appendices to the Design Analysis. Address how the design will mitigate the risks enumerated in the assessment(s).

16.5.3 SPECIFICATIONS

Provide fully edited specifications starting with Unified Facilities Guide Specifications (UFGS) covering all materials, equipment, and systems, and all performance requirements. Do not re-use sections from older, similar projects without verifying that the sections are still valid in the UFGS list on www.wbdg.org. Edits should be visible in mark-up form with deletions and additions clearly discernable from unedited text.

Edit guide specifications to remove non-applicable language. Do not change requirements other than capacity, rates, or dimensions for systems that are to be provided without consulting the DFPE unless guide specifications contain requirements in conflict with applicable UFC requirements.

16.5.4 DRAWINGS

Again, the Fire Protection Drawings including Site Civil, Site Utilities, Architectural Life Safety Plans, Fire Suppression Plans, and Fire Detection and Alarm Plans should be grouped together at the front of the set of drawings, before the Structural Drawings.

The Interim Design Drawings should include, but not be limited to, the following items as applicable:

- **Site Civil Plan –** Highlight the fire truck access, the fire department connection(s), and the locations of fire hydrants. Turn off or lighten extraneous lines/layers/levels/information such that the information of this paragraph is apparent. Ensure that the line symbology and abbreviations are clearly defined in the legend.
- **Site Utility Water Supply Plan –** Highlight the locations of water source mains, flow tested fire hydrants, fire pump houses, water storage tanks, and the service branch line(s) to the building as applicable. Turn off or lighten extraneous lines/layers/levels/information such that the information of this paragraph is apparent. Ensure that the line symbology and abbreviations are clearly defined in the legend.
- **Life Safety (Analysis) Plans –** Illustrate the location and rating of any fire-resistive construction such as occupancy separations, area separations, smoke compartments, exterior walls, shaft enclosures, corridors, stair enclosures, exit passageways and widths, door labels, door hold-opens, fire extinguisher cabinet locations, smokeproof doors, exit lights, fire extinguisher cabinets and signage and Furniture Fixture and Equipment (FF&E), etc. Indicate any hazardous areas and their classification. Include Code Analysis sheet with data provided in narrative. Turn off or lighten extraneous lines/layers/levels/information such as the FF&E so such that the information of this paragraph is apparent. Ensure that the line symbology and abbreviations are clearly defined in the legend.
- **Fire Suppression Plans –** Indicate the location and coverage of any fire suppression systems (e.g., sprinkler risers, standpipes, fire department connection, etc.). Indicate fire service water line(s) from 5 feet outside the building to the riser(s). Provide description of type sprinkler system to be provided (e.g., dry pipe, preaction, wet pipe, etc.). Address special sprinkler system coverages required for high-piled storage, in-rack systems, ESFR systems, etc. Plans should also include notes addressing security requirements (e.g., dielectric couplings, grounding, etc.). Indicate any special suppression requirements for hazardous areas. Sprinkler system performance requirements should be indicated for every room by hatching except that Light Hazard spaces may be left unhatched so long as this is defined in the legend. General requirements such as hose stream allowance(s) and duration(s)

should also be indicated, preferably on the legend sheet. Include Fire Flow Test data that is current. Provide details of different sprinkler types and special situations as applicable. Turn off or lighten extraneous lines/layers/levels/ information such that the information of this paragraph is apparent. Ensure that the line symbology, hatching, and abbreviations are clearly defined in the legend. Indicate seismic design requirements, including ASCE 7 Seismic Design Category, Importance Factor for the building, and acceleration values SDS & SD1 in order for the Contractor to design bracing.

- For aircraft hangars, include design of fire suppression foam systems including foam concentrate tanks, foam fire pumps, foam mixing proportioner locations, and foam generator locations with aircraft silhouettes indicated so as to compare discharge pattern with coverage of aircraft. Include preliminary routing of fire foam solution piping to foam generators from foam mixing risers such that minimum flow velocities in pipes can be used to determine time from actuation to discharge at most remote foam generator(s) in order to assess the efficacy of the system's 60 second coverage requirement compliance. Then use maximum pipe sizes obtained to calculate pressure drop and add to required pressure at base of risers and to head calculations for sizing main fire pump(s). Provide basic, generic details for the mounting/piping requirements on the foam generators.

- For inpatient care facilities, include sprinkler zoning plans which should coincide with smoke zones and fire alarm zoning if applicable. Locate sources for connection or reconnection of new sprinkler piping for renovations and modifications to existing facilities.

- **Fire Detection and Alarm Plans –** Fire alarm floor plans will be essentially complete with all panels, devices, and components shown and labeled. Floor plans should show all initiating devices, signaling devices, notification devices, contacts/relays for other systems that require fire alarm signal (such as HVAC shutdown or door release), etc. Plans should include notes addressing security requirements (e.g., dielectric couplings, grounding, etc.). Identify any hazardous areas in accordance with NFPA 70. Indicate any special detection requirements for hazardous areas. Ensure that the line symbology and abbreviations are clearly defined in the legend.

    - Provide enlarged drawings and/or elevation drawings of spaces when necessary to clearly show device locations at fire risers or pumps.

    - Provide a complete matrix that clearly indicates the sequence of operation of fire alarm and mass notification system. Provide a separate releasing system matrix in accordance with UFC 4-211-01 when required.

- Fire alarm riser diagram will be essentially complete. Risers should indicate the location of major components and interconnections with other systems such as HVAC panel connections to fire alarm panels, etc.
- For hangars, illustrate the final locations of Releasing Service Fire Alarm Control Unit, Manual Release Stations, Manual Stop Stations, Beacons, and Infra-red/Ultraviolet flame detectors. Coordinate with suppression system to make sure all valve supervisory requirements are addressed including possible tamper switch requirements at individual foam generators. Ensure plans include language addressing watertight conduit, devices and junction boxes in accordance with UFC requirements.
- For inpatient care facilities, include fire detection and alarm zoning to match the architectural smoke zones and suppression system zones.

16.6 95% DESIGN

16.6.1 GENERAL CONSIDERATIONS

At this level of the design, the drawings should be 100% developed with no details missing and all outstanding questions answered. The specifications should all be edited and printed to PDFs in their final format. All floor plans should be set. All calculations should be complete. If this is not the case, the submission is not complete.

16.6.2 DESIGN ANALYSIS

All design decisions must be justified. A needs list should be in regular circulation among the members of the Project Team and all answers should be provided at this point. Missing responses to significant design questions, may render this submission incomplete. The Design Analysis will include, but not be limited to, the following items as applicable:

- **Code Analysis –** Provide the same analysis as required for the Interim (65%) design but modify as necessary based on changes to the project/building(s)/site that have resulted from the progress of the design. List any changes since previous submission.
- **Site Data –** Provide a similar description of the plan for vehicular access as required for the previous submission but incorporating any changes in the design or requirements. List any changes since previous submission.
- **Site Utility Water Supplies –** List the latest relevant fire flow test data or water system supply information to include test date(s) and location(s) of hydrants tested that is included in the design documents. Include

information as to requirements for fire water storage tank(s). For hangars, water supply must serve both the hangar bay sprinkler system demand and the foam suppression system demand simultaneously. List any changes since previous submission.

- **Architectural Building Features –** This information should be the same as for the previous submission but with any changes to the design and/or requirements incorporated. List any changes since previous submission.

- **Suppression System Type(s) –** Describe the planned type of fire suppression systems as indicated in the requirements for the Interim (65%) submission. List any changes to the design and requirements since the previous submission.

    - For hangars, include updated calculations of fire suppression foam system water and foam concentrate flows and quantities to size foam concentrate tanks, foam fire pumps, service laterals, fire pumps, foam proportioners/inductors, foam generators, surge arrestors and water storage. Provide hydraulic analysis based on layout presented in drawings to determine compliance with required coverage of aircraft silhouettes and full volume of foam requirements. Coordinate with Utilities Engineer. List any changes since previous submission.

    - For inpatient care facilities, ensure that fire suppression demand is met by each of the two required service entrance water supplies. List any changes since previous submission.

- **Fire Detection and Alarm –** Describe the Fire Alarm and Mass Notification System requirements as required in the Interim (65%) submission requirements. Be sure to discuss any sole source justifications that have been granted and include documentation. List any changes since previous submission. For hangar facilities having foam suppression systems actuated by infra-red/ultraviolet flame detectors, provide a “cone of detection” plan in the design analysis indicating that all areas under and around the aircraft are visible to at least three flame detectors. Do not include this document in the contract drawings.

- **Demolition –** Describe any required demolition and limits of demolition. Include any assumptions made about features, systems, and/or devices to be reused. List any changes since previous submission.

- **Environmental –** List any environmental concerns and address actions to be taken. List any changes since previous submission.

- **Secure Facilities –** Identify any special security requirements such as those for penetration of secure boundaries by piping or conduits. List any changes since previous submission.

- **Risk Assessments –** Include copies of any Risk Assessments conducted as Appendices to the Design Analysis. Address how the design will mitigate the risks enumerated in the assessment(s).

16.6.3 SPECIFICATIONS

Provide fully edited specifications starting with Unified Facilities Guide Specifications (UFGS) covering all materials, equipment, and systems, and all performance requirements. Specifications should now be printed to PDF in their final format. Ensure there are no paragraph gaps or other spaces. Ensure all brackets are deleted and design decisions made. Ensure that all references to other specifications sections refer to sections that actually exist.

16.6.4 DRAWINGS

Again, the Fire Protection Drawings including Site Civil, Site Utilities, Architectural Life Safety Plans, Fire Suppression Plans and Fire Detection and Alarm Plans should be grouped together at the front of the set of drawings, before the Structural Drawings. The Final Design Drawings should include, but not be limited to, the following items as applicable:

- **Site Civil Plan –** Highlight the fire truck access, the fire department connection(s), and the locations of fire hydrants. Turn off or lighten extraneous lines/layers/levels/information such that the information of this paragraph is apparent. Ensure that the line symbology and abbreviations are clearly defined in the legend.

- **Site Utility Water Supply Plan** – Highlight the locations of water source mains, flow tested fire hydrants, fire pump houses, water storage tanks, and the service branch line(s) to the building as applicable. Turn off or lighten extraneous lines/layers/levels/information such that the information of this paragraph is apparent. Ensure that the line symbology and abbreviations are clearly defined in the legend.

- **Life Safety Plans –** Provide a Code Analysis Sheet with the information required in the Design Analysis, including Occupancy(ies) and Use(s), Building Construction Type(s), Allowable and Actual Height, Allowable and Actual Number of Stories, Allowable and Actual Floor Area, Required Separations, Allowable and Actual Occupant Counts, Means of Egress, Exits, Finishes, etc. Describe any special hazards or enclosure as well as assumptions made in

selecting the feature(s) described. List any changes since previous submission. On the plan sheets, illustrate the location and rating of any fire-resistive construction such as occupancy separations, area separations, exterior walls, shaft enclosures, corridors, stair enclosures, exit passageways, etc. Indicate any hazardous areas and their classification. Turn off or lighten extraneous lines/layers/levels/ information such that the information of this paragraph is apparent. Ensure that the line symbology and abbreviations are clearly defined in the legend.

- **Fire Suppression Plans –** Indicate the location and coverage of any fire suppression systems (e.g., sprinkler risers, standpipes, fire department connection, etc.). Indicate fire service water line(s) from five feet outside the building to the riser(s). Provide description of type sprinkler system to be provided (e.g., dry pipe, preaction, wet pipe, etc.). Address special sprinkler system coverages required for high-piled storage, in-rack systems, ESFR systems, etc. Plans should also include notes addressing security requirements (e.g., dielectric couplings, and grounding, etc.). Indicate any special suppression requirements for hazardous areas. Sprinkler system performance requirements should be indicated for every room by hatching except that Light Hazard spaces my be left unhatched so long as this is defined in the legend. General requirements such as hose stream allowance(s) and duration(s) should also be indicated, preferably on the legend sheet. Include Fire Flow Test data that is current. Provide details of different sprinkler types and special situations as applicable. Turn off or lighten extraneous lines/layers/levels/ information such that the information of this paragraph is apparent. Ensure that the line symbology, hatching, and abbreviations are clearly defined in the legend. Fire suppression plans will include graphical indication of fire and smoke rated partitions as well as secure boundaries. Refer to CADD/BIM requirements in this Manual and in the UFCs.

    - For aircraft hangars, include design of fire suppression foam systems including foam concentrate tanks, foam fire pumps, foam mixing proportioner locations and foam generator locations with aircraft silhouettes indicated so as to compare discharge pattern with coverage of aircraft. Include preliminary routing of fire foam solution piping to foam generators from foam mixing risers such that minimum flow velocities in pipes can be used to determine time from actuation to discharge at most remote foam generator(s) in order to determine 60 second coverage requirement compliance. Then use maximum pipe sizes obtained to calculate pressure drop and add to required pressure at base of risers and to head calculations for sizing main fire pump(s). Provide basic, generic details for the mounting/piping requirements on the foam generators.

- For inpatient care facilities, include sprinkler zoning plans which should coincide with smoke zones and fire alarm zoning if applicable. For renovations and modifications to existing facilities, locate sources for connection or reconnection of new sprinkler piping.

- Fire Detection and Alarm Plans: Fire alarm plans, details, risers, and matrices should be complete with all devices and equipment finalized. Thoroughly check the drawings for discrepancies, compatibility between drawings and specifications, and for compatibility between disciplines. Where additions or alterations to existing systems are made, the designer will have verified that the existing system can accommodate the additions. Information on manufacturer, model number, etc. of the existing equipment will be included in the plans and specifications. Provide description of type of system with a Fire Alarm (/MNS) Riser Diagram. Riser should include all panels and all interconnections with other systems. Indicate the location of Fire Alarm Panels, Local Panels, Mass Notification Displays and manual pull stations. Plans should include notes addressing security requirements (e.g., dielectric couplings, grounding, etc.). Identify any hazardous areas in accordance with NFPA 70. Indicate any special detection requirements for hazardous areas. Include any required releasing service panels for special suppression systems. Turn off or lighten extraneous lines/layers/levels/information such that the information of this paragraph is apparent. Ensure that the line symbology and abbreviations are clearly defined in the legend. Fire detection and alarm plans will include graphical indication of fire and smoke rated partitions as well as secure boundaries. Refer to CADD/BIM requirements in this Manual and in the UFCs.

- For hangars, illustrate the final locations of Releasing Service Fire Alarm Control Unit, Manual Release Stations, Manual Stop Stations, Beacons, and Infra-red/Ultraviolet flame detectors. Coordinate with suppression system to make sure all valve supervisory requirements are addressed including possible tamper switch requirements at individual foam generators.

- For inpatient care facilities, include fire detection and alarm zoning to match the architectural smoke zones and suppression system zones.

16.7 100% Final Design

The comments generated concerning the 95% submission and ALL PREVIOUS SUBMISSIONS will be answered or incorporated in the design analysis, specifications and drawing before they are submitted as "Ready to Advertise." Submit Drawings and Specifications in their final form. The Design Analysis document from the previous

submissions should only be included if changes were made to the Unreviewed 100% document.

16.8 TECHNICAL REQUIREMENTS

16.8.1 CODES, STANDARDS, DOD REQUIREMENTS AND FEDERAL LAW

- **Federal Law –** There are specific laws that apply to projects or portions of projects that must be followed. The UFCs and other DoD publications attempt to express these requirements in Code Language. However, the UFCs are NOT exhaustive and cannot be relied upon solely to comply with all applicable law. In addition, the laws of the State in which the facility is located may be enforced with regards to historic, environmental, and/or water concerns.
- **Code Compliance –** The UFCs should not be relied upon solely for code compliance. For fire protection, UFC 3-600-01 does not provide all of the requirements for code compliance. It does, however, provide a road map for the codes to be followed and provides specific exceptions to the codes. Where a UFC is silent, the designers should fall back on the applicable NFPA, IBC, or other relevant non-government codes and standards for design unless the UFC specifically directs otherwise. As an example, UFC 3-600-01 directs the design of sprinkler systems to follow NFPA 13, but UFC 4-211-01 directs that aircraft hangar designs not follow NFPA 409 except where specifically directed in the UFC. For architectural fire protection features, UFC 3-600-01 splits requirements between the International Building Code and NFPA 101. As always, good engineering practice and the laws of physics must guide the design of all systems.
- **UFC Hierarchy –** Refer to UFC 1-200-01.
- **Design –** UFC 3-600-01, Fire Protection Engineering for Facilities, is the primary design requirements document for fire protection design for DoD facilities as well as many Public Works facilities and is supplemented by the non-Government codes and standards listed therein. Designers are cautioned to follow the order of design criteria precedence stated in each various design document, always starting with UFC 3-600-01 for primary directives.
- For Aircraft Maintenance Hangars where UFC 4-211-01 applies, refer to Chapter 3 of UFC 4-211-01 for general requirements, and chapters 5, 6 and 7 for Air-Force-, Army-, and Navy-specific requirements. Requirements of UFC 4-211-01 that differ from those of UFC 3-600-01 will override and govern.
- For Inpatient Care and other DoD Medical Facilities, UFC 4-510-01, Design: Military Medical Facilities, will apply. Requirements of UFC 4-510-01 that differ from those of UFC 3-600-01 will override and govern. In addition, comply with JCECS unless directly in conflict with UFC requirements.

- **Existing Facilities –** Caution, USACE Headquarters has emphasized the need to add sprinkler systems to existing buildings that are required by either the existing buildings provisions of NFPA 101 or UFC 3-600-01, paragraph 9-7.2.4 and the two following paragraphs. Refer to UFC 3-600-01, chapter 34 and NFPA 101, chapter 43 for definitions of the various types of work in existing facilities.

16.8.2 DESIGN REQUIREMENTS FOR SPECIFIC BUILDING FEATURES AND SYSTEMS

- **Site Considerations –** Fire department access must be designed to comply with UFC 3-600-01 and NFPA 1, as applicable. General requirements begin in Chapter 9 of UFC 3-600-01. Specific facility types may have additional requirements as indicated in Chapter 4 of the UFC. For aircraft hangars, additional requirements are detailed in UFC 4-211-01.

- **Utility Water Supply –** The need for a water-based fire suppression system must be determined early in the project. Regardless of the requirement, the water supply needs to support either the flows required by NFPA 1 via the nearest fire hydrants or the sprinkler demand. In either case, the required flow rate must be available with no less than 20 PSIg residual pressure at the nearest fire hydrant. Design fire pumps, their accessories, and their enclosing facilities in accordance with NFPA 20, except as modified by UFC.

    - For aircraft hangars, determine the fire suppression demand from the hangar bay sprinkler system design flow added to the flow required for the foam system flow and include the 500-GPM hose stream allowance, unless supplied by a separate water utility system.

    - For inpatient medical facilities, comply with requirements of UFC 4-510-01 in addition to those of UFC 3-600-01.

- **Architectural –** UFC 3-600-01 directs that Architectural features such as allowable number of floors, allowable floor area(s), and allowable building height comply with the IBC (International Building Code) requirements. Means of egress and exit requirements must comply with NFPA 101 requirements. As a result, a dual approach to code compliance must be made. Building construction type, occupancy, use, and number of occupants must be addressed for both IBC & NFPA 101 and then the appropriate information be used to determine what is allowable.

    - Fire protection features of aircraft maintenance hangars must also comply with the requirements of UFC 4-211-01 and only follow NFPA 409 where specifically directed in the UFC. Take care to follow the UFC 4-211-01 general requirements of Chapter 3 and the service-specific requirements of Chapters 5, 6 or 7. Hangar facilities housing unmanned aerial vehicle

systems may or may not be required to comply with UFC 4-211-01, as detailed in paragraph 4-4.4 of UFC 3-600-01.

- Fire protection features of Military Medical Facilities may have additional requirements as detailed in UFC 4-510-01. Planning for rehabilitation projects must include a Life Safety Assessment (LSA) in accordance with paragraph 14-2 of the UFC. Provide portable fire extinguishers in accordance with paragraph 14-5 of the UFC and NFPA 10.

- **Fire Suppression Systems –** A building must be protected by a fire sprinkler system throughout as required by UFC 3-600-01, NFPA 101, or to comply with allowable floor areas, heights, separations, or allowable number of stories as directed by IBC. For specific types of buildings, the requirements of UFC 3-600-01 chapter 4 will take precedence. For existing facilities, USACE Headquarters has emphasized the need to add sprinkler systems to existing buildings that are required by either the existing buildings provisions of NFPA 101 or UFC 3-600-01, paragraph 9-7.2.4 and the two following paragraphs. Refer to UFC 3-600-01, chapter 34 and NFPA 101, chapter 43 for definitions of the various types of work in existing facilities. The requirements for sprinkler systems and any supporting fire pumps and/or storage tanks must be determined during the early development of the project scope when construction budgets can be adjusted for the added cost.

  - For manned aircraft maintenance hangars, comply with the requirements of UFC 4-211-01. While NFPA 409 is referred to in the UFC, only follow NFPA 409 where specifically directed in the UFC. Take care to follow the UFC 4-211-01 general requirements of Chapter 3 and the service-specific requirements of Chapters 5, 6 or 7. Hangar facilities housing unmanned aerial vehicle systems may or may not be required to comply with UFC 4-211-01, as detailed in paragraph 4-4.4 of UFC 3-600-01. Do not use AFFF on any new Installation. Where hangar bays are required to have high expansion foam systems and sprinkler systems, the water supply must be sized as if both systems are operating simultaneously and include a 500-GPM hose stream allowance from the nearest fire hydrant on the site if it is on the same utility water system. While the design requirements for the hangar bay foam and sprinkler systems will remain a performance specification for the Construction Contractor's QFPE to supervise and perform, the waterflow demand is of sufficient importance that a preliminary design of these systems is necessary. The specifying QFPE will prepare a preliminary design of the hangar bay suppression systems including fire flow calculations with the foam system at full flow and the sprinkler system at a minimum flow of 0.2 GPM/SF that covers the hydraulically most demanding 5,000 square feet of the bay. These calculations may be of the hand-type if sufficiently conservative, but a

software calculation is preferred. For Army projects, foam concentrate pumps and proportioners are required. Foam concentrate pumps are considered fire pumps and their installation must comply with NFPA 20. For Air Force hangars, the design must be reviewed by the USACE Center of Expertise at all design stages for compliance with applicable standards including Air Force ETL 02-15. In addition, the USACE Center of Expertise must review all fire protection system shop drawings. A DFPE from the USACE Center of Expertise will perform the final acceptance testing of the hangar fire protection systems and final acceptance of the building will not occur until accepted by the USACE Center of Expertise's DFPE.

- For military medical facilities, comply with UFC 4-510-01. Provide automatic sprinkler protection in accordance with paragraph 14-4 of the UFC. For defend in place zones, sprinklers within a smoke zone must be fed by a single connection to the water source and provided with a control valve, flow switch, tamper switch, check valve, and zone-labeled monitoring by the fire alarm. The smoke zone, sprinkler zone, and fire alarm zone must match. Provide portable fire extinguishers in accordance with paragraph 14-5 of the UFC and NFPA 10.

- **Fire Detection, Alarm and Mass Notification Systems (MNS) –** Design fire alarm system and mass notification systems to comply with ABA, UFC 3-600-01, UFC 4-010-01, UFC 4-021-01, and NFPA 72 (except as modified by the UFCs). As a first step, determine if the building to be designed will be considered "inhabited" or "low occupancy" as defined in UFC 4-010-01. MNS systems are not required for low occupancy buildings. UFC 4-010-01 requirements only apply to inhabited buildings, but standards should be applied for low occupancy buildings as well, where practical and to the extent the budget allows.

  - Show location of all system components on floor plans. Floor plans should represent a system that complies with all relevant ABA, NFPA, and UFC requirements. Notification device ratings, including speaker wattages and strobe candela ratings, will be determined by the fire alarm contractor during the development of shop drawings. Clearly indicate this requirement in the specifications.

  - Provide riser diagrams that shows all panels (control, releasing, annunciators, local operating consoles, etc.), zones, transmitters, interfaces to other systems and other significant components.

  - The fire alarm system must report to a central station via transceiver, transmitter connected to telephone lines, or existing fire reporting system. The method of communication will be based on the local Installation requirement. The contractor does not normally supply the central station

receiver module; however, any equipment supplied must be fully compatible with the central station equipment. The make and model number of control station equipment must be determined for inclusion in the specifications.

- Include any Installation-specific mass notification messages where applicable. Coordinate this requirement with the Installation.
- For manned aircraft maintenance hangars, comply with the requirements of UFC 4-211-01. While NFPA 409 is referred to in the UFC, only follow NFPA 409 where specifically directed in the UFC. Take care to follow the UFC 4-211-01 general requirements of Chapter 3 and the service-specific requirements of Chapters 5, 6, or 7. Hangar facilities housing unmanned aerial vehicle systems may or may not be required to comply with UFC 4-211-01, as detailed in paragraph 4-4.4 of UFC 3-600-01. Where hangar bays are required to have high expansion foam systems, provide the releasing service fire alarm control unit (RSFACU) separate from the fire alarm control unit (FACU). Provide the manual release stations, manual stop stations, and blue beacons. Where foam concentrate pumps are required for the foam systems, they must be treated as fire pumps. Design of the releasing system should comply with the service specific requirements of UFC 4-211-01 chapters 5, 6 and 7, whichever is applicable (that is Air Force, Army or Navy, respectively).
- For military medical facilities, comply with UFC 4-510-01. Provide fire alarm/MNS in accordance with paragraph 14-6 of the UFC. For defend in place zones, monitor the flow and tamper switches, and all detection within a smoke zone as a single fire alarm zone. The smoke zone, sprinkler zone, and fire alarm zone must match. In addition, comply with JCECS unless directly in conflict with UFC requirements.

CHAPTER 17

PLUMBING

INDEX

CHAPTER 17

PLUMBING

17.1 GENERAL

17.1.1 SCOPE

This chapter provides guidance for preparation and development of plumbing (including compressed air, fuel gas and medical gas systems).

17.1.2 PRESENTATION

Specific design submittal requirements in this chapter supplement the requirements in CHAPTER 1 GENERAL INSTRUCTIONS. All required documents, including drawings and design analysis, will be in accordance with CHAPTER 2 PRESENTATION OF DATA.

17.2 APPLICABLE PUBLICATIONS

Do not rely solely upon the UFCs or the non-Government codes such as the IPC for design decisions but apply good engineering judgement and best practices for all designs while complying with applicable codes. The UFCs, starting with UFC 1-200-01, provide a roadmap for compliance with both the Government Codes and Standards and the non-Government Codes and Standards. As an example, UFC 3-420-01 requires compliance with IPC except it includes amendments to the IPC that are required for DoD project designs.

17.2.1 ALL PROJECTS

The below publications are relevant to the design of all plumbing systems for all projects.

Federal Law

ABA	Architectural Barriers Act
EPAct 2005	Energy Policy Act of 2005
EISA 2007	Energy Independence and Security Act of 2007

Unified Facilities Criteria (UFC)

UFC 1-200-01	DoD Building Code

UFC 3-490-06	Elevators
UFC 3-420-01	Plumbing Systems
UFC 3-420-02FA	Compressed Air

International Code Council (ICC)

IBC	International Building Code
IPC	International Plumbing Code

Unified Facilities Guide Specifications

Unified Facilities Guide Specifications (UFGS) UFGS are updated on a quarterly basis.

Always use the latest versions when starting the project.

17.2.2 AIRCRAFT HANGARS

In addition to the Codes & Standards in 17.2.1 above, the below listed criteria specifically address Aircraft Hangar Plumbing requirements.

Unified Facilities Criteria (UFC) DoD Aircraft Hangars – All, except as exempted by UFC 3-600-01

UFC 4-211-01	Aircraft Maintenance Hangars
UFC 4-211-02	Aircraft Corrosion Control Facilities

17.2.3 MILITARY MEDICAL FACILITIES:

In addition to the Codes & Standards 17.2.1 above, the below listed criteria specifically address plumbing requirements for Military Medical Facilities.

Unified Facilities Criteria (UFC)

UFC 4-510-01	Design: Military Medical Facilities

National Fire Protection Association (NFPA)

NFPA 99	Health Care Facilities Code (Latest Edition)

The Joint Commission

JCECS	Environment of Care Standards

Designers will obtain all applicable Installation- and Service-specific UFCs and ETLs pertinent to the facility design as all applicable UFCs and ETLs are not listed herein. See CHAPTER 1 GENERAL INSTRUCTIONS, paragraph entitled "APPLICABLE PUBLICATIONS" which lists the web site which hosts Air Force, Army, and Corps of Engineers design documents.

17.3 PROJECT DEFINITION (10%)

17.3.1 GENERAL CONSIDERATIONS

During the Project Definition design phase, the designer will define the customer's requirements and confirm that they can be met within the project's constraints. To that end, a comprehensive interface with the customer is required generally through a charrette or other previously approved data gathering process. The primary purpose of the design process at this stage is to gather any information from the customer that would be necessary in the design of the facility. Also, the design preferences of the customer should be obtained for compliance if possible.

- Determine the ownership of domestic water systems, sanitary sewer, storm sewer and natural gas utilities as well as available pressures, capacities, line sizes, for connection of new systems.
- Determine the type of back-flow prevention required and where the service entrance devices are located.
- Determine if utility companies can furnish smart meters complying with Federal UMCS requirements or if Government specified meters are needed or both.
- Obtain or request utility rate structure during this process.
- The general plumbing system type along with a rough order-of-magnitude estimate of major equipment sizes will be provided to the stakeholders during this phase for use in preparing the cost estimate and sizing the required mechanical spaces.
- Provide three acceptable alternatives to be used in the life-cycle cost analysis in DB-RFPs for the DB contractor to use to select the service water heating system. Comply with the requirements of CHAPTER 24 DESIGN-BUILD (DB) REQUEST FOR PROPOSAL (RFP) DEVELOPMENT, when writing DB-RFPs.

17.3.2 NARRATIVE

The narrative will include, but not be limited to, the following items as applicable:

- List all references used in the Design Charrette Narrative including Government design documents, industry standards, safety manuals and criteria given to

designer at the charrette or predesign meeting. Include a code trail used in determining which codes are followed and where the UFCs override and amend.

- Explain the proposed type of plumbing system.
- List the major equipment giving rough order-of-magnitude sizes, and piping materials to be used for each system.
- Describe any demolition required.
- List any environmental concerns and address actions to be taken.

17.4 CONCEPT DESIGN (35%)

17.4.1 GENERAL CONSIDERATIONS

During the Concept Design Stage of project development, it is recognized that all calculations are preliminary for analysis purposes and only indicate approximate capacities of equipment. Any dimensions and sizes required are rough, order of magnitude figures to ensure adequate space for installation and maintenance of equipment and utility elements such as piping, etc., in congested areas.

- Equipment shown in plans and sections need not be shown in great detail but is shown merely as simple geometric forms with approximately correct dimensions.
- Piping layouts shown are simple main pipe runs, showing general location, routing and, when applicable, approximate rough, order of magnitude sizes.
- **Schematic diagrams are simplified –** The purpose of the schematic is only to show system design intent and the basic principle of system operation.
- **Drawings and sketches –** Plans and sections will properly show pertinent information. Quantity of concept drawings are to be kept to the minimum number required to convey basic systems information. Some mechanical information required in the Concept Submittal may logically be included on other discipline drawings in the design analyses and need not be completed on formal drawings.

17.4.2 DESIGN ANALYSIS

The Concept Design Analysis will include but not be limited to all requirements of UFC 3-420-01 and the following items as applicable:

- List all references used in the Concept Design including Government design documents, industry standards, criteria given to the designer at the pre-design

meeting, etc. Include a code trail used in determining which codes are followed and where the UFCs override and amend.

- Provide justification and a brief description of the types of plumbing fixtures, piping materials and equipment proposed for use.
- Prepare basic preliminary calculations for systems such as water supply and waste fixture units, water demand, service size, waste and water mains pipe sizes, compressed air piping, compressors and receivers, vacuum piping, vacuum pumps and receivers, natural gas piping and container gas piping and tanks.
- Provide sizing calculation on domestic hot water demand. Calculations will also show the life cycle cost effectiveness of providing a minimum of 30% of the domestic hot water demand thru the use of a solar water heating system. Provide a description of the type of solar water heating system to be used if shown to be life cycle cost effective.
- Provide calculations of roof drainage system sizing. Indicated roof area, and the design hourly rain fall used in sizing the roof drainage system piping.
- Provide calculations showing water use reduction.
- Describe any demolition required.

17.4.3 SPECIFICATIONS

Provide a basic outline in accordance with CHAPTER 23 SPECIFICATIONS. With the exception of healthcare facilities, Section 22 00 00, PLUMBING, GENERAL PURPOSE, should be selected for inclusion in the project specification manual.

For healthcare facilities, Section 22 00 70, PLUMBING FOR HEALTHCARE FACILITIES, should be substituted for Section 22 00 00 PLUMBING, GENERAL PURPOSE.

Provide Section 22 07 19.00 40 PLUMBING PIPING INSULATION only on NASA projects or if there is no Division 23 work on the project. Otherwise, plumbing piping insulation requirements are included in Section 23 07 19 THERMAL INSULATION FOR MECHANICAL SYSTEMS.

17.4.4 DRAWINGS

The Concept Design drawings should include, but not be limited to, the following items as applicable:

- Indicate locations and general arrangement of plumbing fixtures and major equipment.

- Indicate location and extent of any demolition that will be required concerning the plumbing system.

Ensure that fixture descriptions on drawings match those in the narrative. As an example, wall-hung water closets in the narrative should mean wall-hung water closets should be illustrated on the Architectural plans including required chases for carriers, piping, supports, etc.

17.5 INTERIM DESIGN (65%)

In addition to the following items, the designer will incorporate or answer all comments received concerning the Concept Submittal.

17.5.1 DESIGN ANALYSIS

The Interim Design Analysis will include all items in the Concept Design Analysis and any necessary revisions. In addition, the following specific items will be included when applicable: Provide detailed calculations for the sizing of the following systems: domestic hot water, domestic cold water, waste and vent, natural and LP gases, vacuum, compressed air, distilled or deionized water, medical gases and other specialty systems. Identify and address any security requirements. Calculations must also be provided for:

- **Water Circulation Pumps –** Including pump head for most hydraulically remote branch and required flow rates for all branches (for determining balancing valve settings). Where recirculation is required but can be accomplished by a single loop, the balancing valve may be omitted provided the pump is sized for the minimum required flow or greater at the required head.
- **Expansion/compression tanks –** Calculations must address total elevation change in the system, elevation of the expansion tank, available water pressure from the utility, and pressure settings for any booster pump systems.
- **Water pressure booster systems –** Provide calculations at peak demand flow assuming a 3-pump system with VFDs on each pump where one is an installed, redundant spare pump.

17.5.2 SPECIFICATIONS

Provide hard copies or PDF electronic document redlined, marked-up specifications in accordance with CHAPTER 23 SPECIFICATIONS.

17.5.3 DRAWINGS

The Interim Drawings should show all information given on the Concept Drawings but in greater detail. In addition, the Interim Drawings should include, but not be limited to, the following items as applicable:

- Include plan and isometric riser diagrams of all areas including hot water, cold water, waste and vent piping as applicable. Piping layouts and risers should also include natural gas (and meter as required), LP gas, vacuum systems, compressed air systems, distilled or deionized water, medical gases and other specialty systems as applicable.
- Include equipment and fixture schedules with descriptions, capacities, locations, connection sizes and other information as required.
- Circulating water systems, if more than one zone, should have balancing valves located on the plans with the required flowrate for balancing indicated next to the valve.
- Ensure that all balancing and isolation valves are located so as to be accessible and not entombed in solid walls or blocked by other systems. Indicate all required access panels.
- Indicate all fire and smoke walls and ratings graphically. Indicate secure perimeter walls such as those for SCIF or Tempest boundaries.

17.6 95% DESIGN SUBMITTAL (UNREVIEWED)

17.6.1 DESIGN ANALYSIS

The 95% Design Analysis will include all the information required in the Interim Submittal in its final form and incorporate or answer all review comments.

17.6.2 SPECIFICATIONS

Provide redlined marked up specifications if not provided at the Interim submittal. Provide final edited specifications if an Interim submittal was prepared in accordance with CHAPTER 23 SPECIFICATIONS. Provide hard copies or PDFs as determined by submission requirements. Provide in addition to any requirements for native files such as MS Word or SpecsIntact files.

17.6.3 DRAWINGS

The designer will incorporate or answer all comments received during the Interim Submittal review. The 95% Drawings should be in a Final state which should include, but not be limited to, the following items as applicable:

- Plans, sections, details and riser diagrams in final condition

- Complete all legends and schedules.
- Complete all narratives, notes and title blocks as necessary.
- Whenever a pipe or other conveyance leaves a sheet, it should have a notation indicating the sheet on which it is continued. For pipes continuing above or below on multi-level systems, it is preferred that the language follow the direction of flow in the pipe. As an example, a cold water line serving the floor above is labelled ‘3/4” DCW UP TO FLOOR ABOVE’ but a sanitary line on the Second Floor Plan serving the floor above would read ‘3” WASTE DOWN FROM 3RD FLOOR (P-103) AND DOWN TO 1ST FLOOR (SHEET P-101)’.
- For complex piping systems, including compressed air, medical gas and circulating water, include flow arrows on or next to the piping on the plans and on the risers and schematics.

17.7 100% DESIGN SUBMITTAL (REVIEWED)

The comments generated concerning the 95% Design Submittal will be incorporated in the design analysis, specifications, and drawings before they are submitted as "Ready to Advertise."

17.8 TECHNICAL REQUIREMENTS

17.8.1 GENERAL CONSIDERATIONS

- Use good judgement and engineering best practice in design. Do not solely rely on UFCs and IPC for design decisions.
- Protect the potable water supply. Provide backflow preventers and vacuum breakers at all locations required by the UFCs and IPC, and anywhere that contaminated water could be drawn into a clean, potable-water piping system.
- Protect the trap seals in all drainage systems requiring traps. Proper venting is paramount. No dry vent connection should ever start running horizontally before rising at least six inches above the flood level rim of the fixture and associated trap it serves.
- The maximum water pressure at any fixture connected to the domestic water system will not exceed 80 PSIg.
- The minimum water pressure at design flow to any flush valve, will be at least 35 PSIg. The minimum water pressure to all other fixtures will be no less than that required by the fixture manufacturer and in no case less than 20 PSIg.
- Where water pressure booster systems are provided or utility pressures exceed 80 PSIg, provide a pressure reducing valve set at no higher than 60 PSIg to serve floors where pressure may exceed this value.

- If building height or other elevation changes result in lower than required pressures at upper-level fixtures, provide zoned systems with pressure reducing valve(s) on lower floors and no pressure reducing valve on highest floors. A single pressure zone (and associated pressure reducing valve) will serve not more than 4 stories or 55 feet of difference in elevation between the highest fixture and the lowest fixture.
- Water circulating systems will not cross a pressure reducing valves. A separate pump and accessories must be provided for each pressure zone. A small point-of-use water heater or heat tracing must be provided to maintain minimum hot water temperatures in each circulation loop. A main circulating loop must be provided for the risers going from the lowest to the highest parts of the building that are served by the main water heating plants and that do not cross a pressure reducing valve.
- Coordinate space requirements, foundations, supports, pipe routing, electrical service and the like for mechanical items with architectural, structural and electrical design elements. Coordinate exterior mechanical distribution systems with design elements handling other exterior utility designs and site work.
- Standard or "packaged" equipment will be used to the greatest extent possible to simplify specifying, purchasing, installation and maintenance of equipment.

17.8.2 MOBILE DISTRICT PLUMBING DESIGN REQUIREMENTS

- **Piping System –** Piping materials and sizes will comply with the requirements in the UFC 3-420-01 and IPC. Design flow velocities in water pipe will not exceed 10 feet per second. All piping will be sloped to permit complete drainage and will be properly supported with allowances for expansion and contraction. Expansion loops or expansion joints and anchor points will be shown on plumbing drawings. Piping subject to freezing will be suitably protected.
- **Wall Hydrants and Lawn Faucets –** The maximum spacing between wall hydrants or between lawn faucets around the perimeter of a building is 200 feet. Add five gpm for each hydrant or faucet to building load for sizing water main. This requirement may be reduced if stated in writing to this effect by the Engineering Chief of Design and Construction. For modifications to existing facilities, comply with the requirements of the Statement of Work or determinations made and agreed to during the Project Definition Stage.
- Floor drains will be provided in all boiler and mechanical equipment rooms and adjacent to each indoor emergency deluge shower. Provide trap primers for all floor drains unless specified otherwise. Do not provide floor drains in rooms used as plenums.
- Domestic Hot Water

- Set domestic hot water supply maximum temperatures at the point of use as specified in UFC 3-420-01 or UFC 4-510-01 for Military Medical Facilities.
- It is preferred that domestic hot water circulation be maintained above 130 degrees F at all points in the loop and that tempering/mixing valves be applied at the fixtures where the water is used.
- For Inpatient Medical Facilities, domestic hot water circulation must be maintained above 130 degrees F at all points in the loop and thermostatic tempering/mixing valves will be applied at the fixtures where the water is used. In addition, make provisions for high temperature eradication/sterilization of all domestic water piping including water heaters capable of provision of 180-degress-F water and temporary (removable) cross connections and valves between domestic hot water and cold water piping (so that cold water piping, faucets and shower heads may be flushed with hot water as well).
- Balancing valves in circulating branch loops will be set no lower than 0.5 GPM.
- It is recognized that in some older buildings or in some unusual cases it may be necessary to do more than reset existing temperature controllers. In some cases, added storage tanks, temperature blending equipment, or separate lines may be required.
- Design systems which serve both flush valves and showers to prevent personnel from being scalded while taking showers due to simultaneous operation of water closets equipped with flush valves.

- **Sump Pumps –** Sump pumps will be provided in areas that do not have a way for gravity drainage. Sump pumps serving elevator pits must comply with UFC 3-490-06 and ASME A17.1. Elevator pits that could receive hydraulic oil must have sump pump controller equipped with oil detection sensors and alarms. All sump pump controllers must be monitored by the Building Management and Control System (BMCS) for alarms and to notify cognizant personnel when pump is running.
- **Compressed Air –** Unless requirements are stated in specific instructions, compressed air system and compressor sizes will be determined by the designer from analysis of equipment layout and/or coordination with the customer's requirements. Design will be in accordance with UFC 3-420-02FA.

- **Equipment Schedules –** Each set of drawings for a project or building will include one or more fixture schedules that will designate the symbols, P numbers, outfit numbers, description and sizes of connections.
- Roof drains will be sized in accordance with the International Plumbing Code. Consideration should be given to rainwater harvesting to supply to water closets, urinals and irrigation systems if life cycle cost effective.
- Plumbing piping will not traverse over electrical panels or switchboards unless there is a structural floor between them.

17.8.3 AIRCRAFT HANGAR DESIGN REQUIREMENTS

In addition to general requirements for all buildings above, provide:

- Oil interceptors in all sanitary waste lines coming from hangar bay and shop areas where fuels or oils are handled except if the environmental regulations for the State in which the facility is located require other measures. Toilet room waste will not pass through the interceptor.
- Capture tank for firefighting high-expansion foam effluent, but only in Army owned hangars except if the environmental regulations for the State in which the facility is located require other measures.

State all requirements being followed in Design Analysis.

17.8.4 MILITARY MEDICAL FACILITIES

Review requirements on room data sheets in UFC 4-510-01 and provide fixtures, medical gas outlets, headwall accessories and all other applicable items indicated therein unless specifically directed otherwise by contract or Cognizant Authority. Coordinate with existing facilities to set compatibility requirements of medical gas terminations (inlets and outlets). State compatibility requirements being followed in Design Analysis.

17.8.5 SEISMIC AND WIND PROTECTION

All piping, equipment, and utilities will be anchored and protected in accordance with IBC. Roof- or exterior-mounted solar panels will be anchored to resist IBC-catalogued peak wind speed requirements and, in hurricane-prone regions, in accordance with Miami-Dade design requirements. (The cost of these requirements should be included in the life-cycle cost analysis to determine the feasibility of solar water heating.)

CHAPTER 18
HEATING, VENTILATING, AND AIR CONDITIONING

INDEX

CHAPTER 18

HEATING, VENTILATING, AND AIR CONDITIONING

18.1 GENERAL

18.1.1 SCOPE

This part of the chapter provides guidance for preparation and development of the following design aspects: heating, ventilating, air conditioning (including chilled water and dual temperature water distribution systems).

18.1.2 PRESENTATION

Specific design submittal requirements in this chapter supplement the requirements in CHAPTER 1 GENERAL INSTRUCTIONS. All required documents, including drawings and design analysis, will be in accordance with CHAPTER 2 PRESENTATION OF DATA.

18.2 APPLICABLE PUBLICATIONS

18.2.1 ALL PROJECTS

The below publications are relevant to the design of all plumbing systems for all projects.

Federal Law

EPAct	Energy Policy Act of 2005
EISA	Energy Independence and Security Act of 2007

Unified Facilities Criteria (UFC)

UFC 1-200-01	DOD Building Code
UFC 1-200-02	High Performance and Sustainable Building Requirements
UFC 3-400-02	Design: Engineering Weather Data
UFC 3-410-01	Heating, Ventilating, and Air Conditioning Systems
UFC 3-410-02	Direct Digital Control for HVAC and Other Building Control Systems

UFC 3-410-04	Industrial Ventilation
UFC 3-470-01	Utility Monitoring and Control Systems
UFC 3-600-01	Fire Protection Engineering for Facilities
UFC 4-010-01	DoD Minimum Antiterrorism Standards for Buildings
UFC 4-010-06	Cybersecurity of Facility-Related Control Systems

Air-Conditioning, Heating, and Refrigeration Institute

AHRI-410	Forced-Circulation Air-Cooling and Air-Heating Coils

International Code Council (ICC)

IBC	International Building Code
IMC	International Mechanical Code

National Fire Protection Association

NFPA 30	Flammable and Combustible Liquids Code
NFPA 31	Standard for the Installation of Oil-Burning Equipment
NFPA 54	National Fuel Gas Code
NFPA 90A	Standard for the Installation of Air-Conditioning and Ventilating Systems
NFPA 90B	Standard for the Installation of Warm Air Heating and Air-Conditioning Systems

Unified Facilities Guide Specifications

Unified Facilities Guide Specifications (UFGS) UFGS are updated on a quarterly basis. Always use the latest versions when starting the project.

18.2.2 AIRCRAFT HANGARS

In addition to the Codes & Standards in 18.2.1 above, the below listed criteria specifically address Aircraft Hangar HVAC requirements.

Unified Facilities Criteria (UFC)

UFC 4-211-01	Aircraft Maintenance Hangars
UFC 4-211-02	Aircraft Corrosion Control Facilities

National Fire Protection Association

NFPA 409	Standard on Aircraft Hangars

18.2.3 MILITARY MEDICAL FACILITIES

In addition to the Codes & Standards 18.2.1 above, the below listed criteria specifically address HVAC requirements for Military Medical Facilities.

Unified Facilities Criteria (UFC)

UFC 4-510-01	Design: Military Medical Facilities

National Fire Protection Association (NFPA)

NFPA 99	Health Care Facilities Code

The Joint Commission

JCECS	Environment of Care Standards

Designers will obtain all applicable Installation- and Service-specific UFCs and ETLs pertinent to the facility design as all applicable UFCs and ETLs are not listed herein. See CHAPTER 1 GENERAL INSTRUCTIONS, paragraph entitled “APPLICABLE PUBLICATIONS” which lists the web site which hosts Air Force, Army and Corps of Engineers design documents.

18.3 ENERGY CONSERVATION AND RESILIANCE

The building HVAC systems will be designed in accordance with ASHRAE 90.1 and UFC 1-200-02. The criteria provides mandatory and prescriptive criteria that must be followed in order to provide an energy efficient facility. In addition, the design will meet the applicable requirements of EPACT and EISA where applicable. Life Cycle Cost Analyses (LCCAs) must be conducted early on in the project between various system options and with baseline building models so as to determine the most cost-effective system(s) for further design development.

HVAC Systems to be compared by LCCA must be determined prior to award of Design-Build Contracts and included in the requirements of the RFP. Comply with the requirements of CHAPTER 24 DESIGN-BUILD (DB) REQUEST FOR PROPOSAL (RFP) DEVELOPMENT, when writing DB-RFPs.

18.4 PROJECT DEFINITION (10%)

18.4.1 GENERAL CONSIDERATIONS

During Project Definition the designer must define the customer's requirements and confirm that they can be met within the project's constraints. To that end, a comprehensive interface with the customer is required generally through a charrette or other previously approved data gathering process. The primary purpose of the design process at this stage is to gather any information from the customer that would be necessary in the design of the facility. Also, the design preferences of the customer should be obtained for compliance if possible.

- The general HVAC system type and purpose along with a rough-order-of-magnitude estimate of major equipment sizes will be predicted at this phase for use in preparing the cost estimate and sizing the required mechanical spaces.
- Utility Rates must be obtained during this phase, if at all possible.
- Central utilities such as steam, low-temperature water, chilled water and central condenser water should be evaluated along with available capacity and costs of production for use in the project. Again, LCCA evaluation at this early stage in a project is optimal.
- Most bases have in place Direct Digital Control (DDC) systems. The designer will contact the base to ensure the new controls are equal to or can seamlessly interface with the existing system.

18.4.2 NARRATIVE

The narrative will include, but not be limited to, the following items as applicable:

- List all references used in the Design charrette Narrative including Government design documents, industry standards, safety manuals and criteria given to designer at the Charrette or predesign meeting. Include a code trail used in determining which codes are followed and where the UFCs override and amend.
- Explain the purpose and proposed type of the environmental system (i.e., personnel comfort, process or computer cooling and/or freeze protection or otherwise).
- List mandatory and prescriptive HVAC features to be included in the design as required by ASHRAE 90.1 and UFC 1-200-02 in order to provide an energy efficient facility.

- State the design conditions including indoor and outdoor temperatures, relative humidity for summer and winter conditions, filtration and ventilation requirements, personnel loads, special equipment loads, etc.
- State the proposed building characteristics including 'U' Factors of walls, floors, roofs, windows, etc., orientation of the building, latitude and longitude of location and any special conditions that would have an impact on HVAC design.
- List the major equipment and give the sizes in general order-of-magnitude. List the (minimum) three recommended options for LCCA if system selections are not yet determined.
- Briefly describe the proposed control system type. See Specific Base Criteria.
- Discuss requirements for natural gas, fuel oil and water flow meters.
- Describe any demolition required.
- Describe any special exhaust systems such as:
    - Kitchen Hoods
    - Laboratory Fume Hoods
    - Vehicular Exhaust Capture Systems
    - Other Industrial Ventilation
- List Anti-Terrorism/Force Protection, Sustainable Design, and Seismic Protection concerns. Determine if the building or areas of the building are considered “inhabited” or “low occupancy” as defined in UFC 4-010-01 and discuss the ramifications in regards to outside air intakes, emergency HVAC shut-down switches and other concerns.
- For aircraft hangars, discuss whether Army-owned, Air-Force-owned, or other and determine applicable requirements of UFC 4-211-01 and related codes.
- For military medical facilities, review room data sheets and Table B-1 from UFC 4-510-01 and the JCECS for required room airflows, air filtration, pressure relationships and exhaust and outside airflow requirements.

18.5 CONCEPT DESIGN (35%)

18.5.1 GENERAL CONSIDERATIONS

- During the Concept Design Stage of project development, it is recognized that all calculations are preliminary for analysis purposes and only indicate approximate capacities of equipment. Any dimensions and sizes required are rough-order of magnitude figures to assure adequate space for installation and

maintenance of equipment and utility elements such as piping, ductwork, etc., in congested areas.

- Equipment shown in plans and sections is not shown in great detail but is shown merely as simple geometric forms with approximately correct dimensions.
- Piping layouts shown are simple main pipe runs showing general location, routing and, when applicable, approximate order of magnitude sizes. Control valves, check valves, etc., are shown only as required to indicate function of the system. Only routing of main headers feeding batteries of water coils are shown, not individual lines to coils unless required for clarity of the system.
- Schematic diagrams are simplified. System flow diagrams, layouts and one of each type of takeoff, branch or feed must be shown but not all individual branches. The purpose of the schematic is only to show system design intent and the basic principle of system operation.
- Plans and sections need be only large enough to properly show pertinent information. Quantity of concept drawings are to be kept to the minimum number required to convey basic systems information. Some mechanical information required in the Concept Submittal may logically be included on other discipline drawings in the design analyses and need not be completed on formal drawings.
- Throughout the design submittals and on the Ready to Advertise drawings, abbreviations used on drawings will conform to ASHRAE Fundamentals and will be indicated in the mechanical drawing legend.

18.5.2 DESIGN ANALYSIS

Life-Cycle Cost Analysis determination of systems should be accurate enough to lock in the system types at this point. Provide analysis, calculation results and determination of systems or state information that is missing and needed in order to proceed. Be sure to include non-mechanical costs such as increased mechanical room sizes and/or quantities, historic preservation enclosure requirements, and other expenses in all options so that the LCCAs provide the most accurate assessments of the best system choices.

The Concept Design Analysis will include, but not be limited to, the following items as applicable:

- List all references used in the Concept Design including Government design documents, industry standards, safety manuals, criteria given to the designer at the predesign meeting, etc.

- For Aircraft Hangars, state which service specific requirements of UFC 4-211-01 are to be followed.
- For Military Medical Facilities, state UFC 4-510-01 Table B-1 room code used requirements for review.

- Explain the purpose of the environmental system (i.e., personnel comfort, process or computer cooling, freeze protection or otherwise).
- List mandatory and prescriptive HVAC features to be included in the design as required by ASHRAE 90.1, UFC 1-200-02 and EPAct in order to provide an energy efficient facility.
- State the design conditions including indoor and outdoor temperatures, relative humidities for summer and winter conditions, filtration and ventilation requirements, personnel loads, special equipment loads, etc.
- State building characteristics including 'U' Factors of walls, floors, roofs, windows, etc., orientation of the building, latitude and longitude of location and any special conditions that would have an impact on HVAC design.
- Provide LCCA results based on calculations such as typical room loads, block loads for heating and cooling systems, approximate cfm, gpm (or applicable units) quantities and a balance flow diagram showing quantities of air handled and circulated throughout each building as a whole (including quantities for outside and exhaust air).
- Briefly describe the proposed sequence of control for temperature, humidity, ventilation, etc.
- Discuss requirements for natural gas, fuel oil and water flowmeters.
- Describe any demolition required.
- Provide basic outline specifications in accordance with CHAPTER 23 SPECIFICATIONS.
- Describe actions to be taken to address Antiterrorism/Force Protection, Sustainable Design and Seismic Protection concerns.

18.5.3 DRAWINGS

The Concept Design Drawings should include, but not be limited to, single line layouts of heating and air conditioning systems showing equipment and contemplated zoning for each building. Drawings will identify rooms and be sufficiently complete to show the location, arrangement, approximate capacities of

all major items of equipment and space allocated for servicing and maintenance. Include the following items:

- Main trunk duct layouts of HVAC systems with preliminary representative duct sizes and air quantities. This includes exhaust systems and makeup air systems. Representative sections of ducts in congested areas should be shown double line. Runouts to air devices (diffusers, registers, etc.) need not be shown. Do show air devices and preliminary anticipated airflows even if not yet sized.
- Show required maintenance space for all major equipment, preferably with dashed lines.
- Show main piping with anticipated sizes.
- Indicate preliminary approximate capacities of all major equipment, including horsepower of motors, power rating (kW) of major electric heating elements, airflows (CFM) of major air handlers, cooling and heating capacities, etc.
- Indicate location and extent of any demolition that will be required concerning the HVAC system.

18.6 INTERIM DESIGN (65%)

In addition to the following items, the designer will incorporate or answer all comments received during the Concept Design submittal review.

18.6.1 DESIGN ANALYSIS

The Interim Design Analysis will include all items in the Concept Design Analysis and any necessary revisions. The Design Analysis will state any changes in scope, criteria, or other design direction since the previous submittal. In addition, the following specific items will be included when applicable:

- Provide detailed calculations for the following: heating loads, cooling loads, equipment sizing, etc. Computer calculations will include printout of input data as well as output.
- **Equipment selection –** Equipment selection will be based on not less than three manufacturers whose equipment meets project requirements for each item. The design analysis will include catalog cuts of all major equipment (e.g., air handlers, coils, chillers, condensing units, boilers, pumps, fans, unit heaters, heat exchangers, etc.) used as the basis of the design indicating manufacturer, model number, dimensions, capacities and electrical requirements. The project design is not complete until the designer is assured that there is sufficient

physical space in areas where equipment is to be located to install and to maintain the selected equipment.

- Include any other information or calculations to verify that the design complies with applicable criteria codes or standards and is satisfactory for intended purposes.
- Major unforeseen costs and any changes from Concept Submittal will be referenced and the impact on energy efficiency will be indicated. Justification for departures, if any, from the original design recommendations will be provided.
- Explanatory notes will be included in the design analysis covering all rationale for design which would not be obvious to an engineer reviewing the analysis. Methods of air conditioning and controls for air conditioning systems will generally be confined to those in common use in the industry.
- **Specifications –** The outline specifications previously submitted for concept phase will be revised, updated, further developed and resubmitted in accordance with CHAPTER 23 SPECIFICATIONS.

18.6.2 DRAWINGS

The Interim Drawings should show all information given on the Concept Drawings but in greater detail. In addition, the Interim Drawings should include, but not be limited to, the following items as applicable:

- Show all duct work and piping, with sizes and flow rates, where necessary for balancing purposes. Indicate the duct work pressures in accordance with SMACNA standards. Include all accessories and appurtenances.
- Show temperature control schematics indicating remote sensors, panel mounted controllers, reset schedules if applicable and thermostats.
- Show layout and details of the final version of all HVAC systems. The location, arrangement, capacity, and space requirements of all equipment will be indicated. Selected zones of air distribution will be sufficiently completed to indicate the solution of the design for the remainder of the system and the precautions taken to coordinate the design with the architectural, structural and electrical phases of construction. Equipment room layouts will be sufficiently complete to show piping and duct layouts and access for maintenance. Since equipment rooms represent the most congested areas for both equipment and piping, the following guidelines should be followed when drawings are being prepared.
    - Pipe fittings and accessory details will be shown.

- All duct and fittings in congested areas and mechanical rooms will be modelled fully in BIM software. All ductworks will appear in double-line form on plotted drawings/PDFs.
- All equipment will be outlined to scale, and maintenance or removal space will be indicated by dashed lines.

- Show new exterior chilled water, dual temperature water, or steam distribution systems from central energy plants in plan and profile. Show all other exterior piping in plan.
- The final form of all equipment schedules will be shown with preliminary equipment data filled in.

18.6.3 SPECIFICATIONS

Provide redlined marked up specifications in accordance with CHAPTER 23 SPECIFICATIONS.

18.7 95% DESIGN (UNREVIEWED)

Comments generated during the Interim Design submittal review will be incorporated or answered in the design analysis, specifications and drawing before they are submitted as "95%".

18.7.1 DESIGN ANALYSIS

The Design Analysis will state any changes in scope, criteria, or other design direction since the previous submittal. The 95% Design Analysis will include all of the information required in the Interim Submittal in its final form and the information listed below when applicable:

- Include flow diagrams with all quantities for both air and water sides of complex HVAC systems for balancing purposes (including all kitchens with commercial hood systems).
- Major unforeseen costs and any changes from Interim or Concept Submittals will be referenced and impact on energy and economic studies will be indicated. Justification for departures, if any, will be provided.
- The designer will review the prepared plans and specifications and determine that they are in accordance with this manual and all other criteria and instructions furnished by USACE. It will be the responsibility of the designer to coordinate the HVAC systems with the other trades involved in the building design and to eliminate interference between HVAC equipment and other components of the building.

18.7.2 SPECIFICATIONS

Provide redlined marked up specifications if not provided at the Interim submittal. Provide final edited specifications if an Interim submittal was prepared in accordance with CHAPTER 23 SPECIFICATIONS. The specifications will be edited and tailored by the designer to meet the requirements of the project under design. The Submittal Register must be edited and included.

18.7.3 DRAWINGS

The 95% Drawings should be in a Final state which should include, but not be limited to, the following items as applicable:

- Include all plans, sections, and details in final condition.
- Include all completed legends and schedules.
- Show all necessary piping schematics in final form.
- Complete narratives, notes, and title blocks as necessary.
- Show all temperature control systems as follows:
  - Location of sensors, thermostats, and control panels.
  - Schematics, diagrams, layouts, legends, narratives, sequences, etc. of the Direct Digital Control System.
  - NOTE: Compatibility with any existing base wide control systems must be insured.

18.8 100% DESIGN SUBMITTAL (REVIEWED)

Comments generated during the Final design submittal review will be answered or incorporated in the design analysis, specifications and drawing before they are submitted as "Final".

18.8.1 SPECIFICATIONS

The designer will prepare the final detailed Technical Provisions of the specifications in accordance with CHAPTER 23 SPECIFICATIONS.

18.9 TECHNICAL REQUIREMENTS

18.9.1 GENERAL CONSIDERATIONS

- Coordinate space requirements, foundations, supports, duct and pipe routing, electrical service, etc., for mechanical items with architectural, structural and

electrical design elements. Coordinate exterior mechanical distribution systems with design elements handling other exterior utility designs and site work.

- Standard or "packaged" equipment will be used to the greatest extent possible to simplify specifying, purchasing, installation, and maintenance of equipment. All equipment including AHUs, chillers, boilers, pumps, fans, VAV boxes, etc. will have individual marks and scheduled individually. Diffusers, grilles and registers can be collectively scheduled.
- For all projects, use UFC 3-410-01, IMC and NFPA 90A for HVAC design.

18.9.2 HVAC DESIGN CONSIDERATIONS

- Design Temperatures
  - Indoor design temperatures will be in accordance with UFC 3-410-01.
  - Outdoor design conditions will be in accordance with UFC 3-400-02.
  - All HVAC loads will be calculated using either Carrier.
  - Hourly Analysis Program (HAP), Trane Air Conditioning Economics (TRACE), or a program approved by the Mobile District.
  - Computer printouts (program input data as well as output results) will be submitted as indicated above.
- **Noise Control –** All noise control design work will be in accordance with UFC 3-450-01. The designer will be responsible for ensuring that noise levels in the facility are less than the maximum noise levels recommended in UFC 3-450-01.
- **Selection of HVAC Systems –** Using good judgement and best engineering practices, UFC 1-200-02 and ASHRAE 90.1 will be followed in the selection and efficiencies of the HVAC system. Mandatory and Prescriptive requirements must be met unless an energy budget analysis is performed to prove the selected system is the most efficient and cost effective over the life of the facility. The user’s request for a specific type of equipment will be honored if at all possible or feasible.
- Provide all LCCA-effective and minimum-code-required energy saving controls and heat recovery devices required to ensure UFC 1-200-02, UFC 3-410-01, and ASHRAE 90.1 compliance as applicable.
- Where chosen by LCCA or project parameters, provide water chillers complying with the following:
  - Chillers greater than 200 tons will be centrifugal, helical rotary screw or other type as approved by the Mobile District. Centrifugal machines of less

than 200 tons capacity may be used at the discretion of the designer or at the request of the user. Chiller compressor working parts will not be any materials other than metal. Refrigerant used must comply with applicable UFC and Federal Statute and be approved by the user's Installation. Allowable refrigerants will be decided at the Design Charrette.

- For loads greater than 400 tons, conduct LCCA to determine whether two or three machines may be more economical than a single machine. In no case, where only personnel comfort is involved, will consideration be given to a standby machine. For an installation of more than one chiller, DDC controller provided must be able to optimize chiller staging for most energy-efficient operation.
- Projects in Hot and Humid Areas, as defined in UFC 3-410-01, will comply with the following:
    - Do not use chilled beam systems or radiant cooling panels in hot and humid climates. Only forced air cooling is acceptable. If chilled beam or radiant cooling becomes mandated by superior Standard or Law, buildings that use these systems must be provided with Dual redundant (N+N) DOAS systems that hold leaving air dewpoint temperatures to 45 degrees F or less at all times.
    - The dewpoint temperature of supply air leaving all air-handling units will not exceed 54 degrees F.
- Provide outside airflow as required for compliance with ASHRAE 62.1 and as required for pressurizing the building (not to exceed 0.1 inches of water column) at all times in hot and humid climates and when the building is occupied in other climates. Calculate the required net positive outside airflow required to maintain 0.1 inch pressurization using the building's design air barrier leakage rate and the prevailing wind speed velocity pressure. Use the larger of either the ASHRAE 62.1 airflow or that required for pressurization. If the ASHRAE 62.1 airflow requirement results in over pressurization, provide relief air through the DOAS or energy recovery devices but in no case decrease the net positive outside airflow rate to below that required for building pressurization.
    - The net positive outside air rate is defined as the total conditioned outside airflow rate minus the sum of all exhaust airflow rates.
    - For spaces evolving compensating kitchen hoods, the makeup airflow supplied to the hood may be deducted from the total exhaust airflow of the hood.

- 410-01 including Dedicated Outside Air Systems (DOAS) where required. Comply with the following:

- Central station type package air handling units complete with filters, coils, and fan sections will be utilized where commercially available. Size and number of package units will be dependent upon availability and design considerations. AHUs will not be stacked or installed in any unusual fashion that is not detailed in the manufacturer's standard literature or approved by the Mobile District. For redundant systems in Airport Traffic Control Towers, provide stackable units for cab and electronics rooms where needed for space constraints.

- Central station built up systems comprised of filters, coils and fan(s) will be installed where system requirements cannot be satisfied with the factory-assembled package equipment. Limit maximum capacity for the built up systems to 60,000 cfm. Provide multiple systems for total system demands in excess of 60,000 cfm.

- Packaged air handling units will normally be located at floor level with adequate clearance for maintenance, test procedures and equipment removal. Locations above ceilings, above mechanical equipment, suspended six feet or more above the floor, or on the roof, are undesirable and should be avoided where possible. Overhead units are not allowed in Aircraft Hangars including all areas of the building. Adequate height will be provided in the form of base rails and service pads for proper trap installation. Condensate drain connections must be at least eight inches above the floor.

- Unless noted otherwise, all AHUs in a chilled water system serving a single zone will be furnished with variable frequency drives to vary the airflow to the space. The chilled water coil leaving air temperature will be held constant at a temperature of 55 deg F or less. A reheat coil will be furnished downstream of the chilled water coil to prevent overcooling of the space. All outside airflow rates will be measured by DDC system and held at required values by modulating control dampers on unit outside air and return air streams.

- All louvers will be extruded aluminum type with colors that match the architectural scheme or as noted.

- All air terminal devices (diffusers, registers and grilles) will be louvered face aluminum type except for return/exhaust grilles in utility spaces, which will be cube-core type. Diffusers in exposed round ductwork in shop areas will be industrial type drum louvers, unless otherwise noted. For renovation projects, be sure to include cleaning at minimum or preferably replacement of existing air terminal devices where there is any evidence of mold growth on existing devices.

- All modulating control dampers will have position feedback to DDC system. All motorized isolation dampers (2-position open or closed) will have damper end switch feedback to the DDC system.
- Condensate drains will be rigid metal piping. PVC or other no metallic piping may be used where approved by the District.

- Water cooling coils will be certified in accordance with AHRI 410. In lieu of direct certification by AHRI, the manufacturer may submit a written certification from a nationally-recognized independent testing firm to verify coil performance when tested according to AHRI 410 testing procedures and requirements.
- For features related to fire Protection, comply with the current requirements of UFC 3-600-01, NFPA 90A, and NFPA 90B in all heating and air conditioning system designs in lieu of the requirements of IMC. Corridors will be pressurized to provide makeup air to exhausted spaces such as toilet rooms and janitor closets, that is, more air must be supplied to the corridors at all times than is exhausted or returned from the corridor or any communicating spaces. However, they will not otherwise be used as supply, return or exhaust air plenums.
- **Duct Work –** Duct work will be designed in accordance with applicable SMACNA standards and ASHRAE recommendations. Fibrous glass ductwork will not be used. Ductwork in shops and exposed areas other than mechanical rooms will be double walled round (unless otherwise noted). Concealed ductwork will be externally insulated rectangular (unless otherwise noted). Unless noted, ductwork will be designed for .08” s.p. drop per 100 equivalent feet of duct for low pressure (2” or less pressure class – SMACNA) supply duct, .15” s.p. drop per 100 equivalent feet of duct for medium pressure (greater than 2” to 6” pressure class – SMACNA) supply duct, .30” s.p. drop per 100 equivalent feet of duct for high pressure (higher than 6” pressure class – SMACNA) supply duct and .05” s.p. drop per 100 equivalent feet of duct for return duct. Use 45 deg takeoffs in lieu of air scoops. Flexible duct installation in new systems must comply with UFC 3-410-01 requirements. For renovation projects, determine if cleaning is required for any ductwork to be reused. Require ductwork cleaning if there is any sign of mold growth on existing air terminal devices.
- Ventilation
  - Equipment rooms: Mechanical ventilation will be provided to limit air temperature rise to 10 F in unoccupied equipment rooms. Normally occupied areas will be spot cooled as required.
  - Control rooms on central plants will be air conditioned.

- Some equipment rooms such as control, electrical switchgear, or computer rooms, especially in corrosive humid climates and even though they are unoccupied, will require mechanical cooling and may require 100 percent backup where economically justified or required by design criteria.

- Heating system designs must comply with the following:

  - Outside Design Conditions. Outside heating design conditions for Army and Air Force Installations are listed in UFC 3-400-02.

  - Inside Design Conditions. Unless stated otherwise, the inside design temperatures will be determined as follows:

    - 70 degrees F Living and administrative areas
    - 55 65 degrees F Working areas (active employment)
    - 40 degrees F Storage areas to prevent freezing

  - Boilers will be designed, constructed, tested and installed in accordance with the ASME Boiler and Pressure Vessel Code and Applicable UFC requirements. Design pressures will be 150 psig for steam boilers and 50 psig for hot water boilers except where building height may require higher pressure ratings. Boiler trim will include safety valves, stop valves, water column, blow off valves, piping and tank, low water cutoff, flame safety system and control panel.

  - Fuel Oil Burning Equipment and Fuel Oil Storage Tanks. This equipment and tanks will be in accordance with NFPA 31. All underground fuel oil tanks will be double wall with leak detection system. A monitoring well system will be provided if the fuel oil tank is in ground water.

  - Gas fired Equipment. This equipment will comply with NFPA 54.

- The design of piping, valves and fittings will comply with:

  - Refrigerant piping will be designed in accordance with the ASHRAE Handbooks. Special care in designing suction lines will be taken to ensure oil return and to prevent liquid carry over to the compressor. Where an optional refrigeration piping is allowed, design of piping for all options will be provided. Hot gas discharge lines will be designed to ensure oil return. Oil separators will be provided as required.

  - Water distribution piping will be designed such that:

    - A balancing if indicated and provided at every point where balancing is required

- A flow measuring point plus a balancing valve (or a combination unit) will be specified and shown on the plans. A DDC flow sensor is required in the main piping of all hydronic systems located so as to measure the total flow to the buidling from each cooling or heating plant.
- The required length of straight pipe before and after the flow sensor will be clearly shown on the plans.
- Water velocity in medium and small diameter water piping generally will not exceed eight feet per second and will be sized for friction loss not to exceed four feet per 100 feet.
- An air separator and an expansion tank will be installed in the main line of all systems.
- For maintenance purposes, isolation valves and unions or flanges will always be used for isolating equipment from the system.

- Chilled and Dual Temperature Water Distribution Systems will be indicated on the contract drawings in order to show the general arrangement of piping, sizes, grades, thrust anchors, expansion compensation and other details. Analyses will be made to determine the most economical thickness of insulation for the supply and return lines. Underground systems will generally be composed of factory fabricated preinsulated conduit sections.
  - Thermal expansion compensation must be provided in straight runs of piping. All lines above ambient temperature must be considered, and calculations for lines above 160 degrees F must be included in the design analysis. Allowable stress ranges are given in ANSI B31.1.
  - Anchors will be required where there is a change in direction, diameter, or wall thickness of a pipeline that may cause undesired movement, loads, or stress and whenever buckling of the pipe may occur. For buried piping, no credit may be taken for resisting friction between the pipe and the soil since the full development of this force does not occur when line movement is prevented. Anchors may be concrete or piling type.
- **Mechanical Equipment Spaces –** Mechanical equipment sized from three manufacturers, piping, and accessories in boiler and equipment rooms will be drawn to scale. Adequate space will be provided for maintenance, operation and replacement of equipment, piping and accessories.
- Equipment schedules are required for all HVAC equipment. The schedule will be presented in tabular form.
- Use only cellular glass insulation on chilled water piping, except that flexible elastomeric may be used for locations subject to impact. Insulation must be

completely sealed to prevent condensation from collecting inside the vapor barrier.

18.9.3 SEISMIC AND AT/FP PROTECTION

All piping, equipment, and utilities will be protected in accordance with IBC. In addition, overhead, suspended equipment such as exhaust fans and unit heaters may require sway and vertical bracing for AT/FP reasons in inhabited buildings as indicated in UFC 4-010-01.

CHAPTER 19

OTHER MECHANICAL SYSTEMS AND EQUIPMENT

INDEX

CHAPTER 19

OTHER MECHANICAL SYSTEMS AND EQUIPMENT

19.1 GENERAL

Specific submittal requirements contained in this chapter supplement the requirements of CHAPTER 1 GENERAL INSTRUCTIONS. All required documents including drawings and design analysis will be in accordance with CHAPTER 2 PRESENTATION OF DATA. Requirements of this chapter pertain to the following mechanical systems and equipment.

- Petroleum, Oils, and Lubricant (POL) Facilities/Automotive and Aircraft Fueling Systems
- Diesel Engines for Generators and Fire Pumps
- Cranes and Hoists
- Storage Tanks
- Central Energy Plants and Distribution System
- Elevators
- Other Mechanical Systems

19.2 APPLICABLE PUBLICATIONS

Federal Law

OSHA	Occupational Safety and Health Act

Unified Facilities Criteria (UFC)

UFC 3-401-01	Mechanical Engineering
UFC 3-430-01FA	Heating and Cooling Distribution Systems
UFC 3-430-02FA	Central Steam Boiler Plants
UFC 3-430-05	Natural Gas and Liquified Petroleum Gas (LPG) Distribution Pipelines
UFC 3-430-08N	Central Heating Plants
UFC 3-430-11	Boiler Plant Instrumentation and Control Systems
UFC 3-460-01	Design: Petroleum Fuel Facilities

UFC 3-490-06	Elevators
UFC 3-600-01	Fire Protection Engineering for Facilities
UFC 4-010-01	DoD Minimum Antiterrorism Standards for Buildings
UFC 4-010-06	Cybersecurity of Facility-Related Control Systems

American Society of Mechanical Engineers –

ASME BPVC	Boiler Pressure Vessel Code
ASME A17.1	Safety Code for Elevators and Escalators

American National Standards Institute

ANSI	Codes and Standards

American Petroleum Institute

API	Standards and Publications

American Welding Society

AWS	Codes and Standards

Crane Manufacturers Association of America

CMAA No. 70	Specification for Electric Overhead Traveling Cranes
CMAA No. 74	Crane Manufacturers Association of America Specification for Top Running Single Girder Electric Overhead Traveling Cranes

International Code Council

IBC	International Building Code

National Fire Protection Association

NFPA	National Fire Codes and Standards

Unified Facilities Guide Specifications (UFGS)

UFGS are updated on a quarterly basis. Instructions for retrieving UFGS are covered in CHAPTER 23 SPECIFICATIONS.

19.3 PROJECT DEFINITION (10%)

19.3.1 GENERAL CONSIDERATIONS

During this design phase the designer must define the customer's requirements and confirm that they can be met within the project's constraints. To that end, a comprehensive interface with the customer is required generally through a charrette or other previously approved data gathering process. The primary purpose of the design process at this stage is to gather any information from the customer that would be necessary in the design of the facility. Also, the design preferences of the customer should be obtained for compliance if possible.

The general mechanical system types and purpose along with a rough-order-of-magnitude of major equipment sizes will be estimated at the Design charrette phase for the purpose parametric cost estimate and required mechanical spaces.

Comply with the requirements of CHAPTER 24 DESIGN-BUILD (DB) REQUEST FOR PROPOSAL (RFP) DEVELOPMENT, when writing DB-RFPs.

19.3.2 NARRATIVE

The narrative will include, but not be limited to, the following items as applicable:

- List all references used in the Design Charrette Narrative including Government design documents, industry standards, safety manuals, criteria given to designer at the charrette, predesign meeting, etc.
- Describe the proposed type of each mechanical system.
- Describe any demolition required.
- List any environmental concerns and address actions to be taken.
- Describe proposed construction planning of mechanical system for alteration/modification project.

19.4 CONCEPT DESIGN (35%)

19.4.1 DESIGN ANALYSIS

The following specific items will be included where applicable:

- A list of all special mechanical systems and equipment in the project
- A list of criteria, codes, documents and design conditions used. Reference to any authorized waiver of these criteria or codes

- Logic establishing the need for the system. If necessary, a life cycle cost estimate for all systems considered and a statement of justification for selection of the final system
- Preliminary sizes of equipment, piping and space required for the equipment and distribution methods selected
- A description of the proposed control system
- Description, approximate capacity, and location of any special mechanical equipment such as elevators, cranes, lifts, etc.
- Description of the various types and quantities (supported by calculations as applicable) of POL products and their associated unloading, storage and dispensing systems.
- Phasing

19.4.2 DRAWINGS

The following specific items will be shown where applicable:

- Flow diagrams of all systems proposed. These diagrams will be an accurate schematic representation of the system, showing all proposed equipment, piping, control valve, and primary control loops. In addition, the drawings will indicate approximate capacities of equipment, flow rates in mains, branches and outlets, direction of slope for pipe, and will identify the location of equipment by building and room.
- Plans sufficiently complete to show the location and general arrangement of mechanical equipment and major piping. Piping may be shown with single lines.

19.4.3 SPECIFICATIONS

Provide a basic outline in accordance with CHAPTER 23 SPECIFICATIONS.

19.5 INTERIM DESIGN (65%)

In addition to the following items, the designer will incorporate or answer all comments received concerning the Concept Design submittal.

19.5.1 DESIGN ANALYSIS

The Interim Design Analysis will include all items in the Concept Design Analysis and any necessary revisions. In addition, the following specific items will be included when applicable:

- Detailed calculations for sizing equipment

- Detailed logic diagrams for control schemes used
- Any other information or computation required to verify that the design complies with the design criteria, codes and standards, and is satisfactory for the intended purposes

19.5.2 DRAWINGS

The following specific items will be shown when applicable:

- **Flow Diagrams of Systems (where applicable) -** These diagrams will show all of the information given on the Concept drawings, but in greater detail. The diagrams will include equipment capacities and power requirements, all piping sizes with flow rates indicated, all valves, piping specialties, instrumentation and control devices.
- **Plans and Sections –** Layouts and details of the final version of the proposed system showing location, arrangement, capacity and space requirements of all equipment plus size, elevations, supports, product identification and direction of flow for all piping.
- **Equipment –** The drawings will include space for rating data in tabular form for all items of equipment, with space reserved for designating the manufacturer and the model number, in anticipation of as-built drawings. Preliminary rating data will be inserted in the equipment schedules at this stage. Equipment schedules will be completed when final rating data are established but not later than the Final Review submission.

19.5.3 SPECIFICATIONS

Provide redlined marked up specifications in accordance with CHAPTER 23 SPECIFICATIONS.

19.6 95% DESIGN SUBMITTAL (UNREVIEWED)

Comments generated during the Interim Design submittal will be incorporated or answered in the design analysis, specifications and drawing before they are submitted as "95%". The design analysis will be complete. The 95% Drawings should be in a Final state. Provide redlined marked up specifications if not provided at the Interim submittal. Provide final edited specifications if an Interim submittal was prepared in accordance with CHAPTER 23 SPECIFICATIONS. A technical specification is required for each mechanical system or piece of equipment covered in this chapter.

19.7 100% FINAL DESIGN (REVIEWED)

The comments generated during the 95% Design Submittal will be answered and incorporated in the design analysis, drawings and specifications before they are submitted as Final.

19.8 TECHNICAL REQUIREMENTS

19.8.1 POL FACILITIES

POL facilities will be designed in accordance with UFC 3-460-01, Petroleum Fuel Facilities.

19.8.2 ENGINE-GENERATORS

Diesel engine generators will be designed in accordance with instructions given in applicable Guide Specification and the applicable portions of this text.

- **Generator performance –** Design must include minimum continuous and surge power output requirements at expected maximum enclosure (room) operating temperature so that manufacturer can apply high temperature de-rating of performance prior to selecting the size of the unit to be provided. Design of facilities must accommodate larger size due to any required de-rating of generator performance.
- **Facilities for engine generators –** Engine generator buildings or rooms designed for engine generator installation will be designed to support the unit with the following:
    - Sufficient cooling and combustion air supply and exhaust
    - Correct air flow patterns to optimize cooling of both generator and engine
    - Door width and height to allow installation and removal of sets
    - Floor space for starting batteries, charger and working space around the set, fuel oil supply and return piping trenches, day tank, electrical equipment, etc.
    - Height of building to accommodate diesel engine, exhaust pipe, muffler, and insulation. Materials should be selected for exterior piping to resist rusting, corrosion and to prevent discoloration of the building exterior.
    - Size of building roof framing to accommodate suspension or installation of engine exhaust system. Materials should be selected for exterior piping to resist rusting, corrosion and to prevent discoloration of the building exterior.
    - Sufficient inside building temperature for engine to be maintained with jacket water heaters at required starting temperature

- A scaled drawing is required for all diesel generator sets and will show each set and the above-mentioned appurtenances.

19.8.3 CRANES AND HOISTS

- **Hoists –** Hoists will be shown on the drawings in both plan and elevation. The following items will be shown to scale and dimensioned on the drawings:
  - Length, size, and location of monorail
  - Location, degree, and radius of all monorail curve.
  - Location of all monorail track switches
  - Minimum acceptable hook height, i.e., distance from finished floor to saddle of hoist hook in raised position

  These items can be shown on architectural, structural or on a separate mechanical drawing. If additional specifications are required, recognized standards will be used.
- **Overhead traveling cranes –** A crane clearance diagram is required for all overhead traveling cranes. The required limits of crane hook travel in both plan and elevation and the dimensions of an envelope reserved for installation of the crane will be shown on the drawing. For envelope dimensions, an overhead clearance of three inches above the high point of the crane is satisfactory. Between the crane and the side walls of the building, a clearance of four to six inches is adequate. Details of special features, such as pickup beams, control outriggers, special hooks, trolleys, hoist, end trucks, etc. will also be shown on this drawing.
- **Special hoists and cranes –** Special hoists and cranes that are not monorail or overhead traveling type will be treated as special designs. Design requirements for these special cranes will be requested through Project Management to the appropriate technical section at or before the predesign conference.
- **Coordination with other systems –** Hoists and cranes must be coordinated with the catwalks, roof drainage, bird netting, fire suppression, and heating and ventilating systems. If infrared heating is used in the area where the crane is located, provide a shield for the top of the crane to protect it from the infrared heaters.

19.8.4 STORAGE TANKS FOR PETROLEUM, OILS, AND LUBRICANTS

Tanks will be selected as vertical or horizontal and either aboveground or underground as appropriate for the project and site and in accordance with all State and Installation environmental requirements as well as federal requirements. For

tanks with a volume of 40,000 gallons or less, preference will be given to tanks of the shop fabricated horizontal type. Tanks with volumes larger than 40,000 gallons will be aboveground, vertical type. Provide fixed-roof type with floating pan, as required by project criteria.

- **Aboveground Tanks –** Tanks will be designed in accordance with UFC 3-460-01, the latest editions of API 650 and NFPA 30. Tanks to be rehabilitated or modified will be in accordance with API-653. All aboveground tanks will have spillage containment dikes.
- **Underground Tanks –** Tanks will be designed in accordance with UFC 3-460-01 and NFPA 30. Tanks with volumes of 40,000 gallons or less will be double wall, horizontal and suitable for underground installation. Tanks will be either of fiberglass reinforced plastic construction or of steel construction. Steel tanks will be coal tar or epoxy coated and provided with a cathodic protection system or coated with glass fiber reinforced polyester resin coating. All storage tanks will be monitored by a leak detection system. The leak detection system will indicate, by an audible alarm and indicator lights, the occurrence of a leak in any part of either tank shell. The system will be of the electronic monitoring, pressure monitoring, vacuum monitoring, or liquid monitoring type. Observation wells will be provided in areas of seasonal high groundwater where the tank is anchored in the groundwater during normal operation. The wells may employ any of the types of leak detectors mentioned above to provide continuous monitoring. All observation wells will be clearly identified and provided with locking devices. Tanks with volumes of more than 40,000 gallons will be vertical and field erected unless otherwise authorized.

19.8.5 CENTRAL ENERGY PLANTS AND ENERGY DISTRIBUTION SYSTEMS

Central energy plants and energy distribution systems will be designed in accordance with the UFC 3-430 series of criteria.

19.8.6 ELEVATORS

Elevator systems will be designed in accordance with UFC 3-490-06, the International Building Code, and ASME A17.1, Safety Code for Elevators.

19.8.7 OTHER MECHANICAL SYSTEMS

All other mechanical systems will be designed in accordance with the latest and most stringent design criteria as listed in the contract scope of work.

CHAPTER 20

CYBERSECURITY

INDEX

CHAPTER 20

CYBERSECURITY

20.1 GENERAL

20.1.1 SCOPE

This chapter gives general guidelines for the preparation of drawings, specifications, and design analysis as related to cybersecurity of facility related control systems. Specific submittal requirements in this chapter supplement the requirements of CHAPTER 1 GENERAL INSTRUCTIONS. All required documents, including specifications and design analysis, will be in accordance with CHAPTER 2 PRESENTATION OF DATA.

20.1.2 DESIGN SUBMITTALS

- The following submittal guidelines have been developed for the most common projects such as new construction or renovation of a building or buildings. Projects which require extensive or highly technical control system work and projects with high impact systems, will have special submittal requirements developed for that project.
- The requirements will be defined, developed and agreed upon at the predesign conference and will become part of the contract.
- Design submittals will be reviewed for general compliance with criteria. Some detailed checks will be made. Complete and independent checking of the design should be accomplished by the designer. The designer is fully responsible for the design. The design should be complete and accurate. It should be thoroughly checked for errors, conflicts (both within and between disciplines) and proprietary requirements. No proprietary restrictions may be included in the contract unless specifically authorized.

20.2 APPLICABLE PUBLICATIONS

The latest version in effect at the time of design start will be used.

Committee on National Security Systems

CNSSI 1253	Security Categorization and Control Selection for National Security Systems
CNSSI 4009	Committee on National Security Systems (CNSS) Glossary

Federal Information Processing Standards

FIPS 200	Minimum Security Requirements for Federal Information and Information Systems
FIPS 201-2	Personal Identity Verification (PIV) of Federal Employees and Contractors

National Institute of Standards and Technology

NIST SP 800-37	Guide for Applying the Risk Management Framework to Federal Information Systems
NIST SP 800-53	Security and Privacy Controls for Federal Information Systems and Organizations
NIST SP 800-82	Guide to Industrial Control System (ICS) Security

United States Department of Defense

DODI 8500.01	Cybersecurity
DODI 8510.01	Risk Management Framework (RMF) for DoD Information Technology

Unified Facilities Criteria (UFC)

UFC 1-200-01	DoD Building Code
UFC 3-410-01	Heating, Ventilating, and Air Conditioning Systems
UFC 3-410-02	Direct Digital Control for HVAC and Other Building Control Systems
UFC 3-470-01	Utility Monitoring and Control System (UMCS) Front End and Integration
UFC 3-501-01	Electrical Engineering
UFC 3-520-01	Interior Electrical Systems
UFC 3-530-01	Interior and Exterior Lighting Systems and Controls
UFC 3-600-01	Fire Protection Engineering for Facilities
UFC 4-010-06	Cybersecurity of Facility-Related Control Systems
UFC 4-021-02	Electronic Security Systems

UFC 4-510-01	Design: Military Medical Facilities

USACE Criteria

ECB 2018-11	Control System Cybersecurity Coordination Requirement
ECB 2020-10	Facility-Related Control System Cybersecurity Coordination Requirement
ER 25-1-113	USACE Critical Infrastructure Mandatory Center of Expertise

20.3 10% PROJECT DEFINITION

The Project Definition narrative will include the requirements stated below and will include all data and any calculations if required to support design decisions and estimates at this stage of design. The analysis will incorporate specific criteria furnished and conference minutes for all systems considered. The analysis will include the following:

20.3.1 CYBERSECURITY NARRATIVE

- Identify and document all facility related control systems associated with the project. A list of possible facility related control systems that may be required on a given project are as follows:
    - Fire Alarm and Mass Notification Systems
    - Lighting Control Systems
    - Utility Monitoring Control Systems (UMCS)
    - Energy Monitoring Control Systems (EMCS)
    - Electronic Security Systems
    - Supervisory Control and Data Acquisition Systems (SCADA)
    - Other facility-related control systems
        - Identify and document the System Owner (SO) and Authorizing Official (AO) for each control system.
        - Provide brief description of the network connectivity requirements of each control system.
- Determine if there are any existing Authorities to Operate (ATO) for any of the control systems included in the project scope. Provide documentation confirming existing any ATO’s.

- Identify and document any other control system restraints or interdependencies, such as privatized utilities, energy contracts or sole source justifications.
- Indicate the Confidentiality (C), Integrity (I), and Availability (A) impact rating for each control system within the project scope. The C-I-A ratings should be determined by the System Owner (SO) and Authorizing Official (AO) in accordance with UFC 4-010-06.

20.3.2 SUPPORTING DOCUMENTATION

- Provide a list of security controls for each system that correspond to the system's C-I-A impact level. If the list of relevant controls is not provided by the Service, the designer will be responsible for generating the controls. The DoD uses NIST SP 800-82 as an overlay to determine the baseline security controls. Refer to UFC 4-010-06 for information on generating and tailoring the security control list.
- Provide a list of corresponding control correlation identifiers (CCIs) for each system that are derived from the selected security controls. Refer to UFC 4-010-06 for information on generating and tailoring the CCI list.

20.4 CONCEPT DESIGN (35%)

20.4.1 DESIGN ANALYSIS

The Concept Design Analysis is an extension of the Project Definition (10%) level narrative and will include the requirements stated below. The design analysis will include all data and calculations to support design decisions and estimates at this stage of design. The analysis will incorporate specific criteria furnished and conference minutes of all systems considered. In addition to the project definition (10%) requirements, the analysis will include the following:

- Provide a narrative description of any significant changes or additions to the cybersecurity design that have been made since the project definition stage. Provide documentation that directed significant changes in the scope of work.
- Verify that the System Owner (SO) and Authorizing Official (AO) for each control system has not changed from project definition stage. Document any changes.
- Verify that the C-I-A impact levels for each control system has not changed from project definition stage. Document any changes.
- Verify that any Authorities to Operate (ATOs) identified in project definition stage are still active. Document any changes.

- Provide preliminary list of Unified Facilities Guide Specifications (UFGS) that will be used. The designer will obtain the appropriate guide specifications and use them for design guidance.

20.4.2 SUPPORTING DOCUMENTATION

Categorize all relevant control correlation identifiers (CCIs) identified in project definition stage. Refer to UFC 4-010-06 for information categorizing all CCIs.

Address all CCIs identified as "designer" specific. Per UFC 4-010-06, address each CCI identified as "designer" in one or more of the following ways:

- Incorporate a design requirement in the specifications for the control system.
- Select or identify required changes to standard CCI requirements which affect CCI implementation, such as the value of a specific parameter. Note that approval or rejection of these values by the Authorizing Official will impact control system design.
- Provide information about the design to others so they can implement a CCI. In particular, document CCIs that the system is expected to inherit from another system.

20.5 INTERIM DESIGN (65%)

20.5.1 DESIGN ANALYSIS

This stage of Design Analysis will be an entirely updated analysis (not amendments to concept submittal) to permit verification that the design complies with the criteria furnished and the approved Concept Design. In addition to the requirements of the 35% design analysis, the following requirements will apply:

- Provide a narrative description of any significant changes or additions to the cybersecurity design that have been made since the 35% submittal. Provide documentation that directed significant changes in the scope of work.
- Provide updated list of guide specifications that will be used.

20.5.2 DRAWINGS

Ensure that all designers incorporate minimum cybersecurity design requirements in accordance with UFC 4-010-06 Chapter 4.

20.5.3 SPECIFICATIONS

Provide redlined marked up specifications in accordance with CHAPTER 23 SPECIFICATIONS. Due to C-I-A impact levels and CCIs varying between different

control systems, a dedicated specification will need to be provided for each control system.

20.5.4 ADDITIONAL CRITERIA

Any additional criteria, deviations concerning criteria, questions or problems, should be identified and documented.

20.6 95% DESIGN

The comments generated during the Concept Review will be answered or incorporated into the 95% design analysis (not amended sheets) and drawings before they are submitted.

20.6.1 DESIGN ANALYSIS

- The 95% Design analysis is an extension of the approved Concept Design analysis and supports and verifies that the design complies with the requirements of the project.
- Provide a narrative description of any significant changes or additions to the cybersecurity design that have been made since the 65% submittal. Provide documentation that directed significant changes in the scope of work.

Verify that list of guide specification to be used is complete and accurate.

20.6.2 DRAWINGS

The final drawings are an extension of the approved 65% drawings and will incorporate all accepted submitted comments.

- All drawings will be complete. Ensure that all designers incorporate minimum cybersecurity design requirements in accordance with UFC 4-010-06 Chapter 4.
- Thoroughly check the drawings for discrepancies, for compatibility between drawings and specifications and for compatibility between disciplines.

20.6.3 SPECIFICATIONS

Provide redlined marked up specifications if not provided at the Interim submittal. Provide final edited specifications if an Interim submittal was prepared in accordance with CHAPTER 23 SPECIFICATIONS.

- Read thoroughly and comply with the instructions in each set of guide specifications, including notes to specification writer. The SpecsIntact specification writing system will be used for specification preparation.

- Cross out nonapplicable index items, publications, paragraphs, phrases, words and sentences. Fill in blanks as applicable.
- Add publication references, paragraphs, phrases, words, and sentences for items not adequately covered by specifications.

20.6.4 ADDITIONAL CRITERIA

Any additional criteria, deviations concerning criteria, questions or problems, should be identified and documented.

20.7 100% FINAL DESIGN

- The comments generated during the 95% review and all previous reviews will be answered or incorporated into the completed design analysis (not amended sheets), specifications and drawings before they are submitted as final and ready to advertise.
- The analysis will be complete and will support the requirements of the project.
- The drawings and specifications will be complete and thoroughly checked for technical accuracy, code and scope of work compliance and compatibility with other disciplines.

20.8 TECHNICAL REQUIREMENTS

- Minimum Cybersecurity design requirements are addressed in Chapter 4 of UFC 4-010-06.
- C-I-A impact ratings for each system must be determined by the System Owner (SO) and Authorizing Official (AO). If the Service is unable to provide C-I-A impact ratings, notify USACE for further direction.

20.9 COORDINATION REQUIREMENTS

- For MILCON, SRM, and IIS projects, coordinate the cybersecurity design for each system with the Control Systems Cybersecurity Mandatory Center of Expertise (CSC-MCX). Coordination requirements should be in accordance with the regulations in affect at the time. Provide all cybersecurity related project submittals to CSC-MCX for review at each submittal stage. Submittals should include all related design analyses, drawings, specifications and supporting documentation.
- For Civil Works Programs projects or projects resulting in control systems owned by USACE, coordinate the cybersecurity design for each system with the Critical Infrastructure Mandatory Center of Expertise (CICS-MCX). Coordination requirements should be in accordance with the regulations in

affect at the time. Provide all cybersecurity related project submittals to CICS-MCX for review at each submittal stage. Submittals should include all related design analyses, drawings, specifications and supporting documentation.

CHAPTER 21
ELECTRICAL AND ELECTRONIC SYSTEMS

INDEX

CHAPTER 21

ELECTRICAL AND ELECTRONIC SYSTEMS

21.1 GENERAL

21.1.1 SCOPE

This chapter gives general guidelines for the preparation of drawings, specifications and design analysis as related to power, lighting, grounding and electronic systems. Specific submittal requirements in this chapter supplement the requirements of CHAPTER 1 GENERAL INSTRUCTIONS. All required documents, including drawings and design analysis, will be in accordance with CHAPTER 2 PRESENTATION OF DATA.

21.1.2 DESIGN SUBMITTALS

- The following submittal guidelines have been developed for the most common projects such as a building or buildings and minor exterior electrical design. Projects which require extensive exterior electrical work and projects with complicated or highly technical interior electrical work will have special submittal requirements developed for that project.
- The requirements will be defined, developed and agreed upon at the predesign conference and will become part of the contract.
- Design submittals will be reviewed for general compliance with criteria. Some detailed checks will be made. Complete and independent checking of the design should be accomplished by the designer. The designer is fully responsible for the design. The design should be complete and accurate. It should be thoroughly checked for errors, conflicts (both within and between disciplines), and proprietary requirements. No proprietary restrictions may be included in the contract unless specifically authorized.

21.2 APPLICABLE PUBLICATIONS

The latest version in effect at the time of design start will be used.

National Fire Protection Association (NFPA)

NFPA 70	National Electrical Code
NFPA 70E	Standard for Electrical Safety in the Workplace
NFPA 72	National Fire Alarm and Signaling Code

NFPA 101	Life Safety Code
NFPA 170	Standard for Fire Safety and Emergency Symbols
NFPA 780	Standard for the Installation of Lightning Protection Systems

Unified Facilities Criteria (UFC)

UFC 1-200-01	DoD Building Code
UFC 1-200-02	High Performance and Sustainable Building Requirements
UFC 3-490-06	Elevators
UFC 3-501-01	Electrical Engineering
UFC 3-520-01	Interior Electrical Systems
UFC 3-520-05	Stationary and Mission Batteries
UFC 3-530-01	Interior and Exterior Lighting Systems and Controls
UFC 3-535-02	Visual Air Navigation Facilities
UFC 3-540-01	Engine-Driven Generator Systems for Prime and Standby Power Applications
UFC 3-550-01	Exterior Electrical Power Distribution
UFC 3-560-01	Operation and Maintenance: Electrical Safety
UFC 3-575-01	Lightning and Static Electricity Protection Systems
UFC 3-600-01	Fire Protection Engineering for Facilities
UFC 3-580-01	Telecommunications Interior Infrastructure Planning and Design
UFC 4-010-01	DoD Minimum Antiterrorism Standards for Buildings
UFC 4-010-05	Sensitive Compartmented Information Facilities Planning, Design, and Construction
UFC 4-010-06	Cybersecurity of Facility-Related Control Systems
UFC 4-021-01	Design and O&M: Mass Notification Systems

UFC 4-021-02	Electronic Security Systems
UFC 4-510-01	Design: Military Medical Facilities

International Code Council (ICC)

IFC	International Fire Code
IBC	International Building Code

Telecommunication Industry Association (TIA)/Electronic Industries Alliance (EIA)

TIA-568.0-E	Generic Telecommunications Cabling for Customer Premises
TIA-568.1-E	Commercial Building Telecommunications Infrastructure Standard
TIA-568.2-D	Balanced Twisted-Pair Telecommunications Cabling and Components Standard
TIA-568.3-D	Optical Fiber Cabling and Components Standard
TIA-569-E	Telecommunications Pathways and Spaces
TIA-606-C	Administration Standard for Telecommunications Infrastructure
TIA-607-D	Generic Telecommunications Bonding and Grounding (Earthing) for Customer Premises
TIA-758-B	Customer-Owned Outside Plant Telecommunications Infrastructure Standard

Building Industry Consulting Service International (BICSI)

TDMM	Telecommunications Distribution Methods Manual

United States Army Information Systems Engineering Command

I3A	Technical Guide for Installation Information Infrastructure Architecture

USACE Engineering and Construction Bulletin

ECB 2018-17	New Requirements for Visual Notification for Mass Notification Systems
ECB 2020-10	Facility-Related Control System Cybersecurity Coordination Requirement

Committee on National Security Systems

TEMPEST 1-13 Red/Black Installation Guidance	
CNSSI 7003	Protected Distribution Systems

Intelligence Community Standards

ICS-705	Physical and Technical Security Standards for Sensitive Compartmented Information Facilities
IC Tech Spec	Technical Specifications for Construction and Management of Sensitive Compartmented Information Facilities (SCIF)

Other Industry Criteria

ANSI C2	National Electrical Safety Code
ASHRAE 90.1	Energy Standard for Buildings Except Low-Rise Residential Buildings
IEEE 142	Recommended Practice for Grounding of Industrial and Commercial Power Systems
IES HBK	Lighting Handbook Reference and Application
UL 96A	Installation Requirements for Lightning Protection Systems
USAB	Uniform Federal Accessibility Standards

21.2.1 OTHER PUBLICATIONS AND CODE COMPLIANCE

In addition to the codes and standards listed above, all electrical work will comply with the applicable requirements of the latest edition of the standards of the National Electrical Manufacturer's Association (NEMA); Insulated Power Cable Engineer's Association (IPCEA); and all applicable federal, state, city, and local codes, regulations, ordinances, publications and manuals. All new manufactured equipment will be listed by the Underwriter's Laboratory (UL), ETL, FM, etc. or a similar

nationally recognized testing laboratory acceptable to USACE. When codes conflict, the more stringent will govern.

21.2.2 GUIDE SPECIFICATIONS

Specifications are updated on a quarterly basis. Instructions on retrieving UFGS Specifications are covered in CHAPTER 23 SPECIFICATIONS.

21.3 10% PROJECT DEFINITION

The Project Definition narrative will include the requirements stated below and will include all data and any calculations if required to support design decisions and estimates at this stage of design. The analysis will incorporate specific criteria furnished and conference minutes for all systems considered. The analysis will include the following:

21.3.1 EXTERIOR ELECTRICAL DISTRIBUTION SYSTEM NARRATIVE

- Make a statement, with documentation, that the primary supply is adequate to support the added load. If the primary source is inadequate, state measures proposed to correct the deficiency in the design.
- Provide brief description of the electrical characteristics of power supply from the service point to the main service equipment (voltage, phase, number and size of conductors).
- Provide brief description of the standards of design, such as physical characteristics of overhead and/or underground circuits. If underground, state the basis for the selection. Reference applicable conclusions and/or calculations (if necessary).
- Provide brief description of the conductor type(s), such as copper or aluminum, and a justification for the choice made.
- Provide a statement describing all exterior lighting.
- List Unified Facilities Guide Specifications that will be used. The designer will obtain the appropriate guide specifications and use them for design guidance.
- Include a statement that no brand names or proprietary items will be used in the final plans and specifications.
- Provide the name of the utility if the electrical distribution system is privatized. Include a statement indicating the extent of the privatized utilities responsibilities.

21.3.2 INTERIOR ELECTRICAL SYSTEM NARRATIVE

- Provide brief description of the Electrical Characteristics (phase voltage and number of wires) for electrical system(s). Justification for the type of system proposed (Economical or Special Condition).
- Provide brief description of the lighting system(s), including fixtures and controls, to be used for major areas.
- State type of wiring system, such as rigid or intermediate conduit, electrical metallic tubing, nonmetallic sheathed cable, etc., that will be used.
- Provide a paragraph describing special items of design, such as equipment, handicapped and seismic requirements, etc.; include description and location.
- Clearly define and completely indicate any and all hazardous areas with the applicable class, group, division and suitable operating temperature as defined in the National Electrical Code. Do not attempt to "design around" the hazardous areas in lieu of designating the areas. State source of criteria, such as Safety Officer or other recognized official. Include documentation of the source of the criteria.
- Indicate if a lightning protection system will be required; if none, so state. (Reference NFPA 780).
- Provide brief description of the grounding system to be installed. If a counterpoise, grid, electromagnetic interference (EMI) shielding requirements, etc., is to be utilized, state standards to be used.
- Provide a firm statement that no brand names or proprietary items will be used in final plans and specifications.
- Provide a statement identifying the sustainable design features to be incorporated. See CHAPTER 6 SUSTAINABLE DESIGN AND DEVELOPMENT (SDD) for specifics.
- List UFGS that will be used. The designer will obtain the appropriate guide specifications and use them for design guidance.

21.3.3 EXTERIOR ELECTRONIC SYSTEM NARRATIVE

- Provide a statement describing the extent of any exterior work such as outside plant fiber, copper lines, duct banks, etc., outside of 5 feet from the building line. Clearly identify the source/connection point for all new telecommunications lines. Provide brief description of the standards of design.
- List Unified Facilities Guide Specifications that will be used. The designer will obtain the appropriate guide specifications and use them for design guidance.

21.3.4 INTERIOR ELECTRONIC SYSTEMS DESIGN ANALYSIS NARRATIVE

- Where additions or alterations to existing systems are to be made, verify that the systems are expandable and can accommodate the additions or alterations. Provide a description of all proposed additions and alterations to each system.
- Provide a descriptive narrative of all electronic systems that are required for the project. A list of possible electronic components and/or systems that may be required on a given project are as follows:
  - Telecommunication/Data Systems
  - Fire Detection and Alarm System
  - Special Grounding Systems
  - Public Address Systems
  - Intrusion Detection Systems
  - Mass Notification Systems
  - Access Control Systems
  - Closed Circuit Television (CCTV) Systems
  - Audio Visual (AV) Systems
- Define any hazardous areas (as defined in the National Electrical Code) and indicate the type of equipment proposed for use in such areas.
- List Unified Facilities Guide Specifications that will be used. The designer will obtain the appropriate guide specifications and use them for design guidance.

21.4 CONCEPT DESIGN (35%)

21.4.1 DESIGN ANALYSIS

The Concept Design Analysis will include the requirements stated below and will include all data and calculations to support design decisions and estimates at this stage of design. The analysis will incorporate specific criteria furnished and conference minutes of all systems considered. The analysis will include the following:

- Exterior Electrical Distribution System Narrative
  - Make a statement, with documentation, that the primary supply is adequate to support the added load. If the primary source is inadequate, state measures proposed to correct the deficiency in the design. Reference photographs of existing substations, pole line structures, or

other exterior components. The photographs will be included in the design analysis of all affected equipment and structures.

- Provide electrical characteristics of power supply from the service point to the main service equipment (voltage, phase, number and size of conductors).
- Indicate type, number, kVA capacity and impedance of transformer installation proposed and state method of sizing. State primary and secondary connections of transformers (i.e., 12470 to 480Y/277 volts, Delta-wye) in accordance with ANSI C57.12.00.
- Provide narrative description of any required exterior generator sets. Indicate preliminary ratings and electrical characteristics.
- State type of conductor, such as copper or aluminum and where proposed to use and a justification for the choice made.
- Provide a statement describing standards of design, such as primary and secondary voltage drop and physical characteristics of overhead or underground circuits. If underground, state the basis for the selection. Reference applicable conclusions and/or calculations. State short circuit current available at project site and state the source of this data, if available.
- Provide a statement describing all exterior lighting. IES point-to-point calculations will be submitted to support the selection of the lighting system.
- If the electrical distribution system is privatized, provide the point-of-contact information and any correspondence. Describe the work to be accomplished by the utility and the contractor.
- Include a statement that no brand names or proprietary items will be used in the final plans and specifications.
- Provide preliminary list of Unified Facilities Guide Specifications (UFGS) that will be used. The designer will obtain the appropriate guide specifications and use them for design guidance.

o Interior Electrical System Narrative

- Indicate electrical characteristics (phase voltage and number of wires) for the electrical system. Provide justification for the type of system proposed (Economical or Special Condition). A life cycle analysis is required on 208Y/120 volt system above 150 kVA.

- Provide a preliminary load analysis in accordance with UFC 3-501-01 to support the sizing of the service entrance equipment and feeders, service transformer, generator, UPS and/or alternate energy systems.
- Provide brief description of the lighting system(s), including fixtures and controls, to be used throughout the facility. Provide photometric calculations for each space that includes all information required by UFC 3-530-01. Also include tabulation/summary sheet, showing the following:
    - Room name and number
    - Illuminance levels for each space: Include average, minimum, maximum, average to minimum ratio and minimum to maximum ratio.
    - Lighting power density (watts per square foot)
    - Light loss factor (LLF) used for calculations
- State type of wiring system, such as rigid or intermediate conduit, electrical metallic tubing, nonmetallic sheathed cable, etc. and location of proposed use.
- Provide a paragraph describing special items of design, such as equipment, receptacles, handicapped and seismic requirements, etc.: include description and location. Reference pertinent NEMA or any recognized standards to identify type receptacles selected.
- Clearly define and completely indicate any and all hazardous areas with the applicable class, group, division, zone and suitable operating temperature as defined in the National Electrical Code. Do not attempt to "design around" the hazardous areas in lieu of designating the areas. State source of criteria, such as Safety Officer or other recognized official. Include documentation of the source of the criteria.
- Describe basic characteristics of panelboards, protective devices, switchgear, motor control centers or other major equipment to be provided. Evidence will be included to support that the equipment is manufactured or can be manufactured and supplied by at least three reliable manufacturers and that the space is adequate for the equipment having the greatest dimensions.
- Describe electrical metering equipment to be provided as required by the specific Installation or the private utility company.
- Describe the lightning protection system; if none, so state. Provide a lightning protection risk assessment in accordance with NFPA 780 Annex L that supports the required level of protection.

- Describe grounding system to be installed. If a counterpoise, grid, EMI shielding requirements, etc., is to be used, state standards to be used in design calculations.
- Provide a statement that no brand names or proprietary items will be used in final plans and specifications.
- Provide a statement identifying the sustainable design features to be incorporated. See CHAPTER 6 SUSTAINABLE DESIGN AND DEVELOPMENT (SDD) for specifics.
- Provide a statement identifying compliance with AT/FP requirements. See CHAPTER 5 ANTITERRORISM / FORCE PROTECTION (AT/FP) for specifics.
- Provide a statement that Arc Flash Hazard analysis, calculations, labels and other information will be provided.
- Provide preliminary list of Unified Facilities Guide Specifications (UFGS) that will be used. The designer will obtain the appropriate guide specifications and use them for design guidance.

o Exterior Electronic System Narrative

- Provide a statement describing the extent of any exterior work such as outside plant fiber, copper lines, duct banks, etc., outside of five feet from the building line. Clearly identify the source/connection point for all new telecommunications lines. Provide brief description of the standards of design.
- Include a statement that identifies work to be accomplished by the contractor and work that the Government will be responsible for. Identify the Government telecommunications point of contact for the project.
- Provide preliminary list of Unified Facilities Guide Specifications (UFGS) that will be used. The designer will obtain the appropriate guide specifications and use them for design guidance.

o Interior Electronic Systems Narrative

- Where additions or alterations to existing systems are to be made, verify that the systems are expandable and can accommodate the additions or alterations. Provide a description of all proposed additions and alterations to each system.
- Provide a descriptive narrative of the telecommunications/data system to be provided for the project. Identify the networks and classification levels of the systems to be provided. Provide a description of the

telecommunications spaces that includes equipment arrangement. Provide a description of the horizontal and backbone distribution systems, including cable and pathway types to be utilized.

- Indicate if a fire alarm and/or mass notification system is required. A narrative describing the system(s) will be provided in the Fire Protection design analysis. Refer to CHAPTER 16 FIRE PROTECTION.
- Provide a descriptive narrative of all additional electronic systems that are required for project. Clearly identify which items are to be provided by the contractor and items to be provided by the Government. A list of electronic components and/or systems that may be required on a given project are as follows:
    - User Owned/Maintained Data Systems
    - Special Grounding Systems
    - Public Address Systems
    - Intrusion Detection Systems
    - Access Control System
    - Closed Circuit Television (CCTV) Systems
    - Audio Visual (AV) Systems
- Clearly define and completely indicate any and all hazardous classified locations with the applicable class, group, division, zone and suitable operating temperature as defined in the National Electrical Code. Do not attempt to “design around” the hazardous areas in lieu of designating the areas. State source of criteria, such as Safety Officer or other recognized official. Include documentation of the source of the criteria.
- Provide preliminary list of Unified Facilities Guide Specifications (UFGS) that will be used. The designer will obtain the appropriate guide specifications and use them for design guidance.

21.4.2 DRAWINGS (35%)

- Exterior Electrical
    - Identify existing and new electrical primary lines, both overhead and underground.
    - Show removals and relocations, if any. If extensive, provide separate drawing(s).

- Show the location of new and existing transformers, primary switches, sectionalizing cabinets and exterior generator sets.
- Show the secondary service to the facility and indicate whether it is overhead or underground.
- Indicate electrical characteristics of all items shown; include voltage, phase, conductor size and kVA.
- Show guy leads and guy strengths on the plans when applicable. Guying calculations will be submitted verifying the guying design shown.
- Indicate point of demarcation between contractor and privatized utility, if applicable.
- For complex electrical distribution projects, provide a riser diagram dedicated to the exterior electrical system. Sizes of all wires, poles, duct bank, equipment, etc., need not be included. Where the electrical configuration cannot be adequately explained on a power riser diagram, provide a one-line diagram.

o Interior Electrical

- Provide a complete electrical symbol legend for all devices or equipment shown on the plans.
- Provide lighting floor plans that show light fixture and control device locations.
- Provide light fixture schedule and details that indicate electrical characteristics including voltage, volt-amps, lumen output, CCT and mounting information.
- Provide power floor plans that show receptacles and equipment connections (disconnects, switches, junction boxes, etc.). Equipment connections should be labeled to indicate the equipment they serve.
- Show the location of all major pieces of electrical equipment, including service lines, service equipment, distribution panelboards and transformers.
- Show the proposed riser diagram. Sizes of all conduits, wires, cables, panels, etc., need not be included, except for the main service feeder and service equipment. Where the electrical configuration cannot be adequately explained on a power riser diagram, a complete one-line diagram will be provided.

- Provide samples of panelboard, switchboard, motor control and fixture schedules.
- Clearly define and completely indicate any and all hazardous areas with the applicable class, group, division, and suitable operating temperature as defined in the National Electrical Code. Do not attempt to “design around” the hazardous areas in lieu of designating the areas. State source of criteria, such as Safety Officer or other recognized official. Include documentation of the source of the criteria.

- Exterior Electronic Systems
  - Exterior electronic systems (outside plant) work will be shown on dedicated electronic systems site plan.
  - Identify new and existing communications service lines, both overhead and underground.
  - Show removals and relocations, if any. If extensive, provide separate drawing(s).
  - Show the location of new and existing hand holes, maintenance holes, termination cabinets, etc.
  - Show the service to the facility and indicate whether it is overhead or underground.
  - Indicate characteristics of all items shown; include duct bank, concrete encasement, cable types, etc.
  - For campus/large area telecommunications distribution projects, provide a topology diagram.
- Interior Electronic Systems
  - Provide a complete electronic systems symbol legend for all devices or equipment shown on the plans.
  - Provide electronic systems floor plans that show data/telephone/CATV outlets, cable tray, and other electronic system devices. For large or more complex projects, it may be necessary to include separate floor plans for other electronic systems (such as electronic security or audio-visual plans).
  - Show the location of all electronic system panels, cabinets, racks, etc., on floor plans.
  - Show the proposed riser diagrams for all electronic systems. Sizes of conduit, cables, etc., need not be included at the 35% concept design.

21.5 INTERIM DESIGN (65%)

21.5.1 DESIGN ANALYSIS

This stage of Design Analysis will be an entirely updated analysis (not amendments to concept submittal) to permit verification that the design complies with the criteria furnished and the approved Concept Design. In addition to the requirements of the 35% design analysis, the following requirements will apply:

- Exterior Electrical Distribution System Narrative
  - Provide a narrative description of any significant changes or additions to the exterior electrical design that have been made since the 35% submittal. Provide documentation that directed significant changes in the scope of work.
  - Provide a narrative description of any exterior generator sets including classification, electrical characteristics, fuel type, fuel tank/run time and transfer equipment. Provide calculations with generator sizing software to support generator design requirements.
  - State short circuit current available at project site and indicate the source of this data. Provide voltage drop and short circuit calculations to support sizes and ratings of exterior electrical conductors and equipment.
  - Provide a cost for the exterior distribution system work to be performed by the privatized utility, if applicable.
  - Provide updated list of guide specifications that will be used.
- Interior Electrical System Narrative
  - Provide a narrative description of any significant changes or additions to the interior electrical design that have been made since the 35% submittal. Provide documentation that directed significant changes in the scope of work.
  - Provide updated load analysis in accordance with UFC 3-501-01.
  - Provide short circuit calculations that indicate the available short circuit and ground fault currents at each bus in the distribution system, to include all switchboards, panelboards, transformers, motor control centers, etc. If utility fault current data is unavailable, provide calculations that assume an infinite bus on the primary side of the service transformer. Use a commercially available software program designed for short circuit analysis.

- Provide voltage drop calculations for service conductors and all feeders serving distribution equipment including switchboards, panelboards, transformers, motor control centers, etc. Provide calculations for additional feeders and branch circuits that may be subject to voltage drop. Service conductors and feeders will be sized for a maximum voltage drop of two percent at the circuit's rated capacity. Branch circuits will be sized for a maximum of three percent at the circuit's rated capacity.
- Describe electrical metering equipment to be provided. If the facility has a utility monitor and control systems (UMCS) or energy management and control system (EMCS) system, address the method to provide signals to master station.
- Provide cutsheets for equipment used to develop any elevation drawings, such as switchboards or switchgear.
- Provide updated list of guide specifications that will be used.

o Exterior Electronic System Narrative

- Provide a narrative description of any significant changes or additions to the exterior electronic system design that have been made since the 35% submittal. Provide documentation that directed significant changes in the scope of work.
- Provide updated list of guide specifications that will be used.Interior

o Electronic Systems Narrative

- Provide a narrative description of any significant changes or additions to the interior electronic system design that have been made since the 35% submittal. Provide documentation that directed significant changes in the scope of work.
- Provide updated list of guide specifications that will be used.

21.5.2 DRAWINGS (65%)

o General

- All removals must be shown. If removals are extensive, separate demolition plans are required. The designer will display the information in such a manner that it would not be necessary to visit the site to prepare a bid.
- Complete legends will be provided for all devices and equipment shown on the plans. Mounting heights will be included as applicable.

- Before submittal, drawings will be thoroughly checked by the designer for discrepancies and conflicts, particularly as related between disciplines and various systems above dropped ceiling.

- Exterior Electrical

  - All exterior electrical site plans will be completed with all pertinent components identified.

  - Clearly identify work to be performed by the privatized utility, if applicable. A cost for this work will be provided to be included as a bid item.

  - Provide details of all pertinent components including transformers, poles, manholes, handholes, duct banks, etc. Details will include transformer's location, type of construction, kVA, impedance, voltage, phase, and type, size, and number of conductors. If manholes or handholes are required for underground, utilize typical manhole from UFC 3-550-01.

  - Indicate any primary metering requirements.

  - For complex electrical distribution projects, power riser diagram will be essentially complete except for finalization of conduit and wire sizes.

- Interior Electrical

  - Lighting floor plans will be essentially complete with branch circuits and switching configurations shown and labeled. Normal and emergency fixtures will be clearly identified and coordinated with the lighting fixture schedule. Branch circuit information, including number and size of conductors, should be shown on floor plan, legend or schedule.

  - Lighting control schemes will be indicated for each space. Control schemes may be indicated on plans, details, or in a lighting control schedule.

  - Lighting fixture schedule and details will be essentially complete with all relevant information included.

  - Power floor plans will be essentially complete with branch circuits, home runs, devices, motors and other equipment shown and labeled.

  - All branch circuit information will be provided, including number and size of conductors and conduit. Disconnect switch sizes and NEMA rating will be indicated. Information may be shown on the floor plans, legend or in a schedule.

- Panelboards, motor control centers, switchgear equipment and all utilization equipment will be located with schedules and physical layout arrangement completed. AIC rating will be indicated on panel schedules.
- Power riser diagram will be essentially complete except for finalization of conduit and wire sizes. Riser diagram will clearly identify all electrical equipment, feeders and the spaces the equipment is located in. Riser should clearly distinguish between new and existing equipment and circuits.
- Provide front elevations for switchboards, switchgear and other freestanding equipment. Provide information used (cut sheets, etc.) used to develop the elevations.
- Provide lightning protection plans that show all air terminals, conductors and grounding components. Provide additional elevation drawings when required by the service or when necessary to show compliance with NFPA 780.
- Provide details of all pertinent components including lightning protection devices, special power systems, etc.

o Exterior Electronic Systems

- All exterior electronic systems site plans will be completed with all pertinent components identified. Site plans will clearly identify the source and path of all new telecommunications lines.
- Provide details of all pertinent components including maintenance holes, handholes, duct banks, etc. If maintenance holes or handholes are required for underground, utilize those approved by the service or Installation.
- Provide an outside plant telecommunications riser diagram. Riser diagram will include all pathways (including maintenance holes and hand holes) and cables. For smaller projects, the outside plant information can be included with the interior telecommunications riser diagram.
- For campus/large area telecommunications distribution projects, provide maintenance hole and handhole butterfly diagrams. Details will clearly indicate cable type, name and pathways.
- Interior Electronic Systems
- Electronic systems floor plans will be essentially complete with all outlets, devices, cable tray and equipment shown and labeled.

- Cable tray type, size and mounting height will be indicated on plans, details or legend.
- Provide details of all pertinent components including cabinets, racks, outlets, ground bars, labeling configurations, etc.
- Provide elevation drawings of telecommunications cabinets, racks and/or backboards. Elevations should clearly show patch panel type, number and location.
- Provide enlarged drawings of telecommunication spaces if necessary to clearly indicate space requirements.
- Telecommunications riser diagram will be essentially complete except for finalization of cable sizes. Riser diagram will clearly identify all telecommunications equipment, cabling, spaces and typical horizontal cable runs. Riser should clearly distinguish between new and existing equipment and circuits.
- Riser diagrams for other electronic systems will be essentially complete except for finalization of cable and conduit sizes. Riser diagrams and details should clearly indicate which components are to be provided by the contractor and components to be provided by the Government.

21.5.3 SPECIFICATIONS

Provide redlined marked up specifications in accordance with CHAPTER 23 SPECIFICATIONS.

21.5.4 ADDITIONAL CRITERIA

Any additional criteria, deviations concerning criteria, questions or problems should be identified and documented.

21.6 95% DESIGN

The comments generated during the Interim Review will be answered or incorporated into the 95% design (not amended sheets) and drawings before they are submitted.

21.6.1 DESIGN ANALYSIS

- The 95% Design analysis is an extension of the approved 65% Interim Design analysis and supports and verifies that the design complies with the requirements of the project.
- A preliminary arc fault hazard analysis will be performed for all buildings to verify the adequacy of the electrical spaces. The analysis will show arc fault energy, arc fault boundaries and PPE requirements in both tabular form and on

a riser diagram. This information will be provided for, but not limited to, all transformers, switchgear, switchboards, motor control centers, panelboards, disconnect switches and other locations where exposure to energized parts is possible. The specifications will require an arc fault hazard analysis to be performed by the contractor with the specific equipment to be furnished.

- Provide updated and finalized calculations to support design including lighting photometrics, load analysis, short circuit analysis, voltage drop calculations, etc.

21.6.2 DRAWINGS (95%)

- The 95% drawings are an extension of the approved 65% drawings and will incorporate all submitted comments.
- All drawings will be complete. Congested areas where there may be interference with various electrical systems, cable trays, piping, ducts, etc., will be thoroughly detailed by expanded scale drawings and/or elevations.
- All details will be complete (pole details, fixture details, etc.) and referenced on plans.
- Thoroughly check the drawings for discrepancies, for compatibility between drawings and specifications and for compatibility between disciplines. Check the following, as a minimum, but do not limit checking to these items:
    - Verify compatibility between electrical, electronic systems and other disciplines (equipment locations, reflected ceiling plans, motor voltage and across the line as reduced voltage starters and horsepower, NEMA enclosures, plans and specifications for systems furnished in other specification sections, etc.), to ascertain that there are no conflicts on the drawings.
    - Panelboards, motor control centers, switchboard and switchgear schedules, home runs and floor plans are complete
    - Power riser or one-line diagram configuration agrees with floor plans
    - Legend and/or symbols complete and compatible with drawings
    - Fixture types indicated on the drawings agree with fixture schedule.
    - Assure design complies with design analysis and criteria.
    - Adequacy of details and control diagrams
    - Proper and practical circuitry with number of conductors and conduit sizes indicated clearly and correctly

- Ensure that the proper receptacle type(s) are provided for the specific special purpose equipment that will be used in the facility. Obtain equipment list and requirements from user.
- Clearly define and completely indicate any and all hazardous areas with the applicable class, group, division and suitable operating temperature as defined in the National Electrical Code. Ensure that all devices installed in hazardous classified locations are shown and/or specified as suitable for the location in which they are installed.
- Verify that all electronic systems are provided with power. Scope of work for electronic systems will be clearly defined.
- Where additions to existing electronic systems are made, the designer will have verified that the existing system is expandable and can accommodate the additions. This verification will include an on-site survey of the system and contacts with the manufacturer to ensure that the expansion modules, etc., are available. Information on manufacturer, model number, etc., of the existing electronic equipment will be included in the plans and specifications.

21.6.3 SPECIFICATIONS

- Provide redlined marked up specifications if not provided at the Interim submittal. Provide final edited specifications if an Interim submittal was prepared in accordance with CHAPTER 23 SPECIFICATIONS.
- Read thoroughly and comply with the instructions in each set of guide specifications, including notes to specification writer. The SpecsIntact specification writing system will be used for specification preparation.
- Cross out nonapplicable index items, publications, paragraphs, phrases, words and sentences. Fill in blanks as applicable.
- Add publication references, paragraphs, phrases, words and sentences for items not adequately covered by specifications.
- Do not specify proprietary items. See CHAPTER 23 SPECIFICATIONS.
- Ascertain that major or special types of equipment are available commercially.
- The specifications will require the contractor to provide a system short circuit study and coordination analysis for the equipment to be furnished. The study and curves will be approved prior to approval of shop drawings for the equipment. The study will not be provided for projects having nonadjustable protective devices for which coordination is not possible (e.g. standard molded case breakers). Certain facilities where the loss of power would be critical will also require the study.

- The specifications will require an arc fault hazard analysis will be performed for the equipment to be furnished. The analysis will show arc fault energy, arc fault boundaries and PPE requirements in both tabular form and on a riser diagram. Arc Flash labels will also be provided (information necessary to put on labels). This information will be provided for, but not limited to, all transformers, switchgear, switchboards, motor control centers, panelboards, disconnect switches and other locations where exposure to energized parts is possible.
- If the design is predominantly exterior overhead or underground with a small amount of information required that is contained in the interior electrical specification, the design specifications may include excerpts from the interior specifications in either the overhead or underground specifications and the title changes to "Electrical". This procedure must have prior approval.

21.7 100% FINAL DESIGN

- The comments generated during the 95% review and all previous reviews will be answered and incorporated into the completed design analysis (not amended sheets), specifications and drawings before they are submitted as final and ready to advertise.
- The analysis will be complete and will support the requirements of the project.
- The drawings and specifications will be complete and thoroughly checked for technical accuracy, code and scope of work compliance and compatibility with other disciplines.

21.8 TECHNICAL REQUIREMENTS

21.8.1 INSTALLATION SPECIFIC REQUIREMENTS

In addition to the requirements stated in this document, criteria specific to a particular Installation will also be incorporated. This criterion is in many instances more restrictive than this document and must be obtained and used from the beginning of each project.

21.8.2 SALVAGEABLE MATERIAL

- The salvageable material resulting from a demolition design and not reincorporated in the design remains property of the Government unless directed otherwise. The debris will be disposed of as directed by the Contracting Officer’s Representative. Typical removal paragraphs are listed below:
    - Where indicated, existing equipment and material will be removed and will remain the property of the Government. Salvageable equipment and

materials will be delivered to the Contracting Officer's Representative for storage on the premises as directed. Materials and debris considered unsalvageable by the Contracting Officer's Representative will be disposed of as directed.

- Removed materials, with the exception of poles, may be reused if they are in good condition, meet the requirements of this section of the specifications and are approved by the governing authority. Removed wood poles will not be reinstalled. (Removed materials not incorporated in the new work will be delivered to storage and disposed of as directed by the Contracting Officer's Representative.)

21.8.3 ELECTRICAL SYSTEMS

- Unified Facilities Guide Specifications must be used in preparing contract specifications for diesel electric generators. Unless application requires otherwise, provide brushless type generators.
- Egress lighting must comply with life safety code and UFC 3-600-01. In the concept and design analysis, write up reference paragraph and chapter that the design is based upon. Also provide emergency lighting on the facility exterior at the exit locations.
- Facilities requiring design for the handicapped will comply with UFAS as outlined in 41-CFR-101-19.6, as well as the ABAAAG, and all state and local laws and standards for buildings and facilities requiring accessibility and usability for physically handicapped people. These instructions cover such items as switch heights, adequate lighting at ramps, exit lights, etc. The most stringent of these codes will be applicable.
- In areas where the probability of hurricanes are high, distribution systems and equipment outside of buildings are to be adequately anchored, braced or guyed to withstand hurricane winds. Details with supporting design analysis and specifications will be provided to verify conformance with the applicable codes and regulations for the specific project location.
- Provide both green grounding conductors and driven electrodes for exterior lighting poles.
- Seismic design, when required, will be in accordance with UFC 1-200-01.
- Dedicated electrical space will be provided around and above panelboards, switchboards, transformers, transfer switches, motor control centers and similar major items of electrical equipment. This space will be defined in accordance with UFC 3-520-01.

- Fire Resistant Ceilings. When the false ceiling is used as the fire-resistant ceiling, then the lighting fixtures will be installed in accordance with Underwriters Laboratories Fire Resistance Directory. The lighting fixtures specified will be classified for fire resistance and will be so noted in the lighting fixture schedule.
- The designer will ensure that the requirements of NFPA 20 are met in all designs that include fire pumps. Documentation from the Installation confirming reliability of the utility service in accordance with UFC 3-600-01 and calculations that substantiate the starting voltage drop requirements must be submitted by the designer.
- The lighting design will incorporate the latest techniques of energy savings applied to lighting systems as required by ASHRAE 90.1. Lighting designs will utilize LED fixtures, unless special circumstances dictate otherwise. Designs for work within existing buildings will be compatible with the existing system. Employ sustainable design features to the greatest extent possible.
- Ensure that the impedance for the main transformer(s) are shown on the drawings and/or covered in the specifications.
- “Turtle-friendly” light fixtures will be utilized for Installations where use of other types of fixtures present environment concerns (e.g. impact on marine life such as sea turtles). See also, Installation site specific criteria.
- The designer will ensure that communications (voice, data, LAN, SIPR, NIPR, etc.) wiring systems are separated from each other and from power wiring when installed in systems furniture.
- When generators are a part of a project, show power circuits to the battery charger, block heater and any other associated piece of equipment requiring an external power source. Also show empty conduits for controls, annunciators, etc.
- Advanced metering systems will be provided for both Army and Air Force projects as required by UFC 3-520-01 and as required by the specific Installation and/or utility requirements. Advanced metering systems will comply with Cybersecurity requirements of UFC 4-010-06. Submetering of systems will be provided as required by ASHRAE 90.1.

21.8.4 DESIGN CRITERIA FOR NONLINEAR LOADS

- The design of the electrical distribution (both normal and emergency power) will consider the effects that harmonics from non-linear loads can produce on the system. Harmonics from non-linear loads can affect the sizes of the neutral conductor, panelboards, phase conductors and emergency generators. Design

for facilities having nonlinear loads will be in accordance with requirements of UFC 3-520-01.

- "K" rated transformers will be used where the associated panelboards are feeding a large quantity of non-linear loads. Special attention will be given to the harmonics produced by variable speed and variable frequency drive units for control of HVAC equipment. Use K-4 ratings when the nonlinear load is 50%-90% of the load and K-9 when the nonlinear load is greater than 90% of the load.

21.8.5 TELECOMMUNICATION/DATA SYSTEMS

- In addition to all codes and criteria, telecommunications design will meet the requirements of the Installation Government telecommunications contractor. Conflicts between codes and local requirements will be documented and addressed by USACE during the design process. The responsibilities and work performed by the government telecommunications contractor will vary between Installations and should be confirmed on a per-project basis.
- Design will incorporate industry standard practices as provided by BICSI in the current edition of the TDMM and TIA standards. The designer will incorporate all pertinent regulations and guidelines and with criteria provided into the design. This may include a complete and operational communication system or prewire the building such that the telephone equipment may be installed by others. The designer must specify all work including, but not limited to, all cable, modular outlets, etc.
- The outside plant telecommunications requirements will typically include providing all necessary cabling and pathways from the nearest service source (such as an area distribution node or dark fiber in a maintenance hole) into the facility telecommunications entrance facility.
- The interior telecommunications requirements will typically include providing a complete structured cabling system extending from the telecommunications entrance to the end user outlet. Active devices, such as switches and servers, will typically be provided by the government.
- Design will include all required electrical components and a complete raceway system and cabling for the telecommunications system. Sufficient details for cabling, conduits, raceways, wiring ducts and similar delivery means for telecommunications services will be provided to guide the contractor in their installation. The incoming communication service raceways and primary communications room will be kept separate from the electrical service raceways and main electrical equipment room. These services must remain separate through to the final point of delivery in user areas.

- Underground communication entrance conduit will be shown on the electronic systems site plan. If installation to an existing pole, manhole, etc., is not required and if an entrance conduit termination location is not designated by Installation communications contractor as indicated above, the conduits must extend five feet, as a minimum, outside building and should be clear of any decorative wall, sidewalks, parking areas, etc., with a clear, planned route to the service connection point (pole, manhole, etc.). Provide duct bank sleeves under roads, walks, etc. to facilitate unobstructed access for the installation of cables. Outside of the building, the conduit should be capped and the location marked for future installation of cable by telephone company. All underground conduits should be a minimum of thirty inches below grade and concrete encased.

- When involved with a large complex or building (i.e., multibuilding complex, etc.), determine as early as possible the equipment required for telephone and LAN service. Communication equipment installations may require special considerations (e.g., space, additional HVAC, vented exhaust systems for batteries, rated walls, hazardous area, etc.). Often, the plans for communication equipment may not be stated in the specific project document. State any requirement or anticipated plans for communication equipment in the concept design analysis along with all data justifying this need.

- The designer will ensure that the communication system design complies with the Uniform Federal Accessibility Standards (UFAS) and/or ADAAG, and all state and local laws and standards for buildings and facilities requiring accessibility and usability for physically handicapped people. These requirements may require that power outlets be provided next to telephones for TDD devices.

- Check with the base Communications Officer for local requirements associated with providing a Local Area Network (LAN) connection to the mechanical heating, ventilating and air conditioning (HVAC) direct digital controls (DDC). Coordinate with the Mechanical designer.

- Include provisions for under floor routing of audio-visual cables in video teleconference rooms, classrooms and similar areas.

- Local area networks will be included for all projects as required. The basic criteria will be obtained from the user for inclusion in the project. All LAN outlets installed in prewired workstations will be wired continuously from the outlet to the backboard, multitap, etc. depending on the type of system installed.

- Design should clearly indicate where any TEMPEST and/or red/black separation requirements are applicable.

- CATV systems will be provided as required by project criteria. The CATV may be a turn-key prewired system or an empty conduit system, depending on the criteria given. A two-inch empty entrance conduit will be installed for all projects for future installation of service cable by Using Agency. Provide a 3/4-inch plywood backboard with sufficient space for the distribution cable terminations, amplifiers, and splitters. All empty conduits will have pull wires. Turn-key systems will include cables from the backboard to each outlet, connectors on outlet plates and sufficient spare cable at backboard for future connection to splitters.

21.8.6 ELECTRONIC SECURITY SYSTEMS

- Electronic security systems, to include intrusion detection, access control, and/or closed-circuit television (CCTV) systems will be provided as required by project criteria. These systems may be a turn-key system or an empty conduit system, depending on the criteria given. Electronic security systems design will be coordinated with users and local Installation security.
- The electronic security system will protect all grade level doors, operable windows and openings leading into the facility or area as well as roof hatches and roof access doors. Operable windows will be lockable and accessible windows will be alarmed. Roof access doors or hatches will be secured with heavy duty hardware and alarmed. In addition to perimeter protection, alarm a minimum of the interior doors as designated by the user. Door switches will be of the balanced magnetic type.
- A lockable circuit breaker will be reserved for the Intrusion Detection System primary power connection in the 120V power panel located nearest the service entrance.
- All intrusion detection system signal conductors outside component enclosures must be enclosed in rigid, heavy wall conduit or intermediate metal conduit (IMC). Power cable from the Control Unit and the Monitor Cabinet to their respective junction boxes may be in electrical metal tubing (EMT).
- Cameras will be of the fixed or pan-tilt-zoom type as required for each specific location. Camera components will include cameras, lenses, fixed and remote-control camera accessories, camera housing and environmental options. Cameras will be housed in proper enclosures for the environment in which they are to operate (e.g., defrosters, heaters, weatherproof enclosures, corrosion resistant or vandal-proof enclosures, etc.).
- All cameras will be monitored/controlled at the facilities central control station. Monitors will be event driven. Monitor components will include monitors and monitor mounts. Recording capabilities will be provided where required.

- A riser diagram of the system(s) will be included in the drawings.
- All electronic security system components will be compatible with the local Installation system requirements.

CHAPTER 22
CORROSION CONTROL AND CATHODIC PROTECTION SYSTEMS

INDEX

CHAPTER 22

CORROSION CONTROL AND CATHODIC PROTECTION SYSTEMS

22.1 GENERAL

22.1.1 SCOPE

- This chapter gives general guidelines for the preparation of drawings, specifications and design analysis as related to corrosion control and cathodic protection systems. A cathodic protection (CP) system will be provided where applicable; project design and construction without considering CP is not acceptable. CP is a functional requirement for virtually all projects involving new aboveground water tanks, direct buried or submerged metallic structures (including metallic components of non-metallic pipelines) or the repair or replacement of similar existing structures. New buildings requiring fire protection systems are one example of projects requiring CP. Although new fire protection lines supplying new buildings may be constructed of non-metallic materials such as polyvinyl chloride (PVC), fire protection lines will contain some or all of the following buried metallic components: post indicator valves (PIVs), fire hydrants, pressurized metallic piping under floor slabs, change of direction devices, valves and other buried metallic components. Buried metallic components of fire protection lines require cathodic protection under this chapter, regardless of soil corrosivity. Specific submittal requirements in this chapter supplement the requirements of CHAPTER 1 GENERAL INSTRUCTIONS. All required documents, including drawings and design analysis, will be in accordance with CHAPTER 2 PRESENTATION OF DATA. Specifications will be in accordance with CHAPTER 23 SPECIFICATIONS.
- For additional information and guidance relating to Corrosion Control and Cathodic Protection Systems, see the “Corrosion Control and Cathodic Protection Systems” website at:

  https://www.sam.usace.army.mil/Missions/Military-Missions/Engineering/Corrosion-Control-and-Cathodic-Protection-Systems/

22.1.2 DESIGN SUBMITTALS

- The following submittal guidelines have been developed for the most common projects such as cathodic protection design for the protection of new buried metallic piping to building(s) and utility facilities that might be constructed or installed in support of those new buildings such as water tanks, fuel tanks, sewage lift stations, etc. Projects, which require extensive, unusual, or

complicated cathodic protection work, will have special submittal requirements developed for that project.

- The requirements will be defined, developed and agreed upon at the pre-design conference and will become part of the contract.
- Design submittals will be reviewed for general compliance with criteria. Some detailed checks will be made. The designer should accomplish complete and independent checking of the design.
- The designer is fully responsible for the design. The design should be complete and accurate. It should be thoroughly checked for errors, conflicts (both within and between disciplines), and proprietary requirements. No proprietary restrictions may be included in the contract unless specifically authorized.

22.2 APPLICABLE PUBLICATIONS

National Fire Protection Association (NFPA)

NFPA 70	National Electrical Code

NACE International

NACE SP0169	Control of External Corrosion on Underground or Submerged Metallic Piping Systems
NACE SP0177	Mitigation of Alternating Current and Lightning Effects on Metallic Structures and Corrosion Control Systems
NACE SP0187	Design Considerations for Corrosion Control of Reinforcing Steel in Concrete
NACE SP0188	Discontinuity (Holiday) Testing of New Protective Coatings on Conductive Substrates
NACE RP0193	External Cathodic Protection of On-Grade Carbon Steel Storage Tank Bottoms
NACE RP0274	High-Voltage Electrical Inspection of Pipeline Coatings
NACE RP0285	Corrosion Control of Underground Storage Tank Systems by Cathodic Protection
NACE SP0286	Electrical Isolation of Cathodically Protected Pipelines

NACE SP0388	Impressed Current Cathodic Protection of Internal Submerged Surfaces of Carbon Steel Water Storage Tanks
NACE SP0572	Design, Installation, Operation, and Maintenance of Impressed Current Deep Groundbeds

Unified Facilities Criteria (UFC)

UFC 3-501-01	Electrical Engineering
UFC 3-570-01	Cathodic Protection
UFC 3-570-06	Operation and Maintenance: Cathodic Protection Systems

Air Force Instruction (AFI)

AFI 32-1054	Corrosion Control

Engineering Manual (EM)

EM 385 1-1-1	Safety and Health Requirements Manual
EM 1110-2-2704	Cathodic Protection Systems for Civil Works Structures

Code of Federal Regulations (CFR)

40 CFR 280	Technical Standards and Corrective Action Requirements for Owners and Operators of Underground Fuel Storage Tanks (UST)
49 CFR 192	Transportation of Natural and other Gas by Pipeline: Minimum Federal Safety Standards
49 CFR 195	Transportation of Hazardous Liquids by Pipeline

22.2.1 OTHER PUBLICATIONS AND CODE COMPLIANCE

In addition to the codes and standards listed above, all electrical work associated with cathodic protection work will comply with the applicable requirements of the latest edition of the standards of the National Electrical Manufacturer's Association (NEMA); and all applicable federal, state, city, and local codes, regulations, ordinances, publications and manuals. The Underwriter’s Laboratory (UL) or a similar testing laboratory acceptable to the U. S. Army Corps of Engineers (USACE)

will list all new manufactured equipment. When codes conflict, the more stringent will govern.

22.2.2 UNIFIED FACILITY GUIDE SPECIFICATIONS (UFGS)

Specifications are updated on a quarterly basis. Instructions on retrieving UFGS Specifications are covered in CHAPTER 23 SPECIFICATIONS.

For cathodic protection design, the following guide specifications will be utilized, as applicable:

UFGS 26 42 13	Galvanic (Sacrificial) Anode Cathodic Protection (GACP) System
UFGS 26 42 15	Cathodic Protection System for the Interior of Steel Water Tanks
UFGS 26 42 17	Impressed Current Cathodic Protection (ICCP) System
UFGS 26 42 19	Cathodic Protection Systems (Impressed Current) for Lock Miter Gates

22.3 10% PROJECT DEFINITION

Project Definition will include the requirements stated below and will include all data and calculations to support design decisions and estimates at this stage of design. The analysis will incorporate specific criteria furnished and conference minutes of all systems considered. The analysis will include the following:

22.3.1 DESIGN ANALYSIS

- Provide the name of the licensed Corrosion Engineer, certified NACE Cathodic Protection Specialist, or certified NACE Corrosion Specialist.
- New or supplemental CP will be compatible to the existing CP systems (if operational) and other adjacent structures or components. It is the responsibility of the “Corrosion Expert”, as defined in this chapter, to verify, during the pre-design cathodic protection survey, the operability of existing cathodic protection systems located adjacent to or in the vicinity of the new metallic structures requiring cathodic protection. All variables that may compromise the operation of the new cathodic protection system, such as interference and grounding to existing structures, selection and application of coating systems which are not acceptable for use in conjunction with the application of cathodic protection, etc., must be considered and addressed in the design by the Contractor’s “Corrosion Expert.” The design will require coordination of the selection and application of the protective coating systems

of the structures requiring cathodic protection and the design will further require remedial actions that will mitigate all interference, grounding and other undesirable effects to enable the new CP system to afford the required potentials. The cathodic protection designer will coordinate the CP design with any existing electrical grounding systems and/or with the electrical grounding design for any new grounding systems to ensure that listed ac coupling/dc isolating devices are installed where, and if, necessary (e.g., across required isolation flanges), in accordance with the National Electrical Code, in order to avoid compromise of the cathodic protection system and/or the electrical grounding system. New systems will be compatible with installation wide systems to allow ease of repair and maintenance. New metallic pipelines or other metallic structures which are to be connected to existing metallic pipelines or other existing structures will be electrically isolated by the installation of isolation flanges between the new and old metallic structures, regardless if the existing metallic structure is catholically protected or not. That is, new cathodic protection systems must be independent and isolated from existing cathodic protection systems and designed such that the new CP system provides the specified protective potentials to the new metallic structure. Any variation from the installation of isolation flanges between new and old pipelines, such as expansions of existing cathodic protection systems to accommodate new pipe extensions, must be submitted to and approved by the Mobile District, Engineering Division CP Specialist. Expansions of existing CP systems to new pipelines or other metallic structures requiring cathodic protection must be supported by CP field survey data, including potential surveys of existing pipelines under cathodic protection, existing isolation flange tests, existing coating integrity tests, etc. All these tests, as well as other tests that might be necessary to support the design, must be conducted by the “Corrosion Expert” and results and procedures included in the Design Analysis. Where additions or alterations to existing CP systems are to be recommended, verification and substantiation that the systems are operational, expandable, and can accommodate the additions or alterations are mandatory. Provide a description of all proposed additions and alterations to each system. Information on manufacturer, model number, etc., of the existing cathodic protection equipment will be included in the plans and specifications.

- Provide a descriptive narrative of all cathodic protection systems and other corrosion control measures that are required for project. The narrative will describe the extent of the corrosion control and cathodic protection work both inside and outside of the five-foot line from the building perimeter. Provide brief description of the standards of design. Any project that includes buried or submerged metallic surfaces must be evaluated for corrosion control requirements in accordance with this chapter and with the guidance of all other referenced documents included in this chapter.

- Provide the following for cathodic protection systems:
    - Clearly define areas of structures or components in soil or water to be protected.
    - Type system recommended (i.e., sacrificial or impressed current), comparison of systems, and cost estimate showing all equipment alternatives.
- Define any hazardous areas (as defined in the National Electrical Code) and indicate the type of any cathodic protection equipment proposed for use in such areas.
- List the specifications that will be used.

22.4 CONCEPT DESIGN (35%)

22.4.1 DESIGN ANALYSIS

- The Concept Design analysis will include the requirements stated below and will include all data and calculations to support design decisions and estimates at this stage of design. The analysis will incorporate specific criteria furnished and conference minutes of all systems considered. The analysis will include the following:
- Provide the name of the licensed Corrosion Engineer, certified NACE Cathodic Protection Specialist or certified NACE Corrosion Specialist.
- New or supplemental CP will be compatible to the existing CP systems (if operational) and other adjacent structures or components. It is the responsibility of the “Corrosion Expert”, as defined in this chapter, to verify, during the pre-design cathodic protection survey, the operability of existing cathodic protection systems located adjacent to or in the vicinity of the new metallic structures requiring cathodic protection. All variables that may compromise the operation of the new cathodic protection system, such as interference and grounding to existing structures, selection and application of coating systems which are not acceptable for use in conjunction with the application of cathodic protection, etc., must be considered and addressed in the design by the Contractor’s “Corrosion Expert.” The design will require coordination of the selection and application of the protective coating systems of the structures requiring cathodic protection and the design will further require remedial actions that will mitigate all interference, grounding, and other undesirable effects to enable the new CP system to afford the required potentials. The cathodic protection designer will coordinate the CP design with any existing electrical grounding systems and/or with the electrical grounding design for any new grounding systems to ensure that listed ac coupling/dc

isolating devices are installed where, and if, necessary (e.g., across required isolation flanges), in accordance with the National Electrical Code, in order to avoid compromise of the cathodic protection system and/or the electrical grounding system. New systems will be compatible with installation wide systems to allow ease of repair and maintenance. New metallic pipelines or other metallic structures which are to be connected to existing metallic pipelines or other existing structures will be electrically isolated by the installation of isolation flanges between the new and old metallic structures, regardless if the existing metallic structure is cathodically protected or not. That is, new cathodic protection systems must be independent and isolated from existing cathodic protection systems and designed such that the new CP system provides the specified protective potentials to the new metallic structure. Any variation from the installation of isolation flanges between new and old pipelines, such as expansions of existing cathodic protection systems to accommodate new pipe extensions, must be submitted to and approved by the Mobile District, Engineering Division CP Specialist. Expansions of existing CP systems to new pipelines or other metallic structures requiring cathodic protection must be supported by CP field survey data, including potential surveys of existing pipelines under cathodic protection, existing isolation flange tests, existing coating integrity tests, etc. All these tests, as well as other tests that might be necessary to support the design, must be conducted by the “Corrosion Expert” and results and procedures included in the Design Analysis. Where additions or alterations to existing CP systems are to be recommended, verification and substantiation that the systems are operational, expandable, and can accommodate the additions or alterations are mandatory. Provide a description of all proposed additions and alterations to each system. Information on manufacturer, model number, etc., of the existing cathodic protection equipment will be included in the plans and specifications.

- Provide a descriptive narrative of all cathodic protection systems and other corrosion control measures that are required for project. The narrative will describe the extent of the corrosion control and cathodic protection work both inside and outside of the five-foot line from the building perimeter. Provide brief description of the standards of design. Any project that includes buried or submerged metallic surfaces must be evaluated for corrosion control requirements in accordance with this chapter and with the guidance of all other referenced documents included in this chapter.

- Provide the following for cathodic protection systems:

    - Clearly define areas of structures or components in soil or water to be protected.

- Type system recommended (i.e., sacrificial or impressed current), comparison of systems, and cost estimate showing all equipment alternatives.
- Calculations on all systems that are considered, showing all information and descriptions.
- Estimate showing materials and cost.

- Define any hazardous areas (as defined in the National Electrical Code) and indicate the type of any cathodic protection equipment proposed for use in such areas.
- List the specifications that will be used.

22.4.2 DRAWINGS

- Cathodic Protection work to be shown on Utilities Site Plan or separate Cathodic Protection Systems Site Plan:
- Identify any gas lines, water lines, fire protection lines, fuel lines, force main lines and all other structures that are to be protected by the Cathodic Protection System as required by this chapter, as well as applicable laws and regulations.
- Show removals and relocations, if any.

22.4.3 REMOVAL OR DEMOLITION

A general narrative of the removal and/or demolition will be included.

22.4.4 ADDITIONAL CRITERIA/INFORMATION

Any additional criteria, deviations concerning criteria, questions or problems developed during the Concept Design phase will be listed.

22.5 INTERIM DESIGN (65%)

In addition to the following items, the designer will incorporate or answer all comments received during the Concept Design submittal review.

22.5.1 DESIGN ANALYSIS

This Interim Design Analysis will be an entirely updated analysis (not amendments to concept submittal) to permit verification that the design complies with the criteria furnished and the approved Concept Design.

22.5.2 DRAWINGS

- General

    - All removals must be shown. If removals are extensive, separate demolition plans are required. The designer will display the information in such a manner that it would not be necessary to visit the site to prepare a bid.
    - A complete legend will be provided for all devices and equipment shown on the plans. Mounting heights will be included as applicable.

- Cathodic Protection Systems

    - All plans should be completed.
    - Thoroughly check for discrepancies and conflicts, particularly between disciplines.
    - Cathodic protection system should be complete including analysis, narrative description of system and drawings. The submittal will include drawings showing all structures or components to be protected and all cathodic protection components in relation to the protected structure. This includes showing sacrificial and impressed current anodes, rectifiers, isolation (dielectric), bonding and any other data needed to define the scope and area of the cathodic protection system.
    - Show location of all devices and equipment for cathodic protection system on the floor plans if any components, such as rectifiers, are to be mounted inside of the building. Show location of devices to be interconnected. Include all CP rectifier circuits in electrical panel schedules.

22.5.3 SPECIFICATIONS

Provide redlined marked up specifications in accordance with CHAPTER 23 SPECIFICATIONS.

22.5.4 ADDITIONAL CRITERIA

Any additional criteria, deviations concerning criteria, questions or problems should be listed.

22.6 95% DESIGN

Comments generated during the Interim Design submittal review will be incorporated or answered in the design analysis, specifications and drawing before they are submitted.

22.6.1 DESIGN ANALYSIS

This analysis is an extension of the approved 65% design analysis and supports and verifies that the design complies with the requirements of the project.

22.6.2 DRAWINGS

- The 95% drawings are an extension of the approved 50%-60% drawings and will incorporate the Concept Design submittal review comments.
- All details for final package will be on the drawings.
- Thoroughly check the drawings for discrepancies, for compatibility between drawings and specifications and for compatibility between disciplines. The 95% Drawings should be in a ready to advertise state which should include, but not be limited to, the following items as applicable:
    - Verify compatibility between civil/site utilities, environmental, mechanical, electrical, CP systems and other disciplines (equipment locations, NEMA enclosures, plans and specifications for systems furnished in other specification sections, etc.), to ascertain that there are no conflicts on the drawings relating to the installation of all new CP systems.
    - Panel board locations and home runs to rectifiers
    - Terminal cabinet and test station locations
    - Rectifier locations
    - Legend and/or symbols complete and compatible with drawings
    - Assure design complies with design analysis and criteria.
    - Adequacy of details and diagrams
    - Proper and practical circuitry with type, quantity, and size of conductors; and the type, quantity and size of conduits indicated correctly.
    - Ensure that all hazardous areas are clearly defined where rectifiers and other electrical equipment are to be located.
    - Ensure that all cathodic protection rectifiers are provided with power.

22.6.3 SPECIFICATIONS

- Provide final edited specifications in accordance with CHAPTER 23 SPECIFICATIONS.
- Read thoroughly and comply with the instructions in each set of guide specifications, including notes to specification writer. The SpecsIntact specification writing system will be used for specification preparation.

- Cross out nonapplicable index items, publications, paragraphs, phrases, words and sentences. Fill in blanks as applicable.
- Add publication references, paragraphs, phrases, words and sentences for items not adequately covered by specifications.
- Do not specify proprietary items. See CHAPTER 23 SPECIFICATIONS.
- Ascertain that major or special types of equipment are available commercially.

22.7 100% FINAL

- The comments generated during the 95% design submittal review will be incorporated into the design analysis (not amended sheets), specifications, and drawings before they are submitted as final and ready to advertise.
- The analysis will be complete and will support the requirements of the project.
- The drawings and specifications will be complete and thoroughly checked. Where additions to existing cathodic protection systems are made, the designer must follow the guidance included in previous submittals described in this chapter.

22.8 TECHNICAL REQUIREMENTS

22.8.1 SALVAGEABLE MATERIAL

The Designer will clearly identify materials that are to be salvaged. Salvageable material resulting from demolition that is not reincorporated into the design will remain the property of the U.S. Government. Salvageable equipment and materials will be delivered to the Contracting Officer's Representative for storage on the premises as directed.

- **Removals –** All materials not identified to be salvaged or reused will be disposed of by the contractor either off Government property or as directed by the Installation.
- **Reuse of Existing Materials –** Existing materials will be reused if they are in good condition and they meet the requirements of this section of the specifications.

22.8.2 SPECIAL ITEMS

The following will be included in each submittal: UFGS (Corps of Engineer's version only) must be used in preparing all contract specifications for cathodic protection work.

22.8.3 CORROSION CONTROL AND CATHODIC PROTECTION

- For all metal facilities located in the atmosphere, soil, or water electrolytes, corrosion control will be provided. In all instances, cathodic protection, or approval to omit it, will be provided for metals in soils or water. Coatings are normally provided as corrosion protection in the atmosphere. A cathodic protection system will be provided where applicable; project design and construction without considering cathodic protection are not acceptable. As a minimum, cathodic protection and protective coatings will both be provided for the following buried or submerged ferrous metallic structures, regardless of soil or water resistivity:
    - Natural gas and propane piping, including metallic components of non-metallic lines
    - Liquid fuel piping
    - Oxygen piping
    - Bottom of on-grade fuel storage tanks
    - Interior of water tanks and elevated tank risers
    - Underground metal storage tanks, piping and ancillary items
    - Metallic components of force mains
    - Metallic components of backflow preventors
    - Fire protection lines or water lines utilized for fire protection, including metallic components of non-metallic lines (i.e., PIVs, fire hydrants, change or direction devices, valves, metallic sections under building slab and elsewhere, etc.)
    - Steel, ductile iron, and cast-iron pressurized piping under floor (slab on grade) in soil
    - Underground heat distribution and chilled water piping in ferrous metallic conduit
    - Oil/Water separators and all associated metallic fittings in contact with soil
    - Sewage lift stations (all metallic components in contact with soil or liquids)
    - Other structures with hazardous products as identified by the user of the facility
- These are some of the systems and components requiring cathodic protection by technical instructions and other military criteria, regulations and/or law but are not all-inclusive.

- The results of an economic analysis and recommendations by a “corrosion expert” will govern, subject to government approval, the application of CP and protective coatings on gravity sewer lines, regardless of soil resistivity, and for potable water lines in resistivities above 10000 ohm-centimeters (unless the CP is a requirement on the potable water line due to other reasons, such as pressurized steel piping under floor slab, as listed above).
- The “Corrosion Expert” will identify special areas of concern that could create a need for corrosion mitigation. For example, the installation of grounding systems could create special corrosion problems such as the introduction of dissimilar metal corrosion cells (i.e., copper ground rods interconnected to other metal piping, etc.). Resolution of these type of special problems must be incorporated into the cathodic protection design or some other part of the total corrosion mitigation plan. Installation of listed lightning/surge protection devices and/or ac coupling/dc isolating devices, in accordance with the National Electrical Code, will be accomplished in the design, where and as necessary; the “Corrosion Expert” will ensure coordination between pertinent disciplines to ensure accomplishment in the design. The “Corrosion Expert” will ensure electrical bonding is installed, as necessary, in order to ensure electrical continuity is established between all steel panel surfaces inside bolted steel panel water storage tanks; impressed current cathodic protection systems are required for protection of interior surfaces of water storage tanks and electrical continuity must be ensured by the cathodic protection designer and the General Contractor.
- **Coating Requirements –** In addition to cathodic protection requirements, protective coatings applied to structures will consist of approved dielectric materials and must have the other minimum coating characteristics as described in NACE SP0169.
    - The only coating types that can be utilized on metallic components, structures and pipelines that are cathodically protected are listed in the applicable cathodic protection specification section. These coating types also comply with the requirements of NACE SP0169. These coating types will have precedence over all other specification sections that may specify or allow other coating types for metallic components and structures that are to be cathodically protected.
    - Unbonded coatings, such as polyethylene encasement, will not be allowed on pipelines or components requiring cathodic protection as defined in this chapter and in referenced documents and criteria. Additionally, the use of unbonded coatings such as loose polyethylene wraps are prohibited for all buried metallic components and pipelines installed for Air Force projects, regardless if cathodic protection is also

applied or not. Metal coatings, such as thermally sprayed Aluminum, zinc or Zinc-Aluminum alloys, will not be allowed on pipelines or components requiring cathodic protection as defined in this chapter and in referenced documents and criteria. Additionally, the use of conductive coatings, such as those listed in the preceding sentence, in conjunction with the application of an external cathodic protection system is incompliant with the guidance provided in NACE SP0169.

- Services of a SSPC Coating Specialist, SSPC Coating Inspector, or a NACE International certified coating Inspector will be ascertained. The Certified Coating Inspector will closely coordinate with the "corrosion expert" (as defined below) to ensure that the proper coating system is selected for application on the installed pipelines or other structures in order to provide a completely compatible and operable total corrosion control system consisting of both coatings and cathodic protection. The Certified Coating Inspector will ensure, by personal observation and inspection, that all surfaces are properly prepared and that only qualified coating contractors are utilized to properly apply all coatings. The Coating Inspector will ensure that the use of unbonded coatings (such as PE encasement on ductile iron piping) or metallic coatings, are not allowed in conjunction with cathodic protection. The use of unbonded coatings and/or metallic coatings are strictly prohibited on any structures defined under this chapter as requiring cathodic protection or on any structure that may require cathodic protection in the future. The Certified Coating Inspector will perform a complete coating inspection of all applied coatings prior to backfilling, in accordance with the applicable SSPC or NACE coating standards. The qualifications documentation of the coating inspector must be submitted to the government for approval.

- **Qualifications for Cathodic Protection Work** – Cathodic protection field work (pre-design surveys), analysis and design must be accomplished by or under direct supervision of a "corrosion expert". "Corrosion expert" refers to a person, who by thorough knowledge of the physical sciences and the principles of engineering and mathematics, acquired by professional education and related experience, is qualified to engage in the practice of corrosion control of buried or submerged metallic surfaces. Such a person must be accredited or certified by NACE International as a NACE Accredited Corrosion Specialist or a NACE certified Cathodic Protection (CP) Specialist or be a registered professional engineer who has certification or licensing that includes education and experience in corrosion control of buried or submerged metallic piping and tank systems, if such certification or licensing includes five years' experience in corrosion control on underground and/or submerged metallic surfaces of the type under this contract. The "corrosion expert's" name and qualifications will

be certified prior to start of design. The “corrosion expert” must be available to answer questions relating to their work.

- Description of Analysis Work. The “Corrosion Expert” is responsible for ensuring that all necessary field data such as resistivity measurements, etc., is obtained for the cathodic protection design. This person must ensure that resistivity measurements are taken along the pipeline and/or other buried or submerged metallic structure that will be cathodically protected and in areas of proposed anode ground beds. The geotechnical engineer may conduct measurements in the necessary locations or areas as designated by the “Corrosion Expert” to provide the designer the data necessary to determine Interim size and type cathodic protection for structures to be protected. The resistivity, soil borings and other soils data should be provided in the Foundation Report. The designer is required to obtain the necessary resistivity and other design data if the geotechnical engineer does not obtain this information in the appropriate locations.

- The preliminary design submittal will include economic justification for selection of type of cathodic protection system (sacrificial or impressed current), soil corrosiveness (resistivity, pH, etc.) data, current requirement test (if applicable), potential survey data (if applicable to existing structures) and all design calculations for cathodic protection in the basis of design.

- The design will provide sufficiently detailed calculations and one-line diagrams at the early preliminary design stage to show the magnitude and layout of the cathodic protection system. The designer must clearly define areas that will be protected and the areas that could be affected by interference and steps to be taken to ensure other structures (pipes, tanks, etc.) are protected from interference.

- Provide sufficient and properly located electrical bonds, electrical insulating devices, and corrosion control test stations to ensure adequate allowance for periodic inspection, review, testing and examination of the system.

- **Design of Cathodic Protection** – Regardless if other sections of the contract documents allow the use of specifications other than the UFGS (Unified Facilities Guide Specifications) for other portions of the design of a facility; only the latest Corps of Engineers’ edition of UFGS specifications will be allowed and will be utilized in the cathodic protection design for the specification of cathodic protection systems. These specifications are listed in this chapter under guide specifications and are available on the Whole Building Design Guide website:

  https://www.wbdg.org/ffc/dod/unified-facilities-guide-specifications-ufgs

The specifications can also be obtained from the Mobile District, Corps of Engineers. With regards to Cathodic Protection, this requirement applies also to Design-Build and RFP type contracts, which sometimes may allow the use of specifications other than UFGS specifications for other disciplines.

- The cathodic protection systems provided on the metallic structures listed in this chapter will be either impressed current or galvanic type systems as determined by the following requirements: 1) the pertinent design data as gathered by the "corrosion expert" (defined in this chapter), including but not limited to soil resistivity, material selection, coating selection, coating thickness, current requirements, anode selection, ability to isolate from foreign structures, etc. as necessary to meet the minimum potential criteria defined below; 2) full compliance with one or more of the properly edited and subsequently approved applicable guide specification(s) listed herein; 3) short runs (less than approximately 1000 feet) of all metallic pipelines (including ductile iron) that can be adequately and justifiably protected with galvanic cathodic protection systems, non-metallic pipelines with metallic components, and metallic components of other described structures requiring cathodic protection will, as a minimum, comply with all the requirements of Unified Facilities Guide Specification (UFGS) section 26 42 13 GALVANIC (SACRIFICIAL) ANODE CATHODIC PROTECTION (GACP) SYSTEM (unless gathered data requires the use of an impressed current system); 4) protection of all metallic pipelines, which are too long (e.g., exceed 1000 feet) or have other design restrictions that prevent the use of a galvanic cathodic protection system capable of meeting required potential criteria, and the bottom surfaces of on-grade steel fuel storage tanks (if provided and installed in this project) will, as a minimum, be protected with an impressed current cathodic protection system in full compliance with a properly edited and government approved Unified Facilities Guide Specification (UFGS) Section 26 42 17 IMPRESSED CURRENT CATHODIC PROTECTION (ICCP) SYSTEM. Furthermore, the interior surfaces of metal water storage tanks, including riser piping if so equipped, will be protected with an impressed current cathodic protection system in full compliance with a properly edited and government approved Unified Facilities Guide Specification (UFGS) section 26 42 15 CATHODIC PROTECTION SYSTEM FOR THE INTERIOR OF STEEL WATER TANKS.

- The design of the cathodic protection system will be completed prior to construction contract advertisement except for Design-Build and pre-approved underground heat distribution systems. That is, submission of

an all-performance type design rather than a complete design, ready for construction, is not acceptable.

- In addition to the soil and water resistivity surveys, current requirement tests and design, the designer will provide recommended tests, formats, required methodology, etc., for the final acceptance of the cathodic protection system based upon the USACE cathodic protection acceptance criteria.

- The design will clearly provide thorough and comprehensive specifications and drawings. The design must meet the requirements of this Design Manual and Army ETL 1110-3-507 (upon issuance) and will incorporate guidance from all referenced documents and other applicable criteria, such as NACE SP0169, NACE SP0177, NACE SP0187, NACE SP0188, NACE RP0193, NACE RP0285, NACE SP0286, NACE SP0388, NACE SP0572, applicable Code of Federal Regulations (CFR), etc. The expected results will be provided by field test (in the construction phase) witnessed by the Contracting Officer's Representative.

- The design must include applicable drawings, as available, showing existing construction. Verification of the validity of these drawings and/or any other data furnished by the Government will be the responsibility of the designer.

- The designer will provide an updated cost estimate of the cathodic protection system. This will include all construction and testing costs related to installation of cathodic protection. The estimate will be a detailed estimate showing equipment, labor, excavation, etc.

- The design will identify all locations for interference testing (all pipes that pass within 1000 feet of an impressed current anode bed and then crosses the cathodically protected line).

- The design plans and specifications will show extent of the facilities to be protected; location and type of anodes; location of test points; locations of rectifiers, test stations, junction boxes, wiring, etc.; installation details; insulators; bond connections; and details for sectionalizing an underground piping system. Coordinate with mechanical, site, environmental and other disciplines. This design will be complete enough to purchase equipment and build, without design changes, to meet criteria of protection.

- For non-metallic pipelines or other structure with buried or submerged metallic components, each buried or submerged metallic component will have design calculations, a drawing detail of that component showing cathodic protection with at least one test station. Each component will

have a minimum of one test station, two anodes and one permanent reference electrode. Each location will be shown on drawings. Header cables will not be used for connection of anodes. Each anode will be connected to a test station via an individual lead conductor and bonded to the structure being protected inside the test station. The test station will be connected to the structure being protected via two conductors.

- Each new metallic pipeline connecting to an existing metallic pipeline will be electrically isolated from the existing pipeline by the installation of an insulating flange. New metallic pipeline passing through concrete slabs, walls and floors will have an insulating material (such as a PVC sleeve) between the pipe and concrete to provide isolation. Insulating flanges will also be installed in new metallic pipelines extending above grade or where they extend above floor slabs; the flanges are to be located above grade. Listed lightning protection devices and/or ac coupling/dc isolating devices will be installed across insulating flanges where and as necessary, in accordance with the National Electrical Code and/or in order to avoid compromise of the cathodic protection system and/or the electrical grounding system.

- The cathodic protection designer will coordinate their design with any existing cathodic protection systems around the new facility. As necessary, the contractor will relocate any existing cathodic protection system test stations or other cathodic protection equipment located in areas conflicting with construction of the new facility. Any existing cathodic protection system equipment that must be moved will be relocated to areas approved by the Contracting Officer’s Representative.

- All potential tests will be made at two- and one-half feet intervals witnessed by the Contracting Officer's Representative. Design will require that submittals identify test locations on a separate drawing showing all metal to be protected and all cathodic protection equipment. However, a minimum of three tests will be made at each metallic component in the piping system. Test points, equipment and protected metal will be easily distinguished and identified on the drawings.

- **Criteria of Protection – Criteria** for determining the adequacy of protection on a buried structure are defined in the following NACE International Publications: NACE SP0169, NACE RP0193 or NACE RP0285, as applicable. Criteria for determining the adequacy of protection on internal submerged surfaces of carbon steel water storage tanks are defined in NACE SP0388. For buried metallic components, the cathodic protection system will meet the minimum criteria for steel, ductile iron and cast-iron structures defined in the first subparagraph below (criteria indicated in the second subparagraph may be utilized as an alternative procedure if the first criteria procedure fails and if

submitted to and approved by the Contracting Officer's Representative prior to testing):

- A negative voltage of at least minus 850 millivolts as measured between the structure or specified underground metallic component and a saturated copper-copper sulfate reference electrode contacting the earth (electrolyte) directly over the structure: Determination of this voltage will be made with the cathodic protection system in operation and after it has been in operation for a minimum of 72 hours. Voltage drops will be considered for valid interpretation of this voltage measurement. A minimum of minus 850 millivolts "instant off" potential between the structure being tested and the reference cell will be achieved over 95 percent of the area of the structure. A close interval survey will be conducted on all cathodically protected pipelines and components. The design will be accomplished so that the protective current can be interrupted to obtain the "instant off" potential readings. Adequate number of measurements will be obtained over the entire structure, pipe or other metallic component to verify and record achievement of minus 850 millivolts "instant off." This potential will be obtained over 95 percent of the total metallic area without the "instant off" potential exceeding 1100 millivolts.

- A minimum polarization voltage shift of 100 millivolts as measured between the structure and a saturated copper-copper sulfate reference electrode contacting the earth directly over the structure: This polarization voltage shift will be determined by interrupting the protective current and measuring the polarization decay. When the protective current is interrupted, an immediate voltage shift will occur. The voltage reading, after the immediate shift (this reading will be defined herein as being the same reading as the "instant off" reading described in the immediate paragraph above and this term will be utilized below), will be used as the base reading from which to measure polarization decay. Measurements achieving 100 millivolts decay will be made over 95 percent of the metallic surface. Alternatively, the "instant off" measurements can be compared to the native readings taken prior to energizing of the cathodic protection system and in the exact same locations. For comparison of "instant off" to native readings, the same number of measurements in corresponding locations must be taken. If the "instant off" reading is compared to the corresponding native reading in the same location, it must be a minimum of 100 mV more negative with respect to the copper/copper-sulfate reference cell than the native reading. The "Corrosion Expert" must assure that a complete set of native readings are taken prior to energizing the cathodic protection system at all the same locations as the "on" and "instant off" measurements are taken (i.e., close interval survey), as is

required by the referenced guide specifications. The “instant off” measurements will be made after the system has been in operation for a minimum of 72 hours.

22.8.4 OTHER ELECTRONIC SYSTEMS

- **Leak Detection for Underground Storage Tanks** – Leak detection must be provided for underground storage tanks and piping which will contain petroleum products, or the hazardous materials as required by local, state or federal regulation. The leak detection requirements are discussed in CHAPTER 21 ELECTRICAL AND ELECTRONIC SYSTEMS.
- **Grounding Systems** - Grounding systems can cause special corrosion problems that must be properly resolved in the corrosion control and cathodic protection design. Extreme care must be exercised to avoid the interconnection of dissimilar metallic materials and in order to avoid interference problems and/or the compromising of the cathodic protection system. Refer to CHAPTER 21 ELECTRICAL AND ELECTRONIC SYSTEMS, for guidance on electrical grounding systems.

CHAPTER 23

SPECIFICATIONS

INDEX

CHAPTER 23

SPECIFICATIONS

23.1 GENERAL

23.1.1 PURPOSE

This chapter provides guidance for the preparation of contract specifications. In-House (I-H) and Architect-Engineer (A-E) designers will use the Unified Facilities Guide Specifications (UFGS) on all projects unless specifically directed otherwise. Technical questions relating to preparation of contract specifications should be directed to the Mobile District Project Support Section (EN-TS):

ATTN: EN-TS Chief

Engineering Division

Mailing address:

U. S. Army, Corps of Engineers, Mobile District

CESAM-EN-TS

109 St. Joseph Street

Mobile, Alabama 36628-0001

23.1.2 AUTOMATED SPECIFICATIONS

- In April 2006, Headquarters, U.S. Army Corps of Engineers mandated the use of the new Unified Facilities Guide Specifications (UFGS) in the Construction Specification Institute (CSI), Masterformat 2004 numbering system. These new specifications comprise a total of 48 divisions versus the old numbering system of 16 divisions. Other changes have transpired in these updates, such as a new six-digit section numbering system and revised section titles. The Unified Facilities Guide Specifications (UFGS) Master uses the latest CSI MasterFormat versions, therefore as of January 2012, SpecsIntact ceased support of the creation of Jobs or Masters using the old MasterFormat 1995 UFGS Master.
- The designer will not mismatch or combine the old division 16 specifications with the new Masterformat specifications. Any such combining of the two systems, will not be accepted and will be returned to the designer for a complete re-submittal of the project specifications. Any questions for use of

the applicable system should be directed to the EN-TS point of contact listed herein above.

- The Mobile District utilizes SpecsIntact software as its automated specification system. Designers are required to prepare specifications using this automated system. Use of other software will not be accepted. This software is available on several sites located on the Internet. The following Internet addresses contain the necessary software, help manuals and Unified Facilities Guide Specifications (UFGS):
  - SpecsIntact Software Support Unit Home Page
    - http://specsintact.ksc.nasa.gov/
  - Whole Building Design Guide Home Page
    - http://www.wbdg.org/ccb/browse_org.php?o=70
  - Construction Guide Specifications – Huntsville
    - http://www.hnc.usace.army.mil/techinfo/info.htm

- Updates to the UFGS and Mobile District specifications are done on a periodic basis. It is suggested that the User's Guide Manual be reviewed prior to preparing UFGS specifications, and that the Mobile District point of contact be contacted for updates to specific Mobile specifications.
- Should there be any questions concerning the SpecsIntact process, contact the Mobile District representative, ETL, or the SpecsIntact Support Unit at (321)867-8800. For software questions, contact the SpecsIntact Tech Support at KSC-SpecsIntact@nasa.gov
- Upon accessing the Whole Building Design Guide website, a list containing UFGS guide specifications will be shown. These lists provide a divisional break down for the guide specifications. In order to retrieve the required guide specifications, click on the Division in which the specification is located (i.e., Division 2; Section 02 41 00 - DEMOLITION). Specifications downloaded from the Whole Building Design Guide site page are in a compressed (zipped) format as well as Adobe.PDF format. In order to manipulate and use these files, you must "unzip" them prior to opening the file for use.

23.1.3 SCOPE

The designer is responsible for the accurate preparation and coordination of the technical specifications. EN-TS will prepare the non-technical portion of the specifications (i.e., boiler plate or front-end) using input provided by the designer. Although EN-TS will prepare the Special Contract Requirements, the designer will

be expected to furnish pertinent information that EN-TS might otherwise be unaware of for inclusion in the Special Contract Requirements. Examples of this information are listed in the paragraph 23.6 AIDS TO ADVERTISING.

23.1.4 QUALITY OF WORK

Specifications prepared by the designer must be accurate, clear and precise and should not be subject to interpretation. The specifications will be specific, free of ambiguities and well-coordinated with the drawings. The designer will be solely responsible for ensuring the relevancy and accuracy of cross-references between technical sections of the specifications.

23.2 OUTLINE SPECIFICATIONS

The designer will submit a list of specifications with the Concept design analysis submittal. The list of specifications will support the various types of construction intended and described in the design analysis and provide a description of any specifications which must be developed for the project. Appendix A, Example – Project Definition Narratives and Design Analyses Format, provides an example of typical outline specification integration into the design analysis.

23.3 TECHNICAL SPECIFICATIONS

23.3.1 GENERATING ORIGINAL SPECIFICATIONS

- Designer developed specifications may only be used when UFGS specifications are not available. The original specifications must match the UFGS specifications in format and document arrangement. Designer developed specifications will be prepared in accordance with UFC 1-300-02, UNIFIED FACILITIES GUIDE SPECIFICATIONS (UFGS) FORMAT STANDARD using SpecsIntact (SI), the automated system for preparing standardized facility construction specifications. UFC 1-300-02 requires that each UFGS carry an identifying document section number in accordance with the Construction Specifications Institute (CSI) MasterFormat (MF). The UFGS specifications utilize a 14-character designation of MF 2004 section numbers in the format: "NN NN NN.NN NN", where N's are numbers. CSI has named, numbered or otherwise reserved to the 4th level. The SI-steering committee has agreed that the 5th level double digit designator would replace the former suffixes used to denote sections that are not currently unified: "A" or "10" for Army, "N" or "20" for Navy, "S" or "40" for NASA. An example of the five-level numbering system agreed on for the UFGS follows:

  - Level 1 - 31 00 00 EARTHWORK

- Level 2 – 31 41 00 SHORING
- Level 3 – 31 41 16 SHEET PILING
- Level 4 – 31 41 16.11
    - for activity or project specific use
    - for multiple contracts or alternate systems
    - for very unique narrow scope UFGS (minimal)
- Level 5 – 31 41 16.11 10 Designation for non-unified sections
- 10 Army
- 20 Navy
- 30 Air Force
- 40 NASA
- 50 – 90 other Future participating agencies

- Districts or Centers of Expertise that maintain local master guide specifications must use the 5th level to identify them as non-unified sections. The designation to be used to identify the Mobile District maintaining a local master at the 5th level is “36”. For example, a local master maintained by Mobile District would be 01 50 05.00 36. Any questions concerning a designer developed specification or the numbering system should be addressed to the Mobile District point of contact identified in paragraph 23.1.1 of this chapter.
- **Functional or Descriptive Specifications -** "Functional or descriptive specifications" are normally prepared using industry standards, manufacturer's data and other available information. These specifications will be developed by listing parameters, methods, techniques, salient features and other requirements that several manufacturers can satisfy. These specifications will list the essential features, requirements, minimum functions and other factors to clearly indicate the type and quality of item(s) required. Specifications should not be developed around a single manufacturer.
- **Sole Source Specifications –** Sole source specifications are to be avoided. The use of trade names and proprietary items and the drafting of a specification by adopting a manufacturer's description of a particular article or procedures will be avoided. There may be instances, however, when only one manufacturer's product will satisfy job conditions. For example, in rehabilitation work, updating a particular piece of existing mechanical equipment may require new parts from the manufacturer of that particular piece of equipment. In this

case, specifying the "Brand" or "Manufacturer's" name would be acceptable provided that "Sole Source Approval" is received from higher authority. To receive approval, the designer will provide written "Sole Source Justification" to the Mobile District Project Manager. This justification should be prepared and presented as early in the design process as possible since approval usually takes considerable time.

- **"Or Approved Equal" Specifications –** Experience indicates that a "trade name or approved equal" description is appropriate only as a last resort and should be used with great care and discretion. The project file will be documented to explain the necessity for using this approach in each instance it is used. Further, where the "trade name or approved equal" approach is used, the contract provisions will include those salient features of the item or items specified upon which equality will be determined.

23.3.2 TAILORING AND COORDINATION OF SPECIFICATIONS

- Each specification used in the preparation of project specifications will be tailored to fit the requirements of the project. Where numbers, symbols, words, phrases, clauses or sentences are enclosed in brackets [ ], a designer's choice or modification must be made. The designer will exercise care in making the choice or modification. Where blank spaces are provided for insertion of data or text, the designer will insert the appropriate data or text. Where entire paragraphs are not applicable, they must be deleted. Paragraphs describing systems or materials not used in the construction of the project will be deleted. When necessary to add requirements, they must be consistent with the other requirements of the specification and must not unnecessarily restrict products that can be furnished. Prior to marking up each specification for the Interim (if this submittal is required) and Final design submittal, the designer will review all notes attached at the beginning of the specification. Prior to submitting the 95% specifications, the designer must execute the bracket verification tool within the SpecsIntact software. A complete error-free report will be required before submission of the 100% specifications.

- Each specification used in the preparation of project specifications must be coordinated with other specification sections included in the project and with the project drawings. Duplication of requirements in other sections or on the drawings should be avoided. Cross-referencing of requirements will be done only when necessary to avoid misunderstanding. If the specification states "as shown" or similar wording, the requirement must be shown on the drawings. If the drawings reference the specifications, the specification must cover the reference. If a specification references another specification, the referenced specification must be included in the project. Prior to submitting the 95% specifications, the designer must execute the section verification tool within the SpecsIntact software. A complete error-free report will be required before

submission of the 100% specifications. The designer will ensure that specifications and drawings are properly used: specifications to establish requirements such as quality and workmanship and drawings to establish requirements such as layouts and dimensions.

23.3.3 TAILORING SPECIFICATION SHOP DRAWING SUBMITTALS

The Shop Drawings typically listed in each UFGS specification are intended to cover the majority of circumstances for a variety of projects. Not all Shop Drawings listed in the specification need to be included in every project. During the editing of the Shop Drawing Submittal portion of each specification, the designer should carefully consider which Shop Drawing Submittals are required from an Engineering Verification and Quality Control perspective. All submittals that are not absolutely necessary should be deleted whether listed for "Government Approval" or "For Information Only".

- **Submittals Requiring Government Approval –** Shop Drawings and Product Data Submittals requiring Government Approval should be limited to major pieces of equipment or systems requiring review by the designer, color selection, testing reports, etc. For each Submittal that requires Government Approval, provide the desired reviewer designation "RO" for "Resident Office (Construction Division)" or "DO" for "District Office (Engineering Division.)" "DO" should be used for all submittals that are an extension of Design. For example, a submittal that requires Government Approval by Engineering should be listed as "G, DO". Note the ", " between the "G" and "DO" which is required in order for the Automated Submittal Register feature found in the SpecsIntact software to function properly. Recommendations for labeling Shop Drawing Submittals requiring Government Approval are provided below. See UFGS specification Section 01 33 00 SUBMITTAL PROCEDURES for further information.

  - Preconstruction submittals should be labeled "G, RO".
  - Shop Drawings and Product Data Submittals for major pieces of equipment or systems requiring review by the designer should be labeled "G, DO".
  - Submittals involving "Samples", or "Color" selection should be labeled "G, RO" for coordination with the local BCE, DPW, or other Installation office.
  - Test Reports, Certificates, Operations and Maintenance Data and Closeout Submittals should be labeled "G, RO".
  - "For Information Only (FIO)" Submittals: For Shop Drawing Submittals not requiring Government Approval, the "G" and "RO" or "DO" designations after the Shop Drawing Title will not be included.

23.4 SPECIFICATION SUBMITTALS

23.4.1 65% INTERIM SUBMITTAL SPECIFICATIONS

If this submittal is prepared, redlined marked up specifications will be provided to allow reviewers to evaluate choices made by designers. The statement of work (SOW) will identify the recipients of the hardcopies.

23.4.2 95% SUBMITTAL SPECIFICATIONS

- If an Interim submittal is not made, 95% Submittal specifications will be provided in redlined marked-up format in hardcopy. If an Interim submittal is made, the designer will submit full edited specifications at the 95% Submittal Design review stage in hardcopy. The statement of work (SOW) will identify the recipients of the hardcopies.
- Boiler Plate (Front-end contract clauses) will be furnished, by the Government, to the A-E for inclusion in the 95% Submittal. The “boiler plate” will be provided by EN-TS through the PM or ETL identified in the SOW.

23.4.3 100% FINAL SUBMITTAL SPECIFICATIONS

Following the 95% Submittal review, review comments will be provided to the designer. The designer will incorporate the comments into the specifications and prepare the final specification utilizing the automated specification techniques of SpecsIntact.

23.4.4 RTA SUBMITTAL

The Ready-To-Advertise specification will be furnished in SpecsIntact Standard Generalized Markup Language (SGML) format.

23.5 INSTRUCTIONS FOR PREPARING RTA AUTOMATED SPECIFICATIONS

23.5.1 STANDARD FORMAT

- The designer will utilize the SpecsIntact UFGS MasterFormat files downloaded from the Internet (http://specsintact.ksc.nasa.gov/) to prepare the final specifications. The following must be used, when submitting hard copies.

Top Margin:	1 inch
Bottom Margin:	1 inch
Left-hand Margin:	1 inch

Right-hand Margin: 1 inch

- Courier 10 pitch (small elite). (Large Oversize fonts will not be accepted).
- Bold, italicize and underline will be turned off.
- Specifications will be presented in Letter quality.
- Left justification turned on
- Right justification turned off
- Widow and orphan protection turned on
- Page numbering footers set to allow the computer to automatically number the pages consecutively with the section number included when the document is printed. (Example: 03 30 04 Page 1, 03 30 04 Page 2, 03 30 04 Page 3, etc.) The SpecsIntact program will automatically generate this function.
- Hard returns placed only at the required locations (i.e., at the end of the paragraphs) to allow the text to word-wrap: Hard returns left after each line in tables and forms to prevent word-wrapping and retain the correct text format.
- Sketches, drawings or other attachments to be inserted at the end of a specification section will be scanned into an Adobe .PDF format.
- Appendices to be placed in the rear of the specification set should also be scanned into an Adobe .PDF format.

23.5.2 AUTOMATED SUBMITTAL REGISTER

The Submittal Register will be produced using the automated generation procedures found in the SpecsIntact software commands. Appendix C, Exhibit 23-6**,** provides an example of a Submittal Register generated using the automated procedures.

23.6 AIDS TO ADVERTISING

23.6.1 GENERAL

In addition to the drawings and specifications, the designer is required to furnish certain "Aids to Advertising". These aids are discussed below and will be furnished as indicated.

23.6.2 AIDS REQUIRED WITH THE 95% DESIGN SUBMITTAL

- Resume' of Work:
  - The designer will furnish a "Resume' of Work" statement. This will be a brief written description of the work involved and will include a listing of approximate quantities. The project title and location, including the

City/Base, State and County will be furnished. The construction cost range will be selected from the ranges listed below and included at the end of the resume'.

- less than $25,000
- between $25,000 and $100,000
- between $100,000 and $250,000
- between $250,000 and $500,000
- between $500,000 and $1,000,000
- between $1,000,000 and $5,000,000
- between $5,000,000 and $10,000,000
- between $10,000,000 and $25,000,000
- between $25,000,000 and $100,000,000
- between $100,000,000 and $250,000,000
- between $250,000,000 and $500,000,000
- over $500,000,000

- Appendix C, Exhibit 23-1 is an example of an acceptable "Resume' of Work".

- Estimate of Construction Time:

  - The designer will furnish an estimate of the time to construct the project. Consideration will be given to construction contractor procurement of materials and any associated "lead" time, sequence of construction, phasing requirements, anticipated climatic conditions to be encountered during construction, etc. Rationale will be included to back up the designer's estimated construction time.

23.6.3 AIDS REQUIRED WITH THE READY TO ADVERTISE (RTA) SUBMITTAL

- All aids required with the RTA submittal must be furnished to the Mobile District on CD-Rom. Acceptable formatting is limited to MS Word and Adobe .PDF formats.

- List of Drawings

  - An example of a "List of Drawings" is included as Appendix C, Exhibit 23-2. The list of drawings consists of file numbers, sheet reference, and the

drawing titles. Drawing Titles entered on the List of Drawings must match exactly the titles on the individual drawings.

- Bidding Schedule
  - An example of a typical "Bidding Schedule" is shown in Appendix C, Exhibit 23-3. Bid items will be "lump-sum job" items in preference to "unit price" items. Unit priced items will be included only with prices approved from the Project Manager. The designer is advised that the bidding schedule must be coordinated with the Mobile District Cost Engineering Branch and with EN-TS. Payment paragraphs are no longer required. Bid items identified in the bidding schedule will be supplemented by the "Explanation of Bid Items". "Explanation of Bid Items" will be submitted along with the bidding schedule at final and RTA design stages. An example of "Explanation of Bid Items" is in Appendix C, Exhibit 23-4.
- Table of Contents
  - The designer will prepare and submit a "Table of Contents". An example is included as Appendix C, Exhibit 23-5.
- List of Government-Furnished Equipment
  - The designer will provide a description, weight, size, quantities and approximate value, if applicable, of Government Furnished Equipment.
- Information Concerning Salvageable Material, if applicable
- Special Provisions Covering Unusual Situations, i.e., interface problems, outages, security and/or safety requirements, storage area, construction sequences and phasing requirement (if applicable), access to site, early completion dates, etc.
- Any questions concerning the above-listed submittals should be directed to EN-TS for resolution.

23.7 AMENDMENTS AND CHANGE ORDERS

Following the RTA submittal by the designer, the project will be advertised for construction. During the advertisement period, as discrepancies, oversights, omissions, and other changes surface, the designer will be required to prepare affected drawings and specifications for amendment. Similar changes may also be required to be performed by the designer during construction in the form of a Change Order. Amendments and Change Orders will be structured in the format specified below:

23.7.1 SPECIFICATION REVISIONS

- When specification revisions are necessary on a project, the designer will electronically make revisions to each affected specification paragraph. Each affected specification paragraph will be inserted into a MS Word document in the order of appearance in the original contract documents. Additions to paragraphs will be shown in "bold", "underlined" and "italicized". (Ex: text). Deletions will be shown as "struck-thru". (Ex: ~~text~~). Each specification paragraph inserted in the Word document will be preceded by a short sentence written to identify the specification section from which the paragraph originates, and to provide brief instructions for the Specification Engineer in EN-TS. If an entire new section is to be added to the project, the designer will include an instructional sentence in the location where the new specification will be inserted. The designer will prepare the new section SpecsIntact format and submit it to ENDW for issuance with the amendment or change order. A sample Amendment Report is provided at Exhibit 23-7.
- In-house designers will provide their amendment or change order reports to the ETL who will consolidate them and provide them to EN-TS. A-Es will provide a consolidated amendment or change order report to the ETL. EN-TS will process all amendments. Most change orders will be processed by the appropriate field office. On rare occasions, EN-TS will prepare change orders in accordance with the Engineering Change Order SOP.

23.8 CONTRACTOR GENERATED REQUESTS FOR INFORMATION (RFI) DURING ADVERTISEMENT

23.8.1 PROJNET

All contractor-generated requests for information (RFIs) during advertisement are required to be posted to ProjNet (the advertising portal of Dr Checks). Project designers will be assigned to the appropriate review and will be notified via e-mail when Bidder Inquiries have been posted. Designers will check for inquiries that pertain to their discipline and will input their responses. Approved standard RFI responses are listed below. If there are any questions about the response, the designer may contact the ETL or Specification Engineer. The Specification Engineer will serve as the ProjNet Review Manager.

23.8.2 STANDARD RFI RESPONSES

See Appendix C, Exhibit 23-8, for Standard RFI Responses.

CHAPTER 24

DESIGN-BUILD (DB) REQUEST FOR PROPOSAL (RFP) DEVELOPMENT

INDEX

CHAPTER 24

DESIGN-BUILD (DB) REQUEST FOR PROPOSAL (RFP) DEVELOPMENT

24.1 GENERAL

24.1.1 SCOPE

The objectives of this chapter are to provide guidance to designers responsible for preparation of RFP technical performance requirements and bridging documents (if applicable) for any other DB projects. The majority of this chapter (excluding paragraph 24.3.1 below) applies to development and documentation of project requirements in Sections 01 10 10 DESIGN REQUIREMENTS and 01 10 12 DESIGN AFTER AWARD REQUIREMENTS.

Design-build is a method of project delivery in which one entity - the design-build team - works under a single contract with the project owner to provide design and construction services. One entity, one contract, one unified flow of work from initial concept through completion.

A design-build RFP is not a 35% full design effort as is commonly stated. The design-build package has to have enough specific information to cover all major aspects of a project and enough performance criteria so that reasonable assumptions may be made to complete the pricing for construction.

24.2 APPLICABLE PUBLICATIONS

Unified Facilities Criteria (UFC)

UFC 3-260-11FA	Model Design-Build Request for Proposal for Airfield Contracts

24.3 DB APPROACHES

24.3.1 ARMY CENTER OF STANDARIZATION (COS) DB RFP

Projects acquired through this DB acquisition method will follow the requirements of the publications listed above under USACE Model RFP. Any requests for deviation from the requirements stated in those publications and current contract clauses will be directed to the Mobile District Project Manager (PM) for forwarding to USACE for final determination. Deviations will only be granted by USACE. The USACE intent is to ensure consistency across MT Model RFP projects. Facility type (product line) requirements are being developed in specific Section 01 10 10 for 41 Army product

lines. This section will be used as written (with minimum adjustments for local conditions) when available. Where product line requirements are not available, the designer will contact the Center of Standardization (CoS) for guidance and available lessons learned in development of project specific performance requirements.

- **DB for Projects That Are Not A Designated Product Line –** Some project types (i.e., industrial, research and development, National Guard, etc.) are not assigned CoS responsibility within the set of 41 Army product lines. A determination will be made through the Mobile District PM in coordination with USACE on the procedures to be followed in development of the DB RFP.

24.3.2 DB RFP DEVELOPMENT FOR OTHER THAN ARMY CUSTOMERS

Paragraph 24.4 provides both mandatory and specific criteria requirements that will be used in the development of Mobile District DB RFPs. Mandatory requirements are those that will be incorporated in every RFP. Specific requirements are those incorporated at the different levels of RFP development. Specific requirements are cumulative – each level is to include the requirements of the preceding level/s. Where the requirements stated in this Design Manual differ from those in UFC 3-260-11FA, this Design Manual will take precedence.

The approach (including use of criteria drawings or bridging documents at various levels of design development) to be used will be determined by the Mobile District PM in coordination with the customer and user, prior to the acquisition strategy meeting and pre-design meeting. The Task Order (TO) Statement of Work (SOW) will define the level of RFP development.

24.4 GENERAL AND SPECIFIC CRITERIA REQUIREMENTS

24.4.1 ENVIRONMENTAL PROTECTION

- Requirements
  - The environmental protection aspect of an RFP will minimize environmental pollution and damage that may occur as the result of construction operations. The environmental resources within the project boundaries and those affected outside the limits of permanent work will be protected during the entire duration of the contract. See the CHAPTER 8 ENVIRONMENTAL PROTECTION of this Design Manual for additional and more comprehensive requirements.
  - The DB RFP guidance will comply with all applicable environmental federal, state, and local codes, laws and regulations. Any delays resulting from failure to comply with environmental laws and regulations will be the responsibility of the DB contractor.

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- The RFP will include a comprehensive overview of known or potential environmental issues which the DB Contractor must address during construction and will clearly explain the environmental issues at the site, the documentation available and the documentation needed to complete the design as described in CHAPTER 8 ENVIRONMENTAL PROTECTION chapter of this Design Manual. The contractor will address each topic at a level of detail commensurate with the environmental issue(s) and required construction task(s). Topics or issues which are not identified, but which the contractor considers necessary, will be identified and discussed after those items have formally been identified.
    - Obtain electronic copy of all National Environmental Protection Act (NEPA) documentation such as an Environmental Assessment (EAs, Environmental Impact Statement (EIS), or Finding of No Significant Impact (FONSI) from the Installation's BCE/DPW Office and ensure that each design team member reads through and abides by the restrictions/stipulations required by these documents in the development of the DB RFP.
    - Consult with the Installation's BCE/DPW Office to determine if environmental issues as described in CHAPTER 8 ENVIRONMENTAL PROTECTION, exist on the project site and develop the DB RFP delineation accordingly. If applicable, electronic copies of these documents will be obtained and include as Appendices to the RFP.
    - If the project consists of renovation or addition/alteration type work of an existing facility, clearly explain what hazardous materials may potentially be encountered, the documentation available and the documentation needed to complete the design as described in CHAPTER 8 ENVIRONMENTAL PROTECTION of this Design Manual.

24.4.2 ANTITERRORISM/FORCE PROTECTION

- Requirements
    - List all Antiterrorism/force protection references to be used in the design including Government design documents, industry standards and criteria given to the designer at the charrette or predesign meeting. Provide documentation of AHJ approval of any criteria that does not comply with UFC requirements.
    - Section 01 10 10 DESIGN REQUIREMENTS. Appendix D, Exhibit 24-1, outlines RFP information requirements in a sample Section 01 10 10 DESIGN REQUIREMENTS. Designers are required to use this format

when developing Section 01 10 10. This outline and content of the exhibit will be modified to suit specific project requirements. Bracketed [ ] items will be edited or completed to suit project specific requirements. Items not bracketed will be incorporated in the RFP when appropriate to the project.

- Section 01 10 12 DESIGN AFTER AWARD. Appendix D, Exhibit 24-2, outlines RFP information requirements in a sample Section 01 01 12 DESIGN AFTER AWARD. Designers are required to use this format and list of typical topics shown in the exhibit when developing Section 01 10 12. This outline will be modified for project specific requirements. Bracketed [ ] items will be edited or completed to suit project specific requirements. Items not bracketed will be incorporated in the RFP when appropriate to the project.

24.4.3 SUSTAINABLE DESIGN AND DEVELOPMENT (SDD)

- Requirements:
  - Describe the rating tool, reference criteria, and methods of achieving the required SDD rating.
  - Section 01 10 10 DESIGN REQUIREMENTS. Appendix D, Exhibit 24-1, outlines RFP information requirements in a sample Section 01 10 10 DESIGN REQUIREMENTS. Designers are required to use this format when developing Section 01 10 10. This outline and content of the exhibit will be modified to suit specific project requirements. Bracketed [ ] items will be edited or completed to suit project specific requirements. Items not bracketed will be incorporated in the RFP when appropriate to the project.
  - Section 01 10 12 DESIGN AFTER AWARD. Appendix D, Exhibit 24-2, outlines RFP information requirements in a sample Section 01 01 12 DESIGN AFTER AWARD. Designers are required to use this format and list of typical topics shown in the exhibit when developing Section 01 10 12. This outline will be modified for project specific requirements. Bracketed [ ] items will be edited or completed to suit project specific requirements. Items not bracketed will be incorporated in the RFP when appropriate to the project.

24.4.4 GEOTECHNICAL

- This section provides the geotechnical requirements regardless of the level of RFP development. These are the minimum requirements for development of all RFPs.
- The Mobile District Geotechnical and Dam Safety Section (EN-GG) or the contracted Architectural-Engineering (A-E) firm will provide any existing geotechnical data at the project site and prepare the Geotechnical Design

portion of specification Section 01 10 10 as specified the A-E Scope of Work (SOW). CESAM-EN-GG maintains a database of historical soil borings for many on the Installation within the Mobile District's Area of Responsibility (AOR). If no historical geotechnical data exists for the site, CESAM-EN-GG or the A-E will obtain several borings at the site for inclusion in the Design-Build documents. Minimum requirements for additional subsurface investigations and assumptions to be used by the Construction Contractor's Design of Record for bidding purposes will be provided in Section 01 10 10. These minimum requirements will be established to provide adequate data to perform the analysis required by paragraph 9.4.3 Geotechnical Report. Section 01 10 10 will make it clear that the DB contractor is responsible for the geotechnical design for the project and for providing adequate geotechnical investigations for the conditions encountered at the site. EN-GG or the A-E will, as necessary, include in the geotechnical paragraph(s) of Section 01 10 10 any applicable recommended design parameters (e.g. bearing capacity, CBR, etc.) for bidding purposes.

- If unforeseen subsurface conditions that will significantly impact the design and construction of the project are encountered and additional subsurface investigation is needed, the DB contractor will notify the Government and submit a plan for additional subsurface investigation for Government approval. This additional subsurface investigation must be necessary, directly related to the unforeseen conditions and beyond that required by Section 01 10 10 or necessary for an adequate investigation of the site. If the plan is approved, cost will be negotiated and the contractor will be compensated for the cost of such additional subsurface investigations by change to the contract.

24.4.5 SITE WORK

- **Requirements: All Civil/Site RFPs -** The following are requirements and criteria that will be presented (as applicable) in the RFP for every project. Note that additional requirements that are applicable for Airfield, or Complex Special Needs projects, are listed separately.

  - Design Criteria-Applicable Publications presented will be in accordance with CHAPTER 10, Paragraph 10.2.
  - RFP drawings assemblies will be in accordance with A/E/C graphics and drafting standards. Minimum scales and presentation will be in accordance with CHAPTER 10.
  - Provide a general overview of major site features planned, such as building orientation, drainage patterns, parking provisions, traffic circulation, provisions for the handicapped and security requirements.

- Provide a discussion of wetlands, as defined by federal and/or state criteria, historically significant areas, Installation Restoration Program (IRP) or contaminated sites or areas with endangered species of wildlife within the project site area.
- Provide discussion of items requiring removal or relocation, method and location of the disposition of waste or salvage materials and demolition phasing requirements.
- Provide discussion of the geometric layout of the project facilities. Discuss orientation of building relative to existing site features. Required offsets, site constrictions, site limitations and impacts of new construction on existing facilities will also be discussed (See CHAPTER 5 ANTITERRORISM / FORCE PROTECTION).
- Provide a discussion for proposed site grading, tie in grades to existing adjacent site features, flood hazard planning, finish floor elevation(s) relative to existing and proposed site features. Refer to UFC 3-201-01 for guidance on flood hazard planning.
- Provide discussion of storm drain design scheme and the impacts on the existing storm drain systems. Reference UFC 3-201-01 for minimum and maximum flow velocities, pipe materials, slopes, distance between inlets, minimum pipe size, types of structures, retention/detention requirements and outfall end treatments. Describe intended plan for the design of sediment and erosion control for the project through implementation of current Best Management Practices during construction.
- Provide selected design values to be used in the storm drainage calculations such as methodology, surface runoff coefficient, retardance coefficients, infiltration rate and rainfall intensity based on the criteria Design Storm as applicable for non-airfield and airfield projects per UFC 3-201-01. Provide additional design storms as required by SOW and MAJCOM. Provide the 25-year design storm (if required by state environmental agency), and structures. Require the 100-year design storm check for adverse effects on major site features.
- Provide overview of EISA requirements and Low Impact Development requirements per UFC 3-210-10.
- Discuss existing site features affecting grading such as buildings, streets, curbs, walks, fences, water courses, ponds, elevation of high ground water, rock outcrop, etc. Discuss minimum and maximum slopes to be used in the design for embankments, ditches and pipes. Reference the UFC 1-200-01 for minimum finish floor requirements relative to new adjacent finish grades at the perimeter of the building.

- For non-airfield pavement roads, streets, drives, hardstands, etc., provide geometric design data to include listing of traffic volumes, vehicle types, project design speed, maximum degree of curvature and control grades, sight and stopping distance requirements, lane and shoulder widths, cross-slopes for lanes and shoulders, embankment slopes, Rights-of-way and easements and additional requirements for curbs, sidewalks, guardrails, traffic signs and markings, fencing, as applicable to design the project. Refer to SDDCTEA 55-17 for guidance.
- For Non-Airfield facility pavement(s); provide specific traffic values for pavement thickness determination including the traffic frequency, traffic type and maximum weights of vehicles including emergency vehicles. RFP preparer will coordinate with the Installation and user to project traffic data. Refer to UFC 3-201-01 for guidance on Design Vehicles, Design Traffic and Design Emergency Vehicles. Flexible and rigid pavement thickness will be based on the PCASE software report using the design traffic and the established subgrade CBR and K Subgrade Modulus value. Refer to UFC 3-250-01 for pavement design guidance.
- For Non-Airfield pavement(s): base course, subgrade and drainage layer types and requirements will be per the UFC 3-250-01. Minimum required thickness of base and pavement will be per minimums presented in the UFC. Rigid Pavement thickness will be designed based on a 28-day flexural strength concrete of 650 psi and the established modulus of subgrade reaction.
- Provide discussion of non-airfield parking areas to include the required types of vehicles to be accommodated, size, number and orientation of individual parking spaces, number and location of handicapped parking spaces and ingress and egress of parking area from existing roadways. Refer to UFC 3-201-01 Appendix B Parking Space Guidelines for Non-Organizational Vehicles, for guidance.
- Provide discussion of the miscellaneous required site work features such as emergency vehicle access, dumpsters, location and width of sidewalks, location and types of curb or curb and gutter, and location and type of fencing, as applicable.
- In the RFP, include a list of all required construction permits to be obtained by the Design-Build construction contractor. The list will include but is not limited to the following:
    - General Permit for New Stormwater Discharge
    - State Wetlands Dredge and Fill Permit

- **Requirements: Airfield Projects -** The following are requirements and criteria, in addition to Requirements, that will be presented (as applicable) in the RFP for all Airfield projects.
    - Airfield Projects (horizontal construction) and Airfield Pavement RFP projects will be in accordance with this Chapter, applicable portions of Chapter 10, and UFC 3-260-11FA Model Design-Build (DB) Request for Proposal (RFP) for Airfield Contracts. The minimum level of criteria, as defined in UFC 3-260-11FA, for Airfield Projects, will be in accordance with Partial Criteria, unless otherwise specified in the SOW as Full Criteria. Nominal Criteria will not be used unless otherwise approved by the appropriate MAJCOM. Any conflict between requirements contained in UFC 3-260-11FA and this Paragraph will be governed by UFC 3-260-11FA.
    - For Airfield Projects refer to ER 1110-34-1 for mandatory technical reviews of project designs and technical reviews of PCC mix designs, HMA job mix formulas (JMF) from the MCX-TSC.
    - For Airfield pavement(s): provide specific aircraft traffic values for pavement thickness determination including the Class of Runway and Design Aircraft. For Army Heliports and pavements, provide the Traffic Areas, Class of Army Airfield, design aircraft and emergency vehicles. For Air Force Projects, provide the Traffic Areas, Airfield Load Types and design aircraft, including emergency vehicles. RFP preparer will coordinate with the Installation, end user and airfield manager to determine design aircraft, air traffic types and traffic data. Refer to UFC 3-260-01, 3-260-02, and PCASE, for guidance on airfield design parameters. Pavement thickness will be based on the PCASE software report using the design traffic, base course types, drainage layer requirements and the established subgrade CBR or K values.
    - For Airfield pavement(s): base course, subbases and subgrade types will be per the UFC 3-260-02. Drainage layer types and requirements will be per UFC 3-250-01. Minimum required thickness of base and pavement will be per minimums presented in the referenced Airfield UFC. Rigid Pavement thickness will be designed based on a 90-day flexural strength concrete of 650 psi and the established modulus of subgrade reaction.
    - For Airfield facility pavement(s) geometry: provide specific aircraft traffic values including the Class of Runway and Design Aircraft. Design aircraft dimensions will be provided to allow the designer to select the appropriate airfield facility clearances. Present the required proposed airfield feature clearances and dimensions per the UFC 3-260-01.

- Provide special Operational Phasing and Construction Phasing requirements as needed per user special needs or requirements in accordance with UFC 3-260-01. Provide approved temporary pavement closure requirements.
- For Special Airfield Features provide all necessary aircraft information and operational needs as required by the UFC 3-260-01. Present the required proposed airfield feature clearances and dimensions per the UFC 3-260-01.

- **Requirements: Complex or Special Needs Projects -** The following are mandatory requirements and criteria in addition to bullet "Requirements: All Civil/Site RFPs" (above), that will be presented (as applicable) in the RFP for Complex or Special Needs Projects. Complex specific projects may require additional definition and levels of design to define the Government scope of the work for the RFP Package. Such projects could involve projects with unknown exterior site boundary conditions or boundary conditions which may change during the duration of the RFP development. Refer to the RFP SOW for specific requirements.
  - Provide geometric layout design in accordance with the requirements of a 35-percent as defined in Chapter 10.
  - Provide rough grading contours and storm drainage design in accordance with the requirements of a 35-percent as defined in Chapter 10.
- **RFP Submittal Civil/Site Design Analysis -** Provide a listing and description of all applicable requirements and criteria, design requirements, design motives, user requirements, existing conditions, environmental requirements, wetlands, civil design requirements, pavement design requirements, traffic, design vehicles and frequency, UXO, geometry and grade requirements, material requirements, storm drain requirements, which will govern the Civil/Sitework design including but not limited to UFC, federal publications, AF or Army requirements documents and state criteria.
- **RFP Submittal Specifications Section 01 10 10 -** Provide a listing of all required applicable civil/sitework related permits and requirements for the DB contractor to prepare and obtain for local, state, and/or federal permits.
  - Provide a listing of all applicable criteria for the civil/sitework design including but not limited to UFC, federal publications, AF or Army requirements documents, and state criteria.
  - For the 01 10 10 Civil/Site Requirements Section: Provide the specific project requirements for the complete design and construction of the

civil/sitework in accordance with all applicable UFC criteria, codes and regulations. Provide specific information and guidance to the DB contractor to bid the design and construction of the proposed civil/sitework project items. Include as applicable to the project scope, the required items of work listed herein, for the: Civil/Site RFP projects, Airfield Projects, and Special Needs Projects. Additional requirements may be necessary based on the specific project type.

- **RFP Civil/Site Drawings -** Provide project vicinity and location plan showing location of project, haul roads and staging areas.
    - Provide existing conditions or topographic survey sheets of the project site. Refer to Chapter 07 for technical topographic survey requirements. Refer to RFP SOW for specific project requirement for a Government Furnished Topographic survey.
    - Provide conceptualized site plan presenting the proposed major buildings, parking areas, access roads, airfield features, storm water facilities and other associated project feature proposed locations.

24.4.6 LANDSCAPING, IRRIGATION, PLANTING AND TURFING

- **Requirements -** Consult with the local user and Installation personnel to define the extent of landscaping requirements, to determine appropriate plant materials and Installation grounds maintenance capabilities.
- Specific Requirements
    - Describe the conditions of the existing site, including an indication of existing plant materials that are to remain on the site. Specific site problems related to proposed development and the rationale for proposed plant locations will be indicated. The narrative will also include a list of types and sizes of plant materials which are to be used based upon designated Installation requirements and functional and visual criteria.

24.4.7 WATER AND WASTEWATER UTILITIES

24.4.7.1 Water and Wastewater, General

In addition, see paragraphs 24.4.7.3 through 24.4.7.5 for water treatment plant, wastewater treatment plant and large sewage pumping station facility type requirements.

- Requirements

  The water and wastewater systems will be designed and specified to the latest industry standards, codes and Government regulations. The RFP will ensure high quality, energy efficient equipment and systems with

minimum maintenance. Design documents will be submitted and reviewed prior to commencing work on any treatment system. In the RFP, include a list of all required construction permits. This will include permits required to be obtained by the Design-Build Construction Contractor and permits required to be obtained by the user or Installation. The list will include but is not limited to the following:

- General Permit for New Stormwater Discharge
- State Wetlands Dredge and Fill Permit
- Construction Permit for Water Line Extensions
- Construction Permit for Sanitary Sewer Work

Include a paragraph describing the collection, distribution and treatment system(s), any major features such as pumping stations, treatment systems for drinking water, domestic wastewater and/or industrial wastewater. Describe any major features such as unit processes, unit operations, emergency power generation requirements and any environmental regulations that apply to the project. Process flow diagrams and process and instrumentation diagrams (P&ID) will be submitted including descriptions for proposal for any telemetry or remote monitoring requirements. Describe the pumps, pipe materials and required coatings to be used on all piping systems. A description of water and wastewater permitting requirements will also be submitted in accordance with the requirements herein. For projects that require a final discharge disposal, a submittal fully describing the final fate of the discharge and coordination with regulatory officials will be submitted. On treatment plants or systems, list estimated capacities of equipment, types of equipment and number of each type of equipment. Include a preliminary floor plan showing possible locations of major equipment and maintenance clearances. Discuss control of the plant or systems and provide a commissioning and acceptance plan to demonstrate that the system functions as required without shortcomings. Include a list of specifications to be edited.

24.4.7.2 Water Treatment Plant

- Requirements

The water treatment plant and related ancillary appurtenances will be designed and specified to the latest industry standards, codes and Government regulations. The RFP will ensure high quality, energy efficient equipment and systems with minimum maintenance. Design

documents will be submitted and reviewed prior to commencing work on any water treatment plant DB project.

The DB RFP guidance will comply with all applicable federal, state, and local codes, laws, and regulations. Any delays resulting from failure to comply with these laws and regulations will be the responsibility of the DB contractor.

The RFP will include guidance to develop a system master plan which will identify existing system components and service areas, long-range projections of the area to be served by the water system, planning periods for the various water system facilities, present and future water demands, regulatory requirements for the ultimate approval and operation of the system and evaluations of alternative sources of water supply. The contractor will address each topic at a level of detail commensurate with the scope of work and tasks at hand. Topics or issues which are not identified, but which the contractor considers necessary, will be identified and discussed after those items have formally been identified.

Detailed unit process tests and comparisons will be conducted under applicable federal, state, or local guidelines in order to determine the most efficient and compatible water treatment process train for water treatment purposes. In developing a water treatment train, the multiple treatment capabilities of the different methods and materials will be considered to both simplify and reduce the cost of facility construction and operation. The contractor will specifically address any issues as they arise during this process.

- Specific Requirements

  The following paragraphs describing “nominal”, “partial”, and “full” criteria only apply to the water treatment related portions of the DB RFP documents.

  - ‘Nominal’ Project Criteria

    Include a paragraph describing the water treatment system and any major features such as plant flow schematics indicating all treatment units and equipment for the water treatment process.

    Process flow diagrams will be submitted that include the unit operations and processes that combine to make up the treatment process train. This treatment process train must achieve a desired level of treatment to meet or exceed the applicable drinking water quality standards.

  - ‘Partial’ Project Criteria

Include a paragraph describing any major features such as process and instrumentation diagrams (P&ID), unit processes, unit operations, emergency power generation requirements and any environmental regulations that apply to the project. List estimated capacities of equipment, types of equipment and number of each type of equipment. Include a preliminary floor plan showing possible locations of major equipment and maintenance clearances. Discuss control of the plant or systems and provide a commissioning and acceptance plan to demonstrate that the system functions as required without shortcomings.

Describe the pumps and pipe materials and required coatings to be used on all piping systems.

Include an outline of the specifications to be edited. For specifications that are not available in the UFGS listing, an appropriate specification will be written prior to the final project submittal for review and approval. The approved and revised as necessary equipment specification or other specification will be included in the final unreviewed specifications submittal.

- 'Full' Project Criteria

  95% Design Plans (See CHAPTER 11 WATER AND WASTEWATER UTILITIES.)

  95% Design Specifications (See CHAPTER 11 WATER AND WASTEWATER UTILITIES.)

24.4.7.3 Wastewater Treatment Plant

- Requirements
  - The wastewater treatment plant and related ancillary appurtenances will be designed and specified to the latest industry standards, codes and Government regulations. The RFP will ensure high quality, energy efficient equipment and systems with minimum maintenance. Design documents will be submitted and reviewed prior to commencing work on any wastewater treatment plant design-build project.
  - The design-build RFP guidance will comply with all applicable federal, state, and local codes, laws and regulations. Any delays resulting from failure to comply with these laws and regulations will be the responsibility of the DB contractor.
  - The RFP will include guidance that leads to the development of important design factors that must be considered during the initial

planning and design stages of a wastewater treatment plant project. These basic design factors include the following: initial and design years, service area, site selection, design population, regulatory control and effluent limitations, characteristics of wastewater, degree of treatment, selection of treatment process, equipment selection, plant layout and hydraulic profile, energy and resource requirements, plant economics and environmental impact assessment. The contractor will address each topic at a level of detail commensurate with the scope of work and tasks at hand. Topics or issues which are not identified, but which the contractor considers necessary, will be identified and discussed after those items have formally been identified.

- Detailed unit process tests and comparisons will be conducted under applicable federal, state or local guidelines in order to determine the most efficient and compatible wastewater treatment process train for wastewater treatment purposes. In developing a wastewater treatment train, the multiple treatment capabilities of the different methods and materials will be considered to both simplify and reduce the cost of facility construction and operation. The contractor will specifically address any issues as they arise during this process.
- A wastewater treatment plant will be designed and constructed to achieve federal, state and local effluent quality standards stipulated in applicable discharge permits. Specifically, the plant must be easy to operate and maintain, require few operating personnel, and need a minimum of energy to provide treatment. Plants will be capable of treating normal laundry wastes together with sanitary wastewater. Pretreatment of laundry wastes will not be considered except where such wastes might exceed 25 percent of the average daily wastewater flow, or as a resources conservation measure, when feasible. In a design-construction for the expansion of existing plants, criteria contained in applicable regulations regarding flows and wastewater characteristics may be modified to conform to existing plant performance data if the plant has been in operation long enough to have established accurate data.

- Specific Requirements

  The following paragraphs describing “nominal”, “partial”, and “full” criteria only apply to the wastewater treatment related portions of the DB RFP documents.

  - ‘Nominal’ Project Criteria

    - Include a paragraph describing the wastewater treatment system and any major features such as plant flow schematics indicating all treatment units and equipment for the wastewater treatment process.

- Process flow diagrams will be submitted including descriptions for proposal for any telemetry or remote monitoring requirements. The process flow diagrams will also include the unit operations and processes that combine to make up the treatment process train. This treatment process train must not only achieve a desired level of treatment to meet or exceed the applicable effluent quality requirements, but also prevent any adverse environmental conditions.

- A description of environmental permitting requirements will also be submitted in accordance with the requirements herein. For projects that have discharge or disposal requirements, a narrative or discussion will be provided describing the final fate of such disposal and environmental regulatory impacts. Designer will provide a commissioning and acceptance plan to demonstrate compliance with the approved technical requirements.

- ‘Partial’ Project Criteria

  - Include a paragraph describing any major features such as process and instrumentation diagrams (P&ID), unit processes, unit operations, emergency power generation requirements and any environmental regulations that apply to the project.

  - For projects that require a final discharge disposal, a submittal fully describing the final fate of the discharge and coordination with regulatory officials will be submitted. List estimated capacities of equipment, types of equipment and number of each type of equipment. Include a preliminary floor plan showing possible locations of major equipment and maintenance clearances. Discuss control of the plant or systems and provide a commissioning and acceptance plan to demonstrate that the system functions as required without shortcomings.

  - Describe the pumps, pipe materials and required coatings to be used on all piping systems.

  - Include an outline of the specifications to be edited. For specifications that are not available in the UFGS listing, an appropriate specification will be written prior to the final project submittal for review and approval. The approved and revised as necessary equipment specification or other specification will be included in the final unreviewed specifications submittal.

- ‘Full’ Project Criteria

- 95% Design plans (see CHAPTER 11 WATER AND WASTEWATER UTILITIES.)
- 95% Design specifications (see CHAPTER 11 WATER AND WASTEWATER UTILITIES.)

24.4.7.4 Medium and Large Sewage Pumping Station

Per UFC 3-240-01, medium wastewater pumping stations are defined as having peak flowrates of 500 gpm (31.5 L/s) to 3200 gpm (202 L/s) and large wastewater pumping stations are defined as having peak flows greater than 3200 gpm (202 L/s).

- Requirements
  - The sewage pump station and related ancillary appurtenances will be designed and specified to the latest industry standards, codes and Government regulations. The RFP will ensure high quality, energy efficient equipment and systems with minimum maintenance. Design documents will be submitted and reviewed prior to commencing work on any wastewater treatment plant DB project.
  - The DB RFP guidance will comply with all applicable federal, state, and local codes, laws and regulations. Any delays resulting from failure to comply with these laws and regulations will be the responsibility of the DB contractor.
  - The RFP will include guidance that leads to the development of important design factors that must be considered during the initial planning and design stages of a medium or large sewage pump station project. These basic design factors include the following: site improvements, structures, screening and flow monitoring devices, pumping units, pump drives, system controls and instrumentation, mechanical and electrical components, interior piping, underground force mains, valves and appurtenances. The contractor will address each topic at a level of detail commensurate with the scope of work and tasks at hand. Topics or issues which are not identified, but which the contractor considers necessary, will be identified and discussed after those items have formally been identified.
  - The design contractor must provide an engineered system of sewers and pump stations, complete with all appurtenant facilities, sufficient in size and capacity to collect and convey the required wastewater flows to an acceptable point of discharge. The system must be practicable, economically feasible and all components must be located to minimize the costs of installation, operation and maintenance. Sewers and appurtenances must be structurally sound

and must protect the environment from pollution caused by leakage or overflows.

- Specific Requirements

  The following paragraphs describing “nominal”, “partial” and “full” criteria only apply to the sewage pumping station related portions of the DB RFP documents.

- ‘Nominal’ Project Criteria

  - Include a paragraph describing the sewage pump station and any major features such as type of construction (i.e., package type or conventional field erected), pump type (i.e., centrifugal, radial flow, etc.), pump drive and pump controls and instrumentation.

  - Process flow diagrams will be submitted including descriptions for proposal for any telemetry or remote monitoring requirements. The process flow diagrams will also include the unit operations and processes that combine to make up the treatment process train. This treatment process train must not only achieve a desired level of treatment to meet or exceed the applicable effluent quality requirements but also prevent any adverse environmental conditions.

  - A description of environmental permitting requirements will also be submitted in accordance with the requirements herein. For projects that have discharge or disposal requirements, a narrative or discussion will be provided describing the final fate of such disposal and environmental regulatory impacts. Designer will provide a commissioning and acceptance plan to demonstrate compliance with the approved technical requirements.

- ‘Partial’ Project Criteria

  - Include a paragraph describing the pumping station, any major features such as process and instrumentation diagrams (P&ID), unit processes, unit operations, emergency power generation requirements and any environmental regulations that apply to the project.

  - For projects that require a final discharge disposal, a submittal fully describing the final fate of the discharge and coordination with regulatory officials will be submitted. List estimated capacities of equipment, types of equipment and number of each type of equipment. Include a preliminary floor plan showing possible locations of major equipment and maintenance clearances. Discuss control of the large sewage pump station system and provide a commissioning and acceptance plan to demonstrate that the system functions as required without shortcomings.

- Describe the pumps, pipe materials and required coatings to be used on all piping systems.
- Include an outline of the specifications to be edited. For specifications that are not available in the UFGS listing, an appropriate specification will be written prior to the final project submittal for review and approval. The approved and revised as necessary equipment specification or other specification will be included in the final unreviewed specifications submittal.

- 'Full' Project Criteria
  - 95% Design Plans (See CHAPTER 11 WATER AND WASTEWATER UTILITIES.)
  - 95% Design Specifications (See CHAPTER 11 WATER AND WASTEWATER UTILITIES.)

24.4.8 ARCHITECTURAL

- Requirements
  - Section 01 10 10 DESIGN REQUIREMENTS. Appendix D, Exhibit 24-1, outlines RFP information requirements in a sample Section 01 10 10 DESIGN REQUIREMENTS. Designers are required to use this format when developing Section 01 10 10. This outline and content of the exhibit will be modified to suit specific project requirements.
  - Section 01 10 12 DESIGN AFTER AWARD. Appendix D, Exhibit 24-2, outlines RFP information requirements in a sample Section 01 10 12 DESIGN AFTER AWARD. Designers are required to use this format and list of typical topics shown in the exhibit when developing Section 01 10 12. This outline will be modified for project specific requirements.

24.4.9 INTERIOR DESIGN

- Requirements
  - The Structural Interior Design (SID) and the Furniture Fixtures and Equipment Package (FFE) - formally known as the Comprehensive Interior Design (CID) for the DB RFP project delivery process requires the project interior designer to edit two sections of the DB RFP solicitation. See CHAPTER 15 INTERIOR DESIGN.
  - Coordination of interior design information with the architectural and engineering disciplines is critical and necessary to ensure no overlapping or conflicting criteria occurs in the DB RFP.

- When developing the SID design criteria in a DB RFP, title the paragraph “Interior Design”. Narratives within this paragraph will discuss the following objectives:
    - SID objectives for health, safety and welfare
    - SID Color Scheme objectives and aesthetic goals
    - Project specific criteria
    - Interior Signage Requirements

- For FFE requirements, a standard clause may be used in the RFP Section 01 10 10 Design Criteria requiring the FFE package to be developed after award of the contract under the base bid. If the project specific FFE is required, select and include one clause below and include this information in the narrative. Determine how the furniture will be purchased and installed and provide the narrative to indicate this process. Regardless of how the FFE is purchased and installed, the FFE will be designed under the base bid contract. The designer may modify the clauses to meet project specific requirements. Appendix D, Exhibit 24-1, outlines RFP information requirements in a sample Section 01 10 10 DESIGN REQUIREMENTS.
    - Standard Clauses to use in the RFP, Section 01 10 10 – Design Criteria: The FFE [will be, has been] fully developed and ready for procurement. The contractor is to coordinate building changes with the User and the FFE package. All changes must be coordinated with the User. The User will be responsible for updating the FFE based on building related changes.
    - Standard Clauses to not use in the RFP, Section 01 10 10 – Design Criteria (FFE not included in DB RFP): The Contractor will be responsible for the FFE requirement analysis survey to determine the furniture needs of the User. The Contractor will develop the FFE package in accordance with the Mobile District Design Manual CHAPTER 15 INTERIOR DESIGN. The Government will provide the brand name(s) of furniture to use in the FFE package after award of the DB contract.
    - The standard clause used in the DB RFP Section 01 10 12 DESIGN AFTER AWARD, is a "bridge" clause because it involves both the SID and FFE instructions to the DB Construction Contractor. Some modification to this clause may be needed to meet project specific requirements. For example, if a FFE is not required, then revise the standard clause by deleting the FFE submittal requirements. Appendix D, Exhibit 24-2 outlines RFP information requirements in a sample Section 01 10 12 DESIGN AFTER AWARD.

- The standard clause to use in the RFP Section 01 10 12 DESIGN AFTER AWARD. The contractor will provide the SID [and FFE] in accordance with CHAPTER 15 INTERIOR DESIGN of the Mobile District Design Manual.

24.4.10 STRUCTURAL

- Requirements
  - List all structural references, codes and standards to be used in the design, including Government design documents, industry standards and criteria given to the designer at the design charrette or predesign meeting. Provide documentation of AHJ approval of any criteria that does not comply with UFC requirements.
  - List all dead load requirements
  - List all live loads, including specific loads such as vehicular loads, cranes, special equipment loads, hanging loads, etc. State locations, weights and special support requirements (i.e. vibrating equipment requirements).
  - List the wind speed, building classification category and exposure category.
  - List the seismic short period spectral acceleration value (S_s) and the one second period spectral acceleration value (S_1) for a 2% probability of exceedance in 50 years, and the building risk category. Provide the seismic site classification or address the appropriate method to derive the seismic site classification.
  - List any special structural requirements such as floor tolerances or deflection criteria, which deviates from IBC.
  - List any restrictions on types of structural systems.
- Specific Requirements
  - 'Nominal' and 'Partial' Project Criteria
  - Include specific technical criteria to include minimum material strengths.
  - Include specific quality control items such as sample panels and inspection requirements.
  - Include desired column locations on the architectural drawings.
  - Include list of recommended structural systems if applicable. Typically, the DB contractor will have as many options as possible for the structural system.

- Include guide specifications.
- 'Full' Project Criteria
- Conceptual Drawings if needed. Typically, it is preferrable to not include structural drawings in the DB package unless necessary. If included, the drawings will be limited to the basic structural system without details.
    - Steel: Show locations of primary and secondary members as expected.
    - Concrete: minimum dimensions for concrete items (no reinforcement will be shown).
    - CMU: minimum dimensions for CMU items (no reinforcement will be shown)

24.4.11 PLUMBING

- General Requirements
    - Require that the Design comply with all applicable requirements of UFC 1-200-02 and applicable federal, state, and local law regarding drinking water, sanitary wastewater and storm water.
    - Require that the design of plumbing systems at all Installations comply with the UFC 3-420-01 and International Plumbing Code, except as modified by above requirements. Include a list of applicable UFCs to be followed.
    - Indicate any special plumbing requirements (handicap requirements, low flow requirements, maximum hot water temperature requirements, dilution basins, grease separators, sewage ejection, etc.).
    - Require contractor's design to comply with applicable requirements of CHAPTER 17 PLUMBING, of this Manual.
- Specific Requirements
    - Indicate the requirements for the plumbing fixtures including mounting, controls, materials and required accessories.
    - Where Room Data Sheets are to be provided in the Architectural or Kitchen Design sections (as applicable) of the DB RFP, require that the Plumbing Design accommodate all listed fixtures, utilities outlets and connections.
    - Describe the materials and standards requirements for all pipe, tubing, fittings, joints and supports to be used on all plumbing systems. Include limitations on what piping is allowed to be used for each service. For

example, “Sanitary drain, waste, and vent lines must be cast iron”, (wherever this might be applicable).

- Describe any special control system components and interface requirements. Include existing UMCS/DDC system descriptions as applicable. Include whether electronic faucet and flush controls are battery powered or they require a control transformer and an outlet/junction box.
- Require the Designer to edit the UFGS specifications and include a list of required sections and titles to be edited.
- Provide Natural Gas Site Plan, showing point of connection to existing natural gas utility and proposed meter/building regulator location at building entry point.
- Include available information on size and gas pressure at existing utility connection point. Indicate whether or not existing is part of base system or on private, state, tribal, or other property and requirements for making connections including a point of contact.
- Indicate boundary lines between US-Government property and non-US-Government property.
- Require the Designer of Record to determine and indicate total connected load of building and other site gas loads (if applicable) and size piping from utility point of connection to building entry point based on gas pressure and connected loads and in accordance with NFPA 54 requirements. Require metering of gas service with meter compatible with and connected to UMCS.

24.4.12 HEATING, VENTILATING AND AIR CONDITIONING

- General Requirements
  - Require that the HVAC systems be designed and specified to the latest industry standards, codes and Government regulations. The RFP will ensure high quality, energy efficient HVAC equipment and systems with minimum maintenance. Design documents will be submitted and reviewed prior to commencing work on the HVAC system.
  - Since the selection of HVAC systems must be considered holistically to comply with energy reduction requirements, the design and selection of HVAC systems will be performed by the Design-Build Construction Contractor's Designer of Record. The In-House or A-E design team developing the DB RFP documents will only define design Criteria,

requirements, minimum three allowable system types and limiting/required parameters for each system.

- Require contractor's design to comply with CHAPTER 18 HEATING, VENTILATING, AND AIR CONDITIONING, of this Manual.

- Specific Requirements

  - Include a paragraph describing the types of HVAC systems allowed (and which must be evaluated via life-cycle cost analysis (LCCA)), any major features for each such as central equipment and base/campus distributed systems (i.e., chilled water, hot water, steam). Provide all utilities cost data required for use in the LCCA.

  - Indicate any preferred/sole source manufacturers for equipment that are in place at the Installation and have Sole-Source Justifications and Authorizations approved by the Activity. Include a copy of the Justification and Authorization document as an appendix to the RFP.

  - Describe any special HVAC space requirements such as clean rooms, kitchens, humidity control, DDC Control System type, etc. Describe any special security requirement that will need to be accommodated by the design such as SCIFs, SAP, and TEMPEST.

  - Where Room Data Sheets are to be provided in the Architectural or Kitchen Design sections (as applicable) of the DB RFP, require that the HVAC design accommodate all ventilation, exhaust, makeup air and industrial ventilation systems resulting from said data sheets.

  - Describe the duct and pipe materials and insulation to be used on all systems.

  - Describe any special control system components and interface requirements. Include existing UMCS/DDC system descriptions as applicable. Include interface requirements with other systems such as plumbing controls, building lighting and occupancy sensing, fire alarm system and UMCS (utility monitoring and control systems (UMCS)).

  - Require the Designer to edit the UFGS specifications and include a list of required sections and titles to be edited.

  - If project includes use of and connection to site/campus/base utilities such as steam, campus chilled water, and/or heating hot water, include a site utility plan showing each set of steam and condensate, heating hot water and chilled water lines from points of connection to existing base/campus utilities and routing to anticipated building entry points as applicable.

- Indicate whether existing piping is buried or above ground. Indicate whether new piping runs are to be buried or above ground.
- Indicate allowable piping materials, insulation, jackets and methods of expansion compensation and requirements for cathodic protection. Also indicate anticipated steam drip station/trap locations where applicable.
- Indicate the following existing conditions as applicable:
    - Base/Campus steam minimum and maximum distribution pressure (require Designer of Record to assume saturated steam).
    - Base/Campus condensate return minimum and maximum pressure.
    - Base/Campus chilled water supply and return temperatures and pressures and minimum anticipated pressure difference between the two. Also indicate anticipated maximum chilled water supply temperature in loop.
    - Base/Campus heating hot water supply and return temperatures and pressures and minimum anticipated pressure difference between the two. Base/Campus system may also be designated as Low-, Medium-, or High-Temperature Water, all of which are usually supplied at greater than 212 degrees F. Also indicate anticipated minimum supply temperature in the loop."
- Require Designer of Record to indicate total maximum anticipated flow rates of each utility and metering of each with meter connected to UMCS.

24.4.13 FIRE PROTECTION REQUIREMENTS

- General Requirements

  The mandatory design criteria are those contained in Unified Facilities Criteria; Fire Protection Engineering for Facilities, UFC 3-600-01. UFC 3-600-01 contains fire protection and life safety requirements in the following areas:

  - Type of construction
  - Height and area limitation
  - Building separation
  - Fire resistive construction
  - Flame-spread and smoke-developed ratings
  - Means of egress
  - Special hazard protection
  - Automatic sprinkler and fire suppression systems

- Water supplies for fire protection
- Standpipe systems and fire extinguishers
- Fire alarm and detection systems
- Connection to the base fire reporting system
- UFC 3-600-01 may not include all the latest federal requirements, established by executive orders, public laws, local requirements and other directives that relate to fire protection and life safety. These requirements must be reviewed and included in the RFP as required for each project.
- Include results of Fire Flow test for hydrants in the project vicinity to determine if the existing water system is sufficient in terms of available pressure and volume. This information must be obtained and included in the DB RFP to determine if fire flow requirements (for the site hydrants) or fire demand (for the building suppression systems) will require pressure boosting with a fire pump and/or flow capacity improvement by means of on-site storage tank(s).
- Require Contractor's design to comply with CHAPTER 16 FIRE PROTECTION, of this Manual.
- Indicate how much of Contractor's design will be included in the design documents and how much may be delegated to the Fire Protection subcontractor. All designs whether by the Designer of Record or the Installing Contractor's Designer must be approved in writing by the QFPE (as defined in UFC 3-600-01) and these requirements must appear in the Design Documents of the Designer of Record.

- Specific Requirements
  - List areas Requiring Fire Suppression, Alarm, and Mass Notification or require the DB contractor to make selection of area fire protection requirements based upon applicable codes and standards for the use of the area. If any specific fire protection system is preferred or required by Sole-Source-Justification Authorization, indicate the type(s). Include a copy of the Justification and Authorization document as an appendix to the RFP.
  - Where Room Data Sheets are to be provided in the Architectural or Kitchen Design sections (as applicable) of the DB RFP, require that the Fire Alarm and Suppression Systems accommodate the specific space systems and requirements listed therein.
  - Describe the pipe materials to be used on all sprinkler systems.

- Require Class of Fire Alarm wiring directed in applicable UFC unless otherwise approved.
- Require the Designer of Record to edit the UFGS specifications and include a list of required sections and titles to be edited.
- Provide data on existing fire alarm/mass notification systems including manufacturers and model numbers if available.
- For aircraft hangar projects, require Designer of Record to provide a layout of the foam generators and piping, flame detectors, control/activation/alarm matrices and fire alarm and releasing panel risers in accordance with applicable provisions of UFC 4-211-01.

24.4.14 OTHER MECHANICAL SYSTEMS AND EQUIPMENT

- General Requirements

  Require that the mechanical systems be designed and specified to the latest industry standards, codes and Government regulations. The RFP will ensure high quality, energy efficient mechanical equipment and systems with minimum maintenance. Design documents will be submitted, reviewed and approved prior to commencing work on the mechanical system.

- Specific Requirements

  - Include a paragraph describing the mechanical systems and support utilities that will be needed.
  - On central energy plants, list estimated capacities of equipment, types of equipment and number of each type of equipment. Include a preliminary floor plan showing possible locations of major equipment and maintenance clearances. Discuss control of the plant. Discuss any environmental concerns.
  - Require the Designer of Record to edit the UFGS specifications and include a list of required sections and titles to be edited.
  - Where Room Data Sheets are to be provided in the Architectural or Kitchen Design sections (as applicable) of the DB RFP, require that any specific specialty mechanical equipment be detailed thoroughly as to performance and quality of product in the RFP. Highly specialized equipment may be specified by the Construction Contractor's Designer of Record so long as a sufficient description of quality and intent is included in the RFP.

24.4.15 ELECTRICAL AND ELECTRONIC SYSTEMS

24.4.15.1 Mandatory Requirements by Government or AE as government representative

All criteria not listed in the RFP will not normally be a part of the RFP. Any specific UFC, TM, TI, MIL HDBK, etc., that is required to be used will be referenced as mandatory. A link to a web site where the specific criteria can be obtained will be provided.

24.4.15.2 Vertical Construction

For all electrical, communication and low voltage systems, the RFP writer will utilize performance criteria to the extent possible. A typical vertical construction project will have site electrical and communication plans only. Drawings may be utilized to convey certain aspects of project requirements that cannot be described adequately as performance criteria but is not encouraged in general. Examples of additional drawings to be included in the electrical or communication set if necessary, would include depicting large electrical equipment to ensure it has proper clearances or zoning of classified areas that may be difficult to describe.

The architect will provide 10% drawings indicating a building footprint and room types with descriptions typically to be served as Room Data Sheets. All electrical and electronic systems room requirements as covered by the charrette, will be pulled into the electrical or electronic systems portion of the RFP and will not rely solely on the brief mention in room/space type description in the Room Data sheet schedules typically provided by an architectural charrette team. The RFP writer will explain in detail the performance of each complete systems and where and how the end devices will be served and function in the specific room or spaces. It is highly suggested to follow the architects lead, structurally in the room requirements for these systems and place them in the specification section 01 10 10, in the appropriate place. Systems that require extra attention to detail are Audio Visual Requirements, IDS, CCTV, Access Control, Public Address and Gun Shot Detection if required. Current cybersecurity requirements will be emphasized for each system in the specification section 01 10 10 criteria.

All fixed or existing entities of the project not under the construction contractor's control, will be identified at the beginning of the charette process. Existing site utilities such as water, wastewater, electrical and communications are examples of these types of entities that may be privatized to an onsite base contractor requiring pricing from those utility providers to complete the total project costs. The utility costs are typically done as a pass-through item to the construction contractor and will be identified as CLINs on the bid form. All items not captured by a privatized contractor will need to be included in as much detail that full pricing will be captured. Extensive utility work required to serve

a remote site will need to be identified at the very beginning of a project so that it can be verified that these costs were captured in the DD Form 1391. It is paramount that these types of issues be identified early as they may be a project killer in the end.

A sample RFP is provided in this design manual so that the reader may familiarize themselves with the type of language and detail that is necessary for all aspects of the electrical and electronic systems requirements.

- Minimum Document Requirements
    - 01 10 10 DESIGN REQUIREMENTS
    - 01 10 12 DESIGN AFTER AWARD REQUIREMENTS
    - Electrical Site Plans showing all proposed power utility requirements such as primary entrance and transformer location and communication manholes and building entrance.
    - Special electrical/communication plans if required. Comprehensive list of all applicable UFGS specifications and all up to date UFC and code references to be included in the 01 10 10.
- Minimum 01 10 10 Requirements ELECTRICAL SYSTEMS (Please See Appendix D, Example RFP for reference)
- Codes and References.
- [Provide citation/s and publication dates]
- Exterior Electrical Requirements (As it pertains to building electrical service) [Define requirements.]
- Distribution System. [Define requirements.]
- Design of the primary electrical distribution system will [define requirements.]
- The Contracting Officer's Representative will approve all outages required for connection of new services to existing systems.
- Transformers. [Define requirements.]
- Exterior Lighting. [Define requirements.]
- Existing lighting fixtures, poles and control equipment. [Define requirements.]
- Electrical Interior. [Define requirements.]
- Service Entrance/Equipment. [Define requirements.]

- Voltage Characteristics. [Define requirements.]
- Panel Locations. [Define requirements.]
- Feeder Circuits & Special Equipment. [Define requirements.]
- Branch Circuits. [Define requirements.]
- Separate Circuits. [Define requirements.]
- Interior Lighting. [Define requirements.]
- Lighting Control Systems. [Define requirements.]
- Exterior Outlets/Lights. [Define requirements.]
- Lighting Fixtures. [Define requirements.]
- Emergency (Life Safety) Lighting. [Define requirements.]
- Bathroom Switches. [Define requirements.]
- Lightning Protection. [Define requirements.]
- Specifications. As a minimum, the Contractor will edit and submit the following UFGS as defined in Section 01 10 12, DESIGN AFTER AWARD: [List specific specification sections]
- Minimum 01-10-10 Requirements ELECTRONIC SYSTEMS (Please see Example RFP for reference)
- Codes and References. [Provide citation/s and publication dates]
- Exterior Electronic Systems. [Define requirements.]
- Interior Electronic Systems:
- Fire Detection and Alarm System. [Define requirements.]
- Mass Notification System. [Define requirements.]
- Single Station Smoke Detectors. [Define requirements.]
- Combination Audio/Visual Notification Appliances. [Define requirements.]
- Maintenance Manuals. [Define requirements.]
- Telephone and LAN Systems (Interior). [Define requirements.]
- Qualifications. [Define requirements.]
- Minimum Manufacturer Qualifications. [Define requirements.]

- Cable Television. [Define requirements.]
- System Description: The Cable Television system will be provided by MediaCom or like provider.
- Cable Distribution System. [Define requirements.]
- Electronic Entry System Access Control. [Define requirements.]
- Intrusion Detection System. [Define requirements.]
- CCTV System. [Define requirements.]
- Public Address System. [Define requirements.]
- Gun Shot Detection System. [Define requirements.]
- Specifications. As a minimum, the Contractor will edit and submit the following UFGS as defined in Section 01 10 12, DESIGN AFTER AWARD: [List specific specification sections]
- Minimum 01 10 10 Requirements CORROSION CONTROL AND CATHODIC PROTECTION
- Codes and References. [Provide citation/s and publication dates]
- General. [Define requirements.]
- Cathodic Protection and Coatings. [Define requirements.]
- Qualifications and Required Site Visits. [Define requirements.]
- Criteria of Protection. [Define requirements.]
- Coating. [Define requirements.]
- System Design. [Define requirements.]
- Specifications. As a minimum, the contractor will edit and submit the following UFGS as defined in Section 01 10 12, DESIGN AFTER AWARD: [List specific specification sections]

24.4.15.3 Horizontal Construction

For horizontal construction as it pertains to electrical and communication work, it is typically not recommended to do a DB RFP due to the fact that so much has to be physically shown to provide a contractor with enough information to price the job. As much as 90% of the effort to do a full design may be required to put out a completely biddable DB product. If it is not possible to do a full design for a DBB project, then follow the criteria below:

All fixed entities or portions of the project not under the contractor's control will be identified and responsibility affixed with pricing to be done as a pass-through and identified as CLINs on the bid form. Site utilities such as water, wastewater, electrical and communications are examples of these types of entities that may be privatized to an onsite base contractor requiring pricing from those utility providers to complete the total project costs. All items not captured by a privatized contractor will need to be included in as much detail that full pricing will be captured. Extensive utility work required to serve a remote site will need to be identified at the very beginning of a project so that it can be verified that these costs were captured in the DD Form 1391. It is paramount that these types of issues be identified early as they may be a project killer in the end.

- Minimum Document Requirements Horizontal
- Primary Electrical System Underground-
    - 01 10 10
    - 01 10 12
        - Electrical Site Plans showing all proposed routing, primary junctions, pad mounted switches, pull boxes or manholes and final termination points.
        - Form the substation with switching and final devices such as pad mounted transformers. A simplified conduit/manhole diagram showing connections between the physical cable plant features without the physical site plan to facilitate a quick understanding of what the next device upstream and downstream.
        - Special details that are required by the base or required for the project that may not be captured as a performance item in a 01 10 10.
        - Make all available as-built drawings of the existing distribution system available in PDF form as part of the DB package.
        - Comprehensive list of all applicable UFGS specifications and all up to date UFC and code references to be included in the 01 10 10.
- Primary Electrical System Overhead-
    - Same requirements as for underground except substitute poles for manholes/pull boxes.
- Outside Plant Communications Underground-

- 01 10 10
- 01 10 12
    - Communication Site Plans showing all proposed routing, ITNs, pull boxes or manholes and final termination point. Butterfly diagrams are not required.
    - A topology or Single line diagram showing the logical connections of both the copper plant and the fiber plant preferably as two different diagrams. The topology diagram will indicate where the circuits originate and follow their logical connections to the final termination point. Clearly indicate for all fiber whether it is a ring, radial or daisy chain arrangement. For the copper plant, show the main switch and all subsequent remote switches and how they are connected and how they serve each facility.
    - A simplified conduit/manhole diagram showing connections between the physical cable plant features without the physical site plan to facilitate a quick understanding of what the next device upstream and downstream.
    - Special details that are required by the base or required for the project that may not be captured as a performance item in a 01 10 10.
    - Make all available as-built drawings of the existing outside plant communications system available in PDF form as part of the DB package.
    - Comprehensive list of all applicable UFGS specifications and all up to date UFC and code references to be included in the 01 10 10.

- Outside Plant Communications Overhead-
    - Same requirements as for underground except substitute poles for manholes/pull boxes.

24.4.15.4 Specific Requirements by Government or AE as Government representative

- Typical deliverables for vertical RFP packages are those as described and the example RFPs 01 10 10 and 01 10 12 provided herein. The typical delivery sequence of the RFP package is as follows:
    - Initial 10% charrette report that describes electrical and communication site conditions, anticipated site work or utility work,

special power requirements or communication requirements and anticipated electronic systems requirements.

  - 50% submittal will include the site drawings and the draft 01 10 10 and 01 10 12.
  - 100% submittal will include the final site drawings, any special drawings identified as necessary, unreviewed final of the 01 10 10 and 01 10 12.
  - RTA

- Typical deliverables for horizontal RFP packages are those as described herein. The typical delivery sequence of the RFP package is as follows:
  - Initial 10% charrette report that describes electrical and communication site conditions, anticipated site work or utility work, discussion of limits of survey, tie in termination points with existing utility provider, type of construction be it overhead or underground, SCADA requirements if any and ability to meet goals of project based on surveyed conditions.
  - 50% submittal will include the preliminary site drawings or place holders. Complete single line diagrams or topology diagrams to understand the structure of the system and the draft 01 10 10 and 01 10 12.
  - 100% submittal will include the final site drawings, any special drawings identified as necessary for details, complete single line or topology diagrams and unreviewed final of the 01 10 10 and 01 10 12.
  - RTA

24.4.15.5 Specific Requirements to be required by an Offeror

Specific Requirements to be required by an Offeror based on RFP requirements as they pertain to 24.4.5.2 Airfield Projects and 24.4.7.2.1 Water Treatment Plants only.

- ‘Nominal’ Project Criteria
  - Include all the information included in Chapter 21 ELECTRICAL AND ELECTRONICS SYSTEMS, paragraph 16.4 Concept Design (30%-35%)
- ‘Partial’ Project Criteria
  - Include all the information included in Chapter 21 ELECTRICAL AND ELECTRONICS SYSTEMS, paragraph 16.5 Interim Design (50%-65%) except that branch circuit wiring need not be shown unless

deemed necessary for the specific project. Completed panel schedules are also not necessary unless deemed appropriate.

- 'Full' Project Criteria:
  - Final electrical/Electronic Plans (See Chapter 21 ELECTRICAL AND ELECTRONICS SYSTEMS.)
  - Final Specifications (See Chapter 21 ELECTRICAL AND ELECTRONICS SYSTEMS.)

24.4.16 CORROSION CONTROL AND CATHODIC PROTECTION

RFP contract documents, as well as the subsequent designs based on those documents, will strictly comply with CHAPTER 22 CORROSION CONTROL AND CATHODIC PROTECTION SYSTEMS.

24.4.16.1 Requirements

- Engineering and design of cathodic protection and coatings are required as indicated in accordance with Army Engineer Technical Letter (ETL) No. 1110-3-474. Include requirements in the RFP. Requirements will not be included by reference to the ETL.
- Cathodic Protection and protective coatings will be provided for the following buried or submerged ferrous metallic structures regardless of soil or water resistivity:
  - Natural gas and propane piping
  - Liquid fuel piping
  - Underground storage tanks
  - Fire protection piping
  - Steel, Ductile, or cast iron pressurized piping under floor (slab on grade) in soil
  - Underground heat distribution and chilled water piping in ferrous metallic conduit in soils with resistivity of 30,000 ohm-cm or less
  - Other structures with hazardous products
  - Steel casing for underground hydraulic elevator jack
  - Oxygen piping
  - Metallic components of non-metallic piping systems and other non-metallic systems listed in this paragraph will also be coated and cathodically protected. Some, but not to be limited to, examples of such components are: fire hydrants, post indicator valves (PIVs),

change of direction devices, etc. In addition to the structures listed above, all buried metallic components of force mains, sewer lift stations, backflow preventors, oil/water separators must also be cathodically protected in accordance with this paragraph and the referenced criteria (including CHAPTER 17 of the Mobile District Design Manual).

- Require the DB contractor to have all pre-design surveys, cathodic protection designs, and acceptance surveys performed by a person that is accredited or certified by NACE International [formerly National Association of Corrosion Engineers (NACE)] as a NACE Accredited Corrosion Specialist or a NACE certified CP Specialist or be a registered professional engineer who has certification or licensing that includes education and experience in corrosion control of buried or submerged metallic piping and tank systems.
- Require in the RFP that the DB contractor provide training for each cathodic protection system.
- Codes and Standards. In addition to ETL 1110-3-474, referenced above, the RFP must require the DB contractor to comply with all other relative corrosion control and cathodic protection system requirements as contained in all the criteria documents referenced in this Chapter, as well as Codes and Standards, which may not be included in this Chapter, but are relative to the locality.
- Require in the RFP, that all new metallic components that are connected to existing metallic piping systems or other existing metallic structures will be electrically isolated from those existing structures by the installation of an isolation flange, dielectric union, or isolation valve. This requirement is mandatory regardless if the existing piping system or other structure that is being connected to currently has a cathodic protection system in place, even if the existing system is operational.
- Special Cathodic Protection Requirements (e.g., conflicts with grounding systems; structure interference considerations; structure isolation considerations; coating requirements; special installation problems, such as location of ground beds in conjunction with rock formations; etc.).
- Require in the RFP, that only the latest Corps of Engineers' edition of the UFGS cathodic protection system specifications be utilized in the contractor's cathodic protection design. These specifications must be utilized even if other portions of the RFP design documents allow the use of specifications other than UFGS specifications.

24.4.16.2 Specific Requirements

- 'Nominal' Project Criteria
    - Include a paragraph describing the cathodic protection systems and structures that they are to protect, any major features such as rectifiers, test stations, anode types and locations (i.e., type of anodes; type of system, distributed or remote ground bed), terminal cabinets, cabling, etc. and any special corrosion related requirements such as conflicts with grounding systems; structure interference considerations; structure isolation considerations; coating requirements; special installation problems, such as location of ground beds in conjunction with rock formations; etc. Include a paragraph on required Corrosion Expert qualifications and Coating Inspector qualifications, as defined in the "Corrosion Control and Cathodic Protection Systems" chapter of this Design Manual. Include a paragraph on required criteria of protection.
- 'Partial' Project Criteria
    - Include a paragraph describing the cathodic protection systems and structures that they are to protect, any major features such as rectifiers, test stations, anode types and locations (i.e., type of anodes; type of system, distributed or remote ground bed), terminal cabinets, cabling, etc. and any special corrosion related requirements such as conflicts with grounding systems; structure interference considerations; structure isolation considerations; coating requirements; special installation problems, such as location of ground beds in conjunction with rock formations; etc. Include a paragraph on required Corrosion Expert qualifications and Coating Inspector qualifications, as defined in the "Corrosion Control and Cathodic Protection Systems" chapter of this Design Manual. Include a paragraph on required criteria of protection.
    - Describe the cathodic protection equipment and materials to be used on all cathodic protection systems. Describe the type of cathodic protection system that is to be utilized, i.e., impressed current or galvanic type.
    - Describe all the structures that are to be cathodically protected. Include the type of construction materials that are to be utilized for the structures, a description of the coating systems that are to be employed on those structures, etc.
    - Describe any other cathodic protection systems in the area of the new systems, which may conflict with the new systems.
    - If known, provide data and information relating to the corrosivity of the electrolytes (i.e., water or soil) in which the anodes and the

structures to be protected are to be installed. The data will include such information as resistivity, pH, chloride content, etc.

- Include an outline of the specifications to be edited.

- 'Full' Project Criteria
  - Final Corrosion Control and Cathodic Protection Systems Plans (See CHAPTER 22 CORROSION CONTROL AND CATHODIC PROTECTION SYSTEMS.)
  - Final Specifications (See CHAPTER 22 CORROSION CONTROL AND CATHODIC PROTECTION SYSTEMS.)
  - Design Narrative and other requirements not specifically included in above paragraph under this section. (See description included under Final Design (Unreviewed 100%) of CHAPTER 22 CORROSION CONTROL AND CATHODIC PROTECTION SYSTEMS.)

24.4.17 CYBERSECURITY

Provide a narrative description of the cybersecurity design requirements. The narrative should include the following at a minimum:

- List all relevant references, codes, and standards to be used in the design, including Government design documents, industry standards, and criteria given to the designer at the design charrette or predesign meeting. Provide documentation of AHJ approval of any criteria that does not comply with UFC requirements.
- Identify and document all facility related control systems associated with the project.
- Identify and document the System Owner (SO) and Authorizing Official (AO) for each control system.
- Provide brief description of the network connectivity requirements of each control system.
- Determine if there are any existing Authorities to Operate (ATO) for any of the control systems included in the project scope. Provide documentation confirming existing any ATO's.
- Identify and document any other control system restraints or interdependencies, such as privatized utilities, energy contracts, or sole source justifications.
- Indicate the Confidentiality (C), Integrity (I), and Availability (A) impact rating for each control system within the project scope. The C-I-A ratings should be

determined by the System Owner (SO) and Authorizing Official (AO) in accordance with UFC 4-010-06.

- Provide preliminary list of Unified Facilities Guide Specifications (UFGS) that will be used. The designer shall obtain the appropriate guide specifications and use them for design guidance.

24.5 Charrette

During this phase the designer must define the customer's requirements and confirm that they can be met within the project's constraints. To that end, a comprehensive interface with the customer is required generally through a charrette or other previously approved data gathering process. The primary purpose of the design process at this stage is to gather any information from the customer that would be necessary in the development of the RFP performance requirements.

If a design charrette is conducted, the information to be presented in the narrative and drawing products of that charrette equate to the Project Definition submittal requirements presented in other chapters of this manual. See CHAPTER 4 CHARRETTES.

24.6 DRAFT SUBMITTAL

The initial DB RFP submittal will be a titled DRAFT RFP SUBMITTAL. This submittal will include all technical design requirements, governing guidance and criteria gathered during the charrette in specification 01 10 10 and 01 10 12 format. Examples can be found in Appendix D. This submittal will identify applicable permits and include design drawings, applicable specifications (as outlined above), and a parametric cost estimate and bidding schedule with bid options. This submittal will be reviewed by customer, stakeholder, and the Government utilizing the DrChecks module in ProjNet.

24.7 DRAFT FINAL SUBMITTAL

The DRAFT FINAL submittal will include all items in the Draft RFP submittal advanced to a Draft Final RFP level, and any answers or revisions made necessary by reviewer comments generated in ProjNet from review of the Draft Design submittal.

Front-end contract clauses will be incorporated by EN-TS or furnished to the AE for inclusion in Draft Final Submittal.

24.8 FINAL

The FINAL submittal will represent a completed RFP package and include all items in the Draft Final submittal and any answers or revisions made necessary by reviewer comments generated in ProjNet from review of the Draft Final submittal. This includes a complete bidding schedule and Explanation of Bid Items as well as a complete cost estimate. This submittal will serve to back check and close out all prior ProjNet review

comments in addition to any unresolved design issues or deficiencies. The project will not proceed to Ready-To-Advertise (RTA) until all comments and unresolved design issues or deficiencies are resolved to the satisfaction of the ETL and PM.

24.9 READY-TO-ADVERTISE

Once the Final Submittal is complete and design issues are resolved, the package is ready to proceed forward as an advertised solicitation. A Solicitation Number will be added on the packed design plans and specification book volumes. If the project is to be advertised as a two-step Design Build solicitation, then all the technical requirements (drawings, specifications, etc.) will be identified as an amendment. Amendments will be prepared in accordance with the CHAPTER 2 PRESENTATION OF DATA. The ETL will provide the A-E with the appropriate amendment number to be shown in amendment documents.

CHAPTER 25

COST ENGINEERING

INDEX

CHAPTER 25

COST ENGINEERING

25.1 GENERAL

The purpose of this chapter is to provide specific guidance for the preparation of cost estimates for Military, Civil Works and Support-for-Others construction projects. Estimates are made for programming, cost control during design, evaluation of bids, control of negotiations and to serve as a guide in establishing a schedule of payments. Often these estimates are also used to evaluate the reasonableness of the contractor's proposal for negotiated procurement contracts. As such, they must be consistent with the best estimating practice of the construction industry and be current, accurate and complete. They must reflect the expected cost to the Government to perform the work by contract and include all reasonable costs which a prudent, experienced, and well-equipped contractor might anticipate and include in his/her bid.

25.2 APPLICABLE PUBLICATIONS

EP 1110-1-8	Construction Equipment Ownership and Operating Expense Schedule
EM 1110-2-1304	Civil Works Construction Cost Index System
EM 1110-2-6058	Civil Works Cost Engineering Manual
ER 1110-1-1300	Cost Engineering Policy and General Requirements
ER 1110-2-1302	Civil Works Cost Engineering
ER 1110-3-1300	Military Programs Cost Engineering
ER 1110-3-1301	Environmental Remediation and Removal Programs Cost Engineering
UFC 3-730-01	Programming Cost Estimates for Military Construction (formerly 3-700-01)
UFC 3-740-05	Handbook: Construction Cost Estimating

PIL 2012-03 Procurement Instruction Letter - Requirements for Independent Government Estimates

AACE 56R-08 Cost Estimate Classification System – As Applied in Engineering, Procurement and Construction for the Building and General Construction Industries

AACE 41R-08 Risk Analysis and Contingency Determination Using Range Estimating

25.3 GENERAL INSTRUCTIONS

- The Cost Engineer is responsible for obtaining the current version of all software and applicable user manuals. Micro-Computer Aided Cost Estimating Software (MCACES) 2nd Generation (MII) software can be obtained through the U.S. Army Engineering and Support Center, Huntsville, AL at:

  https://www.hnc.usace.army.mil/Media/Fact-Sheets/Fact-Sheet-Article-View/Article/482084/tri-service-automated-cost-engineering-system-traces/

- Air Force Parametric Cost Estimating System (PACES) software can be obtained from AECOM at the following website:

  https://www.aecomassetmanagement.com/#!/software/paces

- Projects will be designed in U.S. measurements or metric measurements. When the project is a metric design, all units of measure and cost data referenced in this and other referenced documents for this project will be changed to Metric Units of Measure and Metric Cost Data.

25.4 DELIVERABLES

The following items are to be included in estimate submittals, which are to be reviewed by Mobile District:

- **Cost Estimate Submittal Checklist -** (Required for all submittals). The checklist will be filled in and used as a cover sheet for each cost estimate submittal. A copy of the Checklist can be provided by the PM or ETL assigned to the project. Access to each cost estimate and its contents will be limited to those persons whose duties require knowledge of the cost estimate.
- **Estimate –** MCACES 2nd Generation (MII) guidance can be obtained from the Mobile District Cost Engineering Branch. All electronically prepared cost estimates can be transmitted via SAFE to the Mobile District Cost Engineering Branch. A-E RTA estimates will include all amendments that might occur during the advertising period.
- **Bid Schedule -** (Required for all submittals.) Prepare in a format in accordance with instructions in **Chapter 23,** Specifications. During design, Bid Schedules frequently change as selected features may need to be covered under separate bid items. The final Bid Schedule will be as directed or approved by the Government.

- **Supporting Data -** (Required for all submittals). A suitably bound, ordered and legible presentation of all cost estimate backup. Backup consists of Quantity Survey, Quantity Derivations and Quotations. All backups must be traceable to the line-item task in the cost estimate that the backup supports.
- **Spreadsheet -** (Required at each submittal.) A spreadsheet should be prepared and submitted with each cost estimate submittal comparing the Current Working Estimate to the Current Programmed Amount in format that mirrors the DD Form 1391.
- **Annotated Comments, as appropriate –** Provide notes in the MII file.
- **DCA Assessment –** When applicable, provide an assessment of the project budget in accordance with AACE International recommended practice RP56R-08, Cost Estimate Classification System – As Applied in Engineering, Procurement and Construction for the Building and General Construction Industries. This assessment will be completed using the latest ENG Form 6196.
- **CSRA -** When applicable, apply range estimating in accordance with AACE International recommended practice RP41R-08, Risk Analysis and Contingency Determination Using Range Estimating and as directed by the Mobile District Cost Engineering Section.

25.5 ESTIMATOR QUALIFICATIONS

The designers cost estimating staff will consist of dedicated full-time cost engineering specialist(s) for each required design discipline, such as architectural, structural, civil, mechanical, and electrical. It is imperative that estimates be prepared by and reviewed under the supervision of, personnel who are competent in construction cost estimating. Estimators must possess a working knowledge of construction and be capable of making professional determinations based on experience. If the designer determines his staff does not possess all these qualifications, he will obtain assistance from a qualified firm whose specialty is cost estimating. In making this determination, the designer will consider the complexity of the project and the number and qualifications of his full-time estimators. In consideration and selection of a consultant firm for cost estimating, the designer will consider, in addition to the foregoing, the firm's specialties, its ability to coordinate the estimates with the designer and its previous experience in preparing cost estimates for the Government.

Estimates prepared by a consultant must be reviewed by the designer before submittal to ensure coordination and compliance with contract requirements.

25.6 METHODS OF ESTIMATING

25.6.1 GENERAL

- The method(s) used to prepare estimates for the various required submittals will be as specified in the Statement of Work-Cost Estimating Criteria. Method specified may be the Micro-Computer Aided Cost Engineering System (MCACES 2nd Generation (MII)); Tri-Service Automated Cost Engineering System (AF TRACES Parametric Building Models - PACES); Manual Method or Excel Spreadsheet Method as described below, or a combination of the above software systems.
- Regardless of the method used, the designer will make all necessary investigations, evaluations, calculations and adjustments to ensure that the estimate fits the specific project scope and conditions and is current, accurate and complete. Absolutely no other methods (computerized software, spreadsheet, typed, etc.) will be allowed without specific approval in advance from the Mobile District Cost Engineering Branch.

25.6.2 PACES BUILDING MODELS

When PACES building models system is specified, the estimate will be prepared as explained in the Statement of Work-Cost Estimating Criteria and the PACES User Manual and Site Work Model Report. Further detailed instructions and specific information will be provided separately as necessary by the Mobile District Cost Engineering Branch.

25.6.3 MCACES 2ND GENERATION (MII)

Under the MCACES 2nd Generation (MII) procedure, the estimate will be prepared as explained in the Statement of Work-Cost Estimating Criteria. Further detailed instructions and specific information will be provided separately as necessary by the Mobile District Cost Engineering Branch.

25.6.4 EXCEL SPREADSHEET

When the Excel Spreadsheet method is directed, the estimate will be prepared on the Excel Spreadsheet blank forms and similarly to the sample Excel Spreadsheet final estimate which will be furnished, if applicable. Further detailed instructions and specific information will also be provided separately as necessary by the Mobile District Cost Engineering Branch.

25.7 SUBMITTAL REQUIREMENTS

25.7.1 GENERAL

The designer will prepare (or have prepared by an estimating consultant) a professional quality construction cost estimate at each of the various stages of project design. Estimates must accurately reflect the scope and features of work

shown on the design documents submitted. The degree of detail must be commensurate with that represented by the submitted plans, specifications, design analyses, etc. Where the design is not sufficiently complete to enable accurate definition of any portion of the work, appropriate allowances, based on good estimating experience and judgement, must be made to cover work not yet fully defined.

25.7.2 COST CONTROL

Funds for project construction are usually programmed based on the estimated cost at the project definition or concept design stage. Based on the programmed amount, which frequently cannot be increased, a Construction Cost Limitation (CCL) is determined. The designer is responsible for making every reasonable effort to design a project that can be built within the CCL, specified in the Statement of Work (SOW). Throughout the entire design period, close coordination between the designer and cost engineer must be exercised to achieve accurate cost control.

- **Cost Estimate Overruns -** It is the designer's responsibility to design the project so that the current construction costs including project escalation costs are within the construction cost limitation specified in the SOW. However, if for some reason beyond the designer's control, the project should exceed the construction cost limitation, the designer will submit the following: (1) the cost estimate showing a base bid that is equal to or less than the construction cost limitation; (2) identify a list of additives alternates/options to bring the total bid package to no more than the construction cost limitation specified, that have been coordinated through the Mobile District Corps of Engineers Project Manager (PM); and (3) a written narrative explaining the reasons why the current construction costs including project escalation exceeds the construction cost limitation specified. A written narrative will also be submitted whenever the current cost estimate has changed more than 5% (plus or minus) from the previous cost estimate. In the case of the project definition or concept cost estimate, variations from the DD Form 1391 will be explained in narrative form.
- **Failure to Comply with Procedures -** Failure of the designer to conform to the procedures outlined within this or referenced manuals will result in the estimate being rejected and resubmitted with deficiencies corrected and the designer may be required to come to the Mobile District office within 48 hours for a face-to-face meeting for the purpose of preparing a corrected cost estimate.

25.7.3 FORMAT

- **General -** When PACES or MII is specified, the format will be as outlined in the Statement of Work-Cost Estimating Criteria. The Cost Estimate will also follow the Tri-Services Work Breakdown Structure (WBS). In addition, a Work

Breakdown Structure hierarchy (Normal, Full, Partial or Special) has been established for all MII estimated projects. Project information will be input so that the estimate output will present costs for the building (or primary facility), broken down according to its various features, and costs for all support items. Any bid schedule, money allocations, etc. requirements will also be considered. The PCACES system, after project/facility data has been established, models selected, project parameters defined, quantities and direct costs calculated, modifiers (overhead, profit, escalation, contingency and SIOH) added, the system will generate various construction cost reports. MII software system will compute costs and generate an estimate after imputing applicable cost data and utilizing the various libraries. When an estimate is manually prepared, its format will conform to the example provided, with similar breakdown of features and bid items. When an estimate is prepared using the Excel Spreadsheet method, its format will also conform to the example provided, with similar breakdown of features and bid items.

- **Military Projects -** The Military WBS as specified in 25.11.2 Military Estimate Hierarchy will normally be used on all Military Construction Projects.
- **Civil Works Projects**
  - At the Reconnaissance Study or alternative evaluation phase of Feasibility Studies, rough-order-of-magnitude estimates based on historical costs can be prepared manually or using an Excel spreadsheet. Once a selected plan is determined, a detailed MII estimate must be prepared using the appropriate Civil Works Work Breakdown Structure (WBS) format, after which a Total Project Summary of Costs must be prepared using an Excel spreadsheet. This summary must be arranged by Code of Accounts format and include all project costs (e.g. Real Estate, Design, Engineering During Construction, etc.) and show the appropriate escalation.
  - At the Plans and Specifications (P&S) stage, all estimates must be prepared using MII and detailed equal to the level of design. The MII estimate should be arranged according to the project Bid Schedule included in the specifications and be formatted in the Civil Works WBS. The Total Project Summary of Costs must also be updated at this stage to reflect the current estimates.
  - At the RTA stage, the Government Estimate must be arranged according to the Bid schedule shown in the solicitation specifications. The Government Estimate must be prepared using MII to a level of detail commensurate with the solicitation drawings.
  - For Civil Works Projects involving dredging, the cost estimate should be prepared using the appropriate CEDEP spreadsheet program in lieu of

MII for the Dredging Account only. Note that CEDEP is proprietary and will not be provided to contractors.

- **HTRW Projects –** HTRW Environmental Restoration Projects will use the HTRW WBS. The HTRW WBS provides the framework for preparing cost estimates, modeling development and collecting historical data for all remediation projects. The WBS consists of a numbering and title system that details the work to four levels of the WBS to organize the HTRW estimate. As a minimum, all estimates will be prepared to the fourth level followed by detail. The quantity take-off will be prepared following the WBS to the same level. In no case will the WBS title descriptions be changed for levels one through four. Levels five and six are optional. New titles for work not covered in the WBS may be added under numbers 90 through 99. Maintaining this rigid structure for the first four levels will allow systematic collection of historical HTRW costs. Any vertical building construction required within the HTRW project will be a separate estimate from the environmental work and will follow the Military WBS. HTRW projects will likely have two distinct phases; construction of a treatment facility and operation and maintenance of the facility over a period of time that may range from months to years. Construction and operating wage rates, escalation rates, and other cost may be different for construction vs. long-term plant operation. Therefore, construction costs will be prepared in a separate estimate from the "after construction" operations cost. Depending on the project scope, it is possible the designer will be required to prepare three separate estimates for each submittal. One for the vertical building construction, one for the HTRW construction, and one for plant operations.

- **Bid Schedule -** For Project Definition submittals, estimated contract costs will conform to a bid schedule similar to that expected to be developed later, with a minimum of at least one bid item for work within any building (Primary Facilities) and at least one to cover exterior work (Supporting Facilities). For later than concept submittals, estimates will conform to an acceptable bid schedule proposed by the designer. Generally, each different building or building type must be covered under a separate bid item. Within a building, selected features or work items may be required to be covered under separate bid items for cost accounting or other reason. Exterior work may be required to be broken into separate bid items where quantities of work are significant and highly variable or where useful historical cost data can be derived from analysis of bids received. The estimate will present a total amount for each bid item to include direct labor, material and construction equipment costs, indirect costs and profit. The final bid schedule will be as directed or approved by the Government. If the estimated cost of the total project, including cost growth allowance, would exceed the CCL, it may be necessary that the bid schedule include items under a base bid and additive alternates /options. Where additional bid item breakdown beyond that proposed by the designer is

considered necessary, it will be provided by the designer at no additional cost to the Government. Guidance regarding bid item breakdown may be obtained by contacting the Mobile District Cost Engineering Section. Estimates for modifications under an existing construction contract must conform to the contract pay item schedule. When the Statement of Work requires multiple Bid Schedules, preparation of separate detailed cost estimates and associated summaries are mandatory.

- **Contractor Type –** The estimate will be structured according to the type contractor considered most likely to bid as Prime. For example, if the job is so heavy in mechanical work that most bidders would likely be mechanical contractors, the estimate should reflect a mechanical prime contractor.

25.7.4 COST BREAKDOWN

- **General –** Costs must be broken down into priceable elements. All cost and quantities in the estimate must be supported. Unsupported lump sum pricing is not acceptable at any stage of design. The level of breakdown must be commensurate with detail available from the design documents.

- **10% Project Definition -** The Project Definition Cost Estimate should be as detailed as the level of design will permit. Unit pricing which includes all direct labor, material and construction equipment costs and any subcontractor markups is permitted, provided appropriate support is included. Prime contractor indirect costs and allowance for profit must be excluded from such unit prices and added separately.

- **35% Concept Design -** The Project Definition Cost Estimate should be as detailed as the level of design will permit. Unit pricing which includes all direct labor, material and equipment costs and any subcontractor markups, will be permitted up through the concept submittal, provided appropriate support is included. Prime contractor indirect costs and allowance for profit must be excluded from such unit prices and added separately.

- **65% Interim Design -** The Interim Design Submittal Cost Estimate will be prepared in task-by-task detail to accurately reflect the scope of work shown in the submittal. This cost estimate provides good cost control prior to final design.

- **95% Design –** The 95% Design Cost Estimate will be prepared in task-by-task detail to accurately reflect the scope of work shown in the submitted documents. At the Final submittal, since design is complete, the scope of work is defined sufficiently well to permit accurate and complete determination of all project costs.

- **100% Final Design -** At 100%submittal, a final update of the Final submittal, the estimate will be comprised entirely of work tasks for which basic costs are detailed.
- **Ready to Advertise -** The designer is responsible for the complete cost estimate including amendments that might occur during the advertising period. This cost estimate should be submitted to the Mobile District Cost Engineering Branch at least four days prior to the final bid/proposal opening date.

25.7.5 RESUBMITTAL AND/OR SUPPORT

If upon review, any submitted estimate is found to not be in compliance with any of the requirements stated or referenced in these instructions, it will be rejected. The designer will, promptly upon request, revise and resubmit the estimate in the time specified in the resubmittal notice, with deficiencies corrected, at no additional cost to the Government. If cost, quantity, etc., of any item in the estimate appears questionable, the designer will promptly provide sufficient and satisfactory explanation and/or supporting data.

25.7.6 BID EXCEEDS ESTIMATE

After all bids are received and they are significantly higher than the Government Estimate to be determined unreasonable, there is a possibility that one or more bidders will protest the reasonableness of the Government Estimate. In addition, the designer/cost consultant Final Bid Price Estimate may not be within 15 percent of the low responsive bid at bid opening time. If this occurs, the designer has a major role in reviewing the Government Estimate and evaluating the Government's position. The designer/cost consultant will promptly conduct an independent review of the Government estimate at no additional cost to the Government. The responsible cost engineer would review the Government Estimate to be sure that it does not contain any omissions, discrepancies (errors in calculation, etc.), quantity takeoff errors, or errors in cost/pricing data. In addition, the reviewer should further analyze any unusual conditions or circumstances that may affect or complicate the work. If the reasonableness of the Government Estimate is protested, the analysis will consist of an in-depth, point-by-point response to all issues raised by the protestor or contractor. The review/analysis will consist of the Government Estimate, including all backup and supporting data, complete explanations about assumptions made and, if available, historical data from previous similar projects which support the estimate. The Government Estimate should be revised immediately if an error is found, and an explanation of the error should accompany the revised estimate. If the revised estimate brings an offeror's price within range of a fair and reasonable price, the Contracting Officer will review the situation and determine final contracting action.

The designer is required to accomplish the design to permit the award of a contract at a price that does not exceed the construction cost limitation specified. When bids for the construction contract exceed this amount, the Mobile District may enforce the contract clause requiring the designer to perform such redesign necessary to permit award within funding limitations. These services will be performed at no increase in the cost to the Government.

25.8 TECHNICAL REQUIREMENTS

25.8.1 GENERAL

Estimates must accurately reflect the project scope and conditions, local labor situation and prices of material, labor and construction equipment anticipated or forecast to prevail in the project vicinity at the time of construction, based on a practicable construction schedule. The estimate should consider delivery dates for materials and equipment to be installed. Estimates will not be accepted as meeting contract requirements if data used in their preparation is substantially different from that shown on the submitted drawings or other design data. Very close coordination and clear communication among the designers and estimators is required because reliable, accurate estimates cannot otherwise be produced.

25.8.2 QUANTITY SURVEY

- Accuracy and completeness of the quantity survey (takeoff) is essential as it directly and critically affects the accuracy of the estimate. The takeoff will be comprehensively and accurately prepared to cover all work for the project. It will be based on all facts that can be gathered from the available engineering and design data. Assumptions as to detail which is beyond the level available at the current stage of design is often necessary to ensure that total cost of the overall project work is covered. In such cases, statements and explanations of necessary assumptions will be included so that, when design details become available, quantities can be reconciled. Quantity surveys must be planned to fit the pricing for the work involved, conform to the bid schedule and be consistent with the payment provisions of the specifications. Surveys must be documented in such manner that computations can be later followed and verified by others. Tabulation and computation sheets will be dated and contain appropriate references to plans, specifications or design analyses. Relevant sketches will be included. Quantity survey documentation must be furnished as a part of the estimate submittal to be reviewed by the Mobile District Cost Engineering Branch.

- The importance of accurate and concise quantity take-off to the cost estimate cannot be overstressed. The following procedures and exhibits must be followed for the designer to have an acceptable cost estimate. If a spot check of quantities by the District reveals inaccuracies or the required format has not

been used in the preparation of the cost estimate, the estimate will be rejected and must be resubmitted with the deficiencies corrected. The quantity take-off is required to follow the applicable WBS.

- The quantity take-off and cost estimate will be treated in a confidential manner and only those personnel concerned with the preparation and/or review of the project will have access to it. The cost estimate will be utilized in preparing government estimates for evaluating bids and will be classified "CONTROLLED UNCLASSIFIED INFORMATION (CUI)". Such material cannot be divulged to other than accredited Government personnel with a need to know.

- Information contained within estimates will not be divulged to prospective bidders. Parametric measurement(s) such as lump sums, building costs by square foot of area, etc. for all estimates, are not permissible and estimates utilizing such will be rejected.

- Prepare a quantity take-off in accordance with appropriate WBS showing all quantities used in the cost estimate. The estimator will show all assumptions as to scope and design used in preparation of the cost estimate. These assumptions will include WBS systems contained within the project. Proper allowances will be made for WBS system and subsystems not completely determined in the plans, specifications and design analysis. The quantity take-off and cost estimate will be an accurate representation of the complete design submitted. The quantity take-off will be prepared in a manner that is clearly legible, indicating the calculations involved in determining the quantity and any assumptions the estimator has made in determining the quantity. The take-off will contain backup and supporting sheets showing breakdown for all quantities of all materials contained within the design drawings and/or specifications.

- The top of each quantity take-off sheet will contain the following information: (1) project information; (2) the design stage; (3) the drawing file number and/or specification section & paragraph number from which the quantity was derived; (4) facility name, quantity, and Unit of Measure (UOM); (5) WBS code where the quantity is located in the cost estimate; and (6) the date and initials of the estimator who prepared them as well as the initials of the estimator who checked them. All quantities and quantity calculations must be clearly traceable to the to the cost estimate item that they support.

    - **Material Pricing –** When an item of material is relatively minor or not yet fully defined, as at concept or earlier stage, it may be satisfactory to base pricing on data in estimating handbooks (including the MII Cost Book Library). In these cases, appropriate adjustments must be made to account for project conditions. For later stages or for significant items, material costs will be based on verbal or written quotations obtained from manufacturers and suppliers, price lists appropriately discounted and

previous recent quotations. Specific current price quotations (at least two, if practicable) should be obtained for major items of permanent equipment and for significant, unusual or nonstandard material items. Where quantities or unit costs will have only moderate impact, recent reliable quotations from other projects for comparable items are considered acceptable. Freight costs to the project site must be covered. Sales and other applicable taxes must be included in the estimate by applying, in a separate calculation, appropriate percentage markups of material cost. Each submittal for which quotations are appropriate, will include a list showing principal items of material, equipment and supplies (such as concrete, structural steel, siding, pumps, chillers, uninterrupted power system, etc.) and indicating the manufacturer/supplier, location, person contacted, telephone number, date, pricing, etc., along with all other pertinent information collected or prepared for the estimate. A record of the pricing data utilized must be maintained and submitted as backup data with the estimate to be reviewed by the Mobile District Cost Engineering Section.

25.8.3 LABOR

- **Wages -** Labor costs in the estimate must be based on rates that include basic wages, overtime and holiday premium payments and contractor's contributions for fringe benefits such as health and welfare, holiday and vacation pay, pension fund, apprentice training, etc. Estimated rates should be those which the contractor will be expected to pay when the project is actually constructed and must consider prevailing rates actually being paid in the project area as well as minimum rates which will be included in the contract in accordance with the requirements of the Davis-Bacon Act. Information on wages may be available from various sources, such as Corps field offices, Mobile District Cost Engineering Section, contractors in the project area, etc. Ultimately, the designer is responsible for all wage rates used in the cost estimate.

- **Unit Costs**

- **General -** Labor unit costs should be based on estimated productivity and cost of wages, fringe benefits, etc. for the labor involved. Productivity estimates are based on experienced rates tempered by estimators' judgement and must consider project conditions, labor availability, market conditions and the like. Useful information can be obtained from vendors, subcontractors and other pertinent sources.

- **PACES –** PACES do not use specific project location wage rates to develop unit costs, but uses location modifiers to adjust material, labor and construction equipment costs based on the location of the project. However, PACES scope

and cost can be exported to MCACES 2nd Generation MII where specific line items can be adjusted.

- **MCACES 2nd Generation (MII) –** For MII estimates, labor unit cost is a function of the crew unit cost and the value for crew daily output included for each task. The productivity rates in the MII project must be adjusted for project conditions as appropriate.
- **Excel Spreadsheet –** Productivity must also be carefully evaluated for Excel Spreadsheet estimates. For mechanical and electrical work, labor cost must be estimated by assigning unit manhours to each task, then applying an appropriate prevailing wage rate to the summarized manhours. For work other than mechanical and electrical, labor may generally be estimated by applying to each task a realistic unit cost (based on a reasonable task productivity and current prevailing wage rates), unit manhours, unit crew hours, or as directed. Where the labor cost for a specific task in a manually prepared or Excel Spreadsheet prepared estimate is significant, or the task has unique requirements, the submittal should include a detailed estimate based on productivity and cost of an appropriate crew similar to the example provided.
- **Social Benefits Cost -** The contractor's cost for Social Security taxes (FICA), Federal and State Unemployment Insurance, Workmen's Compensation and Employer's Liability Insurance and any other social benefits, must be included in the estimate as a percentage of the labor costs.

25.8.4 CONSTRUCTION EQUIPMENT

PACES do not use specific project location construction equipment costs, but uses location modifiers to adjust material, labor and construction equipment costs based on the location of the project. For MII estimates, costs for construction equipment and small tools costs are included in the equipment rates library. These costs are thereby included by the system for each task, as appropriate. For Excel Spreadsheet estimates, costs will be computed similarly to the crew method of MII and included in the detail for the work item to which it pertains. EP 1110-1-8 is the basis for MII construction equipment unit costs and will be used as well for estimating construction equipment costs for Excel Spreadsheet cost estimates. Sometimes extraordinarily large numbers or highly specialized, unusual or unique items of construction equipment may be required to construct a project. In any instance where it is considered likely that the Contractor would have to rent certain construction equipment, rental rates should be determined for those items and appropriate adjustments included in the cost estimate to cover any additional cost.

25.8.5 SUBCONTRACT WORK

Estimates will be prepared for subcontract work using the same methodology and degree of detail for direct costs as outlined for work by the prime contractor. All subcontractor work must be detailed. The subcontract estimate will include costs for direct labor, materials, equipment and second tier subcontracts, as well as subcontractor mobilization and other indirect costs and profit. A subcontractor's overhead usually bears a fairly stable relationship to the subcontractor's portion of the work and can be estimated on a percentage basis. Overhead rates typically range from 10 to 15 % and profit rates from 7 to 10 %, depending on complexity, risk, etc., and judgement must be exercised in selecting appropriate rates. For second-tier subcontract work, overhead and profit markups must be covered for second-tier as well as first-tier. A detailed derivation of subcontractor's overhead costs will be required where the work has unique requirements or where the cost impact of the subcontracted work is significant. When reliable subcontractor quotations are obtained, they may be used to verify the reasonableness of the estimate for the subcontract work.

25.8.6 MOBILIZATION AND DEMOBILIZATION COSTS

Mob/Demob costs must be estimated by detailed analysis considering equipment requirements, distance to move to project site, transportation methods, effort required to prepare, service, load, unload, etc., and the detail included in the submittal. For most building type projects, mobilization and demobilization for the prime Contractor may be included in the estimate of indirect costs. Subcontractor mobilization and demobilization cost should be included in the estimated subcontract total. Where costs apply primarily to certain work items, e.g., for specialized equipment, they should be appropriately distributed to applicable items.

25.8.7 INDIRECT COSTS

- **General –** For concept or earlier estimates where direct cost items may be estimated by experienced unit prices, use of empirical markups for prime contractor is acceptable. For later-than-concept estimates, all field indirect costs for the project must be estimated in detail (itemized).
- **Field Indirect Costs –** These include such costs as those for field supervisory, administrative and technical personnel, offices, shops, yards, utilities, communications, office and engineering supplies and equipment, etc., expected to be incurred at the project site but not chargeable to a specific work item. Field Indirect Costs (otherwise known as Job Office Overhead (JOOH) should be itemized to the extent possible on all cost estimate submittals.
- **Home Office Expense –** These costs will typically be included in estimates by applying an estimated percentage to the expected total field (direct plus indirect) cost amount. A contractor's home office expense rate is not fixed but varies from period to period. It is considered a function of his total general and

administrative expense for a specific period divided by his total field costs for that same period. A reasonable average range of rates is estimated to be from 2% for larger to 7% for smaller contractors.

25.8.8 PROFIT

The estimate will include appropriate allowances for profit. For the prime Contractor and for subcontractors whose work is a significant portion of the project, rates for profit allowance will be determined by the Weighted Guideline method (Appendix R-1). For less significant subcontract work, experienced percentage rates may be used.

25.8.9 BOND

Costs for performance and payment bonds will be included in the estimate. Specific rates are dependent on factors such as the type of work to be performed, the contract amount and the time allowed for completion.

25.8.10 CONTRACT MODIFICATION ESTIMATES

In certain instances, the designer will be tasked to prepare estimates for a modification to an ongoing construction contract. Such estimates are used as a basis of negotiations with contractors for additions to or deletions from a project, or both, and will be carefully prepared in accordance with the applicable instructions in this Chapter, as well as any supplemental information or instructions to be furnished by the Mobile District Military Cost Engineering Section. A discussion with the Mobile District Military Cost Engineering Section prior to preparation of the contract modification cost estimate is mandatory.

25.8.11 CURRENT WORKING ESTIMATE (CWE)

The CWE is defined as the latest available cost estimate for a particular project and should represent, as closely as possible, the total expected cost to construct the project. It must include the estimated contract cost as of the date of preparation, an allowance for cost growth (Current Cost Growth Factors can be downloaded off the Internet - See Paragraph 18.3 above), as applicable, an amount for contingency reserve to cover unforeseen developments during the actual construction which will result in additional costs, and an allowance for Government supervision and administration (S&A). To account for any cost increases which are anticipated to occur between the estimate preparation date and the actual construction period, an allowance for cost growth must be made. This will ordinarily be accomplished by the use of a percentage factor developed from a cost escalation index. Guidance for construction contingency allowance and S&A costs are outlined in the Statement of Work-Cost Estimating Criteria.

25.8.12 QUALITY ASSURANCE

A Technical Quality Control Checklist will be utilized when developing the cost estimate. This checklist is to ensure the cost estimate submittal is complete. A sample can be provided by the PM or ETL on assigned to the project.

25.8.13 SUPPLEMENTAL INFORMATION

Additional specific information and guidance will be furnished as appropriate for projects which are unique or unusual or for projects outside the Continental United States.

25.8.14 CLARIFICATION

Should any question arise concerning the requirements, instructions, procedures, etc., described herein, the Mobile District Cost Engineering Section should be contacted for explanation and clarification.

25.8.15 DD FORM 1391

Military Construction Project Data, if available.

25.9 SCOPE

Estimates will be based on the most recent and complete design information available and will follow the format of the appropriate Work Breakdown Structure (WBS). There are three separate Work Breakdown Structures: Military, Environmental Restoration and Civil Works. The Military WBS will be used for all vertical building construction whether Military, Environmental or Civil Works funded. Environmental Restoration projects will use the Hazardous, Toxic, Radioactive (HTRW) WBS (funded by DERO, Superfund, DOE, etc.). The Civil Works WBS will be used for large earth moving/dredging projects normally funded with non-military funds.

25.10 SPECIFIC INSTRUCTIONS MCACES 2nd Generation (MII).

The designer will be provided the following information:

25.10.1 SAMPLE PROJECTS

Sample Projects may be provided for review of the required format for the Civil, HTRW and Military type of estimates prepared by the U.S. Army Corps of Engineers.

25.10.2 TEMPLATES

Templates for Military, Civil Works, and HTRW can be obtained from the Mobile District Cost Engineering Section. Verify with the Section what is required for each specific project.

25.10.3 WORK BREAKDOWN STRUCTURE

The Work Breakdown Structure will be used as a guide in structuring the cost estimate and quantity survey sheets. The WBS should be reproduced and provided to each Cost Engineer working on the project. The WBS should be closely coordinated with the project Bid Schedule. If any problems arise in coordinating the Bid schedule and the WBS - the Mobile District Cost Engineering Section should be contacted for resolution.

25.10.4 TRAINING

MII training is available through Acuity International (Formerly named Project Time & Cost), 859 Paces Ferry Road SE, Suite 1600, Atlanta, GA 30339, and telephone number (770) 288-0063.

25.11 TECHNICAL INSTRUCTIONS FOR MII COST ESTIMATES

Note: The following instructions are based on a Military Project. Civil and HTRW would be similar.

25.11.1 ESTIMATE FORMAT

The Military Work Breakdown Structure (WBS) as provided by the Mobile District, and as specified above, will be used on all Military Construction (MILCON) Projects. The Military WBS provides a common Tri-Service framework for preparing cost estimates, model development, and collecting historical data for all conventional MILCON projects. This Military WBS is a hierarchical structure comprised of a total of eight levels: Level 1 – Project, Level 2 – Primary/Supporting/Additive Alternate/Option, Level 3 - Facility (Bid Option), Level 4 – System (WBS), Level 5 – Subsystem, Level 6 – Assembly Category, Level 7 – Assembly, and Level 8 – Details. Each system is divided into assembly categories, then assemblies. Assemblies are made up of construction line items. The system, Subsystem and Assembly Category Titles are rigidly defined and will not be changed. An Assembly is a collection of individual cost items that function together as a single building/construction unit. For example, a 12-inch storm drainage line consists of excavation, backfill, compaction, layer of drainage gravel, 12-inch concrete pipe, etc. One unit of an assembly contains a specified quantity and unit of measure of each included item. The Assembly has its own unit of measure. When the Assembly is “linked” and the assembly quantity is changed, all included quantities are proportionate. Assemblies will be created for building/construction systems as required by the project. In no case will the WBS title descriptions be changed for levels 1 through 6. New titles for Subsystems or Assembly Categories will be entered under the “Other” category. See the Military WBS. Note that the 01 through 15 Systems are for the interior of the building (five-foot line outside the building) and

system 16 Selective Building Demolition fall under Primary Facilities. Systems 17 through 20 are exterior systems and fall under Supporting Facilities.

25.11.2 MILITARY ESTIMATE HIERARCHY

When creating a MII cost estimate, it is important to recognize that the construction project consists of the following hierarchical levels:

- Normal Work Breakdown Structure (WBS) in Sequential Order
    - Project
    - Scope – Primary/Support/Additive Alternate/Option
    - Bid Items
    - System
    - Subsystem
    - Optional Level
    - Optional Level
    - Optional Level
    - Note: Estimate details can be at either optional level.
        - **Project (Level 1).** All cost of the Primary and Support
        - Facilities are accumulated to obtain a total project cost. This will include all construction cost as well as Government-Furnished materials and items furnished through other than construction funds, i.e. information systems. Escalation, Construction Contingency and Supervision & Administration (S&A) or Supervision, Inspection & Overhead (SIOH) Costs are added at this level.
        - **Scope -** Primary/Support/Additive Alternate/Options
        - **(Level 2).** Divides the project into Primary Facilities, Support Facilities, Category E Equipment and Government Furnished Equipment based on DD Form 1391 format for the project. Additive Alternates or Options will also be located at this level if required.
        - **Bid Items -** Primary Facilities (Level 3). Individual Facilities under Primary Facilities will be all individual building/major construction features. Individual Facilities under the Support Facilities will be eight categories under Support Facilities of the DD Form 1391.
        - **System (Level 4).** Under Primary Facilities the interior Military WBS System 01 through 15 and System 16 are titled at this level. If there are multiple Primary Facilities, each one will be broken down by the

01 through 16 Systems. Under Support Facilities the Military WBS Systems 17 through 20 are broken down under the appropriate eight categories defined by DD Form 1391.

- **Subsystem (Level 5).** This level contains the Subsystem titles from the Military WBS for the above Systems. If there are subsystems in the project not identified by the Military WBS, they will be identified using 90 through 99 under the appropriate System.
- **Optional Levels (Levels 6 thru 8).** These levels could be used to further define the project features. Detail can be at any of these levels. Individual cost items are located at this lowest level in the cost estimate and reports at this level are referred to as Detail Reports. These are the basic work tasks consisting of labor, construction equipment and material costs.

- Full Work Breakdown Structure (WBS)
  - Project
  - Scope – Primary/Support/Additive Alternate/Option
  - Bid Item – Primary Facilities
  - System (WBS)
  - Subsystem
  - Assembly Categories, Bid Item – Supporting Facilities
  - Assembly
  - Detail
    - **Project (Level 1).** All cost of the Primary and Support Facilities are accumulated to obtain a total project cost. This will include all construction cost as well as Government-Furnished materials and items furnished through other than construction funds, i.e. information systems. Escalation, Construction contingency and Supervision & Administration (S&A) or Supervision, Inspection & Overhead (SIOH) Costs are added at this level.
    - **Scope -** Primary/Support/Additive Alternate/Options (Level 2). Divides the project into Primary Facilities, Support Facilities, Category E Equipment and Government Furnished Equipment based on DD Form 1391 format for the project. Additive Alternates or Options will also be located at this level if required.
    - **Bid Items -** Primary Facilities (Level 3). Individual Facilities under Primary Facilities will be all individual building/major construction

features. Individual Facilities under the Support Facilities will be eight categories under Support Facilities of the DD Form 1391.

- **System (Level 4).** Under Primary Facilities the interior Military WBS System 01 through 15 and System 16 are titled at this level. If there are multiple Primary Facilities, each one will be broken down by the 01 through 16 Systems. Under Support Facilities the Military WBS Systems 17 through 20 are broken down under the appropriate eight categories defined by DD Form 1391.
- **Subsystem (Level 5).** This level contains the Subsystem titles from the Military WBS for the above Systems. If there are subsystems in the project not identified by the Military WBS, they will be identified using 90 through 99 under the appropriate System.
- **Assembly Category**, Bid Item - Supporting Facilities (Level 6). This level contains the Assembly Category titles from the Military WBS for the Subsystems above. If there are Assembly Categories in the project not identified by the Military WBS, they will be identified using 90 through 99 under the appropriate subsystem. In addition, this level contains the Bid Items for the Supporting Facilities.
- **Assemblies (Level 7).** Assembly Titles will be created at this level following the definitions contained in the WBS.
- **Detail (Level 8).** Individual Cost Items are located at this lowest level in the cost estimate and reports at this level are referred to as Detail Reports. These are the basic work tasks consisting of labor, construction equipment and material cost and is the same level of detail as that found in the Unit Price Book Database. Some of the basic work tasks can be modified by “Modifiers” from the UPB.

- Partial Work Breakdown Structure (WBS)
  - Project
  - Scope – Primary/Support/Additive Alternate/Option
  - Bid Item – Both Primary and Supporting Facilities
  - Systems (CSI or Trades Structure)
  - Optional
  - Optional
  - Optional
  - Optional
  - Note: Detail can be at either optional level.

- **Project Level (Level 0).** All cost of the Primary and Support Facilities are accumulated to obtain a total project cost. This will include all construction cost as well as Government Furnished materials and items furnished through other than construction funds, i.e. information systems. Escalation, Construction contingency and Supervision & Administration (S&A) or Supervision, Inspection & Overhead (SIOH) Costs are added at this level.
- **Scope -** Primary/Support/Additive Alternate/Options (Level 1). Divides the project into Primary Facilities, Support Facilities, Category E Equipment, and Government-Furnished Equipment based on the DD Form 1391 format for the project. Additive Alternates or Options will also be located at this level if required.
- **Bid Item** - Both Primary & Supporting Facilities (Level 2). Individual Facilities under Primary Facilities will be all individual building/major construction features. Individual Facilities under the Support Facilities will be items such as: Exterior Electrical Distribution, Water Supply System, Sanitary Sewer System, Site Improvements, Parking Lot, Landscaping, etc.
- **System.** Under this title show the Construction Specification Index (CSI) items, such as: Concrete Moisture Protection, Finishes, Specialties, etc. or Trades, such as Asbestos removal, Plumbing, Insulation, Controls, Test & Balance, etc. or a combination of both. The major features of the project should be shown at this level.
- **Optional levels.** These levels could be used to further define the project features. Detail can be at level 4, 5, 6 or 7.

25.11.3 DESIGN STAGE IDENTIFICATION

All files of the cost estimate and quantity take-off will be clearly marked as to the design stage (concept, preliminary, final, etc.) the cost estimate represents. The design stage identity will be entered on the cover page of the estimate.

25.11.4 PRIME CONTRACTOR FIELD OVERHEAD

Itemized field overhead items for the Prime contractor will be estimated in detail for all projects based on working knowledge of the project and the anticipated construction period.

25.11.5 PROFIT

The designer will use the “Weighted Guideline Method” in determining profit for the prime contractor.

25.11.6 MAJOR MCACES 2ND GENERATION (MII) MENU SCREENS

- **MII Reports and Rounding –** The settings for reports within MII should be displayed in the "Other Options" with specific settings. This would apply to all previously created reports.
- **Changing Rounding Options –** To change the rounding options for a previously created report, open the report using the report icon from the tool bar, or select the open option from the report menu. The report can also be selected from the list of opened reports. After selecting the appropriate report, select the show options button to display sections.

25.11.7 REQUIRED SERVICES

The designer will supply the following Cost Engineering services:

- The overall project will be analyzed by all disciplines involved in preparing the cost estimate to consider the following procedure before making the detailed quantity take-off. This will be done before preparing the concept estimate as it will dictate the final estimate format needed in the preparation of the quantity take-off.
- Review the drawings and DD Form 1391 for the project to determine the number of Primary Facilities required in the project. Should the DD Form 1391 contain vertical buildings that can be identified by AR-415-28 Category Codes (no matter how small) in Support Facilities, the designer will put these buildings under Primary Facilities in the estimate. When multiple buildings are involved, make each building as a separate Facility under the Primary Facilities. (Example: Tactical Equipment Shop which has POL, Storage and Sentry Buildings). When multiple buildings are being constructed at different sites the designer will prepare a separate facility for each building in the Primary Facility and separate Supporting Facilities for each building site.

When the number of buildings has been defined in the Primary Facility, each of the buildings will follow the WBS of defined Systems, Subsystems, Assembly Categories and Assemblies. The Site Work will follow the DD Form 1391 and WBS format. The detail Quantity take-off will follow this same format.

When projects are funded by more than one funding source, all work related to each funding source will be segregated respectively. Funding sources will be identified separately at Scope in the MII estimate and will be identified separately on the Proposed Bidding Schedule.

CHAPTER 26

VALUE ENGINEERING

INDEX

CHAPTER 26

VALUE ENGINEERING

26.1 GENERAL

Value Engineering is an organized study of functions to satisfy the user's needs with a quality product at the lowest life cycle cost through applied creativity. The intent of this section is to provide guidance on the execution of professional Value Engineering studies for the U.S. Army Corps of Engineers and ultimately present customers with improved project quality, best project value, satisfying customer needs and the reduction of project costs without the reduction of project quality.

26.2 APPLICABLE PUBLICATIONS

ER 11-1-321	Army Programs, Value Engineering
ER 415-1-11	BCOES Reviews
ER 5-1-11	USACE Business Processes
ER 5-1-13	USACE Policy on Regional Business Centers
ER 5-1-15	USACE Strategic Management
OMB Circular A-131	Value Engineering
FAR Part 48	Federal Army Regulations, Value Engineering
FAR Part 52.248	Federal Army Regulation, Value Engineering
Value Standard	SAVE International, https://www.value-eng.org

26.3 CONCEPT DESIGN (35%)

VE Studies for concept design submittals will be performed during the design review period. Results of the studies will be received by the Mobile District while design review comments are received and coordinated. Once the VE suggestions to be adopted are approved by the User, the design A-E or the in-house (IH) designers and Project Manager (PM) will determine if the approved items are outside the original scope for design services. If so, a modification to the contract will be issued prior to the incorporation of the items with the final design. Start of final design will not necessarily have to wait on the processing of a modification if other nonrelated work can be started.

26.4 INTERIM DESIGN (65%)

VE Studies will not be conducted on the 65% submittal unless there are unique circumstances where VE was missed at the 35% submittal, and it is required.

26.5 95% DESIGN SUBMITTAL REQUIREMENTS

VE Studies will normally not be performed on 95% design submittals. If studies are made, they will be due to the project cost being over the budget or due to failure to perform VE Studies earlier or due to a reduction in the programmed amount during the final design phase. Remarks concerning concept design will be applicable to final design. If VE findings are small in scope, the necessary changes or additions may be incorporated during the corrected final period. If VE findings have a major impact on the design, then a contract modification to include a contract time extension will be necessary.

26.6 100% FINAL DESIGN SUBMITTAL REQUIREMENTS

VE Studies will normally be performed prior to the 100% final design submittal.

26.7 VE STUDIES FOR REQUESTS FOR PROPOSAL (RFP)

VE studies will be performed on Design-Build requests for proposals prior to advertisement as scheduled by the Project Manager. VE studies for RFP packages are in essence an in-depth technical review of the entire package which includes instructions, technical criteria and often a detailed site design. The same Value Methodology will apply to VE studies performed on Requests for Proposal and will result in full VE Study Reports No.1 and No.2.

26.8 VE VERSUS DESIGN

VE encompasses a "new look" by a SECOND TEAM approach which objectively analyzes a system and its function and its interface with other systems to achieve the required function at least cost commensurate with its useful life and time frame. The prime purpose of this analysis is not to find fault or tear down the original designers, but rather to determine if the function is worth the cost. A comprehensive function analysis study to identify high cost-low worth or low value items and/or entire systems is essential to the organized VE team approach. The expected cost-benefit ratio of study cost to savings is generally 1 to 30 or greater. The subject of additional design fees to incorporate VE alternatives will be considered and negotiated on a case-by-case basis.

26.9 BEFORE THE VE METHODOLOGY CAN BE APPLIED

Items for the building, process and production equipment, site work, site utilities and support features of potentially "high cost and low worth" must be isolated. As part of the

VE process, a cost model to identify the component costs must be prepared and included in the VE report.

26.10 SCOPE OF WORK

VE service will include a VE analysis of the entire design package. The Value Engineering Study (VES) will consist of a minimum of one 24 to 40-hour team study by a multi-discipline team of professionals. The study group will follow the five-step job plan (see paragraph 28.14.3) as recognized by the Society of American Value Engineers (SAVE). A VES Report No. 1 will encompass the recommendations of the VES team with detailed "BEFORE" (as designed) and "AFTER" (VE alternative) cost estimated life-cycle cost considerations with calculations, sketches and isometrics as necessary. A VES Report No. 2 will be a summation of those items that were accepted by the Government, and which will be incorporated into the final design package. A formal oral presentation to the design A-E or the I-H design team and to the Government will be required as delineated below in this chapter.

26.11 VALUE ENGINEERING STUDY SERVICES

Services will be performed in accordance with the schedules set forth in this chapter.

26.12 ESTABLISHMENT AND APPROVAL OF THE VE TEAM

VE analysis necessitates that the VE effort be performed by a separate or independent firm or group of experienced professional designers not associated with or in the regular employment in the same firm or firms performing the original design or proposals.These VE services should be performed by a qualified firm and the study must be facilitated by a Certified Value Specialist (CVS). In all situations, the team leader will be responsible for and will select their own team members to meet the foregoing requirements and qualifications.

26.12.1 MEMBERS

The VE team size will be as required to provide VE expertise in all design disciplines included in the original design. However, in instances where a discipline has little impact on the total project cost and/or contributes an insignificant design portion of the overall project, a waiver may be granted only by the VEO. Although the VE team members will not be the same personnel that are involved in the original design or proposal, is not to be construed or interpreted to rule out consultation and partnership between the design A-E and VE disciplines which are mandatory and vital to achieve a well-balanced and cost-effective workshop.

26.12.2 VE EXPERIENCE

All members of the team will be completely knowledgeable of VE methodology. The VE Team Leader will be CVS certified by the Society of American Value Engineers (SAVE) International. Practical experience is considered to have been gained primarily by being actively engaged as a consultant and leader in VE activities. All members of the VES team will have prior VE experience and training, thereby making the VE study or workshop effective and accomplished within the shortest time frame.

26.13 VE AND A-E FIRM REQUIREMENTS

26.13.1 TYPICAL VES TEAM REQUIREMENTS (SUBCONTRACTED VES):

- Qualified Architect or Engineer/CVS
- Structural Engineer
- Mechanical Engineer
- Electrical Engineer
- Civil Engineer
- On a case-by-case situation, Cost Estimating/Life Cycle Analysis and Drafting technician
- Obtain overview of original design from design A-E
- Site visitation (on a case-by-case basis)
- At the termination of the VE Workshop, the VE Team Leader will make a formal presentation to the design A-E or the IH designers, the User and the Government
- The VE Team Formal Presentation to the Government, design A-E, User and others will be held at the project site, unless otherwise specified. It is anticipated that a maximum of two disciplines may be required.
- Preparing Report No. 1, including the following mandatory enclosure:

  Executive Report format with summary of initial cost savings attached. The savings must be checked off as "proposed" in Report No. 1.

Other Requirements for VES:

- The specific level of effort will be developed for the VES team based on the scope and nature of the specific project and should consider other factors such as geographical location.

- The PM will coordinate the VE workshop with the VEO, the User, the IH designers, the design A-E and the VE firm as far in advance as possible. The PM will notify all participants by phone and in writing two weeks or more in advance of the workshop dates to allow for adequate scheduling.
- The Mobile District VE Officer will be put on "Copy to" list of review conference minutes and any correspondence relating to VE.

26.13.2 TYPICAL DESIGN A-E EFFORT FOR VE BRIEFING AND REVIEW RESPONSE OF THE VE STUDY

The specific level of effort for support of the VES, review of the study results, participation in the Report No. 1 presentation and preparation of Report No. 2, which will be prepared by the VE A- E or the IH VE team, will be based on the scope and nature of the specific project and should consider factors such as geographic location. The level of effort will be determined by negotiations.

- **First day of the VE Team Workshop -** VE Team meets in geographical location of the design, where the designers and the user present an overview of the original design to VES team. The design team includes only design A-E or I-H disciplines, ie, Project Engineer Manager, Architectural, Structural, Mechanical, Electrical and Civil, as appropriate.
- **At termination of the VE Workshop** or upon completion of VE Report No. 1, the VE Team Lead makes a formal presentation of VE proposals to the designers, User and PM. The designer then joins and interacts in partnership with the VE firm by phone to supplement the VE effort in preparation for the VE Study Report No. 1 presentation. The design A-E or I-H design team and the user will review each VE change proposed by the VE Team Study and reach an agreement on acceptability. If the proposal, however, is totally unacceptable, it will be included in the report as having been considered by the VE Team and the rejection will be accompanied by specific technical reasons for the rejection. Upon a mutually agreeable understanding between the design A-E or the I-H design team and the VE firm, the proposal may be indicated as "void" within Report No. 1 and then discussed at the oral presentation. Inasmuch as the designers may wish to include their response during the minutes covering the VE formal presentation, his response need not be in writing prior to the presentation.
- The designers, VEO, PM, User and VE team will participate in a web/ teleconference for the VE Study Report No. 1 review conference where the formal oral presentation is made by the VE Team Leader. Resolution of VE proposals and concurrence or nonconcurrence is achieved at this scheduled meeting.

- At the conclusion of the VE presentation of Report No. 1, the VE A-E or the IH VE team will prepare Report No. 2 which will reflect the final decision of the Government's management team. Report No. 2 will include the VE Proposal Summary Listing with summary of initial costs savings with those proposals indicated as “Accepted”. The Return on Investment (ROI) is to be completed by the Government VE Officer.

26.14 STUDY GROUP REQUIREMENTS AND ENVIRONMENT

26.14.1 INFORMATION REQUIRED

Prior to commencing a VE Study, the design A-E or the I-H design team will make available, as far in advance as possible, electronic copies of the following information to the VES Team:

- Full size drawings or Request for Proposals
- Detailed cost estimates for full designs for parametric cost estimates for RFPs
- Specifications for full designs
- DD Form 1391 and PDB or other project justifications and description of project pertinent to criteria as appropriate
- Basis of design
- Pertinent technical requirements including technical portions of design manuals that may constrain achieving needed function at lowest overall cost consistent with desired performance
- Design calculations (Mechanical, Electrical, etc.)
- Boring logs and soil reports
- Life cycle cost calculations and energy studies based on 25-year life cycle and 10 percent annual discount rate unless otherwise directed
- Other project information such as catalog cuts, photographs of the site, design and criteria manuals, etc., that will be useful to the VES team during the study period

26.14.2 ENVIRONMENT

The VES Team will be assembled and isolated away from their normal workstation in order to avoid daily interruptions such as phone calls, quick questions, brief meetings, etc., which are very disruptive. If circumstances require it, an appropriate meeting room, motel room, etc., should be rented for the workshop to provide the following:

- Room size to accommodate all VE study participants and preferably isolated from normal environment
- Adequate lighting for prolonged reading, writing, etc.
- Tables large enough to accommodate full size drawings and chairs for all VE study participants
- Proximity and access to telephones and duplicating machines
- Blackboard and/or flip chart
- Projectors and screens
- Current estimating books, at least three-holed punch, scissors, scales, tracing paper, multi-color felt tip pens, loose-leaf notebooks, etc.

26.14.3 BASIC REQUIREMENTS FOR VE

VE studies will be accomplished using a function analysis approach. It should be noted that cost reduction actions cannot be labelled "Value Engineering" unless the action includes identifying the function, brainstorming and selecting the alternative that will perform the required function at the lowest total cost considering performance, reliability, quality and maintainability. The six-phase VE Job Plan will be used and is as follows:

- **Information –** For information gathering and identification of high cost - low worth functions. Define and analyze design, evaluate function and establish worth. Note: Original design team is required to present the VE Team with an overview of original current design. The design team, VE Team and PM will attend.
- **Function Analysis Phase –** This is a critical step in the VE Job Plan and is what differentiates VE when comparing it with other review processes. It also serves as a team building exercise that should not be truncated. Considerations include, but are not limited to:
    - Ensure that the activity is meaningful and enhances the team's understanding of the project.
    - Ensure that functions are defined as 'verb/noun' and are not project activities.
    - Identify project features/activities with defined functions.
    - Assess high-cost features with their corresponding functions for study focus.

- Have the team develop a Function Analysis System Technique (FAST) Diagram or other appropriate function model.

- **Creative (Speculative) Phase –** For brainstorming the generation of alternative ideas by means of creative thinking atmosphere and the withholding of judgment during this phase. The design team, VE Team and PM will attend.
- **Evaluation (Judgment/Judicial) Phase –** For evaluating and judging each alternative idea for merit and separating needs from desires. List basic advantages/disadvantages, compare, evaluate, refine and select best alternative ideas for development of firm proposals. The design team, VE Team and PM will attend.
- **Development Phase –** Fully develop and summarize best alternative ideas using accurate and realistic costs. Develop "before" and "after" cost comparisons with net savings. Discard alternatives that prove to not be cost effective or of low value. Only the VE team will attend.
- **Presentation Phase –** Prepare a formal presentation report in sufficient detail for the fully developed viable alternatives including view-graphs, savings and recommendations needed to implement each specific VE proposal. The report must be in sufficient detail to permit a technical review to evaluate the merits of each proposal. The design team, VEO or VE Team Lead, User and PM will attend.

26.15 REPORTS AND MINIMUM DOCUMENTATION REQUIREMENTS FOR VE

The results of each VE Study performed on the project will be documented as follows: See Appendix E.

26.16 VE REPORT SUBMISSION SCHEDULES FOR ORAL PRESENTATION

VE studies will be submitted in accordance with the schedules as set forth in the Project Management Plan (PMP) and required number of submittals set forth at the predesign or pre-study conference.

26.16.1 WORKING RELATIONSHIPS

Copies of Report No. 1 will be sent out (either electronically or hard copies) in time to be received and reviewed by the Government at least 2 weeks prior to the formal VE oral presentation. Report No. 1 will receive concurrent review by the design A-E or the I-H design team and the Government to include the Using Agency. The design A-E or the I-H design team will consult with the VES Team as necessary during the review time to identify problem areas or questionable VE proposals. It is envisioned that with a good harmonious relationship and the proper spirit of cooperation prior to the formal oral VE presentation to the Government, differences will have been

resolved and agreement and concurrence will have been reached between the design A-E or the I-H design team and the VE team regarding acceptable cost-effective VE proposals or alternative proposals. Accordingly, the Government will have to rule only on those proposals involving criteria changes and those few proposals where agreement is in doubt.

26.16.2 PRESENTATION AND REPORT

In all cases, the VE Team will be required to make a formal oral VE presentation (using aids such as lap top computers with projectors, flipcharts, sketches, isometrics or other acceptable methods) to the Government, the design team and the User within a 2-week period (unless indicated otherwise) immediately following the submittal of VE Report No. 1. Note, the Prime A-E representatives will attend the VE presentation unless otherwise scheduled. Copies of VE Report No. 2 will be prepared by the VES team and submitted following the oral presentation to the Government. It is particularly important that other cost-effective suggestions that may evolve from attendees during the VE presentation to the Government be incorporated by the VES team in the VE Report No. 2.

26.16.3 APPROVAL AND IMPLEMENTATION OF PROPOSED VE CHANGES

The Contracting Officer may approve or reject in whole or in part, any VE change and reasons for rejection will be included in the minutes of the formal VE presentation and Report No. 2. The implementation of approved VE changes will be the incorporation of the approved changes into the final design of the project only as directed by the PM and the Contracting Officer under the changes clause of the contract.

26.16.4 SPECIFIC INSTRUCTIONS

The VE proposals and ideas become the property of the Government and may be used on future contracts or designs without additional compensation to the A-E.

CHAPTER 27

CIVIL WORKS

INDEX

CHAPTER 27

CIVIL WORKS

27.1 GENERAL

This chapter provides criteria, standards and regulations, in addition to those provided in other sections, that pertain to the USACE Civil Works planning, engineering, construction and O&M projects. The content in this Chapter applies to all in-house (I-H) and Architect-Engineer (A-E) members of the Project Delivery Team (PDT).

27.2 APPLICABLE PUBLICATIONS

27.2.1 GENERAL PUBLICATIONS

Engineer Regulation (ER)

ER 1105-2-100	Planning Guidance Notebook
ER 1165-2-217	Civil Works Review Policy
ER 1110-2-1156	Safety of Dams – Policy and Procedures

Engineer Circular (EC)

EC 1110-2-218	USACE Levee Safety Program

Engineer Pamphlet (EP)

EP 1100-1-5	USACE Guide to Resilience Practices

27.2.2 HYDROLOGY

Engineer Regulation (ER)

ER 1110-2-1450	Hydrologic Frequency Estimates
ER 1110-2-1463	Hydrologic Engineering for Hydropower
ER 1110-2-1464	Hydrologic Analysis of Watershed Runoff
ER 1110-8-2(FR)	Inflow Design Floods for Dams and Reservoirs

Engineer Manual (EM)

EM 1110-2-1411	STANDARD PROJECT FLOOD DETERMINATIONS
EM 1110-2-1413	HYDROLOGIC ANALYSIS OF INTERIOR AREAS
EM 1110-2-1415	Hydrologic Frequency Analysis
EM 1110-2-1417	Flood-Runoff Analysis
EM 1110-2-1419	Hydrologic Engineering Requirements for Flood Damage Reduction Studies
EM 1110-2-1420	Engineering and Design Hydrologic Engineering Requirements for Reservoirs
EM 1110-2-1421	Groundwater Hydrology

27.2.3 HYDRAULICS

Engineer Manual (EM)

EM 1110-2-1416	River Hydraulics
EM 1110-2-1418	Channel Stability Assessment for Flood Control Projects
EM 1110-2-1601	Hydraulic Design of Flood Control Channels
EM 1110-2-1602	Hydraulic Design of Reservoir Outlet Works
EM 1110-2-1603	Hydraulic Design of Spillways
EM 1110-2-1604	Hydraulic Design of Navigation Locks
EM 1110-2-1605	Hydraulic Design of Navigation Dams
EM 1110-2-1606	Hydraulic Design - Surges in Canals – Change1
EM 1110-2-1610	Hydraulic Design of Lock Culvert Valves
EM 1110-2-4000	Sedimentation Investigations of Rivers and Reservoirs

27.2.4 FLOOD RISK MANAGEMENT

Engineer Regulation (ER)

ER 1105-2-101	Risk Analysis for Flood Risk Management Studies
ER 1110-2-1405	Hydraulic Design for Local Flood Protection Projects
ER 1110-2-1451	Acquisition of Lands Downstream from Spillways for Hydrologic Safety Purposes
ER 1130-2-530	Flood Control Operations and Maintenance Policies
ER 1165-2-21	Flood Damage Reduction Measures in Urban Areas
ER 1165-2-26	Implementation of Executive Order 11988 on Flood Plain Management

Engineer Manual (EM)

EM 1110-2-1619	Risk-Based Analysis for Flood Damage Reduction Studies

Engineer Construction Bulletin (ECB)

ECB 2018-14	Guidance For Incorporating Climate Change Impacts To Inland Hydrology In Civil Works Studies, Design, And Projects

27.2.5 NAVIGATION

Engineer Regulation (ER)

ER 1110-2-1404	Hydraulic Design of Deep-Draft Navigation Projects
ER 1110-2-1457	Hydraulic Design of Small Boat Navigation
ER 1110-2-1458	Hydraulic Design of Shallow Draft Navigation Projects
ER 1110-2-1458	Navigation and Dredging Operations and Maintenance Polices

Engineer Manual (EM)

EM 1110-2-1611	Layout and Design of Shallow-Draft Waterways
EM 1110-2-1613	Hydraulic Design of Deep Draft Navigation Projects

EM 1110-2-1615	Hydraulic Design of Small Boat Harbors

27.2.6 COASTAL

Engineer Regulation (ER)

ER 1100-2-8162	Incorporating Sea level Changes in Civil Works Programs
ER 1110-2-1406	Coastal Field Data Collection
ER 1110-2-1407	Hydraulic Design for Coastal Shore Protection Projects
ER 1110-2-2902	Prescribed Procedures for the Maintenance and Operation of Shore Protection Works
ER 1110-2-8151	Monitoring Completed Coastal Navigational Projects

Engineer Manual (EM)

EM 1110-2-1100	Coastal Engineering Manual Parts I-VI and Appendix A
EM 1110-2-1607	Tidal Hydraulics
EM 1110-2-1614	Design of Coastal Revetments, Seawalls, and Bulkheads

Engineer Pamphlet (EP)

EP 1100-2-1	Procedures to Evaluate Sea Level Change: Impacts, Response, and Adaptation

CHAPTER 28

ACRONYMS AND ABBREVIATIONS

AASHTO	American Association of Highway and Transportation Officials
ABA	Architectural Barriers Act
ACI	American Concrete Institute
ADA	Americans With Disabilities Act
ADEM	Alabama Department of Environmental Management
A-E	Architect-Engineer
A/E/C	Architect/Engineer/Contractor
AF	Air Force
AFF	Above Finish Floor
AFFF	Aqueous Film-Forming Foam
AF&PA	American Forest and Paper Association
AFI	Air Force Instruction
AFM	Air Force Manual
AHU	Air Handling Unit
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
AMCR	Army Material Command Regulation
ANSI	American National Standards Institute
API	American Petroleum Institute
AR	Army Regulation
ARC	Army Reserve Center
ASCE	American Society of Civil Engineers
ASHRAE	American Society of Heating, Refrigeration, and Air Conditioning Engineers

ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
AT/FP	Anti-terrorism/Force Protection
AWS	American Welding Society
BCE	Base Civil Engineer
BEQ	Bachelor Enlisted Quarters
BI	Bidder Inquiry
BICSI	Building Industry Consulting Service International
BIM	Building Information Modeling
BMP	Best Management Plan
BOQ	Bachelor Officer Quarters
BRAC	Base Realignment and Closure
C	Centigrade
CADD	Computer Assisted Design and Drafting
CATV	Cable Television
CCB	Construction Criteria Base
CCTV	Closed Circuit Television Security
CFM	cubic feet per minute
CFR	Code of Federal Regulations
CFS	cubic feet per second
CID	Comprehensive Interior Design
cm	centimeter
c.m.	corrugated metal
CMAA	Crane Manufacturers Association of America
CMU	Concrete Masonry Unit
COM	Customer’s Own Material
COR	Contracting Officer’s Representative
CoS	Center/s of Standardization

CP	Cathodic Protection
CSV	Comma-Separated-Values
CWE	Current Working Estimate
dB	decibel
DB	Dry Bulb (temperature)
DB	Design-Build
DBB	Design-Bid-Build
DBC	Design-Build-Contractor
DD	Department of Defense
DDC	Direct Digital Controls
DM	Design Manual
DoD	Department of Defense
DPW	Directorate of Public Works
EIA	Electronic Industries Alliance
EC	Engineering Circular
ECB	Engineering Construction Bulletin
EM	Engineer Manual
EMCS	Energy Management and Control System
EMI	Electromagnetic Interference
EN-DA	Architectural/Structural Engineering Section, Mobile District
EN-TS	Project Technical Support Section, Mobile District
ENG	Engineer Form designation
EN-GG	Geotechnical and Dam Safety Section, Mobile District
EPA	Environmental Protection Agency
ER	Engineering Regulation
ETL	Engineering Technical Lead
F	Fahrenheit

FAR	Federal Acquisition Regulation
FFE	Furniture, Fixtures and Equipment
FPP	Furniture Placement Plan
FPS	feet per second
FSC	Federal Supply Class
FSN	Federal Standard Number
FSS	Federal Supply Schedules
FY	Fiscal Year
GD	Geographic District
GPM	gallons per minute
GSA	Government Services Administration
HAG	Historical Analysis Generator
HAP	Hourly Analysis Program
HM	Hollow Metal
HTRW	Hazardous, Toxic and Radioactive Waste
HTW	Hazardous and Toxic Waste
HVAC	Heating, Ventilating and Air Conditioning
IBC	International Building Code
ICC	International Code Council
IDG	Installation Design Guide
IEEE	Institute of Electrical and Electronics Engineers
IES	Illumination Engineering Society
IFC	International Fire Code
IFGC	International Fuel Gas Code
I-H	In-house
IMC	International Mechanical Code
IMCOM	Installation Management Command
IOF	Illustrated Order Form

IPC	International Plumbing Code
IPCEA	Insulated Power Cable Engineer's Association
IRC	International Residential Code
IRP	Installation Restoration Program
ISA	Instrument Society of America
JOC	Job Order Contract
LAN	Local Area Network
LEED	Leadership in Energy and Environmental Design
MAJCOM	Major Command
MBMA	Metal Building Manufacturers Association
MCA	Military Construction Army
MCASES	Micro Computer-Aided Cost Estimating System
MCP	Military Construction Program
MILCON	Military Construction
MIL-HDBK	Military Handbook
MO	Maximum Order
MS	Microsoft
MT	MILCON Transformation
MWPCA	Massachusetts Water Pollution Control Association
NACE	National Association of Corrosion Engineers
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
NOR	Notice of Registration
NPDES	National Pollutant Discharge Elimination System
O&M	Operation and Maintenance
OMA	Operation and Maintenance Army
PACES	Parametric Cost Engineering System
PCASE	Pavement-Transportation Computer Assisted Structural Engineering

PCI	Precast/Prestressed Concrete Institute
PDF	Portable Document Format
PIV	Post Indicator Valve
PM	Project Manager
PPTO	Price Performance Trade Off
PSI	pounds per square inch
PSIa	PSI absolute
PSId	PSI differential
PSIg	PSI gage
PVC	Polyvinyl Chloride
PVD	Power, Voice and Data
PXP	Project Execution Plan
QCP	Quality Control Plan, Qualified Credentialed Professional
RA	Requirements Analysis
RFI	Request For Information
RFP	Request for Proposal
RFQ	Request for Quote
RTA	Ready-To-Advertise
SABER	Simplified Acquisition of Base Engineering Requirements
SAD	South Atlantic Division
SAM	South Atlantic Division – Mobile District
SDI	Steel Deck Institute
SID	Structural Interior Design
SIOH	Supervision, Inspection and Overhead
SIPRNET	Secret Internet Protocol Router Network
SGML	Standard Generalized Markup Language

SMACNA	Sheet Metal and Air Conditioning Contractors' National Association
SOW	Statement of Work
TIA	Telecommunications Industry Association
TI	Technical Instruction
TL	Technical Letter
TM	Technical Manual
TRACE	Trane Air Conditioning Economics
UFC	Unified Facilities Criteria
UG	Underground
UL	Underwriter's Laboratory
UMCS	Utility Monitor and Control Systems
USDOT	United States Department of Transportation
UFAS	Uniform Federal Accessibility Standards
UFGS	Unified Facility Guide Specification
USACE	U. S. Army Corps of Engineers
VAV	Variable Air Volume
WAN	Wide Area Network
WAP	Wireless Access Point
WB	Wet Bulb (temperature)
WBDG	Whole Building Design Guide

CHAPTER 29

ADVANCED MODELING

INDEX

CHAPTER 29

ADVANCED MODELING

29.1 GENERAL

29.1.1 ADVANCED MODELING SCOPE

Refer to the USACE ECB 2018-7 Advanced Modeling Requirements on USACE Projects for applicability. The guidelines, standards, and reference materials contained within this Manual shall be used for preparation of all digital models and documents, unless otherwise noted during the pre-design conference and in the contract scope of work (SOW). The SOW for each project is specific and may include additional requirements of the customer, user, location, or installation.

29.1.2 DOCUMENT FORMAT AND GUIDELINES

All documents presented shall be legible and clearly expressed. The standard formats for many documents are described throughout this Manual. Each and all required documents submitted should be adequately titled and dated. The documents should show the stage of the submittal clearly marked on the cover. Pages within any section or chapter of a document shall be consecutively numbered, indexed, and cross-referenced so that specific information can be easily located.

29.2 APPLICABLE PUBLICATIONS

29.2.1 USACE ENGINEERING AND CONSTRUCTION BULLETINS

USACE ECB 2018-7	Advanced Modeling Requirements on USACE Projects (https://www.wbdg.org/ffc/dod/engineering-and-construction-bulletins-ecb/usace-ecb-2018-7)
USACE ECB 2018-6	Operations & Maintenance (O&M) Facility Data Requirements (https://www.wbdg.org/ffc/dod/engineering-and-construction-bulletins-ecb/usace-ecb-2018-6)
USACE Advanced Modeling Contract Requirements	(https://cadbimcenter.erdc.dren.mil/default.aspx?p=a&t=1&i=14)

29.2.2 A/E/C STANDARDS

(https://cadbimcenter.erdc.dren.mil/default.aspx?p=a&t=1&i=7)
First time users will need to register on the CAD/BIM Technology Center's website: https://cadbimcenter.erdc.dren.mil/Login.aspx?ID=0.

A/E/C CAD Standard	(Current release as published and released by the CAD/BIM Technology Center)
A/E/C Graphics Standard	(Current release as published and released by the CAD/BIM Technology Center)

29.2.3 MOBILE DISTRICT ADVANCED MODELING BULLETINS

SAM AMB 2018-01	Advanced Modeling Bulletin - File Naming Convention
SAM AMB 2018-02	Advanced Modeling Bulletin - Drawing Revisions
SAM AMB 2018-03	Advanced Modeling Bulletin - Graphics Concepts
SAM AMB 2018-04	Advanced Modeling Bulletin - Revit Templates

This design guide and the SAM AMBs above can be downloaded from

http://www.sam.usace.army.mil/Missions/Military-Missions/Engineering/Design-Guides/Mobile-District-Design-Guides/

(For USACE in-house designers, these documents are available in ProjectWise)

29.3 ADVANCED MODELING REQUIREMENTS

The US Army Corps of Engineers Engineering and Construction Bulletins (ECB 2018-6 and 2018-7) listed in 2.2.1, serve as the official directive and policy mandating the use of Advanced Modeling technologies on USACE projects based on specific project criteria. However, this does not preclude the use of Advanced Modeling on smaller projects and other types of projects that fall outside of the criteria.

The CADBIM Technology Center website hosts relevant products that facilitate fulfillment of Advanced Modeling requirements per contract SOW. Additional specific requirements are specified in the Mobile District Advanced Modeling bulletins listed in 2.2.4.

29.4 PROJECT EXECUTION

29.4.1 ADVANCED MODELING PROJECT EXECUTION PLAN (PXP)

In accordance with the USACE Advanced Modeling requirements, develop and maintain a PxP for each project utilizing Advanced Modeling. Use of the USACE Advanced Modeling PxP template is mandatory.

29.4.2 PROJECT CODE (FORMERLY KNOWN AS CADD CODE)

The USACE project engineering technical lead (ETL) shall submit a project code request form to the Mobile District Technical Services Specification Section (EN-TS) with all the required fields completed, including the official title of the project, drawing title block information, the project location (LAT/LON), facility type, and the design software platform(s) required.

(The USACE project ETL shall use the latest version of the project code request form available in ProjectWise)

Questions concerning the project code request form should be addressed to the ETL.

The Project Code and the project border shall be provided by the ETL to the A-E within the SOW or before work begins. For in-house projects, this information shall be provided by the ETL to the team prior to start of work.

29.5 REVIEW SUBMITTALS

29.5.1 ADVANCED MODELING PXP SUBMITTAL

An Advanced Modeling PxP is required to be submitted for review and approval prior to commencement of design. Whenever the PxP is updated throughout the design process, it must be re-submittal with the next submittal. A completed USACE Advanced Modeling PxP Submittal Review Checklist (PxP CHX) is required with each PxP submittal.

29.5.2 ADVANCED MODELING SUBMITTALS

A completed USACE Advanced Modeling Submittal Review Checklist (CHX) is required with every submittal except the PxP submittal. Refer to the USACE Advanced Modeling Checklist Guide (CHX Guide) for details.

Submittal packages shall be logically organized to facilitate efficient reviews. Zipped (compressed) files with proper folder structure may be utilized for packaging submittals. However, nesting of zip files is not acceptable. For clarity, if zip files are utilized, the list of files submitted must include the zip files as well as the files contained within those zip files.

Utilize the Quality Control plan section of the PxP to identify a plan for reviewing the quality of each submittal package prior to submission.

All electronic Portable Document Format (PDF) drawings shall be created at full size and proper scale of the drawings to facilitate use of on-screen measurements and printing hardcopies at both half-size and full-size.

Refer to the project contract SOW for submittal schedule and delivery method.

- Concept (35%), Interim (65%), and 95% Design Submittals

Advanced Modeling submittals are expected to be as complete as possible corresponding to the level of development of the project.

- 100% Final Submittal

  The goal for the final submittal should be that all deliverables are complete.

- Ready To Advertise (RTA) Submittal

  The solicitation number and advertising date shall be placed on each drawing after the 100% Final Submittal has been made and prior to RTA. The project solicitation number and advertising date will be provided by the PM and/or ETL with the final review comments. A-E contract numbers shall not be shown on the drawings.

- Pre-Construction Contract Award Submittal

  Prior to the award of the construction contract, the A-E shall deliver the design BIM and CIM Advanced Modeling models in the native design file format including all Amendments.

29.6 DESIGN FILES

The file naming convention of all design files shall conform to SAM AMB 2018-01 Advanced Modeling Bulletin - File Naming Convention. This ensures proper tracking of the project files within the Mobile District. This naming convention is mandatory for I-H and A-E use from conception of each design file.

All in-house project design files must be housed in their official project folder in ProjectWise as created by the EN-TS project coordinator. Only a few file types are currently exempt such as MS Access database, due to technological limitation.

29.6.1 COMPUTER-AIDED DESIGN (CAD)

All CAD drawings created using CAD platforms are to be delivered in the version of Bentley MicroStation or Autodesk AutoCAD currently in use by Mobile District for in-house projects or as specified in the SOW for A-E projects. A mix of the two CAD formats is NOT acceptable. All symbology for CAD files shall be in accordance with the latest version of the A/E/C CAD Standard and A/E/C Graphics Standard, except where explicitly defined in the SAM AMB 2018-03 Advanced Modeling Bulletin - Graphics Concepts.

The project title block information is populated based on information submitted in the Project Code Request Form. Drawing sheet titles assigned by the designer should clearly define the information contained on that sheet. Multiple sheet title lines are provided for title and sub-title. The designer must ensure that the character count will not cause each line to overlap the area block or wrap. Use abbreviations as

necessary to fit the text but do not deviate from the required text width factor, font, or font size.

Designers shall not use model files, sheet files, and title blocks from previous or other on-going projects without first consulting with the CAD/CIM manager.

Delivered model files shall not make use of the paperspace. Delivered sheet files shall have no more than one paperspace per file (sheet model).

29.6.2 CIVIL INFORMATION MODELING (CIM)

All CIM models and sheet files created are to be delivered in the version of Autodesk AutoCAD Civil 3D currently in use by Mobile District for in-house projects or as specified in the SOW for A-E projects. All symbology for CIM files shall be in accordance with the latest version of the A/E/C CAD Standard and A/E/C Graphics Standard, except where explicitly defined in the SAM AMB 2018-03 Advanced Modeling Bulletin - Graphics Concepts. Use of the USACE Civil 3D template is mandatory. The template can be found of the USACE CADBIM Center website.

Delivered model files shall not make use of the paperspace. Delivered sheet files shall have no more than one paperspace per file (sheet model).

Designers shall not use model files, sheet files, and title blocks from previous or other on-going projects without first consulting with the CAD/CIM manager.

29.6.3 BUILDING INFORMATION MODELING (BIM)

All BIM models created are to be delivered in the version of Autodesk Revit currently in use by the Mobile District for in-house projects or as specified in the SOW for A-E projects. For Revit-specific requirements, refer to SAM AMB 2018-04 Advanced Modeling Bulletin - Revit Templates.

For in-house projects, Revit project models are established by the BIM manager using the latest version of the localized USACE Revit templates.

Delivered Revit models must be detached from central with all worksets discarded. Thus, designers are strongly discouraged from using worksets for visibility purposes, design options, and other uses since these are lost once the worksets are discarded. Designers are encouraged to only use worksharing worksets for their intended purpose which is the management of worksharing.

Revit files and referenced links shall make use of relative paths with the supporting folder structure organized such that moving/copying of the files/folders to a different hosted location does not break the links. Absolute paths stored as relative paths are not acceptable. In general, when the saved path contains a drive letter or server name, it usually means that Revit was not able to resolve the path to a true relative path. “..\MEP\ModelName.rvt” is a relative path, but “C:\MEP\ModelName.rvt” and “\\ServerName\Share\ModelName.rvt” are not.

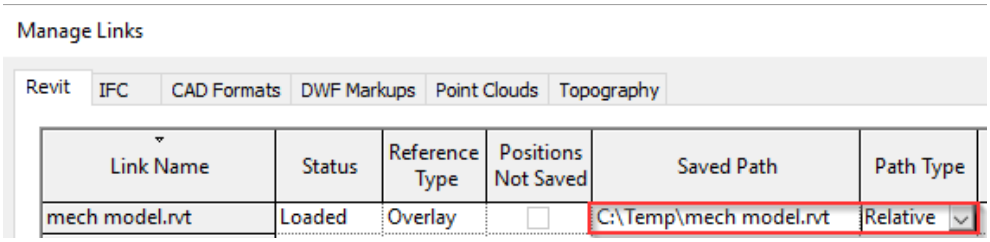


Figure 29-1

Example of an Absolute path stored as Relative path in Revit. This is NOT acceptable as it is not a true relative path because the host file and the link do not share a relative path.

29.7 DESIGN COORDINATION

Each design team member shall coordinate with the team and the team lead to ensure that each Advanced Modeling submittal package is complete and accurate for their area of responsibility.

29.7.1 ADVANCED MODELING PACKAGE ASSEMBLAGE

For design projects where Revit is used for the development of the majority of the drawing sheets, the drawing index shall be created in Revit with drawing sheet placeholders created for sheets outside of Revit. For all other projects where Revit is use, it is encouraged but not required to use Revit drawing index. For projects where Revit is not utilized, the drawing index shall be created in the applicable CAD platform.

Below is the standard sequence for a typical design package. Group number and publish order are sheet parameters used within Revit to properly order the index of sheets.

Discipline	Group Number (Revit Only)	Publish Order (Revit Only)
Cover Sheet	0	00
General - Index of Drawings, Site Location, Haul Routes, etc.	1	10
Hazardous Materials	2	20
Survey/Mapping	3	30
Geotechnical	4	40
Civil	5	50
Landscape	6	60
Structural	7	70
Architectural	8	80
Interiors	9	90
Equipment (deleted in AEC CAD Standard R6)	11	110
Fire Protection	12	120

Fire Protection – Civil/Site (FC)	12	121
Fire Protection – Life Safety (FL)	12	122
Fire Protection – Fire Suppression (FX)	12	123
Fire Protection – Fire Alarm (FA)	12	124
Plumbing	13	130
Process	14	140
Mechanical	15	150
Electrical	16	160
Electrical Legend	16	160
Electrical Exterior	16	161
Electrical Lighting Interior	16	162
Electrical Power	16	163
Electrical Grounding	16	164
Electrical Cathodic Protection	16	168
Telecommunications	17	170
Telecommunications Legend	17	170
Telecommunications Exterior	17	171
Telecommunications Interior	17	172
Resource	17	170
Other Disciplines	18	180
Contractor/Shop Drawings	19	190
Operations	20	200

Note: For designs with Sensitive Compartmented Information Facility (SCIF) areas, a consolidated set of drawings demonstrating SCIF requirements for each discipline shall be provided similar to that shown above for Fire Protection.

29.7.2 DRAWING SIZE, TITLE BLOCKS, BORDERS, AND PROJECT CODE

The current Mobile District standard drawing size is ANSI D (22" x 34"). Any deviation from the standard drawing size requires approval of the Design Branch Chief. For additional information, see SAM AMB 2018-03 Advanced Modeling Bulletin - Graphics Concepts.

29.7.3 DRAWING LAYOUT

Drawings shall be prepared so that they present complete information, void of unnecessary wasted space, duplicate notes, and repetitive details. Only details applicable to the project shall be presented on the drawings. Details of standard products, which are adequately covered in the specifications, should not be included on the drawings. Drawings shall be detailed to the extent that a cost estimate can be accurately prepared and the project can be constructed without additional information. Drawings are required to meet all drafting standards to ensure clarity

and legibility when reduced to half size. Legends, symbols, and lists of abbreviations shall be placed on the drawings for clarification.

29.7.4 TEXT SIZES AND FONTS

Only the standard Arial TrueType font is allowed. Refer to the SAM AMB 2018-03 Advanced Modeling Bulletin - Graphics Concepts for the proper font sizes and usage. No fonts created by third parties, or the designers are permitted.

29.7.5 DRAWING STANDARD LINES STYLES AND WIDTHS

All CAD file graphic lineweights, styles, and colors shall be standardized using the A/E/C CAD Standards. All CAD drawings shall be developed for style-based plotting. Use of color-dependent plotting schemes to control lineweight is not acceptable.

CAD drawings exported from Revit shall conform to the A/E/C CAD Standards to the greatest extent possible, except where required by contract or project requirements.

29.7.6 LOCATION OF PROJECT ELEMENTS

To facilitate the location of project elements and the coordination of the drawings, all plans with column grids shall indicate a column line or planning grid. All floor plans (except structural) shall show room numbers.

Each project utilizing Revit shall have a shared coordinate system named using the project code. Where actual survey information is available, a suitable survey point and a project point shall be established prior to start of Revit design and documented in the Advanced Modeling PxP. Where actual survey information is not yet available, an approximate LAT/LON shall be used.

Revit model elements shall be placed in the positive X and Y coordinates relative to the Revit internal origin.

29.7.7 COMPOSITE AND KEY PLANS

When plans of large buildings or structures must be placed on two or more sheets to maintain proper scale, the total plan shall be placed on one sheet at a smaller scale. Appropriate key plans and match lines shall appear on segmented drawings. Key plans shall be used to relate large-scale plans to total floor plans and individual buildings and complexes of buildings. Key plans shall be placed in a convenient location and shall indicate represented plan area by crosshatching.

29.7.8 FOR INFORMATION ONLY DRAWINGS

When drawings from previous contracts are deemed necessary for information purposes only, the words "FOR INFORMATION ONLY (FIO)" shall be printed in bold letters in the lower right corner of the drawings near the title block or as near thereto

as practical. The original title blocks shall not be changed. The “For Information Only” drawings shall be placed at the end of the drawing assembly. The RTA Report shall include a list of the FIO drawings.

29.8 DRAWING REVISIONS

The design team may be involved in two types of drawing revisions - Amendments during advertisement and Modifications after a contract is awarded. Refer to SAM AMB 2018-02

Advanced Modeling Bulletin - Drawing Revisions for specific drawing revision requirements. All designers are responsible for preparing drawing revisions as specified. It is essential that all revised drawing files be delivered to EN-TS for management and archiving purposes.

29.9 DESIGN FILE MANAGEMENT – IN-HOUSE MILITARY DESIGN

Use of ProjectWise and the Mobile District Military design project folder structure is mandatory.

Refer to SAM AMB 2020-05 Design Files Management – MIL Projects.

29.9.1 DESIGN SET VERSIONING

Versioning of the entire Design Files folder structure is required at each major milestone up through construction contract award. Versioning shall be coordinated and done such that the version record set matches the submitted design submittal and Advanced Modeling submittal.

29.9.2 DESIGN FILE VERSIONING

A post-construction contract award set of design files shall serve as the active set for responding to Requests for Information (RFIs) and for issuance of contract modifications. Versioning of individual files may be done on as-needed basis for historical purposes, or when substantial changes are to be made.

Appendix A
Sample Submittal Report and Design Analysis Template

APPENDIX A1
Sample [10%/35%/65%/95%/100%/RTA] Submittal Report

RTA REPORT – DESIGN SUBMISSION LEVEL
PROJECT TITLE
INSTALLATION, STATE
CADD CODE
SOLICITATION NUMBER (When available)
ADVERTISEMENT DATE (When available)
Date:
Preparer/Phone:

CADD NUMBER	SHT REF.	TITLE OF DRAWINGS
X001E308.DWG	X-001	Index of Drawings
C001E308.DWG	C-001	Location and Vicinity Map
C002E308.DWG	C-002	General Site Plan
C003E308.DWG	C-003	South Site Removal Plan
C004E308.DWG	C-004	North Site Removal Plan
C005E308.DWG	C-005	Overall Site Layout
C006E308.DWG	C-006	Overall Site Quantity/Distance Arcs
C007E308.DWG	C-007	South Site Enlarged Site Plan

SPEC NUMBER	TITLE OF SPECS
04 01 20	REHABILITATION OF REINFORCED AND UNREINFORCED MASONRY WALLS USING FRP COMPOSITE STRUCTURAL REPOINTING
04 01 21	REHABILITATION OF REINFORCED AND UNREINFORCED MASONRY WALLS USING SURFACE APPLIED FRP COMPOSITES
04 01 40	RESTORATION AND CLEANING OF MASONRY IN HISTORIC STRUCTURES
04 20 00.00 40	MASONRY UNIT
04 20 00	MASONRY

SPECIFICATION APPENDICES

APPENDIX A	GEOTECHNICAL INVESTIGATION

DESIGN ANALYSIS	TITLE
MB06E308FVII-1.doc	Architectural

APPENDIX A2
Sample Design Analysis Template

Chapter IX-1-Heating, Ventilation and Air Conditioning
(Level of Design) Design Submittal
Official Job Title
Installation, State

1. DESIGN REFERENCES.
    a. Publisher, Title, date.
    b. Publisher, Title, date as required.

2. TITLE.
(a) Text or Subtitle as required.
    (1) Text or Subtitle as required.

3. TITLE. (If you have only one paragraph associated with a section, do not suspend the text below.)

4. SPECIFICATIONS.
    a. UFGS Section 03 30 04 CONCRETE FOR MINOR STRUCTURES.

5. CALCULATIONS. (As applicable. May add a note directing to applicable appendices. Example, “See Appendix X”

Appendix B
Sample Logs of Boring and Test Data

Appendix B
Sample Logs of Boring and Test Data

APPENDIX 'A' - LOGS OF BORINGS AND TEST DATA

GENERAL NOTES:

1. GROUNDWATER DEPTHS OR ELEVATIONS SHOWN ON THE BORING LOGS REPRESENT GROUNDWATER ENCOUNTERED ON THE DATES SHOWN. ABSENCE OF GROUNDWATER DATA ON CERTAIN BORINGS IMPLIES THAT NO DATA IS AVAILABLE, BUT DOES NOT NECESSARILY MEAN THAT GROUNDWATER WILL NOT BE ENCOUNTERED AT THE LOCATIONS. GROUNDWATER ELEVATIONS VARY AND SEEPAGE ABOVE THE DEPTHS OR ELEVATIONS SHOWN CAN BE EXPECTED AT ANY TIME.

2. WHILE THE BORINGS ARE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT THEIR RESPECTIVE LOCATIONS AND FOR THEIR RESPECTIVE VERTICAL REACHES, LOCAL MINOR VARIATIONS IN CHARACTERISTICS OF THE SUBSURFACE MATERIALS ARE ANTICIPATED AND, IF ENCOUNTERED, SUCH VARIATIONS WILL NOT BE CONSIDERED AS DIFFERING MATERIALLY FROM THE DESCRIPTION SHOWN WITH THE LOGS OR PROFILES.

3. SOILS ARE CLASSIFIED IN ACCORDANCE WITH THE UNIFIED SOIL CLASSIFICATION SYSTEM, ASTM-D-2487, CLASSIFICATION OF SOILS FOR ENGINEERING PURPOSES.

4. DRIVING RESISTANCES (BLOW COUNTS OR N VALUES) ARE DETERMINED WITH A STANDARD SPLIT SPOON SAMPLER (1-3/8" I.D.) AND A 140-LB DRIVING HAMMER WITH A 30" DROP UNLESS OTHERWISE NOTED ON THE BORING LOGS. N VALUES SHOWN NUMERICALLY ON THE LOGS ARE THE SUM OF BLOWS FOR THE LOWER TWO OF THREE 0.5-FOOT DRIVES THAT MAKE UP THE 1.5-FOOT STANDARD PENETRATION TEST, EXCEPT WHEN REFUSAL OCCURS. REFUSAL OF THE SPLITSPOON IS DEFINED AS 50 BLOWS IN LESS THAN A 0.5-FOOT DRIVE. REFUSAL IS SHOWN ON THE LOGS AS INDICATED IN THE FOLLOWING EXAMPLES:

50/0.3' - INDICATES 50 BLOWS (REFUSAL) AFTER 0.3' PENETRATION IN THE FIRST DRIVE.

20, 50/0.2' - INDICATES 20 BLOWS IN THE FIRST DRIVE AND REFUSAL AFTER 0.2' PENETRATION IN THE SECOND DRIVE.

20, 85/0.8' - INDICATES 20 BLOWS IN THE FIRST DRIVE, 35 BLOWS IN THE SECOND DRIVE AND REFUSAL (50 BLOWS) AFTER 0.3' PENETRATION IN THE THIRD DRIVE.

5. "MAX SIZE" OF GRAVEL OR ROCK FRAGMENTS SHOWN ON THE BORING LOGS REPRESENTS THE MAXIMUM SIZE OF MATERIAL RECOVERED IN THE DRIVE SAMPLER AND/OR CORE BARREL OR OBSERVED FROM AUGERING UNLESS OTHERWISE NOTED. NOTE THAT THE MAXIMUM LOGGED SIZE OF GRAVEL OR ROCK FRAGMENTS IS LIKELY TO BE SMALLER THAN THE MAXIMUM SIZE OF THE IN-PLACE MATERIAL, ESPECIALLY WHEN THE MAXIMUM LOGGED SIZE IS MORE THAN APPROXIMATELY ONE-HALF THE DIAMETER OF THE DRIVE SAMPLER OR CORE BARREL, OR MORE THAN ONE-THIRD THE DIAMETER OF THE AUGER.

6. CLASSIFICATIONS SHOWN IN COLUMN D OF THE BORING LOG FORM ARE THE DRILLING INSPECTOR'S FIELD VISUAL CLASSIFICATION OF SAMPLES UNLESS OTHERWISE INDICATED ON THE LOG. WHEN AVAILABLE, LABORATORY CLASSIFICATIONS OF SAMPLES ARE SHOWN IN COLUMN G (REMARKS COLUMN) UNLESS OTHERWISE INDICATED.

Appendix B
Sample Logs of Boring and Test Data (Cont)

Exhibit 9-1
Boring Log - Soil Classification Legend

COARSE-GRAINED SOILS - MORE THAN HALF OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE

GW		WELL GRADED GRAVELS OR GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
GP		POORLY GRADED GRAVELS OR GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
GM		SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES
GC		CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES
SW		WELL GRADED SANDS OR GRAVELLY SANDS, LITTLE OR NO FINES
SP		POORLY GRADED SANDS OR GRAVELLY SANDS, LITTLE OR NO FINES
SM		SILTY SANDS, SAND-SILT MIXTURES
SM-H		SAME AS ABOVE WITH HIGH LIQUID LIMIT
SC		CLAYEY SANDS, SAND-CLAY MIXTURES
SC-H		SAME AS ABOVE WITH HIGH LIQUID LIMIT

NOTE: DUAL CLASSIFICATIONS, E.G. SP-SM, GP-GM, ML-CL AND SM-SC, ARE SHOWN BY PLACING BOTH SYMBOLS SIDE BY SIDE.

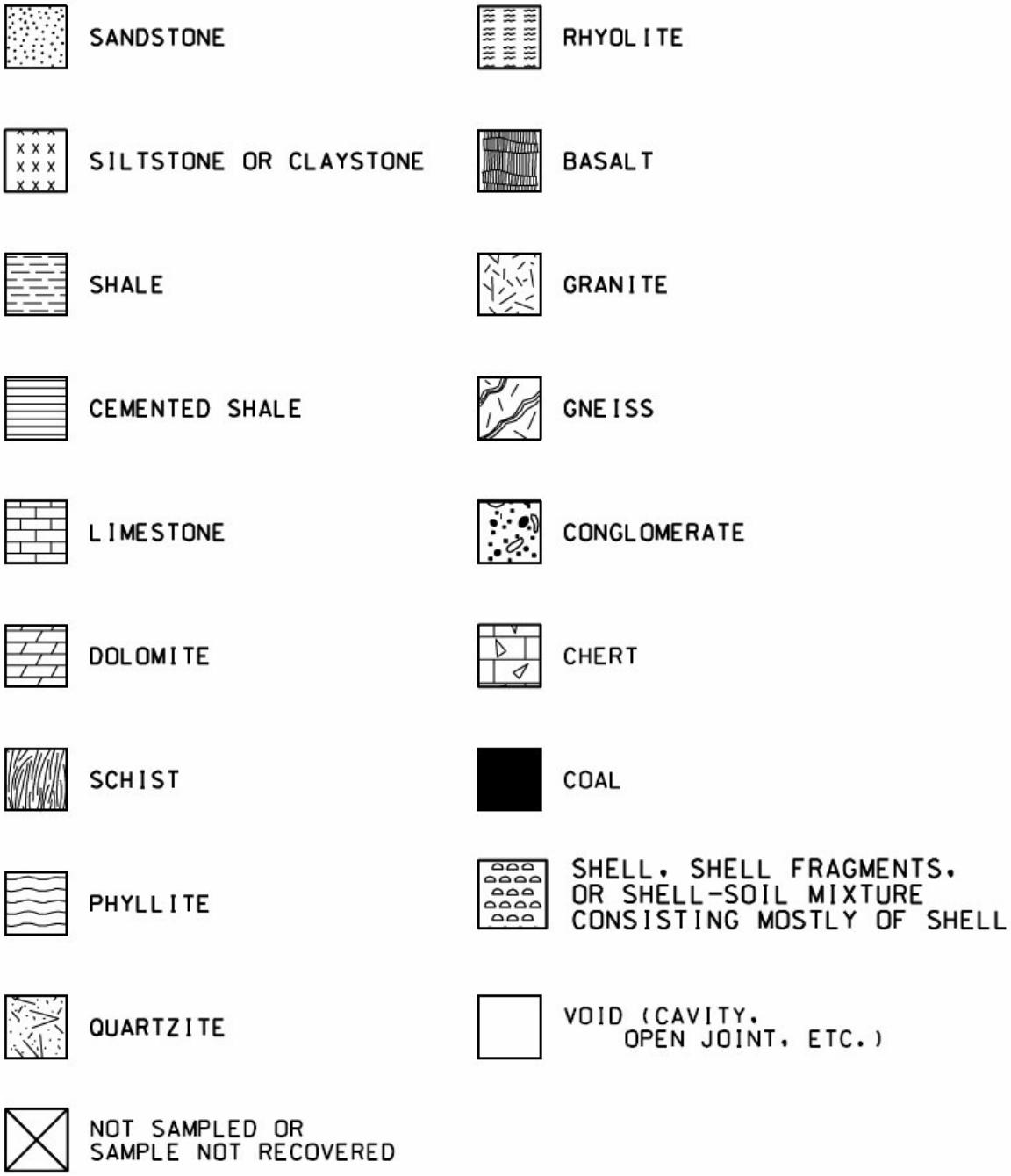
FINE-GRAINED SOILS - MORE THAN HALF OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE

ML		INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SANDY SILTS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
MH		INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SANDS OR SILTY SOIL, PLASTIC SILTS
OL		ORGANIC SILTS AND ORGANIC SILT-CLAYS OF LOW PLASTICITY
OH		ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
CL		INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
CH		INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
PT		PEAT AND OTHER HIGHLY ORGANIC SOILS
		BITUMEN, ASPHALT, OR ASPHALTIC CONCRETE
		CONCRETE

Appendix B
Sample Logs of Boring and Test Data (Cont)

Exhibit 9-2

Sample
Boring Log - Rock Classification Legend



Appendix B
Sample Logs of Boring and Test Data (Cont)

Exhibit 9-4

ABBREVIATIONS

@	AT
ACCUM	ACCUMULATED
ALT	ALTERNATING
ANG	ANGULAR
APPROX.	APPROXIMATE (LY)
ARGIL	ARGILLACEOUS
AUG	AUGER
AVG	AVERAGE
B.A.	BASE OF ALLUVIUM
B.I.	BREAKAGE INTERVAL
B.O.H.	BOTTOM OF HOLE
BBL	BARREL
BDD	BED (ED) (DING)
BDR	BEDROCK
BENT.	BENTONITIC
BGE	BEIGE
BKY	BLOCKY
BL	BLACK (ISH)
BLD	BOULDER
BR	BROWN (ISH)
BREC.	BRECCIATED
BRK	BROKEN. BREAKAGE
C.D.	CORRECTED DEPTH
CAL	CALCITE. CALCAREOUS
CARB	CARBONACEOUS
CAV	CAVITY
CBL	COBBLE
CEM	CEMENT
CHT	CHERT
CIRCLE.	CIRCULATION
CLY	CLAYEY
CMT'D	CEMENTED
CNTR (S)	CONCENTRATION (S)
COMP	COMPACT
CONC	CONCRETE
CONCR	CONCRETIONS
CONGL	CONGLOMERATE
CONT.	CONTINUED
CR'D	CRUSHED
CRM	CRUMBLY
CSE	COARSE
CTD	COATED
D.	DENSE
d.	DEPTH
D.A.	DRILL ACTION
D.T.	DRILL TIME
D.W.L.	DRILL WATER LOSS
D.W.R.	DRILL WATER RETURN
DECOM	DECOMPOSED
DIAG	DIAGONAL
DIS.	DISSEMINATED
DK	DARK
DOL.	DOLOMITE. DOLOMITIC
DRL	DRILLING
DSTG	DISINTEGRATE (D)
EL	ELEVATION
ENC	ENCOUNTERED
EST	ESTIMATE (D)
EXCL	EXCLUDING
EXTR	EXTREMELY
F.	FINE (LY)
F.R.	FLUID RETURN
F/T	FISHTAILED
FE	IRON
FERR	FERRUGINOUS
FIS	FISSILE
FLD	FILLED
FM	FORMATION

ABBREVIATIONS

FOLIA.	FOLIATION
FOS	FOSSIL (IFEROUS)
FRAC	FRACTURE
FRAG	FRAGMENT (S)
G.W.	GROUNDWATER
GEN.	GENERALLY
GLAU	GLAUCONITE (ITIC)
GR	GRAY (ISH)
GRA	GRAIN (ED)
GRAD	GRADATIONAL
GRN	GREEN (ISH)
GRT	GROUT
GVL	GRAVEL (LY)
GYP	GYPSUM
H/A	HIGH ANGLE
H/B	HAMMER BREAK
HD	HARD
HI	HIGH (LY)
HLD	HEALED
HMR	HAMMER
HOR	HORIZONTAL
HYD	HYDRAULIC
INCL	INCLUDING (ED)
INDT	INDURATED
INIT	INITIAL (LY)
INTBDD	INTERBED (DED)
INTLAM	INTERLAMINATED
IRR	IRREGULAR (LY)
JT'S	JOINT'S
JTD	JOINTED
L.C.	LOSE CORE
L.D.W.	LOST DRILL WATER
L/A	LOW ANGLE
LAB.	LABOR
LAM	LAMINATED. LAMINA (NAE)
LAY.	LAYER
LEA	LEACHED
LGE	LARGE
LIG	LIGNITIC
LIT	LITTLE
LL	LIQUID LIMIT
LN. (S)	LENSE (S)
LO	LOOSE
LS	LIMESTONE
LT	LIGHT
MAS	MASSIVE
MAX	MAXIMUM
MECH	MECHANICAL
MED	MEDIUM
MIC	MICACEOUS
MIN	MINIMUM
MINR	MINERALIZED (IZATION)
MIX.	MIXTURE
MOD	MODERATE (D)
MOT	MOTTLED (ING)
MST	MOIST
MTL	MATERIAL
MTX	MATRIX
N/A	NOT APPLICABLE
N/E	NOT ENCOUNTERED
N/R	NO RECOVERY
NOD.	NODULE
NUM	NUMEROUS
OB	OVERBURDEN (UNCLASSIFIED)
OBS	OBSERVED
OCC	OCCASIONAL (LY)
OOL	OOLITE. OOLITIC
OP	OPEN (ED)
OR	ORANGE

Exhibit 9-4 (Continued)

ABBREVIATIONS

ORG	ORGANIC
P.S.I.	POUNDS/SQ. IN.
P.T.	PRESSURE TEST
PART.	PARTIALLY
PCS	PIECES
PERTRO	PETROLEUM. PETROLIFEROUS
PHOS	PHOSPHATE (PHOROUS)
PI	PLASTICITY INDEX
PIT	PIT (TED) (TING)
PKT (S)	POCKET (S)
PL	PLASTIC LIMIT
PLA	PLATY
PLAS	PLASTIC
PLN	PLANE
PNK	PINK
PR	POORLY
PRED	PREDOMINATED
PRESS	PRESSURE
PROB	PROBABLE (ABILITY)
PTC	PARTICLES
PTG	PARTING
PUR	PURPLE
QTZ	QUARTZ
QTZE	QUARTZITE
R.Q.D.	ROCK QUALITY DESIGNATION
RBL	RUBBLE
RD	RED (DISH)
REC	RECOVERY
RECEM	RECEMENTED
RND	ROUND (ED)
RTS	ROOTS
S/S	SPLIT
SAP	SAPROLITE
SAT	SATURATED
SCAT.	SCATTEREDLY
SCH (S)	SCHIST (OS)
SD	SAND
SDY	SANDY
SH	SHALE
SI	SILT
SIS	SILTSTONE
SIY	SILTY
SL	SLIGHT (LY)
SLCES	SILICEOUS
SLICK.	SLICKENSIDE
SML	SMALL
SO	SOFT
SOL	SOLUTION (ED) (ING)
SPG	SPECIFIC GRAVITY
SPT	STANDARD PENETRATION TEST
SPT	STANDARD SPLITSPOON
SS	SANDSTONE
ST	STRAIN (ED) (ING)
STF	STIFF
STR	STRUCTURE
STRG	STRINGER
STYL	STYLOLITE (OLITIC)
SUR	SURFACED
T.F.R.	TOP OF FIRM ROCK
T.O.R.	TOP OF ROCK
T.S.R.	TOP OF SOUND ROCK
TEXT.	TEXTURE
THK	THICK
THN	THIN
TI	TIGHT
TN	TAN (NISH)
TR	TRACE
TRP	TRIPOLI

ABBREVIATIONS

UD	UNDISTUBED
UL	UNACCOUNTABLE LOSS
UNACC	UNACCOUNTABLE
UNWEA	UNWEATHERED
V/	VERY
VERT	VERTICAL
VGY	VUGGY
W.C.	WATER CONTENT
W.L.	WATER LEVEL
W/	WITH
W/H	WEIGHT OF HAMMER
W/R	WEIGHT OF ROD
WD	WOOD
WEA	WEATHERED
WG	WEIGH
WHT	WHITE
X-BDD	CROSS-BEDDED
XL	CRYSTAL
XLN	CYRSTALLINE
YEL	YELLOW

Exhibit 6-4 (End)

Appendix B
Sample Logs of Boring and Test Data (Cont)

Exhibit 9-5

Hole No.

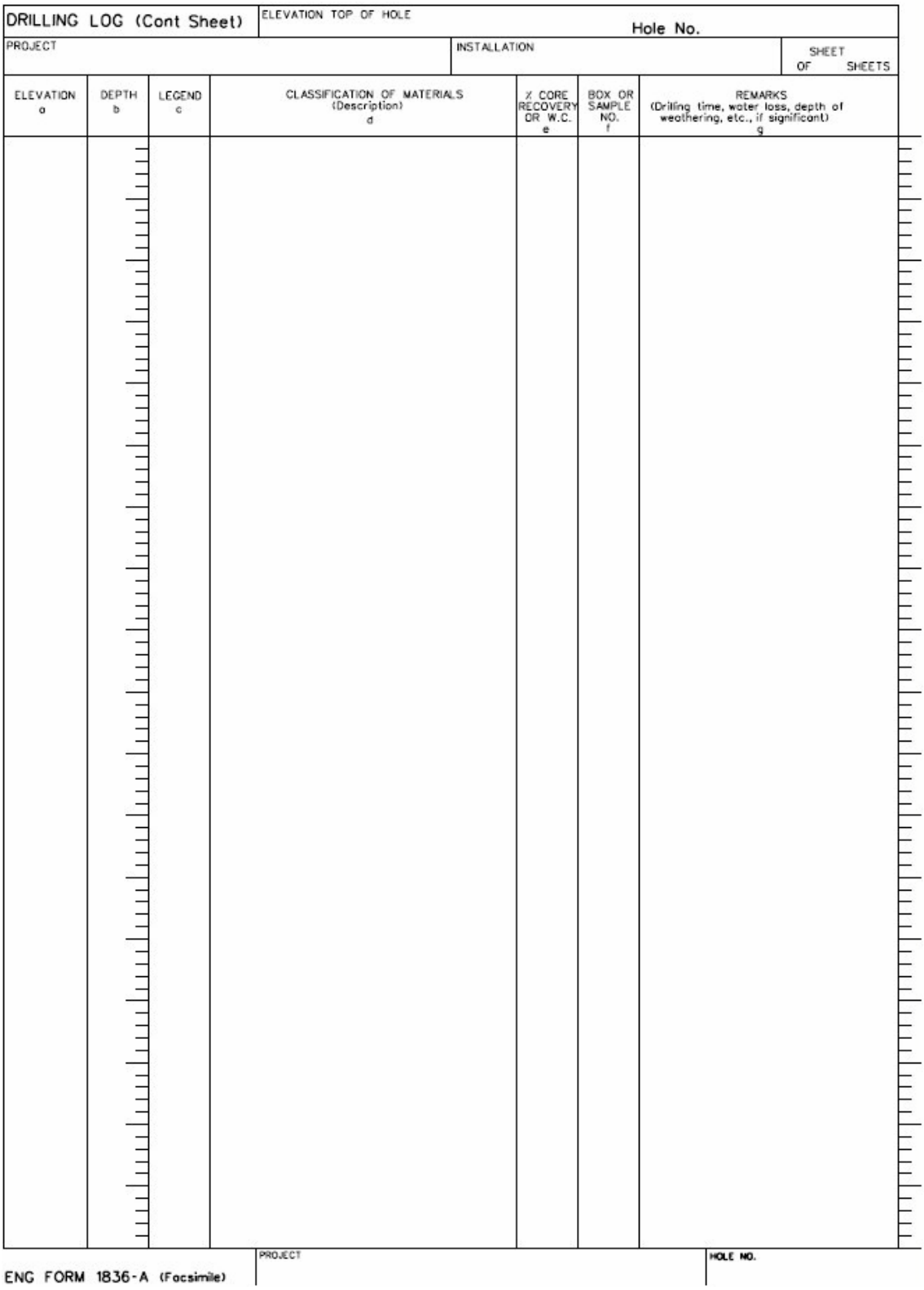
DRILLING LOG	DIVISION	INSTALLATION	SHEET OF SHEETS
1. PROJECT		10. SIZE AND TYPE OF BIT	
2. LOCATION (Coordinates or Station)		11. ELEVATION DATUM	
3. DRILLING AGENCY		12. MANUFACTORER'S DESIGNATION OF DRILL	
4. HOLE NO. (As shown on drawing title and file number)		13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN	DISTURBED / UNDISTURBED
5. NAME OF DRILLER		14. TOTAL NUMBER CORE BOXES	
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED DEG. FROM VERTICAL		15. ELEVATION GROUNDWATER	
7. THICKNESS OF OVERBURDEN		16. DATE HOLE	STARTED / COMPLETED
8. DEPTH DRILLED INTO ROCK		17. ELEVATION TOP OF HOLE	
9. TOTAL DEPTH OF HOLE		18. TOTAL CORE RECOVERY FOR BORING	
		19. SIGNATURE OF INSPECTOR	DRAFTED / CHECKED

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY OR W.C. e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g

ENG FORM 1836 (Facsimile) PROJECT HOLE NO.

Appendix B
Sample Logs of Boring and Test Data (Cont)

Exhibit 9-6



DRILLING LOG (Cont Sheet)

ELEVATION TOP OF HOLE

Hole No.

PROJECT

INSTALLATION

SHEET OF SHEETS

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY OR W.C. e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g

PROJECT

HOLE NO.

ENG FORM 1836-A (Facsimile)

Appendix B
Sample Logs of Boring and Test Data (Cont)

Exhibit 9.7

1. Describe general site access with respect to mobility or drilling or other test equipment. Field sketches of existing utilities, fences, walkways and pavements should be made to compare to the topography map.

2. Generally describe the site topography and note all the topographic features that effect the project.

3. Describe the slope of the ground surface and delineate all drainage channels and any previous cut and fill or erosion.

4. Describe existing structures, pavements, or other obstructions and the procedures for demolition.

5. Fully describe the results of the subsurface investigation and any laboratory testing and its impacts on constructing the project.

6. GENERAL SCOPE:

a. Results of subsurface investigation & testing
b. Recommendations based on (a) above.

7. DETAIL INFORMATION:

a. Description of structure(s)

(1) Written general description
(2) Type of construction contemplated.
(3) Size and Height
(4) Finished Floor elevation; Elevation of existing ground
(5) Type of Foundation recommended
(6) Approximate load (s)
(7) Special Features affecting Foundation Design
(a) Water table, or history of dewatering or seepage problems
(b) Condition or history of nearby buildings
(c) Analyze whether dewatering would cause settlement of adjacent structures
(d) Location of fills or dump areas near site, which may jeopardize foundation
(e) Existing buried Utilities conflict with new foundations

b. Specific recommendations for foundation design and/or construction based on site features.

(1) Topography
(2) Surface Water
(3) Groundwater
(4) Subsurface soil conditions
(5) Availability of borrow materials
(6) Location & availability of spoil areas
(7) Permitting actions required.

Exhibit 9-7 (Continued)

c. Results and/or Recommendations for:

(1) Bearing capacity
(2) Piles (Type, length, capacity, type of installations)
(3) Retaining Walls or basement walls
(4) Mat Foundations
(5) Slope Stability
(6) Settlement
(7) Permanent ground water drainage around or under structures
(8) Construction Dewatering
(9) Erosion control during and after construction

d. Revisions, additions, and/or deletions to the standard guide specs resulting from the foundation analysis.

(1) Include a copy of the specification as it is proposed to be used.
(2) Mention the major changes in the write-up and the reason for making them.

e. Design Calculations

(1) Include applicable design calculations on settlement, bearing capacity, seepage, uplift, stability analysis, quantities, shrinkage, dewatering, etc.
(2) Show formulas, assumptions and reference source

f. Site Plan

(1) Show building road locations
(2) Contours
(3) Boring, test pit, infiltrometer locations
(4) Locations of temporary & permanent surface water diversion measures
(5) Location of buried utility line (existing & to be installed)

g. Logs of all boring and test pits in Adobe Acrobat Portable Document Format in file named logs.pdf. Make sure the logs have horizontal control to the nearest foot and vertical control to the nearest tenth of a foot shown for each log.

h. Results of all laboratory test data in Adobe Acrobat Portable Document Format in file named tests.pdf.

i. Results of all boring log and laboratory test data in CSV files as specified.

j. Detailed Dewatering design, if it is to be a major foundation cost.

Exhibit 9-7 (End)

Appendix B
Sample Logs of Boring and Test Data (Cont)

Exhibit 9-8

GENERAL

1. Coordinate index of drawings with the title of each sheet.

2. Coordinate the title of the drawings with the title of the specifications.

3. Coordinate drawings for scale and dimension.

4. Reference related views and details.

5. Orientate all drawings and plan views by north arrow.

6. Clearly define limits of the contractor and owner's responsibility, i.e. Owner furnished - contractor installed equipment or materials, Owner furnished - owner installed equipment or materials, Contractor furnished - Contractor installed equipment or materials.

7. Proofread applicable sections of the specifications after typing.

8. Coordinate technical provisions terminology of the specifications for compatibility against the drawings.

9. Provide written responses to comments on the previous submittal. Check that the accepted comments have been incorporated.

10. Show haul routes, disposal areas, borrow areas, benchmarks, and all general type contractor information.

11. Check that boring logs and test data have been properly included as Adobe Acrobat Portable Document Files logs.pdf and tests.pdf for Appendix 'A' of the specifications. If provided by CESAM-EN-GG, verify that these files have been emailed to the specifications engineer for the project.

TECHNICAL

1. Check if allowable soil or rocks bearing values are shown on structural sheet.

2. Check logs of borings and test result for accuracy with respect to location, elevation, classification, water level, etc.

3. Check that previous accepted comments have been incorporated into drawings and/or specifications.

REQUIRED SUBMITTALS to USACE – Mobile District – EN-GG

1) Drilling and safety program (include environmental aspects if required)
2) Geotechnical Report
3) Boring location plan, drilling logs and laboratory test results in .pdf format
4) Engineering design calculations for inclusion in the Design Analysis

CURRENTLY USACE IS TRANSITIONING FROM gINT SOFTWARE TO A NEW SYSTEM. BORING LOG AND LABORATORY DATA SHOULD BE SUBMITTED IN .PDF FORMAT. THE SUBMITTAL REQUIREMENTS FOR THE FUTURE SYSTEM WILL BE INCLUDED IN THIS CHAPTER WHEN AVAILABLE.

Appendix C
Miscellaneous Samples

Appendix C

Exhibit 23-1 _ Sample Resume of Work

The site of work is in Okaloosa County, Florida, at Eglin Air Force Base, and includes the following principal features and approximate quantities:

Construction of a gymnasium containing approximately 10,000 square feet of floor space, consisting of concrete floor slabs, concrete frame, concrete masonry unit walls, open-web steel joists, steel deck and built-up roofing. Interior work includes plumbing, heating, air conditioning and electrical work. Gymnasium to be furnished with miscellaneous gymnasium equipment.

- Gas line - 500 feet of 1-1/2-inch pipe
- Water line - 400 feet of 3-inch pipe; 3-inch gate valve; connection to existing 10-inch line
- Sanitary water - 285 feet of 6-inch pipe; one manhole
- Sprigging - 1.6 acres
- Landscaping for the gymnasium building
- Exterior electrical work
- Clearing and grubbing, including removal of portable wooden bleachers (16' X 74') - 2.9 acres
- Unclassified excavation - 1,500 cubic yards
- Unclassified borrow - 500 cubic yards
- 1-1/2 inch flexible pavement, including tack and prime coats and 7-1/2 inch stabilized aggregate base course - 700 square feet
- 4-inch concrete sidewalk - 500 square yards
- 6-inch asphalt concrete curb - 50 linear feet
- Precast concrete bumper curbs - 13 each
- 4-inch painted stripes - 150 linear feet
- Storm Drainage System

Exhibit 23-1 (Continued)

6-inch pipe - 72 linear feet

8-inch pipe - 200 linear feet

10-inch pipe - 58 linear feet

The cost of this work is estimated to be between $1,000,000 and $5,000,000. Construction duration for this project is estimated to be 360 days.

Appendix C

Exhibit 23-2 _ Sample List of Drawings

CADD NUMBER	SHT REF.	TITLE OF DRAWINGS
G000EJ39.DWG		COVER SHEET
G001EJ39.DWG	G-001	SHEET INDEX, SCOPE AND LEGEND
G002EJ39.DWG	G-002	LOCATION MAPS AND HAUL ROUTE
G101EJ39.DWG	G-101	LIFE SAFETY PLAN
A110EJ39.DWG	A-110	DEMOLITION FLOOR PLAN
A111EJ39.DWG	A-111	DEMOLITION REFLECTED CEILING PLAN
A112EJ39.DWG	A-112	EXISTING CEILING JOIST AND DRYWALL FURRING FRAMING PLAN
A121EJ39.DWG	A-121	FLOOR PLAN
A122EJ39.DWG	A-122	DIMENSIONED FLOOR PLAN
A151EJ39.DWG	A-151	REFLECTED CEILING PLAN
A152EJ39.DWG	A-152	REFLECTED CEILING PLAN ABOVE A.C.T.
A210EJ39.DWG	A-210	EXTERIOR BUILDING ELEVATIONS
A300EJ39.DWG	A-300	BUILDING SECTIONS
A310EJ39.DWG	A-310	WALL SECTIONS
A320EJ39.DWG	A-320	WALL TYPES LEGEND
A400EJ39.DWG	A-400	ENLARGED PLAN AND CASEWORK ELEVATIONS
A401EJ39.DWG	A-401	INTERIOR ELEVATIONS
A500EJ39.DWG	A-500	DETAILS
A501EJ39.DWG	A-501	DETAILS
A510EJ39.DWG	A-510	CASEWORK AND CROSS BAR LOCK DETAILS
A600EJ39.DWG	A-600	DOOR AND WINDOW SCHEDULE
A601EJ39.DWG	A-601	DOOR AND WINDOW DETAILS
A610EJ39.DWG	A-610	ROOM FINISH SCHEDULE

Appendix C

Exhibit 23-3 _ Sample Bidding Schedule

PROJECT NAME **SOLICITATION NUMBER**
LOCATION **CADD CODE NUMBER**

BIDDING SCHEDULE

BIDDER'S NAME: _____

Item No.	Description	Estimated Quantity	Unit	Unit Price _____	Estimated Amount _____
Base Bid					
1.0	Removals, Clearing and Grubbing	1	Job	XXX	_____
2.0	Site Work	1	Job	XXX	_____
3.0	Security Forces Facility	1	Job	XXX	_____
4.0	Utility Connections for Water Service	1	Job	XXX	_____
			Total Base Bid		_____
Bid Option No. 1					
5.0.	Warehouse Addition	1	Job	XXX	_____
			Total Bid Option No. 1		_____
			Total Base Bid & Bid Option 1		_____

_____ _____
Signature Certification Date of Certification

The Offeror's signature above certifies that his/her firm has included all prices for this Task Order proposal, in order to arrive at an overall proposed price for this Task Order.

NOTES FOR BIDDING SCHEDULE

NOTE NO. 1. To better facilitate the receipt and proposal process, all modifications to proposals are to be submitted on copies of the latest bid schedules as published in the solicitation or the latest amendment thereto. In lieu of indicating additions/deductions to bid items, all bidders should state their revised prices for each item. The company name should be indicated on the face of the bidding schedule to preclude being misplaced.

NOTE NO. 2. Bidders must insert a price on all numbered items of the Bidding Schedule. Failure to do so will disqualify the bid.

NOTE NO. 3. If a modification to a bid is submitted and provides for a lump-sum adjustment to the total estimated cost, the application of the lump-sum adjustment to each unit price and/or lump-sum price, in the bid schedule must be stated or, if it is not stated, the bidder agrees that the lump-sum adjustment shall be applied on a prorata basis to every bid item in the bid schedule.

NOTE NO. 4. CONDITIONS GOVERNING EVALUATION OF BIDS AND AWARD OF CONTRACTS.

The Government intends to award one Task Order. Overall award of the Task Order will be based on the lowest total price of Base Bid and all Options on the Bidding Schedule. Options will be evaluated in accordance with the following clause:

52.217-5 EVALUATION OF OPTIONS (JUL 1990)

Except when it is determined in accordance with FAR 17.206(b) not to be in the Government's best interests, the Government will evaluate offers for award purposes by adding the total price for all options to the total price for the basic requirement. Evaluation of options will not obligate the Government to exercise the option(s).

(End of clause)

The Government may require the delivery of the numbered line items, identified in the schedule as option items, in the quantity and at the price stated in the schedule. Subject to the availability of funds, the Contracting Officer may exercise Bid Option No. 1 by written notice to the Contractor within 120 calendar days of Notice to Proceed.

NOTE NO. 5. All materials, equipment, supplies, and services obtained for use on and/or incorporation into this project are exempt from all host nation taxes, customs, duties, and tariffs. The Contractor warrants his price for this contract does not include any such charges in its proposal. The procedures for obtaining the exemption from host nation taxes, customs, duties and tariffs will be outlined during the pre-construction kick-off meeting. The contractor is responsible for checking with the local authorities to verify the

procedures before incurring in any purchase or acquisition for this project and providing notice to the Contracting Officer's Representative if the local authorities refuse to provide the exemption.

NOTE NO. 6. CHECKLIST FOR THE BIDDING SCHEDULE:

a. Is it completely filled out? Y__ NA__

b. It may not be altered either as to quantities or as to items offered. Y__ NA__

c. There can be no language of limitation either as to quantities or as to items offered. Y__ NA__

d. If you corrected your numbers, have you initialed these corrections? Y__ NA__

e. If the bidding schedule has been changed by Amendment, is the bidding schedule that you are submitting from the most recent amendment? Y__ NA__

f. Do prices for each bid item include all costs, mark-ups and taxes (if any taxes are imposed)? Y__ NA__

g. Is the cost of obtaining your performance bond included in the total bid price specified on the bid schedule? Y__ NA__

h. In preparing your bid, remember the Corps does not make advanced payments on its contracts? Y__ NA__

i. Is the DBA insurance certification filled out and submitted with the Bidding Schedule? Y___ NA____

--END OF SECTION--

Appendix C

Exhibit 23-4 _ Sample Explanation of Bid Items

PROJECT NAME **SOLICITATION NUMBER**
LOCATION **CADD CODE NUMBER**

EXPLANATION OF BID ITEMS

GENERAL:
This section comprises an explanation of the bid items identified in the Bidding Schedule. This section is a general scope of work for the bid items described in the Bidding Schedule and is not intended to be all encompassing in the description. All work specified herein shall be accomplished in accordance with the procedures prescribed in the technical provisions of the specifications and the plans/details as shown on the contract drawings. The contractor shall bid each type of work under the applicable bid item. Measurement for payment will not be made. Payment described for the various bid items will be full compensation for all labor, materials, and equipment required to complete the work. Compensation for any item of work described in the contract but not listed in the bid schedule shall be included in the payment for the item of work to which it is made subsidiary.

BASE BID

Bid Item No. 1: Removals, Clearing and Grubbing
Includes all costs for labor, materials, equipment, etc., and all other items necessary and incidental to the removals, clearing and grubbing for the new Facilities and Infrastructure, in general accordance with the drawings and project specifications. Item includes all debris removal, clearing and grubbing efforts as described herein and indicated on the drawings and any other associated clearing and grubbing work not specifically named but identified on the drawings or specifications.

Bid Item No. 2: Site Work
Includes all costs for labor, materials, equipment, etc., and all other items necessary and incidental to Site Work for the new Facilities and Infrastructure, in general accordance with the drawings and project specifications. Item includes all Mobilization, Earthwork/Fill, Grading, Drainage, and Stabilization
as described herein and indicated on the drawings and any other associated site work not specifically named but identified on the drawings or specifications.

Bid Item No. 3: Security Forces Facility
Includes all costs for labor, materials, equipment, etc., and all other items necessary and incidental to the new Facilities and Infrastructure, in general accordance with the drawings and project specifications. Item includes all building, structural, roofing, infrastructure facilities, building electrical, telecommunications, mechanical, heating, ventilation, air

Exhibit 23-4 (Continued)

conditioning, fire protection and plumbing as described herein and indicated on the drawings and any other associated site improvements not specifically named but identified on the drawings or specifications.

Bid Item No. 4: Water Service Connections

Includes all costs for labor, materials, equipment, etc., and all other items necessary and incidental to the water service connection for the new Facilities and Infrastructure, in general accordance with the drawings and project specifications. The item includes all piping and fittings as described herein and indicated on the drawings and any other associated site improvements not specifically named but identified on the drawings or specifications.

BID OPTION NO. 1

Includes all costs for labor, materials, equipment, etc., and all other items necessary and incidental to the new Facilities and Infrastructure, in general accordance with the drawings and project specifications. Item includes all building, structural, roofing, infrastructure facilities, building electrical, telecommunications, mechanical, heating, ventilation, air conditioning, fire protection and plumbing as described herein and indicated on the drawings and any other associated site improvements not specifically named but identified on the drawings or specifications.

--END OF SECTION--

Appendix C

Exhibit 23-5 _ Sample Table of Contents

PROJECT NAME **SOLICITATION NUMBER**
LOCATION **CADD CODE NUMBER**

TABLE OF CONTENTS

01 45 35	SPECIAL INSPECTIONS
01 50 00	TEMPORARY CONSTRUCTION FACILITIES AND CONTROLS
01 57 19	TEMPORARY ENVIRONMENTAL CONTROLS
01 74 19	CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL
01 78 00	CLOSEOUT SUBMITTALS
01 78 23	OPERATION AND MAINTENANCE DATA
01 91 00.15 10	TOTAL BUILDING COMMISSIONING

DIVISION 02 - EXISTING CONDITIONS

02 41 00	DEMOLITION
02 81 00	TRANSPORTATION AND DISPOSAL OF HAZARDOUS MATERIALS
02 82 00	ASBESTOS REMEDIATION
02 83 00	LEAD REMEDIATION

DIVISION 03 – CONCRETE

03 30 00	CAST-IN-PLACE CONCRETE
03 42 13.00 10	PLANT-PRECAST CONCRETE PRODUCTS FOR BELOW GRADE

DIVISION 04 – MASONRY

04 20 00	UNIT MASONRY

DIVISION 05 – METALS

05 12 00	STRUCTURAL STEEL
05 30 00	STEEL DECKS
05 40 00	COLD-FORMED METAL FRAMING
05 50 13	MISCELLANEOUS METAL FABRICATIONS
05 51 33	METAL LADDERS

DIVISION 06 - WOOD, PLASTICS, AND COMPOSITES

06 10 00	ROUGH CARPENTRY
06 41 16.00 10	PLASTIC-LAMINATE-CLAD ARCHITECTURAL CABINETS
06 61 16	SOLID SURFACING FABRICATIONS

DIVISION 07 - THERMAL AND MOISTURE PROTECTION

07 05 23	PRESSURE TESTING AN AIR BARRIER SYSTEM FOR AIR TIGHTNESS
07 21 13	BOARD AND BLOCK INSULATION
07 21 16	MINERAL FIBER BLANKET INSULATION

07 22 00	ROOF AND DECK INSULATION
07 27 10.00 10	BUILDING AIR BARRIER SYSTEM
07 27 19.01	SELF-ADHERING AIR BARRIERS
07 27 26	FLUID-APPLIED MEMBRANE AIR BARRIERS
07 42 13	METAL WALL PANELS
07 42 63	WALL PANEL ASSEMBLIES
07 42 93	SOFFIT PANELS
07 54 23	THERMOPLASTIC-POLYOLEFIN (TPO) ROOFING
07 60 00	FLASHING AND SHEET METAL
07 61 14.00 20	STEEL STANDING SEAM ROOFING
07 84 00	FIRESTOPPING
07 92 00	JOINT SEALANTS

DIVISION 08 – OPENINGS

08 11 13	STEEL DOORS AND FRAMES
08 11 16	ALUMINUM DOORS AND FRAMES
08 14 00	WOOD DOORS
08 31 00	ACCESS DOORS AND PANELS
08 33 23	OVERHEAD COILING DOORS
08 34 73	SOUND CONTROL DOOR ASSEMBLIES
08 41 13	ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS
08 71 00	DOOR HARDWARE
08 81 00	GLAZING
08 91 00	METAL WALL LOUVERS

DIVISION 09 – FINISHES

09 22 00	SUPPORTS FOR PLASTER AND GYPSUM BOARD
09 29 00	GYPSUM BOARD
09 30 10	CERAMIC, QUARRY, AND GLASS TILING
09 51 00	ACOUSTICAL CEILINGS
09 62 38	STATIC-CONTROL FLOORING
09 65 00	RESILIENT FLOORING
09 67 23.13	STANDARD RESINOUS FLOORING
09 90 00	PAINTS AND COATINGS

DIVISION 10 – SPECIALTIES

10 14 00.10	EXTERIOR SIGNAGE
10 14 00.20	INTERIOR SIGNAGE
10 21 13	TOILET COMPARTMENTS
10 26 00	WALL AND DOOR PROTECTION
10 28 13	TOILET ACCESSORIES
10 44 16	FIRE EXTINGUISHERS

DIVISION 12 – FURNISHINGS

12 24 13	ROLLER WINDOW SHADES
12 48 13	ENTRANCE FLOOR MATS AND FRAMES

DIVISION 13 - SPECIAL CONSTRUCTION

13 48 73	SEISMIC CONTROL FOR MECHANICAL EQUIPMENT

DIVISION 21 - FIRE SUPPRESSION

21 13 13	WET PIPE SPRINKLER SYSTEMS, FIRE PROTECTION

DIVISION 22 – PLUMBING

22 00 00	PLUMBING, GENERAL PURPOSE

DIVISION 23 - HEATING, VENTILATING, AND AIR CONDITIONING (HVAC)

23 05 48.19	SEISMIC BRACING FOR HVAC
23 05 93	TESTING, ADJUSTING, AND BALANCING FOR HVAC
23 07 00	THERMAL INSULATION FOR MECHANICAL SYSTEMS
23 09 00	INSTRUMENTATION AND CONTROL FOR HVAC
23 09 13	INSTRUMENTATION AND CONTROL DEVICES FOR HVAC
23 09 23.02	BACNET DIRECT DIGITAL CONTROL FOR HVAC AND OTHER BUILDING CONTROL SYSTEMS
23 11 20	FACILITY GAS PIPING
23 21 23	HYDRONIC PUMPS
23 23 00	REFRIGERANT PIPING
23 25 00	CHEMICAL TREATMENT OF WATER FOR MECHANICAL SYSTEMS
23 30 00	HVAC AIR DISTRIBUTION
23 52 00	HEATING BOILERS
23 64 10	WATER CHILLERS, VAPOR COMPRESSION TYPE
23 64 26	CHILLED, CHILLED-HOT, AND CONDENSER WATER PIPING SYSTEMS
23 81 00	DECENTRALIZED UNITARY HVAC EQUIPMENT

DIVISION 25 - INTEGRATED AUTOMATION

25 05 11.21	CYBERSECURITY FOR FACILITY-RELATED CONTROL SYSTEMS FIRE AND LIFE SAFETY SYSTEMS
25 05 11.23	CYBERSECURITY FOR FACILITY-RELATED CONTROL SYSTEMS ENERGY MANAGEMENT CONTROL SYSTEM

25 05 11.26	CYBERSECURITY FOR FACILITY-RELATED CONTROL SYSTEMS UTILITY CONTROL SYSTEM
25 10 10	UTILITY MONITORING AND CONTROL SYSTEM (UMCS) FRONT END AND INTEGRATION

DIVISION 26 – ELECTRICAL

26 20 00	INTERIOR DISTRIBUTION SYSTEM
26 27 13.10 30	MULTI-POINT METERING SYSTEM
26 28 01.00 10	COORDINATED POWER SYSTEM PROTECTION
26 29 23	ADJUSTABLE SPEED DRIVE (ASD) SYSTEMS UNDER 600 VOLTS
26 41 00	LIGHTNING PROTECTION SYSTEM
26 51 00	INTERIOR LIGHTING
26 56 00	EXTERIOR LIGHTING

DIVISION 27 – COMMUNICATIONS

27 10 00	BUILDING TELECOMMUNICATIONS CABLING SYSTEM
27 51 16	PUBLIC ADDRESS SYSTEMS

DIVISION 28 - ELECTRONIC SAFETY AND SECURITY

28 31 76	INTERIOR FIRE ALARM AND MASS NOTIFICATION SYSTEM, ADDRESSABLE

DIVISION 31 – EARTHWORK

31 00 00	EARTHWORK
31 31 16.13	CHEMICAL TERMITE CONTROL

DIVISION 32 - EXTERIOR IMPROVEMENTS

32 05 33	LANDSCAPE ESTABLISHMENT
32 11 23	AGGREGATE BASE COURSES
32 12 13	BITUMINOUS TACK AND PRIME COATS
32 12 16.16	ROAD-MIX ASPHALT PAVING
32 13 13.06	PORTLAND CEMENT CONCRETE PAVEMENT FOR ROADS AND SITE FACILITIES
32 16 19	CONCRETE CURBS, GUTTERS AND SIDEWALKS
32 17 23	PAVEMENT MARKINGS
32 31 13	CHAIN LINK FENCES AND GATES
32 92 23	SODDING

DIVISION 33 – UTILITIES

33 11 00	WATER UTILITY DISTRIBUTION PIPING
33 30 00	SANITARY SEWERAGE

Exhibit 23-5 (Continued)

33 40 00	STORM DRAINAGE UTILITIES
33 51 15	NATURAL-GAS / LIQUEFIED PETROLEUM GAS DISTRIBUTION PIPELINES
33 71 02	UNDERGROUND ELECTRICAL DISTRIBUTION
33 82 00	TELECOMMUNICATIONS OUTSIDE PLANT (OSP)

APPENDICES

APPENDIX A	GEOTECHNICAL EXPLORATION LOGS AND SOIL TESTING RESULTS
APPENDIX B	ENVIRONMENTAL ASSESSMENT
APPENDIX C	JUSTIFICATION AND APPROVAL (J&A) FOR SEL EQUIPMENT

--END OF SECTION--

Appendix C

Exhibit 23-6 _ Sample Submittal Register

Submittal Register (SpecsIntact Automated)

SUBMITTAL REGISTER

CONTRACT NO.

TITLE AND LOCATION: REPLACE MILITARY SERVICE STATION, EGLIN AFB, FL

CONTRACTOR

						CONTRACTOR SCHEDULE DATES			CONTRACTOR ACTION			APPROVING AUTHORITY					
ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH #	CLASSIFICATION GOVT OR A/E REVWR	SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	ACTION CODE	DATE OF ACTION	DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR	DATE FWD TO OTHER REVIEWER	DATE RCD FROM OTH REVIEWER	ACTION CODE	DATE OF ACTION	MAILED TO CONTR/ DATE RCD FRM APPR AUTH	REMARKS
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		01 33 00	SD-01 Preconstruction Submittals														
			Submittal register	1.3.1	G CD												
		01 57 20.00 10	SD-01 Preconstruction Submittals														
			Environmental Protection Plan	1.7	G CD												
		03 11 14.00 10	SD-02 Shop Drawings														
			Shop Drawings	1.4													
		03 11 14.00 10	SD-03 Product Data														
			Materials	2.1													
		03 11 14.00 10	SD-04 Samples														
			Sample Panels	1.6	G CD												
		03 11 14.00 10	SD-06 Test Reports														
			Inspection	3.3													
		03 11 14.00 10	SD-06 Test Reports														
			Formwork Not Supporting Weight of Concrete	3.2.1	G CD												

SUBMITTAL FORM, Jan 96 — PREVIOUS EDITION IS OBSOLETE — PAGE 1 OF 1 PAGES

Appendix C

Exhibit 23-7 _ Sample Amendment Report

AMENDMENT REPORT

Report for Amendment 0002:
FY23 Renovate Building 103 (MEF23002)
Eglin AFB, FL
Solicitation No. W9127823R0001
Date for Amendment: 10 May 2023

1. SPECIFICATIONS:

   a. Add Revised Table of Contents. (Deleted Section 27 51 13.00 10)

   b. Add Revised Bid Schedule and Explanations.

   c. Revise specification Section 06 61 16 "Solid Polymer (Solid Surfacing) Fabrications" as follows:

      (1) Revise Paragraph 2.3.4 as follows:

         2.3.4 Window Stools and Stage Edge

            Window stools and stage edge details will be fabricated from ~~3/~~8 ***1/2*** inch thick solid surfacing, solid polymer material. Dimensions, edge shape, and other details will be determined during the design phase of the project.

   d. Revise specification Section 08 33 23 "Overhead Coiling Doors" as follows:

      (1) Revise Paragraph 2.1.13 as follows:

         2.1.13 Finish

            Steel slats and hoods will be hot-dip galvanized G90 in accordance with ASTM A 653/A 653M, and will be treated for paint adhesion and will receive a factory powder coat finish. The ~~paint~~ ***powder coat*** system will withstand a minimum of 1500 hours without blistering, bubbling, or rust. Surfaces other than slats, hood, and faying surfaces will be cleaned and treated to assure maximum paint adherence and will be given a factory dip or spray coat of rust inhibitive metallic oxide or synthetic resin primer. Interior door surface will be painted to match the

Exhibit 23-7 (Continued)

adjacent wall color. The exterior ***and interior*** of the door will be painted to match Devoe "Tortoise Shell" 2M54E (See ICI Dulux Paints for discontinued Devoe formula).

e. Revise specification Section 09 06 90 "Color Schedule" as follows:

(1) Revise Item c. of Paragraph 2.2.1.1 Exterior Trim as follows:

c. Prefinished metal louvers and enclosure gates, trim and copings:

(EM-2) Match Devoe "Tortoise Shell" 2M54E (See ICI Dulux Paints for discontinued Devoe formula.

2. DRAWINGS:

The Following drawings have been revised:

CADD NUMBER	SHT REF.	TITLE OF DRAWINGS
G000EJ39.DWG		COVER SHEET
A112EJ39.DWG	A-112	EXISTING CEILING JOIST AND DRYWALL FURRING FRAMING PLAN
A600EJ39.DWG	A-600	DOOR AND WINDOW SCHEDULE
E301EJ39.DWG	E-301	ELECTRICAL SINGLE LINE

The Following drawings have been added:

CADD NUMBER	SHT REF.	TITLE OF DRAWINGS
P401EJ39.DWG	P-401	PLUMBING DETAILS – SHEET 1 OF 2
P401EJ39.DWG	P-402	PLUMBING DETAILS – SHEET 2 OF 2

--END OF SECTION—

Appendix C

Exhibit 23-8 _ Standard Responses to Contractor Generated RFIs During Advertisement

STANDARD RFI RESPONSES

- The answer can be found in Section #, Paragraph # or Sheet #.
- The answer was issued in Amendment No. XXXX, Section #, Paragraph # or Sheet #.
- Design is correct as shown. Please bid in compliance with information currently provided in the plans and specs. (No amendment will be issued to clarify.)
- The Government will not direct construction/execution approach for this portion of the work. This shall be at the Contractor's discretion.
- The inquiry will be clarified by a future amendment. (CONTRACTORS WILL NOT SEE THIS RESPONSE. INTERNAL USE ONLY.)
    - *If an amendment is necessary due to a bidder RFI, note (evaluate) that "the inquiry will be clarified by a future amendment". The Review Manager will not respond to the contractors until the amendment is completed. After the amendment has been issued, the designer will revisit that RFI and provide a more detailed response such as: "See revised XXXX (indicate either drawing sheet # or Spec Section and Paragraph #) in Amendment No. X (in which amendment was the issue clarified?). Once the Review Manager gets this information, the Review Manager will close the RFI.

b) This inquiry cannot be answered; it lacks clarity, which may provide inaccurate information if the Government attempted to respond to this question as is.

Appendix D
Exhibit 24-1
Sample 01 10 10

SECTION 01 10 10

DESIGN REQUIREMENTS

TABLE OF CONTENTS

CHAPTER/SECTION

1. SCOPE SUMMARY

1.1 The Contractor shall design and construct the FY-XX Research Facility addition to B.321 at Smith AFB, FL to result in a complete and usable facility based on the requirements defined in the RFP criteria documents, including referenced standards and criteria, and criteria design drawings contained and referenced within this solicitation.

1.2 This contract requires to design and construct a new 9,876 gsf 2-story addition and alterations to existing Building B.321. The new addition includes office, storage and classroom/training functions in a controlled access secure environment with secure areas that require specified physical security measures. The addition shall connect to the existing building that is also a controlled access secured facility with physical security measures that operates on a regular and after duty hours basis that will be occupied and shall remain in operational including all building services and security provisions during all phases of construction of the new addition, alterations and related demolition and sitework.

The design-build contractor and designers shall develop construction phasing and work restrictions to maintain safe, uninterrupted and secure operations of the existing occupied building B.321 during all phases of construction of the new addition, interior alterations, sitework, and any related demolition. Provide necessary temporary barriers and construction, safety and controls, lighting, signage, temperature and humidity controls, maintain existing life safety exits, temporary exits, and exit access to the public way. Existing building T.123 will be unoccupied by the start of this contract. Refer to other portions of this RFP for additional and more specific requirements related to phasing, construction work restrictions in this occupied building and security construction requirements.

The addition is planned to support the 321th Squadron mission to develop, test, and fields mission data for the F23 program with personnel currently located at B.321 including a former temporary building (T.123) attached on the south side of the existing building that was converted to real property in 1999. The new addition is located in the approximate location of the existing building T.123 which shall be demolished as part of this project’s scope.

The existing building was originally constructed in 1977 and had several additions and alterations over the years including the most recent addition and alterations on the north side of the building completed in the first quarter of 2018. Copies of the original building construction drawings and relevant alterations and additions are included in the RFP Appendix M for information only.

Specified portions of the new addition and the existing building shall be designed and constructed to meet the physical security criteria as further defined in the RFP documents.

1.3 The new addition when occupied, 50 to 60 full-time civilian and military personnel, will operate during regular duty hours 0600 to 1800 hours, Monday thru Friday, but may also operate during after duty hours and days as required by mission demands.

The new addition will have an entry on the east side of the building that will be utilized as a secondary building entrance for authorized personnel only. All other personnel and visitors shall enter the building at the existing main entry located at the central portion of the east side of the building.

1.4 The scope of alterations to the existing building for this project is primarily for the connection of the new addition to the existing building envelop and related demolition, connection of the addition corridors to the existing building corridors and internal circulation elements, and connections to the existing building support systems that include, but not limited to; classified and unclassified communications and data systems, fire alarm / mass notification system, intrusion detection system (IDS), access control system (ACS), closed circuit television systems (CCTV), HVAC DDC controls, etc.).

1.5 The site work and supporting facilities required include, but not limited to; new site improvements, modification to existing improvements, new and rework of existing utilities, new parking as an expansion to an existing parking lot and reconfiguration of existing parking, landscaping, and related demolition.

1.6 BASE BID AND BID OPTION SCOPE SUMMARY

1.6.1 Base Bid

The Base Bid includes design and construction of all work required for the new addition, alterations to the existing facility, all required site work, landscaping and utility systems, and construction phasing and security requirements as further defined in this RFP. The Base Bid includes demolition of existing building T.123 and site features as shown on the site plans or required for construction of the Base Bid. Refer to Bid Schedule and Explanation of Bid Items for further explanation of Bid Option and Base Bid work and other sections of this RFP specification for more specific requirements.

1.6.2 Exterior Coating System Bid Option

Bid Option includes the design and construction for the necessary preparations and installation of an elastomeric coating system applied to the existing precast double tee wall panels on the east and south sides of the existing building B123 and more specific location information as indicated on the criteria drawings. Refer to Bid Schedule and Explanation of Bid Items for further explanation of this Bid Option.

1.6.3 Access Floor System Bid Option

Bid Option includes the design and construction of access floor system and related electrical power/telecomm/data systems and recessed floor slab for the Office 132 and Shared Office 133 at the first floor. Refer to Bid Schedule and Explanation of Bid Items for further explanation of this Bid Option.

1.6.4 FF&E (CID) Bid Option

Bid Option includes the procurement and installation of the Furniture, Fixtures & Equipment package (FF&E) included in the RFP that is non-MILCON funded work. Refer to Bid Schedule and Explanation of Bid Items for further explanation of this Bid Option and refer to FF&E Package in Appendix C of this RFP.

2. GENERAL CRITERIA AND REQUIREMENTS

2.1 GENERAL

The information provided in this Request for Proposal (RFP) is intended to guide design and construction by establishing conditions and desired character, appearance, and function of the new addition and alterations to existing B.321. Criteria drawings included in this RFP solicitation include site plans, floor plans, exterior elevations, building section, 3D images, interior finish schedule, and furniture plans. The criteria drawings have been coordinated with and approved by the using agency. Minor modifications will be allowed in the criteria drawings consistent with meeting required criteria and functional requirements. Requests for changes to the criteria drawings shall be submitted to the COR in sufficient time for review and comment prior to the 50% submittal.

2.2 ORDER OF PRECEDENCE FOR CRITERIA AND REQUIREMENTS

Where the various elements of the RFP are in conflict, the following priority shall be used to establish precedence, unless specifically noted otherwise:

1. RFP Section 01 10 10 - DESIGN REQUIREMENTS
2. RFP Criteria Drawings
3. RFP Appendices

In the event of conflict between this RFP and listed criteria, the RFP will govern, with the exception of life safety or building code conditions.

In case of a conflict in requirements of this RFP that is not life safety or building code related, the most stringent requirements or most beneficial to the government relative to the intended purpose, scope and use shall govern.

The Design Build Contractor shall bring all such conflicts to the immediate attention of the COR.

2.3 RFP APPENDICES

The following Appendices are included and shall be used in completing the design and construction of the project.

APPENDIX A	RFP CRITERIA DRAWINGS
APPENDIX B	STRUCTURAL INTERIOR DESIGN (SID) PACKAGE
APPENDIX C	FURNITURE, FIXTURES & EQUIPMENT (FF&E) PACKAGE
APPENDIX D	SUB-SURFACE BORING LOGS
APPENDIX E	ENVIRONMENTAL IMPACT ANALYSIS FORM 813
APPENDIX F	IRP SITE OT-35 INFORMATION
APPENDIX G	LBP/ACM SURVEY REPORT

APPENDIX H	ENGINEERING DESIGN MANUAL SMITH AFB, FLORIDA, February 2018
APPENDIX I	SMITH AFB ARCHITECTURAL COMPATIBILITY PLAN – 2012
APPENDIX J	DEPARTMENT OF THE AIR FORCE 69th COMMUNICATIONS SQUADRON SMITH AIR FORCE BASE, FLORIDA 24523, SMITH AFB CABLE INSTALLATION SPECIFICATIONS, PURPOSE: TO PROVIDE TECHNICAL CRITERIA AND INFORMATION FOR THE INSTALLATION OF BASE CABLE INFRASTRUCTURE, 11 AUGUST 2014
APPENDIX K	UTIL DESIGN – CONSTRUCTION STANDARDS, DECEMBER 1, 2008
APPENDIX L	LOCAL UTILITY SERVICES PROVIDER, INC. (LUSP) STANDARD DETAILS AND SPECIFICATIONS - WATER AND SEWER, LATEST EDITION
APPENDIX M	PRELIMINARY FIRE HYDRANT FLOW TEST DATA
APPENDIX N	EXISTING BUILDING DRAWINGS
APPENDIX O	AIR FORCE SUSTAINABILITY REQUIREMENTS SCORE SHEET (UPDATED JAN 2017) FOR HPSB (unedited version For Information Only)

2.4 GENERAL FEDERAL AND DOD CRITERIA

Except as otherwise noted, the project shall be designed and constructed in accordance with applicable criteria, references and publications listed below. The criteria listing below includes partial listings and title reference of criteria publication series (i.e.: TMs, ETLs, UFCs, etc.) and is not all inclusive and is the responsibility of the Contractor and Designers of Record to review all for application to this contract. These criteria documents can be obtained from the following Internet address: http://www.wbdg.org and other publicly accessed internet sources. Use most current version available at time of the solicitation date. It is the responsibility of the Contractor and design A/E to obtain these documents.

a. Mobile District Design Manual, dated March 2007 (DESMAN 2007). Except as noted otherwise, this project shall be designed in accordance with the applicable references and publications listed in the Design Manual. The Design Manual may be found at:
https://www.sam.usace.army.mil/Missions/Military-Missions/Engineering/

b. FAR Case No. 92-54 requires the Solicitation Package for all construction projects to reflect the government's preference for "acquisition of environmentally sound and energy efficient products and services, and an affirmative procurement program favoring items containing the maximum practicable content of recovered materials".

c. Federal Green Construction Guide for Specifiers. This guide can be found at: http://www.wbdg.org/design/greenspec.php

d. HPSB Guiding Principles for Federal Leadership in High Performance and Sustainable Buildings (HPSB Guiding Principles), “High Performance and Sustainable Buildings Guidance” (Updated December 2008)

e. Guiding Principles for Sustainable Federal Buildings and Associated Instructions (February 2016)

f. Determining Compliance with the Guiding Principles for Sustainable Federal Buildings (February 2016)

g. E.O.13423 Strengthening Federal Environmental, Energy & Transportation Management (Jan 2007)

h. E.O.13514 Federal Leadership in Environmental, Energy and Economic Performance (Oct 2009)

i. EPAct2005 - Energy Policy Act of 2005

j. EISA 2007 - Energy Independence Security Act of 2007

k. International Building Code (IBC) 2015

l. National Fire Protection Association (NFPA) Codes and Standards

m. Technical Manuals (TMs)

n. MIL-HDBK-1190, applicable Engineering Technical Letters (ETLs) and Construction Technical Letters (CTLs)

o. TI-800-01 Technical Instruction - Design Criteria

r. UFC 4-010-05, Sensitive Compartmented Information Facilities Planning, Design, and Construction.
http://www.wbdg.org/FFC/DOD/UFC/ufc_4_010_05_2013_c1.pdf

s. Technical Specifications for Construction and Management of Sensitive Compartmented Information Facilities (version 1.4), IC Tech Spec-for ICD/ICS 705, dated September 28, 2017.

t. ICD 705 (26 May 2010) Sensitive Compartmented Information Facilities

u. ICS 705-1 (17 September 2010) Physical and Technical Security Standards for Sensitive Compartmented Information Facilities

v. ICS 705-2 (17 September 2010) Standards for the Accreditation and Reciprocal Use of Sensitive Compartmented Information

w. DoDM 5205.07 Volume 3, DoD Special Access Program (SAP) Security Manual: Physical Security; http://www.dtic.mil/whs/directives/corres/pub1.html

x. DoDM 5105.21-Volume 1, Sensitive Compartmented Information (SCI) Administrative Security Manual: Administration of Information and Information Systems Security; http://www.dtic.mil/whs/directives/corres/pub1.html

y. DoDM 5105.21-Volume 2, Sensitive Compartmented Information (SCI) Administrative Security Manual: Administration of Physical Security, Visitor Control, and Technical Security;
http://www.dtic.mil/whs/directives/corres/pub1.html

z. Americans with Disabilities Act and Architectural Barriers Act Accessibility Guidelines (ADAABA)

aa. Unified Facilities Criteria (UFCs) (this is not a complete UFC list):

Core UFC are criteria that provide requirements for the majority of traditional building systems that are prevalent on DoD facility construction projects. Core UFC also identify additional criteria such as, but not limited to; Antiterrorism, High Performance and Sustainable Building requirements mandated by law and policy. Comply with the Core UFC listed here, and other UFC identified in this RFP as they are applicable or referenced.

UFC 1-200-01, DoD Building Code (General Building Requirements)
UFC 1-200-02, High Performance and Sustainable Building Requirements
UFC 3-101-01, Architecture
UFC 3-110-03, Roofing
UFC 3-120-10, Interior Design
UFC 3-201-01, Civil Engineering
UFC 3-201-02, Landscape Architecture
UFC 3-210-10, Low Impact Development
UFC 3-220-01, Geotechnical Engineering
UFC 3-230-01, Water Storage, Distribution, and Transmission
UFC 3-230-03, Water Treatment
UFC 3-240-01, Wastewater Collection
UFC 3-301-01, Structural Engineering
UFC 3-310-04, Seismic Design for Buildings
UFC 3-401-01, Mechanical Engineering
UFC 3-410-01, Heating, Ventilating, and Air Conditioning Systems
UFC 3-420-01, Plumbing Systems
UFC 3-501-01, Electrical Engineering
UFC 3-520-01, Interior Electrical Systems
UFC 3-530-01, Interior and Exterior Lighting Systems and Controls
UFC 3-550-01, Exterior Electrical Power Distribution
UFC 3-560-01, Electrical Safety, O&M
UFC 3-580-01, Telecommunications Building Cabling Systems Planning and Design
UFC 3-600-01, Fire Protection Engineering for Facilities
UFC 4-010-01, DoD Minimum Antiterrorism Standards for Buildings
UFC 4-010-02, DoD Minimum Antiterrorism Standoff Distances for Buildings (FOUO)
UFC 4-010-05, Sensitive Compartmented Information Facilities Planning, Design, and Construction
UFC 4-010-06 CYBERSECURITY OF FACILITY-RELATED CONTROL SYSTEMS
UFC 4-021-01, Design and O&M: Mass Notification Systems

2.4.1 INSTALLATION (SMITH AFB) and AIR FORCE CRITERIA

The design criteria contained within this Request for Proposal including this Specification Section 01 10 10 and additional project requirements provided in the RFP as appendices is intended to guide the completion of the design and construction by establishing the desired character, appearance, and function of the new construction as well as capture and identify additional requirements. The requirements of the following references are included as design criteria and will be used in completing the design of the project (use most current version available at time of contract award, unless specifically noted).

a. ENGINEERING DESIGN MANUAL SMITH AFB, FLORIDA, February 2018

b. SMITH AFB ARCHITECTURAL COMPATIBILITY PLAN – 2012

c. DEPARTMENT OF THE AIR FORCE 69th COMMUNICATIONS SQUADRON SMITH AIR FORCE BASE, FLORIDA 24523, SMITH AFB CABLE INSTALLATION SPECIFICATIONS, PURPOSE: TO PROVIDE TECHNICAL CRITERIA AND INFORMATION FOR THE INSTALLATION OF BASE CABLE INFRASTRUCTURE, 11 AUGUST 2014

d. UTIL DESIGN – CONSTRUCTION STANDARDS, DECEMBER 1, 2008

e. Local Utility Service Providers, Inc. (LUSP) Standard Details Water and Sewer

f. AFH 32-1084 Facility Requirements.

g. AF Instructions (AFIs) (not a complete list):

32-1023 Design and Construction Standards and Exec. Of Facility Construction Projects
32-1024 Standard Facility Requirements
32-1063 Electrical Power Systems
32-1064 Electrical Safe Practices
32-1065 Grounding Systems
32-1066 Backflow Prevention Program
32-1067 Water and Fuel Systems
32-1068 Heating Systems and Unfired Pressure Vessels

h. AF Engineering Technical Letters (AF-ETLs).

i. AFCEC A-GRAM 17-01 Change to AF New Construction and Major Renovation Certification Requirements, February 2017.

j. Air Force Sustainable Design & Development (SDD) Implementation Guidance, memorandum dated 2 June 2011.

k. Air Force Systems Security Instruction 7700 - Communications and Information - Emission Security

l. Air Force Systems Security Instruction 7702 - Communications and Information - Emission Security

m. Air Force Systems Security Instruction 7703 - Communications and Information - Communications Security: Protected Distribution Systems (PDS)

2.5 DESIGN AFTER AWARD

2.5.1 The Contractor shall prepare complete construction documents for all work designed as required by the RFP. The construction documents to be prepared include, but are not limited to construction drawings,

specifications, design submittals, design analysis basis of design documentation, sustainability documentation, and other documentation as required in SECTION 01 10 12 DESIGN AFTER AWARD. The project shall be designed and constructed in accordance with the criteria and requirements contained in the RFP using industry standard materials and efficient practices. The building design and the materials selected shall be high quality, durable and easily maintained. The Contractor shall be responsible for the professional quality, code compliance, technical accuracy and coordination of all designs, drawings, specifications and other documents or publications upon which the design and construction are based. The design and construction of this facility shall conform to the drawings, specifications and requirements issued in this solicitation. In case of a conflict in design requirements, the most stringent requirements or beneficial to the government relative to the intended purpose, scope and use shall govern.

2.5.2 Unified Facility Guide Specifications (UFGS) are referenced in various sections in this section. The referenced specifications shall be edited by the Contractor and provided with design submittals at the various design stages required in Section 01 10 12 to include the necessary information to enable the Contractor to complete the work and to enable the government to determine compliance with the RFP requirements. The referenced specifications are anticipated requirements, but based on the final design specifications may need to be deleted and/or added by the Contractor as necessary for work required in the final design and to enable the government to determine compliance with the RFP requirements. AE shall prepare specifications in UFGS format, using Specsintact software, for specific products or systems in which UFGS specifications are not available.

2.5.3 Operations and maintenance (O&M) requirements included in the original unedited UFGS specifications may be edited by the respective Designers of Record in the design phase for the specific scope of this project. O&M requirements and submittals in the original UFGS specification shall not be edited out or deleted for the convenience of the Contractor. Submittals, operating procedures, schematics, as-built drawings, manuals, software, and computer hardware required in the UFGS for system operation incorporated in the design phase are critical to operation and maintenance of the new facility on completion.

2.5.4 The intent of this RFP is to describe the requirements for appearance, function, and equipment, materials, and types of construction in sufficient detail to enable design and engineering to be completed by the Contractor.

2.5.5 All design and construction document drawings and specifications shall be prepared to comply with the RFP. The RFP describes the design work that shall not be changed, and shall be included in the construction documents. All remaining design work shall be performed by the Contractor based on the design criteria as required by the RFP. No deviations from the criteria will be allowed unless prior approval is obtained from the COR. All questions or problems encountered by the Contractor in the following criteria shall be promptly submitted with recommendations to the Contracting Officer's Representative (COR) for approval.

2.5.1.1 Section 01 10 10 - DESIGN REQUIREMENTS defines the design and performance requirements. Applicable building codes and standards shall be

used as the minimum criteria to develop the construction documents for areas of work not specifically defined. All design and bid item pricing shall incorporate requirements listed in Appendices in addition to specific requirements listed within the specifications.

2.5.1.2 Section 01 10 12 - DESIGN AFTER AWARD defines the format and submittal requirements in which the Contractor and designers of record shall prepare the design and the construction documents.

2.5.6 Construction documents shall be sufficient to afford a clear understanding of the construction work required and to demonstrate compliance with the RFP. The work shall be organized in a manner that will assure thorough coordination between the various details on the drawings, between the drawings and the specifications, and between the design and engineering disciplines. The Contractor shall perform design quality control reviews to cross-check all work until all conflicts have been reconciled. The US Army Corps of Engineers Mobile District Design Manual, current edition, available on the Internet at https://www.sam.usace.army.mil/Missions/Military-Missions/Engineering/ and shall be used as the basis for format, content, and preparation of construction documents and used in conjunction with Section 01 10 12.

2.6 DESIGN PROFESSIONAL QUALIFICATIONS AND LICENSURE

The Contractor's Designers of Record shall develop construction documents and technical specifications for all areas of work. The design of landscape, architectural, interior, structural, mechanical, fire protection, electrical, environmental, civil, and other engineering features of the work shall be accomplished, reviewed, and approved by architects, interior designers, and professional engineers that have active license and are registered to practice in their respective professional fields in a State or possession of the United States, in Puerto Rico, or in the District of Columbia.

2.7 DEFINITIONS OF TERMS

The following frequently used terms are defined hereinafter to establish a common understanding when the term is used in this solicitation.

2.9.1 Net Area (occupiable area): The gross square feet less building infrastructure and support members such as exterior walls, electrical and communications spaces, mechanical spaces, fixed corridors, restrooms, stairwells, janitor closets, vestibules, etc. Covered walks, enclosed walkways, terraces, balconies, and patios shall not be counted as net area. Net area is the physical space, which is available for use by the occupant to support the occupant's mission.

2.9.2 Gross Area: All floor area measured from the outer surface of the exterior wall to the outer surface of the exterior wall. Covered (but not enclosed) entrances and walks shall be counted as one-half of the total square feet. Uncovered walks and entrances shall not be counted.

2.9.3 GFGI: Government Furnished and Government Installed

2.9.4 GFCI: Government Furnished and Contractor Installed

3. PROJECT REQUIREMENTS

The following provides a summary of the requirements. Refer to other portions of 01 10 10 and criteria drawings for additional and more specific information and requirements.

3.1 BUILDING ADDITION

3.1.1 General New Addition Scope

The new building addition shall be 9,876 gsf, 2-stories, constructed on the south side of the existing B.321 with corridor connection to the existing building corridors on the first and second floors and with physical separation provided with doors. Demolition to portions of the existing building exterior walls will be required to provide the connection to the existing building circulation corridors and building utility systems. Refer to criteria drawings for conceptional building and site layout.

The first floor elevation shall match the existing building finish floor elevation. The second floor elevation is anticipated to be higher than the existing second floor elevation to provide sufficient clearance above the first floor ceiling for HVAC systems, electrical and telecomm/data systems and raceways, and other building utility systems so a stair and a wheelchair lift is required to transition from the new building addition elevation to the existing building elevation and meet ADAAG accessibility requirements.

The building addition roof elevation is anticipated to be higher than the existing building roof so alterations to the existing roofing system near the building addition is required.

The building addition shall provide exterior wall and roof cladding systems to match the shapes, profiles, and textures of the existing building in a manner as indicated on the criteria drawings.

The building addition construction shall be a Construction Type IIB as defined by the International Building Code 2015 to match the existing building construction type.

3.2 ALTERATIONS

3.2.1 General Alterations Scope

The alterations scope and related repairs as needed to accommodate the connection of the new building addition to the existing building envelop, connection of the new building addition corridors to the existing building corridors, and connections to the existing building support systems including, but not limited to; classified and unclassified communications and data systems, fire alarm / mass notification system, intrusion detection

system (IDS), access control system (ACS), closed circuit television systems (CCTV), HVAC DDC controls, lightning protection system, etc.

The connection of the new addition corridors and building support systems to the existing building at each floor level will require saw-cutting, core drilling and/or demolition of existing precast double tee exterior walls panels and related interior alterations to support this work. Connections to building support systems will involve the installation of system components and pathways above and below areas and corridors with existing suspended acoustical ceiling systems (ACT) and areas or rooms without ceilings.

In all cases, alterations work shall result in a finished condition to match the existing construction materials and performance, quality, color and texture to provide a uniform appearance matching the existing construction to remain and result in an equal or better condition than before the work started.

The existing building will be occupied during the entire contract duration, so the work will need to be planned and coordinated to minimize disruption to the occupants and operations.

Refer to other portions of this RFP for additional requirements related to the work of this contract including Section 01 14 00 WORK RESTRICTIONS that apply to working in and around the occupied building.

3.2.2 Existing Building Information

The southeast area of the existing building which is where the new building addition will be located was originally constructed in 1977 and is a steel framed structure with precast concrete double tee walls panels and light gage framing back-up on the interior side, elevated floor constructed with steel bar joist and concrete slab on metal deck, and a roof system of steel trusses and steel beams, metal deck and a low slope multi-ply built-up asphalt roofing system with gravel ballast in flood coat. The roof slope is provided by the structure, approx. 1/4 inch per foot slope, that slopes towards the exterior walls to exposed scuppers and downspouts. The roofing system was reroofed and appears to be about 15 years old.

Interior for this area of the building is predominately office type functions, but also includes building equipment rooms. Corridor walls are mostly finished with painted gypsum wallboard, carpet flooring and suspended acoustical ceiling tile systems.

Copies of available construction drawings (some as-builts) for the original building construction in 1977 and for subsequent alterations and additions that occurred over the years are included in the RFP Appendix N for information only.

The Contractor is responsible for verifying existing conditions before the start of design and construction activities and report any significant issues that will affect the intended work as defined in this RFP.

1977 Armament Systems Integration Development Facility (original building)
1982 Modifications of Mezzanine (as-builts) –
1984 Modifications of Mezzanine

1989 2529 Relocatable Building at Building 123 (T.123 addition to be demolished by this contract)
1989 2578 Renovate Building 123 (as-builts)
1992 Alter Building 123 (as-builts)
2007 F99 Add/Alter 53rd Joint Reprogramming Facility (as-builts)
2015 Additions to Building 123 (as-builts)

3.4 Demolition Scope

3.4.1 General

The demolition work required by this contract includes the following, but not limited to;

Complete demolition of existing building T.123 including narrow connection corridor to the primary building B.321 and related site improvements and utilities as indicated on the RFP criteria drawings. Existing building T.123 will be unoccupied by the start of this contract.

Portions of existing exterior wall precast double tee panels for new doorways and routing of building support systems for connection to the existing building systems,

Portion of the existing roofing system, flashings, copings, and related drains, scuppers and downspouts as needed to accommodate the new building addition.

Interior demolition and replacement or removal, salvage, storage, and re-installation of existing construction and finishes as required to install new building support systems. In all cases, alterations work shall result in a finished condition to match the existing construction materials and performance, quality, color and texture to provide a uniform appearance matching the existing construction to remain and result in an equal or better condition than before the work started.

Refer to other portions of this RFP for additional requirements related to the demolition work of this contract.

3.4.2 Government Salvaged Equipment and Items

The following existing items will be salvaged from building T.123 by the Government (321 EWS) before the demolition begins and will store and reinstall some of these items in the new addition after construction is complete.

a. Furniture, chairs, storage cabinets, and other loose office furniture and equipment (unless noted otherwise)
b. Refrigerators
c. Popcorn machine
d. Pool table
e. Foosball table
f. Dart boards
g. Trophy case
h. Wood bar (salvaged, but not installed in new addition)
i. Exterior wood deck (salvaged, but not installed in new addition)

3.4.3 Contractor Salvaged Equipment and Items for Reuse

None identified.

3.4.4 Asbestos/Lead Survey and Report

An asbestos and lead survey has been performed in the areas of the existing building anticipated to be affected by the work of this contract and a report is included in RFP Appendix G for information. The Contractor shall take all necessary safety and protection measures required by local, state and federal laws to protect building occupants and workers from exposure to the materials identified in the report. If the work requires removal or impacts the identified materials the Contractor shall handle, remove and/or dispose of such material in a manner required by local, state and federal laws. The Contractor shall notify the COR prior to impacting or disturbing any suspected materials or work in areas that were not surveyed as indicated in the report.

The survey report indicates no asbestos presence was detected. However, the report identified lead-based paint (LBP) having 1.0 mg/cm2 or greater exists in several sample areas tested within the project limits. A copy of the report is included as part of Appendix G.

Refer to other portions of this RFP for identification, protection, containment, handling, and disposal of hazardous materials.

3.5 Sitework Scope

3.5.1 General

Sitework required includes, but not limited to;

Demolition of a portion of building 123 defined as T.123 located on the south side of the building and related site improvements,

Pavements that include sidewalks, service drive, pavement striping related to the expansion of existing parking area on south side of Johnson Road, new accessible parking spaces and curb ramps in the existing east parking lot,

Grading, drainage, and new and modifications to existing stormwater management facilities,

Utility work that includes demolition and new utilities that include; potable water, fire water, sanitary sewer, gas, and power. Coordinate installation, inspections and approvals with privatized utility authorities for power (UTIL) and water and sewer (LUSP).

Landscaping with irrigation system connected to the existing irrigation well system.

Refer to other portions of this RFP for additional requirements related to the work of this contract.

3.5.2 Maintain Existing Site and Building Access and Operations to B.321, B.737 and B.738 During Construction

Emergency Access - Maintain emergency vehicle and personnel access to the buildings, fire hydrants, PIV valves, fire department connection valves (Siamese) and within the project site limits as needed.

Building B.321 – maintain access for personnel and vehicles to doors, equipment and service drives on the south and east sides of the building.

Buildings B.737 & B.738 - maintain personnel and vehicular access to doors and equipment on the north, east and west sides of these buildings during the work for the parking lot expansion and restriping of the existing parking lot. Maintain usage access and usage of the existing parking lot and access drives.

3.5.3 Maintain Access to Existing Parking, Roadways and Service Drives

Construction activities shall not limit access to or prevent full usage to existing parking areas, roadways and service drives to and around B.321.

The expansion of the existing parking area on the south side of Johnson Road adjacent to B.737 and B.738 shall be performed in a manner to minimize loss of use of the existing parking lot and maintain access for personnel, maintenance and delivery during regular duty hours. The restriping of the existing parking lot shall be performed after regular duty hours or on weekends.

3.5.4 Site Environmental Conditions

AF Form 813 - Final design and construction to follow relative requirements, actions, restrictions and notifications identified in 18.0 REMARKS portion of AF Form 813 REQUEST FOR ENVIRONMENTAL IMPACT ANALYSIS included in RFP Appendix F.

IRP Site OT-35 - West of the project site is an Installation Restoration Program (IRP) Site OT-35 and is an active remediation site. There is a plume of xylenes in groundwater at OT-35 that exceeds regulatory limits and extends within 250 feet of the project site. If contaminated soils or groundwater are encountered in the proposed site area, the Contractor shall be responsible for all permits, testing, reporting, disposal and documentation to comply with local, state and federal discharge requirements. See RFP Appendix F for figure showing location of OT-35 and contaminants.

Contractor is responsible for compliance with the GENERIC PERMIT FOR DISCHARGES FROM PETROLEUM CONTAMINATED SITES 62-621.300(1), Effective Date: February 14, 2000.

Refer to RFP Section 01 10 10-17 for additional information and requirements.

3.6 Staging Area.

The construction routes and Contractor staging areas are depicted on the criteria drawings.

3.6.1 Project Site Access.

Access to the site is depicted on the criteria drawings.

3.7 Borrow and Spoil Areas.

Borrow material is not available. Spoil materials to be disposed off site and off the Installation (Base) in a legal and regulated manner.

3.8 GOVERNMENT FURNISHED GOVERNMENT INSTALLED EQUIPMENT (GFGI)

3.8.1 The following GFGI designed systems and equipment will be installed in the last 90 days of the construction phase, refer to Joint Occupancy requirements defined in this RFP.

Contractor to coordinate the power and rough-in requirements with the COTR for the GFGI systems during the design and construction phases.

Contractor shall provide blocking in walls and support above ceilings to support the above GFGI systems. Contractor to coordinate with the COTR and Users to determine the specific blocking installation locations and configurations.

a. IDS System complete - Control panel(s), devices & cabling. Design-build contract provides and installs power and pathways.

   Contractor to provide power and rough-in boxes and pathways for the GFGI designed and installed IDS system installation. Contractor to coordinate the power and rough-in requirements with the COTR for the GFGI IDS system during the design and construction phases.

b. Access Control System complete (ACS) – Control panel(s), scramble keypad/prox-card reader, & control wiring.

   Contractor to provide power and rough-in boxes and pathways for GFGI designed and installed automated access control system (ACS). Contractor to provide electric door lock or electric strike hardware with low voltage transformers, wiring and other necessary components for all doors with ACS as identified on the criteria drawings to provide a fully operation access controlled door.

   Contractor to provide spin dial locks on designated security area entry doors, meeting FF-L-2890B (Type II or IV as required by application) with an integral combination lock meeting FF-L-2740A. FF-L-2890B Type II and IV locks have an electronic release capability for use with automated building access control systems (ACS) keypad/card reader, coordinate the spin dial lock system and operation with the GFGI ACS

system and provide all necessary interface elements, signal wiring and power systems to provide a fully functioning and operating access control lock system.

Contractor to coordinate the power and rough-in requirements with the COTR for the GFGI ACS system during the design and construction phases.

c. Closed Circuit Television (CCTV) – Head end equipment, recording equipment, display monitors, cameras w/ mounting brackets and wiring.

Contractor to provide power, rough-in boxes and pathways for a GFGI designed and installed closed circuit television system (CCTV). Contractor to coordinate the power and rough-in requirements with the COTR for the GFGI CCTV system during the design and construction phases.

d. A/V Equipment - Rack equipment, video displays and mounting bracket, projectors and mounting bracket, VTC equipment, cabling and outlets, hardware and software. Design-build contract provides and installs power and pathways to support the GFGI AV system.

Refer to GFGI AV SYSTEMS AND COORDINATION in this RFP section for additional coordination requirements.

3.8.2 The following GFGI equipment will be installed by the Government after construction is complete.

a. Typical office equipment including; desktop computers, thin-client, monitors, laptop computers, copiers, printers, and other items not included in the FF&E package to be provided by this contract.

b. Existing equipment salvaged by Government from T.123 and installed in the new Breakroom area; refrigerators, pool table, foosball table, popcorn machine, and dart boards.

3.9 GOVERNMENT FURNISHED CONTRACTOR INSTALLED EQUIPMENT (GFCI)

3.9.1 Communications Equipment Racks and Cabinets in Secure Comm Rooms 131A and 205.

a. Contractor to install Government furnished racks with cabinets for the Contractor furnished and installed patch panels required by this RFP.

b. Contractor shall coordinate the delivery of the Government furnished racks and cabinets for installation.

3.10 FURNITURE, FIXTURES & EQUIPMENT (FF&E)

The RFP Appendix includes a completely developed and designed FF&E package for the design-build Contractor to bid, procure and install (refer to RFP Appendix C). The FF&E package is non-MILCON funded and is identified as a Bid Option for funding and award purposes. The criteria floor plans include

furniture layouts as a means to explain the room function. Refer to Section 9 INTERIOR DESIGN of this specification and the FF&E Package included in the RFP Appendix for additional requirements and more detailed information. Refer to RFP Section 01 10 10 DESIGN AFTER AWARD for additional requirements with regards to the Contactor responsibilities for FF&E design after award.

Contractor proposed changes to the criteria floor plans that affect the FF&E furniture package and layout shall be identified to the Government during the design phase for approval.

3.10 GFGI AV SYSTEMS AND COORDINATION

Government Furnished and Government Installed (GFGI) AV Systems includes, but not limited to; VTC and sVTC systems, rack mounted equipment, large wall mounted video displays and mounting brackets, and related wiring and outlets.

AV system design and equipment information will be developed by the Government and provided to Contractor for coordination with building design and construction documents for related supporting elements.

Contractor shall provide blocking in walls and support above ceilings for all AV video displays. Contractor to coordinate with the COTR and Users to determine the specific installation locations, power and rough-in requirements, blocking requirements, and configurations for the GFGI AV equipment.

AV System components will also be installed in furniture specified in the FF&E Package of this RFP. The Contractor shall review the GFGI AV Systems design package being prepared by the Government to coordinate the power, pathways, blocking, and wiring requirements with the contract design and construction.

3.11 SUSTAINABLE DESIGN AND FEDERAL MANDATES

Various federal and Air Force mandates for reduction in energy and water usage and sustainable design are required to be applied to the new addition and sitework. The applicable portions of this criteria shall be applied to the alterations portions of the work, but limited to the required work elements. Refer to Section 18 SUSTAINABLE DESIGN AND ENERGY USE REDUCTION of this specification for additional requirements and related compliance documentation.

3.12 ACCESSIBILITY

This new building addition will have both civilian and military occupants and visitors, so the entire new addition with connections to the existing building and sitework improvements are to be designed and constructed to meet accessibility standards and criteria.

3.13 APPLICATION OF UFC 3-600-01 FOR ELECTRONIC EQUIPMENT INSTALLATIONS

Secure Comm Rooms 131A and 205 in the new addition are classified as an Electronic Equipment Installation as defined by this UFC and shall meet specific requirements of Chapter 4-11 of UFC 3-600-01.

3.14 APPLICATION OF ETL 1-18 FIRE PROTECTION ENGINEERING CRITERIA – ELECTRONIC EQUIPMENT INSTALLATIONS

The functions and equipment rooms included in this new addition are not classified as "mission essential" or "mission support" therefore the requirements of this ETL does not apply to the new addition.

3.15 WORK RESTRICTIONS AND TEMPORARY CONTROLS

3.15.1 Maintain existing building operations, life safety, and access to building.

Provide necessary temporary barriers and construction, safety and controls, lighting, signage, temperature and humidity controls; maintain existing life safety exits, exit access and pathways and access to exits to the public way; provide temporary exits and exit access; provide temporary weather protection of existing envelop when effected by work of this contract; provide temporary security measures when the existing security perimeter is affected by the work of this contract.

Refer to Section 01 14 00 WORK RESTRICTIONS for additional and more specific requirements.

3.16 MAINTAIN OPERATIONS OF EXISTING OCCUPIED FACILITY AND CONTROLLED ACCESS SECURE AREA ACCREDITATIONS

The existing building is a controlled access facility with several separate controlled access areas within the building and also has mission critical functions that shall remain operational 24/7, 365 days a year. The alterations work of this contract will require access into the various controlled access areas and will have work restrictions to maintain the required security protocols and maintain existing physical security elements at all times.

The design and construction documents shall be developed and construction work performed to prevent disruption and interruption to the existing operations and security accreditations that includes, but not limited to; supporting utilities, security systems (IDS, ACS, CCTV); site and building access by occupants, visitors, delivery and maintenance personnel and their vehicles; and unrestricted occupant access within the existing building with all work accomplished in a manner to allow facility to operate continuously throughout the duration of this design-build contract. Refer to other sections of this RFP for additional phasing and work restrictions.

The construction of the new addition and site work shall be accomplished in a manner that does not interrupt the 24/7 365-day operation of the existing facility and maintains current security accreditations until the entire existing building and new addition is completed. The new addition requires

utility, security and life safety systems that will tie into the existing systems as well as a physical connection to existing facility with doorways on each floor that requires careful planning and construction measures to maintain the existing physical security and 24/7 365-day operation capabilities of the existing facility. Temporary construction and utilities, temporary services and systems to support existing secure areas security systems, phasing and strategic work sequencing, and other measures shall be provided as determined by the Contractor and approved by the COTR and Security Officer to accomplish this requirement.

The Contractor shall develop a Contractor Construction Security Plan (CCSP) that defines how the existing secure areas will maintain operation during all phases of construction and submit to COTR for review by the User's Site Security Manager (SSM) and approval of Contractor's proposed approach and execution of the work. A Construction Security Plan (CCSP) shall be prepared and submitted for review at each design submittal following submittal requirements of Section 01 10 12 and updated during the construction phase as a construction submittal for approval as required by Section 01 00 00. The design and construction documents shall include sufficient detail and information to support the construction security plan to explain how the Contractor will maintain uninterrupted operations of existing building, including current Secure Area accreditations.

3.17 SECURE AREA ACCREDITATION FOR NEW ADDITION

The new addition will have separate accredited Secure Areas that include a Government performed accreditation process that starts during the design phase, continues during construction, and will be completed at some point after construction is complete. A successful accreditation will enable the Government to move equipment into and occupy the Secure Area(s) to perform their duties in an access controlled environment constructed to meet the required physical security measures.

The accreditation will be performed by the Air Force and Accrediting Officials (AO) using the process outlined in ICD 705 (26 May 2010), ICS 705-1 (17 Sept 2010), ICS 705-2 (17 Sept 2010), and Technical Specifications For Construction And Management Of Sensitive Compartmented Information Facilities, Version 1.4 IC Tech Spec-for ICD/ICS 705 (September 28, 2017), and conditions further defined by the Site Security Officer (SSO) or Site Security Manager (SSM). The new addition will have Secure Areas that are separate from the existing Secure Areas in this building.

The Contractor shall provide necessary information to designated security representative during the design, construction and accreditation process as required as part of the accreditation process. Information provided by the Contractor includes, but not limited to: construction drawings and specifications; phasing plans and construction schedule identifying the durations for use of temporary construction, utilities and security measures; information for inspection and accreditation checklists; construction submittal information (product data, shop drawings, etc.), and other information required by the designated security representative.

The Contractor is responsible for making necessary changes and corrections to the work installed under this contract at no additional cost to the Government for any conditions identified during the accreditation and inspection process to achieve an accredited Secure Area facility that was not in compliance with the specified criteria and criteria defined by the security representative during design and construction. Contractor shall provide access to the building during construction for security inspection purposes. Contractor to coordinate these activities with the designated security inspection representative to provide access to areas before conditions are concealed or covered up not allowing for adequate inspections.

3.18 DESIGN AND CONSTRUCTION SECURITY PROTOCOLS AND PROCEDURES

The Contractor shall design and construct the Secure Areas in the new addition in accordance with the requirements of IC Tech Spec-for ICD/ICS 705 for Fixed Facility SCIF Construction and ICS 705-1 that includes, but not limited to; U.S. Design and Construction companies, design and construction personnel meeting specific citizenship and permanent residence status criteria, handling and protection of design and construction plans and related documents in accordance with the Construction Security Plan (CSP), information security, access control to the construction site in accordance with CSP, unrestricted access to the construction site by security representatives for accreditation inspection of construction and CSP, and other protocols and procedures identified by the security representative.

3.18.1 The following are additional requirements and clarification for this project related to the Secure Area design and construction shall be adhered to for the work of this contract:

a. All cleared and uncleared workers will be vetted though a local file check by the local law enforcement office and the SSM prior to starting work on the project.
b. Barriers shall be installed to segregate construction workers from existing operational activities (secure areas). These barriers will provide protection against unauthorized access and visual observation.
c. Contractor shall secure construction site, including stored materials with a 7-feet high chainlink fence with screen and lockable gate. Gate locked after regular work hours and holidays. Contractor shall secure the building when exterior wall elements installed have ability to be secured (locked).

3.19 PHYSICAL SECURITY DESIGN AND CONSTRUCTION REQUIREMENTS FOR NEW ADDITION SECURE AREAS

3.19.1 New Addition Design and Construction

The new addition will have two (2) individual Secure Areas (one on each floor), with “closed storage” classification as defined by IC Tech Spec-for ICD/ICS 705, and are separate from the existing Secure Areas in this building, but will connect to the existing security systems (IDS, ACS and CCTV) located in the existing building. The Secure Area on the second floor will have a secondary controlled access area within the Secure Area perimeter that is to be constructed to the same criteria to separate the area from the

primary Secure Area and adjacent uncontrolled areas. There are uncontrolled areas and rooms within the new addition that located outside of the Secure Area perimeter. Refer to criteria drawings for Secure Area perimeter boundaries (primary and secondary).

For purpose of this RFP section references to IC Tech Spec-for ICD/ICS 705 and ICD/ICS 705 is synonymous for Technical Specifications for Construction and Management of Sensitive Compartmented Information Facilities (version 1.4), IC Tech Spec-for ICD/ICS 705, dated September 28, 2017.

The Contractor shall design and construct the Secure Areas in the new addition in accordance with the requirements of ICS 705-1 and IC Tech Spec-for ICD/ICS 705 following criteria for Fixed Facility SCIF Construction with "closed storage" classification, other elements required by IC Tech Spec-for ICD/ICS 705 and defined in this RFP. The Secure Areas, including the secondary controlled access area within the second floor Secure Area (Training Room 207), shall be designed and constructed to meet the minimum security requirements identified in the stated criteria as well as the following enhanced security requirements and additional clarification of criteria and requirements identified by the Users and their security representative as follows.

a. Perimeter Wall Construction - Metal Stud Walls (Permanent Drywall Construction); Wall Type A with RF foil shielding, in accordance with ICD/ICS 705 criteria. Walls shall meet acoustic protection requirements defined by ICD/ICS 705 and further defined herein this RFP. RF foil shielding shall be provided in the wall design, between two layers of gypsum wallboard as required by ICD/ICS 705, and be connected to the RF foil shielding required for the floors and ceilings to provide a continuous and uninterrupted shielded envelop.

   A secondary frangible galvanized metal stud framed wall with a gypsum wall board finish will be installed on both sides of the perimeter security wall as a means to allow building system device outlets, boxes, conduits and other types of pathways to be installed in a concealed manner to provide a finished appearance as ICD/ICS 705 does not permit building utilities to be installed inside a designated perimeter security wall (concealed). Secondary frangible walls shall terminate above the false ceiling. All utility distribution (power, signal, etc.) on the controlled side of the perimeter walls shall be surface mounted on the Secure Area perimeter wall or within the frangible wall assembly.

   All secure area perimeter wall surfaces, both sides (including behind frangible walls), shall be taped, finished and painted to provide a uniform appearance for security inspection purposes, including above accessible suspended ceilings and below access flooring.

   Wall perimeter, penetrations and all gaps to be filled and sealed with sealant.

b. Perimeter Wall Construction - Masonry Walls; masonry perimeter walls that also serve as building exterior and interior walls shall have construction equivalent to a Wall Type A to provide the same or better

level of physical security and sound rating (STC). Walls shall meet acoustic protection requirements defined by ICD/ICS 705 and further defined herein this RFP.

RF foil shielding shall be provided in the wall design, between two layers of gypsum wallboard as required by ICD/ICS 705, and be connected to the RF foil shielding required for the floors and ceilings to provide a continuous and uninterrupted shielded envelop.

A secondary frangible galvanized metal stud framed wall with a gypsum wall board finish will be installed on the controlled side (interior) of the masonry perimeter security wall exterior wall assembly as a means to allow building system device outlets, boxes, conduits and other types of pathways to be installed in a concealed manner to provide a finished appearance as ICD/ICS 705 does not permit building utilities to be installed inside a designated perimeter security wall (concealed). Secondary frangible walls shall terminate above the false ceiling. All utility distribution (power, signal, etc.) on the controlled side of the perimeter walls shall be surface mounted on the Secure Area perimeter wall or within the frangible wall assembly.

All secure area masonry perimeter wall surfaces, both sides (including behind frangible walls), shall be finished and painted to provide a uniform appearance for security inspection purposes, including above accessible suspended ceilings and below access flooring.

Wall perimeter, penetrations and all gaps to be filled and sealed with sealant.

c. Perimeter Security Floor and Ceiling Construction - As part of the 6-sided box security approach, floor/ceilings and roof/ceilings that form the perimeter of a Secure Area shall provide a field STC 50 (FSTC 50) minimum required by ICD/ICS 705 to provide acoustic separation between adjacent controlled access Secure Areas and uncontrolled areas. Ceiling surface to be finished and painted to provide a uniform appearance for security inspection purposes.

   Floor and ceiling perimeter, penetrations and all gaps to be filled and sealed with sealant.

   RF foil shielding shall be provided in the floor and ceiling design and be connected to the RF foil shielding required for the walls to provide a continuous and uninterrupted shielded envelop.

   RF foil at the ceiling to be between two layers of gypsum wallboard as required by ICD/ICS 705.

   RF foil at the floor below the access flooring not required to be installed between two layers are gypsum wallboard, but required to have a protection board or light weight concrete or gypsum topping system installed over the RF foil to protect from damage.

d. Sound Attenuation for Secure Area Perimeter (floors, walls, ceilings, doors) – Sound Group 4 (field STC 50 (FSTC 50), minimum). Government accreditation process will perform field testing to verify acoustic

rating is achieved. Contractor to perform preliminary field testing and make necessary improvements to achieve the required minimum FSTC rating.

e. Primary Entry Door Access Control and Locks; Provide spin-dial locks meeting FF-L-2890B (Type II or IV as required by application) with an integral combination lock meeting FF-L-2740A. The FF-L-2890B (Type II and IV) is a pedestrian door preassembled lock with exit functions (Type II lever handle; Type IV PDLAP exit device) with an electronic release capability that is integrated for use with automated building access control systems (ACS) keypad/card reader to meet means of egress and accessibility criteria for exiting with a single releasing operation if the spin-dial lock is locked. Coordinate the spin dial lock system and operation with the GFGI ACS system and provide all necessary interface elements, signal wiring and power systems to provide a fully operational ACS and spin-dial lock assembly. Provide high-security keyway and dead bolts for use in event of an access control system failure.

   All door assemblies that form part of the security perimeter shall be FSTC 50 minimum and have a minimum shielding effectiveness of 40dB at 10KHz –10GHz (which is less than RF foil effectiveness, but approved by Security Official for this application).

f. Emergency and "Exit Only" Doors In Perimeter Walls – emergency exit device, no outside trim, with local alarm (on controlled side of door) and remote alarm in Security Office located near building main entry lobby.

g. Sound Masking - Provide sound masking on the controlled side of all Secure Area perimeter doors and duct penetrations, including Training Room 207 within the second floor Secure Area. Follow specific criteria guidance and requirements of ICD/ICS 705.

h. Intrusion Detection System (IDS) – At unspecified times or events the entire building or new addition secure areas may not occupied therefore an IDS system is required to be provided meeting ICD/ICS 705 requirements. Provide power and rough-in boxes and pathways for the GFGI designed and installed IDS system, components and wiring. Contractor to coordinate the power and rough-in requirements with the COTR for the GFGI IDS system requirements during the design and construction phases.

   Refer to Section 01 10 10-3.8 and 01 10 10-15 ELECTRONIC SYSTEMS of this specification for additional requirements.

i. Penetrations Thru Secure Area Perimeter;
   1. General – keep penetrations to a minimum. Group penetrations to be at or near the secure area entry vestibule.
   2. Ductwork – provide permanently affixed security bars or grilles with inspection ports in ductwork for openings larger than 96 square inches. Acoustical protection to be provided using Z-duct configurations as required by ICD/ICS 705 and shall have white noise generators (sound masking) inside ductwork on the controlled side for additional acoustic countermeasure protection

to provide physical, acoustic and visual security control. Refer to Section 01 10 10-11 HVAC and 01 10 10-15 ELECTRONIC SYSTEMS of this specification for additional requirements.

j. Access Control System (ACS) Secure Area Entry Doors – provide power and rough-in boxes and pathways for GFGI designed and installed automated access control system (ACS); keypad and proximity card reader (KP/CR) for entry doors into Secure Areas (swipe out function is not required).

Contractor to provide spin dial locks on designated secure area entry doors, meeting FF-L-2890B (Type II or IV as required by application) with an integral combination lock meeting FF-L-2740A. FF-L-2890B Type II and IV locks have an electronic release capability for use with automated building access control systems (ACS) keypad/card reader, coordinate the spin dial lock system and operation with the GFGI ACS system and provide all necessary interface elements, signal wiring and power systems to provide a fully functioning and operating access control lock system.

Contractor to coordinate the power and rough-in requirements with the COTR for the GFGI ACS system during the design and construction phases.

Refer to Section 01 10 10-3.8 and 01 10 10-15 ELECTRONIC SYSTEMS of this specification for additional requirements.

k. CCTV System – Provide power and rough-in boxes and conduits for a GFGI designed and installed closed circuit television system (CCTV). Contractor to coordinate the power and rough-in requirements with the COTR for the GFGI CCTV system during the design and construction phases.

GFGI Cameras to be installed to monitor the 1st and 2nd floor unclassified corridors of new addition with homerun to existing Equipment Room 126 on the first floor.

GFGI cameras to be installed to monitor the secure vestibule entry doors. A local feed GFGI video display monitor will be installed on the interior wall of the security vestibules only (homerun to Equipment Room 128 not required). Provide power and rough-in boxes and conduits for GFGI camera at entry doors into each secure area and door to Training Room 207 and for local feed wall mounted video display on the secure side of the door.

Refer to Section 01 10 10-3.8 and 01 10 10-15 ELECTRONIC SYSTEMS of this specification for additional requirements.

l. Rotating Blue Lights – Provide ceiling mounted rotating blue light system throughout the secure areas as a means to alert occupants in Secure Area of the presence of uncleared personnel or visitors. Switching of rotating lights to be within the secure area near the entry door.

Refer to Section 15 ELECTRONIC SYSTEMS of this specification for additional requirements.

m. TEMPEST Countermeasures – TEMPEST countermeasures required as follows:

1. RF Foil Shielding – provide RF foil shielding on the walls, floor and ceiling of each Secure Area. RF foil shielding shall be installed on walls, floors and ceilings to provide a continuous and uninterrupted shielded envelop.

   The RF foil shielding referenced in ICD/ICS 705 Figure 1 Wall A Note 1 states to use foil back gypsum wallboard or layer of approved Ultra Radiant R-Foil. rFoil Ultra NT Radiant Barrier (1800 series, 1800-48-125S solid) is a product manufactured by Covertech Fabricating, Inc.(www.rfoil.com) that is approved by the Security Officer so is the basis of design to provide a minimum shielding effectiveness of 100 MHz – 10GHz at 85 dB (Test Standard IEEE-299/ASTM D4935). This product listed as the basis of design does not limit other products from being considered and will be evaluated to providing the equivalent minimum shielding effectiveness or better.

2. RF Shielded Doors – Door assemblies that form part of the RF shielded perimeter shall have a 40dB at 10KHz–10GHz minimum shielding effectiveness. Door assemblies that form part of the Secure Area perimeter and RF shielded perimeter shall be FSTC 50 assemblies and shall have a 40dB at 10KHz–10GHz minimum shielding effectiveness.

3. Metallic ductwork, Non-pressure Piping, Conduits and Other Metallic penetrations – provide non-conductive sections (dielectric) to prevent the metallic component from carrying audio and radio frequency (RF) emanations. Refer to other Sections of this specification for additional requirements. Waveguides for ductwork, piping or conduits not required as determined by the Security Officer.

4. Metallic Fire Sprinkler, Hydronic Pressure and Refrigerant Piping – provide non-conductive sections (dielectric) to prevent the metallic component from carrying audio and radio frequency (RF) emanations or due to potential problems with pressure testing non-conductive type components, piping can be electrically grounded to prevent emanations. Fire sprinkler piping to be grounded only (dielectric coupling not permitted). Waveguides for piping not required as determined by the Security Officer.

5. Provide electronic isolation for fire alarm and mass notification system speakers, other system components that are transducers.

6. Power and signal metallic wiring and cabling is not required to be filtered as determined by the Security Officer.

4. PERMIT REQUIREMENTS

4.1 PERMITS

The Contractor shall thoroughly investigate the requirements for permitting of air quality, potable water, wastewater, stormwater discharge, NPDES, wetlands, dredge and fill, local construction for disruptions of vehicular traffic and base utility systems, irrigation well construction and consumption use, and other permits during design. The Contractor shall determine permit requirements as part of the design process and shall submit permit draft applications as part of the submittal process. The Contractor shall plan the required permit review times into the construction schedule including a typical 90 day review period. The Contractor shall provide and submit Specification 01 57 19, Temporary Environmental Controls (edited as required and to be provided in the Design Phase of this project) and list all permits that are to be obtained by the Contractor. The permits shall be listed by title, permit number, permitting agency, effective date and expiration date. Refer to Specification 01 00 00, Additional Special Contract Requirements, for additional information. The Contractor shall be responsible for submitting all applications and paying for all associated fees for environmental permits for the project. All permits shall be delivered through the COR to the BCE who will forward them to the appropriate government organizations. All environmental permit applications and construction completion certificates shall be prepared by an engineer registered in the State of Florida. All environmental permit applications and accompanying drawings and calculations shall be furnished using English units. The approved permit application must be provided to the COR prior to starting construction on any of these activities.

4.2 PERMIT COMPLETION

At the Contractor's expense, the Contractor shall complete all necessary work (as-built surveys, bacteriological tests, application forms, etc.) for all certifications of completions for permitted activities. Certifications of completions shall be performed by a Florida License Professional Engineer as required for each permit certification. The Contractor shall complete and submit all construction completion certificates on all permits from local, state and federal agencies within 30 days of completion of the permitted activity. The construction completion certificates shall be provided to the COR. Refer to the latest edition of Smith AFB Design Manual Chapter 1, Section 3.9, Environmental Regulatory Permits for additional information regarding permit responsibilities.

5. ANTI-TERRORISM FORCE PROTECTION REQUIREMENTS

5.1 CODES AND REFERENCES

a. UFC 4-010-01 DoD Minimum Antiterrorism Standards for Buildings (9 February 2012) with Change 1, dated 1 October 2013.

b. UFC 4-010-02 DoD Minimum Standoff Distances for Buildings, (9 February 2012)

c. UFC 4-021-01 Design and O&M: Mass Notification Systems (9 April 2008) with Change 1, dated January 2010.

5.2 BUILDING USE CLASSIFICATION AND LEVEL OF PROTECTION

The existing building included the new addition will have more than people on a regular basis and is classified as "Primary Gathering" requiring a "low" level of protection. Per Table B-1 of UFC 4-010-01, the applicable explosive weight shall be "II". All site and new addition scope elements of this contract to comply with UFC 4-010-01 criteria. The structural design shall incorporate applicable requirements of UFC 4-010-01.

5.3 EXISTING BUILDING

Existing The portion of the existing building constructed in 1977 where the new addition will connect to was not designed or constructed in accordance with UFC 4-010-01 criteria.

5.4 DESIGN AND COMPLIANCE CALCULATIONS

5.4.1 Structural Elements: If the conventional construction parameters set forth in UFC 4-010-01 are not met, then the Contractor must provide calculations showing that the structural systems for both the walls and roof meet UFC 4-010-01 blast loading requirements. The flexural and shear design of the structural elements and their connections shall be based on the requirements as set forth in UFC 4-010-01. Design structural elements and their connections based on their ultimate capacities.

5.4.2 Demonstration that the design of each different size and type of window or door system and their connection to the structure meets the minimum antiterrorism standards contained herein shall be submitted to the government for approval. Demonstration shall be by Design Analysis as described below:

5.4.2.1 Design analysis prepared and signed by a registered professional engineer. The design analysis shall include calculations verifying the structural performance of each window or door system proposed for use, under the given loads. The window components and anchorage devices to the structure, as determined by the design analysis, shall be reflected in the shop drawings.

5.5 Mass Notification System (MNS)

Provide a mass notification system (MNS) for the new addition meeting UFC 4-021-01 Design and O&M: Mass Notification Systems criteria and shall connect to and interface with the existing building MNS. Quantity and location of new local operating consoles (LOC) to support the new addition to be based on existing LOCs not being within the required distance.

6. SITEWORK

6.1 CODES AND REFERENCES:

The engineering design requirements and criteria for the sitework section herein shall be in accordance with the requirements specified within this

section and the criteria documents listed. All criteria documents shall be the current edition, where there is a conflict in criteria, the most stringent shall apply. Many of these criteria may be found on-line at the Army Corp of Engineers (www.usace.armi.mil) or the Whole Building Design Guide (www.wbdg.org).

- Smith Air Force Base Engineering Design Manual, Smith AFB, Florida, February 2018
- Americans with Disabilities Act Accessibility Guidelines (ADAAG), Latest Edition
- Local Utility Service Providers, Inc. Water Details
- Local Utility Service Providers, Inc. Sanitary Sewer Details
- NFPA 24 Standard for the Installation of Private Fire Service Mains and Their Appurtenances, 2016 Edition
- UFC 1-200-01 DoD Building Code (General Building Requirements), June 20, 2016
- UFC 1-200-02 High Performance and Sustainable Building Requirements, with Change 1, December 1, 2016
- UFC 3-210-10 Low Impact Development, with Change 1, February 1, 2016
- UFC 3-201-01 Civil Engineering, with Change 1, March 1, 2017
- UFC 3-220-04FA Backfill for Subsurface Structures, January 16, 2004
- UFC 3-220-05 Dewatering and Groundwater Control, January 16, 2004
- UFC 3-230-01 Water Storage, Distribution, and Transmission, with Change 2, July 1, 2014
- UFC 3-240-01 Wastewater Collection, with Change 1, November 1, 2014
- UFC 3-250-01 Pavement Design for Roads and Parking Areas, November-14, 2016
- UFC 3-250-03 Standard Practice Manual for Flexible Pavements, May 15, 2001
- UFC 3-250-04 Standard Practice for Concrete Pavements, with Change 2, July 29, 2009
- UFC 3-250-08FA Standard Practice for Sealing Joints and Cracks in Rigid and Flexible Pavements, January 16, 2004
- UFC 3-250-11 Soil Stabilization for Pavements, January 16, 2004
- UFC 3-600-01 Fire Protection Engineering for Facilities, with Change 2, 25 March 2018
- UFC 4-010-01 DoD Minimum Antiterrorism Standards for Buildings, with Change 1, October 1, 2013
- UFC 4-610-01 Administrative Facilities, with Change 2, May 21, 2014
- Design Manual, Army Corps of Engineers, Mobile District, March 2007
- PCASE Computerized Pavement Design, Version 2.09
- Section 438 of the Energy Independence and Security Act (EISA) of 2007
- National Pollutant Discharge Elimination System, (NPDES) for Construction Activities
- AASHTO, A policy on Geometric Design of Highways and Streets, Latest Edition
- Manual on Uniform Traffic Control Devices for Streets and Highways (MUTCD), Latest Edition
- Florida Department of Transportation Standard Specifications for Road and Bridge Construction, Latest Edition

6.2 GENERAL CIVIL DESIGN REQUIREMENTS

The sitework design required for this project shall include, but may not necessarily be limited, to the items listed within this section. Additional design requirements parameters are included throughout all RFP concept design documents.

6.3 DEMOLITION, GRUBBING AND REMOVALS

The topographic survey drawing provided in the RFP presents existing topographic conditions and locations of existing structures and utilities. The Contractor may utilize the Government provided survey for information and bidding purposes only. It will be the Contractor’s responsibility to perform an independent topographical survey, refer to Section 6.9.1, Topographic Survey for additional information. The Contractor shall provide layout surveying as necessary to locate the new work items prior to initiating demolition work. Erosion and sediment control Best Management Practices (BMP's) shall be in place and approved by the Contracting Officer's Representative prior to initiating demolition work. The Contractor may utilize the utilities during construction operations as approved by the Contracting Officer's Representative and may incorporate the utilities as part of the final project. Existing utilities that interfere with this project shall be relocated or removed at the Contractor’s expense and shall be approved by the Contracting Officer's Representative. All demolition debris shall be removed from the limits of Smith Air Force Base (AFB) and disposed of in a manner as required by law and Air Force regulations. The Contractor shall be responsible for all disposal permits and regulations requirements.

6.3.1 The Contractor shall clear and grub the area within the limits of construction as necessary to construct project. The Contractor is encouraged to save on-site existing trees to the greatest extent possible.

6.3.2 The clearing and grubbing limits are not shown on the RFP concept drawings. The Contractor shall provide the clearing and grubbing limits for coordination and approval purposes by Contracting Officer’s Representative.

6.3.3 The Contractor shall demolish existing site features, as generally shown on the RFP concept drawings. Pavements, curbs and sidewalks to be demolished shall be saw cut to a clean even edge. The Contractor shall place a silt fence along the perimeter of the demolition area and install additional erosion control measures as applicable.

6.3.4 No phase of demolition shall impede access for emergency response vehicles or personnel to adjacent facilities. The Fire Prevention authority shall be notified prior to any road closure.

6.3.5 Demolition will occur at the existing parking area adjacent to Buildings 637 and 638 to prepare for the realignment of the existing parking lot. Large portions of asphalt will be removed and some replaced as shown on the RFP drawings to prepare for the parking area reconfiguration. The existing pavement markings will be removed and replaced throughout the parking area north of Buildings 637 and 638 and several stalls east of Building 123 as indicated on RFP Criteria Drawings.

6.4 SITE DESIGN AND CONSTRUCTION.

6.4.1 Project Location. The new Research Facility (ARF) Addition shall be located as generally shown on the RFP concept drawings and in accordance to UFC 4-010-01, DOD Minimum Antiterrorism Standards for Buildings, with Change 1, October 1, 2013.

6.4.2 Constraints. The Contractor is required to comply with the concept site layout and requirements provided on the RFP Concept Drawings. The RFP Concept Drawings have been coordinates and approved by the using agency. The goal of the RFP technical documents is to ensure that the adequacy and quality of desired construction meets the project requirements and will provide a completed project that meets the original quality and design intent of the RFP. Bid shall be based on the current version of the RFP Concept Drawings. Any changes from the RFP Concept Drawings, documents, and specifications shall be submitted for review and approval after the contract award and shall be in accordance with the requirements set forth is Section 01 10 12 DESIGN AFTER AWARD. Minor modifications will be allowed in the RFP Concept Drawings consistent with meeting required criteria and functional requirements. Request for changes to the RFP Concept Drawings shall be submitted to the COR in sufficient time for review and comment prior to the 50% submittal.

6.4.3 Special Phasing Requirements and Work Restrictions. The facility that is being expanded is a **24 hour** facility. All service interruptions shall be kept to a minimum. Any service interruptions shall be performed on the non-peak, off-duty hours or weekends hours and coordinated with the contracting officer`s representative. The Contractor shall maintain access to all parking areas, sidewalks, and service drives utilized by Smith AFB traffic and pedestrian users at all times during construction. No phase of demolition/construction shall impede access for emergency response vehicles or personnel to adjacent facilities. The Fire Prevention authority shall be notified prior to any road or parking lot closure.

Contractor shall submit a construction phasing plan for approval by the Contracting Officer's Representative and Base Civil Engineering Department prior to commencing any construction activity for the project.

6.4.3.1 Emergency Vehicle Access. There is an existing emergency vehicle access route located on the southwest side of the proposed structure that runs in the north-south direction which is identified on the RFP concept drawings. The Contractor shall maintain access to the emergency vehicle access route at all times during construction except for limited durations when necessary for specific project construction conditions. Prior to the closure of the emergency/service vehicle access, the Contractor shall notify the Contracting Officer's Representative a minimum of 21 days prior to closure.

6.4.3.2 Pedestrian Access. The requirements for this project includes demolition of a portion of the existing sidewalk located on the east side of the new facility. The Contractor shall install new sidewalks as identified in the RFP Concept Drawings and restore the area back to original condition.

The Contractor shall maintain a pedestrian access to the main entrance and south entry doors of the existing facility (Building 123) at all times, refer the RFP Concept Drawings. The pedestrian access along the east side of the

existing Building 123 facility will be relocated to provide access to the south across Johnson Road to the parking lot including a new mid-block crossing.

The Contractor shall also maintain pedestrian circulation in the parking lots by leaving the pedestrian access open to the public at all times.

6.4.3.3 Vehicular Access. There is an existing parking lot located to the south of the Johnson Road which will be utilized for parking for the new facility addition. Vehicular access to the existing lot will remain and will be accessed from two driveway connections along Johnson Road.

6.4.3.4 Utility Relocations. This project will require improvements to the existing sanitary sewer system. Since this is a **24-hour** facility, the existing sanitary sewer system must remain in operation during construction. Contractor shall develop and submit a maintenance of service plan to the Contracting Officer and Base Civil Engineering Department for approval prior to any demolition and installation of new sanitary sewer piping or connections for required site utilities. All equipment, labor and materials required for the approved maintenance of service plan are considered incidental to the sewer and water work and will not constitute extra payment. Outages for connections to existing buildings shall occur only during weekends. Since this is a 24-hour facility, the existing utilities must remain in operation during construction. Short duration outages will be permitted and must be approved by the Contracting Officer and the Base Civil Engineering Office. No shutdown/outages shall occur during wet weather events. All sanitary sewer and watermain improvements shall comply with Local Utility Service Providers, Inc. (LUSP) requirements. Contractor shall adhere with Chapter 7 – Water, Wastewater and Environmental Protection as specified in Section 7.1 of the Smith AFB, Engineering Design Manual latest edition included in RFP as Appendix H.

6.4.4 Force Protection. The facility in this RFP package is considered a "Primary Gathering Building" which is defined as a structure routinely occupied by 50 or more DOD personnel. All facilities under this contract shall strictly comply with the requirements set forth in UFC 4-010-01, DOD Minimum Antiterrorism Standards for Buildings, with Change 1, October 1, 2013. **Any changes to the building location, as shown on RFP Drawings, the Contractor shall resubmit for approval prior to proceeding with any changes.** Fire Protection access and activities shall not be impeded by Force Protection structures or systems. Refer to Section 5, ANTI-TERRORISM FORCE PROTECTION REQUIREMENTS for additional information.

6.4.5 Contractor Staging and Haul Routes. Contractor Staging Areas and Haul Routes shall be as shown on the drawings provided in the RFP concept drawings. The Base CE office will provide the Contractor an off-site storage area on Base. Location of the off-site storage area will be coordinated after contract has been awarded. Construction sites shall be kept neat and free of trash. Construction sites shall be screened from view by a 6-foot high FE-6 chain link fence with silt-fabric attached or an approved equal. The construction fence shall separate construction traffic from daily personnel traffic. The project (site) limits line shown on the RFP concept drawings does not depict the location of the construction fence. Emergency vehicle access shall be provided through and within the project site at all times.

6.4.6 Contractors Use of Site. The Contractor shall coordinate with Contracting Officer's Representative for laydown area, offices, parking and storage facilities. Any damage to existing improvements adjacent to, on the project site or at the off-site storage location due to construction activity under this contract shall be replaced/repaired at the Contractor's expense. All Contractor POV parking areas shall be coordinated and approved in advance by the Contracting Officer's Representative.

6.4.7 Borrow Areas. All borrow materials are the Contractor's responsibility and shall be obtained from approved private sources located off Government controlled lands.

6.5 NEW SITE DESIGN AND CONSTRUCTION

The RFP concept site plan presents the general geometric layout for the site work. The Contractor shall design the horizontal and vertical control, drainage, sidewalks, landscaping, site grading, privately owned vehicle (POV) parking, emergency vehicle pavement access areas, concrete curbs and gutters, and utilities (including fire hydrants and area lighting) for the FY18 Armament Research Facility Addition.

6.5.1 Pavement Parking Areas. The parking lot addition shall be paved with asphalt pavement as shown on the RFP concept drawings and shall be based on UFC 3-250-01 Pavement Design for Roads and Parking Areas. Both asphalt and concrete pavements shall be designed utilizing the Pavement-Transportation Computer Assisted Structural Engineering Program (PCASE) provided by the US Army Corp of Engineers. The software is available at www.pcase.com. Both asphalt and concrete pavement shall be placed over a minimum of 6-inches thick graded crushed aggregate base course. The minimum asphalt thickness shall be 2-inches, and the minimum thickness for concrete shall be 4-inches for pedestrian sidewalks and 6-inches for all other concrete pavements. All pavements shall be designed for a pavement life of twenty-five (25) years. All concrete pavements shall have a joint layout plan and shall be based on the Army Corp of Engineers, Mobile District Design Manual. All uncontrolled parking shall meet the requirements of UFC 4-010-01, DOD Minimum Antiterrorism Standards for Buildings, with Change 1, October 1, 2013. A net total of 92 vehicle parking stalls shall be provided in the parking lot adjacent to Buildings 637/638. The parking lot for Building 123 shall have four (4) existing stalls removed and two (2) ADAAG accessible parking stalls installed as part of the project. The parking area shall be designed for standard duty pavement.

6.5.1.1 Parking areas shall be provided as generally indicated in the RFP concept drawings. The layout design of parking lots shall conform to UFC 3-201-01, Chapter 2, Site Development. The Contractor shall ensure that the layout for the entire site, parking lots, and access drives shall accommodate emergency and fire fighting vehicles, and are in accordance with NFPA 1 Standard for Fire Code. Special care shall be exercised to minimize traffic congestion in parking areas. The Contractor shall ensure that all radii and widths of parking lots, access drives, and channelized turn lanes shall accommodate emergency and fire fighting vehicles. All signs and pavement markings shall conform to the FDOT Standard Drawings and the current Manual on Uniform Traffic Control Devices for Streets and Highways (MUTCD). New connections to existing asphalt or concrete pavements shall be accomplished

by saw cutting the adjacent existing pavement. Minimum access drive pavement width shall be 24 feet from edge of pavement to edge of pavement, unless noted otherwise. All traffic aisles shall be 24-feet wide within the parking lot, unless noted otherwise on the RFP concept drawings. Traffic flow through the parking lot shall be two way unless shown otherwise. The Contractor shall consider the types of vehicles traversing and parking on these facilities, and shall incorporate their requirements in the site design. Vehicles shall include but not be limited to: passenger cars, emergency vehicles, garbage trucks, fire crash rescue vehicles, military vehicles, delivery service (Single-Unit (SU) truck), Smith Fire Department Truck TI-3000(gross vehicle weight is 81,000 pounds)and other utility vehicles. The parking stalls shall be Hot mix asphalt material (refer to RFP concept drawings); this pavement shall be designed for standard-duty roads. The Contractor shall provide traffic control signs and pavement markings per FDOT Standard Drawings and MUTCD requirements.

6.5.1.2 Parking areas shall be delineated with pavement markings for the material, type, color, and width specified in the RFP concept drawings for accessible and standard parking stalls, include lighting and be adequately drained. Accessible parking stalls, sidewalks and ramps will be provided in accordance with the Americans with Disabilities Act Accessibility Guidelines (ADAAG). The parking spaces shall have no angle. Standard parking stalls shall be 9-feet wide and 18-feet long per the current edition of Smith AFB Engineering Design Manual Section 3.4.1.8. Accessible parking stalls shall be 12-feet wide and 18-feet long.

Pavement markings for parking stalls and special emphasis crosswalks shall be in accordance with the Florida Department of Transportation (FDOT), latest edition, Standard index drawings and specifications. Proposed parking stalls shall be striped with six (6) inches white line, thermoplastic/paint material. See Section 01 10 10-14, Electrical Systems, for lighting requirements. Proposed special emphasis crosswalk shall be transverse marking, thermoplastic/paint, crosswalk line, 24 inches white and the longitudinal transverse line shall be 12 inches white.

6.5.1.3 Parking lot drainage shall be designed to provide adequate sheet flow drainage to the collection system per UFC 3-201-01, Civil Engineering, with Change 1, March 1, 2017, Refer to Section 6.6, STORM DRAINAGE for additional information. The slopes of the surface shall be held to the minimum required for drainage and to prevent ponding, but shall not be less than 0.5%. For safety, the maximum slope for parking is 5% along the isles through the parking area and 2% for the transverse slope. The Contractor shall construct the parking addition such that the parking areas and paved areas adequately flow to the surrounding stormwater management facilities (SWMF) and adjacent roadside ditches. The Contractor shall develop a storm drain/grading plan that will incorporate/include any off-site storm water runoff. Side slopes shall not be less than 4 Horizontal to 1 Vertical.

The Contractor is responsible for all drainage design calculations to determine the final depth of the stormwater management facility (SWMF) required. The Contractor shall incorporate additional measures to capture and treat stormwater from the site and parking area accordingly and provide a complete design to comply with The Florida Department of Environmental

Protection (FDEP) dry pond criteria and dependent on the Contractor's final drainage design.

6.5.2 New Concrete Sidewalks, Ramps, and Landings. Sidewalks, ramps, landings, and curb cuts shall be sized in accordance with criteria outlined in the ADAAG and shall be provided as indicated on the RFP concept drawings and first floor drawings. Sidewalk widths shall be a minimum of 5-feet wide or as necessary to meet pedestrian traffic flow. All building egresses shall have concrete sidewalks connected to them and those sidewalks shall be connected to the pedestrian sidewalk system. Sidewalks shall be widened as necessary to meet building entrance and exit ways. Sidewalks shall be constructed of concrete with a minimum compressive strength of 3500 psi and a minimum thickness of 4 inches. Joints shall be provided in the concrete sidewalk to eliminate random cracking. Transverse contraction joints shall be spaced at a distance equal to the sidewalk width or 5 feet on centers, whichever is less, and shall be continuous across the slab. Longitudinal contraction joints shall be constructed along the centerline of all sidewalks 10 feet or more in width. Expansion joints shall be placed at 25 feet on center and at the intersection of walks and curbs. Cross slope on sidewalks shall be 2 percent. Sidewalks may be used at locations around the new facility other than those shown on the drawings provided. The new concrete sidewalks shall not cross drainage swales, unless the Contractor has ensured that the storm water shall flow underneath the concrete sidewalk by a new storm drain pipe and new concrete sloped paved headwalls or concrete drainage flume.

6.5.3 Sidewalk Network. The existing site includes a sidewalk network located along the east side of the new facility in a north-south route. A large portion of the sidewalk network will require demolition and reconstruction as part of the building addition, parking improvements, and installation of the new underground utilities.

Existing Pavements. The sidewalk network is constructed of concrete. A portion of the sidewalk will be removed prior to construction. Refer to RFP drawings for limits of pavement removal and reconstruction.
New Work - Contractor shall replace existing pavement as necessary for the construction of the building addition and the installation of the new underground utilities. Replacement shall include concrete pavement of color and thickness to match existing style and shape. Pavement and adjacent landscape material and plantings disturbed shall match existing design and appearance prior to start of the project.

6.5.4 Service Drive. The existing service drive on the southwest side of existing Building 123 will be utilized by the ARF Addition. New concrete sidewalk will be constructed adjacent to the ARF Addition to provide access to the building. The emergency/service drive shall be designed to accommodate firefighting equipment and delivery vehicles.

The emergency access route shall be design for the criteria of TI-3000(Smith Fire Department's truck) design vehicle with a weight of 81,000 lbs.

6.5.5 Mechanical Equipment Enclosure. A new mechanical equipment enclosure will be required to enclose the new chiller and shall be generally located as indicated on the RFP concept drawings. The enclosure shall be visually screened and the top shall be secured with chain link fence cover. Access to

the enclosure will be through a minimum 6-foot wide gate. The surface within the enclosure will include concrete equipment pads and the open areas shall be 4-inches (minimum) of gravel with a weed barrier.

6.5.6 Dumpsters. No new dumpster enclosures will be required for this project. The existing dumpsters shall remain in place and shall not be modified in any way by the Contractor. Any damage to the existing enclosure, pavement surface, bollards, curbing, etc. shall be repaired by the Contractor at the Contractor expense.

6.6 STORM DRAINAGE

6.6.1 The project site is included in the Stormwater Management Plan for Smith Air Force Base (AFB). This drainage area drains to an existing underground conveyance system which ultimately discharges to Weekly Pond permitted under F.A.C 62-330 by the Florida Department of Environmental Protection (FDEP). It is the responsibility of the Contractor shall submit Environmental Resource Permit (ERP) to FDEP and the Base Civil Engineering Office including the calculations showing the amount of runoff generated by the project`s impervious areas included in the project.

6.6.2 The site stormwater drainage system shall be designed for a 25-year return storm water frequency per the current edition of the Smith AFB Engineering Design Manual, Chapter 3, Site Development. No ponding on sidewalks or pavements shall occur for the 25-year event. All runoff onto the site from adjacent properties shall be included in the storm drainage calculations. Storm drainage system design shall be checked for a 100-year return event to insure no flooding will occur to any new or existing facility finished floor. Storm drainage design shall be in accordance with the current edition of the Smith AFB Engineering Design Manual, Florida Administrative Code (FAC) 62-330, UFC 3-201-01, Civil Engineering, with Change 1, March 1, 2007, and the Army Corp of Engineers, Mobile District Design Manual. The site is tidally influenced; therefore, no rate control is required.

6.6.3 The storm drainage shall consist of swales, storm drainage structures, retention/detention ponds, and piping. The structures shall include concrete drop or curb inlets, concrete headwalls, flared end sections and outlet control structures, as necessary. All storm drainage structures located in traffic areas shall be rated to withstand heavy vehicle loading. All grading shall be completed such that parking areas and areas adjacent to the new building drain adequately with storm water flowing away from the building. All side slopes shall not be steeper than 4-feet horizontal to 1-foot vertical. Minimum pipe velocities shall be 2.5 ft/sec and the maximum shall be 5.0 ft/sec with outlet erosion protection. The minimum pipe size for an open pipe system shall be 18-inches and 12-inch for a closed system. The maximum allowable storm water pavement spread shall not exceed 4-feet in width for a 25-year storm event. Sufficient inlets shall be provided to control drainage spread. The maximum interval for inlets shall be 300 feet for conduits smaller than 30-inches. No inlets shall be provided in curb radii. There shall be no ponding at flumes/inlets for a 25-year storm.

6.6.4 Concrete inlets/catch basins may be poured in-place or precast concrete. Metal grates or manholes shall be galvanized. Basins shall have 3-inch weep holes cast into the walls. The exterior of the weep holes shall receive a 1/4-inch wire mesh with a 12-inch width belt of crushed rock, ASTM

A357. Precast manhole or inlet rings shall connect with industry standard gaskets. Storm drainpipes shall be grouted into the concrete structures to provide a watertight connection.

6.6.5 Catch Basins and Inlets. Locate storm water inlets so that no collection swales flow across a street or sidewalk to reach a storm sewer other than where cross gutters are used. Where grating is to be used, it shall be of "Bicycle Tire Proof" design.

6.6.7 Downspouts and Roof Drain Leaders. The downspouts and roof drain collection system shall be connected to a new underground collection and routing system for the new facility addition. The downspouts and roof drain leaders for the portion of the new facility additional shall connect to the existing/proposed stormwater system located within the project site. Refer to the RFP concept drawings for the location of the new and existing stormwater infrastructure.

6.6.8 The drainage design documents shall include erosion and sediment control features as necessary to minimize site erosion and to prevent silt-laden stormwater from leaving the site. The Contractor shall follow all current Best Management Practices (BMP) during construction, and shall implement the use of silt fences, hay bales, and sediment traps as necessary.

6.6.9 The allowable pipe types shall include concrete pipe, type III or IV, as required. Pipe joints shall be water tight with gaskets. For reinforced concrete pipes with vehicular traffic and less than 2-feet of cover over the top of the pipe, the reinforced concrete pipe shall be Class IV.

6.6.10 Stormwater Pollution Prevention (SWPPP). The Contractor shall clearly define the requirements for National Pollutant Discharge Elimination Systems Permit (NPDES) Notice of Intent (NOI) for this project. Site plans shall incorporate designs that control runoff and erosion. Site plans shall conform to the applicable requirements of an NPDES storm water permit. Information regarding such may be found at: http://www.dep.state.fl.us/water/stormwater/npdes/index.htm. No site work will commence until the NOI has been submitted and accepted by the State. Refer to Section 01 10 10-4, Permit Requirements for additional information.

6.6.10.1 The Contractor shall prepare a Stormwater Pollution Prevention Plan (SWPPP) in accordance with and meet the intent of the National Pollutant Discharge Elimination Systems Permit (NPDES) for EPA Region IV, Florida Department of Environmental Protection (FDEP) Notice of Intent to Use Generic Permit for Stormwater Discharge from Large and Small Construction Activities, Section 01 10 10-4, Permit Requirements, and the Chapter 6 of the Florida Land Development Manual. The plan shall be submitted to the Contracting Officer's Representative to be reviewed by the Base Civil Engineering Squadron. Upon acceptance, the Contractor and the Base Civil Engineer shall sign the plan as co-applicants for permit coverage. The Contractor shall implement, maintain, and update the SWPPP, as required, throughout the project until a Notice of Termination for permit coverage is submitted upon final stabilization of the project site. The Contractor shall maintain a copy of the SWPPP on-site at all times during construction and shall make the plan and all supporting documents and reports available for inspection upon request by the Government and/or Regulatory Agency.

6.6.10.2 Upon completion and Contracting Officer`s notification of acceptance of the SWPPP, the Contractor shall prepare a NPDES Notice of Intent (NOI) application form in accordance with the requirements of the NPDES Permit for EPA Region IV and the state of Florida, which administers the program. This NOI shall be submitted to the Florida Department of Environmental Protection 30 days prior to construction commencement. The Contractor must include with the NOI the appropriate processing fee(s) payable to the Department of Environmental Protection. Information regarding such may be found at:
http://www.dep.state.fl.us/water/stormwater/npdes/index.htm .
This NOI must be transmitted with the Air Force NOI for this project. A copy of the NOI and a brief description of the project shall be posted at the construction site in a prominent place for public viewing. No site work shall commence until the NOI has been submitted and accepted by the State.

6.6.10.3 Upon satisfactory completion of final stabilization of the project site and acceptance by the Government, the Contractor shall submit a Notice of Termination (NOT) of permit coverage for the project. This NOT shall be submitted to the Florida Department of Environmental Protection. The NOT shall be submitted following the procedures and requirements outlined in the current edition of the Smith AFB Engineering Design Manual, Section 1.3.9, Environmental Regulatory Permits.

6.7 JURISDICTIONAL WETLANDS

There are no wetlands located on this site. Weekly Pond is the closest jurisdictional wetland location and the project site is outside of the regulatory required 25-foot buffer.

6.8 Not Used

6.9 GOVERNMENT FURNISHED INFORMATION

6.9.1 Topographic Survey. The RFP concept drawings that have been provided indicate the existing conditions and locations of existing utilities. The survey provided shall be used bidding purposes and for information only. The government provided survey is included in the RFP concept drawings.

6.9.1.1 It is the Contractors responsibility to perform an independent topographical survey of the project limits prior to starting work. The Contractor shall perform field topographic, planimetric, and utility surveys, office computations, and 3D digital mapping for use in developing the construction documents for this project. Specific Requirements for the survey shall include, but not limited to the following:

a) Horizontal and Vertical control for the project shall comply with the current edition of the Smith AFB Engineering Design Manual Specifications, Chapter 4, Section 4.5.2. Horizontal control shall be based on Florida State Plane Coordinate System – North Zone (NAD83). Vertical control shall be based on North American Vertical Datum of 1988 (NAVD88). Use English units.

b) Subsurface Utility Investigation shall be at a minimum **Quality Level B**, per the current edition of the Smith AFB Engineering Design Manual, Chapter 4, Section 4.4.12 and US Army Corps of Engineers (USACE)Design Manual, Mobile District, latest edition. Perform Level A survey as required for design and to meet other RFP criteria.

c) The contractor shall layout horizontal and vertical control in the identified project areas. A minimum of 3 control points shall be provided.

d) Water - Locate all valves, standpipes, regulators, etc. Locate all fire hydrants. Provide an elevation on top of valve case and top of valve. Provide size of pipe and distance above ground for standpipes. Locate all underground water lines, pipe sizes, and locations.

e) Sanitary Sewer - Locate all manholes and provide top of rim elevation along with an invert elevation of all pipes connected to the manhole. Identify type, size, and direction of each pipe. Locate all clean-outs. Locate all Sanitary Sewer lines, pipe sizes. Provide distance to and top rim and invert for manholes or sanitary sewer structures at least one structure upstream and downstream for sanitary sewer lines that extend outside the cross-hatched or area identified to be surveyed.

f) Storm Drainage - Locate manholes and all other storm drainage structures such as culverts, headwalls, catch basins, and clean-outs. Provide top of manhole or top of catch basin elevation along with an invert elevation of all pipes connected to a manhole or catch basin and bottom elevation. Identify type, size, and direction of each pipe. Provide type, size, and invert elevation for all culverts. If only one structure on a gravity flow line falls within the survey area shown on the drawing, provide distance and invert data for one structure both upstream and downstream of the site.

g) Electrical and Communication - Locate all power poles, guy wires, vaults, manholes, meters, transformers, electrical boxes, and substations. Obtain type and height of poles, number and size of transformers, number of conductors on each pole, including telephone and cable TV, number of cross arms, number of wires (electrical and communication), direction and low wire elevation at each pole. Provide top of rim or top of vault elevation, top of wire or conduit elevation, direction and bottom elevation of manholes and vaults. Provide size for all electrical vaults and boxes identify the size and number of ducts or cables entering each manhole and their invert elevations.

h) Gas - Locate all valves, meters, and gas line markers. Provide elevation on top of valve case and on top of valve.

i) Telephone - Locate all poles, manholes, boxes, etc. Provide top of rim elevation, top of wire or conduit elevation, direction and bottom of manhole elevation. Obtain type and height of poles, number of crossarms, number of wires and low wire elevation at each pole.

j) Streetlight - Locate all poles and provide type and height of poles. Identify number and type of lights on poles. If connected by wires, show direction and low wire elevation.

k) Fire Alarm - Locate any fire alarm systems (box with number), telephones (box with number), etc. in project.

Caution shall be taken by the contractor around any underground cable or utility to prevent damage. Any damage to existing utility lines shall be repaired or replaced to the satisfaction of the Contracting Officer's Representative at no additional cost to the government. The Contractor may utilize the utilities during construction operations and may incorporate the utilities as part of the final project. Existing utilities that interfere with this project shall be relocated with the approval of the Contracting Officer at the Contractor's expense.

6.9.1.2 As-Built Survey. The Contractor shall perform an as-built survey for the site. The as-built survey shall locate all new improvements, including subsurface utilities. The as-built survey shall also include GIS Coordinates for utilities at all connections, structures, valves, and changes of direction. The as-built survey shall also meet the conditions of any permits (if required). The as-built drawing shall be provided to the Base CE in CADD format and provide signed/sealed originals as necessary for permit closeouts (if required). Refer to Section 01 00 00.

6.9.2 Standard Details. Some standard site details will be available to the Contractor by Mobile District. Details will require editing as necessary to match the project requirements. The Contractor shall be responsible for creating all details needed for the project, which are not in the Mobile District Standard Design Library. The Library can be accessed through the Mobile District home page.

6.9.3 Geotechnical Investigation and Design. The Government provided Geotechnical boring logs, site characterization, field test data, and lab test data are provided "for information only" and shall be used as a basis for bidding only. Two geotechnical investigations were performed by the government at different phases of the project. One of the geotechnical investigations were performed recently on the parking lot addition and the other was performed as part of the Phase 1 facility. This information can be found in the RFP Appendix U.

6.9.3.1 The Contractor shall be responsible for determination of actual soil conditions present at the site, and designed to suit those conditions. It shall be the contractor's responsibility to investigate the subsurface soil conditions, and ground water table beneath the final structure locations, and complete the design for the facility using contractor-developed data. The contractor shall be responsible for obtaining all required drilling permits.

For bidding purposes only, the contractor shall assume the following: net allowable bearing capacity – 2000 psf, CBR – 10%, Modulus of subgrade reaction – 200 pci. Phase 1 of construction utilized a shallow foundation system.

6.9.3.2 The Contractor shall provide a minimum of four (4) borings for the building footprint and one (1) boring per 500 square yards of the new parking area, exact location and number shall be determined by the contractor. All borings shall be continuously sampled by a splitspoon sampler in accordance with ASTM D-1586, with samples visually classified at 1.5 foot intervals in accordance with the Unified Soil Classification System (ASTM D-2487). The

depth to water (if encountered) shall be recorded during drilling and after termination depths have been reached. Under the footprint of building(s), borings shall extend to a minimum depth of 30 feet, ponds to a minimum depth of 15 feet and under roads and/or parking areas, to a depth of 9 feet.

6.9.3.3 The contractor shall obtain soil samples for testing as required for the computation of bearing capacities, settlement calculations, lateral earth pressure calculations, temporary and permanent dewatering, pavement designs, etc. A dated drilling log shall be provided for each boring drilled. The approximate elevations and locations of borings drilled shall be provided on each boring log. Coordinates shall be in state plane +/- 1-foot horizontal.

6.9.3.4 Soil borings shall be abandoned in accordance with the following:

a. Each boring shall be measured for depth before it is sealed to ensure freedom from obstructions that may interfere with effective sealing operations.
b. All borings shall be sealed by backfilling with concrete, grout, neat cement or a bentonite/cement mixture.
c. All backfill material shall be placed into the borehole from the bottom to the top by pressure grouting with the positive displacement method (tremie method).
d. Each borehole sealed shall be given time, allowing the backfill material to settle and set in the borehole. If the backfill material settles 2-feet or more below ground surface (BGS) than the contractor shall place more backfill material, as described above, in the borehole to the top. If the backfill material is less than 2-feet BGS than the contractor may backfill the borehole using properly compacted native material.
e. A measurement of the borehole's theoretical volume, the amount of grout introduced into the borehole and the depth of the top of the grout or cement backfill shall be included in the borehole log.

6.9.3.5 Contractor's Geotechnical Report. The contractor shall provide his own geotechnical report complete with recommendations specific to the geotechnical design requirements at the site. The report shall be performed under the direction of and signed by a Florida licensed professional geotechnical engineer. The report shall include drilling logs, the results of soils test data (if any), and a plan showing the location of each boring as drilled. The contractor shall use the data from his own investigation to provide bearing capacity analyses, settlement calculations, lateral earth pressure calculations, temporary and permanent dewatering designs, pavement design, and foundation design, as applicable. NOTE: Applicable calculations are required and shall be presented in the contractor's report. A copy of the report in Adobe Acrobat PDF format shall be provided to the Corps of Engineers for review. The report shall specifically address the following:

Structures. The report shall recommend the type of foundation system to be used, lateral load resistance capacities for foundation systems, allowable bearing capacity(ies), seismic site class, depth(s) of placement and bearing elevations for footings, grade beams, slabs, pile tips, etc., utilizing the recommendations and restrictions presented in the report. An assessment of post-construction settlement potentials, including total and differential, shall be provided. Recommendations regarding lateral earth pressures (active,

at-rest, passive) to be used in the design of retaining walls shall be provided.

Pavements. The report shall recommend the allowable design CBR and modulus of subgrade reaction along with the required compaction effort for subgrades. Guidance shall be offered on the types of base course materials available in the area and design strengths.

General Earthwork and Special Features. The report shall recommend any undercutting requirements, proof rolling requirements for subgrades, fill and backfill placement procedures, and types of compaction equipment to be used. The report shall outline earthwork procedures for special features such as retaining walls, buried utilities, and slope stability if applicable. Any material from undercutting will be required to be disposed of properly as stated in the Section 17, ENVIRONMENTAL CONSIDERATIONS.

Cathodic Protection and Grounding Systems. The report shall include all pH tests, salinity tests, resistivity measurements, etc., required to design corrosion control and/or grounding systems. The raw field data shall be provided in the report. The contractor shall design all corrosion control and grounding systems required for the project.

Dewatering. The report shall determine project dewatering requirements. If temporary construction dewatering is required due to high water table, the contractor shall prepare and present a dewatering plan. The contractor shall be responsible for securing all the required information necessary for the design of the dewatering plan selected. Dewatering projects shall not discharge to surface waters or storm water systems.

Storm Water Retention. As a part of the contractor's geotechnical investigation, the contractor shall be responsible for securing all the required information necessary, e.g. soil infiltrometer test, as applicable for the design of storm water retention ponds and drainage swales in accordance with State regulations.

6.10 EARTHWORK

Material shall be classified in accordance with the Unified Soil Classification System and compaction efforts shall be specified by ASTM standards. Borrow material will be obtained off site. Disposal of materials will be off site. All costs in connection with borrow material and disposal of materials shall be at the Contractor's expense. All liability of any nature resulting from borrow operations including transportation of, and those resulting from disposal of material shall be the responsibility of the Contractor.

6.11 SOIL TREATMENT

Just prior to placing concrete slab on grade and just prior to backfilling around concrete or masonry foundations for structures, soil treatment shall be applied. All pesticide applications shall be made by state licensed and certified pest control personnel in strict accordance with manufacturer's label. The Contractor shall formulate, treat, store and dispose of the pesticides in accordance with manufacturer's instructions, and both State and Federal regulations.

6.12 CAPILLARY WATER BARRIER

Floor slabs of all buildings shall be underlain by a minimum 6-inch (loose thickness) aggregate capillary barrier as described in UFGS guide specification 31 00 00 EARTHWORK.

6.13 DEWATERING

Dewatering may be required for any trenching or excavation at or below groundwater indicated in the Contractor's Geotechnical Report and potentially at a higher elevation during seasonally heavy rainfall. Compaction of dry, satisfactory material is required for all foundation soils. Dewatering specifications must be in accordance with FDEP (Florida Department of Environmental Protection). No water will be allowed to exit the site without a permit. Also, Refer to Appendix F IRP SITE OT-35 INFORMATION and RFP Environmental section. If construction dewatering generates contaminated effluent, the Contractor shall be responsible for all permits, testing, reporting, disposal and documentation of local, state and federal discharge requirements. See RFP Appendix for figure showing location of OT-35 and contaminants.

6.14 UTILITIES

6.14.1 General. The Contractor shall design and construct new utility services to provide domestic, fire protection requirements and sanitary sewage removal for the new facility. The fire protection and sewage systems shall be designed and constructed in accordance with the criteria contained herein. Specifically, all water and sewer work under this contract shall conform to the requirements set forth in the Local Utility Service Providers, Inc. (LUSP) Standard details and Specifications, refer to Appendix L of this RFP document. Coordination of all utility work on the project is the responsibility of the Contractor. The Contractor shall notify the Contracting Officer's Representative and Local Utility Service Providers, Inc. (LUSP) before a utility tie-in is required. The notification shall be a minimum of 21 days prior to tapping the line. Placement of buried utility mains under new buildings shall not be allowed. The Contractor's design shall limit installation beneath pavement. Water main alignments shall follow existing streets or utility corridors. The Contractor shall confirm the exact location of existing utilities. Contractor shall comply with Chapter 7 – Water, Wastewater and Environmental Protection as specified in Section 7.1 of the Smith AFB, Engineering Design Manual latest edition.

6.14.2 The engineering design requirements and criteria for the utilities section herein, shall be in accordance with the guidelines specified within this section and the criteria documents listed. All criteria documents shall be the current edition. The design of all water and sanitary sewer systems shall be in accordance with the current LUSP design requirements. The RFP Concept Drawings and special contract requirement documents are essential part of the contract. They are intended to be complementary and to describe and provide for a complete design and construction work. In case of discrepancy between documents included as part of the RFP contract requirements, LUSP provisions shall govern, as specified in Chapter 7 –

Water, Wastewater and Environmental Protection, Section 7.1 of the Smith AFB Engineering Design Manual, latest edition.

LUSP Payment under Bid Item No. 4 "LUSP (Privatized Water and Wastewater Utility)Connection Fee" will include the inspection and installation of the exterior water and sanitary sewer components to the 5 foot line as well as all physical connections and tie-ins to the existing water and sanitary sewer systems in accordance with the design-build Request for Proposal (RFP) solicitation documents, criteria, requirements and criteria drawings, including but not limited to trenching, dewatering, filling and compaction for installation of the water and sewer system service components. The design-build Contractor shall be responsible for saw cutting, demolition and removal of the abandoned water and sewer lines and patching of pavements, sidewalks and restoration of any damaged landscaping related to the water and sewer line service utility
system installation as part of the Base Bid costs, but not limited to all activities and appurtenances related to the installation of the domestic water meter furnished by LUSP. All erosion control measures and finish grading of the site impacted by utility installation will be completed by the DB Contractor. DB Contractor shall coordinate with LUSP to schedule the installation of this work to be completed within the required Construction Completion duration. If contaminated soils are encountered during ASU's new utility installation, handling the soils and any work associated with environmental remediation activities will be consider an additional cost. All soils and materials testing, if required, shall be provided by the DB Contractor. After the new water main is placed in service, demolition and removal of the existing abandoned water and sewer lines shall be performed by the DB Contractor. If unsuitable soils are encountered, furnishing and providing suitable soils shall be provided by the DB Contractor. Final site grading and final site restoration work is not included. LUSP will install pipes, backfill and compact the utility trenches, and rough grade only. ASU assumes that the DB Contractor will be responsible for finish grade, restore pavements, and install grass sod. If any existing pavement must be open cut to perform the installation of water main piping, LUSP will perform pavement removal activities. The removed pavement debris cleaning, hauling, and disposal from the site shall be performed by the DB Contractor.

6.14.3 Existing Utilities. Government supplied surveys and construction documents related to the location of utilities may not represent actual installed conditions. The Contractor shall verify actual locations of all placed utilities and shall coordinate with the Government regarding any future planned utility installations that affect the work. It is the Contractor's responsibility to confirm the specific locations of the existing utilities and to design and construct new utility services for the new building. The contractor shall provide necessary measures to protect existing utilities.

6.14.3.1 The Contractor shall adjust the tops of any existing manholes, meters boxes, valves boxes, etc. as necessary in paved and unpaved areas. Contractor shall replace existing meter and valve boxes and manhole covers with traffic-rated equivalents in paved areas.

6.14.4 Device Location. Transformers, electric switches, telephone/cable boxes, manholes, irrigation pump and controller, etc., shall be located in

locations not immediately apparent to the facility users or personnel passing by the site.

6.14.5 Marking of Utility Lines. Utility lines shall be marked with plastic marking tape. The tape shall be manufactured with integral wires, foil backing or other means to enable detection by a metal detector when the tape is buried up to 3.28 ft deep. The tape shall be of a type specifically manufactured for marking and locating underground utilities. The metallic core of the tape shall be encased in a protective jacket or provided with other means to protect it from corrosion. Warning tapes shall be provided and installed directly above all buried pipes or wires, at a depth of 18-inches below finished grade. Tape color shall be as specified below and shall bear a continuous printed inscription describing the specific utility.

Tape Color:

Red: Electric
Orange: Telephone, Telegraph, Television, Police, and Fire Communications
Blue: Water Systems
Green: Sewer Systems
Yellow: Gas, Dangerous Materials

6.14.6 Metering. Area meters shall be provided where water and electricity are connected to base distribution lines. The electrical meter must be an approved remote readable meter compatible for connection to existing base-wide metering system, refer to Section 14, ELECTRICAL SYSTEMS and Section 12, PLUMBING for additional metering requirements. Fire service lines are not to be metered. **Contractor shall be responsible for all connection and meter fees.**

6.14.7 Open Cuts. There shall be no open cuts on major streets. All utilities crossing shall be bored and jacked. Only minor streets and drives may be open cut, with prior approval of the COR. The Contractor shall notify the Government 7 days in advance of any such open cut.

6.14.8 Wastewater

6.14.8.1 Wastewater. The wastewater facilities shall be located, as generally shown on the RFP concept drawings. The wastewater collection and conveyance system shall be designed in accordance with the applicable criteria. The designer shall ensure compliance with state and local regulations that apply with LUSP standards, Florida Administrative Code, USACE Design Manual, Mobile District and UFC 03-240-01 Wastewater Collection, with Change 1, November 1, 2014. The Contractor shall provide a minimum of one lateral per building with a cleanout provided at the entrance of the lateral to the building. New sanitary sewer lines shall be laid on adequate slopes in order to obtain the proper cleansing velocities. Requirements for minimum pipe sizes, minimum slopes, and flow velocities shall be in accordance with state and local regulations that apply. To meet LUSP requirements, sanitary sewer connections will be installed a minimum of five feet from the building addition and will be at least three feet underground to meet the depth requirements. Refer to Appendix L for further information regarding LUSP sanitary sewer details.

6.14.8.2 Existing Wastewater. There are existing sanitary sewers and manholes surrounding the site. The sanitary sewer work to be performed will include removing existing sanitary sewer lines in the proposed building addition footprint and providing a new connection. The Contractor shall reconstruct the sanitary system as shown on the RFP concept drawings. The Contractor shall keep the sewer system operational at all times, except when connections are required. All service interruptions shall be kept to a minimum. Contractor shall protect all existing facilities. Any damage to the existing system shall be repaired by and at the expense of the Contractor.

6.14.8.3 Sewer Connections. The Contractor shall connect to the existing sanitary sewer system as identified in RFP documents.

6.14.8.4 Wastewater Piping. Sanitary Sewer piping shall be PVC unless intended use dictates otherwise. New sanitary sewers shall be tested for leakage by low pressure air testing, infiltration tests, or exfiltration tests in accordance with the requirements set forth in the guide specifications edited by the Contractor and the Florida Department of Environmental Protection. The minimum size gravity sewer lateral shall be 6-inches for building connections and minimum pipe size for all other gravity sewer lines shall be 8-inches per Smith Base and LUSP Standards. According to UFC 3-201-01, the minimum slope shall be 0.2% for constructability purposes. Gravity sewers shall be design with a minimum slope to provide a velocity of at least 2.5 ft/s when the pipe is flowing full and 2.0 ft/s at the average rate of flow. To meet LUSP standards, waste water connections will be installed at a minimum distance of five (5) feet from the proposed building and at a minimum depth of at least three (3) feet underground. Refer to **Appendix L** for further information regarding LUSP waste water requirements.

6.14.8.5 Sanitary Sewer Manholes. Sanitary Sewer Manholes shall be provided at junctions of gravity sewer lines, and at each change in pipe direction, size or slope. Manholes shall be pre-cast reinforced concrete manhole sections. Manholes should normally not be located in the roadways or parking lots, but in areas that are readily accessible for operation and maintenance purposes. Precast manhole steps, shall be provided where the depth of a manhole exceeds 4-feet. Manhole covers shall match those currently in use at Smith AFB in all essential details. Tops of frames and covers shall be set flush with finished grade in paved areas or 2-inches higher than finished grade in unpaved areas. Frames and covers in vehicle use areas, including emergency vehicle accesses, shall meet anticipated vehicle loadings. Refer to **Appendix L** for LUSP Standard detail S-5, Standard Precast Concrete Manhole, for standard details.

6.14.8.6 Connections to Manholes. Per LUSP Standards, connections to existing sanitary sewer manholes shall be by coring manhole and field installing a flex-boot connector. The Contractor shall ensure no debris enters the systems, and that all new connections are water tight and protected from ground water intrusion.

6.14.8.7 Sewer Permits. This project, as the RFP documents illustrate, will not require a permit for the construction of the sanitary sewer lateral. If changes are made by the Contractor during design, the Contractor shall contact FDEP to determine the permit requirements. The Contractor shall abide by the permit rules, conditions and regulations per the Florida

Administrative Code and LUSP requirements. Refer to Section 4, PERMITS for additional information.

6.14.9 Water Supply. New domestic water supply is required for the facility addition. The domestic water supply will be connected to the existing water supply in the existing facility, refer to Section 12, PLUMBING. An existing water service line is within the proposed facility footprint and will be required to be relocated. A new fire service line will be required for the installation of a new fire hydrant, as generally shown on the RFP concept drawings. The Contractor shall provide fire water service lines, water distribution lines and connections to the existing water mains which shall be designed and constructed on the west side of the ARF Addition in accordance with UFC 3-600-01, Fire Protection Engineering for Facilities, with Change 2, 25 March 2018 and NFPA 291. The design of the water distribution mains and service lines shall provide an adequate quantity of water at sufficient pressure for fire suppression use. **Preliminary fire flow test results can be found in the RFP Appendix M.**

6.14.9.1 Existing Water. There are existing water mains surrounding the site. Contractor shall protect all existing facilities not impacted by the footprint of the proposed ARF Addition. Any damage to the existing system shall be repaired at the expense of the Contractor. An existing water main shall be relocated outside of the building footprint.

6.14.9.2 Water Supply Mains, Service Lines, and Appurtenances. The water supply service and appurtenances shall be designed and installed in accordance with the American State Utility Services, Inc. Standards (LUSP, Standard Plumbing Code, NFPA 24 Private Fire Service Mains and Their Appurtenances, NFPA 1141, UFC 3-600-01, applicable AWWA standards, and manufacturer's recommended procedures. In addition, the designer shall comply with state and local regulations that apply.

6.14.9.3 Piping. Piping for water service and distribution lines shall be polyvinyl chloride (PVC) except where use dictates otherwise. All water piping 4 inches in diameter or greater shall be push-on joint PVC. Piping less than 4 inches in diameter shall be solvent-weld PVC. Refer to Specification Section 33 11 00 WATER UTILITY DISTRIBUTION PIPING, as edited by the Contractor, for additional water distribution system requirements.

6.14.9.4 Valves. Curb stops or valves shall be installed near the point of connection to the main. All service stops and valves shall be provided with service boxes. Valve connections shall be as required for the piping in which they are installed. Flanges shall not be buried. All valves shall be resilient seat gate valves or approved equal. Refer to **Appendix L** for LUSP requirements regarding valves.

6.14.9.5 Post Indicator Valves. A post indicator valve will be required for the project and will be located on the west side of the ARF Addition. The PIV will be configured to be secured with a frangible padlock and shall not be electronically supervised. The Fire Department or CE Alarm Shop will provide and install the frangible padlock following final acceptance. All post indicator valves shall be in accordance with LUSP requirements, refer to **Appendix L.**

6.14.9.6 Backflow Preventer. A backflow preventer will be required for the potable and fire services located on the west side of the ARF Addition. These backflow preventers will adhere to the requirements set forth by Local Utility Service Providers, Inc. (LUSP). All backflow preventers shall be on the list of approved devices published by the Foundation for Cross-Connection Control and Hydraulic Research (FCCHR), University of Southern California as specified in UFGS 33 11 00 WATER UTILITY DISTRIBUTION PIPING. Per the current edition of Smith AFB Design Manual, Appendix A, all exterior backflow preventer control valves shall be locked by CE and shall not be electronically supervised. Refer to **Appendix L** for LUSP Standard Details regarding backflow preventers.

6.14.9.7 Water Meters Water meters shall be furnished by Utility unless otherwise specified within the contract documents. All water meters shall be capable of reporting data to base side Utility Monitoring and Control System (UMCS.) The utility meters shall be equipped with a pulse output device which provides not less than one pulse per revolution. The meters shall measure consumption of water in gallons. Irrigation taps shall be separated from domestic or fire supply taps and shall be metered independently. Refer to **Appendix L** for LUSP Standard Details and specifications regarding water meters.

6.14.10 Fire Protection Water. The Contractor shall provide water service for fire protection of capacity as determined by the Design Build Fire Protection Engineer and in accordance with UFC 3-230-10, Water Storage, Distribution, and Transmission, with Change 2, July 1,

2014. Refer to RFP Section 01 10 10-13, Fire Suppression, for additional requirements.

6.14.10.1 Fire Hydrants. The Contractor shall provide fire hydrants to meet the hose stream demand and shall be located as required by UFC 3-600-01. Fire hydrants shall be added to meet the requirement that a fire hydrant is within 150 feet of each fire department connection and that all parts of each building are within 350 feet of a fire hydrant with consideration given to accessibility and obstructions. Fire hydrants shall be installed adjacent to paved areas, accessible to fire department apparatus. Hydrants must not be closer than 3 feet and no farther than 7-feet from the roadway shoulder, curb or sidewalk in accordance with UFC 3-600-01. Fire hydrant bonnet and cap shall be color coded in accordance with NFPA 291 and based on flow capacity. Fire hydrants shall be manufactured in accordance with LUSP requirements, refer to **Appendix L**, and be compatible with existing equipment in use at Smith AFB. Hydrants shall be painted in accordance with the current edition Smith AFB Design Manual Appendix 2, A2.2(19) colors as directed by the Contracting Officer’s Representative. Contractor shall provide an isolation valve and box for the fire hydrant and provide thrust blocks at tee’s and hydrant bend.

6.14.10.2 Hydrant Flow Tests. New hydrant flow tests shall be conducted by the Contractor in accordance with NFPA 291 Recommended Practice for Fire Flow Testing and Marking of Hydrants. **The preliminary fire flow data provided in the RFP Appendix M is “for information only”.** The Contractor shall flow an adequate number of hydrants to minimize hydraulic inefficiencies during the flow. Raw data and results of the fire flow testing shall be included in the design analysis report with calculations to support water line sizing. Fire

flow results shall be indicated graphically. As soon as the test is completed, a flow report shall be provided to the COR. As necessary, re-tests may be required. The worst-case data shall be used for design, unless the retest indicates that one of the other results appears improbable. From this data and the specific fire protection requirements, the Contractor shall determine the need for additional water supply components such as fire pumps and/or water storage tanks.

6.14.10.3 Fire Protection System. The fire mains shall be designed to supply the quantity of water at sufficient pressures for the fire protection system required in Section 13, FIRE SUPPRESSION of this document. The Contractor shall provide water service for fire protection of capacity as determined by the DBFPE (Design Build Fire Protection Engineer) in accordance with UFC 3-230-10, Water Storage, Distribution, and Transmission, with Change 2, July 1, 2014.

6.14.11 Water Permit. This project requires a permit for the removal/adjustment of existing water line per 62-555, F.A.C. The Contractor shall contact FDEP to determine the permit requirements. The Contractor shall abide by the permit rules, conditions and regulations per the Florida Administrative Code. Refer to Section 4, PERMITS for additional information.

6.15 GAS DISTRIBUTION SYSTEM. An existing two-inch gas line is located parallel to Johnson Road, south of the new facility. A new gasline service connection will not be required for the ARF new building facility.

6.16 LANDSCAPE ARCHITECTURAL FEATURES.

6.16.1 The Contractor shall provide the design for a complete landscaping plan in the Base Bid.

6.16.1.1 A landscape plan prepared by a Registered Landscape Architect will be required to develop the landscaped area around the proposed Armament Research Facility Addition and parking area. The plan shall include the design and location of all plant materials and lawn areas, installation notes, planting details, plant schedule and narratives. The RFP Landscape Plan shall be used as a design guide for the preparation of the detailed landscape plan.

6.16.1.2 The landscaping will be developed in accordance with approved plant species outlined in the Smith AFB Architectural Compatibility Plan and coordinated with applicable requirements for compliance with Anti-Terrorism/Force Protection criteria.

6.16.1.3 Provide complete landscaping consisting of trees, shrubs, groundcover, and turf as required to provide a quality, cost effective, functional, and visually appealing landscaping that will visually enhance and provide a consistent appearance with the existing landscaping around Building 123 while complying with all applicable requirements.

6.16.1.4 Landscape plantings shall be native/locally adaptive species of trees, shrubs, and groundcovers requiring minimal water and maintenance. Plant materials shall be selected on the basis of plant hardiness, climate, soil characteristics, low maintenance, and high quality and be included in the approved list for Smith AFB, FL. (See RFP Appendix I). All selected

plant material must be tolerable of the site's sandy soil conditions and match existing plant material utilized at existing Building 123. Landscaping shall utilize Xeriscape concepts of planting adaptive species requiring low to moderate water consumption. Selected plant materials shall be self-sustaining and capable of surviving on natural rainfall quantities after a one (1) year establishment period.

6.16.1.5 Low evergreen groundcover, not to exceed 6-inches in height, is to be utilized within the ATFP unobstructed space. Small flowering trees having sufficient ground clearance of a minimum of 4-feet above grade to ensure visibility within this setback can be utilized.

6.16.1.6 Detailed landscape plantings consisting of low evergreen groundcover and small trees shall be concentrated at building entrances to visually enhance pedestrian entryways. The building foundation will be landscaped with a combination of low evergreen groundcovers, small trees, and Sabal Palms. Equipment enclosure shall be screened from view by the use of large evergreen shrubs or small evergreen trees. Landscaping shall be specified in Section 32 93 00, Exterior Plants.

6.16.1.7 Large trees recommended include Live Oak, Florida Maple, Bald Cypress, and Bay Magnolia and shall be installed at a minimum size of 10-feet to 12-feet, 3-inch to 3-1/2-inch caliper, 45-gallon container or B&B. Sabal Palm, 15'-20' in clear trunk height, full head, bare root may also be used in the landscape. Recommended small trees include Crape Myrtle (Muskogee, Tuscarora), Wax Myrtle, Sweet Bay Magnolia, and Little Gem Magnolia, 6-feet to 8-feet, 1-inch to 1-1/2-inch caliper, 30-gallon container or B&B. Balled and Burlapped trees (B&B) shall be grown in and acclimated to the local geographic area for a period of six (6) months prior to planting. Small shrubs recommended include Dwarf Yaupon Holly, Dwarf Indian Hawthorn, Flax Lily, Saw Palmetto, Muhly grass, and Fakahatchee grass and shall be minimum 18-inches to 24-inches in height, 3-gallon containers. Groundcover plants shall be 4-inches to 6-inches maximum in height and be 1-gallon containers planted a maximum of 36" o.c. Daylily, Rosemary, Twin Flower, and Liriope is recommended, but do not use Asian Jasmine.

6.16.1.8 Provide a minimum of 6 large trees, 13 small trees, 9 Sabal Palms, 50 small shrubs, and 240 groundcover plants within the project boundary of the Base Bid.

6.16.1.9 All plant beds not bordered by pavement, walks, and curbs shall be edged with commercial quality, zinc-coated, steel edging, 3/16-inch by 4-inch, black in color.

6.16.1.10 Install weed barrier fabric in all planting beds.

6.16.1.11 Install 18" wide gravel maintenance strip between building and sod areas. Gravel to match white gravel at existing building 123.

6.16.1.12 Mulch all planting beds with 3-inches of Base approved inorganic white gravel to match existing gravel mulch at Building 123. Mulch trees planted in lawn areas with a minimum 5-feet diameter mulch bed around the base of the tree and separate tree from the lawn area by steel edging 5-feet in diameter.

6.16.1.13 Landscaping installed shall be guaranteed for a period of one (1) full year after the final acceptance date of the project. The contractor shall provide complete landscape maintenance including routine mowing, pruning, watering, weeding, and fertilizer for a period of 365 days. Maintenance shall be specified in Section 32 05 33, Landscape Establishment.

6.16.2 A temporary irrigation system for all new landscape and sod areas shall be provided. Contractor shall be responsible for adequately watering all newly planted sodded areas by installing and operating a temporary watering system for a period of one (1) year after date of Final Acceptance. The Contractor shall include in his bid all materials, labor, and equipment necessary for the installation and operation of a watering method of the Contractor's discretion to include watering truck, watering bags, in ground or above ground system and approved by the contracting officer. After the one (1) year period, the Contractor shall disassemble and remove from the site the temporary watering system and shall repair and disturbed area.

6.16.3 Sodding

6.16.3.1 The Contractor shall fully sod with Argentine Bahia grass all disturbed and lawn areas within the project limits of work not landscaped.

6.16.3.2 Prior to sodding, loosen existing soil to a minimum depth of 4-inches. Top 4-inches shall be mixed with soil amendments including 2-inches topsoil.

Provide 2-inch offsite topsoil for all sodded areas. Amend existing soil by applying agricultural lime at a rate of 50-pounds per 1,000 square feet and 12-12-12 commercial fertilizer at the rate of 1½-pounds per 1,000 square feet. Sodding shall be specified in Section 32 92 23, Sodding.

6.17 SPECIFICATIONS.

As a minimum, the Contractor shall edit and submit the following UFGS as defined in Section 01 10 12, Design After Award:

01 57 19	Temporary Environmental Controls
02 41 00	Demolition and Deconstruction
02 83 13.00 20	Lead in Construction
31 00 00	Earthwork
31 11 00	Clearing and Grubbing
31 23 00.00 20	Excavation and Fill
31 31 16.13	Chemical Termite Control
31 32 11	Soil Surface Erosion Control
32 05 33	Landscape Establishment
32 08 11	Contractor Designed Sprinkler System
32 11 23	Aggregate Base Course
32 12 17	Hot Mix Bituminous Pavement
32 13 13.06	Portland Cement Concrete Pavement for Roads and Site Facilities
32 13 73	Compression Joints Seals for Concrete Pavements
32 16 13	Concrete Sidewalks and Curbs and Gutters

32 17 23	Pavement Markings
32 31 13	Chain link Fence and Gates
32 92 23	Sodding
32 93 00	Exterior Plants
33 11 00	Water Distribution
33 30 00	Sanitary Sewers
33 40 00	Storm Drainage Utilities

7. ROOM DESCRIPTIONS AND FUNCTIONAL REQUIREMENTS

7.1 GENERAL

The paragraphs in this section are included to aid the Contractor in understanding the requirements all the functional areas within the new addition and existing areas being altered. Refer to criteria drawings for additional requirements that supplement the information provided in the Functional Area/Room Summary and Requirements below. Refer to other portions of this RFP for additional requirements and criteria that apply to these functions.

All materials and equipment are Contractor Furnished and Contractor Installed (CF/CI) unless otherwise indicated. General types of furnishings and equipment for each room are shown in the criteria drawings to assist in establishing anticipated individual room areas. Refer to FF&E Package included in RFP Appendix C for additional furniture and equipment information.

All offices, workstations and desk positions will have the following GF/GI equipment (unless noted otherwise in this RFP); thin-client, KVM switch, keyboard and mouse, and (2) 24” LED monitors. This information is provided for functional layout, power, data and HVAC cooling considerations and as general requirements.

Provide a construction schedule to include specific alteration activities by floor and floor areas to the level of detail necessary for the COR and Users to understand the construction approach, activities and phasing to determine if the Contractor’s plan will impact their operations in the existing building. Coordination meetings during the construction phase with Contractor, subcontractors, DB design team members, COR, Base CE and Users are required on a weekly basis and as necessary daily basis to discuss upcoming week and day to day activities for alterations work and any work that could have the potential to impact current operations. For work occurring in the existing building, the schedule for each floor shall be submitted weekly for review and approval by the COR and Users the week before and adjusted as necessary.

7.2 NEW ADDITION - FUNCTIONAL AREA/ROOM SUMMARY AND REQUIREMENTS

Room requirements below may include items that are part of the Bid Option FF&E package and is provided as a means to define the space usage and requirements for room design and layout. Refer to RFP Section 01 10 10-9 INTERIOR DESIGN for a complete list of FF&E items to be provided as part of the FF&E package.

1st Floor (unless noted otherwise)

Room Name & Number:	S. Vestibule 130
Description:	Secure entry vestibule
Quantity & Area	1 @ 80 nsf
Functional Requirements:	Ceiling: 8’ minimum
Special Requirements:	Locate in Secure Area; non-security partition walls extend to deck and seal all penetrations; interior door to have a GFGI ACS keypad/card reader and Contractor provided and installed electric door lock, low voltage transformer and wiring connected to the GFGI ACS system; outer door to Corridor 143 shall have a GFCI spin-dial lock FF-L-2890B (Type II or IV) integrated with the GFGI ACS system at the outer door.

Room Name & Number:	Open Office 131
Description:	open office area with 12 workstations.
Quantity & Area	1 @ 900 nsf; includes area for GFGI equipment; 3 printers, shredder, 4-drawer safe, storage cabinets and workstations
Functional Requirements:	ceiling 9’ minimum, from finished floor elevation
Special Requirements:	Locate in Secure Area; access floor; provide power and data connectivity for workstations, printers and shredder

Room Name & Number:	S. Comm 131A
Description:	Secure communications rooms with rack equipment
Quantity & Area	1 @ 132 nsf
Functional Requirements:	Ceiling 9’ minimum from finished floor elevation.
Special Requirements:	Locate in Secure Area; access floor system; provide room with space for rack cabinets (racks and cabinets for Contractor provided patch panels shall be GF/CI); non-security partition walls extend from top of access floor to deck above and seal all penetrations; Provide and install electric door lock or strike including low voltage transformer and wiring, connect and integrate with GFGI ACS system to provide a fully operational electric door locking system for access control.

Room Name & Number:	Office 132
Description:	Private office
Quantity & Area	1 @ 130 nsf
Functional Requirements:	ceiling 8’ minimum from finished floor elevation.
Special Requirements:	access floor (bid option); walls to extend to

	deck for sound control and to secure room.

Room Name & Number:	Shared Office 133
Description:	open office area with 3 workstations.
Quantity & Area	1 @ 340 nsf
Functional Requirements:	ceiling 9’ minimum from finished floor elevation.
Special Requirements:	access floor (bid option); window for natural daylighting; walls to extend to deck for sound control and to secure room; provide power and data connectivity for workstations, printers and shredder

Room Name & Number:	Conference 134
Description:	Conference room
Quantity & Area	1 @ 385 nsf
Functional Requirements:	ceiling 9’ minimum, seating for 18
Special Requirements:	GFGI AV systems includes wall mounted video display and VTC suite, power, data and AV controls at table, and AV/VTC equipment in credenza; provide power & pathways for AV systems, STC 50 walls extend to deck and door with automatic door bottom and perimeter sound seal (not STC rated)

Room Name & Number:	Breakroom 135A
Description:	Breakroom and Heritage functions
Quantity & Area	1 @ 940 nsf
Functional Requirements:	ceiling 10’ minimum; double door to exterior; space for FF&E tables and seating; space for GFGI combo pool/ping pong table and foosball table; trophy case and recycle containers; FF&E back-bar;
Special Requirements:	provide power/cable TV outlet/blocking for GFGI wall mounted large video display/TV and mounting bracket; windows for natural daylighting; storefront entry door with Contractor provided and installed electric door lock exit device with low voltage transformer and wiring connected to the GFGI ACS system keypad/card reader.

Room Name & Number:	Prep Area 135B
Description:	Food/drink preparation area and storage area space to support for Breakroom functions
Quantity & Area	1 @ 80 nsf
Functional Requirements:	ceiling 9’ minimum; provide base cabinets with countertop with sink and upper cabinets along one wall; provide space for GFGI equipment (3 refrigerators, commercial bin type icemaker, countertop, 2 microwaves, popcorn machine); FF&E countertop commercial coffee maker and

	undercounter dishwasher;
Special Requirements:	provide power for GFGI equipment; water supply for GFGI refrigerators and icemaker; drain for GFGI icemaker; water connection for coffee maker, water and drain for dishwasher

Room Name & Number:	Storage 136
Description:	Storage of general building supplies and breakroom supplies
Quantity & Area	1 @ 140 nsf
Functional Requirements:	ceiling 9’ minimum; FF&E shelving
Special Requirements:	none

Room Name & Number:	Mech 137
Description:	Mechanical room for HVAC equipment supporting the breakroom
Quantity & Area	1, nsf to be determined by equipment size and maintenance clearances
Functional Requirements:	No ceiling; walls to deck for sound control; interior door for access
Special Requirements:	Floor drain for HVAC equipment

Room Name & Number:	Stair #3 138 & 204
Description:	stair
Quantity & Area	1, nsf to be determined by code clearances and function
Functional Requirements:	ceiling 8’ minimum at upper landing, stairs minimum 48 inches wide
Special Requirements:	Door leading directly to exterior to be “exit only” with no outside trim

Room Name & Number:	Women’s Tlt 139 & 202
Description:	Toilet room
Quantity & Area	2 @ 75 nsf
Functional Requirements:	Ceiling 8’ minimum, floor mounted water closet, base cabinet with counter and lavatory sink, mirror, toilet accessories
Special Requirements:	Floor drain

Room Name & Number:	Men’s Tlt 141 & 201
Description:	Toilet room
Quantity & Area	2 @ 150 nsf
Functional Requirements:	Ceiling 8’ minimum, floor mounted water closets, toilet partitions, base cabinet with counter and lavatory sink, mirror, toilet accessories
Special Requirements:	Floor drain

Room Name & Number:	Jan 140
Description:	Janitors closet
Quantity & Area	1 @ 40 nsf
Functional Requirements:	Ceiling 8’ minimum,

Special Requirements:	Floor drain; mop sink; stainless steel mop holder with shelf

Room Name & Number:	Mech/Elec 142
Description:	Mechanical room for HVAC & plumbing equipment, electrical panels and equipment, fire alarm/MNS equipment
Quantity & Area	1, nsf to be determined by equipment size and maintenance clearances
Functional Requirements:	No ceiling, masonry walls to deck for sound control and security at Secure Area perimeter conditions; double door access to exterior
Special Requirements:	Floor drain for HVAC equipment

Room Name & Number:	Corridor 143
Description:	Corridor
Quantity & Area	1, nsf to be determined
Functional Requirements:	6’ wide minimum; ceiling 8’ minimum; alcove area for GFGI printers/fax/shredders and FF&E storage cabinets
Special Requirements:	Provide door connecting to existing building; floor elevation to match existing building 1st floor; provide storefront exit door and window at north wall.

2nd Floor

Room Name & Number:	Corridor 200
Description:	Corridor
Quantity & Area	1, nsf to be determined
Functional Requirements:	6’ wide minimum; ceiling 9’ minimum (higher at east end for window); alcove area stair and handicapped accessible lift to transition to higher floor elevation;
Special Requirements:	Provide door connecting to existing building; provide windows at north side and east end of corridor for views to the exterior and natural daylighting; floor elevation to match existing building 2nd floor

Room Name & Number:	Storage 203
Description:	Storage of general building supplies
Quantity & Area	1 @ 40 nsf
Functional Requirements:	ceiling 9’ minimum; FF&E shelving
Special Requirements:	none

Room Name & Number:	S. Comm 205
Description:	Secure communications rooms with rack equipment
Quantity & Area	1 @ 132 nsf
Functional Requirements:	Ceiling 9’ minimum from finished floor elevation.

Special Requirements:	Locate in Secure Area; access floor; rack cabinets (racks and cabinets for Contractor provided patch panels shall be GF/CI); non-security partition walls extend from top of access floor to deck above and seal all penetrations; Contractor provided and installed electric door lock with low voltage transformer and wiring connected to the GFGI ACS system keypad/card reader.

Room Name & Number:	Open Office 206A
Description:	open office area with 35 workstations.
Quantity & Area	1 @ 2330 nsf, includes area for GFGI 3 printers and 1 shredder
Functional Requirements:	ceiling 9′ minimum from finished floor elevation.
Special Requirements:	Locate in Secure Area; access floor; provide power and data connectivity for workstations, printers and shredder

Room Name & Number:	Office 206B & 206C
Description:	Private office
Quantity & Area	2 @ 130 nsf
Functional Requirements:	ceiling 9′ minimum from finished floor elevation.
Special Requirements:	Locate in Secure Area; access floor; FF&E demountable partition walls and door from top of access floor to ceiling; door hardware by FF&E partition manufacturer except lock core and keys by Base Bid.

Room Name & Number:	Training 207
Description:	Training and conference room type function
Quantity & Area	1 @ 210 nsf
Functional Requirements:	ceiling 9′ minimum from finished floor elevation; seating for 8
Special Requirements:	Locate in Secure Area, but as a separate controlled access area meeting the same physical security criteria as the primary Secure Area to separate from primary area (walls, protection of penetrations, access control door hardware (spin-dial lock not required), etc); access floor; provide power & pathways for GFGI AV systems (wall mounted video display and VTC suite); provide and install electric door lock or strike including low voltage transformer and wiring, connect and integrate with GFGI ACS system to provide a fully operational electric door locking system for access control; provide “kill switch” on room side to disable access control system or electric door hardware.

Room Name & Number:	S. Vest 208

Description:	Secure entry vestibule
Quantity & Area	1 @ 90 nsf
Functional Requirements:	ceiling 8’ minimum
Special Requirements:	Locate in Secure Area; non-security partition walls extend to deck and seal all penetrations; interior door to Open Office 206A shall have a GFGI ACS keypad/card reader and Contractor provided and installed electric door lock, low voltage transformer and wiring connected to the GFGI ACS system; interior door leading to Training 207 and outer door to corridor 200 shall have a GFCI spin-dial lock FF-L-2890B (Type II) integrated with the GFGI ACS system at the outer door.

Room Name & Number:	Mech/Elec 209
Description:	Mechanical room for HVAC & plumbing equipment, electrical panels and equipment, fire alarm/MNS equipment
Quantity & Area	1, nsf to be determined by equipment size and maintenance clearances
Functional Requirements:	No ceiling, masonry walls to deck for sound control and security at Secure Area perimeter conditions; double door access to interior
Special Requirements:	Floor drain for HVAC equipment; Contractor provided and installed electric door lock, low voltage transformer and wiring connected to the GFGI ACS system keypad/card reader; provide ladder to roof and lockable roof hatch; provide removable wall panel in exterior wall adjacent to HVAC AHU to permit future equipment removal/installation.

7.3 ALTERATIONS TO EXISTING BUILDING - SUMMARY AND REQUIREMENTS

7.3.1 General Requirements:

a. The interior alterations scope is primarily for the installation of the new doorway and corridor connection to the existing building at the 1st and 2nd floors and to connect the new addition building support systems to existing building support systems located in various locations in the existing building. These building support systems include, but not limited to; classified and unclassified communications and data systems, fire alarm / mass notification system, intrusion detection system (IDS), access control system (ACS), closed circuit television systems (CCTV), HVAC DDC controls, lightning protection system, etc.

b. Patch, repair or replace finishes, materials and systems damaged or disturbed by this contract. If a wall finish is patched or repaired in any manner the entire wall length from floor to ceiling and corner to corner to be repainted to match existing color, sheen and texture.

c. Removal of suspended acoustical ceiling system will be required for new utility routing. Remove, store and protect existing ceiling components and replace any components damaged due to the work of this contract.

d. Patch and repair walls related to creation of new openings and penetrations through existing walls and floors for the installation of new building support systems. Completely seal all new penetrations and openings created in walls and floors using appropriate materials and methods for fire/sound rated, security rated and non-rated construction conditions.

e. Refer to criteria drawings, FF&E Package provided in Appendix C of the RFP, and other sections of this RFP specification for additional alteration requirements.

f. Existing building will be occupied so all work shall be done in a manner to prevent disruption to operations and occupants. Refer to Section 3 PROJECT REQUIREMENTS of this specification titled "MAINTAIN OPERATIONS OF EXISTING OCCUPIED FACILITY AND CONTROLLED ACCESS SECURE AREA ACCREDITATIONS" for additional requirements and criteria for performing the work in the occupied facility.

7.3.2 First Floor Interior Alterations – Summary and Requirements

Room Name & Number:	Ex Stair #2 E129
Description:	Existing exit stairway
Quantity & Area	Existing
Functional Requirements:	Existing exit serving 2nd floor and general building circulation
Demolition Requirements:	Removal of existing suspended acoustical ceiling system (ACT); removal of portion of existing exterior wall assembly to accommodate the new doorway and corridor connection to the existing building; removal of interior finishes
Alteration Requirements – Corridor Connection for New Addition:	Provide new egress door assembly in existing stair wall and related wall work for new door opening; at 1st floor landing area provide new floor finish, paint walls and install new ACT ceiling to match existing; patch/repair or replace existing construction and finishes to remain damaged by the work.
Alteration Requirements – Connection to Existing Building Support Systems for New Addition:	Removal/reinstallation or replacement of existing suspended acoustical ceiling system (ACT) to provide access for routing of new building support systems; saw-cutting or core drilling holes in existing exterior wall assembly; installation of new building support systems above the existing ceiling for connection to existing building systems for systems and locations defined in this RFP; patch/repair or replace existing construction and finishes to remain damaged by the work.

Room Name & Number:	Corridor E125
Description:	Existing exit access corridor
Quantity & Area	Existing
Functional Requirements:	Existing exit access corridor and general building circulation
Demolition Requirements:	Removal/reinstallation or replacement of existing suspended acoustical ceiling system (ACT) to provide access for routing of new building support systems;
Alteration Requirements – Connection to Existing Building Support Systems for New Addition:	installation of new building support systems above the existing ceiling for connection to existing building systems for systems and locations defined in this RFP; patch/repair or replace existing construction and finishes to remain damaged by the work.

Room Name & Number:	Comm Room E128
Description:	Existing communications equipment room
Quantity & Area	Existing
Functional Requirements:	Existing
Demolition Requirements:	Removal/reinstallation or replacement of existing suspended acoustical ceiling system (ACT) to provide access for routing of new building support systems; provide opening and/or holes in existing walls for routing of new building support system conduits and pathways into this room.
Alteration Requirements – Connection to Existing Building Support Systems for New Addition:	installation of new building support systems required to be installed and connected to building support system in this room as defined in this RFP; patch/repair wall and finishes; seal all new penetrations through walls.

Room Name & Number:	Mech E133
Description:	Existing building equipment room
Quantity & Area	Existing
Functional Requirements:	Existing; room access from exterior door
Demolition Requirements:	Provide opening and/or holes in existing walls for routing of new building support system conduits and pathways into this room.
Alteration Requirements – Connection to Existing Building Support Systems for New Addition:	installation of new building support systems required to be installed and connected to building support system in this room as defined in this RFP; patch/repair wall and finishes; seal all new penetrations through walls.

Room Name & Number:	Equipment Room E126

Description:	Existing equipment room
Quantity & Area	Existing
Functional Requirements:	Existing
Demolition Requirements:	Provide opening and/or holes in existing walls for routing of new building support system conduits and pathways into this room.
Alteration Requirements – Connection to Existing Building Support Systems for New Addition:	installation of new building support systems required to be installed and connected to building support system in this room as defined in this RFP; patch/repair wall and finishes; seal all new penetrations through walls.

Room Name & Number:	Corridor E115
Description:	Existing exit access corridor
Quantity & Area	Existing
Functional Requirements:	Existing exit access corridor and general building circulation
Demolition Requirements:	Removal/reinstallation or replacement of existing suspended acoustical ceiling system (ACT) to provide access for routing of new building support systems;
Alteration Requirements – Connection to Existing Building Support Systems for New Addition:	installation of new building support systems above the existing ceiling for connection to existing building systems for systems and locations defined in this RFP; patch/repair or replace existing construction and finishes to remain damaged by the work.

Room Name & Number:	Corridor E158
Description:	Existing exit access corridor
Quantity & Area	Existing
Functional Requirements:	Existing exit access corridor and general building circulation
Demolition Requirements:	Removal/reinstallation or replacement of existing suspended acoustical ceiling system (ACT) to provide access for routing of new building support systems;
Alteration Requirements – Connection to Existing Building Support Systems for New Addition:	installation of new building support systems above the existing ceiling for connection to existing building systems for systems and locations defined in this RFP; patch/repair or replace existing construction and finishes to remain damaged by the work.

Room Name & Number:	Corridor E159
Description:	Existing exit access corridor
Quantity & Area	Existing
Functional Requirements:	Existing exit access corridor and general building circulation

Demolition Requirements:	Removal/reinstallation or replacement of existing suspended acoustical ceiling system (ACT) to provide access for routing of new building support systems;
Alteration Requirements – Connection to Existing Building Support Systems for New Addition:	installation of new building support systems above the existing ceiling for connection to existing building systems for systems and locations defined in this RFP; patch/repair or replace existing construction and finishes to remain damaged by the work.

Room Name & Number:	Mech E192
Description:	Existing building equipment room
Quantity & Area	Existing
Functional Requirements:	Existing; room access from exterior doors; existing stairs within this room to access Mech Mezzanine E236 located above this room.
Demolition Requirements:	Provide opening and/or holes in existing walls for routing of new building support system conduits and pathways into this room.
Alteration Requirements – Connection to Existing Building Support Systems for New Addition:	installation of new building support systems required to be installed and connected to building support system in this room or through this room to other adjacent equipment rooms as defined in this RFP; patch/repair wall and finishes; seal all new penetrations through walls.

Room Name & Number:	Model Shop E176
Description:	Existing shop area
Quantity & Area	Existing
Functional Requirements:	Existing shop with large equipment for building shipping containers, crates and other work.
Demolition Requirements:	Provide opening and/or holes in existing walls for routing of new building support system conduits and pathways into this room.
Alteration Requirements – Connection to Existing Building Support Systems for New Addition:	installation of new building support systems required to be installed and connected to building support system in this room as defined in this RFP; patch/repair wall and finishes; seal all new penetrations through walls; paint all new exposed building support system components in this room.

Room Name & Number:	Main Comm Room E7
Description:	Existing building main communications and FA/MNS equipment room
Quantity & Area	Existing
Functional Requirements:	Existing
Demolition Requirements:	Provide opening and/or holes in existing walls for routing of new building support system

	conduits and pathways into this room.
Alteration Requirements – Connection to Existing Building Support Systems for New Addition:	installation of new building support systems required to be installed and connected to building support system in this room as defined in this RFP; patch/repair wall and finishes; seal all new penetrations through walls.

7.3.3 Second Floor Interior Alterations – Summary and Requirements

Room Name & Number:	Ex Stair #2 E212
Description:	Existing exit stairway
Quantity & Area	Existing
Functional Requirements:	Existing exit serving 2nd floor and general building circulation
Demolition Requirements:	None anticipated
Alteration Requirements – Corridor Connection for New Addition:	None anticipated
Alteration Requirements – Connection to Existing Building Support Systems for New Addition:	None anticipated

Room Name & Number:	Corridor E210A
Description:	Existing exit access in open office area
Quantity & Area	Existing
Functional Requirements:	Existing exit access and general building circulation
Demolition Requirements:	removal of portion of existing exterior wall assembly to accommodate the new doorway and corridor connection to the existing building; removal of interior finishes; removal of existing suspended acoustical ceiling system (ACT) to provide access new doorway connection work and for routing of new building support systems;
Alteration Requirements – Corridor Connection for New Addition:	Provide new door assembly in existing wall and related work for new door opening; at south end of corridor adjacent to new doorway provide new floor finish, paint walls and new ACT ceiling to match existing; patch/repair or replace existing construction and finishes to remain damaged by the work.

Alteration Requirements – Connection to Existing Building Support Systems for New Addition:	installation of new building support systems below and above the existing ceiling for connection to existing building systems for systems and locations defined in this RFP.

Room Name & Number:	Corridor E205
Description:	Existing exit access corridor
Quantity & Area	Existing
Functional Requirements:	Existing exit access corridor and general building circulation
Demolition Requirements:	Removal/reinstallation or replacement of existing suspended acoustical ceiling system (ACT) for routing of new building support systems;
Alteration Requirements – Connection to Existing Building Support Systems for New Addition:	installation of new building support systems below and above the existing ceiling for connection to existing building systems for systems and locations defined in this RFP; patch/repair or replace existing construction and finishes to remain damaged by the work.

Room Name & Number:	Exst Comm Room E200
Description:	Existing communications equipment room
Quantity & Area	Existing
Functional Requirements:	Existing
Demolition Requirements:	Removal/reinstallation or replacement of existing suspended acoustical ceiling system (ACT) to provide access for routing of new building support systems; provide opening and/or holes in existing walls for routing of new building support system conduits and pathways into this room.
Alteration Requirements – Connection to Existing Building Support Systems for New Addition:	installation of new building support systems required to be installed and connected to building support system in this room as defined in this RFP; patch/repair wall and finishes; seal all new penetrations through walls.

Room Name & Number:	Corridor E201
Description:	Existing exit access corridor
Quantity & Area	Existing
Functional Requirements:	Existing exit access corridor and general building circulation
Demolition Requirements:	Removal/reinstallation or replacement of existing suspended acoustical ceiling system (ACT) for routing of new building support systems;
Alteration	installation of new building support systems

Requirements – Connection to Existing Building Support Systems for New Addition:	below and above the existing ceiling for connection to existing building systems for systems and locations defined in this RFP; patch/repair or replace existing construction and finishes to remain, damaged by the work.

Room Name & Number:	Corridor E229
Description:	Existing exit access corridor
Quantity & Area	Existing
Functional Requirements:	Existing exit access corridor and general building circulation
Demolition Requirements:	Removal/reinstallation or replacement of existing suspended acoustical ceiling system (ACT) for routing of new building support systems;
Alteration Requirements – Connection to Existing Building Support Systems for New Addition:	installation of new building support systems below and above the existing ceiling for connection to existing building systems for systems and locations defined in this RFP; patch/repair or replace existing construction and finishes to remain damaged by the work.

Room Name & Number:	Corridor E235
Description:	Existing exit access corridor
Quantity & Area	Existing
Functional Requirements:	Existing exit access corridor and general building circulation
Demolition Requirements:	removal and replacement of existing suspended gypsum wallboard ceiling system; removal and installation or replacement of existing acoustical ceiling system (ACT) for routing of new building support systems;
Alteration Requirements – Connection to Existing Building Support Systems for New Addition:	installation of new building support systems below and above the existing ceiling for connection to existing building systems for systems and locations defined in this RFP; patch/repair or replace existing construction and finishes to remain damaged by the work; install new suspended gypsum wallboard ceiling system and paint to match existing

Room Name & Number:	Mech Mezz E236
Description:	Existing building equipment room
Quantity & Area	Existing
Functional Requirements:	Existing mezzanine; access by existing stairs within this room to Mech E192 located below this area; existing ladder and roof hatch to access roof from this room
Demolition Requirements:	Provide opening and/or holes in existing walls for routing of new building support system conduits and pathways into this room.

Alteration Requirements – Connection to Existing Building Support Systems for New Addition:	installation of new building support systems required to be installed and connected to building support system in this room or through this room to other adjacent equipment rooms as defined in this RFP; patch/repair wall and finishes; seal all new penetrations through walls.

Room Name & Number:	Corridor E222
Description:	Existing exit access corridor
Quantity & Area	Existing
Functional Requirements:	Existing exit access corridor and general building circulation
Demolition Requirements:	Removal/reinstallation or replacement of existing suspended acoustical ceiling system (ACT) for routing of new building support systems;
Alteration Requirements – Connection to Existing Building Support Systems for New Addition:	installation of new building support systems below and above the existing ceiling for connection to existing building systems for systems and locations defined in this RFP; patch/repair or replace existing construction and finishes to remain damaged by the work.

Room Name & Number:	NOC Office Area E227
Description:	Existing open office area in an existing Secure Area
Quantity & Area	Existing
Functional Requirements:	Existing open office workstations; Existing NOC is an accredited Secure Area with physical security enhancements meeting ICD/ICS 705 criteria that shall not be changed or reduced by the work; Contractor to submit a penetration plan (drawing) indicating holes to be cut in the existing wall and new conduit penetration locations 10 days prior to start of any work for approval by 321EWS security personnel.
Demolition Requirements:	Removal/reinstallation or replacement of existing suspended acoustical ceiling system (ACT) for routing of new building support systems; provide opening and/or holes in existing security walls for routing of new building support system conduits and pathways into this room;
Alteration Requirements – Connection to Existing Building Support Systems for New Addition:	installation of new building support systems below and above the existing ceiling for connection to existing building systems for systems and locations defined in this RFP; patch/repair or replace existing construction and finishes to remain damaged by the work; seal all new penetrations through walls; follow ICD/ICS 705 criteria for protection and location of penetrations through the existing security wall and perimeter.

Room Name & Number:	NOC E228
Description:	Existing server room in existing Secure Area
Quantity & Area	Existing
Functional Requirements:	Existing open office workstations; Existing NOC is an accredited Secure Area with physical security enhancements meeting ICD/ICS 705 criteria that shall not be changed or reduced by the work; Contractor to submit a penetration plan (drawing) indicating holes to be cut in the existing wall and new conduit penetration locations 10 days prior to start of any work for approval by 321EWS security personnel.
Demolition Requirements:	Removal/reinstallation or replacement of existing suspended acoustical ceiling system (ACT) for routing of new building support systems; provide opening and/or holes in existing security walls for routing of new building support system conduits and pathways into this room;
Alteration Requirements – Connection to Existing Building Support Systems for New Addition:	installation of new building support systems below and above the existing ceiling for connection to existing building systems for systems and locations defined in this RFP; patch/repair or replace existing construction and finishes to remain damaged by the work; seal all new penetrations through walls; follow ICD/ICS 705 criteria for protection and location of penetrations through the existing security wall and perimeter.

8. ARCHITECTURAL DESIGN

8.1 CODES AND REFERENCES

Facilities shall be designed in accordance with all government requirements, regional, and national applicable codes effective at issue date of RFP including, but not limited to:

a. Engineering Design Manual Smith AFB, Florida, February 2018

b. Smith AFB Architectural Compatibility Plan – 2012

c. International Building Code (IBC) 2015

d. National Fire Protection Association (NFPA) Codes and Standards

e. Americans with Disabilities Act and Architectural Barriers Act Accessibility Guidelines (ADAABA)

f. UFC 1-200-01, DoD Building Code (General Building Requirements)

g. UFC 1-200-02, High Performance and Sustainable Building Requirements

h. UFC 3-101-01, Architecture

i. UFC 3-110-03, Roofing

j. UFC 3-600-01, Fire Protection Engineering for Facilities
k. UFC 4-010-01, DoD Minimum Antiterrorism Standards for Buildings
l. AFCEC A-GRAM 17-01 Change to AF New Construction and Major Renovation Certification Requirements, February 2017.
m. Air Force Sustainable Design & Development (SDD) Implementation Guidance, memorandum dated 2 June 2011.
n. Mobile District Design Manual, dated March 2007
o. UFC 4-010-05, Sensitive Compartmented Information Facilities Planning, Design, and Construction.
p. Technical Specifications for Construction and Management of Sensitive Compartmented Information Facilities (version 1.4), IC Tech Spec-for ICD/ICS 705, dated September 28, 2017.

8.2 GENERAL

The Contractor shall design and construct the addition and alterations to result in a complete and usable facility addition based on the design requirements contained within this solicitation.

Architectural design shall be in accordance with the criteria drawings, and RFP defined criteria and requirements. The site and new addition with connection to the existing building shall meet accessibility requirements.

The new addition shall be permanent construction of a Type IIB Construction as defined by the International Building Code 2015, Business occupancy, and in accordance with the UFC 3-600-01. This facility must conform to the NFPA 101 Life Safety Code. Provide a fire alarm and mass notification system, smoke detection system, and protect with a wet pipe fire suppression sprinkler system (refer to other Sections of this specification for additional and more detailed requirements).

8.3 ARCHITECTURAL THEME

Exterior of new addition shall be designed with a similar scale, proportion, features and details, materials and colors to match the existing building. The criteria drawings include exterior elevations and 3D building exterior massing images of the new addition and existing building.

Suitable interior building materials and treatments have been chosen based upon maintenance requirements, costs, availability, color and texture as well as visual compatibility of the existing building.

Government shall have final approval authority for the overall exterior and interior design, materials, finishes and colors for the project.

8.4 LIFE SAFETY CODE ANALYSIS

The Contractor shall prepare and submit a code analysis documenting compliance with building and life safety codes and references.

8.5 SPECIAL DESIGN AND CONSTRUCTION

8.5.1 Secure Area Physical Security

The Contractor shall design and construct the Secure Areas in the new addition in accordance with the requirements of ICS 705-1 and Technical Specifications For Construction And Management Of Sensitive Compartmented Information Facilities, Version 1.4 IC Tech Spec-for ICD/ICS 705 (September 28, 2017) following criteria for Fixed Facility SCIF Construction with "closed storage" classification, other elements required by ICD/ICS 705 and defined in this RFP. Refer to criteria drawings for Secure Area locations and perimeter boundary.

Architectural building systems and elements that are part of the security features to meet the stated criteria include, but not limited to the following; exterior and interior Secure Area perimeter walls, perimeter floors and ceiling construction, doors and frames in perimeter walls of special construction, access control and locking hardware for perimeter doors. Refer to Section 3 PROJECT REQUIREMENTS of this specification for more detailed information for the Physical Security Requirements that need to be incorporated into the architectural building design and systems.

8.6 BUILDING ENVELOPE DESIGN

Exterior envelope design shall follow requirements and criteria of UFC 3-101-01 Chapter 3 Building Envelope Requirements as a minimum. The building envelope must be designed to comply with or exceed ANSI/ASHRAE/IESNA 90.1 2013. The building envelope shall be designed to control the transfer of heat, air, moisture, light/radiation, and noise. Design each control strategy holistically and use an integrated approach. The architect shall review and coordinate with the mechanical engineer for the placement of vapor retarder and air barrier at the airconditioned boundary.

The most important barriers in the building enclosure shall be continuous: rain screen or water deflection layer, insulation or thermal barrier, air barrier, water drainage plane, and the waterproof barrier. Continuity of the barriers shall be traced through all details of the building enclosure. Clearly identify the boundary limits of the building air barriers, and of the zone or zones to be tested for building air tightness.

8.6.1 Air Barrier Requirements

8-6.1.1 Design, construct and test the building enclosure with a continuous air barrier to control air leakage in accordance with the requirements of ANSI/ASHRAE/USGBC/IES 189.1 – 2009 Normative Appendix B, "Prescriptive Continuous Air Barrier" as indicated herein. Clearly identify all air barrier components of each envelope assembly on construction documents and detail the joints, interconnections and penetrations of the air barrier components. Clearly identify the boundary limits of the building air barriers and of the zone or zones to be tested for building air tightness on the drawings. Include the statement of the calculated six-sided area of the air barrier

envelope on the drawings for each test area. The air barrier requirements apply to the new addition only. For testing purposes, the construction adjoining the new addition to the existing building shall be improved as necessary, so the new addition air barrier is constructed as 6-sided box as a permanent condition as well for testing.

8-6.1.2 Trace a continuous plane of air-tightness throughout the building addition envelope and make flexible and seal all moving joints. Air barrier requirements shall be verified per the requirements noted below in Inspection and Testing.

8-6.1.3 Seal all penetrations of the air barrier. Unavoidable penetrations of the air barrier (such as electrical boxes, plumbing fixture boxes, and other assemblies that are not airtight) shall be made airtight by sealing the assembly and the interface between the assembly and the air barrier or by extending the air barrier over the assembly. The air barrier must be durable to last the anticipated service life of the assembly. Do not install lighting fixtures with ventilation holes through the air barrier.

8-6.1.4 Provide low-leakage dampers and controls to close all ventilation or make-up air intakes and exhausts, etc when leakage can occur during inactive periods.

8-6.1.5 Compartmentalize spaces under negative pressure such as boiler rooms and provide make-up air for combustion.

8-6.1.6 Inspection and Testing

Performance Criteria and Substantiation: Submit the qualifications and experience of the testing entity for approval. Demonstrate performance of the continuous air barrier for the opaque building envelope (new addition only) per the following criteria:

ECB 2012-16 Building Air Tightness and Air Barrier Continuity Requirements (1 May 2012) with referenced "U.S. Army Corps of Engineers Air Leakage Test Protocol for Building Envelopes, Version 3, February 21, 2012" (http://www.wbdg.org/references/pa_dod_energy.php), except acceptable air leakage rate shall be as allowed by UFC 3-101-01 for Air Force projects.

UFC 3-101-01; building air barrier system shall be tested in accordance with the requirements of ANSI/ASHRAE/USGBC/IES 189.1 – 2009 Normative Appendix B, "Prescriptive Continuous Air Barrier" with the following exceptions defined in UFC 3-101-01 (3-6.3) for Air Force projects:

The building air leakage rate shall be determined by testing to 0.2 in. water (50 Pa) and extrapolating the test results to 0.3 in. water (75 Pa). The building air leakage rate shall not exceed 0.25 cfm/ft2 (this follows criteria for Army and Navy project which is more restrictive than allowed for Air Force projects) when test results are extrapolated to 0.3 inches water (75 Pa). Use of 0.2 inches water (50 Pa) test pressure allows for the use of the building HVAC system to provide test pressure.

Inspection and testing applies to the new addition only so Contractor to provide temporary closure of openings between the new addition and the

existing building for testing purposes and to remove such temporary closures after all testing is completed.

Detailed inspection and testing requirements and acceptance criteria shall be included in the project specifications.

Notify the Government at least 3 working days before the tests to provide the Government the opportunity to witness the tests. Provide the Government written test results confirming the results of all tests. Determine air leakage pathways using ASTM E1186-03(2009)'Standard Practices for Air Leakage Site Detection in Building Envelopes and Air Barrier Systems'. If test results indicate the building does not meet air leakage criteria, the Contractor shall correct problems and retest. Provide a test report that includes methodologies for testing, equipment, inspection procedures and testing results with comparison to the air leakage criteria for review by the Government and the commissioning authority (CxA).

8-6.1.7 Mock-up

Specifications written by design-build designers shall include requirements for a mockup for air barrier installation to be reviewed for approval by the COTR and commissioning agent (CxA). See ASHRAE 189.1 Appendix B, Best Practices for guidance.

8.7 EXTERIOR CONSTRUCTION

8.7.1 Exterior Walls

8.7.1.1 General

The exterior walls shall be composed of two configurations; stucco clad masonry walls or prefinished insulated metal wall panel clad masonry walls for the new addition to match the existing building design and cladding system materials and configurations.

Stucco clad walls to be composed of a cementitious stucco system with an integrally colored elastomeric finish coating over galvanized metal lath, continuous rigid insulation, air and water barrier, and masonry back-up wall. Stucco control joint and reveal joints of the profile and locations as generally shown on the criteria drawing and to match and coordinate with the existing building wall joints on the east side of the building.

Prefinished insulated metal wall panel clad walls to be composed of prefinished factory fabricated vertical metal faced panels with interlocking and gasketed joints, galvanized framing for attachment of metal panels for attachment to the masonry back-up wall, continuous rigid insulation, air and water barrier, and masonry back-up wall. Wall assembly to include large vertical rib elements composed of factory-formed and finished aluminum-faced composite panels and prefinished metal copings at the top and bottom of the metal wall panels of the design, profile and locations shown on the criteria drawings and to match the recent ACURL addition to the existing building on the east and north side of the building.

The exact combination and thickness of these wall system components to consider Secure Area physical security, energy conservation and anti-terrorism force protection criteria.

Exterior wall construction assemblies shall meet or exceed the requirements of ASHRAE 90.1 (2013) for energy performance.

8.7.1.2 Stucco System

2 or 3-coat cement stucco (5/8 inch to 1 inch nominal thick) with an integrally colored and textured elastomeric finish coating, applied on galvanized steel lath ASTM A653 with a minimum G90 coating, lath attached to masonry/concrete back-up with hot dipped galvanized or stainless steel screws. Stucco system shall be drainable type with flashings, trim and other means for water to be directed to the exterior of the wall assembly. Stucco accessories shall be PVC.

Exterior walls shall include reveals and control joints in patterns and profile similar to the criteria drawings to provide scale and interest to the facility design, thermal movement and crack control.

8.7.1.3 Insulation

Insulation shall be of R-value as required by ASHRAE 90.1 as a minimum and as part of a high performing building envelop to assist in achieving reducing energy usage. Rigid insulation shall be provided in drain cavity outboard of the masonry back-up substrates and shall be extruded preformed cellular polystyrene meeting ASTM C 578 or other similar closed cell rigid insulation board products that are intended for use in wall cavities with moisture. Rigid insulation in wall cavity for wall systems with light gage framing back-up shall be designed to minimize thermal bridging.

8.7.1.4 Exterior Sheathing

Exterior sheathing utilized as part of the exterior wall system shall be a Glass Mat Covered or Reinforced Gypsum Sheathing meeting physical properties of ASTM C 79/C 79M and ASTM C 1177/C 1177M, minimum 1/2 inch thick, consisting of a noncombustible water-resistant core, with a glass mat surfaces embedded to the gypsum core or reinforcing embedded throughout the gypsum core. Gypsum sheathing board shall be warranted for at least 6 months against delamination due to direct weather exposure. Sheathing shall be installed following manufacturer’s installation instructions and recommendations.

8.7.1.5 Air and Water Barriers

Fluid applied membrane barrier systems shall be of the type and installed to prevent air and water intrusion into the wall system. Barrier system shall be capable of performing as a continuous vapor-permeable air barrier and as a liquid-water drainage plane flashed to discharge to the exterior incidental condensation or water penetration. Air barrier assemblies shall be capable of accommodating substrate movement and of sealing substrate expansion and

control joints, construction material changes, and transitions at perimeter conditions without deterioration and air leakage exceeding specified limits.

Barrier system shall be designed and installed continuous, with all joints made airtight. It shall have an air permeability not to exceed 0.004 cfm/sq. ft. under a pressure differential of 0.3 in. water (1.57 psf). It shall be capable of withstanding positive and negative combined design wind, fan and stack pressures on the envelope without damage or displacement, and shall transfer the load to the structure. It shall not displace adjacent materials under full load. It shall be durable or maintainable. The barrier shall be joined in an airtight and flexible manner to the barrier material of adjacent systems, allowing for the relative movement of systems due to thermal and moisture variations and creep. Connection shall be made between:

a. Foundation and walls.
b. Walls and windows, louvers or doors.
c. Different wall systems.
d. Wall to roof, wall to soffit, soffit to roof.
e. Wall and roof over unconditioned space.
f. Walls, floor and roof across construction, control and expansion joints.
g. Walls, floors and roof to structural, utility, pipe and duct penetrations.

All penetrations of the air barrier and paths of air infiltration/exfiltration shall be made airtight. Barrier system shall be designed and installed to meet air barrier inspection and test criteria specified in this section. Provide auxiliary materials and flashings recommended by air barrier manufacturer for intended use and compatible with air barrier membrane. Barrier system shall be installed following manufacturer’s installation instructions and recommendations.

8.7.1.6 Light Gage Framing Back-up

Light gage framing as a back-up or attachment of exterior wall cladding systems shall be galvanized steel, ASTM A653/A653M, SS Grade 50, G60, 20 gage thickness minimum.

8.7.1.7 Masonry Back-up

Masonry as an exterior wall assembly back-up material shall be minimum 8 inch nominal units meeting ASTM C90, made with normal weight aggregate for acoustical control performance.

8.7.1.8 Job Site Mock-up of Stucco and Metal Wall Panel Clad Walls:

Provide mock-up to establish that proposed materials and construction techniques provide acceptable visual effect. Materials used for mock-up should be those proposed for actual construction; retain samples of cement and aggregates used. Provide mock-up sections of building and structures which typify the most difficult areas to build.

Mock-up Panel Configuration:
L or Z-Shaped Mock-up Panel that includes the following conditions;

1. Typical inside and outside corners, panel edge, reveal, and joint with sealant and backer rod for each panel finish, texture and profile.
2. Typical window and door opening.
3. Typical connections to support structural to demonstrate interface with air/water barrier, insulation, flashings, window assemblies, and other wall substrate materials.
4. Panels with finish coating (after above items are approved to satisfaction of Contracting Officer).
5. Maintain mock up on-site for comparison with finished work.

If approved by the Contracting Officer, the mock-up may be able to be included as part of the final wall construction work.

8.7.2 Roof System Assembly General

Low slope membrane roof system that shall meet requirements of UFC 3-110-03 Roofing, UFC 1-200-01 General Building Requirements, IBC 2015, ASCE 7, current NRCA Manuals (Membrane Roof Systems and Architectural Metal Flashing), and SMACNA. Roof system shall be designed by a Registered Roofing Consultant (RRC) or have a registered professional engineer or registered architect whose principal income from roofing design on the quality control staff of the design team or design-build team.

Roofing Consultant: The Contractor shall hire an independent roofing consultant to review and approve drawings and specifications prior to submission of design submittals and review and approve construction shop drawings and data. The roofing consultant shall inspect the roof installation on a regular basis for conformance with the contract documents and approved shop drawings. The roofing consultant shall issue reports with copies to the Contracting Officer's Representative and designer of record. The roofing consultant and/or his representative will be certified by the roofing manufacturer and/or the Roof Consultant Institute.

Pre-roofing Conference: provide conference led by Contractor with subcontractors, designer of record, roofing consultant, COR and Base CE. Provide a Roof Quality Assurance Plan to include design review and on-site quality control during construction. Discuss Comply with UFC 3-110-03.

8.7.2.2 Roof System Assembly New Addition

a. 3-ply low slope membrane roofing system, hot asphalt or torch applied, composed of a base sheet, SBS interply and mineral surfaced SBS modified bitumen cap sheet.
b. R-30 rigid roof insulation (minimum) with cover board as required by manufacturer and to meet wind uplift pressures (wood or wood fiber not allowed)). Provide crickets to direct water to roof drains.
c. Slope half inch per foot (minimum).
d. Roof system shall be installed over a minimum 22 gage galvanized roof deck secured to structure.
e. Design wind speed and pressures calculated as defined in Section 10 STRUCTURAL DESIGN of this specification.
f. Wind resistance tested and rated assembly by Factory Mutual (FM).

g. Fasteners and attachment methods shall be installed in accordance with the tested assembly.
h. Designed for thermal expansion and movement of building and structural components and interface with the existing building and roofing and flashing systems.
i. Manufacturer Warranty: 20 year, no dollar limit, full system material and water-tightness, from a single source manufacturer, covers roofing system including penetrations, flashings, roof drains, overflow drains, curbs, lightning protection system attachments and penetrations, and other terminations.
j. Contractor Warranty: 5 years for water-tightness, bonded.
k. Installer Warranty: 2 years for water tightness.
l. Installer Qualifications: approved by roofing manufacturer and for the warranted roofing system. 5 years roofing experience with similar roofing systems relative to the scale and complexity of this project.

8.7.2.3 Reroof System Assembly – Existing Building Adjacent New Addition Connection

a. Intent of reroofing is to be the minimum required to rework the existing roof drainage and connection to accommodate the new addition.
b. 4-ply low slope membrane roofing system, hot asphalt, composed of a base sheet, 3 ply sheets, and aggregate gravel surfacing. Contractor and Roofing consultant to verify exact system required to match existing.
c. Provide rigid roof insulation and cover board as required to match the existing condition or as required by the roofing manufacturer and to meet wind uplift pressures (wood or wood fiber not allowed)). Provide crickets to direct water to roof drains.
d. Perform pull-out tests to verify capacity of existing metal roof deck.
e. Design wind speed and pressures calculated as defined in Section 10 STRUCTURAL DESIGN of this specification.
f. Wind resistance tested and rated assembly by Factory Mutual (FM).
g. Fasteners and attachment methods shall be installed in accordance with the tested assembly.
h. Designed for thermal expansion and movement of building and structural components and interface with the existing building and roofing and flashing systems.
i. Manufacturer Warranty: 10 year, no dollar limit, full system material and water-tightness, from a single source manufacturer, covers roofing system including penetrations, flashings, roof drains, overflow drains, curbs, lightning protection system attachments and penetrations, and other terminations.
j. Contractor Warranty: 5 years for water-tightness, bonded.
k. Installer Warranty: 2 years for water tightness.
l. Installer Qualifications: approved by roofing manufacturer and for the warranted roofing system. 5 years roofing experience with similar roofing systems relative to the scale and complexity of this project.

8.7.2.4 Sheet Metal Copings, Trim and Flashings

Follow recommendations of NRCA and SMACNA, National Roofing Contractors Association, and recommendations and guidance in the unedited UFGS Section 07

60 00 FLASHING AND SHEET METAL. Provide prefinished flashings with a 20-year manufacturer finish warranty. Exposed fasteners should be kept to an absolute minimum using concealed fasteners and cleats used wherever possible. Provide attachments based upon wind loads as determined in accordance with ASCE 7 and the IBC. All fasteners shall be stainless steel.

Sheet metal copings, trim and flashings to be prefinished aluminum (0.040 inch min) or Galvalume (24 gage min) with color and profile color to match existing. Copings to have back-up plate joints and membrane underlayment that laps onto the wall or roofing a minimum of 3 inches and shall have continuous cleat anchorage to wall substrate if not self-adhered type. Provide flashings for windows, louvers and other openings with end dams and direct water to the exterior.

8.7.2.5 Roof Drains and Overflow Systems

Provide roof drain system with concealed rainleader downspouts and connect to underground storm drainage piping system provided by this project. Roof drain assemblies shall be large dome sump type with clamping rings and flashed into the roofing system in accordance with NRCA roofing details and manufacturer roofing recommendations. Provide emergency overflow drain system that includes an independent piped drainage system with through-wall drain outlet.

8.7.2.6 Roof Hatch and Access Ladder

Provide ladder and roof hatch to main roof of the new addition. Ladder to be located in the new addition mechanical/electrical room. Roof hatch to be galvanized steel with interior latch and lock hasp, insulated hatch and curb assembly (12 inch high min), and flashed to the roofing system. Provide ladder from new addition lower roof to new addition upper roof area.

Ladders to be steel (interior - primed and painted, exterior - galvanized and painted), and with safety posts and rails per OSHA requirements.

8.7.2.7 Fall Protection

UFC 3-110-03, par 1-8.5; Elimination, Prevention or Control of Fall Hazards:

Any part or component of the building, facility, structure or equipment requiring future maintenance work at all roofs shall incorporate in the design fall prevention methods or techniques to eliminate fall hazards during occupancy and when performing maintenance work. The preferred order of control measures or the hierarchy of controls is to eliminate the need to work at heights (design out fall hazards), followed by prevention (installing guards) and protection and control of fall hazards by identifying, designing and installing anchorages (hard points) for safe use of fall arrest equipment and systems.

The materials used in all fall protection equipment shall be selected for metal compatibility in order to minimize corrosion – type 316 stainless steel is recommended and therefore is required.

Elimination, prevention or control of fall hazards shall comply with the provisions and requirements of American National Standards Institute, ANSI/ASSE Z359 Fall Protection Code, ANSI/ASSE A1264.1 Standard and DOL - 29

CFR Part 1910, Subpart D. For additional information, refer to Building Design Elements for Enhanced Fall Protection for Construction and Maintenance Personnel: An NRCA Perspective.

AFI 91-203, par 13.2.1:
Fall prevention and protection must be considered for maintenance work or storing of equipment at heights. At the planning and design phase of a project, fall hazards SHALL be considered and eliminated whenever possible. When elimination or prevention of fall hazards is not feasible, the design must include certified and labeled anchorages IAW 29 CFR 1910.66, Powered Platforms for Building Maintenance, and ANSI Z359.1, Safety Requirements for Personal Fall Arrest Systems, Subsystems and Components. Where fall protection is required near weight handling equipment, care must be taken to prevent potential conflicts between the weight handling equipment and fall protection measures.

Provide an engineered fall protection system that includes anchor points, tracks or cable systems for connection of maintenance personnel Personal Fall Arrestor Systems to perform maintenance, inspections and repairs for the entire roof surface of all roof levels of the new addition. The materials used in all fall protection equipment shall be selected for metal compatibility in order to minimize corrosion – type 316 stainless steel shall be provided.

8.7.2.8 Covered Entry Canopy

A covered entry to the new addition is to be provided. Canopy system to be a pre-engineered cantilevered (wall supported) aluminum framed canopy system composed of exposed tube style framing components, clear anodized or baked enamel finish, and polycarbonate roof panels. Basis of design to be equal to Custom Cantilevered Canopy System by Mitchell Metals, LLC (www.mitchellmetals.net).

Aluminum canopy cover shall be shop welded together into a two part frame system consisting of the main support frame and the decking frame.

Polycarbonate Panel decking shall be attached using H-Channel to connect each panel together. All connections of the Polycarbonate Panel shall be caulked. Decking shall be 16mm (minimum) translucent Polycarbonate Panel, clear color, 10 year warranty for anti-yellowing (Basis of Design; Triple Clip Polycarbonate Panels, Polygal, Inc. www.polygal.com).

Canopies shall drain from the decking to the drain beam against the wall, down the vertical column at each end, and discharge at the bottom of the column into underground stormwater drain system.

The canopy frame is to be fastened to the wall using required fasteners to withstand wind loading pressures and factors and rain loading on the canopy. Custom flashing is to be used under the decking frame to prevent water from blowing out between the decking and drain beam.

8.7.3 Exterior Door Assemblies

Exterior flush doors and frames shall be galvanized steel and of the thickness and construction to meet physical security criteria specified in Section 3 PROJECT REQUIREMENTS of this specification if located in the secure area perimeter. Doors, frames and hardware shall meet and AT/FP requirements of UFC 4-010-01 for low level of protection with explosive weight II, tested in accordance with ASTM F 2247. Single doors shall be 1 ¾" thick, minimum 3' x 7' and double doors 6' x 7' unless required otherwise to be larger.

8.7.3.1 Steel Flush Doors:

All flush steel exterior doors and frames shall meet SDI/DOOR A250.8, Level 3, physical performance Level A, Model 2 with insulating core construction. All steel door frames shall be welded. Exterior doors shall have top edge closed flush and sealed to prevent water intrusion and a minimum thickness for doors shall be 1-3/4 inches minimum. Fabricate exterior doors and frames from hot dipped zinc coated steel, alloyed type, that complies with ASTM A924/A924M and ASTM A653/A653M. The coating weight shall meet or exceed the minimum requirements for coatings having 0.4 ounces per square foot, total both sides (A40). Door frames not located under protective overhangs shall have drips. All doors shall include aluminum thresholds and aluminum housed weather seals. Exterior flush doors shall receive a painted finish. All drips and insulation will be specified to match the color of the doors.

8.7.3.2 Door Hardware:

Refer to Interior Construction portion of this RFP specification for door hardware requirements.

8.7.4 Exterior Glazed Entrances and Window Assemblies

Prefinished aluminum storefront entrance and curtain wall window systems, fluoropolymer finish (Kynar 500 or equal) of color to match existing main entry, with insulating laminated low-e tinted glazing. The storefront entrance is to be provided at the new addition main entry. Storefront or curtainwall window assemblies to be provided at other locations shown.

Prefinished aluminum curtainwall and storefront entrance and glazing assembly shall comply with UFC 4-010-01 AT/FP and shall meet all code required structural design and wind loads. Window and door assemblies shall meet hurricane impact criteria for large and small missiles; Large Missile Test per ASTM E 1996 and Small Missile Test per ASTM E 1886. Door and frames to be extruded aluminum shapes (thermally broken) with minimum wall thickness, 0.125 inch. Storefront and curtainwall glazing shall be insulating glass Quality q3 - glazing select, conforming to ASTM C 1036, with medium bronze tint coating color to match existing. Refer to Interior Construction portion of this RFP specification for door hardware requirements.

Aluminum storefront doors to be minimum 1-3/4 inch thick; minimum wall thickness, 0.125 inch, except beads and trim, 0.050 inch; full-lite design with medium stiles and rails; Fabricate from extruded aluminum hollow seamless tubes or from a combination of open-shaped members interlocked or welded together; air leakage of weather stripping door shall not exceed 0.5 cubic feet per minute of air per square foot door area when tested in

accordance with ASTM E283. Provide storefront doors with insulated glazing assemblies.

Storefront window frames to be extruded aluminum shapes with removable glass stops and glazing beads for frames accommodating fixed glass. Mill joints in frame members to a hairline fit, reinforce, and secure mechanically. Aluminum Alloy for Doors and Frames; ASTM B221M, ASTM B221, Alloy 6063-T5 for extrusions; ASTM B209M, ASTM B209, alloy and temper best suited for aluminum sheets and strips. When tested in accordance with ASTM E283, air infiltration per door leaf must not exceed 0.06 cubic feet per minute per square foot of fixed area at a test pressure of 6.24 pounds per square foot. When tested in accordance with ASTM E331, there must be no water penetration at a pressure of 8 pounds per square foot of fixed area.

Aluminum curtainwall frame window systems shall be aluminum-alloy extrusions conforming to ASTM B221; framing members shall be aluminum-alloy extrusions with a wall thickness not less than 0.125 inch. Glazing rabbet legs shall be an integral part of the frame with the leg depth not less than the minimum depth specified for the thickness and size of the glass material or panel to be installed in the curtain-wall frame; joints shall be accurately fitted and flush, with watertight hairline joints not exceeding 1/64 inch in width. Apply non-skinning
sealing compound to the unexposed surfaces of all mortise-and-tenon joints; Air Infiltration Test through the wall when tested in accordance with ASTM E283 shall not exceed 0.06 cfm per square foot of fixed wall area. No water penetration shall occur when the wall is tested in accordance with ASTM E331 at a differential static test pressure of 20 percent of the inward acting design wind pressure as specified, but not less than 4 psf. Make provision in the wall construction for adequate drainage to the outside of water leakage or condensation that occurs within the outer face of the wall.

Doors with electric locking hardware connected to access control system shall have all wiring concealed in frame.

Glazed systems (frames and glass) will be Energy Star labeled products as appropriate to climate zone and as applicable to window type, and as required by ASHRAE 90.1 and energy performance standards as defined in this RFP, as a minimum insulating glazing units with tinted glass and low-e coating system.

Perimeter sealant shall be silicone sealant meeting ASTM C 920, Type S, Grade NS.

Provide ½” thick solid surface window sill with bevel edge treatment on the room side of all windows.

8.7.5 Wall Louvers

Prefinished aluminum or galvanized steel, fixed blade 45 degree minimum slope drainable wall louvers. Wall louvers will meet wind loads as defined in accordance with ASCE 7 and be AMCA certified for expected wind driven rain. Intake louvers shall comply with UFC 4-010-01 standards. Finish color shall match wall surface.

8.7.6 Exterior Equipment Enclosure

Provide an equipment enclosure for the new mechanical chiller serving the new addition. The equipment enclosure to be generally located as shown on the criteria drawings and of a configuration that provides space for equipment, ventilation and maintenance clearances.

The enclosure walls are to be stucco clad masonry with prefinished metal coping design as shown on the criteria drawings and to match similar condition of the existing building. Stucco walls shall include reveals and control joints in patterns and profile similar to the criteria drawings to provide scale and interest to the facility design, thermal movement and crack control.

Walls to be of a height to conceal all equipment and allowing for maintenance access between equipment and chain link cover. The enclosure to be secured with a chain link fabric cover and lockable louvered gate to meet AT/FP criteria. Chain link fence cover and supports to be of galvanized materials and fabric and supports installed below the top edge of the screen walls so not to be visible from eye level. Enclosure gates shall be 6’ wide minimum x 8 feet high, prefinished louvered aluminum style, and stainless steel hardware (hinges, drop-arm/keeper, lock hasp and pad lock (keyed as required by Base CE).

8.7.7 Exterior Painting

Comply with Master Painter Institute (MPI) standards for commercial quality coatings. As a minimum, SSPC PA Method 1 will apply to all surfaces, follow MPI Architectural Painting Specification - recommendations noted are considered to be required. Paint all exposed unfinished surfaces unless otherwise noted including but not limited to precast concrete panels, exposed portions of stormwater system, exterior piping systems, handrails, valves, signs and other non-factory finished items. System shall include as a minimum prime coat as recommended by finish coating system manufacturer and two finish coats (color, texture and sheen to match existing).

8.7.8 Exterior Coating on Existing Precast Tee Wall Panels
(Bid Option)

Provide an elastomeric acrylic coating system with integral color on the existing precast concrete double tee wall panels on the east and south sides of the existing building as shown on the criteria drawings. Elastomeric acrylic coating system shall be integral color, textured to match the adjacent stucco surfaces, roller or spray applied. Provide primer recommended by coating manufacturer.

Clean and prepare existing surfaces for new coating system as required by the manufacturer. Remove existing sealant at joints between precast panels, around windows, louvers and doors and replace with new backer rod and sealant. Sealant to be the type that is compatible with the new elastomeric coating system.

8.7.9 Exterior Building Signs

Provide two building number signs, aluminum plaque, colors per base standards, installed on the opposing south west corners of the new addition as generally shown on the criteria drawings.

8.8 INTERIOR CONSTRUCTION

8.8.1 General

Refer to Section 9 of this specification for additional criteria and requirements.

8.8.1.2 Secure Area Wall, Floor, and Ceiling Construction

This facility includes Secure Areas that have specific design and construction requirements and criteria. Refer to Section 3 PROJECT REQUIREMENTS of this specification for additional requirements. Secure Area perimeter walls shall be constructed from the top of the concrete floor slab to the underside of the metal floor or roof decks. Provide fire and smoke rated partitions in compliance with design criteria identified.

8.8.2 Partitions

8.8.2.1 Interior Wall Construction

Interior walls shall be constructed using galvanized metal studs (minimum 3 5/8”, 24 gauge, 16” o.c.) and gypsum board, and/or CMU masonry as indicated or required. CMU masonry walls requiring gypsum board wall finish shall be furred with minimum 2-1/2 inch deep metal furring or metal studs and sheathed in gypsum wallboard. Gypsum board shall be 5/8 inch thick minimum and meet ASTM C1396/C1396M (provide glass mat faced gypsum wall board meeting ASTM C1658/C1658M-13 for interior sides of exterior walls). Provide Type ‘X’ for fire rated assemblies and higher density core for STC acoustical rated assemblies. Provide impact resistant gypsum wallboard in Breakroom and Prep area.

Provide cement backboard for toilet room walls with tile. Provide moisture resistant gypsum board for janitor rooms and toilet room ceilings meeting ASTM C1396/C1396M. Apply gypsum board to framing and furring members in accordance with ASTM C840 or GA 216 and the requirements specified.

All interior walls, interior side of exterior walls and columns shall be finished with gypsum wall board and painted (except for mechanical room walls). Interior gypsum surfaces shall be finished to ASTM C 840 and GA 214 and GA 216; provide Level 4 finish unless otherwise noted and Level 3 finish when overlaid by tile.

Metal studs shall have a galvanized coating ASTM A653/A653M, G-60; aluminum coating ASTM A463/A463M, T1-25; or a 55-percent aluminum-zinc coating. Provide support systems and attachments per UFC 3-310-04, "Seismic Design for Buildings" in seismic zones. Installation of metal support framing shall be in accordance with ASTM C754.

Masonry walls shall be provided for mechanical rooms for durability and acoustical sound control and at stairways (interior and exterior walls), all

walls painted. Stair walls shall be furred and finished with gypsum wallboard and painted.

8.8.2.2 Environmental Conditions for Installation

No wall board or finishes shall be installed prior to construction meeting required interior environmental conditions. This includes gypsum wallboard, cementitious backerboard, and all applied finishes. Acceptable environmental conditions are as follows. Building is completely dried in including: roofing system, wall air/water barrier, exterior windows, louvers and doors. The Contractor is responsible for providing a watertight facility with humidity control with additional systems as required to achieve sustainability indoor air quality criteria. Additionally, temperature and humidity ranges shall be in compliance with manufacturer's directions and technical specifications for specific products.

8.8.2.3 Acoustical and Physical Security Considerations

Partitions shall consider acoustical properties required by physical security criteria and acoustical privacy. Refer to Section 3 PROJECT REQUIREMENTS for physical security requirements for walls and partitions that are part of the Secure Area perimeter. The following rooms shall have STC 45 rated walls for acoustical privacy; private and shared offices, breakroom (if enclosed), secure comm rooms, and toilet rooms (STC rating to follow physical security criteria if these rooms form part of the secure area boundary). Conference rooms shall have STC 50 rated partitions. Mechanical room walls shall have STC 60 partitions or walls. Walls shall extend from concrete floor slab to floor or roof deck above with perimeter and all penetrations sealed.

Non-secure walls installed in areas with access flooring shall install the partition wall on top of the access floor system and infill the space below the access floor with construction to close the space between the access floor and concrete floor slab and any penetration or opening sealed to provide a similar level of acoustical control (intent is to provide as much uninterrupted access floor possible for future use flexibility). Security walls in areas with access flooring shall be installed on top of the true concrete floor slab and extend to the true floor or roof deck above with perimeter and all penetrations sealed.

Security walls and partitions that form part of the Secure Area boundary shall meet criteria specified in Section 3 PROJECT REQUIREMENTS that defines the minimum construction criteria for the security wall construction and the frangible portion of the wall for the installation of building utility system device outlets, boxes, conduits and other types of pathways to be installed in a concealed manner to provide a finished appearance as ICD/ICS 705 does not permit building utilities to be installed inside a designated perimeter security wall (concealed). Secondary frangible walls shall terminate above the false ceiling. All utility distribution (power, signal, etc.) on the controlled side of the perimeter walls shall be surface mounted on the Secure Area perimeter wall or within the frangible wall assembly. Frangible wall construction shall be provided at all security walls to conceal building utility systems and pathways (building utility systems shall not be installed exposed except in mechanical room on masonry walls).

8.8.2.4 Blocking

All walls to receive mounted items whether Government or Contractor provided or installed must have galvanized steel or treated wood blocking as structural backup. Grab bars must sustain a pulling force of 350 lbs. exerted in any direction.

The Contractor is responsible for installing all blocking and coordination of the size, extent and location of blocking required for each item and shall coordinate blocking for Government furnished and installed equipment (GF/GI) with the Contracting Officer to confirm actual equipment weights and dimensions of the specific wall mounted equipment.

8.8.2.5 Demountable Partitions

Criteria floor plans indicate locations for demountable partitions. Demountable partitions and related doors (door, frame, hardware) are to be provided as part of the FF&E package. Refer to Section 9 INTERIOR DESIGN of this specification for additional information and requirements for demountable partitions.

8.8.2.6 Patch and Repair of Existing Walls

Alterations work may require patch and repair of existing gypsum wallboard surfaces due to work on this contract. Walls that are patched or repaired shall be finished and painted from corner to corner of that room to match existing texture, color, and finish.

8.8.3 Colors and Finishes

The Design Build Contractor will update the Government provided Structural Interior Design (SID) and Comprehensive Interior Design (CID) packages included in this RFP. Colors and finishes will not be changed without prior approval of the Government. Refer to Section 9 INTERIOR DESIGN of this specification for additional SID and CID requirements and the SID and CID Packages included in Appendix B and C of this RFP.

8.8.4 Flooring

8.8.4.1 Tile Flooring

Provide thickset tile flooring in toilet rooms to slope floor to drains. Refer to Section 9 INTERIOR DESIGN of this specification for additional requirements.

8.8.4.2 Access Flooring

Provide access flooring in rooms and areas indicated on the criteria drawings and this RFP. The floor structure shall be recessed 12 inches below the true finished floor elevation of the building to avoid the need for steps and ramps so the new access floor system finish elevation will be at the same

elevation as the adjacent floor slabs. Contractor shall coordinate all cable opening size and location with Government prior to installing openings.

Access Floor Criteria and Performance Requirements:

a. Panels shall be die-formed steel composite panels totally enclosing the panel. The void between the top and bottom sheet shall be completely filled with a non-combustible cementitious or concrete material. Seal cut edges in accordance with manufacturer's recommendations. Fasten end of each stringer and mid-point of each 4-foot stringer positively to pedestal heads, using manufacturer's standard screws. Provide screws that are removable from the top of the panel.

b. Provide rigid grid stringer type with concentrated load of 1250 lbs. Uniform Live 300 psf, Rolling load 800 pounds applied through hard rubber surfaced wheel 6 inches diameter by 2 inch wide for 10,000 cycles over the same path. A Rolling load of 1250 pounds applied through a 3 inch diameter by a 1-13/16 inch wide caster for 10 cycles over the same path, without developing a local overall surface deformation greater than 0.04 inch. The impact load of 150 pounds anywhere on the panel dropped from a height of 36 inches onto a 1 square inch area without a failure of the system. Provide stringers capable of supporting a 250 pound concentrated load at mid-span without permanent deformation in excess of 0.010 inch. Provide additional pedestals at sides of panel beneath access floor if required to insure proper support of racks, equipment, safes, and for large cable openings.

c. Ground the access flooring system for safety hazard and static suppression. Provide positive contact between components for safe, continuous electrical grounding of entire floor system. Total system resistance from wearing surface of floor to building grounding electrode shall be within range of 0.2 to 2.0 megohms. Electrical joint resistance between individual stringer and pedestal junctions shall be less than 0.1 milliohms. Electrical resistance between stringers and floor panels, as mounted in normal use, shall be less than 3 ohms.

d. Provide accessories that include grommets with hinged or sliding covers for various cabling types and sizes (minimum 3-inch diameter), and recessed floor boxes with covers. Provide a minimum of (3) grommets at each workstation for comm/data cabling and power feeds. Provide grommets for each shredder, Quantity and locations of grommets with covers in Secure Comm rooms shall be as follows at each rack cabinet; (1) each minimum 4" x 6" edge mounted or center mounted grommet as required for rack condition. Raw edges created by cutting tiles shall be trimmed with manufacturers trim installed to provide a neat and clean appearance without use of exposed fasteners (no raw edges allowed). Provide access floor panel lifter appropriate for each finish flooring type (i.e. Laminate Floor: Suction cup lifter, Modular Carpet Tile Lifter with Carpet Grip).

e. Basis of design is Tate Access Floor Concore 1250. Refer to Section 9 INTERIOR DESIGN of this specification for additional requirements.

8.8.4.3 Sealed Concrete Floor Slabs

All concrete floor slabs that do not receive a finish shall be sealed with a water based sealer to prevent dusting and for general maintainability. Areas include but not limited to; mechanical rooms, electrical rooms, and all concrete slabs and sidewalls below access flooring.

8.8.4.4 Exterior Sidewalks

Exterior sidewalks and paved surfaces shall be slightly lower than the building finish floor elevation at the entry doors to provide a positive water stop while meeting accessibility criteria.

8.8.5 Ceilings

Ceiling systems shall be provided in all rooms except for the mechanical and electrical rooms. Rooms without ceilings shall have the structure and all exposed element painted (fire sprinkler piping and fire alarm system components to be painted a different color as specified in this RFP. Refer to Section 7 ROOM DESCRIPTIONS AND FUNCTIONAL REQUIREMENTS for additional ceiling requirements and minimum heights.

8.8.6 Doors

Doors shall be solid core wood, 1 ¾" thick, 3' x 7' minimum, unless otherwise noted or larger for required application. Provide particleboard core or wood stave, Type II flush doors conforming to WDMA I.S. 1-A with faces of select premium white birch. Hardwood veneers shall be plain sliced book matched. Doors shall be factory stained and finished and factory prepared for door hardware. Provide vertical oriented narrow view glass view panels (approx 4 inches x 24 inches) in doors to the following rooms; private office, doors in circulation path of corridors and stairway doors.

Doors shall be fire-rated and/or STC rated as required for application. Doors required to have an STC ratings will be a tested assembly that includes door and frame, and certified to achieve the STC rating equal to or higher than the partition wall it is installed in, unless noted otherwise. Doors for non-secure private office and shared office, and toilet rooms are not required to be STC rated assemblies, but shall have closer, perimeter sound seals and automatic door bottoms to provide acoustic control.

STC rated/RF Shielded doors and frames shall be constructed of metal and of the construction required to meet ICD/ICS 705 criteria, required sound rating, and RF shielding effectiveness as further defined in Section 01 10 10-3.19.

Door frames shall meet SDI/DOOR A250.8, Level 3, except as otherwise specified. Form frames to sizes and shapes indicated, with welded corners (knock-down frames are not allowed). Provide steel frames for doors, transoms, cased openings, and interior glazed panels, unless otherwise indicated.

8.8.7 Door Finish Hardware

8.8.7.1 Door Hardware General

Exterior and interior door hardware shall be provided for all doors in a satin stainless or chrome finish (BHMA 630 or 626) or unless specially noted otherwise. Exterior hardware shall be stainless steel unless not available then shall be satin chrome. Hardware components and keying shall be provided and shall meet requirements for accessibility, and NFPA requirements for life safety. Use concealed style hardware devices whenever possible. All doors and frames will be reinforced as needed to accommodate hardware. All doors shall have locking hardware to secure door.

Hardware shall be of the type and configuration required to meet physical security, AT/FP, and hurricane impact as specified in other sections of this RFP.

Provide the services of an Architectural Hardware Consultant (AHC) or Equivalent hardware consultant. The Consultant shall review and approve the hardware design and construction submittals.

8.8.7.2 Special Hardware Requirements for Secure Area Perimeter Security Doors

Provide door hardware as required by Section 3 DESIGN REQUIREMENTS in this specification for physical security criteria in this RFP.

8.8.7.3 Exterior Hardware Minimum Requirements

a. Hinges – provide minimum three per door leaf, BHMA A156.1, 4-1/2 by 4-1/2 inch (minimum), stainless steel, BHMA 630 finish, ball bearing hinges, non-removal pins for security doors.
b. Locksets – BHMA A156.13, Series 1000, Operational Grade 1, Security Grade 2, escutcheons not less than 7 by 2-1/4 inch with a bushing at least 1/4 inch long, BHMA 630 finish. Provide lever style handles of design to match existing doors. Provide electric lock or strike devices and related power supplies and electrical transfer devices for doors with GFGI keypad / card reader access controlled doors (coordinate system with GFGI ACS system to provide a fully operational system).
c. Exit Devices - BHMA A156.3, Grade 1, BHMA 630 finish. Provide adjustable strikes for rim type and concealed vertical rod devices. Provide open back strikes for pairs of doors with mortise and vertical rod devices. Provide touch bars in lieu of conventional crossbars and arms. Provide escutcheons, not less than 7 by 2-1/4 inch. Provide no outside trim and local audible alarm as required for security doors. Provide electric exit device and related power supplies and electrical transfer devices for doors with GFGI keypad / card reader access controlled doors (coordinate system with GFGI ACS system to provide a fully operational system).
d. Closers – BHMA A156.4, Series C02000, Grade 1, with PT 4C (unless otherwise noted), BHMA 689 finish. Provide with brackets, arms, mounting devices, fasteners, full size covers, except at storefront mounting, and other features necessary for the particular application. Provide closers on all fire rated or acoustic rated doors.

e. Coordinators – provide for pairs of doors with closers, BHMA 689 finish.
f. Weather Stripping and Thresholds - Provide adjustable weather stripping (1.25 CFM air leakage rate, maximum) and aluminum thresholds at all exterior doors.
g. Soundproofing Gasketing – provide at all sound rated door assemblies as tested.
h. Kick Plates – stainless steel, BHMA 630; provide on following door conditions; stairs.
i. Hardware for storefront doors can be provided by the door manufacturer for the tested assembly.

8.8.7.5 Interior Hardware

a. Hinges – provide minimum three per door leaf, BHMA A156.1, 4-1/2 by 4-1/2 inch (minimum), non-removal pins for security doors. Provide cam lift hinges for STC doors.
b. Locksets – BHMA A156.13, Series 1000, Operational Grade 1, Security Grade 2, escutcheons not less than 7 by 2-1/4 inch with a bushing at least 1/4 inch long, BHMA 630 finish. Provide lever style handles of design to match existing doors. Provide electric lock or strike devices and related power supplies and electrical transfer devices for doors with GFGI keypad / card reader access controlled doors (coordinate system with GFGI ACS system to provide a fully operational system).
c. Exit Devices - BHMA A156.3, Grade 1, BHMA 630 finish. Provide adjustable strikes for rim type and concealed vertical rod devices. Provide open back strikes for pairs of doors with mortise and vertical rod devices. Provide touch bars in lieu of conventional crossbars and arms. Provide escutcheons, not less than 7 by 2-1/4 inch. Provide electric exit device and related power supplies and electrical transfer devices for doors with GFGI keypad / card reader access controlled doors (coordinate system with GFGI ACS system to provide a fully operational system).
d. Spin Dial locks – provide spin dial locks on designated security area entry doors, meeting FF-L-2890B (Type II or IV as required by application) with an integral combination lock meeting FF-L-2740A. FF-L-2890B Type II and IV locks have an electronic release capability for use with automated building access control systems (ACS) keypad/card reader, coordinate the spin dial lock system and operation with the GFGI ACS system and provide all necessary interface elements, signal wiring and power systems to provide a fully operational ACS and spin-dial lock assembly. Refer to RFP Section 01 10 10-3.19 for additional information and requirements.
e. Closers – BHMA A156.4, Series C02000, Grade 1, with PT 4C (unless otherwise noted), BHMA 689 finish. Provide with brackets, arms, mounting devices, fasteners, full size covers, except at storefront mounting, and other features necessary for the particular application. Provide closers on all fire rated or acoustic rated doors. Provide heavy duty closers with large pistons (equal to LCN 4040 series) for STC rated doors with sound gasketing.
f. Coordinators – provide for pairs of doors with closers, BHMA 689 finish.
g. Soundproofing Gasketing – provide at all sound rated door assemblies as tested.

h. Kick Plates – stainless steel, BHMA 630; provide on following door conditions; janitor closets, toilet rooms, and stairs.
i. Door silencers – provide on all doors.

8.8.7.2 Cores, Cylinders and Keying Requirements

Provide cylinders and cores with seven pin tumblers (small format IC 7 pin cores). Provide cylinders from products of one manufacturer, and provide "CORMAX" cores (Smith Standard) from the products of one manufacturer. Rim cylinders, mortise cylinders, and knobs of bored locksets have interchangeable cores which are removable by special control keys. Stamp each interchangeable core with a key control symbol in a concealed place on the core.

Provide an extension of the existing keying system. Provide construction interchangeable cores.

The Contractor shall coordinate a keying system meeting. The Contractor's Project Manager, Superintendent, Hardware Subcontractor, Contracting Officer, Base Hardware Specialist, Electrical Subcontractor, and the Using Activity shall attend this meeting to establish the keying system for the project. This meeting is intended to verify base limitations, the necessary security, and access control within the facility. The meeting shall produce a marked up copy of the floor plan together, and any master keying or grand master keying.

a. Keys: Furnish one file key, one duplicate key and three working keys for each key exchange and for each master and grand master keying system.

b. Key Cabinet and Control System: BHMA A 156.5 - Provide key cabinet with 25 percent more key hooks than required for interior and exterior doors.

8.8.10 Stairs

8.8.10.1 Stair Construction

Stairs shall be steel stairs complete with stringers, metal-pan concrete-filled treads, landings, handrails, guardrails, and necessary bolts and other fastenings. Steel stairs and accessories to be shop painted and field painted.

8.8.10.2 Handrails and Guardrails

Handrails shall be steel handrails, including inserts in concrete, steel pipe conforming to ASTM A 53 or structural tubing conforming to ASTM A 500, Grade A or B of equivalent strength. Provide steel railings of 1 1/2 inches nominal size. Handrail and components shall be shop primed and field painted.

Guardrails shall be steel, vertical picket style with rectangular top rail and bottom rail and square tube posts welded or bolted to the side of stair stringer. Guardrail and components shall be shop primed and field painted.

8.8.11 Paint and Painting

All room and area surfaces shall be painted unless surface is prefinished. All secure area perimeter wall surfaces shall be painted including above ceiling and below access flooring and paint ceilings that form part of the security perimeter to provide a uniform appearance for security inspection purposes (refer to Section 3 for additional finishing and painting requirements for Secure Areas). Provide eggshell finish on gypsum board walls and semi-gloss on trim and door frames. Provide commercial grade paint systems meeting MPI standards. Comply with UFC 1-200-02 and sustainability requirements. Paint all exposed surfaces unless otherwise indicated. Coordinate painting and stenciling of fire sprinkler water system within building as indicated in guide specifications. As a minimum, all surfaces are to receive primer as recommended by the finish coating system manufacturer and two finish coats. Masonry walls to have block filler and primer (if required) and two finish coats (semi-gloss).

Comply with the recommendations of UFGS 09 90 00 PAINTS AND COATINGS for materials and preparation of surfaces to be coated. Comply with Master Painter Institute (MPI) standards for commercial quality coatings. As a minimum, SSPC PA Method 1 will apply to all surfaces, follow MPI Architectural Painting Specification - recommendations noted are considered to be required.

8.8.12 INTERIOR FINISHES

Selections of interior finishes have been made and are included in the RFP – criteria drawings, and the SID and FF&E portions of this RFP. Relative to the material, the selections serve to identify the requirements for quality and characteristics of the finish materials. Any changes or modifications to the material selections included in the RFP must be of equal or better quality to the selections included as part of this RFP and approved by the Government.

See Section 9 INTERIOR DESIGN of this specification for additional information and requirements.

8.8.13 Cabinets and Casework

Materials and construction of cabinets and countertops shall be in accordance with Architectural Woodwork Institute (AWI) quality standards "AWI Custom Grade" with plastic laminate finish except as noted below. Melamine is not allowed.

Wall and base cabinets shall be of the same construction and appearance with solid ends and frame fronts, or with frames all around. Frames shall be not less than 3/4 inch by 1-1/2 inches hardwood. All ends, bottoms, backs, and partitions shall be hardwood plywood. All drawers will include solid wood rails and plywood bottoms. Cabinet doors and drawer fronts shall be either hardwood plywood or medium density fiberboard cores with like materials both faces. Construction of cabinets shall be by mortise and tenon, dovetail, or dowel and glue joints.
Hardware: Provide cabinet hardware including minimum two self-closing hinges for each door and two side-mounted self-closing metal drawer slides for each drawer and pulls for all doors and drawers as follows. All cabinet hardware exposed to view shall be ANSI/BHMA 156.9, Grade 1, and comply with the following requirements:

a. Concealed Euro-Style, back mounted hinges with opening to 165 degrees and a self-closing feature at less than 90 degrees.
b. Drawer slides shall have a static rating capacity of 100 lbs. (444N), full extension.
c. Provide adjustable shelving standards with shelf support hardware for all cabinets.

Countertops and backsplashes shall be solid surface material, minimum ½ inch thick, 100 percent pure acrylic polymer, mineral fillers, and pigments. The material shall be homogenous, not coated or laminated. Superficial damage to a depth of 0.010 inch shall be repairable by sanding or polishing. Install with factory recommended fasteners, adhesives and sealants. Provide the following performance characteristics:

a. Tensile strength, ASTM D 638: 5800 psi minimum.
b. Hardness, ASTM D 2583: Barcol Impressor 55 minimum.
c. Flammability, ASTM E 84: Class I/A, flame spread 25 maximum; smoke developed 30 maximum.

8.8.14 Toilet Room Accessories

Toilet accessories shall be ABA compliant and furnished as indicated below. All accessories shall be stainless steel with brushed nickel finish commercial grade quality products.

a. Each toilet stall shall have; double roll toilet tissue dispenser; door mounted coat hooks (standard and ADA height). Handicapped accessible stalls shall also include wall mounted grab bars. All women's toilet stalls shall have sanitary napkin disposal units. Coordinate selection with Base janitorial services Supply Contractor.

b. Countertop sinks shall be constructed integrally to the countertop using a solid surface material.

c. Each lavatory shall be furnished with a wall mounted recessed soap dispenser.

c. Where countertop sinks are shown, a mirror 48 inches in height extending the "full width" of the countertop shall be provided ("full width" may be shortened approximately 1 inch on both ends to accommodate side fasteners).

d. One recessed handicapped accessible paper towel dispenser/disposal unit shall be furnished adjacent to each lavatory area.

e. One full length mirror near entry door.

8.8.15 Toilet Partitions and Urinal Screens (ADAABA Compliant)

Partitions, doors and screens shall be solid plastic with stainless steel fittings and hardware. Toilet partitions shall be floor mounted and overhead braced. Urinal screens shall be wall supported.

8.8.16 Janitor Closets

Provide floor mounted service sink, medium duty steel shelving (16 inches deep x 36 inches wide x 84 inches high with minimum 4 shelves), and storage space for a portable mop bucket, one stainless steel utility rack for holding mop and broom holder. FRP surface splash adjacent janitor sinks - minimum width of sink plus 24 inches and minimum 36 inches high.

8.8.17 Fire Extinguishers and Cabinets

Provide portable fire extinguishers and semi-recessed cabinets throughout the new addition in accordance with NFPA 10, UFC 4-740-06 and UFC 3-600-1 and with a maximum 75 foot spacing along the normal path of exit. Cabinets installed on secure area perimeter security walls shall not be recessed in any manner to preserve acoustical integrity of wall assembly. All cabinets shall have a clear glass front and shall be located in accordance with NFPA standards. Fire extinguisher cabinets shall be sized to accommodate as a minimum one ABC Dry Chemical, 10 lb. fire extinguisher. Fire extinguisher cabinets shall be primed steel painted to match the adjacent wall color and braced for extinguisher size. Cabinets shall not be lockable. Refer to Section 13. FIRE SUPPRESSION for additional requirements.

8.8.18 Comm/Data Cabling Penetrations at Fire Rated and/or Sound rated Walls and Floors

Comm/Data cabling that penetrate through walls and floors shall utilized a re-enterable sealing system to maintain the required fire or sound rating of the wall or floor assembly and to allow cabling to be removed and installed without having to utilize destructive means to remove sealing systems.

Cabling for data and communication applications shall be sealed with re-enterable systems or products. Sealing devices shall be pre-manufactured modular devices, containing built-in self-sealing intumescent inserts. Devices shall allow for cable moves, additions or changes without the need to remove or replace any firestop and acoustic materials.

Fire stopping devices must be capable of maintaining the fire resistance rating of the penetrated membrane at 0% to 100% visual fill of penetrants; while maintaining "L" rating of <5 cfm/sf at 0% to 100% visual fill. Each device must be capable of retrofit applications and be available in square and round configurations, with single, double, triple and six-plex bracket systems provided. Firestop devices must also allow for plastic pipe, metallic pipe, and mixed multiple penetrations plastic, metallic, insulated metallic, and cable through a single device.

8.8.19 Wheelchair Lift

Provide an electric vertical platform wheelchair lift at the second floor corridor area near the entry to the Secure Vestibule as generally shown in the RFP criteria drawings. The vertical platform lift shall be a manufactured system consisting of a machine tower with lifting platform, minimum 750 lb capacity and 9 fpm travel speed, recessed pit design, with all necessary controls and components to provide a fully functioning and

operational lift assembly, and of the specific type and dimension to provide adequate lifting height to suit the building requirements.

Manufacturer shall have a minimum of 10 years of experience in the design and fabrication of vertical platform lifts.

Unit shall have a four (4) year limited parts warranty on the basic unit, including all electrical and drive system components.

Unit shall be installed and operated in accordance with the ICC/A117.1, NEC and ASME A18.1 Guidelines.

The installation of the vertical platform lift shall be made in accordance with the approved plans and specifications and the manufacturers installation instructions.

8.9 SPECIFICATIONS

The following list of specifications is anticipated for this project. The list is not comprehensive and the Contractor shall provide all specifications required to adequately describe the project and all materials to be used and installed. The Contractor shall edit and submit the following UFGS as defined in Section 01 10 12, Design After Award using the latest comparable SpecsIntact version:

01 33 29 SUSTAINABILITY REPORTING
01 91 00.00 COMMISSIONING

02 41 00 DEMOLITION

04 20 00 MASONRY

05 50 13 MISCELLANEOUS METAL FABRICATIONS
05 51 00 METAL STAIRS
05 52 00 METAL RAILINGS

06 10 00 ROUGH CARPENTRY
06 41 16.00 10 LAMINATE CLAD ARCHITECTURAL CASEWORK
06 61 16 SOLID POLYMER (SOLID SURFACING) FABRICATION

07 05 23 PRESSURE TESTING AN AIR BARRIER SYSTEM FOR AIR TIGHTNESS
07 21 13 BOARD AND BLOCK INSULATION
07 21 16 MINERAL FIBER BLANKET INSULATION
07 22 00 ROOF AND DECK INSULATION
07 27 26 FLUID-APPLIED MEMBRANE AIR / MOISTURE BARRIER
07 42 14 INSULATED METAL WALL PANELS
07 42 43 COMPOSITE WALL PANELS
07 51 13 BUILT-UP ASPHALT ROOFING
07 52 00 MODIFIED BITUMINOUS MEMBRANE ROOFING
07 60 00 FLASHING AND SHEET METAL
07 84 00 FIRESTOPPING
07 92 00 JOINT SEALANTS

08 11 13 STEEL DOORS AND FRAMES

08 11 16 ALUMINUM DOORS AND FRAMES
08 14 00 WOOD DOORS
08 44 00 CURTAIN WALL AND GLAZED ASSEMBLIES
08 71 00 DOOR HARDWARE
08 81 00 GLAZING
08 91 00 METAL (WALL) (AND) (DOOR) LOUVERS

09 06 90 COLOR SCHEDULE
09 22 00 SUPPORTS FOR PLASTER AND GYPSUM BOARD
09 24 23 STUCCO
09 29 00 GYPSUM BOARD
09 69 13 RIGID GRID ACCESS FLOORING
09 90 00 PAINTS AND COATINGS

10 14 01 EXTERIOR SIGNAGE
10 21 13 TOILET COMPARTMENTS
10 28 13 TOILET ACCESSORIES
10 44 16 FIRE EXTINGUISHERS

14 20 00 VERTICAL PLATFORM LIFTS

32 31 13 CHAIN LINK FENCES AND GATES
32 31 20 ORNAMENTAL STEEL FENCING AND GATES

9. INTERIOR DESIGN

9.1 STRUCTURAL INTERIOR DESIGN (SID)

The SID includes the selection and sampling of all applied finishes to complete the building exterior and interior architectural features.

9.1.1 DESIGN REQUIREMENTS

The Contractor must use this criterion and the drawings for the development of the SID exterior and interior finishes, materials, and colors. The SID submittals must run concurrent with the architectural submittals. The Contractor must update the color boards and the UFGS to reflect any of the Government comments or discontinued manufacturer colors indicated. The SID finishes accepted at the Final design phase (defined in Section 01 10 12) must be the SID finishes installed during the construction phase of the project.

9.1.2 SID/CID ROOM FINISH NARRATIVE

Each interior space must be finished in accordance with this narrative. This narrative provides initial guidance only. As the design becomes more defined after award of the contract, the Contractor must provide a comprehensive room finish schedule, signage schedule, edited UFGS 09 06 90 Color Schedule and associated guide specifications to define all aspects of the SID. Definitions: (GFGI) must mean Government Furnished, Government Installed.

9.2 New Addition Function Area/Room Summary Requirements

Room(s):	Secure Vestibule 130
Summary:	Secure Vestibule
Finish Requirements:	Floor: Modular Carpet Tile Base: 4" high rubber base Walls: Paint Ceilings: Acoustical Ceiling System See Finish Schedule and Color Schedule Key on Criteria Drawings I-601. See SID Submittal Appendix B.
Bid Option (FFE)	No furnishings required.
(GFGI)	Equipment has not been identified.

Room(s):	Open Office 131
Summary:	Open office area
Number of Occupants	(12) at Workstations
Finish Requirements:	Floor: Modular carpet tiles secured to access floor system by manufacturer. Provide Modular Carpet Tile Lifter with Carpet Grip. Base: 4" high rubber base Walls: Paint Ceiling: Acoustical Ceiling System See Finish Schedule and Color Schedule Key on Criteria Drawings I-601. See SID Submittal Appendix B.
Bid Option (FFE)	(11) Open Office Workstations 6’-0” x 6’-0” Provide two overhead storage cabinets at spline side. Workstations require one full height box / box/ file and one file / file pedestal with workstation. Provide freestanding LED Task Light with Occupancy Sensor. Provide (11) fully ergonomic chairs. Provide 3 60” printer stands, 1 shredder, 1 safe and 3 storage cabinets. Workstations will access power/voice/ data from beneath the rigid grid access floor. User will run telephone/data cabling (Patch cords) from MILCON provided comm outlets below the raised floor direct to equipment using cable management fasteners attached to workstations (exposed). Users to work with design-build contractor to determine best placement of grommets to protect exposed cabling below workstations. Power connection beneath access floor must be via U.L. Listed base feed connector with a metallic sheath provided by the Systems Furniture Manufacturer. Provide minimum 4 Duplex receptacles mounted in the base raceway. Design Build Contractor must provide modular jacks to fit in the knockouts in the raceways. Communications must be supplied through rigid grid access floor grommets from beneath the raised access flooring via side vertical raceways to a trough beneath the worksurface. There must be a minimum of 3-LC duplex fiber connectors

	NIPR/SIP/SAP) and 1-CAT 6 RJ45 jack (telephone per workstation. Printers at the North side of workstations must be connected to a separate circuit within the systems furniture. Outer panels must be fabric finish. See Installation Requirements and Order Data Sheets / Drawings in CID Appendix C for complete details.
(GFGI)	3 Printers

Room(s):	S. Comm 131A and 205
Summary:	Secure communications room.
Finish Requirements:	Floor: Static dissipative laminate on access floor. Provide suction cup access floor lifter. Base: 4” high rubber base Walls: Paint Ceiling: No ceiling, walls to deck. See Finish Schedule and Color Schedule Key on Criteria Drawings I-601. See SID Submittal Appendix B.
Bid Option (FFE)	No FFE identified.
(GFGI)	No equipment identified.

Room(s):	Office 132
Summary:	Single Person Office space
Finish Requirements:	Floor: Modular carpet tiles secured to access floor system by manufacturer. (Bid Option) Provide Modular Carpet Tile Lifter with Carpet Grip. Base: 4" high rubber base Walls: Paint Ceiling: Acoustical Ceiling System See Finish Schedule and Color Schedule Key on Criteria Drawings I-601. See SID Submittal Appendix B.
Bid Option (FFE)	Provide (1) L-Shaped Desk with side (2) cleat or horizontal track mounted overheads with write board glass fronts. Provide (1) full height box/box/file pedestal and (1) combination 2-drawer lateral file/storage cabinet. Provide 60” x 48” Glass Magnetic Markerboard. Provide freestanding LED Task Light with Occupancy Sensor. See Installation Requirements and Order Data Sheets / Drawings in CID Appendix C for complete details.
(GFGI)	Equipment has not been identified.

Room(s):	Shared Office 133
Summary:	3 Workstations

Finish Requirements:	Floor: Modular carpet tiles secured to access floor system by manufacturer (Bid Option). Provide Modular Carpet Tile Lifter with Carpet Grip. Base: 4" high rubber base Walls: Paint Ceiling: Acoustical Ceiling System See Finish Schedule and Color Schedule Key on Criteria Drawings I-601. See SID Submittal Appendix B.
Bid Option (FFE)	Provide (3) Person workstation with (2) panel mounted overheads, (1) 2-drawer undersurface lateral files, (1) box / box/ file. Provide 96" x 48" H Glass Magnetic Markerboard. Provide (2)36" x 48"H panels at front with opal glaze upmount screen. Provide freestanding LED Task Light with Occupancy Sensor. Workstations will access power/voice/ data from beneath the rigid grid access floor. User will run telephone/data cabling (Patch cords) from MILCON provided comm outlets below the raised floor direct to equipment using cable management fasteners attached to workstations (exposed). Users to work with design-build contractor to determine best placement of grommets to protect exposed cabling below workstations. Power connection beneath access floor must be via U.L. Listed base feed connector with a metallic sheath (hard-wire base feed connection) provided by the Systems Furniture Manufacturer. Provide minimum 4 Duplex receptacles mounted in the base raceway. Design Build Contractor must provide modular jacks to fit in the knockouts in the raceways. Communications must be supplied through rigid grid access floor grommets from beneath the raised access flooring via side vertical raceways to a trough beneath the worksurface. There must be a minimum of 3-LC duplex fiber connectors NIPR/SIP/SAP) and 1-CAT 6 RJ45 jack (telephone per workstation. Outer panels must be fabric finish. See Installation Requirements and Order Data Sheets / Drawings in Appendix C for complete details.
(GFGI)	Printer

Room(s):	Conference Room 134
Summary:	Conference Room
Number of Occupants	Seating at table for 10; around walls 8
Finish Requirements:	Floor: Modular carpet tiles. Base: 4" high rubber base Walls: Paint / Acoustical Panels / Glass Magnetic Write Boards (CID). Ceiling: Acoustical Ceiling System See Finish Schedule and Color Schedule Key on

	Criteria Drawings I-601. See SID Submittal Appendix B.
Bid Option (FFE)	Provide 1 Rectangular Table with (2) flush mounted power/voice/data module mounted on top. Table communications module must accommodate power/voice/data/AV module at each side of table to include 4 receptacles, 1-LC Duplex fiber connector and 1 RJ45 fiber connector and 2 USB power ports, one HDMI port and blank space for other AV connections. Provide 10 conference chairs and 8 guest chairs, one 4’ x 8’ glass magnetic markerboard, one AV Cabinet with AV equipment rack. Refer to section 10 10 15 for further communications information. See Installation Requirements and Order Data Sheets / Drawings in Appendix C for complete details.
(GFGI)	Flat Panel Display and AV equipment.

Room(s):	Breakroom 135A
Summary:	Breakroom
Number of Occupants	Bar (14); High-top Tables (8); Café Tables (12)
Finish Requirements:	Floor: Porcelain Paver Base: 4" Porcelain Paver Base Walls: Paint Ceiling: Acoustical Ceiling System See Finish Schedule and Color Schedule Key on Criteria Drawings I-601. See SID Submittal Appendix B.
Bid Option (FFE)	Provide (1) long Table with seating both sides. Table must have hardwire connection to wall for power. Table underside will have single power receptacle and one USB power port where indicated on order data sheet. Provide 1 Back Cabinet must have base cabinets and upper cabinets with Glass Doors and fascia (leaving space for the Popcorn Machine). Provide 14 bar stools without backs and 8 barstools with backs. Provide (2) 36” high top tables with stools. Provide (3) 36” square café tables and 12 café chairs. Provide double recycle bin with top opening. See Installation Requirements and Order Data Sheets / Drawings in Appendix C for complete details.
(GFGI) Existing	Popcorn Machine, Pool Table, Foosball Table, Flat Panel Display, Beer Sign

Room(s):	Prep Area 135B
Summary:	Prep Area
Finish Requirements:	Floor: Modular carpet tiles secured to access floor system by manufacturer. Provide Modular Carpet Tile Lifter with Carpet Grip. Base: 4" high rubber base Walls: Paint Ceiling: Acoustical Ceiling System See Finish Schedule and Color Schedule Key on

	Criteria Drawings I-601 and I-602.
Bid Option (FFE)	Provide (1) dishwasher, (1) icemaker, (1) trash can. Data Sheets / Drawings in Appendix C for complete details.
(GFGI)	(3) Refrigerators

Room(s):	Storage 136
Summary:	Storage Room
Finish Requirements:	Floor: Sealed Concrete Base: No Base Walls: Paint Ceiling: Acoustical Ceiling System See Finish Schedule and Color Schedule Key on Criteria Drawings I-601. See SID Submittal Appendix B.
Bid Option (FFE)	Provide 6 heavy duty shelving units. See Installation Requirements and Order Data Sheets / Drawings in Appendix C for complete details.
(GFGI)	No equipment identified.

Room(s):	Mechanical Room 137 and 209
Summary:	Mechanical Room
Finish Requirements:	Floor: Sealed Concrete Base: No Base Walls: Block Filler and Paint Ceiling: Exposed structure painted See Finish Schedule and Color Schedule Key on Criteria Drawings I-601. See SID Submittal Appendix B.
Bid Option (FFE)	No FFE identified.
(GFGI)	No equipment identified.

Room(s):	Stair #3 138 and 204
Summary:	Stairwell
Finish Requirements:	Floor: Rubber stair treads, risers, and landing tile. Base: Steel Pan Stair, Painted Stringer Walls: Paint Handrails: Paint Ceiling: Acoustical Ceiling System See Finish Schedule and Color Schedule Key on Criteria Drawings I-601. See SID Submittal Appendix B.
Bid Option (FFE)	No FFE identified.
(GFGI)	No equipment identified.

Room(s):	Women’s Toilet 139 and 202
Summary:	Restroom
Finish Requirements:	Floor: Porcelain Paver Base: No base Walls: Porcelain Tiles to Floor Tile Threshold and Edge Trim: Brushed Silver Ceiling: Acoustical Ceiling System See Finish Schedule and Color Schedule Key on

	Criteria Drawings I-601. See SID Submittal Appendix B.
Bid Option (FFE)	Open top dome wastebasket. See Installation Requirements and Order Data Sheets / Drawings in Appendix C for complete details.
(GFGI)	No equipment identified.

Room(s):	140 Janitor Closet
Summary:	Janitor Closet
Finish Requirements:	Floor: Sealed Concrete Base: 4” high rubber base Walls: Paint and FRP panels surrounding janitor sink. Ceiling: Exposed structure painted See Finish Schedule and Color Schedule Key on Criteria Drawings I-601.See SID Submittal Appendix B
Bid Option (FFE)	No FFE identified.
(GFGI)	Mop and Bucket

Room(s):	Men’s Toilet 141 and 201
Summary:	Men’s Restroom
Finish Requirements:	Floor: Porcelain Paver Base: Porcelain Base Walls: Paint. Ceiling: Acoustical Ceiling System See Finish Schedule and Color Schedule Key on Criteria Drawings I-601. See SID Submittal Appendix B
Bid Option (FFE)	Open top dome wastebasket. See Installation Requirements and Order Data Sheets / Drawings in Appendix C for complete details.
(GFGI)	No equipment identified.

Room(s):	Mechanical / Electrical Room 142
Summary:	Mechanical and Electrical Equipment Rooms
Finish Requirements:	Floor: Sealed Concrete Base: No Base Walls: Block Filler and Paint. Ceiling: Exposed Structure Painted. See Finish Schedule and Color Schedule Key on Criteria Drawings I-601. See SID Submittal Appendix B.
Bid Option (FFE)	No FFE this room
(GFGI)	No equipment identified.

Room(s):	Corridor 143
Summary:	Corridor and Copy / Fax / Shred Area
Finish Requirements:	Floor: Porcelain Tile / Carpet Base: Porcelain Tile Walls: Paint Ceiling: Acoustical Ceiling Tile. See Finish Schedule and Color Schedule Key on Criteria

	Drawings I-601. See SID Submittal Appendix B.
Bid Option (FFE)	Provide (2) Storage Cabinets, 1 68”H and 1 38” H. See Installation Requirements and Order Data Sheets / Drawings in Appendix C for complete details.
(GFGI)	Copier, Shredder

Room(s):	Corridor 200
Summary:	Corridor
Finish Requirements:	Floor: Modular carpet tiles secured to access floor system by manufacturer. Provide Modular Carpet Tile Lifter with Carpet Grip. Rubber stair treads and risers. Extend modular carpet tile beneath ADA Lift. Base: 4" high rubber base Walls: Paint Ceiling: Acoustical Ceiling System See Finish Schedule and Color Schedule Key I-601. See SID Submittal Appendix B.
Bid Option (FFE)	No FFE has been identified.
(GFGI)	No Equipment has been identified.
Room(s):	Storage 203
Summary:	Storage Area
Finish Requirements:	Floor: Porcelain Paver Base: Porcelain Base Walls: Paint Ceiling: Acoustical Ceiling System See Finish Schedule and Color Schedule Key on Criteria Drawings I-601. See SID Submittal Appendix B.
Bid Option (FFE)	Provide heavy duty shelving. See Installation Requirements and Order Data Sheets / Drawings in Appendix D for complete details.
(GFGI)	No equipment has been identified.

Room(s):	S. Vest. 206
Summary:	Secure Vestibule
Finish Requirements:	Floor: Modular carpet tiles secured to access floor system by manufacturer. Provide Modular Carpet Tile Lifter with Carpet Grip. Base: 4" high rubber base Walls: Paint Ceiling: Acoustical Ceiling System See Finish Schedule and Color Schedule Key on Criteria Drawings I-601. See SID Submittal Appendix B.
Bid Option (FFE)	No FFE identified.
(GFGI)	No equipment has been identified.

Room(s):	Open Office 206A
Summary:	Workstation and Printer Areas for 35
Finish Requirements:	Floor: Modular carpet tiles secured to access floor system by manufacturer. Provide Modular Carpet Tile Lifter with Carpet Grip.

	Base: 4" high rubber base Walls: Paint Ceiling: Acoustical Ceiling System See Finish Schedule and Color Schedule Key on Criteria Drawings I-601. See SID Submittal Appendix B.
Bid Option (FFE)	Provide (35) new workstations in configuration shown on plan. Workstations must have 2 overheads, 1 box / box file, and 1 file / file. Provide (1) each LED Task Light with Occupancy Sensor for each workstation. Provide (1) each ergonomic chair for each workstation. Provide (8) Storage cabinets, (3) printer cabinets and (1) shredder. Workstations will access power/voice/ data from beneath the rigid grid access floor. User will run telephone/data cabling (Patch cords) from MILCON provided comm outlets below the raised floor direct to equipment using cable management fasteners attached to workstations (exposed). Users to work with design-build contractor to determine best placement of grommets to protect exposed cabling below workstations. Power connection beneath access floor must be via U.L. Listed base feed connector with a metallic sheath (hard-wire base feed connection) provided by the Systems Furniture Manufacturer. Printers against workstations panels must be connected to a separate circuit within the systems furniture. Provide minimum 4 Duplex receptacles mounted in the base raceway. Design Build Contractor must provide modular jacks to fit in the knockouts in the raceways. Communications must be supplied through rigid grid access floor grommets from beneath the raised access flooring via side vertical raceways to a trough beneath the worksurface. There must be a minimum of 3-LC duplex fiber connectors NIPR/SIP/SAP) and 1-CAT 6 RJ45 jack (telephone per workstation. Outer panels must be fabric finish. See Installation Requirements and Order Data Sheets / Drawings in CID Appendix C for complete details.
(GFGI)	Printers

Room(s):	Office 206 B and 206C
Summary:	Private Office
Finish Requirements:	Floor: Modular carpet tiles secured to access floor system by manufacturer. Provide Modular Carpet Tile Lifter with Carpet Grip. Base: 4" high rubber base Walls: Demountable Partitions must have integrated glass magnetic markerboard on East and West Walls. Other walls must have vinyl or

	laminate finish. Trim must be anodized aluminum. Demountable Partitions are CID. Ceiling: Acoustical Ceiling System See Finish Schedule and Color Schedule Key on Criteria Drawings I-601. See SID Submittal Appendix B.
Bid Option (FFE)	Provide (1) U-Shaped desk with rear overheads, 1 storage / wardrobe / file cabinet, (1) ergonomic chair, (2) guest chairs and (1) glass magnetic markerboard. Provide freestanding LED task light with occupancy sensor. Demountable Partitions must have two walls with entire center section glass magnetic markerboard material. Upper and lower section of wall and North and South Walls will be Type 2 vinyl wallcovering or plastic laminate. STC of Demountable Partitions must be 47. See Installation Requirements and Order Data Sheets / Drawings in Appendix C for complete details.
(GFGI)	No equipment identified.

Room(s):	Training 207
Summary:	Training and Conference Room function
Finish Requirements:	Floor: Modular carpet tiles secured to access floor system by manufacturer. Provide Modular Carpet Tile Lifter with Carpet Grip. Base: 4" high rubber base Walls: Demountable Partitions. Ceiling: Acoustical Ceiling System See Finish Schedule and Color Schedule Key on Criteria Drawings I-601. See SID Submittal Appendix B.
Bid Option (FFE)	Provide (4) training tables and 8 ergonomic chairs, and (2) glass magnetic markerboards. CCV Workgroups: Tables must have locking casters and power/voice/data module at table top with two receptacles and two jacks. Table communications module must accommodate power/voice/data/AV module at each side of table to include 2 receptacles, 1-LC Duplex fiber connector and 1 RJ45 fiber connector and 1 USB power ports. Connection to power beneath raised floor will be through a U.L. listed metal sheath with a multi-pin connector. Provide (2) AV cabinets on each side of room with 19” AV racks. AV cabinets must have access from both back and front of cabinet. Access to power/voice/data must be through grommets beneath rigid grid access flooring. Additional power/voice/data receptacles are required on East and West Walls for flexibility of training room table arrangement. See Installation Requirements and Order Data Sheets / Drawings in Appendix D for complete details.

(GFGI)	Flat panel Display and AV Equipment.

9.3 Alterations to the Existing Building - Functional Area/Room Finish and Design Requirements

9.3.1 EXISTING AREAS

Room Name & Number:	Existing Stairwell E129
Description:	Existing stair landing
Functional Requirements:	Provide new landing tile to match existing. Patch and repair existing gypsum wallboard walls as required when replacing ceiling and installing new doorway. Existing stair treads and risers to remain.
Demolition Requirements:	Minor demolition work anticipated in this room related for creating new doorway opening to new addition and running new comm and data lines to server room. Remove existing modular carpet tile and glue and remove existing first floor rubber tile landing material Remove existing 4" high rubber base.
Alteration Requirements:	Minor work anticipated in this room for routing of new overhead utilities. Finish new doorway opening with gypsum wallboard. Paint existing walls adjacent to new doorway and entire length of corridor. Provide new landing material throughout area as indicated on finish plan Sheet I-101.
Finish Requirements:	Floor: Provide new rubber floor tiles to match stairwell. Base: Provide new 4" high rubber base Walls: New gypsum board where required. Paint existing gypsum board walls to match adjacent walls. Ceiling: Replace portions of Acoustical Ceiling System where required by alteration. Match Existing Ceiling Tile See Finish Schedule and Color Schedule Key I601. See SID Submittal Appendix B.

Room Name & Number:	Corridor E125
Description:	Existing exit access corridor
Quantity & Area	Existing
Functional Requirements:	Existing exit access corridor and general building circulation
Demolition Requirements:	Removal/reinstallation or replacement of existing suspended acoustical ceiling system

	(ACT) to provide access for routing of new building support systems;
Alteration Requirements – Connection to Existing Building Support Systems for New Addition:	Installation of new building support systems above the existing ceiling for connection to existing building systems for systems and locations defined in this RFP; patch/repair or replace existing construction and finishes to remain, damaged by the work.
Finish Requirements:	Walls: New Gypsum Board if required or patch and repair. Paint to match existing gypsum board wall. Door Frames: Match existing door frame paint. Ceiling: Existing Acoustical Ceiling System to remain.

Room Name & Number:	Comm Room E128
Description:	Existing communications equipment room
Quantity & Area	Existing
Functional Requirements:	Existing
Demolition Requirements:	Removal/reinstallation or replacement of existing suspended acoustical ceiling system (ACT) to provide access for routing of new building support systems; provide opening and/or holes in existing walls for routing of new building support system conduits and pathways into this room.
Alteration Requirements – Connection to Existing Building Support Systems for New Addition:	installation of new building support systems required to be installed and connected to building support system in this room as defined in this RFP; patch/repair wall and finishes; seal all new penetrations through walls.
Finish Requirements:	Walls: New Gypsum Board if required or patch and repair. Paint to match existing gypsum board wall. Door Frames: Match existing door frame paint. Ceiling: Existing Acoustical Ceiling System to remain.

Room Name & Number:	Mech E133
Description:	Existing building equipment room
Quantity & Area	Existing
Functional Requirements:	Existing; room access from exterior door
Demolition Requirements:	Provide opening and/or holes in existing walls for routing of new building support system conduits and pathways into this room.
Alteration Requirements – Connection to Existing Building Support Systems for New Addition:	installation of new building support systems required to be installed and connected to building support system in this room as defined in this RFP; patch/repair wall and finishes; seal all new penetrations through walls.
Finish Requirements:	Walls: New Gypsum Board if required or patch

	and repair. Paint to match existing gypsum board wall. Door Frames: Match existing door frame paint. Ceiling: Existing Acoustical Ceiling System to remain.

Room Name & Number:	Corridor E115
Description:	Existing exit access corridor
Quantity & Area	Existing
Functional Requirements:	Existing exit access corridor and general building circulation
Demolition Requirements:	Removal/reinstallation or replacement of existing suspended acoustical ceiling system (ACT) to provide access for routing of new building support systems;
Alteration Requirements – Connection to Existing Building Support Systems for New Addition:	installation of new building support systems above the existing ceiling for connection to existing building systems for systems and locations defined in this RFP; patch/repair or replace existing construction and finishes to remain damaged by the work.
Finish Requirements:	Walls: New Gypsum Board if required or patch and repair. Paint to match existing gypsum board wall. Door Frames: Match existing door frame paint. Ceiling: Existing Acoustical Ceiling System to remain.

Room Name & Number:	Corridor E158
Description:	Existing exit access corridor
Quantity & Area	Existing
Functional Requirements:	Existing exit access corridor and general building circulation
Demolition Requirements:	Removal/reinstallation or replacement of existing suspended acoustical ceiling system (ACT) to provide access for routing of new building support systems;
Alteration Requirements – Connection to Existing Building Support Systems for New Addition:	installation of new building support systems above the existing ceiling for connection to existing building systems for systems and locations defined in this RFP; patch/repair or replace existing construction and finishes to remain damaged by the work.
Finish Requirements:	Walls: New Gypsum Board if required or patch and repair. Paint to match existing gypsum board wall. Door Frames: Match existing door frame paint. Ceiling: Existing Acoustical Ceiling System to remain.

Room Name & Number:	Corridor E159
Description:	Existing exit access corridor

Quantity & Area	Existing
Functional Requirements:	Existing exit access corridor and general building circulation
Demolition Requirements:	Removal/reinstallation or replacement of existing suspended acoustical ceiling system (ACT) to provide access for routing of new building support systems;
Alteration Requirements – Connection to Existing Building Support Systems for New Addition:	installation of new building support systems above the existing ceiling for connection to existing building systems for systems and locations defined in this RFP; patch/repair or replace existing construction and finishes to remain damaged by the work.
Finish Requirements:	Walls: New Gypsum Board if required or patch and repair. Paint to match existing gypsum board wall. Door Frames: Match existing door frame paint. Ceiling: Existing Acoustical Ceiling System to remain.

Room Name & Number:	Mech E192
Description:	Existing building equipment room
Quantity & Area	Existing
Functional Requirements:	Existing; room access from exterior doors; existing stairs within this room to access Mech Mezzanine E236 located above this room.
Demolition Requirements:	Provide opening and/or holes in existing walls for routing of new building support system conduits and pathways into this room.
Alteration Requirements – Connection to Existing Building Support Systems for New Addition:	installation of new building support systems required to be installed and connected to building support system in this room or through this room to other adjacent equipment rooms as defined in this RFP; patch/repair wall and finishes; seal all new penetrations through walls.
Finish Requirements:	Walls: New Gypsum Board if required or patch and repair. Paint to match existing gypsum board wall. Door Frames: Match existing door frame paint. Ceiling: Existing Acoustical Ceiling System to remain.

Room Name & Number:	Model Shop E176
Description:	Existing shop area
Quantity & Area	Existing
Functional Requirements:	Existing shop with large equipment for building shipping containers, crates and other work.
Demolition Requirements:	Provide opening and/or holes in existing walls for routing of new building support system conduits and pathways into this room.
Alteration Requirements –	installation of new building support systems required to be installed and connected to

Connection to Existing Building Support Systems for New Addition:	building support system in this room as defined in this RFP; patch/repair wall and finishes; seal all new penetrations through walls; paint all new exposed building support system components in this room.
Finish Requirements:	Walls: New Gypsum Board if required or patch and repair. Paint to match existing gypsum board wall. Door Frames: Match existing door frame paint. Ceiling: Existing Acoustical Ceiling System to remain.

Room Name & Number:	Main Comm Room E7
Description:	Existing building main communications equipment room
Quantity & Area	Existing
Functional Requirements:	Existing
Demolition Requirements:	Provide opening and/or holes in existing walls for routing of new building support system conduits and pathways into this room.
Alteration Requirements – Connection to Existing Building Support Systems for New Addition:	installation of new building support systems required to be installed and connected to building support system in this room as defined in this RFP; patch/repair wall and finishes; seal all new penetrations through walls.
Finish Requirements:	Walls: New Gypsum Board if required or patch and repair. Paint to match existing gypsum board wall. Door Frames: Match existing door frame paint. Ceiling: Existing Acoustical Ceiling System to remain.

7.3.3 Second Floor Interior Alterations – Summary and Requirements

Room Name & Number:	Ex Stair #2 E212
Description:	Existing exit stairway
Quantity & Area	Existing
Functional Requirements:	Existing exit serving 2nd floor and general building circulation
Demolition Requirements:	None anticipated
Alteration Requirements – Corridor Connection for New Addition:	None anticipated
Alteration Requirements – Connection to Existing Building Support Systems for New	None anticipated

Addition:	

Room Name & Number:	Corridor E210A
Description:	Existing exit access in open office area
Quantity & Area	Existing
Functional Requirements:	Existing exit access and general building circulation
Demolition Requirements:	removal of portion of existing exterior wall assembly to accommodate the new doorway and corridor connection to the existing building; removal of interior finishes; removal of existing suspended acoustical ceiling system (ACT) to provide access new doorway connection work and for routing of new building support systems;
Alteration Requirements – Corridor Connection for New Addition:	Provide new door assembly in existing wall and related work for new door opening; at south end of corridor adjacent to new doorway provide new floor finish, paint walls and new ACT ceiling to match existing; patch/repair or replace existing construction and finishes to remain damaged by the work.
Alteration Requirements – Connection to Existing Building Support Systems for New Addition:	installation of new building support systems below and above the existing ceiling for connection to existing building systems for systems and locations defined in this RFP.
Finish Requirements:	Floor: Provide new modular carpet tiles. Modular carpet tiles must coordinate with existing carpet tiles. Existing style and pattern are discontinued. Base: 4" high rubber base Walls: New Gypsum Board if required or patch and repair. Paint to match existing gypsum board wall. Door Frames: Match existing door frame paint. Ceiling: Existing Acoustical Ceiling System to remain. See Finish Schedule and Color Schedule Key I601 and I602.

Room Name & Number:	Corridor E205
Description:	Existing exit access corridor
Quantity & Area	Existing
Functional Requirements:	Existing exit access corridor and general building circulation
Demolition Requirements:	Removal/reinstallation or replacement of existing suspended acoustical ceiling system (ACT) for routing of new building support systems;
Alteration Requirements –	installation of new building support systems below and above the existing ceiling for

Connection to Existing Building Support Systems for New Addition:	connection to existing building systems for systems and locations defined in this RFP; patch/repair or replace existing construction and finishes to remain damaged by the work.
Finish Requirements:	Walls: New Gypsum Board if required or patch and repair. Paint to match existing gypsum board wall paint. Door Frames: Match existing door frame paint if required by construction. Ceiling: Existing Acoustical Ceiling System to remain.

Room Name & Number:	Exst Comm Room E200
Description:	Existing communications equipment room
Quantity & Area	Existing
Functional Requirements:	Existing
Demolition Requirements:	Removal/reinstallation or replacement of existing suspended acoustical ceiling system (ACT) to provide access for routing of new building support systems; provide opening and/or holes in existing walls for routing of new building support system conduits and pathways into this room.
Alteration Requirements – Connection to Existing Building Support Systems for New Addition:	installation of new building support systems required to be installed and connected to building support system in this room as defined in this RFP; patch/repair wall and finishes; seal all new penetrations through walls.
Finish Requirements:	Walls: New Gypsum Board if required or patch and repair. Paint to match existing gypsum board wall. Door Frames: Paint door frame to match existing if required by renovation. Ceiling: Existing Acoustical Ceiling System to remain. Replace ceiling tiles or portions of grid if required by construction to match existing.

Room Name & Number:	Corridor E201
Description:	Existing exit access corridor
Quantity & Area	Existing
Functional Requirements:	Existing exit access corridor and general building circulation
Demolition Requirements:	Removal/reinstallation or replacement of existing suspended acoustical ceiling system (ACT) for routing of new building support systems;
Alteration	installation of new building support systems

Requirements – Connection to Existing Building Support Systems for New Addition:	below and above the existing ceiling for connection to existing building systems for systems and locations defined in this RFP; patch/repair or replace existing construction and finishes to remain damaged by the work.
Finish Requirements:	Walls: New Gypsum Board if required or patch and repair. Paint to match existing gypsum board wall paint. Door Frames: Match existing door frame paint if required by construction. Ceiling: Existing Acoustical Ceiling System to remain.

Room Name & Number:	Corridor E229
Description:	Existing exit access corridor
Quantity & Area	Existing
Functional Requirements:	Existing exit access corridor and general building circulation
Demolition Requirements:	Removal/reinstallation or replacement of existing suspended acoustical ceiling system (ACT) for routing of new building support systems;
Alteration Requirements – Connection to Existing Building Support Systems for New Addition:	installation of new building support systems below and above the existing ceiling for connection to existing building systems for systems and locations defined in this RFP; patch/repair or replace existing construction and finishes to remain damaged by the work.
Finish Requirements:	Walls: New Gypsum Board if required or patch and repair. Paint to match existing wall paint. Ceiling: Existing Acoustical Ceiling System to remain. Replace tiles or grid if required by construction to match existing.

Room Name & Number:	Corridor E235
Description:	Existing exit access corridor
Quantity & Area	Existing
Functional Requirements:	Existing exit access corridor and general building circulation
Demolition Requirements:	removal and replacement of existing suspended gypsum wallboard ceiling system; removal and installation or replacement of existing acoustical ceiling system (ACT) for routing of new building support systems;
Alteration Requirements – Connection to Existing Building Support Systems for New	installation of new building support systems below and above the existing ceiling for connection to existing building systems for systems and locations defined in this RFP; patch/repair or replace existing construction

Addition:	and finishes to remain damaged by the work; install new suspended gypsum wallboard ceiling system and paint to match existing
Finish Requirements:	Walls: New Gypsum Board if required or patch and repair. Paint to match existing wall paint. Ceiling: Paint new Gypsum ceiling PT 3.

Room Name & Number:	Mech Mezz E236
Description:	Existing building equipment room
Quantity & Area	Existing
Functional Requirements:	Existing mezzanine; access by existing stairs within this room to Mech E192 located below this area; existing ladder and roof hatch to access roof from this room
Demolition Requirements:	Provide opening and/or holes in existing walls for routing of new building support system conduits and pathways into this room.
Alteration Requirements – Connection to Existing Building Support Systems for New Addition:	installation of new building support systems required to be installed and connected to building support system in this room or through this room to other adjacent equipment rooms as defined in this RFP; patch/repair wall and finishes; seal all new penetrations through walls.
Finish Requirements:	Walls: New Gypsum Board if required or patch and repair. Paint to match existing wall paint.

Room Name & Number:	Corridor E222
Description:	Existing exit access corridor
Quantity & Area	Existing
Functional Requirements:	Existing exit access corridor and general building circulation
Demolition Requirements:	Removal/reinstallation or replacement of existing suspended acoustical ceiling system (ACT) for routing of new building support systems;
Alteration Requirements – Connection to Existing Building Support Systems for New Addition:	installation of new building support systems below and above the existing ceiling for connection to existing building systems for systems and locations defined in this RFP; patch/repair or replace existing construction and finishes to remain damaged by the work.
Finish Requirements:	Walls: New Gypsum Board if required or patch and repair. Paint to match existing wall paint. Ceiling: Existing Acoustical Ceiling System to remain. Replace tiles or grid if required by construction to match existing.

Room Name & Number:	NOC Office Area E227
Description:	Existing open office area in an existing Secure Area
Quantity & Area	Existing

Functional Requirements:	Existing open office workstations; Existing NOC is an accredited Secure Area with physical security enhancements meeting ICD 705 criteria that shall not be changed or reduced by the work; Contractor to submit a penetration plan (drawing) indicating holes to be cut in the existing wall and new conduit penetration locations 10 days prior to start of any work for approval by 321EWS security personnel.
Demolition Requirements:	Removal/reinstallation or replacement of existing suspended acoustical ceiling system (ACT) for routing of new building support systems; provide opening and/or holes in existing security walls for routing of new building support system conduits and pathways into this room;
Alteration Requirements – Connection to Existing Building Support Systems for New Addition:	installation of new building support systems below and above the existing ceiling for connection to existing building systems for systems and locations defined in this RFP; patch/repair or replace existing construction and finishes to remain damaged by the work; seal all new penetrations through walls; follow ICD 705 criteria for protection and location of penetrations through the existing security wall and perimeter.
Finish Requirements:	Walls: New Gypsum Board if required or patch and repair. Paint to match existing wall paint.

Room Name & Number:	NOC E228
Description:	Existing server room in existing Secure Area
Quantity & Area	Existing
Functional Requirements:	Existing open office workstations; Existing NOC is an accredited Secure Area with physical security enhancements meeting ICD 705 criteria that shall not be changed or reduced by the work; Contractor to submit a penetration plan (drawing) indicating holes to be cut in the existing wall and new conduit penetration locations 10 days prior to start of any work for approval by 321EWS security personnel.
Demolition Requirements:	Removal/reinstallation or replacement of existing suspended acoustical ceiling system (ACT) for routing of new building support systems; provide opening and/or holes in existing security walls for routing of new building support system conduits and pathways into this room;
Alteration Requirements – Connection to Existing Building Support Systems for New Addition:	installation of new building support systems below and above the existing ceiling for connection to existing building systems for systems and locations defined in this RFP; patch/repair or replace existing construction and finishes to remain damaged by the work; seal all new penetrations through walls; follow

	ICD 705 criteria for protection and location of penetrations through the existing security wall and perimeter.
Finish Requirements:	Walls: New Gypsum Board if required or patch and repair. Paint to match existing wall paint. Ceiling: Existing Acoustical Ceiling System to remain. Replace tiles or grid if required by construction to match existing.

9.4 SIGNAGE AND CORNER GUARDS

The Contractor must provide interior signage and corner guards. A signage plan must be submitted the 100% stage that shows the placement of all interior and exterior signage used in the project including building directory, room identification plaques, emergency egress plaques, restroom signs, directional information signs. Product Basis of Design: Takeform Fusion Quad. Provide signs in all rooms receiving Access Flooring indicating weight capacity. The Contractor may use this same plan to place the Corner Guards with separate identification symbols. Corner guards must be solid plastic with color clear through and extend from top of base to ceiling. Assembly must have a snap on plastic retainer. Surface mounted corner guards must be placed on all outside corners in corridors. Corner guards must have top and bottom caps to provide a finished appearance. See SID Submittal Appendix B.

9.5 Visual Communication Boards.

The Contractor must provide glass magnetic visual communication boards sized as indicated on the order data sheets. These are a part of the Comprehensive Interior Design Package and are a part of Appendix C.

9.6 COLOR SCHEDULE

Product and color are shown as being specific to one manufacturer to establish design intent. An equivalent product and color by another manufacturer may be submitted for approval. Manufacturers and materials specified are not intended to limit the selection of equivalent products and colors from other manufacturers. Acceptance by the COR is required before the substituted product may be used. As the design becomes more defined after award of the contract, the Contractor must provide a comprehensive room finish and color schedule, signage schedule, edited UFGS 09 06 90 Color Schedule and associated guide specifications to define all aspects of the SID. Refer to Criteria Drawings I-101 and I-102; Interior Finish Plans and I-601; the Room Finish Schedule and Color Schedule Key on the drawings. See SID Submittal Appendix B.

9.7 INTERIOR FLOOR FINISHES

9.7.1 Access Floor AF1. Provide Basis of Design; Tate Access Floor Concore 1250 Panel with PosiTile Modular Carpet Tile adhered to the Access Floor Panel by the Manufacturer. All areas having access flooring must be sealed concrete floor below elevated floor plane. Basis of Design Carpet: Shaw Commercial; Social 59585, Color: Mick 66597; multi-level cut/loop with

average density of 8615. Carpet must be Cradle to Cradle silver certified. Carpet must carry a Declare, EPD certifications noting that product is PVC free and that backing conforms to NSF/ANSI 140 Carpet Gold.

9.7.2 Access Floor AF2. Basis of Design; Tate Access Floor Concore 1250 Panel with static control dissipative vinyl tile adhered with specially formulated conductive adhesive to flow through the tile and along the adhesive to the ground point. Static electricity is conducted from the surface of the floor through the conductive elements distributed with the tile. Grounding can be accomplished by placing a copper strip in the wet adhesive (1"strip approx. every 2,000 sq. ft. or 1 strip per room), extending it beyond the perimeter and permanently connecting it to the ground point. Flooring must be adhered by the Manufacturer to the access panel. All areas having access flooring must be sealed concrete floor below elevated floor plane.

9.7.3 Access Floor AF3. Basis of Design; Tate Access Floor Concore 1250 Panel with modular carpet tile (not PosiTile). All areas having access flooring must be sealed concrete floor below elevated floor plane.

9.7.4 Porcelain Tile Floor PA1. Basis of Design; Product must be color body porcelain tile. Product must meet .42 - .52 DCOF AcuTest when tested in accordance with ANSI A137.1. Match product and color identified for PA1. 24" x 24" x 3/8" thick. Floor must be installed with TCNA Method F112 with uncoupling membrane. Provide engineered aluminum expansion joints with rigid PVC soft movement zone at perimeter of walls. Provide engineered aluminum movement joint with soft thermoplastic rubber movement zone over building expansion joints as recommended by TCNA. Provide mortar and grout appropriate for type of tile and setting method. Maximum grout joint 1/8”. Porcelain Tile floor must run beneath surface mounted walk-off matt.

Product Basis of Design:
PA1: American Olean; System Sable MT06 Textured

9.7.5 Resilient Stair Treads, Risers, and Landing Tile. RM 2. Stair treads, risers and landing tile and must be formulated from a combination of SBR rubber and 10% post-industrial cork. Basis of Design; Roppe; Low Profile Raised Square Rubber Tile; Color: 410 Marengo.

9.7.6 Walk-Off Matt. WM-1 must meet the requirements of ASHRAE 189.1; Section 8.3.1.5. Exception is that Walk-off matt must extend to length indicated on plan. Surface mounted tapered vinyl frame with scraper carpet yarn inserts. Basis of Design; C/S Pedi-systems; Pedimat M1. Color: Wrought Iron.

9.7.7 Concrete Sealer. Basis of Design; White, Hardener Sealer.

9.8 INTERIOR BASE FINISHES

9.8.1 Resilient Base RM1. Wall base must be formulated from 100% TS rubber. Rubber base 4" high x 1/8" thick base in rolls, job formed corners. Basis of Design; Roppe, 123 Charcoal.

9.8.2 Porcelain Tile Base PAB1. 3” x 12” base bullnose top edge at Janitor Closet, Breakroom and Storage Room.

Product Basis of Design; System Sable MT06 Unpolished

Colors as indicated in Appendix B.

9.9 INTERIOR WALL FINISHES

9.9.1 Paint. Architectural Grade Egg Shell Finish Paint; Walls. Basis of Design; Sherwin Williams, Gossamer Veil SW9165

9.9.2 Paint. Architectural Grade Semi-Gloss Finish (Exposed Structure and CMU walls). Basis of Design; Sherwin Williams, SW7005.

9.9.3 Paint. Architectural Grade Flat Finish White. (Plywood at Electrical Rooms). Basis of Design; Sherwin Williams, SW7005 Pure White.

9.9.4 Porcelain Paver: PA2. Basis of Design: American Olean Method 12” x 24” x 3/8”. Product must be color body porcelain tile. Product must meet .42 - .52 DCOF AcuTest when tested in accordance with ANSI A137.1. Install porcelain paver wall tile in accordance with TCNA W244C. Maximum Grout Joint 1/8”.

Product Basis of Design
PA2: American Olean; System Sable MT06 Unpolished
PA3: American Olean; Taupe Technique MT04 Unpolished
PA4: American Olean; Taupe Technique MT04 Textured
MT1: Schluter; Quadec Satin Anodized Aluminum; 3/8” grouted in trim to finish outside edge condition in Men’s Tlt. 141 and 201.

9.9.5 Vinyl Wall Graphic: WG1. Basis of Design; JVA Art Group Details to follow next submittal.

Colors as indicated in Appendix B.

9.10 INTERIOR CEILING FINISHES

9.10.1 Paint. Architectural Grade Semi-Gloss Finish (Exposed Structure). Basis of Design; Sherwin Williams, SW7005 Pure White.

9.10.2 Acoustical Ceiling System.
ACT1. Provide Armstrong World Industries, Inc. Fine Fissured Open Plan High NRC, 15/16" Angled Tegular #1757, 24" x 24" x 3/4" thick. Product must have the following acoustical properties: NRC.75, CAC 35, AC 170. Panels must have the following characteristics: Class A Fire Rating, .87 Light Reflectance, Type III, Form 2, Pattern C, E; Humigard Plus, Bio Block, Certified Low VOC Emissions, 73% Recycled Content. Panels must also be sag resistant. Acoustical panels must provide resistance to sagging in high humidity conditions up to, but not including standing water and outdoor applications. Panels must contain BioBlock anti-microbial treatment and provide guaranteed resistance against growth of mold/mildew and Gram-positive and Gram-negative odor /stain-causing bacteria for 30 years. Ceiling system

must be installed with Armstrong Prelude XL 15/16" Grid to maintain 30 year performance Guarantee and Warranty. Color: Grid and Ceiling Tiles must be White.

ACT2. Provide Armstrong World Industries, Inc. School Zone Fine Fissured 15/16" Angled Tegular #1717, 24" x 24" x 3/4" thick. Product must have the following acoustical properties: NRC .70, CAC 40. Panels must have the following characteristics: Class A Fire Rating, .87 Light Reflectance, Type III, Form 2, Pattern C, E; Humigard Plus, Bio Block, Certified Low VOC Emissions, 73% Recycled Content. Panels must also be sag resistant. Acoustical panels must provide resistance to sagging in high humidity conditions up to, but not including standing water and outdoor applications. Panels must contain BioBlock anti-microbial treatment and provide guaranteed resistance against growth of mold/mildew and Gram-positive and Gram-negative odor /stain-causing bacteria for 30 years. Ceiling system must be installed with Armstrong Prelude XL 15/16" Grid to maintain 30 year performance Guarantee and Warranty. Color: Grid and Ceiling Tiles must be White.

9.11 INTERIOR TRIM FINISHES

9.11.1 Paint. Architectural Grade Semi-Gloss Finish Paint Door Frames, Stair Handrails, Stringers and Guardrails. Color as indicated in Appendix B.

9.11.2 Wood Doors: WD-1: Basis of Design; Marshfield Door System; Color: Birch Plain Sliced Espresso finish.

9.11.3 Fire Extinguisher Cabinets: Paint. Architectural Grade Semi-Gloss Finish Paint; Walls. Basis of Design; Sherwin Williams, Gossamer Veil SW9165.

9.11.4 Metal Stairs: Paint. Architectural Grade Semi-Gloss Finish. Basis of Design; Sherwin Williams, SW 7017 Dorian Gray.

9.11.5 Door Frames: Paint. Architectural Grade Semi-Gloss Finish. Basis of Design; Sherwin Williams, SW 7017 Dorian Gray

9.12 Interior Miscellaneous:

Miscellaneous items shall be provided to match the colors listed below.
9.12.1 Toilet Partitions. TP-1 Basis of Design; AMPCO Solid Plastic Type 5; Color Ivory Speckle 947-144.

9.12.2 Casework. Countertops (Restrooms and Kitchen) Solid Surface: Wilsonart White Stone 9208CS. Pipe Skirt at Restrooms and Upper Kitchen Cabinets; Plastic Laminate: Pionite IL Palio Papel AV981. Base Cabinets at Kitchen; Wilsonart Black Velvet Traceless Finish 15505-31.

9.12.3 Interior Signage; Adhere to ABA Handicap Accessibility Signage Requirements. Basis of Design; Takeform Fusion Quad. Message Color (Copy); C0 601 Satin Silver. Signage Background Color: Nevamar Vous Metal VS6001T. Signage Metal Accent Bar; S103 Black. Signage Backer Plate; DA105 Glass

Black. Signage mounted on Glass at Demountable Partitions must have backer plate on the inside of room.

9.12.4 Corner Guards; Basis of Design InPro Corporation High Impact BluNose Vinyl Retainer, Surface Mounted. 3” x 3” Face Color Taupe. Corner Guard shall be Green Guard Gold Certified.

9.12.5 Wall Switch Handles and Standard Receptacle Bodies; White

9.12.6 Electrical Panels; Grey.

9.13 DEMOUNTABLE PARTITIONS (FF&E Package)

9.13.1 New Demountable Partitions in Addition: Basis of Design: Inscape Reform. Panels must be unitized, movable, non-progressive steel-sheet-faced fiber board partition system consisting of individual floor-to-ceiling factory constructed prefabricated panels as indicated on the drawings. Partitions must be narrow 2 1/4" thick with narrow 1/2" recessed reveal at panel joints, recessed ceiling channel and 4 1/2" extruded aluminum base trim project .080" from panel face. Partition verticals must be slotted both sides 1 1/2" on center to a height of 120". Complete installation must have flat panel surfaces and tight, straight-line joints. All elements will assemble into a rigid grid structure. Provide electrical switches and other wall devices as required for the demountable panels.

9.13.3 Panels: Panels and door units of like size must be readily interchangeable. The design must permit complete rearrangement easily, quickly and economically with maximum reusability of materials. Design must permit extension in two, three and four-way conditions without removing adjacent units. Top channel must hold panels in place. End filler must be constructed similar to flush panel unit and telescope into a spring loaded wall channel with concealed sound and light seal at foreign wall. Panel unit must be 2 1/4" thick with unit sizes 12”, 18”, 24”, 30”, 36”, 42” and 48”. Panels must be constructed of two formed sheets of 20 gauge furniture grade steel -reinforced horizontally on approximate 12" centers - with solid reinforcements glued to each surface to provide ample rigidity to the panel face. 18 gauge slotted vertical side members and 20 gauge panel faces to be bolted together by means of an internal anchor band and panel clips to form a rigid unitized panel. The entire panel unit must be completely insulated with 3.5-pound density mineral wool. Panel and door units must be mechanically locked together by alignment clips precision fitted to slotted vertical side members. The alignment clips and side members must be concealed by a recessed dual durometer vinyl drive trim providing a light and sound seal. Ceiling channel must be one piece, 16 gauge steel, 2" deep, recessed from panel face and designed to provide +/-1" vertical adjustment and easy removal of panel. Ceiling channel must be provided with continuous open cell light and sound seal at the ceiling and attached to the ceiling grid by means of non-damaging clips. Provide a frame at the end of each side of the panel for the mounting of switches. Provide glass magnetic markerboard panel fabricated from 1/4” tempered glass with steel backing must fit at 3’6” AFF to 7’-0” AFF on East and West Walls. Finish at top and bottom of glass magnetic marker board is painted steel.

9.13.4 Glass Panels and Clerestory Panels: Panel unit must be 2 1/4" thick with unit sizes 12”, 18”, 24”, 30”, 36”, 42” and 48”. Top and bottom glazing members must be formed of 20-gauge steel, reinforced with solid reinforcements and welded into a complete assembly. Vertical glazing legs to be assembled using an 18 gauge vertical post attached to a 20 gauge vertical glass rail. All vertical and horizontal glazing members will have a formed groove to accept 1/4” thick glass. Horizontal and vertical glazing members are assembled around the glass insert and bolted together to form a complete unitized assembly. Glass of specified design, quality and 1/4" thickness will be furnished and factory glazed by the partition manufacturer and must be set in vinyl glazing to provide firm retention and seal. All panel tops to be formed in such a manner as to permit them to wrap around the recessed ceiling channel. Panels to interlock into the recessed ceiling channel by means of an adjustable jack post. Panel Alignment Panel and door units must be mechanically locked together by alignment clips precision fitted to slotted vertical side members. The alignment clips and side members must be concealed by a recessed dual durometer vinyl drive trim providing a light and sound seal. Clerestory Panel Lower panel must be 2 1/4" thick with unit sizes 12”, 18”, 24”, 30”, 36”, 42” and 48”. Lower panel to be approximately 84" high constructed of two formed sheets of 20 gauge furniture grade steel reinforced horizontally on approximately 12" centers with solid reinforcements glued to each surface to provide ample rigidity to the panel face. 18 gauge slotted vertical side members and 20 gauge panel faces to be bolted together by means of an internal anchor band to form a rigid unitized panel. The entire panel must be completely insulated with 3.5-pound density mineral wool. Unitized upper clerestory panel must be designed to be attached to lower panel by means of an 18 gauge continuous slotted side member attached to the vertical glazing member. Glass of specified design, quality and 1/4" thickness must be furnished and factory glazed by the partition manufacturer and must be set in vinyl glazing to provide firm retention and seal, without exposed screws.

9.13.5 Door and Frame Construction: Door frames to be 18 gauge furniture grade steel, welded construction, with slip fit adjustable plinth at bottom to compensate for floor irregularities. Standard door frames must be 42" centerline units and have a continuous cushioned sound seal stop at head, hinge, and strike jambs. Frame must be mortised and reinforced to receive 1 1/2 pair of 4 1/2" x 4 1/2” ball bearing hinges and a 4 7/8” strike plate. Door frame to be securely anchored within the ceiling channel by means of jack posts. Doors and hardware must match existing and be provided by General Contractor as opposed to demountable partition subcontractor.

9.13.6 Acoustics and Fire Ratings: Partitions must be designed for maximum sound control and must provide a minimum STC of 47 when tested in accordance with ASTM E-90-90 by an approved testing laboratory. Partitions must be Class A non-combustible rated – wall panel flame spread to be 25 or less and “smoke develop” to be 100 or less as per ASTM E-84-00. Partition has been laboratory tested according to ASTM E-72-80 to prove that deflection will not exceed L/120 with a 5 pound per square foot uniform load applied uniformly over the surface of panel. Partitions must be installed on top of finished flooring. If on carpeting, carpet grippers must be furnished which permit installation of partition without damage to carpeting or flooring. Partitions must be neatly fitted to building conditions, installed in a rigid and substantial manner, straight and plumb, with all horizontal lines level. Hardware must be adjusted and left in proper working condition. All fastenings must be completely concealed. Metal surfaces must be cleaned and free from scratches

or abrasions. Installation contractor is responsible to remove all cartons, wrappings, left over materials, etc. and leave job broom clean.

9.13.7 Coordination: Coordinate location of wall devices (switches and thermostats) Thermostats must be adjacent to switches mounted on the panel (within 6" of frame).

Finishes: Glass Panels are segmented with a clerestory glass panel over door. Glazing must be Clear Tempered Glass. Side wall panel finish must be fabric: for top and bottom segments with glass magnetic marker board between at height indicated above. All trim shall be Aluminum Leaf. Glass markerboard color will be as indicated on Order Data Sheet.

9.14 CID FURNITURE, FIXTURES AND EQUIPMENT (FFE)

A fully developed FFE package is presented herein which is the furniture and equipment package based on Corps of Engineer Mobile District guidance and the 321EWS as a Bid Option. The Contractor's Interior Designer will be responsible for confirming that requirements are still in place. The FFE package must serve as the list of requirements that must be verified. Should major changes be required to the FFE package Reference Mobile District Design Manual Chapter 10 Interior Design for the required format in the development of the FFE package. The Contractor must show a line drawing of the furniture specified for Research Facility First and Second Floor. Provide critical dimensions on the floor plan to verify the specified furniture and equipment fit within the design. The FFE package must specify items such as desks, workstations, ergonomic chairs, tables, AV support equipment, files, storage cabinets, shredders, custom conference tables, but not be limited to those items. The FFE plans are found on Sheets I-103 and I-104. The specifications are found in Appendix D and are inclusive of specification sections 12 50 00 Furniture Systems and 12 70 00 Comprehensive Interior Design, Order Data Sheets and Typical Drawings. The Air Force Mandatory Use Blanket Purchase Agreement does not apply to this project.

9.14.3 Supplies/Services to be Obtained. The products required include all furniture and furnishings needed to provide a fully integrated, fully operational, complete and useable facility upon the beneficial completion date of the contract. The services required include all effort associated with ordering, receiving, storing, staging, installing, adjustments/leveling, trash removal/disposal, and touch-ups and/or repair or replacement of damaged furniture or their components (either in part or whole) and/or repair or replacement of damaged building surfaces.

9.14.4 Furniture Sustainability Standards: Specify low-emitting furnishings, including substrates, upholstery and other finish materials. Products shall be third party certified. Products shall pass BIFMA ANSI e-32014e Furniture Sustainability Standards, Level Two.

9.14.5 Compliance Verification: Compliance with the CID Description and CID Requirements shall be determined by Government review of the drawings, specifications and construction submittals, as required. The completed installation shall comply with NFPA 70 and NFPA 101. The Contractor shall coordinate the work of this section with that to be performed under other sections.

9.14.6 Bid Option 3. Cost of furnishings may involve State of Florida sales tax. It is the Design Build Contractors responsibility should he/she wish to obtain a waiver of tax liability based on sale to the government. No letter will be given to the Design Build Contractor by the Corps of Engineers authorizing him/her to procure products for this project.

9.14.7 Bid Option 3 includes, but not be limited to the following:

a. Cost of furnishings
b. Crating, Freight Costs, Mileage upcharges:
c. Installation cost of all moveable furnishings, in locations as indicated on the plans.
d. Rental of equipment required to complete any aspect of installation.
e. State of Florida Taxes.

9.15 SPECIFICATIONS.

As a minimum, the Contractor must edit and submit the following UFGS as defined in Section 01 10 12, Design After Award:

09 06 90 COLOR SCHEDULE
09 30 00 CERAMIC TILE, QUARRY TILE, AND PAVER TILE
09 51 00 ACOUSTICAL CEILINGS
09 65 00 RESILIENT FLOORING
09 68 00 CARPET
09 69 13 RIGID GRID ACCESS FLOORING
10 10 00 VISUAL COMMUNICATIONS SPECIALTIES
10 14 02 INTERIOR SIGNAGE
10 21 13 TOILET COMPARTMENTS
10 22 19 DEMOUNTABLE MOVABLE PARTITIONS
10 26 13 WALL AND CORNER GUARDS
10 28 13 TOILET ACCESSORIES
12 48 13.13 ENTRANCE FLOOR MATS

10. STRUCTURAL DESIGN

10.1 CODES AND REFERENCES.

a.	COE	Mobile District Design Manual, March, 2007
b.	Smith E.D.M.	Engineering Design Manual, Smith AFB, Florida, February 2018 (An appendix to this RFP)
c.	IBC 2015	International Building Code, 2015 edition
d.	ASCE 7-10	Minimum Design Loads for Buildings and Other Structures, (2010)
e.	UFC 1-200-01	DoD Building Code (General Building Requirements) (20 June 2016) with change 1, 01 February 2018
f.	UFC 3-301-01	Structural Engineering (1 June 2013) with Change 3, dated 12 September 2016

g. UFC 4-010-01 DoD Minimum Antiterrorism Standards for Buildings (9 February 2012) *with Change 1, dated 1 October 2013.*

h. UFC 4-010-02 DoD Minimum Standoff Distances for Buildings, (9 February 2012)

10.2 GENERAL DESIGN REQUIREMENTS

10.2.1 The Design-Build Contractor shall have on his staff a licensed Structural Engineer that shall be responsible for the design of the complete structural building system. A complete structural system for the building shall include foundations, walls, roof framing, roof diaphragms, lateral load stability, framing and connection of any architectural features, and the support of mechanical and electrical equipment. In addition, the Structural Engineer is responsible for the design of all lesser related structures such as utility vaults, pits, retaining walls, etc., although they may be shown on other disciplines' drawings. Structural design of the building shall be compatible with the architectural design. Structural design shall be in accordance with the criteria, requirements, and guidance provided in the codes and references noted in 10.1, and the following requirements.

10.2.2 The exterior structural wall system for this project shall be 8" nominal minimum reinforced concrete masonry. Refer to section 8 of this RFP for additional architectural wall type and layout requirements to match existing construction. The Second Floor shall be framed with steel beams or steel joists with composite concrete deck. The deck thickness, beam sizes and spacing shall be proportioned to reduce the perception of vibrations due to footfalls in accordance with the acceptability criteria of AISC Steel Design Guide 11: Floor Vibrations due to Human Activities. The floor system shall provide adequate clearances above ceilings for ductwork, lighting, etc., while matching the 2nd floor finish floor elevations noted in this RFP. The contractor should pay particular attention to the depth of framing at the second floor corridor, due to matching the existing building's second floor elevation, to ensure adequate clearances above the ceilings for other disciplines. The structural roof system shall be bar joists and/or steel beams with structural metal roof deck. The structural steel roof system shall be sloped 1/2 inch per foot minimum to provide roof system drainage. The column and framing layout shall not affect the usage of the building based on the architectural layout presented in this RFP.

10.2.2.1 Columns and/or bracing at perimeter walls shall be inside stud framing cavity to avoid projections into the interior of the building.

10.2.2.2 Interior columns shall be designed to work with criteria floor plans to avoid significant changes to floor plan layout and CID furniture design and layout.

10.2.2.3 Provide column free rooms, spaces and open office areas, except for 2nd floor open areas in which a column will be permitted as shown on the RFP drawings.

10.2.2.4 The building addition shall be structurally independent of the existing building. Joints, as required by the contractor's design team, shall be placed to accommodate thermal movements, shrinkage, seismic deflection and wind deflection.

10.2.2.5 The Contractor shall coordinate new to existing foundation intersection details with the Contractor's final geotechnical engineer of record. The engineer of record shall follow the recommendations of the Contractor's final geotechnical report.

10.2.2.6 All stair wall construction shall be 8" Nominal minimum fully grout filled reinforced concrete masonry unit construction.

10.2.2.7 Provide 8" nominal CMU walls at all Mechanical and/or Electrical rooms to 8 ft. above finished floor, minimum. If wall is part of service area perimeter, masonry shall extend to deck above.

10.2.3 Variations from level or from slopes specified for roof decks, floors, ceilings, beam soffits, lintels, sills, horizontal grooves, or other conspicuous lines shall be as follows: for overall length of line or surface of 10 feet or less, +/- 1/8 inch; up to 20 feet, +/- 1/4 inch; up to 40 feet, +/- 3/8 inch.

10.2.4 Where raised or depressed floors are provided, structural slab elevations shall be adjusted so that all finished floor levels (including access flooring systems) are at the same elevation.

10.2.5 Where depressed floors are provided for access flooring, provide sump in slab. Coordinate size and location with Mechanical, Electrical and Plumbing requirements.

10.2.6 A minimum safety factor of 1.5 shall be provided against uplift, sliding, overturning, or flotation.

10.2.7 Wood shall not be used for any structural members. Plywood shall not be used for wall sheathing or structural roof sheathing, or floor decking. Pre-engineered metal buildings shall not be used.

10.2.8 Where dissimilar metals are in contact, or where aluminum is in contact with concrete, mortar, masonry, wet or pressure-treated wood, or absorptive materials subject to wetting, the surfaces shall be protected with a coat of bituminous paint or asphalt varnish.

10.3 DESIGN LOADS

10.3.1 Design dead, live, and wind loads, and load combinations shall be in accordance with the IBC 2015, unless specified otherwise herein or modified by UFC 3-301-01.

10.3.2 Live loads, not given, shall be in accordance with Appendix D of UFC 3-301-01 and IBC 2015. The following floor areas shall be designed using the stated loads, as a minimum:

	Uniform	Concentrated
Slab-on-Grade (Unless Noted Otherwise)	150 psf	
1st Floor Mechanical and Electrical Rooms	400 psf	
2nd Floor Mechanical and Electrical Rooms	125 psf	
2nd Floor Corridors and Vestibules	100 psf	
2nd Floor Areas with Access Floor	100 psf	

Stairs and Exits	100 psf	300 lbs

10.3.3 Wind loads shall be based on a 152 miles/hr Ultimate Wind Speed, Building Risk Category IV, and Exposure Category C as described in UFC 3-301-01. Wind loads shall be computed and applied in accordance with the IBC 2015 and ASCE 7-10. All parts of all structures shall be designed for the specified wind velocity and shall be tied together to provide an integrated resistance to high wind effects.

10.3.4 Seismic loads shall be in accordance with UFC 3-301-01 and ASCE 7-10, Building Risk Category IV. The short period spectral acceleration value (Ss) shall be taken as 0.09g and the one second period spectral acceleration value (S1) shall be taken as 0.05g, for a 2 percent probability of exceedance in 50 years. Seismic Site Classification D shall be used unless modified by the contractor's geotechnical report. Seismic loads shall be computed and applied in accordance with the IBC 2015 and ASCE 7-10.

10.4 CONCRETE

10.4.1 Codes and References

a. ACI 315 Manual of Standard Practice for Detailing Reinforced Concrete Structures, lastest ed.

b. ACI 318-14 Building Code Requirements for Reinforced Concrete

c. ACI 360 R-10 Design of Slabs on Grade

d. ACI 302.1R-15 Guide to Concrete Floor and Slab Construction

10.4.2 Specified minimum compressive strength f'c shall be 3500 psi at 28 days for all concrete, unless noted otherwise. All main structural concrete, including but not limited to beams, columns, and walls, shall have a minimum compressive strength f'c of 4000 psi at 28 days. Exterior exposed concrete shall receive proper air entrainment as required by ACI.

10.4.3 All edge or spandrel beams shall have continuous reinforcing top and bottom. As a minimum, two #5 bars, top and bottom shall be used. Beams shall have continuous ties at a maximum spacing of 16 inches.

10.4.4 The reinforcing of concrete walls, continuous footings, and tie and bond beams shall be continuous and, therefore typical details showing the arrangement of reinforcing at corners and intersections of these members shall be shown on the drawings.

10.4.5 Building slabs-on-grade shall be placed on a minimum 15 mil vapor barrier and minimum 6-inch capillary water barrier. Concrete floor slabs remaining exposed shall be treated with a hardener/sealer.

10.4.6 Slabs on grade shall be designed in accordance with ACI 360 "Design of Slabs on Grade" and ACI 302 "Guide for Concrete Floor and Slab Construction". Slabs on grade shall be a minimum of 4 inches thick and reinforced with a minimum of .15 percent welded wire fabric, provided in flat sheets, or deformed bars. Reinforcement shall be placed approximately 1-1/2

inches from top of slab. Floor slabs on grade subject to heavy loads may be designed in accordance with UFC 3-
320-06A, "Concrete Floor Slabs on Grade Subjected to Heavy Loads". Control joints for slabs 4"-5" thick shall be spaced a maximum 12.5' on center. Control joints for slabs 6"-9" thick shall be spaced a maximum 15' on center. Slab areas created by crack control joints shall be as near to square as possible; slab area lengths shall not be greater than twice the length. Slabs-on-grade shall be placed on a minimum 15 mil vapor barrier.

10.4.7 Slabs shall be placed in a checkerboard or lane fashion. Crack control joints may be construction joints, contraction joints, expansion joints, or isolation joints. Reentrant corners in slabs shall be reinforced with two #4 bars, 4 feet long, placed diagonally to the corner. Discontinuous joints shall be reinforced with two #4 bars, 4 feet long, placed opposite the end of the discontinuous joint. Where visible, construction joints in slabs, exterior walls and cap blocks shall match joints.

10.4.8 The flatness of the floors shall be carefully controlled and the tolerances shall be measured by the straightedge system as specified in paragraph 4.5.7 of ACI 117/117R, using a 10 foot straightedge, within 72 hours after floor slab installation and before shores and/or forms are removed. The listed tolerances shall be met at any and every location at which the straightedge can be placed.

Bullfloated	1/2 inch
Straightedged	5/16 inch
Float Finish	3/16 inch
Trowel Finish	3/16 inch

Tolerances may also be measured by the F-number system in accordance with Paragraph 4.5.6 and 4.5.6.1 of ACI 117/117R.

10.4.9 All detailing and materials used for concrete reinforcement shall be in accordance with ACI 315 and ACI 318, latest editions.

10.4.10 Reinforcing of concrete walls, continuous footings, and tie and bond beams shall be continuous and, therefore, typical details showing the arrangement of reinforcing at corners and intersections of these members shall be shown on the drawings.

10.4.11 The contractor shall provide a hot weather concreting plan that shall be approved by the contractor's structural engineer of record.

10.5 STEEL

10.5.1 Codes and References

a. AISC 360-10 Specification for Structural Steel Buildings

b. AISC 341-10 Seismic Provisions for Structural Steel Buildings

c. SJI Standard Specifications Load Tables and Weight, latest edition.

d. AISC D.G. 11 Steel Design Guide 11: Floor Vibrations due to Human Activities, latest edition.

10.5.2 Shop connections for structural steel shall be welded, and field connections will generally be made with high-strength bolts, ASTM A325 bearing-type connections. Connection angles shall be a minimum 5/16 inch thick and bolts shall be a minimum ¾ inch diameter. Twist-off-type tension-control bolts conforming to RCSC, Specification for Structural Joints Using High-Strength Bolts shall be provided at all bolted connections. All connections other than standard AISC beam connections shall be designed by the structural engineer and detailed on the final plans. When standard AISC beam connections are used, beam end reactions shall be provided on the drawings. Design responsibility for all connections remains with the designer's Engineer of Record.

10.5.3 The structural steel specification shall be edited to include the requirements that the steel fabricator shall be certified by the AISC Quality Certification Program for the appropriate category.

10.5.4 Steel Joists: Steel joist construction will be in accordance with the IBC 2015 and the SJI, latest edition. Joists will be anchored to steel supports by bolting or field welding. Steel insert plates shall be provided in concrete work as required. Maximum joist spacing will be 2.5 feet for floors and, generally, 5.0 feet for roofs, except where composite joists are utilize the maximum spacing shall be 4 feet. Where top chords are extended, the required section modulus of extensions shall be shown in the drawings. Where equipment is hung from joists, details of joist reinforcement at hangar locations shall be provided on the drawings. Floors shall be designed to prevent excessive vibration. For joist supported floor systems, design calculations shall be submitted demonstrating that the floor system is acceptable in accordance with the "AISC Steel Design Guide Series #11: Floor Vibrations Due to Human Activity".

10.5.5 Braced frames, if used, shall be designed and detailed according to AISC 360 and AISC 341.

10.5.6 Structural steel frames, if used, shall be designed and detailed according to AISC 360 and AISC 341.

10.5.7 An erection plan shall be provided by the contractor. The erection plan shall be reviewed, stamped and sealed by a structural engineer licensed by the State of Florida. The erection plan shall also be approved by the engineer of record.

10.5.8 Masonry steel lintel angles and relieving angles: Shall be designed, detailed and indicated on the structural contract drawings. All masonry lintel angles shall be 1/4" thick minimum and shall be hot-dip galvanized.

10.5.9 Exterior steel embedded in concrete for such purposes as exterior railing, handrails, fence, base plates, anchor bolts, etc. shall be hot-dipped galvanized unless otherwise directed.

10.5.10 All column base plates and anchor bolts shall be completely encased in concrete, with 3" minimum clear cover. All below grade steel shall be

completely encased in concrete with 3" minimum clear cover or coated with coal-tar epoxy.

10.5.11 Where dissimilar metals are in contact, or where aluminum is in contact with concrete, mortar, masonry, wet or pressure-treated wood, or absorptive materials subject to wetting, the surfaces shall be protected with a coat of bituminous paint or asphalt varnish.

10.6 METAL DECK

10.6.1 Codes and References

a. SDI Diaphragm Mnl.	Diaphragm Design Manual
b. ANSI-10	Standard for Noncomposite Steel floor Deck
c. ANSI-10	Standard for Steel Roof Deck
d. SDI-C-2011	Standard for Composite Steel Floor Deck Slab
e. SDI-QA/QC-2011	Standard for Quality Control and Quality Assurance for Installation of Steel Deck.

10.6.2 Where steel floor and roof deck is used, the required section modulus and moments of inertia shall be shown on the drawings.

10.6.3 The type and quantity of decking connectors to be used to resist computed wind uplift and shear diaphragms shall be clearly detailed on the final plans.

10.6.4 Steel deck diaphragms shall be designed in accordance with the SDI Diaphragm Manual.

10.6.5 Metal form deck material shall be galvanized steel and have a minimum thickness of 0.0239 inches (24 gage).

10.6.6 All decking shall have a minimum galvanized coating conforming to ASTM A653, G60. Steel roof deck material shall have a minimum thickness of 0.0295 inch(22 gauge).

10.6.7 Structural metal roof decks shall be attached to structural supports and to adjoining units using mechanical fasteners, such as screws, powder actuated or pneumatically driven fasteners. Welding shall not be used to attach roof decks.

10.6.8 When the underside surface of large areas of steel decking is exposed to view and indicated to be finish painted, the underside surface of the steel decking shall be specified to be factory cleaned and factory primes with a finish paint compatible primer.

10.6.9 Net uplift resistance required will be specified in the Metal Deck specification in keeping with project design computations.

10.7 MASONRY

10.7.1 Codes and References

a. ACI 530-13 Building Code Requirements for Masonry Structures

b. ACI 530.1-13 Specifications for Masonry Structures

c. UFC 4-010-01 DoD Minimum Antiterrorism Standards for Buildings

10.7.2 Concrete Masonry Units and Concrete Masonry Veneer Units

10.7.2.1 Masonry construction shall be designed in accordance with the 2015 IBC. All structural masonry walls (load bearing walls, shear walls, or exterior walls) shall be designed as reinforced masonry, neglecting the tensile strength of masonry. Masonry walls shall be laid in running bond and reinforced as required to resist all vertical and horizontal loads.

10.7.2.2 Minimum thickness of structural masonry walls shall be 8 inches. Minimum reinforcement shall be as follows: Minimum bar size shall be #4. One vertical reinforcing bar shall be provided continuously from support to support at each wall corner, at each side of each opening, at each side of control joints, at ends of walls, and elsewhere in the wall panels at a maximum spacing of 48 inches. This minimum reinforcement shall be the same size as the minimum vertical reinforcement provided for flexural stresses.

10.7.2.3 Horizontal reinforcement in continuous masonry bond beams shall be provided continuously at floor and roof levels and at the tops of walls. Horizontal reinforcement shall also be provided above and below all wall openings. These bars shall extend a minimum of 40 bar diameters, but not less than 24 inches, past the edges of the opening. For masonry laid in running bond, the minimum horizontal reinforcement should be two #5 bars per bond beam. Lintel units shall not be used in lieu of bond beam units.

10.7.2.4 Particular attention will be given to details for the reinforcement of masonry construction. The horizontal and vertical wall reinforcement and reinforcement around openings and at lintels shall be clearly shown on the structural drawings and coordinated with the sections and details on the architectural drawings. Masonry control joint and expansion joint locations shall be shown on the drawings.

10.7.2.5 Nonstructural masonry walls may be designed as unreinforced masonry in accordance with ACI 530. However, the minimum reinforcement around openings given above for structural walls shall be incorporated.

10.7.2.6 Concrete masonry walls shall have vertical control joints as follows.

a. Exterior and Interior Walls: 24 feet and/or 1.5 Width to Height ratio, maximum.
b. At changes in wall height or thickness
c. Near wall intersections
d. At points of stress concentration
e. At control joints in foundation walls
f. Where a slab joint passes beneath a wall.

In no case shall any masonry control joint be placed so as to interrupt the continuity of lintel bar extensions as described above. Bond beam reinforcing shall extend through masonry control joints.

10.7.2.7 Certain standard structural details are required, as applicable on all projects. Typical masonry details shall be furnished showing details of horizontal and vertical wall reinforcement, reinforcement around openings and at lintels, and masonry control joints.

10.7.2.8 If the masonry compressive strength (f'm) used in the design is 1500 psi or more, a qualified masonry inspector approved by the COR shall perform inspection of the masonry work. Minimum qualifications for the masonry inspector shall be 5 years of reinforced masonry inspection experience or acceptance by a State, municipality, or other governmental body having a program of examining and certifying inspectors for reinforced masonry construction. The masonry inspector shall be present during preparation of masonry prisms, sampling and placing of masonry units, placement of reinforcement (including placement of dowels in footings and foundation walls), inspection of grout space, immediately prior to closing of cleanouts, and during grouting operations. The masonry inspector shall assure Contractor compliance with the drawings and specifications. The masonry inspector shall keep a complete record of all inspections and shall submit daily written reports to the Quality Control representative reporting the quality of masonry construction.

10.7.2.9 A sample masonry panel shall be built on the project site where directed. The sample panel shall be constructed after the material samples are approved and prior to starting masonry work. The sample panel shall be not less than 6 feet long by 4 feet high. The panel shall be of typical wall thickness for the construction represented. The panel shall show joint finish, bond pattern, control joints, and cleaning of the masonry as required in the work. The panel shall also show cold-formed steel framing, insulation, gypsum wallboard, gypsum sheathing, water/vapor barrier, joint reinforcement, steel shelf angles, flashing and weep holes, as applicable. The approved sample panel shall be used as a standard of workmanship required in the actual installation. The sample panel shall be protected from weather and construction operations and shall not be removed until the wall work has been completed and accepted.

10.8 MISCELLANEOUS COLD FORMED STEEL FRAMING

10.8.1 Codes and References

a. AISI S100-12	North American Specification for the Design of Cold-formed Steel Structural Members, 2012
b. AISI S200-12	North American Standard for Cold-formed steel framing-General Provisions, 2012.

10.8.2 Structural steel studs may be used for interior non-load bearing walls, soffits, fascia and eyebrow framing construction.

10.8.3 Structural Cold-Formed Steel: Cold-formed steel framing shall be designed in accordance with the IBC 2015 and the above referenced codes.

10.8.4 All cold-formed steel framing shall be formed from steel that conforms to the requirements of ASTM A-653, Grade 33 or higher, having a minimum yield of 33 ksi.

10.8.5 Minimum uncoated steel thickness (design thickness times 0.95) shall be 0.0329 inches (20 gage). All cold-formed steel framing, connectors, etc. shall receive a G60 galvanized coating, as a minimum.

10.8.6 Cold formed metal framing shall be designed by a registered professional engineer licensed in the State of Florida to meet all design loads and deflections as established in IBC 2015, UFC 3-301-01, and UFC 4-010-01.

10.8.7 The contract drawings shall show all components of the steel interior stud walls, soffits, fascia and eyebrow systems. The connections shall be completely detailed on the drawings.

10.8.8 Design and detail the connections between steel framing and the main structural system to prevent the cold formed framing from carrying floor or roof axial or shear loads.

10.8.9 Contract drawings shall specify the required stud depth, spacing, thickness, section modulus and moment of inertia

10.8.10 Use #10 minimum self-tapping screws for connections. Do not weld 18 gage (43 mils) thick or thinner materials.

10.9 ANTITERRORISM/FORCE PROTECTION

10.9.1 Antiterrorism/Force Protection design shall be in accordance with Chapter 5, Anti-Terrorism Force Protection Requirements.

10.10 SPECIFICATIONS

As a minimum, the Contractor shall edit and submit the following UFGS as defined in Section 01 10 12, Design After Award:

a. 01 45 35 Special Inspections
b. 03 30 00 Cast-In-Place Concrete
c. 04 20 00 Masonry
d. 05 12 00 Structural Steel
e. 05 21 19 Open Web Steel Joist Framing
f. 05 30 00 Steel Decks
g. 05 40 00 Cold-Formed Metal Framing
h. 05 50 13 Miscellaneous Metal Fabrications
i. 05 51 00 Metal Stairs

11. HEATING, VENTILATING, AND AIR CONDITIONING (HVAC)

11.1 CODES AND REFERENCES.

Facilities shall be designed in accordance with all government requirements, regional, and national applicable codes effective at issue date of RFP including, but not limited to:

a. Engineering Design Manual Smith AFB, Florida, February 2018
b. Americans with Disabilities Act and Architectural Barriers Act Accessibility Guidelines (ADAABA)
c. ASHRAE Handbook of Fundamentals, 2017
d. ASHRAE Standard 62.1 "Ventilation for acceptable Indoor Air Quality", 2010
e. ASHRAE 90.1, 2013 Energy Standard for Buildings Except Low-Rise Residential Buildings
f. ASHRAE 55 2013 Thermal Comfort
g. SMACNA HVAC Duct Construction Standards, latest ed.
h. SMACNA HVAC Systems Commissioning Manual, latest ed.
i. SMACNA HVAC Air Duct Leakage Test Manual, latest ed.
j. EISA 2007, Energy Independence and Security Act of 2007
k. EPACT 2005, Energy Policy Act of 2005
l. Executive Order (EO) 13423 "Strengthening Federal Environmental, Energy, and Transportation Management"
m. International Building Code (IBC), 2015 edition
n. International Mechanical Code, 2015
o. International Plumbing Code, 2015 Edition
p. National Fire Protection Association Standard 90A (NFPA 90A), Standard for the Installation of Heating and Air Conditioning Systems, 2015 edition
q. UFC 1-200-02, High Performance and Sustainable Building Requirements, with Change 01, 1 October 2017
r. UFC 3-410-01, Heating Ventilating and Air Conditioning Systems, with Change 3 (October 1, 2013)
s. UFC 3-420-01 Plumbing Systems, including Change 10, October 26, 2015
t. UFC 3-600-01, Design: Fire Protection Engineering for Facilities, Change 2, 25 March 2018
u. UFC 4-010-01, DoD Minimum Antiterrorism Standards for Buildings, with Change 1, dated 1 October 2013
v. USACE Mobile District Design Manual, March 2007
w. AFI91-203 Air Force Instruction
x. FEMP Federal Energy Management Program
y. Executive Order (EO) 13514 Federal Leadership in Environmental, Energy and Economic Performance (Oct 2009)
z. Executive Order (EO) 13514 Federal Leadership in Environmental, Energy and Economic Performance (Oct 2009)
aa. FLHPSB - Federal Leadership in High Performance and Sustainable Buildings MOU (HPSB) (issued 2006)
bb. ASME Code for Pressure Piping
cc. ASME Boiler and Pressure Vessel Code
dd. Technical Specifications for Construction and Management of Sensitive Compartmented Information Facilities (version 1.3) IC Tech Spec-for ICD/ICS 705, dated 10 Sept 2015
ee. AGRAM 17-01 Change to AF New Construction and Major Renovation Certification Requirements (February 2017) changes guidance for 3rd Party Validation and use of LEED from:
    a. Air Force Sustainable Design & Development (SDD) Implementation Guidance, memorandum dated 2 June 2011
    b. Air Force Sustainable Design and Development (SDD) Policy letter (31 July 2007)

11.2 DESIGN CRITERIA

11.2.1 The HVAC systems shall be designed to the latest industry standards, codes, Government regulations, the Energy Policy Act of 2005 (EPACT 2005), and to the specifications included in this solicitation. Design documents shall be submitted and approved prior to commencing work on the HVAC system. The Contractor shall be responsible for the professional quality and technical accuracy of all HVAC design documents and shall insure construction meets all requirements of the approved design. Drawings, specifications, and other design documents upon which construction is based shall be coordinated with other disciplines to insure compatibility of all building systems.

11.2.2 It shall be the design/build design professionals' responsibility to verify occupancy and heat loads for all equipment prior to commencing work. The design/build contractor shall submit, for review and approval, building HVAC load calculations and shall demonstrate compliance with Section 18 Sustainable Design and Energy Use Reduction.

11.2.3 Heat gain and loss calculations shall be, as a minimum, in accordance with the ASHRAE Handbook of Fundamentals. Computer load calculations shall be provided, and include complete input and output summaries. Acceptable computer load analysis programs are BLAST, Trane TRACE, or Carrier HAP. If the designer wishes to use a different load analysis program, this shall require approval by the Contracting Officer's Representative. Cooling equipment shall be selected to meet the calculated load operating at 95 deg F ambient.

11.2.5 The design of the facility systems shall make use of the latest technology to provide equipment with the highest efficiency possible to achieve compliance with EPACT 2005 without compromising maintainability. The design shall comply with ASHRAE Standard 90.1-2013 "Energy Standard for Buildings Except Low Rise Residential Buildings."

11.2.5 Table I
GENERAL DESIGN PARAMETERS

a. Standard Design Conditions:
Outside:
Summer 93 Degrees FDB; 81 Degrees FWB
Winter 30 Degrees FDB

b. Inside-General (Occupied):
Summer 78 Degrees FDB; 50% RH
Winter 68 Degrees FDB

c. Inside-General (Un-Occupied):
Summer 82 Degrees FDB; 50% RH
Winter 55 Degrees FDB

d. Telecommunication Rooms:
Summer 70 Degrees FDB; 50% RH
Winter 70 Degrees FDB

e. Filtration Rates:

MERV 13 filters per ASHRAE 52-76 with MERV-8 pre-filters
Maximum 350 feet per minute face velocity
Construction filters shall be provided per HPSB requirements

f. Exhaust Rates:
Restrooms Minimum 75 cfm per fixture.
Janitor's Closets Minimum 1 CFM/Sq. Ft.
Pressurization 10-15%

g. Mechanical rooms where air handling equipment is located and electrical rooms shall be part of the conditioned spaces.

h. Each telecommunication room shall be designed for a sensible heat load of 20 watts per square foot. The successful D/B team shall verify exact loading prior to design. Communication rooms shall each be provided with computer room air conditioning-type units sized for the equipment load and provided with humidifier, reheat and condensate pump (if required to pump condensate to drain location). Provide sufficient reheat to offset the cooling sensible capacity of the unit for humidity control at low loads.

i. The Heritage Room (Break Room) may have up to 80 people in it for approximately 2 hrs. four to six times per year. Will typically have 10-15 people in it for all other times.

j. All workstations within the facility will be provided with thin-client interfaces.

k. Miscellaneous Loads:
Equipment Heat Load for Office Spaces and Other Areas: Include 1.0 watts per square foot (approx.) for miscellaneous office equipment loads and 1.0 watt per square foot (approx.) lighting load.

l. Personnel:
As indicated in Section 01 10 10 and furniture layouts.

m. Outside Air Criteria:
Design facilities to comply with ASHRAE Standard 62.1 2010. The Design/Build Contractor shall provide documentation describing the calculations and methodology for ventilation in accordance with ASHRAE 62.1 2010.

11.3 SYSTEM TYPES AND EQUIPMENT REQUIREMENTS

11.3.1 Systems Description and Requirements

a. All equipment shall be of the high efficiency type and in compliance with ASHRAE 90.1-2013 minimum efficiency requirements.

b. The mechanical/HVAC scope is to provide heating, ventilation, air conditioning (HVAC), and summer/cooling space humidity control.

c. The HVAC systems shall be zoned to provide maximum year-around comfort and adequate flexibility. Air handling, heating, ventilation, and

exhaust systems shall comply with NFPA 90A, except as modified by UFC 3-600-01. The facility operating hours will be Monday thru Friday from 6am to 6pm. Refer to Section 1 "Description of Facility" for additional operational requirements information.

d. Spaces shall be heated and cooled to the indoor conditions listed above using variable air volume, single duct VAV air handling units (AHU) ducted to pressure independent terminal units or single zone VAV AHU's as indicated. Terminal units shall be provided with electric heating coils.

e. The chilled water system shall consist of one air-cooled chiller serving a constant volume pumping chilled water distribution system with a single distribution loop. The chillers shall be provided with multiple compressor circuits for automatic capacity reduction.

f. The first floor and second floors, with the exception of the Heritage Room, shall be served by a VAV air handling unit provided with a direct drive fan section, a variable frequency drive, and shall be located in the first floor mechanical room.

g. The Heritage Room shall be served by a dedicated single zone VAV air handling unit located in the first floor mechanical room adjacent to the Heritage Room. The unit shall be provided with a direct drive fan section and a variable frequency drive.

h. The building heating systems shall consist of electric resistance heat. Electric heating/reheat coils in each VAV terminal unit shall provide zone heating. Electric heating/reheat coil with SCR control shall be provided for the single zone VAV unit.

11.3.2 Air Distribution

The air distribution system shall be designed to meet the minimum ASHRAE design guidelines for 2015 (ASHRAE HVAC Application Chapter 48) room criteria (RC) sound levels when operating at maximum space design requirements (Maximum air flow). Fire dampers, smoke dampers, exhaust fans, terminal units, turning vanes, balancing dampers, control dampers, diffusers, registers, grilles, louvers, flexible connections, etc. shall be selected to provide a complete, easy to balance air distribution system free of objectionable noise. Mechanical rooms shall not be used as return air plenums. The supply, return, outside, and exhaust air systems shall be fully ducted using galvanized steel of thicknesses suitable for the pressure classification. All supply air ductwork upstream of VAV boxes shall be single walled, insulated, flat-oval or round medium pressure ductwork. All exhaust, return, outside air and low pressure supply ductwork downstream of VAV boxes shall be single walled round or rectangular ductwork. All ductwork shall be exterior insulated.

11.3.3 Air Handling Units

The VAV air handling units shall be of double wall construction with minimum R-13 insulated walls and welded or bolted frame and rated as a complete assembly. Provide ARI certified fan and ARI certified coils.

The air handling unit supply air fan shall be of the fan array type for redundancy and reduced maintenance and shall be provided with a variable frequency drive (VFD) for fan speed control. Fans shall be internally isolated for vibration control. Each fan cell of the fan array shall be provided with a backdraft damper to prevent short cycling should one fan fail and each fan motor shall be direct drive.

The air handler shall be provided with positive draining stainless steel drain pan.

The VAV air handler shall be provided with base rails and housekeeping pads of sufficient height for proper trapping and draining of the condensate drain pan. The air handler shall be provided with minimum MERV 13 filters and MERV 8 pre-filters.

Airflow measuring stations shall be provided to measure outside airflow during demand control ventilation operations for the single zone VAV unit and to maintain constant outside airflow for varying airflow conditions in the multi-zone VAV air handling unit. A static pressure sensor shall be provided in the medium pressure ductwork as required for fan speed control of the multi-zone VAV AHU.

11.3.4 Variable Air Volume Units (VAV)

a. Pressure independent VAV units shall be provided with electric heat to meet the requirements described in Section 18 Sustainable Design and Energy Use Reduction. VAV shall be provided with minimum one inch internal Foil-faced Rigid Insulation. Additional insulation requirements to prevent condensation shall be evaluated by the design/build professional and provided as required. Maximum air pressure drop including coils shall be 0.5 inches W.C. VAV's shall be controlled by the DDC system. VAV shall be capable of modulating air flow from minimum setting to maximum setting to maintain zone cooling adjustable set point, controlling reheat to maintain heating supply air temperature. VAV cooling and heating zone temperature set point, actual zone temperature, VAV air flow rate, VAV supply air temperature, VAV damper position, and electric heater stages cycling shall be viewable with full graphics at DDC control station. VAV zone controller shall allow for +/- 3 degrees of user adjustment to zone temperature. Design/build contractor shall provide VAV DDC controls and sequence of operation based on general DDC requirements. VAV's shall be located in an easily accessible location with full and code compliant access to control box enclosure and electric duct heater enclosure.

b. Zoning:
    1. The zoning shall be provided such that each conference room is provided with an individual zone.
    2. Offices and rooms having the same load profile shall be grouped in a maximum of four rooms per zone.
    3. The electrical/mechanical rooms shall be conditioned /tempered and shall be on a separate zone.
    4. Each telecommunication room shall be a separate zone served by a dedicated unit.
    5. First floor break room (Heritage Room) shall be on separate zone served by a dedicated unit.

11.3.5 Chillers

Air cooled chillers shall be high efficiency magnetic bearing or scroll chillers as required to comply with Section 18 Sustainable Design and Energy Use Reduction and shall have multiple stages of cooling capable of operating down to 15% load for an extended period of time. Chillers shall be provided with a minimum of two totally independent refrigerant circuits, factory applied seacoast condenser corrosion protection on copper tubes/aluminum fins condenser coils, gateway interface required for communicating with the DDC/EMCS and remote display with chiller percent capacity, louvered panels, low ambient controls option, circuit breaker, and increased thickness evaporator insulation for high humidity. Provide 5 year parts and labor warranty for all components in both units to include refrigerant. Provide automatic control valves, isolation valves, bypass valves, and buffer tank unless not required by manufacturer. Chiller controls shall be fully integrated with the DDC including host programming and chiller graphics screen. Chillers shall be located in mechanical yard on a concrete equipment pad. Chillers startup shall by provided by chiller manufacturer representative. New refrigeration equipment (including chillers, compressors, etc.) shall use refrigerants as required to comply with AFI 32-7086 "Hazardous Materials Management". No Class I or Class II ODS shall be allowed on any refrigeration equipment. Refrigerant Ozone Depletion Factor: 0.050 or Lower. All refrigerants shall be R-134A, R-410A or R-407C to meet Section 18 Sustainable Design and Energy Use Reduction criteria.

11.3.6 Heating System

Building heating shall be provided by electric heat.

11.3.7 Pumps and Piping Systems

The chilled water pump serving central mechanical equipment shall be located inside the mechanical rooms and shall be base-mounted, end-suction, close-coupled. Provide oil filled suction, discharge and differential pressure gages. Provide isolation valves, balancing valves, check valves, strainers, and suction diffusers. Triple duty valves are not acceptable. Pump operation shall be controlled by the DDC system with failure alarm. Provide minimum 6" thick concrete equipment pad for each pump. Chilled water pump shall be provided with a variable frequency drive.

Piping systems shall be designed to include pipe, fittings, thermometers, gages, pumps, hangers, valves, flexible connectors, balancing cocks, wells for controllers and sensors, strainers, pressure reducing stations, flow meters, etc. as required to provide complete, functional, easy to balance systems. Chilled water piping systems shall be provided with a chemical treatment system complete with feeder and chemicals to control scaling inside the pipe. Dielectric couplings shall be provided at all connections of dissimilar metals. Provide makeup water stations, air separators and expansion tanks for the chilled water system.

All exterior piping, tanks, or other appurtenances that could be damaged by freezing shall be protected with heat tracing and proper coatings or finishes.

Chilled water piping inside the building shall be insulated with cellular glass or phenolic foam insulation with a vapor barrier and white all-purpose jacket. Any chilled water piping routed exterior to the facility shall be provided with an aluminum insulation jacket and heat trace as required. Contractor shall evaluate and design the chilled water system for freeze protection during low ambient temperature and to allow for chiller operation during low load conditions. Piping larger than 4" shall be Schedule 40 black steel pipe. Chilled water piping 4" and smaller may be Type L copper piping. Piping shall not be routed through or over rooms containing electrical and/or communication equipment. Chilled water piping between the chiller and the building shall be routed underground utilizing a pre-insulated piping system with Schedule 40 steel carrier pipe, polyurethane insulation, and HDPE outer jacket installed per manufacturer's recommendations. Water losses, pressure losses, etc., for sizing piping shall be based on "Cameron Hydraulic Data" with C = 150. The maximum friction loss shall be 1219mm (4 feet) of water per 30.48 meters (100 feet) of pipe with a maximum velocity of 1.22 meter/sec (5 fps) for systems in occupied areas, and up to 2.44 meter/sec (8 fps) for mains and large branches. The minimum pipe size shall be 19mm (¾-inch).

The chilled water system shall be provided with a chilled water buffer tank as required for minimum system volume. Chilled water system shall be provided with valves and blind flanged emergency connections to a portable chiller.

All exterior piping, tanks, or other appurtenances that could be damaged by freezing shall be protected with heat tracing and proper coatings or finishes.

Cathodic protection shall be provided for all metallic underground piping and valves and coordinated with electrical/corrosion engineering.

11.4 COMMISSIONING

Third Party, Independent, Commissioning Authority services shall be provided by the contractor in compliance with UFC 1-200-02 and as further defined in RFP 01 10 10 Section 18 Sustainable Design and Energy Use Reduction. The requirements for contractor and sub-contractor participation in the commissioning process shall be as per the unedited specification requirements of Section 01 91 00 Commissioning. The Commissioning Authority oversees the commissioning process to be performed by the contractor and the sub-contractors.

11.5 TEST AND BALANCE

The design shall include testing, balancing, and adjusting of all HVAC systems by a certified AABC or NEBB test and balance firm. Reports of all tests shall be submitted for approval to the COR on standard AABC or NEBB forms.

11.6 OPERATION AND MAINTENANCE MANUALS

Operation and Maintenance Manuals for all components of the HVAC systems shall be submitted by the design/build contractor prior to the training date. Manuals shall be submitted for approval 60 days prior to the scheduled completion date for the project. The design shall include requirements for training of operating personnel in the operation and maintenance of the

complete HVAC system. Framed instructions, control drawings, and system diagrams shall be in place prior to the start of training.

11.7 MAINTENANCE CLEARANCES AND EQUIPMENT LAYOUT

The air handling units, pumps and any other plant accessories and/or appurtenances, with the exception of the air-cooled chillers, shall be designed and arranged to fit properly within the mechanical room. The layout of the mechanical room shall consider proper maintenance clearances around all equipment including coil pull space, and observance of the "dedicated electrical space" around electrical equipment as required by the National Electrical Code, as well as the minimum clearance requirements set forth in the International Mechanical Code, and the manufacturer's minimum recommended clearances.

Access panels and doors shall be provided for maintenance of all equipment and appurtenances above hard ceilings or otherwise concealed. Access panels shall be of sufficient size and located so that concealed items can be easily serviced, maintained and completely removed and replaced. Any valves, VAV's, dampers or other mechanical devices that maintenance personnel may need to access shall be marked on the ceiling grid with phenolic nameplates and a laminated index of markings shall be placed in the mechanical room.

11.8 PHYSICAL SECURITY AND ANTITERRORISM FORCE PROTECTION REQUIREMENTS

Contractor shall adhere to the requirements of Section 3 and 5 of this specification. The following is a partial list of AT/FP requirements:

a. All equipment, ductwork, and piping located inside of the building will be installed and supported in accordance with UFC 4-010-01.
b. All outside air intakes for distribution to the occupied spaces shall be located a minimum of 10 feet above grade.
c. Emergency shutoff switches shall be provided to shut down the entire HVAC air distribution system in accordance with UFC 4-010-01. A minimum of one switch per floor shall be provided.
d. Provide all outside air intakes, relief air, and exhaust openings with low leakage dampers that are automatically closed when the emergency air distribution shutoff switch is activated. The low leakage dampers will have maximum leakage rates of 3 cfm/square foot (15 liters/second/square meter) with a differential pressure of one inch of water gage (250 Pa) across the damper.
e. All vents and duct openings that penetrate the perimeter walls of secured areas and exceed 96 square inches shall be protected with permanently affixed bars or grills and access doors.
f. Duct silencers, z-ducts, and/or white noise generators shall be used to reduce sound transmission to required STC rating.
g. Metallic piping, conduits and other metallic penetrations through perimeter walls of secured areas shall be electrically grounded to reduce emanations.

11.9 ALTERNATIVE SYSTEMS

Any alternative system designs proposed by the Contractor shall be provided with a life cycle cost analysis (LCCA) executed in accordance with UFC 1-200-

02. The present worth discount rate, and future fuel escalation rates, used in the LCCA shall be those published in the National Institute of Standards and Testing (NIST) Life-Cycle Cost Handbook. The LCCA shall be based on actual operating hours, and shall realistically reflect first cost, installation, operations, maintenance, and replacement costs that occur within the study period. DX, unitary, and fan-powered VAV systems are not acceptable due to their limitations in meeting ventilation requirements, increased contamination source potential, and increased maintenance requirements.

11.10 UTILITIES RATES

The utility rates are as follows:

Electricity 0.10 $/KWH
Gas 1.00 $/Therm

11.11 GENERAL DIRECT DIGITAL CONTROL REQUIREMENTS

11.11.1 An extension of the existing automatic temperature control system located in Building 123 shall be designed by the design/build HVAC design professional. The existing direct digital control (DDC) system extension shall be suitable for the heating, ventilating, and air conditioning (HVAC) systems provided. The existing DDC system front end is located in Room 7 of Building 123 and shall be upgraded per the requirements indicated. System upgrades and extension shall be compatible with and completely integrated into the existing Smith Niagara framework including host graphics, programming, and end to end commissioning of each field point to the host graphics screen. All control wiring shall be routed in dedicated metallic raceways. **C**oordinate with 796 CES CEOIC for compliance with base requirements and fpr DDC system acceptance.

a. Provide building level supervisory controllers based on Smith's existing Niagara AX Framework Rev 3.6 or later. The building level supervisory controllers shall include point-2-point (P2P), Secure Socket Layer SSL, Web server and embedded WorkBench (WB). The building level supervisory controllers shall contain all building logic and graphics.
b. All graphics and points shall be duplicated in the existing Niagara AX Framework ENS (Enterprise Network Server) using existing workbench software located in building 696 which shall serve as the Web Server for the system. All trended points shall be transferred via P2P to the server for history trending of points.
c. The system shall allow CE technicians to connect to all controllers with all available software in all modes available from the manufacturer from Building 696 via the local area network (LAN) to program, backup, download, configure and perform all functions necessary to maintain the system as if onsite and direct connected to the device.
d. All hardware and software administrator level passwords shall be provided to the government to access all levels of all controllers including the new Niagara Framework controllers. The password shall allow complete access to everything the manufacture has access to.
e. All field controllers shall use Bacnet MSTP protocol.

f. Provide a LAN drop within three foot of each building level supervisory controller and provide a patch cable between the Lan drop and the building level supervisory controller.
g. When the BACnet comm bus leaves and enters the building provide inline surge protection.
h. When the BACnet comm bus is ran between buildings use fiber optic cable.
i. Control and network wiring shall be run as high above the ceiling as possible to allow easy removal of ceiling tiles without interference due to control or network wiring. Control wiring in partition walls, structural walls, or run exposed in equipment rooms shall be in dedicated metallic raceways.
j. The design shall include complete control system drawings, complete technical specifications, and commissioning procedures for each control system. Temperature control drawings shall be prepared by the control system vendor and shall be similar to shop drawings. No catalog cuts or specific component information is required on the temperature control system design drawings. Variation of air flow delivered by the air handling unit fan shall not create a variation in outside air quantity except as required to satisfy the measured carbon dioxide levels in systems utilizing demand control ventilation schemes.
k. The DDC system shall include hardware and software necessary for monitoring, control and programming of the HVAC system, as indicated below, directly over the Ethernet LAN, and via direct connection to each DDC panel and controller.
l. Coordinate requirements to insure that LAN and phone connections are installed in the mechanical rooms in close proximity to DDC control panels and DDC communications modules.
m. Each thermal zone shall be provided with manual override capability of the DDC time clock function at the space sensor to start and stop the HVAC system(s) so as to provide air conditioning during unscheduled operational hours. The override run time shall be adjustable with no limit on the number of overrides allowed per zone.
n. One laptop computer with the latest operating system, CPU, and technology as it relates to laptops shall be provided to the Government unconditionally for monitoring and control of the new DDC systems. All required training of Government personnel shall be carried out utilizing this laptop to insure software and hardware compatibility to include demonstrating host integration with the base system. Provide software and USB adapters for each type of DDC field controllers, to include factory installed DDC controllers.

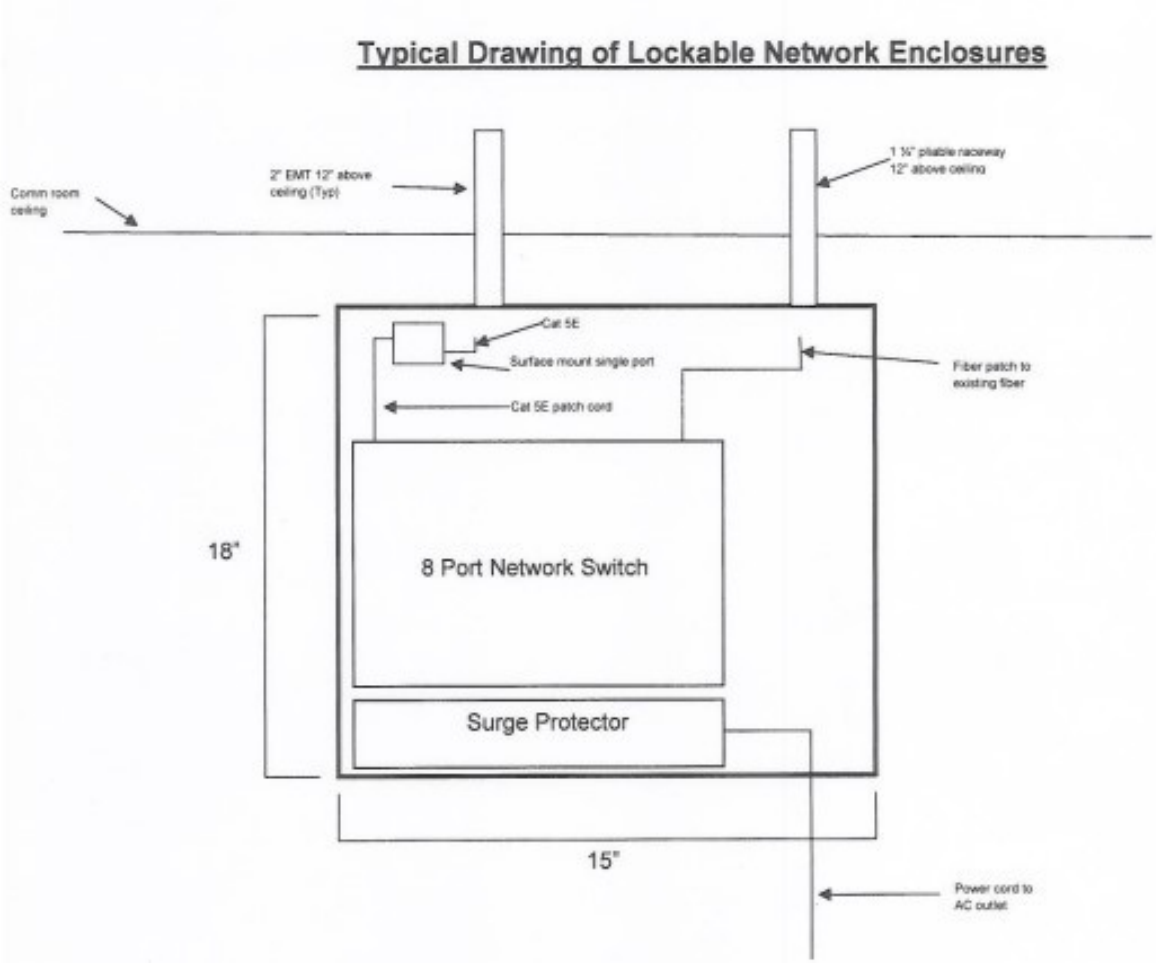
11.11.2 All equipment such as chillers, variable frequency drives, CRU’s, etc. shall be provided with communications cards to interface with the DDC system.

11.11.3 Graphics *sh*all be in the existing ENS (Enterprise Network Server) located in building 696 which shall serve as the Web Server for the system. Include date and time on all graphic screens.

a. Main Map Graphic- This screen shall have a list and link to all of the buildings on the entire Smith complex.
b. Building Graphic - This screen shall have a 3d graphic of the front of the building and a building number. The following links are required on this page: Back to Main Map, floor plans, alarms, reports, schedules, history, and user service.

c. Floor Plan Graphic - The floor plan shall be 3D with color coded zones, room numbers, and as- built sensor and equipment locations. The following links are required on this page: back to building graphic, all equipment (Click on sensor or equipment shown on the floor plan and the link shall go to the corresponding equipment).
d. Typical Equipment Graphic - Include a header with equipment type and number, room numbers and area served. Include all points on the equipment graphic. The following points shall be animated: fans, dampers, coils, pumps, boilers. All set points shall have the capability of being changed from the graphic. The following links are required on this page: back to floor, provide a hidden link over each point to show an hourly 3 day trend, provide a hidden link over each point to override all outputs. Provide a link to a spread sheet with manufacture and part numbers and warranty dates for all parts on the equipment graphic.
e. Communication Bus Graphic - Include an as-built wiring diagram of the communication bus between all controllers.

11.11.4 Typical Lockable Network Enclosure



11.11.5 Energy Management Control System (EMCS) Network Requirements:

1. Install and dedicate 2 fiber strands for DOC connectivity.
2. Install a wall mounted lockable network enclosure {LNE) with an 8 port switch and a surge protector with backup power (provided by customer) in the main Communications room (refer to 13.10.5).
3. Install a 20A/12SV duplex receptacle within 3' of the LNE for connection of the surge protector. This receptacle shall be connected to the emergency power panel if the building is, or shall be, equipped with an emergency generator.
4. Install a single port LAN connection inside the LNE and inside each building level supervisory controller.
5. Install a 2" EMT conduit from the LNE to a height approximately 12" above the Communications room ceiling for connection of the LNE to each building level supervisory controller in the building.
6. Install a 1-1/4” pliable raceway from the LNE to a height approximately 12" above the Communications room ceiling.
7. Install a 1-1/4” pliable raceway from the Communications terminated fiber patch panel to approximately 12" above the Communications room ceiling.
8. Install a 1/4” EMT conduit from each building level supervisory controller to a height approximately 12" above the ceiling of each mechanical room they are installed in. If a ceiling is not installed, install the conduit to the same height that matches the height of the 2" conduit installed from the LNE above the Commutations room ceiling.
9. Install a pull string connecting both 1-1/4” pliable conduits installed in Communications room or install a fiber jumper-provided by customer from the LNE to the installed fiber patch panel.
10. Install purple Cat SE cable from the LNE to each building level supervisory controller. If the distance exceeds 100 meters between the LNE and the building level supervisory controller, the building level supervisory controller shall be moved to the main Communications room.
11. Provide a fiber jumper (provided by customer) for the Complex node that connects the end building to the backbone network switch.

11.11.6 Minimum Points to be Monitored

a. Air Handling Units:
   Coil leaving air temperature
   Coil Entering air temperature
   Entering chilled water temperature
   Leaving chilled water temperature
   Temperature and humidity in each zone
   Temperature set-point in each zone
   Fan on-off indication
   Filter differential pressure
   Supply Air Quantity
   Outside Air Quantity

b. VAV Boxes:
   Supply air temperature
   Supply air volume
   Air valve position
   Electric heat status
   Space temperature
   Zone humidity

c. Main Mechanical Room:
Chiller on-off
Chilled water temperature in and out
Chiller "Out of Operation" or in alarm
Pump on-off indication, each pump
Water meter
Power meter

d. Server Room Units:
Run Status
Room air temperature
Space humidity
Alarm condition

11.11.7 General DDC Minimum Alarm Print Outs

a. Chillers failure to start
Air handling unit fan failure
Zone space temperature rise to 4 degrees above set-point
Chilled water rise 4 degrees above set point
Zone RH 3% above set-point
Pump failure
Server room temperature and humidity above setpoint
Water on Floor of Mechanical Room

11.11.8 General DDC Minimum Points to be controlled

a. Start/stop chiller/chilled water pumps
Start/stop air handling units
Set-point adjust - all controllers with set-points Set-point adjust - all VAV zones

Note: Provide capacity for 12 extra points.

13.10.9 The facility mechanical systems shall be designed and controlled with the consideration that maintenance personnel shall not be readily available to address operational problems in a timely manner. To this end, the controls shall provide for automatic restart of all equipment (air and water sides) after interruptions except in the case of safety code requirements for a manual restart. An alarm shall be sent to the DDC system whenever equipment or controller outputs have been placed in the "hand" mode. The supplier of the control system shall provide a copy of the operating software and the technical manuals for the control system to the operating personnel.

An emergency shutoff switch shall be provided in each facility located at the LOC that shall immediately shut down the entire HVAC air distribution system for that facility. Each switch shall be placed inside a clear flip up cover or equal anti-tamper enclosure. A plastic laminate sign shall be provided for each switch that reads "BUILDING VENTILATION SYSTEM EMERGENCY SHUTOFF SWITCH".

11.11.10 DDC Training Requirements

a. Provide a qualified instructor (or instructors) with two years minimum field experience with the installation and programming of similar BACnet DDC systems. Orient training to the specific systems installed. Coordinate training times and location with the Contracting Officer and BAS Owner after receiving approval of the training course documentation.
b. Training shall take place at the job site or a nearby Government-furnished location. A training day shall occur during normal working hours, last no longer than 8 hours and include a one-hour break for lunch and two additional 15-minute breaks. The project's approved Controls System Operators Manual shall be used as the training text. The Contractor shall ensure the manuals are submitted, approved, and available to hand out to the trainees before the start of training.
c. Training Documentation - Submit training documentation in the form of a training manual for review 60 days minimum before training. Documentation shall include an agenda for each training day, objectives, a synopses of each lesson, and the instructor's background and qualifications. The training documentation can be submitted at the same time as the project's Controls System Operators Manual. One training manual shall be provided for each trainee plus two additional manuals for archival storage at the project site. Two copies of audiovisual materials shall be delivered to the government for archival storage at the project site, either as part of the printed training manuals or on the same media as that to be used during the training session.
d. Phase I Training – Fundamentals - The contractor will provide training by factory certified trainer(s) for 3 operating staff members designated by the government. The course shall be selected from the DDC manufactures controls factory training department and be relevant to main components used on this project. The training can be located at the manufacturer’s factory school or at a classroom provided by the government. The training session shall be conducted in a classroom environment with complete audiovisual aids provided by the contractor. Provide each trainee a printed 8.5 by 11 inch hardcopy of all visual aids used. Upon completion of the Phase I Training, each trainee should fully understand the project's DDC system fundamentals. The training session shall include the following:

    i. DDC fundamentals (objects, services, addressing) and how/where they are used on this project.
    ii. This project's list of control system components
    iii. This project's list of points and objects
    iv. This project's device and network communication architecture
    v. This project's sequences of control, and:
        Alarm capabilities
        Trending capabilities
        Troubleshooting communication errors
        Troubleshooting hardware errors

e. Phase II – Operation - Provide Phase II Training shortly after completing Phase I Training. Phase II training shall last one day per Building and be conducted at the DDC system workstation, using one laptop computer with the latest operating system, cpu, and technology as it relates to laptops. Provide software and USB adapters for each

type of DDC Field Controllers, to include factory installed DDC Controllers. connected to the
DDC system in the field, and at other site locations as necessary. Upon completion of Phase II Training, each trainee should fully understand the project's DDC system operation. The training session shall include the following:

i. A walk-through tour of the mechanical system and the installed DDC components (controllers, valves, dampers, surge protection, switches, thermostats, sensors, etc.).
ii. A discussion of the components and functions at each DDC panel.
iii. Logging-in and navigating at each operator interface type.
iv. Using each operator interface to find, read, and write to specific controllers and objects.
v. Modifying and downloading control program changes.
vi. Modifying set points.
vii. Creating, editing, and viewing trends.
viii. Creating, editing, and viewing alarms.
ix. Creating, editing, and viewing operating schedules and schedule objects.
x. Backing-up and restoring programming and data bases.
xi. Modifying graphics text, backgrounds, dynamic data displays, and links to other graphics.
xii. Creating new graphics and adding new dynamic data displays and links.
xiii. Alarm and Event management.
xiv. Adding and removing network devices

11.12 SPECIFICATIONS

The following list of specifications is anticipated for this project. The list is not comprehensive and the Contractor shall provide all specifications required to adequately describe the project and all materials to be used and installed. The Contractor shall edit and submit the following UFGS as defined in Section 01 10 12, Design After Award using the latest comparable UFGS version:

23 00 00 AIR SUPPLY, DISTRIBUTION, VENTILATION, AND EXHAUST SYSTEMS
23 03 00.00 20 BASIC MECHANICAL MATERIALS AND METHODS
23 05 93 TESTING, ADJUSTING, AND BALANCING FOR HVAC
23 07 00 THERMAL INSULATION FOR MECHANICAL SYSTEMS
23 09 23.02 BACNET DIRECT DIGITAL CONTROL FOR HVAC AND OTHER BUILDING CONTROL SYSTEMS
23 09 00 INSTRUMENTATION AND CONTROL FOR HVAC
23 64 10 WATER CHILLERS, VAPOR COMPRESSION TYPE
23 64 26 CHILLED WATER PIPING SYSTEMS
23 81 00.00 20 UNITARY AIR CONDITIOING EQUIPMENT

12. PLUMBING

12.1 CODES AND REFERENCES.

Facilities shall be designed in accordance with all government requirements, regional, and national applicable codes effective at issue date of RFP including, but not limited to:

a. Engineering Design Manual Smith AFB, Florida, February 2018
b. Americans with Disabilities Act and Architectural Barriers Act Accessibility Guidelines (ADAABA)
c. ASHRAE Handbook of Fundamentals, 2017
d. ASHRAE 90.1, 2013 Energy Standard for Buildings Except Low-Rise Residential Buildings
e. EISA 2007, Energy Independence and Security Act of 2007
f. EPACT 2005, Energy Policy Act of 2005
f. Executive Order (EO) 13423 "Strengthening Federal Environmental, Energy, and Transportation Management"
g. International Building Code (IBC), 2015 edition
h. International Plumbing Code, 2015 Edition
j. UFC 1-200-02, High Performance and Sustainable Building Requirements, with Change 01, 1 October 2017
k. UFC 3-420-01 Plumbing Systems, including Change 10, October 26, 2015
l. UFC 3-600-01, Design: Fire Protection Engineering for Facilities, Change 2, 25 March 2018
m. UFC 4-010-01, DoD Minimum Antiterrorism Standards for Buildings, with Change 1, dated 1 October 2013
n. USACE Mobile District Design Manual, March 2007
o. AFI91-203 Air Force Instruction
p. FEMP Federal Energy Management Program
q. Executive Order (EO) 13514 Federal Leadership in Environmental, Energy and Economic Performance (Oct 2009)
r. Executive Order (EO) 13514 Federal Leadership in Environmental, Energy and Economic Performance (Oct 2009)
s. FLHPSB - Federal Leadership in High Performance and Sustainable Buildings MOU (HPSB) (issued 2006)
t. ASME Code for Pressure Piping
i. ASME Boiler and Pressure Vessel Code
j. Technical Specifications for Construction and Management of Sensitive Compartmented Information Facilities (version 1.3) IC Tech Spec-for ICD/ICS 705, dated 10 Sept 2015
k. AGRAM 17-01 Change to AF New Construction and Major Renovation Certification Requirements (February 2017) changes guidance for 3rd Party Validation and use of LEED from:
    a. Air Force Sustainable Design & Development (SDD) Implementation Guidance, memorandum dated 2 June 2011
    b. Air Force Sustainable Design and Development (SDD) Policy letter (31 July 2007)

12.1.1 GENERAL SYSTEM CRITERIA

The design of the plumbing system shall conform to the Mobile District Design Manual 2007 and the applicable codes, standards and requirements included in this RFP. Plumbing system shall be designed and installed in accordance with the International Plumbing Code and referenced criteria. Inspection and testing of the plumbing system shall be performed as prescribed in the International Plumbing Code. The plumbing system shall conform to the applicable rules of the International Plumbing Code governing venting of

plumbing fixtures, sizing of waste, vents, drains, and water systems. All shutoff/isolation valves and water hammer arrestors shall be accessible. If installed above hard ceilings, access doors shall be provided. All piping shall be labeled, color coded, titled, and indicate direction of flow. Backflow preventers shall be provided at the service entrance in the mechanical room, located in an accessible location inside the mechanical room. Fixture counts for the facility have been determined in accordance with the International Building Code and as supplemented by UFC 3-420-01. The male/female split for the facility is 80/20.

a. Water efficiency: Plumbing fixtures shall be selected to meet the water-efficiency requirements of EPAct 2005 and UFC 1-200-02.

b. Backflow Preventers: All facilities requiring potable water shall be provided with a reduced pressure backflow preventer. New backflow preventers shall be installed at the domestic water service entrance outside the building. The assembly shall have two positive seating check modules with bronze valve seats. The assembly shall meet the requirements of ASSE Std. 1015 and AWWA Std. C510 and be approved by the foundation for Cross-Connection Control and Hydraulic Research (FCCHR-01) at the University of Southern California. All test cocks shall be equipped with 1/4 inch flare adapters to facilitate attachment of test equipment. A poppet replacement kit shall be provided with each backflow preventer.

c. Backflow Preventer Test Kit: The design-build contractor shall provide the Government with two sets of FCCHR-01 detailed and approved test equipment and gauges compatible with the backflow preventer installed. Each set shall include all necessary equipment to test both double check and reduced pressure backflow preventers. The gauges on these test kits shall be a type that can be calibrated.

d. Domestic Hot Water Temperatures: The domestic hot water shall be heated and stored by the domestic hot water heating system to a minimum of 140° F. A thermostatic mixing valve shall be provided to reduce the water supply temperature to the facility fixtures. All latrines and toilet facilities with showers shall be supplied with hot water at a maximum temperature of 110° F.

e. The water meter shall be provided with Advanced Meter Reading capability and shall be integrated into the DDC building automation system. Water Meters shall be provided for all facilities requiring potable water and shall be turbine-type water services meters located inside the facility. New meter shall be sized to account for the new service/fixtures.

f. A life cycle cost analysis has been conducted to determine the suitability of providing solar hot water heating to offset 30% of the required domestic hot water demand as required by EPAct 2005. The life cycle cost results indicate that providing 30% of the facility hot water useage via solar hot water heating is not life cycle cost effective.

g. A life cycle cost analysis has been conducted to determine the suitability of providing a rainwater harvesting system to offset the required domestic water useage for water closets and urinals as required by UFC 1-200-02. The life cycle cost results indicate that providing the facility with water from an alternate source than the building domestic water supply via rainwater harvesting is not life cycle cost effective.

h. All soil, waste, vent, and storm drainage piping shall be tested by capping or plugging and filling the system with water, allowing it to stand filled for 8 hours. If tested in sections, each section shall be subjected to not less than a 10 foot head. Cold water, hot water and hot water circulating piping shall be tested by applying a hydrostatic pressure of 150 psig for 4 hours minimum. Piping under floor slabs in floor fill shall be tested before slabs are poured. Piping which is not tight under tests shall be taken down and reassembled. Joints in cast iron no-hub pipe not tight under test shall be taken down and reassembled using new couplings. Each fixture shall be tested for soundness, stability of support and operation. A statement certifying that piping has passed the herein specified test shall be provided. Tests shall be made while pipe is exposed to view.

i. Flush and disinfect all new potable water systems.

j. Roof drains and overflows shall be provided in accordance with Section 8.7.2 Roof Drains and Overflow System and Section 6.6.7 Downspouts and Roof Drain Leaders and shall be piped to the underground collection system.

k. The utility rates are as follows:

Domestic water 0.035 $/gallon

12.2 GENERAL PLUMBING MATERIALS, EQUIPMENT AND FIXTURE REQUIREMENTS

12.2.1 Routing and Design

All piping shall be concealed and properly supported with allowances for expansion and contraction. Do not route water piping through any Telecommunication/Server room. Interior water distribution piping shall not be buried under concrete floors except where no other routing options exist. All piping shall be drainable and exposed piping subject to freezing shall be insulated and heat traced. Domestic cold water piping shall be provided to serve coffee makers and refrigerators with ice makers in the break room~~s~~. Individual shutoff or stop valves shall be provided on water supply lines to all plumbing fixtures Individual stops shall also be furnished at all equipment connections such as dishwashers, vending machines, coffee makers, icemakers, etc. Isolation shutoff valves shall be provided for each bathroom group to allow isolation shutoff for maintenance purposes while continuing service to the remainder of the building. Consolidate fixture vents through one common vent whenever possible. All vent penetrations through the roof shall be made through a roof jack designed for use with the roofing system furnished.

12.2.2 Materials for Waste, Vent, and Storm Drain Lines

Soil, waste, and storm drain piping and fittings passing through and located below the slab and out to the exterior line shall be Schedule 80 PVC. Soil, waste, drain and vent piping above the slab shall be ~~s~~Schedule 40 PVC or cast iron pipe and fittings. PVC shall not be used in return air plenums unless protected by plenum rated jacket. Each fixture and piece of equipment requiring connections to the drainage system shall be equipped with a trap, and all fixtures shall be vented. Surface or wall cleanouts shall be provided for each drainage main. If pipe is larger than 2 inches nominal, encase plastic piping passing through fire rated walls with Schedule 40 steel or cast iron pipe sleeve extending not less than 2 feet beyond either side of such walls. Cleanouts shall be provided at each change in direction of sanitary sewer lines, at the intervals specified in the International Plumbing Code, and at the building service entrance. All cleanouts shall be permanently accessible. Ground cleanouts shall be installed in a 1 foot by 1 foot, 4 inch thick concrete pad, flush with grade.

12.2.3 Material for Domestic Water Lines

Water piping shall be type K copper pipe and fittings. Joints under the slabs are not permitted. Amount of supply piping located under concrete slabs shall be held to a minimum and limited to trap primer piping. Material or equipment containing lead shall not be used in any potable water system.

12.2.4 Piping Insulation

Provide mineral fiber insulation on all domestic water (hot and cold) supply and recirculation piping. Provide vapor barrier on all cold water piping. Minimum pipe insulation performance for Domestic Service Hot Water Piping shall be in accordance with the requirements of the latest edition of ASHRAE/IESNA 90.1.

Provide blanket insulation at the underside of the roof drains and insulate all storm drain piping to prevent condensation.

12.2.5 Icemaker Boxes

Icemaker boxes shall be provided at each refrigerator. Cold water supply shall be provided for refrigerator icemakers and commercial coffee makers.

12.2.6 Major Appliance Plumbing Connections

The Contractor shall provide appropriate connections for all appliances, vending machines, coffee makers and any other items requiring water and/or drain connections.

12.2.7 Water Hammer Arrestors: PDI WH2O1

Provide engineered mechanical type sized and installed to safeguard the water distribution system against destructive water hammer hazard and noise. Air chambers are not acceptable.

12.2.8 Domestic Water Heater:

Domestic Water Heater shall be electric type located in the janitor's closet (mounted overhead) with a heating capacity and storage adequate for the building occupancy as required to meet Section 18 Sustainable Design and Energy Use Reduction, UFC 1-200-02, EPACT 2005, and EISA 2007. Water heaters shall be sized based on the methods described in the American Society of Plumbing Engineers (ASPE) Volume I, Fundamentals for Plumbing Design and 2015 ASHRAE HVAC Applications "Service water heating". A pressure/temperature relief valve, vacuum breaker on the water supply line, drain and angle iron support frame connected to the building structure shall be provided for the water heater and/or storage tank. Service shall be provided within water distribution system where required.

12.3 GENERAL PLUMBING FIXTURES

Fixtures shall be of the water conservation type and be provided complete with fittings and brushed nickel trim. All shutoff valves shall be metal construction. Plastic valves are not acceptable. All fixtures, fittings, and trim in a project shall be from the same manufacturer and shall have the same finish. Fixture descriptions shall be as described by the American Society of Mechanical Engineers, ASME A112.19. Any plumbing fixtures designed as handicapped fixtures shall meet the requirements of ABA. Each fixture shall be tested for soundness, stability of support and operation. Fixture shall exhibit no movement from a 180 lb person exerting moderated force on fixture. A statement certifying that piping has passed the herein specified test shall be provided.

In general, all faucets shall have solid brass bodies, ceramic valve, and brushed nickel finish over brass trim. Fixtures shall be water conservation type, in accordance with the International Plumbing Code. All vitreous china plumbing fixtures shall conform to ANSI A112.19.2M, Vitreous China Plumbing Fixtures. Stainless steel fixtures shall be in accordance with ANSI A112.19.3M, Stainless Steel Plumbing Fixtures (residential design).

a. Water closets shall be siphon-jet type with elongated bowl, top supply spud, ASME A112.19.2M and floor mounted. Gasket shall be wax type. Seat shall be ANSI Z124.5, Type A, white plastic, elongated with open front. Flushometer Valve shall be ASSE ANSI/ASSE 1037, large diaphragm type with non-hold-open feature, backcheck angle control stop and vacuum breaker. Minimum open chamber inside diameter shall not be less than 2.5 inches at the point where the diaphragm is sealed between the upper and lower chambers. The maximum water use shall be 1.28 gallons per flush. Water closet trim shall conform to ANSI A112.19.5, Trim for Water-Closet Bowls, Tanks, and Urinals (Dimensional Standards). Any designed as handicapped water closet mounting height and appurtenances shall be in accordance with UFAS and ADAAG.

b. Urinals shall be wall hanging, with integral trap and extended shields, ASME A112.19.2M, siphon jet. Top supply connection, back outlet. Flushometer Valve – ASSE ANSI/ASSE 1037, large diaphragm type with non-hold-open feature, backcheck angle control stop, and vacuum breaker. Minimum upper chamber inside diameter of not less than 2-5/8 inch at the point where the diaphragm is sealed between

the upper and lower chambers. The maximum water use shall be 0.125 gallon per flush. Waterless urinals shall not be allowed. Urinal trim shall conform to ANSI A112.19.5, Trim for Water-Closet Bowls, Tanks, and Urinals (Dimensional Standards). Any urinals designed as handicapped urinals shall meet the dimensional requirements of CABO A117.1.

c. Countertop Lavatories shall be white, ASME A112.19.2M vitreous china lavatories with minimum dimensions of 508 mm (20inches) wide x 457 mm (18 inches) front to rear, and self-rimming type. Provide ASME 112.18.1M copper alloy centerset faucets with single handle. The flow shall be limited to 0.25 gpm. Provide with aerator, adjustable P-traps, and perforated grid strainers, unless popup drain fittings are provided.

d. Break Rooms ASME/ANSI A112.19.3M sink, stainless steel with integral mounting rim, single compartment with ledge back and undersides coated with sound dampening material. Provide top-mounted ASME A112.18.1M copper alloy faucets, swing spout with aerator, and stainless steel drain outlets with cup strainers. Faucets shall have all brass and copper waterways and ceramic valving. The flow shall be limited to 0.5 gpm. Drain shall be grid type. Strainer shall be copper alloy or stainless steel.

e. Service Sinks shall be pre-cast terrazzo floor-mounted, 36 inches x 36 inches x 12 inches (914 mm x 914 mm x 305 mm) made of marble chips cast in white Portland cement to a compressive strength of not less than 3625 PSI (25 mPa) 7 days after casting. Brass body drains with nickel bronze strainers cast integral with terrazzo shall be provided along with stainless steel rim guard for mop sink. Chrome-plated exposed hot and cold water faucets ASME A112.18.1 wall-mounted copper alloy faucets swing spout with 3/4 inch (20 mm) hose connection, vacuum breaker, and pail hook shall be provided with a mop hanger on wall above sink suitable for four mops.

f. Water Cooler Drinking Fountains shall be provided as required by the IPC. Corridors which are distant from these rooms shall contain at least one water cooler drinking fountain as well. Water cooler drinking fountains shall be self-contained, conform to ARI 1010, use one of the fluorocarbon gases conforming to ARI 700 and ASHRAE 34 which has and Ozone Depletion Potential of less than or equal to 0.05, have a capacity to deliver 4.75 gph of water at 50 degrees F with an inlet water temperature of 80 degrees F while residing in a room environment of 90 degrees F and have selfclosing valves. Self-closing valves shall have automatic stream regulations, have a flow control capability, have a push button actuation or have a cross-shaped index metal turn handle without a hood. Exposed surfaces of stainless steel shall have No. 4 general polish finish. Spouts shall provide a flow of water at least 4 inch high so as to allow the insertion of a cup or glass under the flow of water. Handicap accessible drinking fountains shall be provided as required by the Americans with Disabilities Act. The water cooler shall be provided with a filterless water bottle filling station.

g. Wall Hydrants (Exterior): Wall Hydrants shall be provided at building exterior such that all points along the perimeter can be reached with a 100 foot long hose. Each hydrant shall be box type, freeze proof, with an integral vacuum breaker/backflow preventer. Hydrants shall have 3/4 inch hose connections.

h. Hose Bibbs: Provide angle type copper alloy hose bibbs with lockshield and removable tee-handle. Inlet shall have internal threads. Outlet shall have vacuum breaker with 3/4 inch external hose threads. Hose bibbs shall be provided in mechanical rooms and toilet rooms.

i. Floor drains shall be flush strainer type with waterless trap guards and shall be provided in mechanical rooms, restrooms, plumbing chase areas, fire sprinkler areas, at ice machines, and to receive condensate from air handling equipment.

j. Roof drains and emergency roof drains shall be cast iron deep sump type with anchor flange, cast iron waterproofing membrane clamp ring with integral gravel stop, adjustable cast iron extension flange, underdeck clamp, and metal dome strainer. Emergency drain shall be routed to an observable location and shall discharge through a wall mounted discharge nozzle.

k. Icemaker Boxes shall be provided at each refrigerator location. Cold water supply shall be provided for refrigerator icemakers. Icemaker connection, ½ inch compression fitting supply shall be provided in standard manufactured recessed wall box with single-face plate. Boxes shall be constructed of PVC plastic. Boxes shall be mounted a minimum of 18” above the finish floor.

l. Major Appliance Plumbing Connections including all appliances, vending machines, ice machines and any other items requiring water and/or drain connections shall be provided by the contractor.

12.4 PHYSICAL SECURITY FOR SECURE AREA REQUIREMENTS

Refer to Section 3.19 Physical Security Design and Construction Requirements of this specification for requirements.

12.5 SPECIFICATIONS

The following list of specifications is anticipated for this project. The list is not comprehensive and the Contractor shall provide all specifications required to adequately describe the project and all materials to be used and installed. The Contractor shall edit and submit the following UFGS as defined in Section 01 10 12, Design After Award using the latest comparable UFGS version:

22 00 00 PLUMBING, GENERAL PURPOSE

13. FIRE PROTECTION

13.1 CODES AND REFERENCES.

Facilities shall be designed in accordance with all government requirements, regional, and national applicable codes effective at issue date of RFP including, but not limited to:

a. Smith Air Force Base Engineering Design Manual, February 2018 (included in Appendix H of this RFP. Specific requirements pertaining to this project have been include in this section)

b. Unified Facilities Criteria (UFC) 3-600-01, Design: Fire Protection Engineering for Facilities, 8 August 2016, Change 2 (March 2018)

c. Unified Facilities Criteria (UFC) 4-010-01, DoD Minimum Antiterrorism Standards for Buildings, 9 February 2012, Change 1 (October 2013)

d. Unified Facilities Criteria (UFC) 4-021-01, Design and O&M: Mass Notification Systems, 9 April 2008

e. International Building Code® (IBC), 2015, for construction type and fire resistance rating, occupancy separation, allowable floor area, building height limitations and building separation distance requirements, except as modified by UFC 3-600-01

f. National Fire Protection Association (NFPA) 10, Standard for Portable Fire Extinguishers, 2013

g. National Fire Protection Association (NFPA) 13, Standard for the Installation of Sprinkler Systems, 2016

h. National Fire Protection Association (NFPA) 14, Standard for the Installation of Standpipe and Hose Systems, 2016

i. National Fire Protection Association (NFPA) 24, Standard for the Installation of Private Fire Service Mains and their Appurtenances, 2016

j. National Fire Protection Association (NFPA) 70, National Electrical Code®, 2017

k. National Fire Protection Association (NFPA) 72, National Fire Alarm and Signaling Code®, 2016

l. National Fire Protection Association (NFPA) 90A, Standard for the Installation of Air-Conditioning and Ventilating Systems, 2015

m. National Fire Protection Association (NFPA) 101, Life Safety Code®, 2015, for separation from hazards, building egress and life safety and applicable criteria in UFC 3-600-01

n. National Fire Protection Association (NFPA) 291, Recommended Practice for Flow Testing and Marking of Hydrants, 2016

o. ADA and ABA Accessibility Guidelines for Buildings and Facilities (Federal Register July 23, 2004) Replaces UFAS and ADAAG criteria. [Americans with Disabilities Act (ADA) and Architectural Barriers Act (ABA)]

13.2 GENERAL REQUIREMENTS.

Provide fire sprinkler and fire alarm and mass notification systems that meet United Facilities Criteria (UFC) and Nation Fire Protection Association (NFPA) Standards including, but not limited to, the codes and references listed in this RFP.

13.2.1 A Qualified Fire Protection Engineer (QFPE), meeting the qualifications required by UFC 3-600-01, shall be responsible for, but not limited to, the design engineering, preparation of the construction documents, construction phase inspection and acceptance testing of the fire suppression and fire alarm and mass notification systems. QFPE shall also be involved with the building code and life safety code analysis. QFPE shall provide certifications in writing that the design is in compliance with UFC 3-600-01 and all applicable criteria. A Qualified Fire Protection Engineer is an integral part of the design team, and must be involved in every aspect of the design as it relates to fire protection.

13.2.2 At a minimum, during the construction phase the QFPE shall be responsible for material submittal review, shop drawing review, and participate in the Preparatory Inspection Meeting, initial inspection at job site, mid-point inspection at job site, Pre-Final Inspection with General Contractor and installation subcontractors, and Final Acceptance Inspection and Testing with General Contractor, installing subcontractors and Corps of Engineers.

13.2.3 Refer to other portions of this specification and RFP for additional requirements and criteria.

13.3 FIRE SUPPRESSION SYSTEM.

13.3.1 Design of sprinkled facilities shall be in accordance with UFC 3-600-01, which takes precedence over NFPA 13. NFPA 13 shall be applied where referenced by UFC 3-600-01 and where installation guidance is not covered by the UFC.

13.3.2 The facility shall be protected throughout with an automatic, wet pipe sprinkler system, hydraulically designed for the most demanding area. Floor control valve assemblies shall be provided at each floor level in accordance with UFC 3-600-01. Hydraulic calculations shall include a 10 pound per square inch safety factor as well as include a 12 pound per square inch loss through the backflow prevention device. A new fire protection lead-in shall be provided in Mechanical/Electrical Room 142 in accordance with UFC 3-600-01. A new riser assembly, located in in Mechanical/Electrical Room 142

located on the first floor, shall be equipped with an alarm check valve and water-motor gong assembly.

13.3.3 All systems shall be electronically supervised with tamper switches on all valves controlling water to the fire sprinkler system and transmit a signal to the Base fire department. Sprinklers shall be centered in each direction of the ceiling tiles. All sprinkler pipes, braces and hangers, etc., shall be designed to meet seismic requirements.

13.3.3.1 In areas classified as ordinary hazard, the overhead sprinkler system shall be hydraulically designed to provide a discharge density of 0.20 gallons per minute over the hydraulically most remote 2,500 square feet of floor area. Sprinklers in these areas shall be ordinary temperature (unless ambient conditions require higher temperature rated sprinklers), quick-response type. In areas with ceilings 30 feet or less, pendent, chrome finish, recessed, K-8 sprinklers shall be provided in areas with finished ceilings and upright, rough brass, K-8 sprinklers shall be provided in areas without finished ceilings. The maximum protection area per sprinkler shall be 130 square feet, with a maximum spacing of 15 feet. An outside hose stream allowance of 250 gallons per minute, taken at the fire hydrant closest to the building, shall be included in the system design.

13.3.3.2 In areas classified as light hazard with ceilings 30 feet or less, the overhead sprinkler system shall be hydraulically designed to provide a discharge density of 0.10 gallons per minute over the hydraulically most remote 1,500 square feet of floor area. Sprinklers in these areas shall be ordinary temperature (unless ambient conditions require higher temperature rated sprinklers), quick-response type. In areas with ceilings 30 feet or less, pendent, chrome finish, recessed, K-5.6 sprinklers shall be provided in areas with finished ceilings; and upright, rough brass, K-5.6 sprinklers shall be provided in areas without finished ceilings. The maximum protection area per sprinkler shall be 225 square feet with a maximum spacing of 15 feet. An outside hose stream allowance of 250 gallons per minute, taken at the fire hydrant closest to the building, shall be included in the system design.

13.3.3.3 The raised access floors shall be constructed of non-combustible materials and all wiring and cabling beneath the raised access floor shall either be installed in conduit or plenum rated to avoid the need for fire suppression beneath the raised access floor. If combustible wiring or cabling is installed beneath the raised access floor, then the underflow area shall be protected via a clean agent fire suppression and releasing system in accordance with UFC 3-600-01. Automatic sprinkler protection is not permitted.

13.3.4 Inspector’s test connection shall be provided at the most hydraulically remote section of the system. If any portion of the Inspector's test piping extends outside of the building, it shall be painted the same color as the adjacent area and a concrete splash block shall be provided under the discharge. Test valves as well as all auxiliary drain valves shall be located in accessible areas. Any valves or other mechanical devices that maintenance personnel may need to access shall be marked on the ceiling grid with an approved marking system and a laminated index of markings shall be placed in the mechanical room.

13.3.5 A new double-check backflow preventer, installed in a hot-box enclosure, shall be provided exterior to the building on the new fire protection lead-in to the building. A new backflow preventer test header shall be provided on the exterior of the building, outside the fire floor mechanical room.

13.3.6 A new fire department connection shall be provided on the exterior of the building, located within 150 feet of a fire hydrant. Signage shall be provided on the fire department connection indicating the areas of the building is serves.

13.3.7 A preliminary fire hydrant flow test performed at the project site on February 22, 2018, indicated a static pressure of 59 pounds per square inch, reduced to 56 pounds per square inch while flowing 1,062 gallons per minute. Based on this information, a fire pump may not be required for this building. The Design/Build Contractor’s QFPE shall be responsible for determining if fire pump is required. The QFPE shall conduct a flow test at the project site to verify flow and pressure available. The QFPE shall provide the AHJ with calibration documentation for all equipment required for system testing, including but not limited to pressure gauges and flow meters. System shall include any water supply, fire pump, etc., as determined from the QFPE preliminary calculations prior to any design submissions. These tests shall be conducted by the preparer of the Contract Documents (i.e., the QFPE) under the supervision of the Contracting Officer's Representative and in accordance with the procedures contained in NFPA 291. Preliminary Flow Test Data is included in the Appendix of this RFP.

13.3.8 The Contractor's design shall be prepared by and sealed by the QFPE.

13.3.8.1 The project QFPE must review the 100 percent design submission of plans and specification and certify in writing that the design is in compliance with UFC 3-600-01 and all applicable criteria. This certification letter must be submitted with the 100 percent submission.

13.3.8.2 Qualifications shall be submitted for approval. Construction Drawings shall be prepared by a Fire Protection Specialist having obtained a Level III or IV certification as defined by the National Institute for Certification in Engineering Technologies (NICET) in the Automatic Sprinkler System Layout subfield of Fire Protection Engineering Technology in accordance with NICET 1014-7. The Fire Protection Specialist shall be regularly engaged in the design and installation of the type and complexity of system specified in the contract documents and shall have served in a similar capacity for at least three systems. The Construction Drawings shall be signed and sealed by the QFPE.

13.3.9 The Fire Protection Specialist and the QFPE shall inspect the sprinkler system periodically during installation to assure that the sprinkler system is being provided and installed in accordance with the Construction Drawings. The Fire Protection Specialist and QFPE shall witness the preliminary and final tests and both shall sign the test results. The QFPE, after completion of the system inspections and a successful final test, shall certify in writing that the system has been installed in accordance with the Construction Drawings and the contract requirements. The hydraulic design plate shall be engraved to preserve the markings.

13.3.10 Pre-Final Acceptance Test and Final Acceptance Test shall be conducted by a Fire Protection Specialist. The Fire Protection Specialist shall provide a complete demonstration of the operation of the system. The Fire Protection Specialist shall provide the AHJ with calibration documentation for all equipment required for system testing, including but not limited to pressure gauges and flow meters. The QFPE shall certify the final plans and specifications and participate in commissioning of the fire protection systems. At the end of construction, a letter from the QFPE must be provided certifying compliance.

13.3.11 The Contractor is responsible for obtaining water supply data, developing the hydraulic analysis and developing a code analysis demonstrating compliance with NFPA codes and the model building code utilized prior to initial design submittals. Submit the input data, hydraulic analysis, and code analysis from the computer program used to design the sprinkler system along with the design submittal to the Authority Having Jurisdiction (AHJ) for review.

13.3.12 A manual, wet Class I standpipe shall be provided in the new stair in accordance with NFPA 14.

13.3.13 The following criteria, as outlined in the Smith Air Force Base Engineering Design Manual, shall be incorporated into the design of the fire suppression and standpipe systems:

a. Butterfly valves shall not be installed.

b. Concrete splash blocks shall be provided to intercept the discharge from all inspector’s test and main drain valves.

c. Each new fire sprinkler riser shall be provided with an alarm check valve and water motor gong assembly. The use of a 24VDC electric waterflow bell is not permitted.

d. The inspector’s test and main drain shall be discharged to the exterior of all facilities to a safe location that does not cross any egress path from the building.

e. Hydraulic design plates shall be engraved so the markings shall be permanent.

f. Piping for fire suppression systems in this facility shall be Schedule 40 steel piping. All sprinkler piping shall be concealed. All piping shall be marked in accordance with AFOSH 91-501 Chapter 20. Schedule 10 and CPVC piping shall not be allowed on this project.

g. Metallic pressure piping (i.e sprinkler system piping) shall be properly grounded on the secured side of the wall when piping must penetrate security wall assemblies. See Section 01 10 10-3 for additional grounding requirements.

13.3.14 Portable fire extinguishers in the new addition shall be sized and spaced in accordance with NFPA 10. At least one class 4A:80B:C rated dry chemical portable fire extinguisher shall be provided for every 11,250 square feet of floor area and located such that an occupant travels no more than 75

feet before reaching a portable fire extinguisher in all areas of the building. One class 4A:80B:C rated portable fire extinguisher shall be located within 30 feet of the appropriate hazard, such as the main electrical panel.

13.4 FIRE ALARM AND MASS NOTIFICATION SYSTEM.

13.4.1 The fire alarm and mass notification systems provided for the addition shall be extensions of the existing Notifier fire alarm system and Wheelock SafePath mass notification system installed in Building 123. The existing fire alarm and mass notification control panels are located in Comm. Room E7 in the existing portion of Building 123. All work in the existing building shall be scheduled to minimize the impact on ongoing operations. Work in the existing building shall require night and weekend work and shall be scheduled at the convenience of the government. An existing remote annunciator is provided at the entrance to the USRL facility, and therefore a new remote annunciator is not required in the building addition.

13.4.2 New initiating devices shall consist of spot-type smoke detection (above any new fire alarm panels), manual pull stations at the exits and sprinkler waterflow switches. Photoelectric duct detectors shall be provided in new air handling units greater than 2,000 cfm. Sprinkler system tamper switches shall be monitored as supervisory conditions by the fire alarm system.

13.4.3 All new SLC, IDC and NAC wiring shall match the existing circuitry in the building and shall be installed in red conduit.

13.4.4 Alarm, trouble and supervisory signals shall be transmitted to the Base Fire Department via the existing Monaco BT-XM radio transceiver. Transient voltage surge suppression shall be provided for each control panel and auxiliary panel.

13.4.5 Combination speaker/strobes, speakers and strobes shall be provided in accordance with NFPA 72. All speaker devices located in secure areas shall be of the self-amplifying type. Amber mass notification strobes shall be provided adjacent to each fire alarm strobe. The system shall be designed in accordance with UFC 04-021-01, including live voice messaging and playback of prerecorded messages. Weatherproof exterior speakers shall be provided at exterior gathering locations and entrances/exits to the buildings.

13.4.6 Local operator consoles (LOC) shall be provided at the main lobby of the addition and located throughout the building addition such that an occupant does not have to travel more than 200 feet or transverse floors to get to a LOC. A global emergency HVAC shutdown button shall be provided inside of, or adjacent to, each LOC and interfaced with the existing system. An interface with the fire alarm system shall be provided to silence the fire alarm voice messages during broadcast of mass notification messages. The mass notification system shall utilize the existing Monaco BT-XM radio transceiver for connection to the Base-wide mass notification system.

13.4.7 All metallic conduit penetrations associated with the fire alarm and mass notification system through security wall assemblies shall be provided with dielectric unions on the secured side of the wall. The used of non-list dielectric unions is acceptable.

13.4.8 It is required that the Design/Build Contractors QFPE participate in the following inspections: Preparatory inspection meeting, initial inspection meeting at the job site, midpoint inspection at the job site, pre-final inspection and final inspection (see also Section 01 10 12).

13.4.9 The fire alarm/mass notification subcontractor shall be a first-tier subcontractor to the prime contractor.

13.5 SPECIFICATION

The following list of specification sections is anticipated for this project. The list is not comprehensive and the Contractor shall provide all specifications required to adequately describe the project and all materials to be used and installed. The Contractor shall edit and submit the following UFGS as defined in Section 01 10 12, Design After Award using the latest comparable UFGS version:

21 12 00	STANDPIPE SYSTEMS
21 13 13.00 10	WET PIPE SPRINKLER SYSTEM, FIRE PROTECTION
28 31 76	INTERIOR FIRE ALARM AND MASS NOTIFICATION SYSTEM

14. ELECTRICAL SYSTEMS

14.1 CODES AND REFERENCES.

a. ADA-ABA Accessibility Guidelines, current version
b. AF Handbook 32-1084 Facility Requirements
c. Air Force Instructions (AFIs)
d. Air Force Manuals (AFMs)
e. Air Force Sustainable Design & Development (SDD) Implementation Guidance
f. Air Force Technical Letters (AF-ETLs)
g. ASHRAE 90.1 Energy Standards for Buildings except Low Rise Residential Buildings 2013
h. UTIL Standards
i. CNSSAM TEMPEST 1-13-17 January 2014; Red/Black Installation Guidance
j. Smith AFB Cable Installation Specifications 11 Aug 2014
k. Engineering Design Manual Smith AFB FL Feb 2018
l. E.O. 13423 & E.O. 13514 with applicable portions of FLHPSB MOU, EPAct2005 & EISA 2007
m. IBC 2015
n. IC Tech Spec for ICD/ICS 705 Technical Specifications, version 1.4, dated September 28, 2017
o. MIL-HDBK 1013 Military Handbook – Facilities Engineering Design and Construction
p. MIL-HDBK 1190 Military Handbook – Facility Planning and Design Guide
q. Mobile District Design Manual, dated March 2007
r. NFPA 70 National Electrical Code (2017)
s. NFPA 101 Life Safety Code (2015)

t. NFPA 780 Installation Lightning Protection Systems (2014)
u. TI 800-01 Technical Instruction – Design Criteria
v. Technical Manuals (TMs)
w. UFC 1-200-01 General Building Design, 1 July 2015
x. UFC 1-200-02 High Performance and Sustainable Building Requirements, Change 01 Feb 2018
y. UFC 3-501-01 Electrical Engineering, with Change 2, 6 Oct 2015
z. UFC 3-520-01 Interior Electrical Systems, 6 Oct 2015
aa. UFC 3-530-01 Interior and Exterior Lighting and Controls, with Change 3, 01 June 2016
bb. UFC 3-550-01 Exterior Electrical Power Distribution , with Change 1, 23 March 2017
cc. UFC 3-560-01 O&M: Electrical Safety, 24 July 2017
dd. UFC 3-575-01 Lightning and Static Electricity Protection Systems, 01 July 2012
ee. UFC 3-600-01 Fire Protection Engineering for Facilities, with Change 2, 25 Mar 2018
ff. UFC 4-010-01 DOD Minimum Antiterrorism Standards for Buildings, Change 1, 1 October 2013
gg. UFC 4-010-05 Sensitive Compartmented Information Facilities Planning, Design and Construction, with Change 1, 01 October 2013

14.2 EXTERIOR ELECTRICAL REQUIREMENTS

14.2.1 Special Phasing and Work Restrictions

The existing overhead primary system adjacent to the proposed new construction is required to be relocated prior to start of construction (the existing overhead primary will be too close to the new construction to allow safe construction practices). The contractor shall coordinate the timing of the work such that the overhead primary is removed prior to the start of vertical construction. The existing building is mission critical with controlled access areas such that all power outages must be scheduled a minimum of 14 days in advance and shall be during non-business hours.

14.2.2 Distribution System

The existing primary distribution system (12470/7200 3 phase) is overhead south of the proposed site. The primary distribution system has been privatized and is maintained by UTIL.

The existing primary overhead conductors and poles are located such that they will be in conflict with the proposed new addition. The existing overhead distribution system also includes overhead Cox Communications lines which will require relocation. The existing overhead conductors and poles shall be reworked by UTIL. UTIL has provided a design and cost estimate that reworks the existing overhead line clear of the proposed new construction (UTIL’s cost includes the rework of the Cox Communications lines with the exception of a new underground Cox service line; see drawings. The cost for UTIL’s work shall be included in the contractors bid. The contractor will be responsible for payments to UTIL and for coordinating UTIL’s work with

the design and construction. See site electrical RFP drawings. The existing building is mission critical with controlled access areas such that all power outages must be scheduled a minimum of 14 days in advance and shall be during non-business hours.

14.2.2.1

The existing service to Building T-123 (Bldg T-123 will be demolished as part of the work) and is from pole mounted transformer(s) located adjacent to the site. This service shall be removed as part of the work. Remove all electrical system for the building which will be removed (i.e. HVAC equipment). UTIL shall remove the transformers and the contractor shall remove the secondary service. The existing power meter and related current transformers shall be turned over to the government.

14.2.2.2

The contracting officer’s representative shall approve all outages required for modifications or demolition of the existing system. Work shall be performed during night time or weekends where required.

14.2.3 Exterior Lighting

14.2.3.1

A complete and functional site lighting systems shall be provided and installed for the new facilities. The design of exterior lighting and associated lighting levels shall be in accordance with UFC 3-530-01 and IES guidelines and The Smith Engineering Design Manual. Where there is no guideline in the UFC or Smith Engineering Design Manual, use IES guidelines. Exterior lighting shall include the new walkways, facility entrances/exits, equipment yard, equipment room exterior doors, and new parking areas. New poles shall be square non tapered aluminum anchor base type rated for 150 mph with powder coat paint finish. Poles shall be provided with concrete foundations. Luminaires shall be architectural grade LED. Luminaires shall be die cast or extruded aluminum with powder coat paint finish. Luminaire basis of design is Lithonia D Series or equivalent. All luminaires shall have a 10 year warranty.

14.2.3.2

Walkways shall be illuminated with pedestrian scale bollard type luminaries or building mounted luminaires. Illumination source shall be LED. Bollards shall be anchor base type fixtures, aluminum with powder coat paint finish with stainless steel hardware. Provide bollards with concrete foundations. Bollards shall be nominal 42” high, basis of design Lithonia KBA series or equivalent. All luminaires shall have a 10 year warranty.

14.2.3.3

Facility entrances/exits and perimeter and equipment yard shall be illuminated with wall mounted or recessed soffit mounted LED lighting fixtures. Fixtures shall be architectural grade and be compatible with architectural building features. Soffit mounted fixtures shall be architectural grade with LED sources basis of design Acuity (Gotham) ICO

series or equal. New wall mounted exterior luminaires shall have cast aluminum housing with powder coat paint finish and LED sources, basis of design Lithonia WSR series. All luminaires shall have a 10 year warranty.

14.2.3.4

Exterior lighting circuits shall be provided with a lighting contactor with H-O-A selector switch and photocell controls.

14.2.3.5

Provide power for all exterior equipment (HVAC equip, etc.). Also provide general use receptacles for services purposes in the new equipment yard and where required by UFC or code. Provide general use service receptacles around the building perimeter (100’ spacing maximum).

14.3 INTERIOR ELECTRICAL SYSTEMS

14.3.1 Maintain Operations of Existing Occupied Facility and Secure Area Accreditations

The existing building has a mission critical function with controlled access areas that shall remain operational.

The design and construction documents shall be developed and construction work performed to prevent disruption and interruption to the existing power system. Any required interruption of the power systems shall be scheduled a minimum of 30 days in advance with the contracting officer. Work in the existing building shall be limited from 6am-5pm. Escorts will be required by 321 EWS personnel for all work in the existing building at all times.

14.3.2 Basic System Requirements

A complete and functional electrical system shall be provided and installed for the facility addition. The electrical system within the facility shall be designed and provided and installed in accordance with UFC 3-520-01, Engineering Design Manual Smith AFB, NFPA 70 (National Electrical Code), and other standards as applicable to the system. Provide power connections to all building addition systems and for all GFGI systems (i.e. IDS, ACS, CCTV, printers, shredders, etc.). Actual equipment electrical loads and demand factors, where known, shall be used for electrical calculation purposes. Where loads are unknown, the contractor shall utilize loading and demand factors outlined in NFPA 70. Branch circuits feeding receptacles of unknown loads shall be limited to 1200VA per circuit. The interior electrical distribution system shall be designed with a minimum of 20% excess load capacity in all new panelboards and new feeders after all load and demand factors have been applied to the electrical calculations. Additionally, all distribution new panelboards shall have 20% excess physical space for future use. The building power systems shall not be installed within the security walls (systems shall be installed in the frangible portion of the walls).

14.3.3 Demolition

a. Demolition of the existing electrical systems are required that are affected by the “T” building demolition. Contractor shall remove all

existing electrical systems in the "T" building. See Section 01 10 10-7 paragraph 7.3 for additional requirements.

14.3.4 Power Systems Requirements

a. The existing facility, Bldg 123/T123 has 3-power services as follows:

   1) Service No 1. 2000 amp 480/277 volt service from a 1500 kVa pad mounted transformer at Bldg 123 (This service also has a whole building 1500kW standby generator).
   2) Service No. 2 2000 amp 480/277 volt service fed from a 1500 kVa pad mounted transformer on the north side of the facility.
   3) Service No. 3 200 amp 120/208 volt service to Bldg T-123 (this service shall be removed as part of the demolition of Bldg T-123).

b. The existing 2000 amp 480/277V Service No. 1 has full generator back up. This service and generator has spare capacity which shall be utilized for the entire service to the building addition. The existing system shall be modified by extending a new feeder from an existing distribution switchboard in the existing building (see RFP drawings A-101 and E102 for location) to new distribution and branch panels in the new addition. The new feeder must be routed outside of the secure area, and will be required to run partially underground (See RFP drawings A-101 and E102). The existing switchboard is an Eaton powerline series (Eaton G.O. No MM003402) with electronic trip circuit breakers. The new feeder breaker shall have a full function LSI trip unit and shall have a minimum AIC rating of 3500 AIC to match the existing.

14.3.5 UPS Power Systems

Rack mounted UPS for the racks in the comm. room will be GFGI, contractor shall provide input power (20 amp 120V circuit is required for each rack).

14.3.6 Panelboards

All panelboards shall be circuit breaker type with bolt in thermal magnetic or electronic trip circuit breakers (provide adjustable electronic trip circuit breakers where required to achieve selective coordination) and copper bus. All panelboards shall be fully rated for available fault current (series rating is not acceptable). Provide 200% neutrals in panelboards serving electronic equipment loads. All panelboards shall include integral surge protection devices (UL1449 3rd addition listed Type 1 and Type 2 SPD). All panelboards shall be provided with "door in door" construction.

14.3.7 Disconnect Switches

Disconnect switches shall be non fused heavy duty type or circuit breaker type. Provide disconnects for all equipment where required by code or standards.

14.3.8 Dry Type Transformers

Dry type transformers for 120/208V service shall be provided. Dry type transformers shall meet NEMA Premium standards for energy efficiency. Transformers shall be K rated (K-9) and shall have copper windings.

14.3.9 Wiring Methods

All wiring shall be copper conductors. All wiring shall be provided and installed in conduit (MC cable or similar will not be allowed). Wiring system shall consist of insulated single conductors provided and installed in raceways as follows: Galvanized rigid steel conduit or IMC in concrete, masonry, and areas subject to moisture. Electric metallic tubing (EMT) in concealed areas and exposed where not subject to physical damage. Non metallic conduit (Type 80 PVC or schedule 40 PVC) in the ground and below concrete slab. Provide non metallic breaks (PVC) dielectric coupling at all Secure Area wall, floor and roof penetrations. Wiring shall be concealed within the walls in all areas except in equipment areas. All conduit shall be labeled with source and destination. Empty conduit shall have nylon pull rope installed in it with 10 additional feet of pull rope coiled at each end. A grounding conductor shall be provided and installed with all feeders and with all branch circuit wiring. Conductors shall be a minimum size of 12 AWG. UL instructions shall be applied when applying the ampacity tables of National Electrical Code. The ampacity de-rating for number of conductors in raceway and ambient temperature will be based upon the National Electrical Code. The percentage of conductor fill in conduit shall be based upon National Electrical Code: one conductor maximum fill of 53 percent; two conductor maximum fill of 31 percent; and, more than two conductors maximum fill of 40 percent. All branch circuits shall have separate neutrals. A maximum of 3-circuits shall be combined in a single conduit. All circuits shall be provided with separate neutrals. All power wiring in secure areas shall be run concealed above ceiling, below raised floors or within the “frangible” portion of the secure walls.

14.3.10 Branch Circuit and Outlet Requirements

All power outlets shall be 20 amp 125V NEMA 5-20R heavy duty specification grade with thermoplastic plates on finished walls and galvanized plates in unfinished areas. Provide outlets and circuits as follows:

- Mech/Elec Rooms – Provide outlets required for service purposes and general use (minimum 1-per wall).
- Open office and shared office areas – Provide junction boxes below raised floor layed out in a grid pattern for flexibility with connections to system furniture. Circuitry shall be configured such that a maximum of 1-workstation is on a single circuit. Provide additional outlets/circuits for equipment (i.e. printers, shredders etc.). Provide additional wall mounted outlets for general use (12’ spacing).
- Office – Provide wall mounted outlets (1-per wall) with 2-quadraplex outlets at the workstation.
- Conference and Training Rooms – Provide wall mounted outlets (8’ spacing) and floor outlets for conference table power outlets.
- Break Room – Provide wall mounted outlets (12’ spacing) and additional outlets for appliances. Provide outlets at counter areas (2’ spacing maximum).
- Kitchen – Provide outlets and dedicated circuits for each appliance. Provide additional convenience receptacles on walls and at countertops.
- Storage Room – Provide 2-duplex receptacles.
- S. Vestibules – Provide 1-duplex receptacle.
- Janitors Room – 1-duplex receptacle (GFCI).

- Toilet Rooms – 1-duplex (GFCI) receptacle at sink locations.
- Comm Rooms – Provide dedicated outlets (20 amp 125V) for GFGI rack mounted UPS units at each rack (2-racks per comm. room). Provide additional quadraplex receptacle on each wall.
- Corridors – Provide duplex receptacles (25’ spacing). Provide additional receptacles and dedicated circuits for first floor copier, faxes, printers and shredders.

Provide additional outlets/circuits to support equipment or systems required throughout the facility. Provide power connections and circuits for all components of the FF&E package included in this RFP. Provide dedicated outlets where indicated or required for circuits or outlets not specified or required to be dedicated a maximum of 6-duplex receptacles shall be on a circuit.

14.3.11 Interior Lighting

A complete and functional lighting system shall be provided and installed for the facility. All areas shall in general, utilize LED lighting sources. The design of interior lighting and associated lighting levels shall be in accordance with UFC 3-530-01 Engineering Design Manual Smith AFB (See RFP Appendix) and IES guidelines. Lighting calculations for each area shall utilize data from the actual fixture to be used. The engineer designing the lighting system shall maintain uniformity ratios equal to or better than that recommended by the I.E.S. standards. Incandescent lighting shall not be used.

14.3.11.1 Lighting Fixture Types

Lighting fixtures in all areas except toilet, janitor, mechanical, electrical and comm. rooms shall use 2’x4’ lay in direct indirect lighting fixtures with metal perforated diffusers and 3500K LED (basis of design Lithonia Avante series or equivalent). Toilet rooms and shower areas shall utilize recessed LED fixtures with acrylic lenses or LED down lights. Janitors closets shall use surface mounted linear LED lighting fixtures with acrylic lenses. Mechanical/electrical and comm. rooms shall use industrial LED lighting fixtures with lenses and wire guards. All fixtures shall have a 10 year warranty.

14.3.11.2 Lighting Controls

a) Lighting controls shall be in accordance with UFC, Engineering Design Manual Smith AFB (see Appendix) and ASHRAE standards and shall primarily consist of individual room or area occupancy/vacancy sensors. All sensors shall be dual technology type. Provided zoned multifunction switching for all rooms where required by ASHRAE, Engineering Design Manual Smith AFB or UFC standards.
b) Conference and training rooms shall be provided with zoned full range (1%-100%) dimming.
c) Lighting controls in the new addition shall be independent of the existing building control system.

14.3.11.3 Emergency (Life Safety) Lighting

Interior emergency lighting shall be provided by installing unit battery equipment integral with room lighting fixtures. Exterior emergency egress lighting shall utilize either remote indoor battery packs or a central inverter system. Emergency and exit lighting shall be provided in accordance with NFPA 101, NFPA 70 (Note that the existing whole building generator system is a standby system and shall not be utilized for emergency lighting).

14.3.12 Lightning Protection

14.3.12.1

A conventional lightning protection systems shall be provided; design shall be in accordance with TM 5-811-3, AFI 32-1065, NFPA 70 National Electrical Code, NFPA 780 Lightning Protection Code, UL 96 Lightning Protection Components, and UL 96A Installation Requirements for Lightning Protection Systems. The lightning protection system for the facilities shall be UL inspected and provided with a UL Master Label. All structures including OESB and mechanical equipment yards shall be equipped with lightning protection systems. The existing building is equipped with a lightning protection system and it shall be modified as required to include the new addition and provide a UL master label for the entire structure.

14.3.12.2

The lightning protection system shall consist of air terminals, roof conductors, down conductors, ground connections, and grounds, electrically interconnected to form the shortest distance to ground. All conductors on the structures shall be in protected conduit (PVC schedule 80), painted to match building color. Secondary conductors shall interconnect with grounded metallic parts within the building. Interconnections made within side-flash distances shall be at or above the level of the grounded metallic parts. The system furnished shall consist of the standard products of a manufacturer regularly engaged in the production of lightning protection systems and shall be the manufacturer's latest UL approved design. No combination of materials shall be used that form an electrolytic couple of such nature that corrosion is accelerated in the presence of moisture unless moisture is permanently excluded from the junction of such metals. Aluminum shall not contact the earth nor shall it be used in any other manner that will contribute to rapid deterioration of the metal. Appropriate precautions shall be observed at connections with dissimilar metals.

The tip of air terminals shall be a minimum of 2 feet above the ridge parapet, ventilator, or perimeter. Air terminals more than 2 feet in length shall be supported by a suitable brace, with guides, not less than one-half the height of the terminal. Terminals shall be rigidly connected to, and made electrically continuous with, roof conductors by means of pressure connectors or crimped joints of T-shaped malleable metal and connected to the air terminal by a dowel or threaded fitting. Air terminals shall be secured against overturning either by attachment to the object to be protected or by means of a substantial tripod or other braces permanently and rigidly attached to the building or structure.

Conductors shall be connected directly to the roof or ridge roll. Necessary turns shall have a radius of not less than 8 inches. Conductors shall preserve a downward or horizontal course and shall be rigidly fastened every

3 feet along the roof and down the building to ground. Metal ventilators shall be rigidly connected to the roof conductor at three places. All connections shall be electrically continuous. Roof conductors shall be coursed along the contours of roof in such a way as to join each air terminal to all the rest.

Conductors shall be electrically continuous from air terminals and roof conductors to grounding electrodes. Down conductors shall be coursed over extreme outer portions of the building. All down leads shall be concealed in building wall and shall be in PVC conduit. Facility shall have not less than two down conductors located as widely separated as practicable, at diagonally opposite corners. Additional down conductors shall be installed when necessary to avoid "dead ends" or branch conductors ending at air terminals. The exception is where the air terminal is on a roof below the main protected level and the "dead end" or branch conductor is less than 16 feet in length and maintains a horizontal or downward coursing. Down conductors shall be equally and symmetrically spaced about the perimeter of the structure. Down conductors shall be protected to prevent mechanical injury to the conductor.

14.3.13 Grounding

A counterpoise shall be provided around the new addition. Connect counterpoise to lightning protection system, buildings steel (and the existing building steel structure) and all metallic piping. Provide a ground bars below all raised floors (bond raised floor system and comm. system components to ground bars).

14.4 SPECIFICATIONS

The following list of specifications is anticipated for this project. The list is not comprehensive and the Contractor shall provide all specifications required to adequately describe the project and all materials to be used and installed. The Contractor shall edit and submit the following UFGS as defined in Section 01 10 12, Design After Award using the latest comparable SpecsIntact version:

26 20 00	INTERIOR DISTRIBUTION SYSTEM
26 41 00.00 20	LIGHTNING PROTECTION SYSTEM
26 51 00	INTERIOR LIGHTING
33 70 02.00 10	ELECTRICAL DISTRIBUTION SYSTEM, UNDERGROUND

15. ELECTRONIC SYSTEMS

15.1 CODES AND REFERENCES.

a. ADA-ABA Accessibility Guidelines, current version
b. AF Base Area Network Functional Specification 2017
c. AF Handbook 32-1084 Facility Requirements
d. Air Force Instructions (AFIs)
e. Air Force Manuals (AFMs)
f. Air Force Sustainable Design and Development (SDD) Implementation Guidance, memorandum dated 2 June 2011
g. Air Force Technical Letters (AF-ETLs)

h. ANSI/NEMA WC 66 Performance Standard for Category 6 and Category 7 100 Ohm Shielded and Unshielded Twisted Pairs (2013)
i. CNSSAM TEMPEST 1-13-17 January 2014; Red/Black Installation Guideance
j. ECIA EIA/ECA 310-E Cabinets, Racks, Panels and Associated Equipment (2005).
k. Smith AFB Cable Installation Specifications 11 Aug 2014
l. Engineering Design Manual Smith AFB FL Feb 2018
m. UTIL Standards
n. Engineering Technical Letter (ETL) 02-12 dated 27 June 2002
o. E.O. 13423 & E.O. 13514 with applicable portions of FLHPSB MOU, EPAct2005 & EISA 2007
p. IC Tech Spec for ICD/ICS 705 Technical Specifications, for construction and management of sensitive compartmented information facilities Version 1.4 Sept 28, 2017
q. International Building Code 2015
r. MIL-HDBK 1012/3 Military Handbook - Telecommunications Premises Distribution Planning, Design and Estimating; dated May 1996
s. MIL-HDBK 1013 Military Handbook - Facilities Engineering Design and Construction
t. MIL-HDBK 1190 Military Handbook - Facility Planning and Design Guide
u. Mobile District Design Manual, dated April 2007
v. NFPA 70 National Electrical Code (2017)
w. NFPA 72 National Fire Alarm Code (2015)
x. NFPA 101 (2015)
y. Rural Utilities Services (RUS) Bulletin - Latest applies
z. TIA-1152 Requirements for Field Test Instruments and Measurements for Balanced Twisted-Pair Cabling (2009)
aa. TIA-455-21 FOTP-21 - Mating Durability of Fiber Optic Interconnecting Devices (1998a; R 2012)
bb. TIA-526-14 OFSTP-14A Optical Power Loss Measurements of Installed Multimode Fiber Cable Plant (2015)
cc. TIA-526-7 OFSTP-7 Measurement of Optical Power Loss of Installed Single-Mode Fiber Cable Plant (2015)
dd. TIA-568-D.0 Generic Telecommunications Cabling for Customer Premises (2009; Add 1 2010; Add 2 2012)
ee. TIA-568-D.1 Commercial Building Telecommunications Cabling Standard (2009; Add 2 2011; Add 1 2012)
ff. TIA-568-D.2 Balanced Twisted-Pair Telecommunications Cabling and Components Standards (2009; Errata 2010; Add 2 2014; Add 1 2016)
gg. TIA-568-D.3 Optical Fiber Cabling Components Standard (2008; Add 1 2011)
hh. TIA-569Commercial Building Standard for Telecommunications Pathways and Spaces (2015)
ii. TIA-606Administration Standard for the Telecommunications Infrastructure (2012; Add 1 2015)
jj. TIA-607Generic Telecommunications Bonding and Grounding (Earthing) for Customer Premises (2011)
kk. TIA/EIA-598 Optical Fiber Cable Color Coding (2014)
ll. TIA/EIA-604-10 FOCIS 10 Fiber Optic Connector Intermateability Standard - Type LC (2002)
mm. TIA/EIA-604-2 FOCIS 2 Fiber Optic Connector Intermateability Standard (2004; R 2014)
nn. TIA/EIA-604-3 Fiber Optic Connector Telecommunications Cabling and Components Standards(2004; R 2014)

oo. TIA-758 Customer-Owned Outside Plant Telecommunications Infrastructure Standard (2012)
pp. TI 800-01 Technical Instruction – Design Criteria
qq. Technical Manuals (TMs)
rr. UFC 1-200-01 General Building Design, 20 June 2016
ss. UFC 1-200-02, High Performance and Sustainable Building Requirements, 1 Oct 2017
tt. UFC 3-580-01 Telecommunications Building Cabling Systems Planning and Design, 01 June 2016
uu. UFC 3-600-01 Fire Protection, Change 2, 25 Mar 2018
vv. UFC 4-010-01 DOD Minimum Antiterrorism Standards for Buildings, with Change 1, dated 1 October 2013
ww. UFC 4-010-05, Sensitive Compartmented Information Facilities Planning, Design and Construction, dated 1 Feb 2013 (w/Change 1, Oct 2013)
xx. AF Base Area Network Functional Specification 2017
yy. Rural Utility Service (RUS) Bulletin

15.2 GENERAL

All construction personnel are required to be U.S. citizens to perform work on this project.

15.3 EXTERIOR ELECTRONIC SYSTEMS.

The site fiber and copper infrastructure installed at the existing facility (Comm. Room E7 [RM 183]) is adequate to support the new addition. A new system of communications ductbanks, conduits, handholes and cables is required to replace duct/cables system which are in conflict with the new addition. The new duct bank/cable system must be installed prior to start of construction of the new addition such that disruption of service will be kept to a minimum. All outages to the communications system must be scheduled a minimum of 14 days in advance and can only occur during non-business hours. See the Electrical Drawings for the side communications requirements.

The design build contractor shall provide detailed site "T" drawings indicating the new system going into the existing demarc location Room 133, including location and sizes of pull boxes, cable termination details and cross connect details. The new 300 pair cable will require a new building entrance protector (basis of design CIRC Model/part number: 1890ECT1-100series). New handholes shall be a minimum of 5' (length), 3' (width) and 4' (depth). Handholes shall be installed on a leveled, crushed gravel base of sufficient depth (minimum 6") under each handhole for drainage and stability.

15.4 INTERIOR ELECTRONIC SYSTEMS:

15.4.1 Maintain Operations of Existing Occupied Facility and Secure Area Accreditations.

The existing building has a mission critical function that shall remain operational.

The design and construction documents shall be developed and construction work performed to prevent disruption and interruption to the existing operations that includes existing intrusion detection systems, access control systems and closed circuit TV systems. Any required interruption of the

electronic systems shall be scheduled a minimum of 30 days in advance with the contracting officer. Work in the existing building shall be limited from 6am-5pm. All work in the existing building requires escorts by 321 EWS personnel at all times.

15.4.2 Power and Pathways Rough-In for Intrusion Detection Systems (IDS)

An intrusion detection system shall be provided for the secure areas to meet ICD/ICS 705 criteria. The system control panels, door switches, motion sensors and wiring will be GFGI. The contractor shall provide power and pathways. The power and pathways system shall include provisions for a separate control panels on each floor with rough in for door switches and motion sensors in accordance with ICD/ICS 705 requirements. Note that the first floor secure area will not initially be certified as a secure area, but the complete rough-in for the IDS system shall be installed. Pathways shall be provided from each control panel to existing Room 133 for connection to the basewide system (see RFP Sheet A-101 for location). The contractor shall coordinate the final power and pathways with the government’s intrusion detection system designers.

15.4.3 Power and Pathways Rough-In for Access Control System (ACS)

An access control system is required for entry doors to the secure areas secure comm. rooms and other rooms (see RFP for specific door locations and requirements). The system will be GFGI and the contractor shall provide power, pathways and electric door hardware. A pathway is also required from the new addition to the main Comm Room E7 (Room 183) for interface with the existing access control system. Provisions for an ACS “kill” switch shall be provided in Training Room 207. The contractor shall coordinate the final power and pathways design with the government’s system design.

15.4.4 Power and Pathways Rough-In for Closed Circuit TV (CCTV)

Closed circuit TV systems will be GFGI (cameras, monitors and wiring will be GFGI), the contractor shall provide power and pathways.

The first and second floor unclassified corridors shall be roughed in for cameras with homerun to existing Room 126. Provide camera system rough-in such that the entire length of the corridors can be monitored.

The first and second floor Security Vestibules and the Training Room shall be a local feed only to monitor personnel entering secure area. Provide rough in from each camera location to a monitor located on the secure side of each vestibule and Training Room.

The contractor shall coordinate the final power and pathways design with the government’s system designers.

15.4.5 Audio Visual System

The equipment required for Audio Visual (AV Systems) shall be GFGI. The contractor shall provide infrastructure (pathways and power systems) for the AV systems. Infrastructure shall include provisions for large video monitors and VTC systems in the Conference and Training Rooms. The contractor shall

coordinate the final power and pathways and wall blocking design with the governments systems designer.

15.4.6 White Noise System

Provide white noise systems at the secure area entry doors and at duct work penetrations at secure walls. White noise systems shall be designed in accordance with ICD/ICS 705 Chapter 9. The system shall be zoned to provide a separate zone for each room (duct work can be on its own zone).

15.4.7 Blue Light Systems

Provide rotating blue lights with switching for each room in the secure areas. Blue light fixtures basis of design Edwards 48 FLED series or equivalent.

15.4.8 **TELEPHONE/DATA SYSTEMS**

15.4.8.2

All work including design drawings shall be performed by an Industry Certified Telecommunications Contractor. Contractor shall have a minimum of 3 years experience in the application, installation and testing of the specified systems and equipment. The contractor shall have the name and certification number of a BICSI certified Registered Communications Distribution Designer (RCDD) who is a permanent employee of the Structured Cabling System Contractor. The Contractor shall maintain this RCDD, or another RCDD approved by the Government, in his permanent employment throughout this project. The RCDD shall have overall responsibility for certifying that the installed structured cabling system conforms to these contract documents and to the referenced EIA/TIA, IEEE, BICSI, UFC, and UL standards. All supervision and installers assigned to the installation of this system or any of its components shall have factory certification from each equipment manufacturer that they are qualified to install and test the provided products. General electrical trade staff (electricians) shall not be used for the installation of the premises distribution system cables and associated hardware. All installers assigned to the installation of this system or any of its components shall have a minimum of 3 years experience in the installation of the specified copper and fiber optic cable and components. Construction submittals shall include manufacturer’s catalog information showing dimensions, colors, and configurations. The building structured wiring system shall be in accordance with ANSI/TIA-606 designed by a Registered Communications Distribution Designer (RCDD). The design drawing of the communications and security systems shall consist of detailed construction drawings detailing the exact requirements of the system. The identifier for each termination and cable shall appear on the drawings. Drawings shall depict final telecommunications installed wiring system infrastructure in accordance with ANSI/TIA-606. The drawings should provide details required to prove that the distribution system shall properly support connectivity.

15.4.8.3

All cabling and equipment shall be in accordance with Smith AFB Cable Installation Specifications and all other referenced standards (Smith

Standards take precedence). The systems shall be fully wired and terminated in outlets and patch panels.

15.4.8.4

All premise wiring system shall be tested. All governmental ISP acceptance testing shall be witness/approved by the government. Category 6 link tests in accordance with EIA TIA/EIA-568-B.1 and EIA TIA-EIA-568-B-2. Tests will include wire map, length, insertion loss, NEXT, PSNEXT, ELFEXT, PSELFEXT, return loss, propagation delay, and delay skew. Optical fiber end-to-end link tests will be performed in accordance with EIA TIA/EIA-568-B.3. Provide both a hard copy and a soft copy of test results.

15.4.8.5

The electrical designer, the Architect, the RCDD and the interior designer must coordinate the layout of all furniture with electrical and communications outlets during the design process.

15.4.8.6 Communications Outlet Requirements:

a. Each workstation and office in the secure areas – outlet shall have 3-LC duplex fiber connectors (keyed) (NIPR/SIPR/SAP) and 1-CAT6 RJ45 jack (telephone). Outlets shall be installed below the raised floor at each workstation.
b. Each printer in the secure area shall have an outlet with 3-LC duplex fiber connectors (keyed)(NIPR/SIPR/SAP). Outlets shall be installed below the raised floor at the printer locations.
c. The Training Room in the secure area have 4-sets of outlets; each outlet with 3-LC duplex fiber connectors (keyed)(NIPR/SIPR/SAP) and 1-CAT6 RJ45 jack (telephone). Outlets shall be installed in the furniture via patch cords to outlets mounted below the raised floor.
d. Each workstation and office in the area outside the secure area shall have an outlet with 1-LC duplex keyed fiber connector (NIPR) and 1-CAT6 RJ45 jack (telephone). Outlets shall be wall mounted in coordination with the furniture utilizing downward sloped faceplates.
e. Each printer outside of the secure area shall have an outlet with 1-LC duplex keyed fiber connector (NIPR). Outlets shall be wall mounted utilizing downward sloped faceplates.
f. The Conference Room shall have 4-sets of outlets (2-wall and 2-mounted in the table top [table top outlets shall be fed via patch cords from flush floor outlets]). Each outlet shall have 1-LC duplex keyed fiber connector (NIPR) and 1-CAT6 RJ45 connector (telephone).
g. Provide wall telephone outlets (RJ45 CAT6) in secure vestibules, break room and in the mechanical rooms.
h. Fiber cables to the desktop shall be multimode type OM3.
i. The new secure comm. rooms 131A and 205 shall not host or contain 96CS equipment for NIPR or SIPR.

The premise areas shall be served via above ceiling or below floor, cable tray support system with a minimum 1-inch EMT conduit to each work area outlet from serving cable tray support system. Cable shall be installed uniformly using cable management, waterfall cable protection and stain-relief throughout cable tray support, cable ladder, cable distribution rack, TRs and network cabinet(s) in a professional skilled manner without twist, kinks,

crossovers or braids. The required horizontal pathway shall be a ceiling distribution system employing a centralized cable tray system originating in the telecommunications space and continuing out into the serving area. Likewise, utilize cable tray for horizontal distribution to the maximum extent possible (80 to 90 percent of the horizontal cable length). The maximum fill ratio of any cable tray is 50%. Provide and maintain a minimum of 12 inches access headroom above a cable tray system or cable runway.

All cables shall be color coded for each system (NIPR/SIPR/SAP/telephone)(bundle each label color separately).

In areas without raised floors, provide surface mounted raceways for installing outlets (Wiremold 3000 or 4000 or equal) and cable trays above the ceiling (the 321 EWS requires that communications systems be inspectible such that all raceways shall be run exposed within the rooms and in cable trays above ceilings [lay in ceilings and raised access floors are considered inspectible]). Cable trays shall be basket type below raised floor and above ceilings and steel ladder type in the comm. rooms. All comm./data system cabling penetrations into comm. rooms and equipment room walls and floor to floor to be "re-enterable" type sealing system (fire or security/sound) to allow cabling to be installed or removed after penetration is initially sealed.

15.4.8.6 Cabling Requirements

a. All NIPR/VOIP (telephone) drops shall be routed to patch panels in existing Comm. Room 128. The contractor shall provide new patch panels in existing racks in Room E 128 to support the new cables. NIPR/VOIP cables from the new addition to Comm. Room E 128 shall be installed in conduit. Provide 1-spare conduit (spare conduit shall be the same size as the active conduit).
b. All SIPR drops shall be routed to patch panels in existing Room E 128. The contractor shall provide new patch panels in existing racks in Room E 128 to support the new cables. SIPR cables from the new addition to Room E 128 shall be installed in conduit (separate conduit from NIPR/VOIP conduit). Provide 1-spare conduit (spare conduit shall be the same size as the active conduit). Patch panels shall be "non-keyed".
c. All SAP drops shall be homerun to patch panels in the comm. rooms on each floor in the new addition. The contractor shall install patch panels in GFGI racks. Patch panels shall be "non-keyed".
d. Backbone cable shall be provided as follows:
   - Provide a 24 strand single mode OS3 cable from existing NOC Room 228 to the second floor comm. room. This cable shall be installed in an alarmed PDS.
   - Provide a 24 strand single mode OS3 cable from the first floor comm. room to the second floor comm. room. Install in conduit. Leave the cable coiled in the 2nd floor comm. room for future use (install the pathway complete).
e. Backbone fiber cable shall be single mode (OS3). Horizontal fiber cable shall be multimode tight buffered OM3. Horizontal copper shall be UTP, 24 awg CAT 6. Cable manufactured more than 12 months prior to installation shall not be used.

f. Firestopping or acoustical sealing systems thru fire rated or security walls shall be “re-enterable” systems to allow cabling to be easily added or removed.

15.6 SPECIFICATIONS

The following list of specifications is anticipated for this project. The list is not comprehensive and the Contractor shall provide all specifications required to adequately describe the project and all materials to be used and installed. The Contractor shall edit and submit the following UFGS as defined in Section 01 10 12, Design After Award using the latest comparable SpecsIntact version:

27 10 00	BUILDING TELECOMMUNICATIONS CABLING SYSTEM
28 20 00.00 10	ACCESS CONTROLS SYSTEM
33 82 00	TELECOMMUNICATIONS OUTSIDE PLANT (OSP)

16. CORROSION CONTROL AND CATHODIC PROTECTION

The following cathodic protection design requirements were developed specifically for this project based on the guidelines contained in paragraph 15 of the Engineering Design Manual Smith Air Force Base, Florida February 2018-“Corrosion Control and Cathodic Protection Systems”. Also referenced in the development of these requirements are the National Fire Protection Association (NFPA) 70 –the National Electric Code (NEC), NACE standard SP0169-2013, NACE SP0188-2006, NACE SP0286-2007, UFC 3-570-01 Cathodic Protection Systems, UFC 3-570-06 Operation and Maintenance: Cathodic Protection Systems.

16.1 GENERAL

Metal components of the water distribution system (domestic and fire water), natural gas and propane pipes, force mains, heating and chilled water pipes, oil/water separators, pipes and tanks that store hazardous materials that are in soil or submerged in water shall be protected from corrosion to prevent waste, hazardous conditions, or contamination. Contractor shall conduct a survey of the existing cathodic protection system or systems in the vicinity of the new facility to insure that interference does not occur as a result of multiple cathodic protection systems. If any conflicts between existing cathodic protection systems and/or other facilities and the new cathodic protection system(s) are found, the contractor shall properly coordinate and provide appropriate remedial solutions. All new water lines; fire protection lines; metallic gas lines or metallic components of nonmetallic gas lines; backflow prevention valves; shall be protected. The Contractor shall relocate any existing cathodic protection test stations or other cathodic protection equipment located in areas conflicting with construction of the new facility. Any existing cathodic protection system equipment that has to be moved shall be relocated to a grassed area.

16.2 CATHODIC PROTECTION AND COATINGS

For all metal facilities located in the atmosphere, soil, or water electrolytes, corrosion control shall be provided. Cathodic protection shall be provided for metals in soils or water. Coatings are normally provided as

corrosion protection in the atmosphere. As a minimum, cathodic protection is required on all metallic piping (and other metallic structures listed) and on all metallic components of plastic pipelines of the following systems: interior surfaces of elevated steel water storage tanks, including the interior of the riser; interior surfaces and bottom surfaces of on-grade steel water storage tanks; backflow preventers; gas lines; water lines; and fire protection lines. Pressurized ductile iron and other metallic piping under floor slabs shall also be cathodically protected and provided with an isolation flange above the floor slab. Pipes with cathodic protection must past through concrete floor slabs in non-metallic sleeves or in metallic sleeves with insulating link seals to isolate the pipe from the sleeve. The cathodic protection systems provided on the metallic structures listed above shall be galvanic type systems as determined by the following requirements: 1) the pertinent design data as gathered by the "corrosion expert" (defined below), including but not limited to soil resistivity, material selection, coating selection, current requirements, anode selection, ability to isolate from foreign structures, etc. as necessary to meet the minimum potential criteria defined below; 2) full compliance with one or more of the properly edited and subsequently approved applicable guide specification(s) listed below; 3) nonmetallic pipelines with metallic components and metallic components of other described structures requiring cathodic protection shall, as a minimum, comply with all the requirements of UFGS Section 26 42 14.00 10 CATHODIC PROTECTION SYSTEM (SACRIFICIAL ANODE)(unless gathered data requires the use of an impressed current system); 4) all metallic pipelines shall, as a minimum, comply with all requirements of UFGS specification 26 42 14.00 10 CATHODIC PROTECTION SYSTEM (SACRIFICIAL ANODE). The minimum technical requirements that are to be included in the specification Section 26 42 14.00 10 CATHODIC PROTECTION SYSTEM (SACRIFICIAL ANODE) are included in the technical specification sections as part of these contract documents; however, other specification sections as listed must be properly edited and submitted for government approval if they are required as described herein. Additionally, the Section 26 42 14.00 10 CATHODIC PROTECTION SYSTEM (SACRIFICIAL ANODE) provided herein, must not be utilized as the construction specification section; the "corrosion expert" must obtain a new specification section, completely edit it for the specific design required in order to meet the defined criteria, and submit it to the government for approval.

16.3 QUALIFICATIONS AND REQUIRED SITE VISITS

Cathodic protection field work (surveys), analysis, and design shall be accomplished by a "corrosion expert." "Corrosion expert" refers to a person, who by thorough knowledge of the physical sciences and the principles of engineering and mathematics, acquired by professional education and related practical experience, is qualified to engage in the practice of corrosion control of buried or submerged metallic surfaces. Such a person must be accredited or certified by NACE International, formerly National Association of Corrosion Engineers (NACE), as a NACE Accredited Corrosion Specialist or a NACE Certified Cathodic Protection (CP) Specialist or be a registered professional engineer who has certification or licensing that includes education and experience in corrosion control of buried or submerged metallic piping and tank systems, if such certification or licensing includes 5 years experience in corrosion control on underground metallic surfaces of the type under this contract. The "corrosion expert's" name and qualifications shall be certified prior to start of design. The "corrosion expert" shall make at least 3 visits to the project site. The first of these visits shall include

obtaining soil resistivity data and other required data necessary for design, verifying the type of pipeline materials and coatings (must coordinate with the pipeline supplier and installer) to be used and reporting to the Contractor the type of cathodic protection required. Once the "corrosion expert's" cathodic protection design submittals are approved and the materials delivered, the "corrosion expert" shall revisit the site to ensure the Contractor understands installation practices and laying out the components. The third visit shall involve testing the installed cathodic protection systems and training applicable personnel on proper maintenance techniques. The "corrosion expert" shall supervise installation and testing of all cathodic protection.

16.4 CRITERIA AND PROTECTION

Criteria for determining the adequacy of protection on a buried structure shall be in accordance with the criteria as describe below and as defined in the following NACE International Publications: NACE SP0169-2013 revision, Control of External Corrosion on Underground or Submerged Metallic Piping Systems; The cathodic protection system shall meet the minimum criteria for steel, ductile iron, and cast iron structures defined in the first subparagraph below (Criteria indicated in the second subparagraph may be utilized at the discretion of the Corrosion Expert):

a. A negative voltage of at least minus 850 millivolts as measured between the structure or specified underground metallic component and a saturated copper-copper sulfate reference electrode contacting the (electrolyte) earth directly over the structure. Determination of this voltage shall be made with the cathodic protection system in operation and after it has been in operation for a minimum of 72 hours. Voltage drops shall be considered for valid interpretation of this voltage measurement. A minimum of minus 850 millivolts "instant off" potential between the structure being tested and the reference cell shall be achieved over 95 percent of the area of the structure. A close interval survey shall be conducted on all cathodically protected pipelines and components. The design shall be accomplished so that the protective current can be interrupted in order to obtain the "instant off" potential readings. Adequate number of measurements shall be obtained over the entire structure, pipe, or other metallic component to verify and record achievement of minus 850 millivolts "instant off." This potential shall be obtained over 95 percent of the total metallic area without the "instant off" potential exceeding 1100 millivolts.

b. A minimum polarization voltage shift of 100 millivolts as measured between the structure and a saturated copper-copper sulfate reference electrode contacting the earth directly over the structure. This polarization voltage shift shall be determined by interrupting the protective current and measuring the polarization decay. When the protective current is interrupted, an immediate voltage shift shall occur. The voltage reading, after the immediate shift (this reading shall be defined herein as being the same reading as the "instant off" reading described in the immediate paragraph above and this term will be utilized below), shall be used as the base reading from which to measure polarization decay. Measurements achieving 100 millivolts decay shall be made over 95 percent of the metallic surface. Alternatively, the "instant off" measurements can be compared to the native readings taken prior to energizing of the cathodic protection system and in the exact same locations. For comparison of "instant off" to native readings,

the same number of measurements in corresponding locations must be taken. If the "instant off" reading is compared to the corresponding native reading in the same location, it must be a minimum of 100 mV more negative with respect to the copper/copper-sulfate reference cell than the native reading. The "Corrosion Expert" must assure that a complete set of native readings are taken prior to energizing the cathodic protection system at all of the same locations as the "on" and "instant off" measurements are taken (i.e., close interval survey), as is required by the referenced guide specifications. The "instant off" measurements shall be made after the system has been in operation for a minimum of 72 hours.

16.5 COATING

A minimum coating thickness of 40 mils is required on all underground metal. Allowable coating types shall be as listed in the applicable cathodic protection specification section.

16.6 SPECIFICATIONS AND SYSTEM DESIGN

Regardless if other sections of the RFP allow the use of specifications other than the UFGS (Unified Facilities Guide Specifications) for other portions of the design of this facility; ONLY the latest Army's edition (has an "A" at end of section number) of UFGS specifications (currently dated August 2008) shall be allowed for specification of cathodic protection systems. These specifications are available at the following web address: http://www.wbdg.org/ccb/browse_org.php?o=70, or can be obtained from the Mobile District, Corps of Engineers. It is mandatory that the Contractor, as a minimum, edits and submits latest Specs-In-Tact version of the following UFGS specification section (re-submission of the specification Section 26 42 14.00 10 CATHODIC PROTECTION SYSTEM (SACRIFICIAL ANODE) section included in the technical specification section of these contract documents is not acceptable): UFGS 26 42 14.00 10 CATHODIC PROTECTION SYSTEM (SACRIFICIAL ANODE) The "Corrosion Expert" shall also completely edit and submit for approval specification Section 26 42 14.00 10 CATHODIC PROTECTION SYSTEM (SACRIFICIAL ANODE), under the following conditions: 1) the "Corrosion Expert" determines that an impressed current cathodic protection system is required in order to meet the criteria of protection defined above; 2) an all metallic piping system is to be provided and installed by the Contractor, which may require an impressed current system in order to meet the required criteria; or 3) it becomes necessary to install an on-grade water tank, which would subsequently require the installation of an impressed current cathodic protection system to protect the tank bottom. If a water storage tank becomes necessary in this project, then the "Corrosion Expert" shall also completely edit and submit for approval specification Section 26 42 14.00 10 CATHODIC PROTECTION SYSTEM (SACRIFICIAL ANODE), in order to provide cathodic protection to the interior submerged surfaces of the tank.

a. In addition to the design and submittal requirements required by the Mobile District Design Manual and elsewhere in the RFP, as a minimum, the following submittals shall be submitted to the government for approval and for review by Engineering Division, Corps of Engineers, Mobile District: descriptive and technical literature of all cathodic protection materials and equipment, drawings and details, evidence of qualifications of the "corrosion expert," and tests and measurements data and procedures. Additionally, all

other submittals included in the applicable specification shall be submitted to the government.

b. The Contractor shall provide a complete design for acceptance and approval prior to purchase of any of the equipment included herein. The Contractor shall provide calculations, manufacturer's cutsheets, a complete list of material showing location where each anode, test station and other material shall be used, design drawings and shop drawings to support this design and indicate the intentions of the Contractor's final product.

c. Each buried or submerged metallic component in this contract shall have design calculations, a drawing detail of that component showing cathodic protection with at least one test station. Each component shall have a minimum of one test station, two anodes, and one permanent reference electrode. Each location shall be shown on drawings.

d. Each new metallic pipeline connecting to an existing metallic pipeline shall be electrically isolated from the existing pipeline by the installation of an insulating flange. New metallic pipeline passing through concrete slabs, walls, and floors shall have an insulating material between the pipe and concrete in order to provide isolation (this can be accomplished by passing the metallic pipe through a PVC sleeve). Insulating flanges shall also be installed in new metallic pipelines extending above grade or where they extend above floor slabs; the flanges are to be located above grade.

e. The Contractor shall coordinate his work with any existing cathodic protection systems in the area of the new facility of this project. As necessary, the contractor shall relocate any existing cathodic protection system test stations or other cathodic protection equipment located in areas conflicting with new facilities. Any existing cathodic protection system equipment that has to be moved shall be relocated to areas approved by the Contracting Officer's representative.

f. Detailed drawings shall be provided showing location of rectifiers (if an impressed current system is deemed necessary), anodes, insulated fittings, test stations, permanent reference cells, and bonding. Locations shall be referenced to two permanent facilities or marker points.

g. All potential tests shall be made at 2.5 feet. intervals witnessed by the Contracting Officer's Representative. Submittals shall identify test locations on a separate drawing showing all metal to be protected and all cathodic protection equipment. However, a minimum of 3 tests shall be made at each metallic component in the piping system. Test points, equipment, and protected metal shall be easily distinguished and identified on the drawings.

17. ENVIRONMENTAL CONSIDERATIONS

17.1 APPLICABLE CRITERIA

AFI 32-1053	Pest Management Program
40 CFR 68	Chemical Accident Prevention Provisions
40 CFR 152-186	Pesticide Programs
40 CFR 260	Hazardous Waste Management System: General
40 CFR 261	Identification and Listing of Hazardous Waste

40 CFR 262	Standards Applicable to Generators of Hazardous Waste
40 CFR 279	Standards for the Management of Used Oil
40 CFR 302	Designation, Reportable Quantities, and Notification
40 CFR 355	Emergency Planning and Notification
49 CFR 171-178	Hazardous Materials Regulations

17.2 ENVIRONMENTAL PROTECTION

The Contractor shall prevent environmental pollution and damage as the result of construction operations. Environmental pollution and damage is defined as the presence of chemical, physical, or biological elements or agents which adversely affect human health or welfare; unfavorably alter ecological balances of importance to human life; affect other species of importance to man; or degrade the utility of the environment for aesthetic, cultural and/or historical purposes. The control of environmental pollution and damage requires consideration of air, water, and land resources; and includes management of visual aesthetics; noise; solid, chemical, and liquid waste; radiant energy and radioactive materials; as well as other pollutants.

17.3 EXISTING HAZARDOUS MATERIALS

There is some demolition as a part of this contract; if the contractor encounters existing hazardous materials such as asbestos, lead paint, PCB containing ballasts, mercury containing bulbs, or ionization type smoke detectors, the Contractor shall dispose of the material in accordance with Smith Air Force Base (AFB), State of Florida and local regulations.

A lead-based paint (LBP) and asbestos survey has been performed to identify potential hazardous materials that are present in the areas of the building being renovated and related to the new addition and alterations in the existing building. The survey report indicates no asbestos was detected. However, the report identified lead-based paint (LBP) having 1.0 mg/cm2 or greater exists in several sample areas tested within the project limits. A copy of the report is included as part of Appendix G included with the RFP documents.

17.4 INSTALLATION RESTORATION PROGRAM

Installation Restoration Program (IRP) Site OT-35 is located across Seventh Street from Building 123. OT-35 is an active remediation site. Refer to Appendix F for figure showing location of OT-35 Groundwater Contamination Maps and Generic Permit for Discharges from Petroleum Contaminated Sites and additional information regarding contaminants including petroleum related compounds to evaluate project site environmental reports and determine necessary requirements and procedures for remediation purposes.

If the Contractor design requires dewatering operations within the project site, the Contractor shall evaluate the presence of documented petroleum-contaminated groundwater near the area of construction, as well as the hydraulic conductivity of the shallow aquifer in this area, to document the potential for influencing the movement of contaminated groundwater during dewatering. Dewatering at the project site shall both be designed and confirmed not to influence the flow of contaminated groundwater to the

construction site so that contaminated dewatering effluent will not be generated, or the Contractor shall be responsible for managing potentially contaminated effluent. If dewatering is designed not to draw contaminated groundwater to the construction site, the Contractor shall demonstrate and document how the design will meet this objective. If dewatering may generate contaminated effluent, the Contractor shall be responsible for all permits, testing, reporting, disposal, and documentation of local, state, and federal discharge requirements.

The Contractor shall comply with the requirement to discharge groundwater produced from dewatering in compliance with the Generic Permit for the Discharge of Produced Ground Water from Any Non-Contaminated Site Activity, FDEP Rule 62-621.300(1), and Generic Permit for Discharges from Petroleum Contaminated Sites, FDEP Rule 62-621.300(2)(a) - Generic Permit for Discharge of Ground Water from Dewatering Operations, as appropriate based on Contractor's dewatering design. Refer to Appendix F for a copy of the FDEP Rules 62-621.300(1) and (2).

17.5 HAZARDOUS MATERIALS

Hazardous material shall be stored in lockers specifically made for storage of hazardous materials. MSDSs for all hazardous materials brought on base shall be submitted to the COR. An initial inventory and a monthly usage of hazardous materials shall be submitted to COR quarterly during construction.

17.6 CONTRACTOR GENERATED HAZARDOUS WASTE

The Contractor shall comply with all provisions of 40 CFR 260 through 281 regarding the generation, storage, and disposal of hazardous waste. If the applicable, the Contractor shall submit a hazardous waste management plan to the COR for approval by Base Civil Engineering. The Contractor shall not commence any work until this approval is obtained. The Contractor shall stop all work in the event Base Civil Engineering identifies noncompliance with federal and state regulations and shall correct any discrepancies immediately within 2 hours of notification by Base Civil Engineering. All hazardous waste shall be labeled and an inventory management system will be initiated to insure timely removal and proper disposal. No on-base disposal will be allowed. All drums will be labeled with a hazardous waste label. The label shall include the proper DOT shipping name, UN or NA, EPA waste number, generator information, and accumulation start date. The label shall be placed on the side of the drum. All drums used to store hazardous waste shall be nonleaking and safe to handle. Contractor shall be responsible for overpacking drums that are rusted, dented, or leaking. Drums and/or overpacks shall be provided by the Contractor. All drums shall be “new” DOT approved containers. The storage location for the hazardous waste drums shall be approved by the Base Civil Engineering prior to the generation of hazardous waste. The Contractor shall document inspection of drums for leaks on a daily basis or if not working in the area daily, then a weekly inspection will suffice. A copy of the inspection checklist shall be forwarded to Base Civil Engineering every Friday. Hazardous waste transportation and disposal shall be coordinated through Base Civil Engineering. The Contractor shall be responsible for transportation and disposal of all hazardous waste at an EPA approved treatment, storage, disposal facility (TSDF). The transportation and disposal facilities shall be approved by Base Civil Engineering prior to their use. Manifests shall be signed only by Base Civil Engineering. Drums

shall be disposed of within 90 days of placing the first drop in the container. The Contractor shall reimburse the Government for any remediation undertaken to clean up releases by the Contractor and for any civil or criminal fines or penalties for any environmental infraction caused by the Contractor.

17.7 ASBESTOS MATERIALS AND LEAD BASED PAINTS

The Contractor shall not use materials containing Asbestos or Lead Based Paints in the construction of this facility. Upon completion of the construction, the Contractor shall submit two copies of a Certified Letter to the Contracting Officer's Representative (COR) stating that no lead based paints of materials containing asbestos were used in the construction of the new facilities.

17.8 SPECIFICATIONS

As a minimum, the Contractor shall edit and submit the following UFGS as defined in Section 0 10 12, Design After Award:

01 57 19 Temporary Environmental Controls – Smith AFB Standard
02 83 13.00 20 Lead in Construction

18. SUSTAINABLE DESIGN AND ENERGY USE REDUCTION

18.1 CODES AND CRITERIA

Facility shall be designed in accordance with all government requirements, regional, and national applicable codes effective at issue date of RFP including. The following sustainable design and energy conservation criteria shall apply to this project:

a. UFC 1-200-02 High Performance and Sustainable Building Requirements 01 Dec 2016 (Change 01, 1 December 2016)

b. AFCEC AGRAM 17-01 Change to AF New Construction and Major Renovation Certification Requirements (February 2017)

c. Air Force Sustainable Design & Development (SDD) Implementation Guidance, memorandum dated 2 June 2011.

d. Air Force Sustainable Design and Development (SDD) Policy letter, dated 31 July 2007.

e. ASHRAE 189.1 Standard for the Design of High-Performance Green Buildings Except Low-Rise Residential Buildings (2011)- application as defined by UFC 1-200-02.

f. FLHPSB - Federal Leadership in High Performance and Sustainable Buildings MOU (HPSB) (issued 2006)

g. Guiding Principles for Federal Leadership in High Performance and Sustainable Buildings (Guiding Principles), "High Performance and Sustainable Buildings Guidance" (Updated December 2008), http://www.wbdg.org/references/fhpsb.php

h. E.O.13423 Strengthening Federal Environmental, Energy & Transportation Management (Jan 2007)

i. E.O.13514 Federal Leadership in Environmental, Energy and Economic Performance (Oct 2009)

j. EPAct2005 - Energy Policy Act of 2005

k. EISA 2007 - Energy Independence Security Act of 2007

l. U.S. GREEN BUILDING COUNCIL (USGBC); GBCI GP Assessment (2016) Guiding Principles Assessment by GBCI (DOD Version)

m. TECHNICAL GUIDE Guiding Principles Assessment by GBCI, Department of Defense: Building Design & Construction (v2.0), UFC 1-200-02 01Dec16 Projects Supported: LEED BD+C: v4, v2009 or Non LEED projects

18.2 SUSTAINABLE DESIGN CRITERIA AND APPLICATION

18.2.1 General

Design and construct the new addition, sitework, and the alterations work limited to the relevant intended scope to comply with the requirements of UFC 1-200-02 High Performance and Sustainable Building Requirements, and provide all required compliance documentation.

The Contractor shall include all costs to design and prepare necessary calculations and documentation and construct the facility to meet the HPSB sustainability requirements and certification process. No requests for additional funds to meet this requirement will be entertained by the Government.

Current public laws and executive orders require all new Federal facilities to meet a comprehensive set of requirements commonly referred to as the Federal High Performance and Sustainable Building (HPSB) Guiding Principles (GPs). These requirements have been consolidated into the current UFC 1-200-02, High Performance and Sustainable Building Requirement. The Department of Defense Sustainable Buildings Policy Memorandum (10 Nov 2013) states "A building that meets the UFC (1-200-02) requirements shall be considered compliant with the requirements of law and the Guiding Principles." Additionally, the memo requires DOD Components to "… establish an auditable process to ensure applicable new buildings and major renovations meet requirements as defined in the UFC. The auditable process shall include green-building certification …"

18.3 AIR FORCE REQUIREMENTS FOR THIRD PARTY CERTIFICATION (TPC)

In the past, the Air Force has utilized the USGBC LEED rating system as a third-party validation of meeting project sustainability goals. While the intent of

the HPSB GP requirements align with the LEED rating system, LEED Silver certification does not constitute compliance with the Federal requirements and UFC 1-200-02. In an effort to reduce confusion about project sustainability goals, advance compliance with the Federal requirements, streamline HPSB GP compliance and tracking requirements, and identify a third-party certification that can be used for all new construction and major renovation projects, the Air Force reviewed newly developed USGBC/GBCI and GBI Guiding Principles Compliance rating systems and determined these can better serve as indicators of HPSB GP compliance.

AFCEC A-Gram, dated Feb 2017, provides guidance on the Air Force switching from using Leadership in Energy and Environmental Design (LEED) third party certification program, as required by the Air Force Sustainable Design and Development (SDD) Implementing Guidance Memorandum (Jun 2011); to a third-party certification program using the DoD version of Guiding Principles (GPs) Compliance certification of either the 1) US Green Building Council (USGBC)/ Green Business Certification Inc. (GBCI), or 2) Green Building Initiative (GBI) rating systems, for all applicable projects as described herein.

This project shall utilize the U.S. GREEN BUILDING COUNCIL (USGBC); GBCI GP Assessment (2016) Guiding Principles Assessment by GBCI (DOD Version) and shall achieve verification of meeting the Federal requirements as detailed in UFC 1-200-02.

18.3.1 Project Registration, Reviews and Compliance Assessment

Contractor shall register this project with the USGBC (GBCI) including submission of initial Interest Forms and payment of registration fees, prepare compliance documentation as required by TECHNICAL GUIDE Guiding Principles Assessment by GBCI, submission of design and construction reviews and payment of fees, and obtain final assessment report and certification by GBCI.

18.3.2 Government Review of GBCI Report and Certification

Submit all compliance documentation, final assessment report and certification to Government for review and acceptance. Failure to obtain certification will be considered non-compliant with the contract requirements requiring the Government to consider withholding of progress payments, equitable adjustment to the Contractor’s contract value, unsatisfactory performance evaluation, or termination for default of contract.

18.4 Air Force Sustainability Requirements Score Sheet (updated Jan 2017) for HPSB

Prepare and submit the Air Force Sustainability Requirements Score Sheet at each design phase submittal, update during construction phase, and submit final version for review and acceptance.

18.5 COMPLIANCE DOCUMENTATION OF SUSTAINABLE DESIGN AND FEDERAL MANDATES

Provide documentation demonstrating compliance with the various federal mandates and sustainable design requirements in the Design Analysis as separate chapter(s). As a minimum, compliance documentation to include narratives, calculations, energy reduction calculations, report summaries, and LCCA and supporting information. This information is in addition to documentation required for third party certification required elsewhere in this RFP and related criteria references.

18.6 Sustainable Design Team Qualifications and Process

Design-Build design and construction team with experience in sustainable design and construction practices and documentation similar to the type and scale to this project. The sustainable team members shall lead the design-build team through the sustainable design, documentation, and certification process, and through project closeout.

Documentation shall be submitted with each design submittal during the design process, the construction phase, as well as with project Operation Maintenance Data as part of Project Closeout Submittals.

Pre-design & Pre-construction Conferences - Contractor to lead and facilitate these conferences, provide an agenda to include discussion of roles and responsibilities, goals and compliance requirements, credits being pursued and overview of approach, coordination issues, discussion of possible problem areas, and review of documentation requirements. Meeting attendees will include design-build contractor (including superintendent and CQC), major subcontractors, design-build Contractor's Designers of Record for each design discipline requiring participation, USACE Project Manager, USACE construction staff, Base CE Representative(s) including maintenance personnel. Meeting shall be organized and led by the Contractor including preparation of meeting agenda provided to the COTR at least 7 days prior to each meeting, and meeting minutes documenting the discussions, decisions and action items. A Pre-Design conference shall occur before the start of the design phase and a Pre-Construction conference before the start of the Construction Phase to assure there is adequate understanding of the sustainable requirements for the design and construction.

18.7 SPECIFICATIONS

The following list of specifications is anticipated for this project. The Contractor shall edit and submit the following UFGS as defined in Section 01 10 12, Design After Award using the latest comparable Specsintact version:

01 33 29 SUSTAINABILITY REPORTING

Specification shall be edited to reflect the requirements of this design-build contract. Requirements for Implementation Plan, Documentation Notebook, and Coordination Meetings shall not be deleted.

Sustainability Documentation Notebook required by this specification shall be prepared and provided in the construction phase to the level of detail required by the unedited specification. The notebook shall be updated throughout the construction phase and available for review by the COTR.

The final notebook shall be delivered to the COTR (provide 4 hard copies; 3-ring binder with table of contents, labeled dividers for each credit, checklist summary for credits and points, and compliance documentation for each credit. Provide (4) electronic file copies of the Documentation Notebook on CD-ROM with the same information provided hard copies in .pdf format with each credit bookmarked.

01 91 00 COMMISSIONING

Edit this specification to include commissioning requirements meeting all listed criteria for all systems required by UFC 1-200-02 and as summarized below being installed by this contract. The commissioning specifications shall be supplemented by other UFGS commissioning specs available for these systems.

Level of Building Commissioning

UFC 1-200-02 Section 2-2.2 requires Building Project Commissioning shall be provided for the project. UFC also states the commissioning scope may be tailored to the project as determined by the DOD Component AHJ. The RFP project Delivery Team determined the level of commissioning appropriate for the building systems as follows:

Follow LEED v2009 BD+C EAP1, the level of commissioning appropriate for this project will include the HVAC, domestic hot water systems, building controls (including water, gas, and electric meters), and lighting controls.

No renewable energy systems will require commissioning as they have been determined to not be LCC effective per UFC 1-200-02.

No irrigation systems will require commissioning as this system is connected to an existing irrigation well system and not connected to a domestic water system.

The PDT has determined that the appropriate level of envelope commissioning will include envelop pressure testing to verify building air-tightness and thermography analysis to verify thermal and moisture integrity for building envelope systems, components and assemblies. Testing to be performed by the Contractor with results reviewed by the Commissioning Authority (CxA).

Commissioning Authority Services (CxA) will be contracted by the Government following the level of commissioning as determined by the PDT.

--End of Section--

Appendix D
Exhibit 24-2
Sample 01 10 12

SECTION 01 10 12

DESIGN AFTER AWARD

1. DESIGN RESPONSIBILITY

The Contractor shall furnish and be responsible for a complete set of design documents as called for in specification section 01 10 10 DESIGN REQUIREMENTS, and Section 00 10 00, ADDITIONAL SPECIAL CONTRACT REQUIREMENTS and as called for hereinafter. Information provided below is intended to supplement the Mobile District Design Manual requirements. The Design Manual is available on the internet at:

http://www.sam.usace.army.mil/Missions/Military-Missions/Engineering/Design-Guides/Mobile-District-Design-Guides/

2. DESIGN SUBMITTALS

The Contractor shall submit its design in different phases to the Government for review. The number and requirements of each design submittal are listed below. The number and contents of the design submittals shall be reflected in the Contractor's progress charts. All comments for each submittal shall have been annotated and incorporated into the subsequent design before approval is granted.

2.1 TECHNICAL SPECIFICATIONS

Utilize Unified Facilities Guide Specifications (UFGS) in the SpecsIntact format. Utilize complete project specifications to cover the full scope of work. Delete references to materials that are not allowed or that are not intended to be provided. Government standards will not be referenced in the specifications; instead, provide any specific requirement of the standard in the specification as applicable.

Operations and maintenance (O&M) portions of UFGS shall be edited by the respective Designers of Record in the design phase. O&M requirements in the UFGS shall not be edited out. Submittals, operating procedures, schematics, as-built drawings, manuals, software, and computer hardware required in the UFGS for system operation incorporated in the design phase are critical to the operation of the new facility on completion. All operations and maintenance (O&M) manuals shall be compiled into one binder with a separate sections tabbed and with a cover sheet for each UFGS section with O&M requirements. Provide in hard copy and electronic format (.pdf) with each section bookmarked.

2.2 STANDARD DESIGN SUBMITTALS

Items of work (not Fast-Tracked) shall be submitted in a maximum of three complete packages at the 50%, 100% Un-Reviewed, and Final Reviewed Design stages as outlined in the following paragraphs. Partial design submissions of various portions of the project other than those identified for fast- tracking will not be allowed. The Contractor shall prepare the drawings and specifications in such a manner and level of completeness that the Mobile

District could construct the facility without any additional assistance from the Contractor or designers (drawings shall be complete).

2.3 FAST-TRACKING AND DESIGN SUBMITTALS

The Contractor may at his/her option, "fast track" the design and construction of site work and exterior utilities. These items shall be designed to a 100% Unreviewed level of completion and submitted with the 50% Design Submittal with Fast Track work clearly labeled. A Final Submittal shall be provided for Fast-Tracked items for review and approval by the Government, so that a Partial Notice To Proceed (NTP) can be issued to the Contractor for that portion of the work. Fast Track submittal shall include the same deliverables for standard design submittals.

2.4 SPECIAL INFORMATION REQUIRED IN EACH DESIGN SUBMITTAL

2.4.1 Provide specific drawings, phasing plans, narratives and construction schedule to explain approach for keeping the existing building operational, maintain existing Secure Area physical security features and accreditation, and not disrupting the occupants in the existing building. Refer to specifications Refer to specification Section 01 10 10 Section 3 PROJECT REQUIREMENTS for additional requirements.

2.4.2 Secure Area Physical Security Elements: Provide specific drawings, phasing plans, and narratives (separate Design Analysis chapter) to explain the physical security elements, features and details to demonstrate approach, methodology and details for compliance with physical security standards and requirements for the Secure Area. Refer to specification Section 01 10 10 Section 3 PROJECT REQUIREMENTS for additional requirements.

2.4.3 Sustainable Design and Federal Energy Mandates Compliance: Provide documentation demonstrating compliance and approach with the various federal mandates and sustainable design requirements in the Design Analysis as separate chapter(s). As a minimum, compliance documentation to include narratives, calculations, energy reduction calculations and report summaries, and LCCA and supporting information. This information is in addition to Third Party Certification (TPC) documentation required for HPSB documentation required elsewhere in this RFP and related criteria references. Refer to specification Section 01 10 10 Section 18 SUSTAINABLE DESIGN AND ENERGY USE REDUCTION for additional requirements.

2.4.4 Building Information Modeling (BIM): Design and construction shall be performed meeting U.S. AIR FORCE BUILDING INFORMATION MODELING PROJECT EXECUTION PLAN(PxP)VERSION 2.1 (or current version) and the USACE Minimum Modeling Matrix (M3) documents (version 1.3 Sept 2014).

PxP shall be prepared and submitted for approval before the start of design. Provide BIM deliverables with each design submittal (except fast-track submittals as long as the fast track BIM model content is included in the non-fast track submittals) as required by the BIM Requirements included as an appendix to this RFP.

Refer to As-built BIM Requirements for SMITH AFB in Section 01 00 00 for additional requirements.

2.4.5 Air Force Sustainability Requirements Score Sheet (updated Jan 2017) for HPSB: Prepare the Air Force Sustainability Requirements Score Sheet and

submit updated version with each design submittal in the Design Analysis as a separate chapter and at the end of construction phase. Blank copy of AF score sheet included in RFP as an appendix.

2.4.6 ECB 2016-30 Implementation of the Energy & Sustainability Record Card Air Force Sustainability Guidance for Third Party Certification: Prepare Energy & Sustainability Record Card and submit updated version with each design submittal in the Design Analysis as a separate chapter and at the end of construction phase. Prepare and provide necessary calculations and data to support the information presented in the Record Card at each milestone submission. Guidance documents and the AF Sustainability Requirements Scoresheet can be found at: http://www.wbdg.org/ffc/af-afcec/policies-and-guidance-af-design-and-construction. Provide completed Record Card with final design, and at initial beneficial occupant date (BOD) and at final completion turn over.

2.4.7 Building Commissioning: Provide necessary drawings, specifications, basis of design, and other necessary information at each design submittal and during construction phase for review by the Government's Commissioning Authority (CxA). Refer to RFP Section 01 10 10 - 18 for additional requirements.

2.5 FIRE PROTECTION ENGINEER QUALIFICATIONS AND REQUIREMENTS

A Fire Protection Engineer (FPE) meeting the qualifications required by UFC 3-600-01 shall be responsible for but not limited to the design engineering, preparation of the construction documents, construction phase inspection and acceptance testing of the fire suppression and automatic detection systems, mass notification systems. FPE shall also be involved with the building code and life safety code analysis. FPE shall provide certifications in writing that the design is in compliance with UFC 3-600-01 and all applicable criteria. A qualified fire protection engineer is an integral part of the design team, and must be involved in every aspect of the design as it relates to fire protection.

As a minimum, the FPE shall be responsible for the following during the construction phase; material submittal review, shop drawing review, and participation in the following; Preparatory Inspection Meeting, initial inspection at job site, mid-point inspection at job site, Pre-Final Inspection with General Contractor and installation subcontractors, and Final Acceptance Inspection and Testing with General Contractor, installing subcontractors and Corps of Engineers.

Refer to other portions of this specifications and RFP for additional requirements and criteria.

2.6 PERMITTING

The Contractor is responsible for identifying and obtaining all necessary permits, fees, approvals and licenses prior to the start of construction.

3. GOVERNMENT APPROVED SUBMITTALS

The approval of submittals by the Contracting Officer's Representative shall not be construed as a complete check, but will indicate only that the design is in conformance with the contract requirements. Approval will not relieve

the Contractor of the responsibility for any error which may exist, as the Contractor is responsible for the design and construction of all work.

4. DESIGN SCHEDULE

Within 21 days after Notice to Proceed, the Contractor shall submit, for approval, a complete design schedule with all submittals and review times indicated by calendar dates. The schedule shall be updated monthly with copies furnished to the Contracting Officer. No progress payments will be made without an approved schedule. Any additional changes which the Contractor may wish to make to number or composition of design submittals shall be made 30 days prior to the expected submittal date. The Contractor shall allow 21 days for the Government review period if submittal dates are met. If a scheduled design submittal date is not met without notifying the Contracting officer in writing one (1) week in advance, 28 days shall be allowed for the Government review period. If a submittal date is not going to be met, the Contractor shall notify the Contracting Officer, in writing, one (1) week prior to the scheduled submittal date. Failure to do so will increase the Government review time by seven (7) days. See paragraph: "SUBMITTAL REVIEW". Review meetings for each design submittal shall occur the week following the review period.

5. PROGRESS CHARTS

The Contractor shall prepare and submit a progress chart to the Contracting Officer. The progress chart shall show, as a percentage of the total design price, the various items included in the contract and the order in which the Contractor proposes to carry on the work, with dates on which he will start the features of the work and the contemplated dates for completing same. Significant milestones such as review submittals shall be shown. The Contractor shall assign sufficient technical, supervisory and administrative personnel to insure the prosecution of the work in accordance with the progress schedule. The Contractor shall correct the progress schedule at the end of each month and shall deliver three copies to the Contracting Officer. In as much as monthly partial payments to the Contractor are based to a large extent on the progress schedule, the monthly corrections should be realistically made to the best ability of the Contractor.

6. INTERIOR DESIGN

6.1 PREDEFINITION CONFERENCE

The Contractor shall lead a predefinition conference at Smith AFB and Government personnel shall attend it. A full SID color scheme has been prepared for this project. The purpose of the predefinition conference is to present, confirm and discuss the SID color scheme for the project. Actual exterior and interior materials, finishes and colors are to be provided for review and comment. The Contractor may provide colored elevations/perspectives of the SID color scheme to assist in the discussion of the SID. At the end of the predefinition conference, the Government will decide the necessary adjustments needed to the SID and this information will be used by the Contractor to further develop the project.

6.2 STRUCTURAL INTERIOR DESIGN (SID)

A full SID color scheme has been prepared for this project and included as an appendix in this RFP. The Contractor shall submit an updated SID design and

binders to provide confirmation of contractor's interpretation of selections, substitution should any items be discontinued, specification and installation of all the building related finishes, materials and colors. The design philosophy shall be interpreted using the UFGS 09 06 90 Color Schedule. All SID materials, finishes and colors shall be reviewed by the Government for compliance with the RFP. All SID submittals will run concurrent with the Architectural submittals.

6.3 CID FURNITURE, FIXTURES AND EQUIPMENT (FFE = CID)

A full FFE package has been prepared for this project and included as an appendix in this RFP. The FFE under this RFP includes the confirmation of the contractor's interpretation of the FFE package and specification of all moveable furnishings for all occupied and unoccupied areas as indicated in Section 01 10 10 Design Criteria.

Movable furnishings shall include but are not limited to desks, workstations, ergonomic chairs, tables, AV support furnishings and equipment, files, storage cabinets, shredders, and line of sight conference tables.

6.3.1 FFE INTERIOR DESIGN REQUIREMENTS

6.3.1.1 The design of the FFE shall be concurrent with the building related design and fully coordinated with the building systems design for power, voice, data and mechanical devices such as thermostats, fire protection devices, fire pull boxes, sprinkler heads, etc. The Contractor will be responsible for insuring all the building systems devices are correctly placed so that the FFE is fully coordinated for access. The CID shall also be fully coordinated with the Customer's equipment requirements.

6.3.1.2 Based on customer in-put, the FFE has been fully developed and includes the space planning with comprehensive furniture placement plans, selection of all furniture and furnishings with all associated fabrics and finishes and development of illustrated furniture order forms and furniture drawings to allow accurate procurement from sources that have current General Services Administration (GSA) Federal Supply Schedule (FSS) contracts for the specified items. The CID movable furnishings demonstrate complete coordination with every aspect of the building related designs and finishes. Any deviations to this package shall require the full coordination of the interior design; including fabrics and finishes by an Interior Designer. A minimum of two User interviews shall be required to confirm that products meet the function and design intent.

6.3.2 The FFE shall be formatted as indicated in Chapter 10 Interior Design of the Mobile District Design Manual.

6.3.3 All movable furnishings designed shall be purchased by the Contractor from sources that have current General Services Administration Federal Supply contracts, in accordance with the Federal Acquisition Regulations (FAR) Part 8 Required Sources of Supply and FAR Part 51. In addition to the cost of the moveable furnishings, all of the Contractor's administrative costs associated with procurement and coordination and all labor cost associated with receiving, staging, installation (including hardwire, voice and data connections if required), adjustments/leveling, trash removal/disposal, and touch-ups shall be included in the total price of the FFE. Installation shall be provided by an installation team regularly engaged and certified by the products being installed in the installation of furnishings in order to

maintain product warranties. The Design Build contractors' own personnel shall not provide installation services.

6.3.4 All Contractor services involving moveable furnishings shall be completed within the specified construction contract completion date for the building.

6.3.5 The final cost for the moveable furniture specified in the FFE shall be determined during the design phase of the Design Build project delivery process. The Contractor shall not add any additional mark-ups to the FFE over and above his normal overhead and profit. The final cost estimate shall show pricing in accordance with the following line items:

(a) Totals of all the FFE items specified by the Contractor's Interior Designer
(b) Freight, crating and all handling costs if not included in the price of an item
(c) Installation cost of all FFE (moveable furniture items)
(d) Local Sales tax, if applicable

For each FFE submittal required during the design phase of the project, each cost shall be reported as separate line items in the cost summary.

6.3.6 COMPLIANCE VERIFICATION: Compliance with the FFE Description and FFE Requirements shall be determined by the government review of the design, drawings, specifications and construction submittals.

Standards set in the Design Criteria and Design After Award submittal sections apply. Submittal shall be as indicated in Chapter 10 Interior Design of the Mobile District Design Manual.

6.3.7 Special Condition 1: TI/VTC conference table T2 and T3 conference tables shall be constructed with aluminum substructure and trough to accommodate voice/data/AV/power. Audio-Visual Boxes (provided under bid option #3) shall be mounted in the top by the table fabricator. It is suggested that rough-in cut sheets from AV Contractor (owner's source) be sent to table contractor to make factory finished cut-outs. If this is not possible, Custom Table Fabricator must come back to the job site to make these cuts. Devices for table include HDMI, microphones for each seat, table top conference phone, audio-visual electronics, and AV system controller. Verify number and types of devices at submittal phase. Table design is intended to cover floor boxes, the General Contractor must coordinate this with other trades to insure compliance with this requirement. A deposit up to 50% may be required for the custom conference table T1, AV Cabinet AV1, Double Sided Table B1 and Cabinet B2.

6.3.8 FFE IMPLEMENTATION SCHEDULE

After acceptance of the FFE package, the Contractor shall submit a FFE Implementation Schedule with set benchmark dates for the procurement and installation of the FFE. The Contractor shall fully coordinate the construction schedule with the FFE Implementation Schedule. The Implementation Schedule shall take into account for correction of any missing parts and/or replacement items.

6.3.9 FFE PROCUREMENT AND INSTALLATION REQUIREMENTS

The Contractor is required to purchase and install all items required by the CID. To ensure the warrantees are valid, all items requiring installation by a factory trained, manufacturer approved installer is to be adhered to. Overall the installers are to have a minimum of 5 years' experience installing furniture systems workstations and general office furnishing and file storage systems. If the installation of the furniture systems workstations requires the relocation of electrical or mechanical / communications devices, this shall be performed by the Contractor at no addition cost to the Government. The CID FF&E (storage, metal shelving units, furniture systems, etc) shall be fully coordinated with mechanical thermostats, fire alarm pull boxes/devices, and electrical/communication devices/items, etc. to ensure access to these switches are not interfered with when the furniture is installed and that the moveable furnishings comply with NFPA 70 and NFPA 101. Procurement and installation of the all moveable furnishings designed under the base price proposal must be purchased by the Contractor and installed within the specified construction contract completion date for the building under Bid Option No. 3. All furniture systems and FFE items shall be installed in accordance with the manufacturer's instruction and by the manufacturer's certified installer to insure the warranty is not void. All FFE items shall be level and aligned so that all items are complete, usable and in working order. All FFE items are to be touched up, dusted and left in clean condition, including drawer and cabinet interiors. Upon completion of the installation the Contractor shall conduct a Post Installation Evaluation including the Government and the Vendor. Items requiring correction shall be ordered immediately at no expense to the Government. The correction of the work shall be completed within the specified construction contract completion date for the building.

6.3.10 Furniture Sustainability Standards: Provide low-emitting furnishings, including substrates, upholstery and other finish materials. Products shall be third party certified. Products shall pass BIFMA ANSI e-32014e Furniture Sustainability Standards, Level Two at a minimum except for custom conference table.

7.0 DESIGN SUBMITTALS

7.1 50% SUBMITTAL

7.1.1 Contractor Furnished Topographical Survey: provide per specification Section 01 10 10 requirements. Submittal shall include supporting documentation incorporating work as shown for an interim submittal in the Mobile District Design Manual.

7.1.2 Contractor Furnished Fire Flow Test and Data: provide as indicated per specification Section 01 10 10 requirements.

7.1.3 Paving, Grading and Drainage:

a. Provide drawings, narrative and supporting documentation incorporating work as shown for an interim submittal in the Mobile District Design Manual. Identify all required permits.

b. Provide UFGS marked-up specifications supporting work in this category.

7.1.4 Water Supply and Sanitary Sewer

a. Provide drawings, narrative and supporting documentation incorporating work as shown for an interim submittal in the Mobile District Design Manual.

b. Provide UFGS marked-up specifications supporting work in this category.

c. The submittal shall contain the design narrative and design calculations for the water and wastewater systems relating to this project. Include an analysis showing the required size of all components of the water supply and distribution system. The design narrative for wastewater systems shall show calculations for sewage flows, pipe sizes, and capacities. The narrative shall discuss anticipated permit requirements for water and wastewater features. Identify any deviation in the design from what was originally proposed and provide reasons and justifications for the deviation.

d. The Contractor shall perform a fire protection design analysis in accordance with UFC 3-600-01. The Contractor shall provide the services of a qualified fire protection engineer who shall be an integral part of the design team and shall be involved in all aspects of the design as it relates to fire protection, in accordance with UFC 3-600-01.

e. The Drawings shall show, in plan, the anticipated water distribution and sewage conveyance systems and layout. Standard details shall also be included.

f. The Contractor is encouraged to include manufacturer's catalog cuts and descriptive information in the submittal. (Manufacturer's trade names are allowable on the drawings and in the specifications.)

g. Fire pump if required for fire protection drawings and design analysis will be 100% complete by the 50% submittal.

7.1.5 Stormwater

The submittal shall contain the design narrative and design calculations for the stormwater systems relating to this project. Include an analysis showing the required size of all components of the stormwater system. The design narrative for stormwater systems shall include calculations for stormwater runoff, flows, pipe sizes, and capacities. The narrative shall discuss the anticipated treatment volume required for the project area. Identify any deviation in the design from what was originally proposed and provide reasons and justifications for the deviation.

7.1.6 Environmental

a. Provide a marked-up UFGS 01 57 19 Temporary Environmental Controls specification.

b. Provide a list of all permits that are required to be obtained and any associated fees.

c. Submit draft permit applications as part of the submittal process.

d. Permits shall be obtained prior to start of construction and/or installing or operating any new or modified equipment or processes.

e. In addition to Environmental Permits, based upon information provided by the Base Engineering Office, the Contractor will determine when Installation specific permits are required, such as digging, communications, and security.

7.1.7 Landscape

a. Provide drawings, narrative, and supporting documentation incorporating work as shown for an interim submittal in the Mobile District Design Manual.

b. Provide marked-up specifications supporting work in this category.

7.1.8 Geotechnical Investigation and Design:

a. Provide Geotechnical Report, narrative, and supporting documentation incorporating work as shown for an interim submittal in the Mobile District Design Manual.

b. Provide marked-up specifications supporting work in this category.

7.1.9 Architectural Design

a. Provide drawings, design analysis, and supporting documentation incorporating work as shown in the Mobile District Design Manual.

b. Provide marked-up specifications supporting work in this category.

c. Provide detail drawings (Sections, Elevations, etc.) of Building, Windows, Doors, Roof, Walls, Partitions, Shelving and Cabinets, and Door Thresholds.

d. Provide Building Code, Life Safety and Fire Protection Analysis in accordance with UFC 3-600-01.

7.1.10 SID and FFE (CID)

A full SID and CID package has been prepared. The Contractor shall submit complete sets of his interpretation of the SID and FFE packages. All SID and FFE proposals shall be reviewed and approved by the Government. If no revisions are made to the original SID or FFE package the Design Build Contractor shall submit the package developed as part of the RFP at each submittal phase. The Government shall return the SID and FFE packages to the Contractor after the review for updating and incorporating review comments. Each submittal will follow this method of review until the Government approves the completed SID and FFE package. The Submittals shall be side marked and distributed as required in the Submittal Distribution List at the end of this specification. The SID and FFE shall be submitted as part of the 50% submittal. After the 50% submittal package has been approved, no substitutions to the SID or the CID shall be considered.

7.1.11 Structural

a. Provide drawings, narrative, and design analysis to include

calculations and supporting documentation incorporating work as shown for an interim submittal in the Mobile District Design Manual.

b. Provide marked-up specifications supporting work in this category.

7.1.12 Plumbing

a. List all references used in the design including Government design documents and industry standards.

b. Provide justifications and brief descriptions of the types of plumbing fixtures, piping materials and equipment proposed for use.

c. Provide detailed calculations for the sizing of the following systems:

Domestic cold water piping
Domestic hot water piping
Waste and Vent
Water heating system
Natural gas distribution
Roof Drainage System

d. Provide pipe layouts and risers for each plumbing system listed above. Included equipment and fixture schedules with description, capacities, locations, connection sizes, and other information as required.

e. The design analysis, submitted for review shall consist of the following:

(1) Design Narrative to include applicable design assumptions, sizing methods chosen, and why.

(2) Design Calculations.

(3) Drawings.

f. Drawings shall be complete with legends, floor plans, schedules section, details and risers diagrams.

g. Prepare detailed calculations for systems such as sizing of domestic hot water heater and piping; natural gas piping.

h. Indicate locations and general arrangement of plumbing fixtures and major equipment.

i. Include plan and isometric riser diagrams of all areas including hot water, cold water, storm drain, waste and vent piping. Piping layouts and risers should also include natural gas (and meter as required), and other specialty systems as applicable.

j. Include equipment and fixture schedules with descriptions, capacities, locations, connection sizes and other information as required.

k. Include marked up UFGS specifications of materials and methods.

7.1.13 Fire Suppression System:

a. The Fire Protection Engineer qualifications shall be submitted to and approved by the Contracting Officer certifying that the design engineer is a registered fire protection engineer or a registered professional engineer with a fire protection background and at least four years experience in fire protection/detection design.

b. Certificates shall be furnished to certify that the sprinkler system designed for the buildings in this project complies with the material and fabrication requirements of this specification.

c. The design analysis shall consist of the design narrative, design calculations, and drawings as specified in the Design Criteria such as the fire protection and life safety drawings.

d. Drawings shall not be smaller than the scale used for architectural floor plans. Drawings shall provide the information required by NFPA 13 and any additional requirements as stated in the Design Criteria. The drawings shall be submitted for review.

e. Drawings shall detail method of attaching waterproofing membranes to sleeves passing through walls or floors that are subject to a static head of water.

f. Maintain fire resistive integrity as tested per ASTM E 814.

g. Locate or detail the following items on the contract drawings as applicable:

(1) Control valve locations.
(2) Type of sprinkler heads to be used.
(3) Required flagged pipe or mechanical grooved coupling connection locations and symbols.
(4) Wall and floor pipe penetration locations and details.
(5) Post indicator valve location.
(6) Pipe runs requiring freeze protection location and length to be protected.
(7) Fire department connections and water flow indicators locations and symbols.
(8) Mounting location for local water flow alarm facilities.
(9) Point of interconnection between alarm signal circuit and source of power will be indicated on the appropriate riser diagram.

h. Submit marked-up technical specifications of materials and methods.

i. Fire protection shall be 100% complete by the 50% submittal.

7.1.14 Heating, Ventilating and Air Conditioning (HVAC)

a. Provide a 50% HVAC design review package to include the following items.

(1) 50% Design Analysis: The Design Analysis shall include the following items:

(a) Detailed calculations for the following: heating loads, cooling loads, piping, ductwork, equipment sizing, etc. Computer calculations shall include print out of input and output data.

(b) Equipment selection: Equipment selection shall be based on not less than three manufacturers whose equipment meets project requirements for each item. The project design is not complete until the designer is assured that there is sufficient physical space in areas where equipment is to be located to install and to maintain the selected equipment.

(c) Include any other information or calculations to verify that the design complies with applicable criteria codes or standards and is satisfactory for intended purposes.

(d) Explanatory notes shall be included in the design analysis covering all rationale for design which would not be obvious to an engineer reviewing the analysis. Methods of air conditioning and controls for air conditioning systems shall generally be confined to those in common use in the industry.

(e) Specifications: Marked-up specifications shall be submitted.

(2) 50% Drawings: The drawings shall show all information given on the concept drawings but in greater detail. The drawings should include, but not be limited to, the following items as applicable:

(a) Show all ductwork and piping, with sizes and flow rates. Indicate the ductwork pressures in accordance with SMACNA standards. Include all accessories and appurtenances.

(b) Show elementary ladder diagrams and temperature control schematics indicating remote sensors, panel mounted controllers, and thermostats.

(c) Show layout and details of the final version of all HVAC systems. The location, arrangement, capacity, and space requirements of all equipment shall be indicated. Selected zones of air distribution shall be sufficiently completed to indicate the solution of the design for the remainder of the system and the precautions taken to coordinate the design with the architectural, structural, and electrical phases of construction. Equipment room layouts shall be sufficiently complete to show piping and duct layouts and access for maintenance. Since equipment rooms represent the most congested areas for both equipment and piping, the following guidelines should be followed when drawings are being prepared.

(i) Pipe fittings and accessory details shall be shown.

(ii) All duct and fittings in congested areas and mechanical rooms shall be drawn to scale using double-line layouts. In a VAV system, ducts between the AHU and VAV boxes shall be double-lined and ducts downstream of the VAV boxes may be single lined.

(iii) All equipment shall be outlined to scale, and maintenance or removal space shall be indicated by dashed lines,

(iv) Removal and replacement space must be considered for the largest and heaviest equipment when a drawing is made.

(v) In other HVAC plans, sections, and details, these same guidelines shall apply.

(d) The final form of all equipment schedules shall be shown with preliminary equipment data filled in.

7.1.15 Electrical Systems

7.1.15.1 Interior Electrical System

a. Narrative. In narrative, address the following to allow verification that the design complies with the requirements of the project. The design analysis shall include all calculations required to support design decisions and estimates at this stage of design. The analysis shall include specific criteria furnished, conference minutes, and cost analyses of all systems considered.

(1) Indicate electrical characteristics (voltage, phases, and number of wires) for the electrical system.

(2) Provide a description of lighting systems(s) to be used for all areas, referencing calculations. Also, include tabulation showing the following:

(a) Rooms name and number.
(b) Lighting intensity for each room. State the basis for selection such as I.E.S., etc.
(c) Identify the type of fixture by manufacturers catalog cut.

(3) State the type of wiring system to be used, such as insulated conductors installed in rigid or intermediate metal conduit, insulated conductors installed in electrical metallic tubing, etc. and location of proposed use.

(4) Describe any special areas of design, such as equipment, receptacles, handicap requirements, seismic requirements, etc

(5) Define any hazardous classified locations by class, division, and group as defined by the National Electrical Code. Indicate the types of equipment to be used in these areas. State the reasons for the area(s) being hazardous classified locations.

(6) Describe the lightning protection system to be installed.

(7) Describe the type of grounding system planned.

(8) Describe the basic characteristics of panel boards, and other major pieces of electrical equipment being provided. Short circuit and voltage drop calculations at all equipment with protective devices included shall be provided. Indicate equipment interrupting ratings and short circuit withstand ratings based on these calculations.

(9) Describe the electrical metering equipment to be provided.

(10) Provide a statement that no duct or liquid piping shall pass over and/or through any electrical space and/or room as defined by the National Electrical Code Article 384.

(11) Provide marked-up specifications supporting work in this category.

b. Drawings. In drawings, provide the following to allow verification that the design complies with the requirements of the project. Some detailed checks will be made. Complete and independent checking of the design shall be accomplished by the Contractor. The Contractor is fully responsible for the design. The design shall be complete and accurate. It shall be thoroughly checked for errors and conflicts (both within and between disciplines).

(1) The power riser or one-line diagram shall be essentially complete except for finalization of conduit and wire sizes.

(2) Panel boards, and all other utilization equipment shall be located on the floor plans. Schedules for applicable equipment shall be provided. The schedules shall include all pertinent information to fully describe the equipment. Elevations for free standing equipment shall be provided but need not be entirely finalized. Details of the layouts for electrical room and closets shall be shown.

(3) Branch circuits, lighting fixtures, receptacles, and switches, shall be shown with number of conductors indicated.

(4) A completed fixture schedule shall be included on the drawings.

7.1.15.2 Exterior Electrical Distribution System:

a. Narrative. In narrative, address the following to allow verification that the design complies with the requirements of the project. The design analysis shall include all calculations required to support design decisions and estimates at this stage of design. The analysis shall include specific criteria furnished, conference minutes, and cost analyses of all systems considered.

(1) Clearly describe the electrical distribution system and state the changes to be made to the existing system to accommodate this project.

(2) Indicate existing transformer location and characteristics.

(3) State the type of conductor and location of proposed use and provide a justification for its use.

(4) Include a statement describing the criteria used for the exterior design such as primary and secondary voltage drop. Describe the physical characteristics of circuits. Provide the short circuit current available at the site and state the source of this value.

(5) Describe all exterior lighting. Provide types of fixture, pole heights, and proposed intensities. IES point to point calculations shall be submitted to support the selected lighting system.

(6) Provide marked-up specifications supporting work in this category.

b. Drawings. In drawings, provide the following to allow verification that the design complies with the requirements of the project. Some detailed checks will be made. Complete and independent checking of the design shall be accomplished by the Contractor. The Contractor is fully responsible for the design. The design shall be complete and accurate. It shall be thoroughly checked for errors and conflicts (both within and between disciplines). The electronic systems drawing information may be placed on the electrical drawings or on separate electronic systems drawings.

(1) All of the exterior electrical design drawings shall be completed with all conductors (underground) with all pertinent component details. Details shall include but are not limited to duct banks, transformer location, transformer data (kV A, impedance. voltage, phase. etc.), conductor type and size, etc.

(2) Show removals and relocations, if any.

7.1.16 Electronic Systems

7.1.16.1 Interior Electronic Systems:

a. Narrative. In narrative, address the following to allow verification that the design complies with the requirements of the project. The design analysis shall include all calculations required to support design decisions and estimates at this stage of design. The analysis shall include specific criteria furnished, conference minutes, and cost analyses of all systems considered.

(1) Provide a descriptive narrative for all the electronic systems that are required for the project.

Telecommunication/Data Systems
Fire Detection and Alarm/Mass Notification System
Cable TV Systems
CCTV system
Access Control System
Intrusion Detection System

(2) Provide marked-up specifications supporting work in this category.

b. Drawings. In drawings, provide the following to allow verification that the design complies with the requirements of the project. Some detailed checks will be made. Complete and independent checking of the design shall be accomplished by the Contractor. The Contractor is fully responsible for the design. The design shall be complete and accurate. It shall be thoroughly checked for errors and conflicts (both within and between disciplines). The electronic systems drawing information may be placed on the electrical drawings or on separate electronic systems drawings.

(1) Provide riser diagrams for all electronic systems. Riser shall show the location of the various components and interconnections with other systems.

(2) Show location of all devices and equipment for electronic system on floor plans. Show location of devices to be interconnected.

(3) Provide details of tele/data outlets, telephone backboard arrangement, and other pertinent items required by criteria.

7.1.16.2 Exterior Electronic Systems:

a. Narrative: In narrative, address the following to allow verification that the design complies with the requirements of the project. The design analysis shall include all calculations required to support design decisions and estimates at this stage of design. The analysis shall include specific criteria furnished, conference minutes, and cost analyses of all systems considered.

(1) Describe the extent of the exterior work.

(2) Provide the name of the licensed corrosion engineer or NACE specialist. Provide the following for cathodic protection systems:

(a) Clearly define areas of structures or components in soil or water to be protected.

(b) Type system recommended, comparison of systems, cost estimates showing all equipment alternatives.

(c) Calculations on all systems that are considered showing all information and descriptions.

(3) Provide marked-up specifications supporting work in this category.

b. Drawings: In drawings, provide the following to allow verification that the design complies with the requirements of the project. Some detailed checks will be made. Complete and independent checking of the design shall be accomplished by the Contractor. The Contractor is fully responsible for the design. The design shall be complete and accurate. It shall be thoroughly checked for errors and conflicts (both within and between disciplines). The electronic systems drawing information may be placed on the electrical drawings or on separate electronic systems drawings.

(1) Cathodic protection system should be complete. Drawing shall indicate all structures or components to be protected and all cathodic protection components in relation to the protected structure. This includes showing sacrificial and impressed current anodes, rectifiers, isolation (dielectric) bonding, and any other data needed to define the scope and area of the cathodic protection system.

7.1.17 Anti-terrorism/Force Protection

a. Provide narrative and supporting documentation discussing methods of referenced requirements into project.

b. Antiterrorism/Force Protection requirements shall be included in applicable discipline drawings, design analysis and calculations to a level of completion described for an interim submittal in the Mobile District Design Manual and related UFC’s.

7.1.18 Sustainable Design and Energy Use Reduction

Provide narratives and support documentation to demonstrate compliance with the various federal mandates for sustainability and energy/water use reduction that include, but not limited to UFC 1-200-02, EPAct2005, and EISA2007. Narratives and support documentation shall be provided in the Design Analysis as a separate chapter(s) to explain approach for compliance with each requirement. Provide references to drawings and specifications for location of applicable features.

Contractor will be register the project with the USGBC (GBCI) for third party certification (TPC) as required by UFC 1-200-02 and further defined in Section 01 10 10-18 of this RFP. Compliance documentation shall be provided in accordance with the third party certification process requirements. Documentation shall be updated during construction phase for constructed related credits and submitted for final compliance review and acceptance by the third party reviewing entity. Refer to specification Section 01 10 10 Section 18 SUSTAINABLE DESIGN AND ENERGY USE REDUCTION for additional requirements.

7.2 100% UNREVIEWED SUBMITTAL

7.2.1 Paving, Grading, and Drainage. Provide drawings, final specifications, narrative, annotated comments, and supporting documentation revised to comply with comments resulting from the 50% submittal. Include copies of all required permit applications.

7.2.2 Water Supply and Sanitary Sewer

a. Provide drawings, final specifications, narrative, annotated comments, and supporting documentation revised to comply with comments resulting from 50% submittal. Include copies of all required permit applications. Key points in the 100% unreviewed submittal include:

(1) Drawings shall be completed and ready for implementation by construction forces.

(2) The submittal shall include all construction details and standard drawings.

(3) Sanitary sewer profile.

7.2.3 Environmental

a. Provide a final UFGS 01 57 19 Temporary Environmental Controls specification.

b. Provide a list of all permits that are required to be obtained and any associated fees.

c. Submit a copy of the prepared technical documentation and application submittals for all permits for this project, including a copy of payment for permit fees.

d. All permit submittal shall be routed through the Base Civil engineering office through the Contractor’s Representative. The Representative shall forward all permit applications and fees to the Base Engineering Office for review. The Base Engineering Office will sign the applications and forward them to the appropriate regulatory authority.

e. Permits shall be obtained prior to start of construction and/or installing or operating any new or modified equipment or processes.

f. In addition to Environmental Permits, based upon information provided by the Base Engineering Office, the Contractor will determine when Installation specific permits are required, such as digging, communications, and security.

7.2.4 Landscape Work

Provide drawings, final specifications, narrative, annotated comments, and supporting documentation revised to comply with comments resulting from 50% submittal.

7.2.5 Geotechnical Investigation and Design

Provide Geotechnical Report, final specifications, narrative, annotated comments, and supporting documentation revised to comply with comments resulting from 50% submittal.

7.2.6 Architectural Design

a. Provide drawings, design analysis, and supporting documentation incorporating work as shown in the Mobile District Design Manual. Include revisions to address 50% submittal review comments.

b. Provide detail drawings (Building Sections, Elevations, etc.) details of Windows, Doors, Rails, Walls, Wall Bracing, STC Assemblies, Partitions, Wall blocking for Accessories, Shelving and Cabinets, and Door Thresholds. Identify any deviation in the design from what was originally proposed and provide reasons and justifications for the deviation.

c. The Contractor shall furnish final Specifications supporting work in this category. The Contractor shall use the UFGS Guide Specification. For specific items not covered by a UFGS Guide Specification, the Contractor shall develop the specification using an industry specification or manufacturer's specification formatted to UFGS Guide Specification format.

d. Provide building code analysis and a life safety analysis to include but not limited to occupancy classification, distances for dead end corridors, common path, and travel distances, building construction type, fire rated assemblies, occupancy separation walls, etc. Provide life safety plan. Refer to Mobile District Design Manual for additional requirements.

7.2.7 SID and FFE

The Contractor shall submit complete sets of the approved and final SID and FFE packages. Once the Contractor has submitted the SID and FFE and the Government has approved the submittal, all materials, finishes, colors, textures and pattern submitted and approved for this project are then considered as part of the contract and the Contractor shall furnish and install all approved SID finishes and items. No deviations will be

considered once the SID and FFE packages have been approved. If no revisions are made to the original SID or FFE package the Design Build Contractor shall submit the package developed as part of the RFP at each submittal phase.

7.2.8 Structural

Provide drawings, narrative, design analysis with complete calculations and supporting documentation, final specifications, and annotated comments, as shown for a final submittal in the Mobile District Design Manual revised to comply with comments resulting from 50% submittal. Structural drawings shall be carefully checked to insure coordination with architectural, site, mechanical, and electrical drawings.

7.2.9 Fire Protection

Submit the complete 100% unreviewed final submittal revised to comply with comments resulting from 50% submittal.

7.2.10 Plumbing

The final plumbing design review package shall be submitted by the Contractor for Government review to include the final design analysis, specifications, annotated comments, and drawings of the plumbing systems showing the completed designs revised to comply with comments resulting from 50% submittal.

7.2.11 Heating, Ventilating and Air Conditioning (HVAC)

The final HVAC design review package shall be submitted by the Contractor for Government review to include the final design analysis, specifications, annotated comments, and drawings of the HVAC systems showing the completed designs revised to comply with comments resulting from 50% submittal.

7.2.12 Electrical Systems

7.2.12.1 Interior Electrical Systems

The final design review package revised to incorporate 50% review comments shall be submitted by the Contractor for Government review to include the final design analysis, specifications, annotated comments, and drawings showing the completed designs.

a. The drawings shall be thoroughly checked for discrepancies, for compatibility between drawing and specifications, and for compatibility between disciplines.

b. Completed short circuit calculations and a coordination analysis with time current curves and arc flash data for the entire electrical system shall be provided. All equipment shall be identified by manufacturer's name and catalog number.

c. Complete voltage drop calculations shall be provided. The voltage drop calculations shall use the same single line diagram as the short circuit calculations and shall show drops at the same locations as short circuit currents are shown.

d. Lighting calculations (lumen method for interior and point-to-point for exterior) shall be provided for all rooms and spaces and all exterior locations requiring illumination.

e. All details shall be completed at this stage. Congested areas where there can be interferences with various systems shall be thoroughly detailed by expanded scale drawings.

7.2.12.2 Exterior Electrical Distribution System:

The final design review package revised to incorporate 50% review comments shall be submitted by the Contractor for Government review to include the final design analysis, final specifications, annotated comments, and drawings showing the completed designs.

7.2.12.3 Interior Electronic Systems:

The final design review package revised to incorporate 50% review comments shall be submitted by the Contractor for Government review to include the final design analysis, final specifications, annotated comments, and drawings showing the completed designs.

7.2.12.4 Exterior Electronic Systems:

The final design review package revised to incorporate 50% review comments shall be submitted by the Contractor for Government review to include the final design analysis, final specifications, annotated comments, and drawings showing the completed designs.

7.2.13 Antiterrorism/Force Protection:

a. Provide narrative and supporting documentation discussing methods of incorporating requirements of UFC 4-010-01 into project.

b. Antiterrorism/Force Protection requirements shall be included in applicable disciplines' drawings, design analysis, calculations, and specifications as shown for a final submittal in the Mobile District Design Manual revised to comply with comments resulting from 50% submittal.

7.2.14 Sustainable Design and Energy Use Reduction

Provide updated narratives and support documentation to demonstrate compliance with the various federal mandates for sustainability and energy/water use reduction that include, but not limited to UFC 1-200-02, EPAct2005, and EISA2007. Narratives and support documentation shall be provided in the Design Analysis as a separate chapter(s) to explain approach for complying with each requirement. Highlight any changes from the previous design submittal and describe the reason for the change. Provide references to drawings and specifications for location of applicable features.

Contractor will be register the project with the USGBC (GBCI) for third party certification (TPC) as required by UFC 1-200-02 and further defined in Section 01 10 10-18 of this RFP. Compliance documentation shall be provided in accordance with the third party certification process requirements. Documentation shall be updated during construction phase for constructed related credits and submitted for final compliance review and acceptance by the third party reviewing entity. Refer to specification Section 01 10 10

Section 18 SUSTAINABLE DESIGN AND ENERGY USE REDUCTION for additional requirements.

Documentation developed for the third party certification process shall also be included in the Documentation Notebook required by Section 01 10 10-18.

7.3 FINAL SUBMITTAL

Completed drawings, specifications, design analysis, and supporting documentation for all previous submissions and disciplines as required by this section and in accordance with the Mobile District Design Manual, other specified criteria, and with all review comments incorporated.

8. QUANTITY OF SUBMITTAL ITEMS

The documents which the Contractor shall submit to the Government for each submittal are listed and generally described below.

9. MAILING OF SUBMITTALS

All submittals to the Government during design shall be mailed using overnight mailing service. The addresses to where each copy shall be mailed are listed below. Each submittal shall have a transmittal letter accompanying it which indicates the date, design percentage, type of submittal, list of items submitted, transmittal number and point of contact with telephone number.

9.1 RECIPIENT AND MAILING ADDRESSES FOR SUBMITTAL DISTRIBUTION

A. U.S. Army Engineer District, Mobile ATTN: CESAM-EN-DA, **John Smith** 109 St. Joseph Street Mobile, Alabama 36602	**E.** USACE, Smith Resident Office ATTN: CESAM-CD-GA, **John Adams** Building 123 Johnson Road Smith AFB, FL 24532
B. U.S. Army Engineer District, Mobile ATTN: CESAM-PM-AF, **Mike Jones** 109 St. Joseph Street Mobile, Alabama 36602	**F.** AFCEC/CFMA ATTN: **Emily Thompson** 3599 S. General Lee, Bldg 1 Smalltown, TX 78999
C. 96 CEG/CENMPW Attn: **Chris Grime** Building 123 Johnson Road, Base CE Smith AFB, FL 24532	**G.** 513 EWS ATTN: **Glenn Caldwell** 110 Wide Road, Building 258 Smith AAFB, FL 24532
D. U.S. Army Corps of Engineers ATTN: CESAM-CD-GS **Susie Alexander**	H. COMMISSIONING AUTHORITY (CxA) Address to be determined (mailing

Building 123 Johnson Road Smith AFB, FL 24532	address to be within 150 miles of Smith AFB).

9.2 SUBMITTAL DISTRIBUTION LIST

The following table lists the number of copies of design submittal requirements for this project:

SUBMITTAL ITEMS	NUMBER OF COPIES								REMARKS
50% DESIGN SUBMITTALS	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	4
DESIGN ANALYSIS	8	1	7	2	1	1	3	1	3
SPECIFICATIONS	8	1	7	2	1	1	3	1	
DRAWINGS	8	1	7	2	1	1	3	1	
SID BINDER	1		1	1			1		2
CID BINDER	1		1	1			1		2
PERMIT APPLICATIONS	1		1	1					
BIM DELIVERABLES	1		1	1		1			
ELECTRONIC COPY OF ALL SUBMITTAL DELIVERABLES	8	1	7	2	1	1	3	1	1
100% UNREVIEWED FINAL DESIGN SUBMITTALS	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	4
DESIGN ANALYSIS	8	1	7	2	1	1	3	1	3
SPECIFICATIONS	8	1	7	2	1	1	3	1	
DRAWINGS	8	1	7	2	1	1	3	1	
SID BINDER	1		1	1			1		2
CID BINDER	1		1	1			1		2
PERMIT DOCUMENTATION	1		1	1		1			
ANNOTATED REVIEW COMMENTS	8	1	7	2	1	1	3	1	
DRAFT 3D RENDERING VIEW IN .PDF FORMAT	1	1	1	1		1			
BIM DELIVERABLES	1		1	1		1			
ELECTRONIC COPY OF ALL SUBMITTAL DELIVERABLES	8	1	7	2	1	1	3	1	1
FINAL DESIGN SUBMITTALS	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	4
DESIGN ANALYSIS	8	1	7	2	1	1	3	1	3
SPECIFICATIONS	8	1	7	2	1	1	3	1	
DRAWINGS	8	1	7	2	1	1	3	1	
SID BINDER	1		1	1			1		2
CID BINDER	1		1	1			1		2
PERMIT DOCUMENTATION	1		1	1		1			
ANNOTATED REVIEW COMMENTS	8	1	7	2	1	1	3	1	
FINAL 3D RENDERING (FRAMED & MATTED)	1		1	1					
FINAL 3D RENDERING (8”x10” COLOR COPY)	1	1	1	1		1			
BIM DELIVERABLES	1		1	1		1			
ELECTRONIC COPY OF ALL SUBMITTAL DELIVERABLES	8	1	7	2	1	1	3	1	1
	A	**B**	**C**	**D**	**E**	**F**	**G**	**H**	

Remarks:

1. Electronic copies shall be on a single DVD disc. Each deliverable shall be a single .pdf document bookmarked for each title indexed and/or major elements of the document. These electronic file copies are in addition to that required for the final drawings, specifications and design analysis specified elsewhere in this specification section.
2. Binder updates or replacements. If no revisions are made to the original SID or CID/FFE package included in the RFP the Design Build Contractor

shall submit the package developed as part of the RFP at each submittal phase.

3. Includes sustainable design and federal mandate compliance documentation/calculations. Provide additional documentation as required in other portions of the RFP.
4. If Contract elects to Fast Track the work, the quantity of design deliverables for Fast Track design submittals shall be provided as indicated in this distribution list.

10. SUBMITTAL REVIEWS

For each design review submittal, the Contractor will be furnished comments from personnel of the Mobile District and from other concerned agencies involved in the review process. The review will be for conformance with the technical requirements of the solicitation. The Government will take twenty- one (21) days to review and comment on each design submittal including the 100% unreviewed submittal. The last two weeks of the calendar year shall not be considered when scheduling review times or meeting times. If the Contractor disagrees technically with any comment or comments and does not intend to comply with the comment, the Contractor shall clearly outline, with ample justification, the reasons for noncompliance within five (5) days after receipt of these comments in order that the comment can be resolved. The disposition of all comments shall be furnished in writing within 5 working days after the review meeting. The Contractor is cautioned in that if the Contractor believes the action required by any comment exceeds the requirements of this contract that the Contractor should take no action and notify the Contracting Officer's Representative (COR) in writing immediately.

Review comments will be written using Design Review and Checking System (DrChecks). DrChecks is an Internet based computer program. DrChecks is free of charge. Comments will be written in DrChecks. The Contractor shall annotate the comments using DrChecks and the Government will backcheck the comments. For more information on DrChecks, go to http://www.projnet.org/projnet/binKormHome/index.cfm.

Review conferences will be held for each design submittal at Smith AFB, FL. The Contractor shall bring the designer of record and other personnel that developed the design submittal to the review conference. These conferences will take place the week after the twenty-one (21) day review period. The Contractor shall be responsible for writing and distributing Minutes on each submittal review meeting within 7 calendar days of the meeting. Time for design submittal reviews and conferences will be included in the Contractor's schedule. Distribution shall be to the offices shown under paragraph 8, Mailing of Submittals.

If a design submittal is over one (1) day late in accordance with the latest design schedule and the Contractor has not given the COR a one (1) week written notice that the submittal will be late, the Government review period will be extended 7 days. The review conference will be held the week after the extended review period.

During the design review process, comments will be made on the design submittals that will change the drawings and specifications. The Government will make no additional payments to the Contractor for the incorporation of comments. Review comments are considered part of the design/build process.

If the COR requests a design change after the Final Design Submittal drawings and specifications have been submitted, then this shall be considered a change and proper payment will be made by the COR.

If a design submittal is not of the quality level required for the stage of design submitted, the Government has the right to return the submittal to the Contractor so the design quality can be increased, and request a resubmittal. The review time will begin when the submittal received is of the quality level required for the stage of design submitted by the Government. Returned incomplete submittals will not be the basis of a claim by the Contractor for additional time or money.

11. PAYMENT DURING DESIGN

Payments, as authorized by the Authorized COR, will be made monthly for the amount and value of the work and services performed by the Contractor. This estimate will be verified by the Contracting Officer utilizing the progress charts or the CONTRACTOR-PREPARED NETWORK ANALYSIS SYSTEM submitted by the Contractor and independent analyses of progress. See Contract Clause entitled PAYMENTS UNDER FIXED-PRICE CONSTRUCTION CONTRACTS for additional information.

12. DESIGN ANALYSIS

12.1 Media and Format. The design analysis shall be presented on 8-1/2" x 11" paper except that larger sheets may be used when required for graphs or other special calculation forms. All sheets (including oversized sheets, and hand calculations) shall be submitted in Adobe PDF format. The original material may be computer generated, typewritten, hand lettered, handwritten, or a combination thereof, provided it is legible. Side margins shall be 1- inch minimum to permit side binding and head to head printing. Bottom margins shall be 1-1/4 inches, with page numbers centered 1-inch from the bottom.

12.2 Organization. The several parts and sheets of the design analysis shall be given a sequential binding number and bound under a cover indicating the name of the facility and project number, if applicable. The title page shall carry the designation of the submittal being made. The complete design analysis presented for final review with the final drawings and specifications shall carry the designation "FINAL DESIGN ANALYSIS" on the title page.

12.3 Design Calculations. Design calculations are a part of the design analysis. When they are voluminous, they shall be bound separately from the narrative part of the design analysis. The design calculations shall be presented in a clean and legible form incorporating a title page and index for each volume. A table of contents, which shall be an index of the indices, shall be furnished when there is more than one volume. The source of loading conditions, supplementary sketches, graphs, formulae, and references shall be identified. Assumptions and conclusions shall be explained. Calculation sheets shall carry the names or initials of the computer and the checker and the dates of calculations and checking. No portion of the calculations shall be computed and checked by the same person.

12.4 Automatic Data Processing Systems (ADPS): When ADPS are used to perform design calculations, the design analysis shall include descriptions of the computer programs used and copies of the ADPS input data and output summaries. When the computer output is large, it may be divided into volumes at logical division points. Each set of computer printouts shall be preceded by an index and by a description of the computation performed. If several sets of computations are submitted, they shall be accompanied by a general table of contents in addition to the individual indices. Preparation of the descriptions which must accompany each set of ADPS printouts shall include the following:

a. Explain the design method, including assumptions, theories, and formulae.

b. Include applicable diagrams, adequately identified.

c. State exactly the computation performed by the computer.

d. Provide all necessary explanations of the computer printout format, symbols, and abbreviations.

e. Use adequate and consistent notation.

f. Provide sufficient information to permit manual checks of the results.

13. DRAWINGS

13.1 General: Design and preparation of all drawings shall BIM technologies and software following BIM criteria as defined in this RFP and related BIM and AutoCAD deliverables. The Contractor shall prepare the drawings and specifications in such a manner and level of completeness that the Mobile District could construct the facility without any additional assistance from the Contractor or designers (drawings shall be complete). Unnecessary work such as duplicate views, notes and lettering, and repetition of details shall not be permitted. Standard details not applicable to the project shall not be shown. Details of standard products or items which are adequately covered by specifications shall not be included on the drawings. Drawings shall be detailed such that conformance with the RFP can be checked and to the extent that shop drawings can be checked. Shop drawings shall not be used as design drawings. The Contractor shall use standard Corps of Engineers title blocks and borders on all drawings at all submittal stages. Standard drawing sheet formats and title blocks, and file and drawing CADD file names will be furnished to the Contractor by the Government. The Contractor shall incorporate the drawing, file, and contract numbers on individual drawing sheets at the earliest submittal.

13.2 50%, 100%, and Final Submittals: Drawing submittals shall be half size 11" x 17" with black lines or plots.

The building drawings shall consist of 1/8" scale minimum floor plans. Elevations shall be drawn to a 1/8" scale minimum. The scale of other visual information shall be as required. Building wall sections shall be drawn at a minimum of 1/4" scale. The site and exterior utility drawings shall use a minimum scale of 1"=30' unless otherwise indicated. Additionally, the overall site plan for this project shall be on one drawing sheet. Minimum text size on half size drawings is 1/8". Refer to Mobile District Design Manual for additional requirements.

14. SPECIFICATIONS

The Contractor shall submit marked-up (red-lined) specifications at the 50% submittal, and final form specifications at the 100% unreviewed and final submittals. The specifications shall be Unified Federal Guide Specifications (UFGS). These specifications are available on the Internet at: http://www.wbdg.org

The specifications shall be detailed enough such that another product meeting the specification could be substituted and it would not adversely impact the project. All marked-out or redlined text shall be deleted and all inserted text shall be typed at the 100% unreviewed and Final submittals.

15. SUBMITTAL REGISTER

The Contractor shall develop submittal requirements required during construction as part of the design phase of the contract. This shall be done by the Contractor's Designer of Record by producing a Contractor Submittal Register at each submittal during design. A submittal register shall be prepared for each section of the specifications for the submittal requirements of that section. The Contractor's Designer of Record shall be responsible for listing all required submittals necessary to insure the project requirements are complied with. The Register shall identify submittal items such as shop drawings, manufacturer's literature, certificates of compliance, material samples, guarantees, test results, etc. that the Contractor shall submit for review and/or approval action during the life of the construction contract. See specifications Section 01 33 00 SUBMITTAL PROCEDURES for submittal and submittal register definitions and procedures.

16. DESIGNER OF RECORD

The Contractor shall identify and have a Designer of Record to develop submittal requirements during design and be responsible for each submittal identified in the Contractor Submittal Register. A Designer of Record may be responsible for more than one submittal. All areas of work shall be accounted for by a listed Designer of Record. Designer of Record shall approve all design submittals they are responsible for prior to submittal to the Government and review of construction submittals.

17. RENDERING AND PRINTS

17.1 Submit professionally prepared, 24" x 36" framed renderings for the facility showing the new addition including main entry and the existing building in a slightly elevated perspective view. Submit a draft rendering for approval of view angle and content prior to preparing final rendering. The size shall include double matting and frame. Frames shall be metal, 3/4- inch to 1-inch deep. Matting shall be a double mat that is neutral in color to complement the rendering. The Contractor shall consult with Smith AFB representative for frame and matting preference. Total number shall be in accordance with SUBMITTAL DISTRIBUTION LIST.

17.2 Submit 8" x 10" color photographic prints of rendering and electronic file copy (.pdf and .jpg formats), printed on photo quality material. Total number shall be in accordance with SUBMITTAL DISTRIBUTION LIST.

18. PROJECT KICK-OFF MEETING

A project kick-off meeting will be held at Smith AFB, FL that requires the Contractors, major subcontractors, and the design team Designers of Record to attend. The COR, Corps of Engineers, Base CE and Users will attend this meeting. The kick-off meeting will provide a forum for the Contractor and Government to discuss the requirements of the contract, project specific requirements and to discuss communication and contract protocols.

--End of Section--

Appendix E
Value Study Report Guide

TABLE OF CONTENTS

1. REPORT GUIDE OVERVIEW

1.1. PURPOSE OF GUIDE

The purpose of the Value Study Report Guide is to establish standards and specifications for the development, review, and distribution of draft and final value study reports and related content.

The guidance provided in this document is intended to be performance-based, with a few exceptions. The Certified Value Specialist® (CVS®) Team Leader responsible for preparing the value study report is afforded the latitude to develop reports in the manner he or she sees fit, but should follow the framework and include the key content identified in this guide to ensure that all value study reports share a similar level of consistency and completeness across U.S. Army Corps of Engineers (USACE).

1.2. CONTENT AND STRUCTURE

Much thought has been given to developing a standard value study report structure that aligns with the users' needs. USACE value study reports must support two basic functions:

- *Facilitate Decisions* - Value studies are performed with the intent to identify proposals that will improve the value of the project, program, or process that is under study. The recommendations that are the result of a value study must be sufficiently detailed and presented such that they enable stakeholders to make decisions related to implementing them. Therefore, the focus of the value study report should be to facilitate this decision-making process.

- *Certify Compliance* - It is of the express interest of USACE to ensure that value studies performed under its auspices are conducted consistent with both USACE and professional standards. Toward this end, the value study report must adequately document the Value Methodology (VM) activities performed during the workshop and provide evidence of the techniques used and analysis performed. This information will be leveraged to support USACE Value Program activities on future projects. Certification that the report complies with the USACE Value Standard formally indicates that it is permitted to be used for this purpose.

In support of these functions, the structure of USACE value study reports follows this logic. The body of the report, which includes the Executive Summary, value proposals, and recommendations, supports the first function, *Facilitate Decisions*. This will focus readers concerned with the results to the body of the report. The second function, *Certify Compliance*, is supported by the appendices, which contain the documentation that indicates the value study adhered to the VM process.

All templates referenced in this document are available for consultant use from the DVO.

2. VALUE STUDY REPORT CONTENT AND STRUCTURE

This section provides guidance on USACE value study report structure, content, and format.

2.1. COVER

This section specifies the cover page format requirements to ensure all information is presented consistently. If the report is used later for bridging or scanning, having all relevant project information stated on the cover simplifies those processes. Covers should include the following:

- Report Title — Draft vs. Final, etc.
- USACE Logo — This should be equal to or larger than the CVS® firm's logo
- Project Photo/Image — This should be a large portion of the cover
- Project Name and Location
- USACE District or Division
- Project P2#
- VE Activity # — This information can be obtained from VERS by the DVO
- Study Dates — The range of dates representing the study duration
- Report Date — This is the date the report is submitted to the DVO
- Name/Logo of CVS® firm

2.2. TABLE OF CONTENTS

The Table of Contents (TOC) orients the reader and facilitates review and navigation. Each major heading in the TOC should be appropriately hyperlinked or bookmarked. Page numbering shall start with the Value Study Results, and each appendix shall have its own numbering (A-1 for Appendix A, B-1 for Appendix B). At a minimum, the TOC should include the following:

- **Executive Summary**
  - Value Study Results
  - Value Study Background
- **Value Study Results and Proposals**
  - Table of Value Proposals
  - Recommended Value Proposals
  - Quality Review Comments
  - Individual Value Proposals

Value Study Report Part I

- **Appendices - Value Study Documentation**
  - Appendix A: Value Study Overview
  - Appendix B: Project Analysis
  - Appendix C: Function Analysis
  - Appendix D: Idea List and Idea Evaluation
  - Appendix E: Supplemental Information (if necessary)
  - Appendix F: Value Engineering Reporting System (VERS) Data
    Revise to Appendix E if there is no Supplemental Information
  - Certification Statement (always the final page of the report)

Part II

2.3. VALUE STUDY RESULTS AND PROPOSALS (PART I)

Part I of the value study report is focused on the information of direct benefit to those involved with the value study subject (i.e., the project team, key decision-makers, stakeholders, etc.). This first section of the report body includes the Executive Summary and the Value Study Proposals, and contains detailed information concerning the value proposals and design review comments.

2.3.1. Executive Summary

The Executive Summary provides an overview of the overall value study effort. It should be written as if it may be the only portion of the report decision-makers will read to determine if action is warranted relative to the recommendations developed by the value team. It must grab their attention and entice them to read through the more in-depth documentation in the remainder of the report.

The Executive Summary includes a Value Study Results summary (one page) and the Value Study Background (one to two pages maximum).

2.3.1.1. Value Study Results

The Value Study Results is a brief synopsis of the entire value study effort. A standard template shall be used to capture the relevant information. This one-page document has the dual purpose of serving as a summary of the results, and also, as a vehicle for marketing the broader benefits of the USACE Value Program. Therefore, there is a desire to maintain consistency of this document from one report to the next in terms of the information contained and overall appearance.

The Value Study Results template includes the following information:

- USACE Logo
- Project Name
- Project Location
- USACE District or Division
- Representative image/graphic that best conveys the study benefits
- Value Study Dates
- Value Study Timing (e.g., 90% DDR, 30% P&S, etc.)
- Original Project Cost
- Project P2#
- Proposed Initial Cost Avoidance
- Schedule Savings
- Value Study Return on Investment
- Qualitative Impacts
    - Reliability
    - Operations & Maintenance
    - Functionality

- Project Overview
- Value Study Benefits
- Key Recommendations

The information used to populate the Value Study Results summary in the Draft Value Study Report will be developed by the value team and will focus on their initial recommendations. For example, the initial cost avoidance and schedule savings should reflect the maximum potential sum of the quantitative value proposals that are recommended (as articulated in the Value Proposals section of the report). Information related to Reliability, Operations and Maintenance (O&M), and Functionality should reflect the value team's judgment relative to the aggregate, qualitative benefits of each value proposal. Options for evaluating the performance categories are limited to: Improved, Maintained, or Degraded. Return on Investment (ROI) should initially be calculated based on the total cost avoidance of the recommended mutually exclusive value proposals, minus the value study costs (provided by the DVO and defind in Section 2.4.6), and then divided by the value study costs.

The Value Study Results presented in the Final Value Study Report should be based on information obtained following the Preliminary Decision Meeting (i.e., accepted value proposals). It is recommended that the DVO consult with the project manager during the Value Workshop Evaluation process to review the value study benefits and their views on the qualitative performance impacts related to Reliability, O&M, and Functionality. The total cost avoidance and schedule savings should reflect the sum of the accepted mutually exclusive value proposals.

The term "Recommended Results" is used for the draft report. The term "Accepted Results" is used for the final report. *In addition to appearing in the report, the completed Value Study Results Microsoft Word template should be provided to the DVO as a stand-alone document.*

2.3.1.2. Value Study Background

This section of the report provides additional context to assist the reader in developing a deeper understanding of the conditions and environment in which the value study was performed. This section should be one to two pages maximum and address the following topics:

2.3.1.2.1. **Key Challenges and Issues** - Discuss the major challenges, risks, and issues facing the project.

2.3.1.2.2. **Constraints** - Elaborate on the key constraints that were placed on the project team and the Value Study effort.

2.3.1.2.3. **Value Study Objectives** - Based on the challenges, issues, and constraints that were identified above, what were the explicit objectives of the value study?

2.3.1.2.4. **Value Study Highlights** - What key information was uncovered during the value study that led to important value improvements identified in this report? How did the VM process lead the team to identify and develop these value improvements (i.e., use of Function Analysis, team creativity, risk analysis, etc.)?

2.3.2. Value Study Proposals

2.3.2.1. Section Overview

This section is a narrative overview of the content that follows, including a description of the types of recommendations developed by the value team. This is intended to serve as a focal point to support a common understanding and management of studies across USACE.

Value proposals may be considered quantitative or qualitative. For purposes of consistent reporting with other federal agencies, quantitative value proposals are only those that reduce the initial or first cost of the project, program, or process being studied. This is to support the specific requirements of upward reporting to the Office of Management and Budget (OMB). Instead of including all proposals that add or reduce cost, which would show a net benefit, the purpose is to demonstrate the maximum potential benefit offered to the customer.

Qualitative proposals are those that either add initial cost or do not have a cost impact. Generally speaking, a good mnemonic device for remembering the difference between qualitative and quantitative proposals is that qualitative proposals are those that add quality, and quantitative proposals are those that reduce upfront costs. Future life cycle costs (maintenance, replacement, etc.) do not factor into the determination of whether a proposal is quantitative or qualitative.

In certain instances, there may be ideas that the value team initially selected for development but ultimately were unable to develop during the value study due to lack of time. Do not identify these as qualitative proposals. As they have not been developed, do not seek a formal response from the project delivery team (PDT). Rather, identify those ideas separately as potentially offering value improvement and worth the PDT's consideration in addition to the value proposals that were fully developed.

Quality review comments represent another category of recommendations. Quality review comments are observations made during the value team's review and are not typically the result of Function Analysis or creative thinking. Common examples of quality review comments include errors, omissions, estimate corrections, schedule corrections, and document quality issues. Quality review comments do not require a formal response to accept or reject.

Note: This guide considers "design suggestions" an outdated term that should no longer be used. Going forward, the CVS® Team Leader should focus on categorizing proposals and recommendations into one of the categories described above.

2.3.2.2. Table of Value Proposals

This section is intended to provide a quick summary of the proposals that were developed as part of the value study. There shall be a single table that lists all proposals, both quantitative and qualitative. Recommended value proposals, as indicated in the "Recommended Value Proposals" section of this guide, shall be presented within the "Total" portion of the table.

The information contained within the table includes the following.

Draft Value Study Report - The draft report shall include strategies recommended by the value team.

- Proposal Number
- Proposal Title
- First Cost (increase/decrease)
- Life Cycle Cost (Gross) (increase/decrease)
- Preliminary Decision (include a space in the table but leave blank in the draft report)
    - Accept: any proposal that is accepted in part or in whole. The concept is "intent to integrate." It is possible that the proposal ultimately is not feasible and is not implemented in later design
    - Reject: any proposal that is 100% rejected.
- Preliminary Decision Rationale

Final Value Study Report - The final report shall incorporate the acceptance and rejection of the proposals as determined by the Preliminary Decision Document. Thus, the strategies and/or proposals within the strategies may change from the draft to the final report. The final report contains:

- All items listed in the Draft Report.
- Preliminary Decision - This section should now be completed and include a record of acceptance or rejection. If the proposal is accepted with conditions, is accepted with modification, or rejected, a brief justification shall be included explaining the decision. If the proposal was accepted outright, no justification is necessary.

2.3.2.3. Recommended Value Proposals

Following the development of the value proposals, the value team must next consider how they could be applied to the project in concert with one another. The value team may develop multiple potential groupings or strategies for consideration by the decision-makers. It is not essential to consider every possible permutation at this point, only those that seem to be the most logical and beneficial to the project objectives. Common value strategy themes include:

- **Recommended** - What is the value team's recommended list of value proposals? What would they pursue if it were their project? Typically, this grouping should reflect the combination of proposals that offer the "best value."

- **Greatest Cost Reduction** - A group of proposals that would have the greatest total reduction in project cost. This could either be first/initial cost or life cycle cost.

- **Highest Performance** - A group of proposals that would have the greatest level of qualitative benefit to the project (regardless of cost impact).

- **Shortest Schedule** - A group of proposals that would offer the greatest time savings.

- **Lowest Risk** - A group of proposals that would have the greatest impact on managing project risk.

Other themes could revolve around competing design approaches (for example, proposals that supported different building configurations). Often, a value team will identify multiple ways to solve a problem that are mutually exclusive. The proposals that support these separate approaches can be grouped into value strategies.

At a minimum, the value team should identify their "Recommended" set of value proposals, as this will be used to perform the various calculations needed for the Value Study Benefits Summary.

2.3.2.4. Quality Review Comments

This section should be a summary of any quality review comments that the value team has identified during the value study. These comments are typically only recommending corrections or identifying concerns relating to the quality of the project documents provided (cost estimate, drawings, specifications, schedule, etc.). The types of comments that would fall into this category could include, but are not limited to:

- Errors
- Omissions
- Schedule Corrections
- Estimate Corrections
- Document Quality Issues

2.3.2.5. Individual Proposals

This section provides guidance on the structure and content of individual value proposal write-ups. The primary focus of these write-ups is to provide enough detail for the reader to make an informed decision. Individual value proposal write-ups should include the following items:

2.3.2.5.1. **Proposal Title and Number** - The title is typically the reader's introduction to a developed proposal; it creates the reader's first impression of the proposal. Generally, the developed proposal title is written during brainstorming. While this initial title may be understood by the value team during the context of the workshop, it does not always translate well to the reader of the report.

A complete value proposal title should include the following three components: the new idea, the current or baseline plan, and the reason to change. For example, instead of using a title such as "Use gravel for roads," the title should be more specific: "Use gravel in lieu of paving for temporary roads during construction".

2.3.2.5.2. **BLUF Section** - Each value proposal write-up should begin with a Bottom Line Up Front (BLUF) statement that is eye-catching and clearly conveys the proposal's

merits. This section should have a similar format and appearance to the Value Study Results Summary.

- **Value Proposal Synopsis** - A brief (one- to two-sentence) statement summarizing the proposal's value proposition. It should address questions such as: Why is it a good idea?; What is the value team's perspective?; and Why is this proposal better than the baseline concept (risks, performance, safety, etc.)? This is the 15-second elevator sales pitch; it should be succinct and impactful. It is not intended to replace the fuller explanation in the discussion that follows.

- **Cost Avoidance** - Bottom-line number of estimated cost avoidance for this value proposal. This can also show cost increase if applicable*. Because this figure refers to cost avoidance, a positive number indicates a reduction in cost and a negative number indicates an increase in cost.*

- **Schedule Savings** - The time savings anticipated to result from the proposal.

- **Qualitative Benefits** - Identify the impact of the proposal on the following three areas (at a minimum):

    - Reliability - Impact on the robustness and service life of the value study subject.
    - Operations & Maintenance - Impact on future and long-term operations (i.e., energy, personnel, etc.) and maintenance (i.e., spare parts, routine maintenance, repairs, etc.) related to the value study subject.
    - Functionality - Impact on the performance and/or quality of the value study subject.

  Indicate the impact using one of three terms:

    - Improved - Performance will be improved from the baseline.
    - Maintained - Performance will not change relative to the baseline.
    - Degraded - Performance will be reduced from the baseline.

2.3.2.5.3. **Baseline Concept** - The intent of this section is to briefly describe the baseline concept that would be changed by the relevant value proposal.

2.3.2.5.4. **Value Proposal Description** - The intent of this section is to provide a brief summary of the value proposal relative to the baseline concept.

2.3.2.5.5. **Advantages and Disadvantages** - The intent of this section is to provide a quick look at the "why" for this specific value proposal. Why is this value proposal better

or worse than the baseline concept? These advantages and disadvantages should be presented as bulleted lists, to enable the reader to quickly and easily understand the potential benefits and drawbacks of the value proposal. The items listed here should be more specific than increased cost or decreased cost. Schedule, risk, maintenance, durability, life cycle impacts and other similar characteristics related to the project should be addressed. Remember, cost is generally associated with something specific (i.e., reduced labor, equipment, materials, unwanted secondary function, etc.), so it is best to identify the underlying cause of the reduction as the cost will be explicitly shown in the BLUF section.

2.3.2.5.6. **Discussion and Justification** - The intent of this section is to provide an in-depth analysis of the value proposal. This analysis dives deeper into how the value proposal can be implemented in the design, as well as providing detailed justification for why it is a better idea than the baseline concept design. Sufficient detail should be included to allow the reader to see this is a viable proposal that will improve the value of the project. The following items are examples of what should be included in this section when applicable:

- Technical Considerations
- Performance Impacts
- Cost Considerations
- Schedule Impacts
- Risk Considerations
- Project Management Considerations
- Stakeholder Acceptance
- Implementation Considerations

2.3.2.5.7. **Review Comments** - As part of the individual value proposal write-up, any review comments and feedback received during the mid-point review should be specifically called out here and addressed by the value team if applicable. By doing this, the value team demonstrates that they have heard and listened to comments and concerns of the project team and/or stakeholders and have addressed those comments and concerns to show that the value proposal is still viable.

2.3.2.5.8. **Sketches/Diagrams** - Sketches and diagrams of both the baseline design concept and the value proposal should be included, where applicable, to assist the reader in visualizing how the proposal differs from the baseline concept.

2.3.2.5.9. **Assumptions and Calculations** - Any assumptions made or supporting calculations that were developed to support the quantities used in the cost estimate(s), for both initial and life cycle cost (LCC) should be included.

2.3.2.5.10. **Cost Estimates** - Include as detailed a cost estimate as possible (avoid one-line, or lump-sum estimates) to support cost reporting (potential cost avoidance, cost savings or costs added) and modified acceptance easier to understand what was

accepted. The more detailed, precise quantities used, the more credible the costs reported. Provide the source of costs where applicable: RSMeans, vendor quotes, previous contracts, etc. LCC estimates should be included when relevant.

2.4. APPENDICES – VALUE STUDY DOCUMENTATION (PART II)

The information in this section of the report provides all remaining supporting documentation relevant to the project and value study effort. This information is required for the following reasons:

- Provides documentation of the VM tools and techniques applied during the value study. This information will be used during the Post Workshop Evaluation Process and to ensure compliance with the USACE Value Standard.
- Supports the CVS® application process for USACE personnel. The information in this section of the report may be included in the CVS® application process.

2.4.1. Appendix A: Value Study Overview

2.4.1.1. Introduction

The purpose of the overview is to establish the context of the value study effort. This is an opportunity to capture what happened during the workshop and how it influenced the direction and results of the team's effort.

2.4.1.2. Project Description

2.4.1.2.1. List of Documents Reviewed

Include a list of the documents that were reviewed and used by the value team to develop their understanding of the project, product, or process and establish study goals, objectives, and constraints. Be sure to note versions or publication dates of any documents provided for review.

This section of the report should include a note instructing the reader to contact the PM to obtain full copies of the documents listed. This will make it clear that the PM should be the main POC for obtaining these documents as needed.

2.4.1.2.2. In-Brief

Provide a synopsis of the in-brief presentation. Identify any highlights or key discussions (do not include PowerPoint slides).

2.4.1.2.3. Site Visit

State whether a site visit was performed for the value study. If a “virtual” site visit was performed, indicate how it was conducted. If a site visit was performed, identify key observations and highlight any takeaways that contributed to the value team’s understanding of the project.

2.4.1.2.4. Mid-Point Review

Include a paragraph describing what type of presentation was made and what key issues/points were identified or emphasized to the value team. Identify participants and include any specific comments that may have influenced the rest of the workshop or the recommendations/proposals developed by the team.

2.4.1.2.5. Presentation

Identify what type of presentation was made, summarize key issues or points of clarification that were presented, and participants from all organizations represented. If any comments or questions were received that influenced the value team’s recommendations, those should be captured in the report (do not include PowerPoint slides).

2.4.1.3. VM Process

This section provides a narrative description of the activities performed relative to VM Job Plan and later appendices. This section should summarize the work completed in each phase in support of the VM Job Plan and how it contributed to the overall process and outcome of the value study. For example, demonstrate how the identification of functions led to better ideas in the Creativity Phase. The following list identifies the type of information to include for each phase of the VM Job Plan.

1. **Preparation Phase:** Include a summary of the pre-workshop effort completed prior to the actual workshop.

2. **Information Phase:** Identify key information acquired during this phase and how this affected subsequent phases.

3. **Function Analysis Phase:** Identify technique(s) used to generate functions and resulting Function Analysis.

4. **Creativity Phase:** Identify ideas that were generated by the team and their disposition (i.e., developed, combined with other ideas, dismissed). The team is encouraged to generate and sort ideas based on functions.

5. **Evaluation Phase:** Identify how the team narrowed down the ideas from the previous step. Describe the technique used and resulting rationale that led to the team’s decision.

6. **Development Phase:** Details of this phase will be demonstrated in the proposals that are developed and presented in Part I of the report.

7. **Presentation Phase:** Identify the communication technique used for the study and any special considerations that led to the team's delivery.

8. **Preliminary Decision:** Include summary information of the preliminary decision meeting with the Project Delivery Team to establish disposition of the value proposals. Minimum information should include participants, meeting date, significant concerns that were identified, and accept/reject status.

2.4.1.4. Participants

Note who participated in the value study workshop, the organizations represented, participants' role in the value study, and their level of participation (full-time, in-brief, mid-point review, out-brief). This section should also identify support roles and co-facilitators. There should be only one participant list, and it should identify the dates on which the value team members met.

2.4.1.5. Agenda

The report should include a detailed, actualized agenda for the value study. This is important in evaluating time allocated to phases of the VM process as well as the workshop as a whole.

2.4.2. Appendix B: Project Analysis

This section of the report is intended to capture value study activities that were performed relative to cost, performance, schedule, and risk in relation to the VM Job Plan. This section should include the following types of information, include a brief paragraph that describes the action(s) taken, and include applicable content:

- Cost models used in the preparation of the value study (i.e., Pareto Chart).
- Flowcharts developed in support of the value study.
- Performance or quality assessments or evaluations.
- Schedule Analysis - Any such analysis that was performed as part of the value study, techniques, and a statement of findings, or recommendations should be included.
- If a formal cost estimate review validation was performed as part of the value study, techniques, and a statement of findings, or recommendations should be included.
- If risk analysis was performed as part of the value study, summarize the techniques used, and provide a statement of findings or recommendations. Include a risk register or other documents developed, if applicable.

Include any additional Information Phase-type analysis as necessary.

2.4.3. Appendix C: Function Analysis

Function Analysis is the heart of Value Methodology. As such, this portion of the study and the report is a focal point representing the industry. The CVS® Paper topic required for the CVS® application instructs the author to discuss Function Analysis and how it led the team to the outcomes of the study. Appendix C should follow the same approach: what type of Function Analysis was used and why was that particular method chosen; how were the functions prioritized for use in the Creativity Phase, and; how did the functions broaden the team's creativity? At a minimum, Random Function Identification shall be performed. Several examples of different types of Function Analysis that may be included in this section are listed below.

- Random Function Identification
- Function-Resource Matrix
- Function Analysis System Technique (FAST) Diagram
- Function Cost/Worth
- Function Hierarchy

2.4.4. Appendix D: Idea List and Idea Evaluation

This section of the report is intended to capture value study activities that were performed relative to the Creativity and Evaluation Phases of the VM Job Plan. This section should include the following types of information:

- The total number of ideas generated and the total number of ideas that were developed.
- List of ideas organized by function.
- Evaluation techniques used (e.g., nominal group technique, numerical ratings, evaluation matrices) and their results. Describe what method(s) was used and include relevant evaluation comments and discussions.
- Any other types of Creativity or Evaluation Phase activities that demonstrate the tools and techniques used in the value study

This information may be used as a supplementary resource to the value study report recipients as a source of additional ideas and related evaluation rationale.

2.4.5. Appendix E: Supplemental Information

If additional technical information is developed during the value study effort and deemed of use to the report recipients, it should be placed in Appendix E. It is recommended that a reference to this additional material is made in the appropriate sections of the report so that readers can easily find and navigate to this information. Examples may include: references, analysis, cut sheets, specifications, presentations, etc.

2.4.6. Appendix F: Value Engineering Reporting System (VERS) Data

VERS Data should be the last appendix of the report. If Appendix E: Supplemental Information is not required, then this appendix can be moved up to Appendix E. This section of the report is intended to be rigid in nature to support USACE reporting requirements. It is critical for consistent reporting that a common understanding of the terms used within VERS is established.

The CVS® Team Leader is responsible for including this information in the draft value study report. This information should be updated (as necessary) following the preliminary determination step of the post-workshop phase. The DVO is responsible for ensuring the necessary VERS information is included in the report and may be required to provide or supplement specific components of this data (e.g., VE Activity Cost).

A version of the following table shall be completed to capture the information needed from the value study to input into VERS. This table can be partially completed at the time of the draft value study report and then updated to reflect the Preliminary Decision in the final value study report. The DVO should verify the information in this table before transferring it to VERS.

Appendix F: VERS Data

VERS Data Fields	Data	Report Version
Number of Proposals Developed	#	Draft
Number of Accepted Proposals	#	Final
Number of Quantitative Proposals	#	Draft
Number of Accepted Quantitative Proposals	#	Final
Number of Qualitative Proposals	#	Draft
Number of Accepted Qualitative Proposals	#	Final
Potential/Projected Cost Avoidance (Gross)	$	Draft
Accepted Cost Avoidance	$	Final
Maximum Life Cycle Cost (Gross)	$	Draft
Accepted Life Cycle Cost	$	Final
VE Activity Cost (DVO to provide)	$	Draft
Return on Investment	Ratio (ex: 2:1)	Final

VERS Data Field Definitions

Number of Proposals Developed: Total number of all Quantitative Proposals and Qualitative Proposals developed in the value study report

Number of Accepted Proposals: Total number of all Quantitative Proposals and Qualitative Proposals accepted for implementation

Number of Quantitative Proposals: The total number of proposals that generate a reduction in First Cost (not Life Cycle Cost).

Number of Accepted Quantitative Proposals: The total number of quantitative proposals accepted for implementation.

Number of Qualitative Proposals: Total number of proposals that generate an increase in First Cost (not Life Cycle Cost) or ideas that do not have a cost generated. This does not include Quality Review Comments.

Number of Accepted Qualitative Proposals: The total number of Qualitative Proposals accepted for implementation.

Potential/Projected Cost Avoidance (Gross): Maximum first cost avoidance considering a combination of mutually non-exclusive proposals (i.e., only count the impacts of one mutually exclusive proposal).

Accepted Cost Avoidance: Total first cost avoidance amount of accepted Quantitative Proposals.

Maximum Life Cycle Cost (Gross): Maximum Life Cycle Cost possible considering a combination of mutually non-exclusive proposals (i.e., only count one mutually exclusive proposal in the total combination). Life Cycle Costs are inclusive of first cost avoidance, thus if there is a Cost Avoidance of $1M and a Life Cycle Cost of $0, the Life Cycle Cost reported will be $1M.

Accepted Life Cycle Cost: Total Life Cycle Cost amount of accepted Quantitative Proposals.

VE Activity Cost: Sum of Task Order Award amount, PDT VE Cost, Contracting Cost, and DVO Cost. PDT VE Cost is only those costs for personnel who participate full time in a VE activity. Participation for briefing meetings, review, re-design, etc. are not to be captured/reported as part of the VE Activity Cost.

Return on Investment (ROI): (Implemented Cost Avoidance – VE Activity Cost) ÷ VE Activity Cost. The ROI should be displayed as a ratio (e.g., 4:1, 25:1, 150:1, etc.).

2.4.7. Certification Statement

The intent of the certification statement is to validate compliance with the USACE Value Standard and SAVE International® requirements. An additional function of the certification statement, when being applied to a programmatic study, is to indicate if the Study/Report has been permitted for future use in a Scan or Bridge strategy. If the report does not contain the appropriate signatures, it is not allowed to be used in the future. Example certification statements are provided below. Please note that statement C is only required when a Programmatic Study is conducted.

A. The undersigned Certified Value Specialist (CVS®) facilitator (along with any participating co-facilitators) attests that the Value Study documented by this report meets the USACE Value Standard and that the Value Study was facilitated in accordance with the SAVE International® Standards of Conduct.

[Facilitator Signature]	***[Co-Facilitator Signature]***
CVS® No. [###]	***VMA/CVS® No. [###]***
Facilitator	***Co-Facilitator***

B. As the District Value Officer, I attest that the Value Study documented by this report was executed in accordance with the USACE Value Standard. I have validated the Value Study using the Standard Evaluation Tool; uploaded it to VERS; and shared it with the Certified Value Specialist® (CVS®) facilitator.

[DVO Signature]
VQR No. [###]
District Value Officer

C. The Programmatic Study documented by this Value Study Report has been validated by the undersigned member of the Office of Value Expertise (Ovx) as meeting the USACE Value Standard and is authorized for application through bridging.

[Ovx Member Signature]
VQR No. [###]
Office of Value Expertise

Signed Certification Statements should be included as the last page in every Final Value Study Report.

3. REPORT DEVELOPMENT AND DISTRIBUTION

3.1. ROLES AND RESPONSIBILITIES

Roles and responsibilities are similar across Districts, with minor differences to fit local organizational structures and processes. In general, report development and distribution falls between the CVS® Team Leader, District Value Officer, and Project Manager. Report distribution responsibilities should be determined on a case-by-case basis and be clearly communicated to all involved parties.

Involvement in each value study will be different, based on complexity and interest in the project. In some cases, internal or external stakeholders will participate. Below are a few examples to consider:

3.1.1. Internal Stakeholders:

- Operations
- Environmental
- Historical Preservation
- Planning
- Real Estate
- Contracting

3.1.2. External Stakeholders:

- Sponsor
- Customer
- User

The table below provides general guidance on who should read what section of the value study report. This information may be communicated as the DVO sees fit.

Report Section	CVS	DVO	PM	Technical Team	Internal Stakeholders	External Stakeholders
Executive Summary	P	R	R	R	R	R
Value Study Results & Proposals	P	R	S	R	S	S
Value Study Documentation (Appendices)	P	R	O	O	O	O

P = Prepare R = Read thoroughly S = Skim O = Optional

3.2. QA/QC PROCESS

The Quality Assurance/Quality Control (QA/QC) process is vital to ensuring data within the report is accurate and consistent. It also plays a role in legitimizing the Value Program. If data is found to be inaccurate and did not go through a QA/QC process, it could lead to a negative impression of the USACE Value Program.

In an effort to expedite the review of the value study report, the following table provides guidance on the sections for which individuals should provide quality review feedback. Please note that this table can be expanded to match the complexity of the project.

Report Section	CVS	DVO	PM	Technical Team	Internal Stakeholders	External Stakeholders
Cover	QC	QA	QA			
Executive Summary	QC	QA	QA	QA	QA	QA
Value Study Results & Proposals	QC	QA	QA	QA	QA	QA
Value Study Documentation (Appendices)	QC	QA				

3.3. REPORT DEVELOPMENT CONSIDERATIONS

- Tell the story of the value study effort and the results.
- Be concise.
- Focus on value beyond cost avoidance when possible.
- Do not include the CVS® firm's logo beyond the cover page.
- Do not include the "History of the Value Methodology" in the report.
- Do not include the in-brief, mid-point, or out-brief presentation slides in the report.
- Do not include copies of other supporting project documents – just include references.
- Avoid adding "duplicate" information (i.e., redundant tables, figures, etc.).
- Avoid "boilerplate" information – the intent is to capture the unique nature of the value study effort, and the gratuitous use of superfluous language should be avoided.

4. REPORT FORMATTING

Decision-makers and stakeholders are more likely to trust the content in the value study report if it is presented in a clear, concise, and consistent format.

The format of the value study report should do the following:

- Promote readability
- Provide a clear and consistent framework for the report
- Enable the reader to navigate the report and locate specific information quickly

4.1. FONT AND STYLE

Use commonly available fonts that are easy to read on a screen as well as on the printed page (e.g., Arial, Calibri).

Body text should be large enough to be read easily (e.g., 11- or 12-point type).

Use bold and italics sparingly to call the reader's attention to items in the text.

Use headers and footers to direct the reader and identify the section of the report.

Use a distinct style for each heading (Level 1, 2, 3, etc.), and use headings consistently throughout the report. Ensure the most prominent headings appear in the TOC. (See Table of Contents for more information.)

4.2. DOCUMENT FUNCTIONALITY

4.2.1. Page Numbering

The report should include page numbering as described in the Table of Contents section. Report pagination should be accurate and consistent from one section to the next, clearly marked in the header or footer. All page numbers within the body of the report should align correctly with the page numbers listed in the TOC.

4.2.2. Bookmarks and Hyperlinks

The PDF report should contain Bookmarks aligned to each major section of the report, as shown in the TOC. The PDF should contain hyperlinks connecting each major section in the TOC with its location in the document. This is completed in the final stages of deliverable preparation:

In the PDF TOC, highlight first section, right-click > Create Link > Invisible Rectangle and 'Go to a page view' > Next > Use bookmarks to jump or scroll to desired page > Set Link

4.2.3. PDF View settings

Updating the initial view enhances the usability and the reader's first impression of the report.

PDF > File > Properties > Initial View:

- Navigation Tab: Bookmarks panel and Page
- Page Layout: Single Page
- Magnification: Fit Page

With these document property settings, the bookmark panel opens automatically for easier navigation, the page zoom is set to fill the window, and each scroll of the mouse moves the report to the next page (vs. a slow scroll).

5. CHECKLISTS

Example Value Study Report Checklist

Report Section	Checklist
Cover	
Executive Summary	
Value Study Results and Background	
Value Proposals Section Overview	
Table of Value Proposals	
Recommended Value Proposals	
Quality Review Comments	
Individual Proposals	
Value Study Overview – Introduction	
Value Study Overview – Project Description	
Value Study Overview – VM Process	
Value Study Overview – Participants	
Value Study Overview – Agenda	
Project Analysis	
Function Analysis	
Idea List and Idea Evaluation	
VERS Data	
Certification Statement	

6. APPENDIX: VALUE STUDY EVALUATION TOOL

The performance of value studies must be measured and tracked to effectively manage the USACE Value Program. To support this objective, the USACE Value Engineering Evaluation Tool is used to assess every value study. The purpose of this evaluation is to provide feedback to those parties involved in the planning and execution of a value study.

The objective is to better identify those aspects of the workshop that may be affecting the desired outcomes from these workshops so adjustments can be made where necessary to improve these outcomes. This tool is used to grade not only the CVS® Team Leader and value team's performance, but also the overall management, planning, study outcomes, and lessons learned from the workshop. The Evaluation Tool shall be completed prior to issuing of the final Value Study report. It will be completed as a separate, stand-alone document.

6.1. The Evaluation Tool should be filled out in a collaborative meeting setting to ensure a fair and accurate assessment of all aspects of the value study. This meeting should be attended by the DVO, CVS® Team Leader, and key representatives of the PDT, at a minimum.

6.2. The DVO is responsible for coordination of the Evaluation Tool completion meeting including communicating objectives, scheduling the meeting, and identifying the roles of participants involved. The DVO is ultimately the responsible party for entering the data into the tool and ensuring all components are addressed appropriately. The completed Evaluation Tool should be shared with all participants of the meeting and the CVS® Team Leader, as well as appropriate upward reporting chains.

6.3. Several inputs into the tool can be inserted prior to the Evaluation Tool meeting, but it is important for all participants to have the opportunity to offer feedback and assessment of the workshop. This should not be filled out by the DVO in a vacuum.

6.4. There are specific questions within the tool that require input from the CVS® Team Leader or the PDT, so collaboration is key to successfully completing this step. Everyone in this meeting is encouraged to offer lessons learned and identify ways to improve future value studies.

6.5. Please contact the DVO to obtain the latest version of the Evaluation Tool.